

Township of Mapleton

Mapleton Water and Wastewater Servicing Master Plan

Master Plan

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T000974D

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Master Plan

Mapleton Water and Wastewater Servicing Master Plan

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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 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 watermain 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

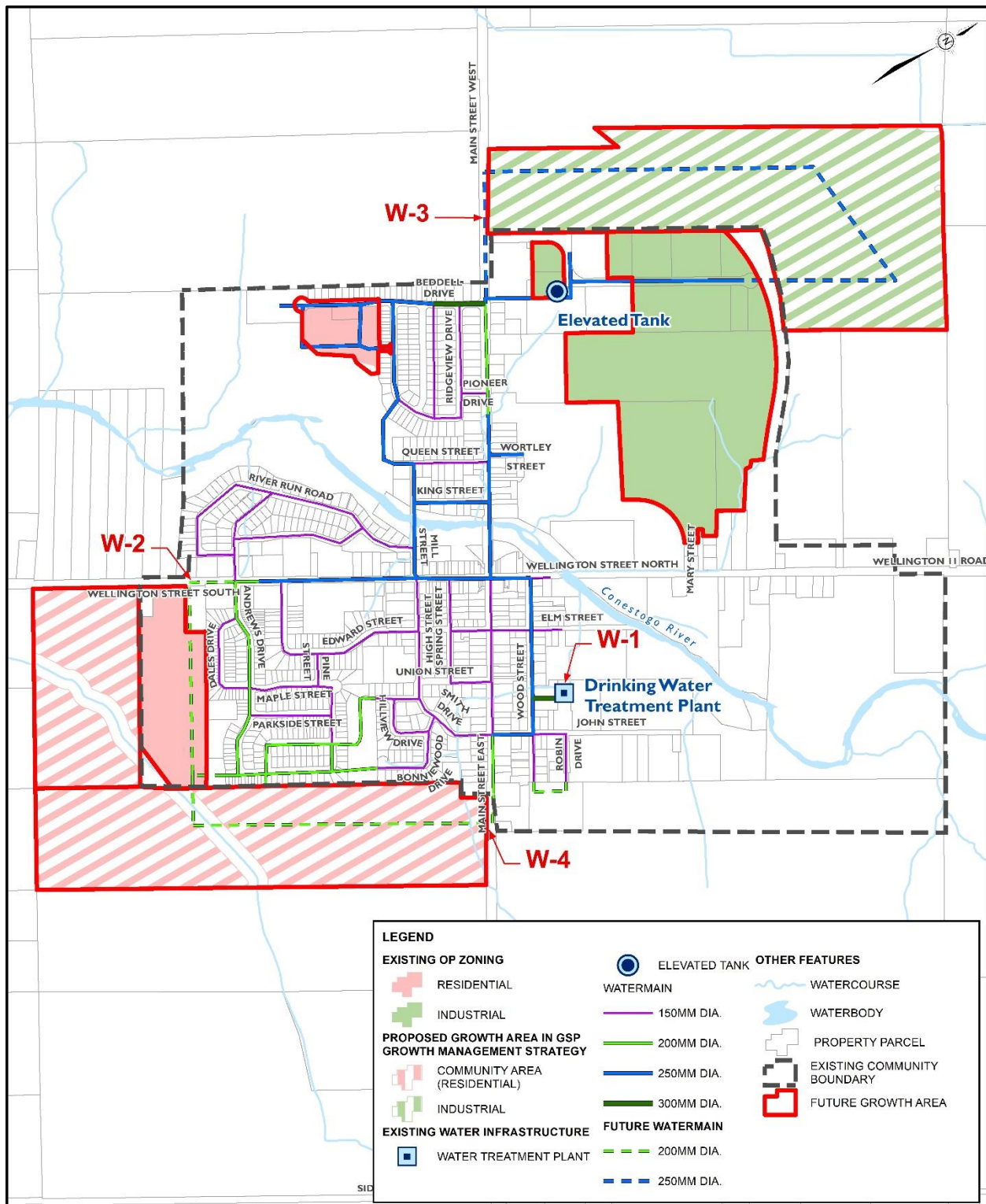


Figure ES- 1: Preferred Water Servicing Strategy in Drayton

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 m³/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 WPCP to increase the rated capacity of the facility to 1,300 m³/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 m³/d to 1,300 m³/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 m³/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. The Township of Mapleton has prepared this Master Plan based generally on Approach 2, which involves preparing a Master Plan document after 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. Given the Schedule C projects are more complex by their nature and often require detailed studies, investigations and analyses, these projects will require the preparation of a formal Environmental Study Report (ESR).

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

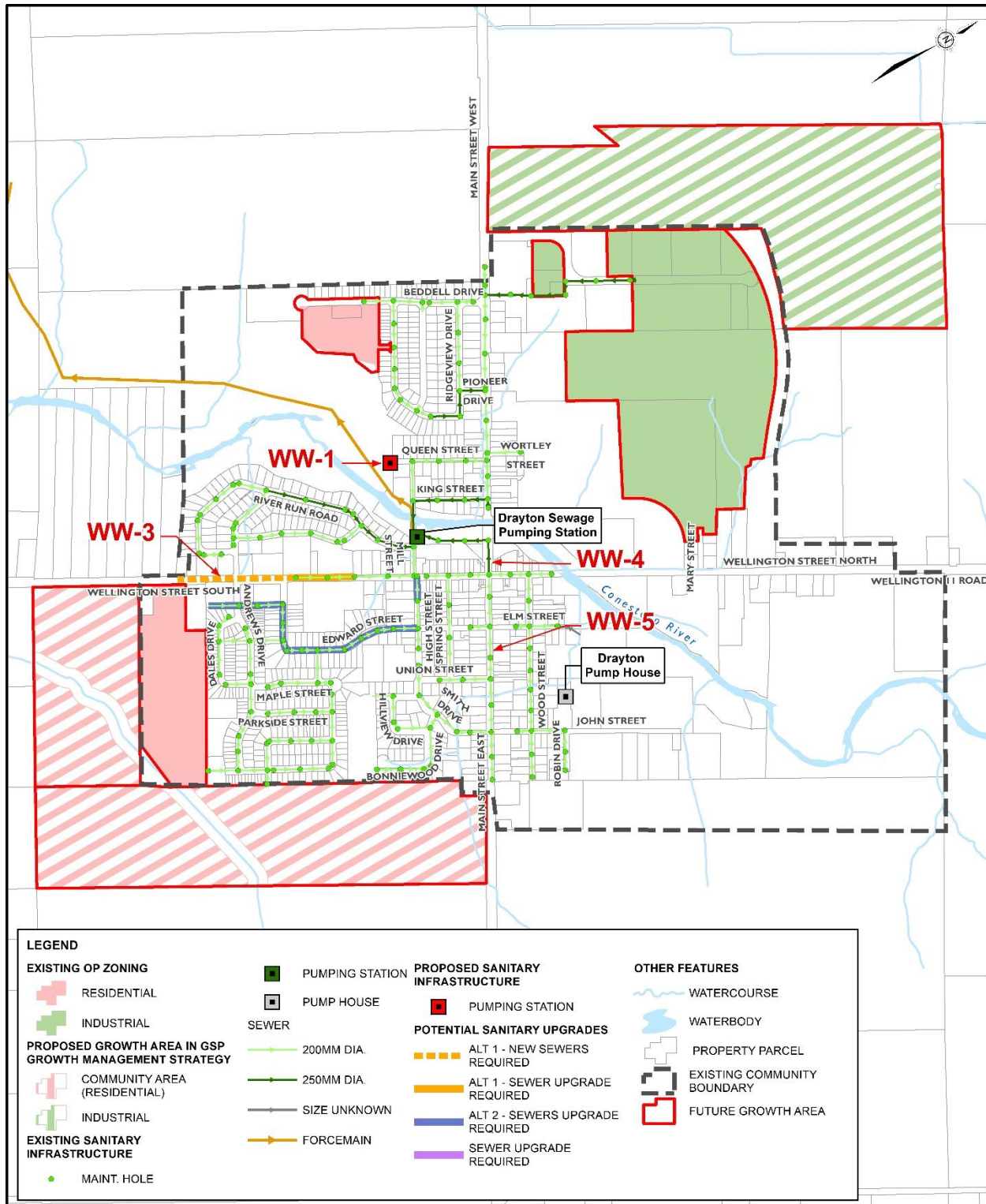


Figure ES- 2: Preferred Wastewater Servicing Strategy in Drayton

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

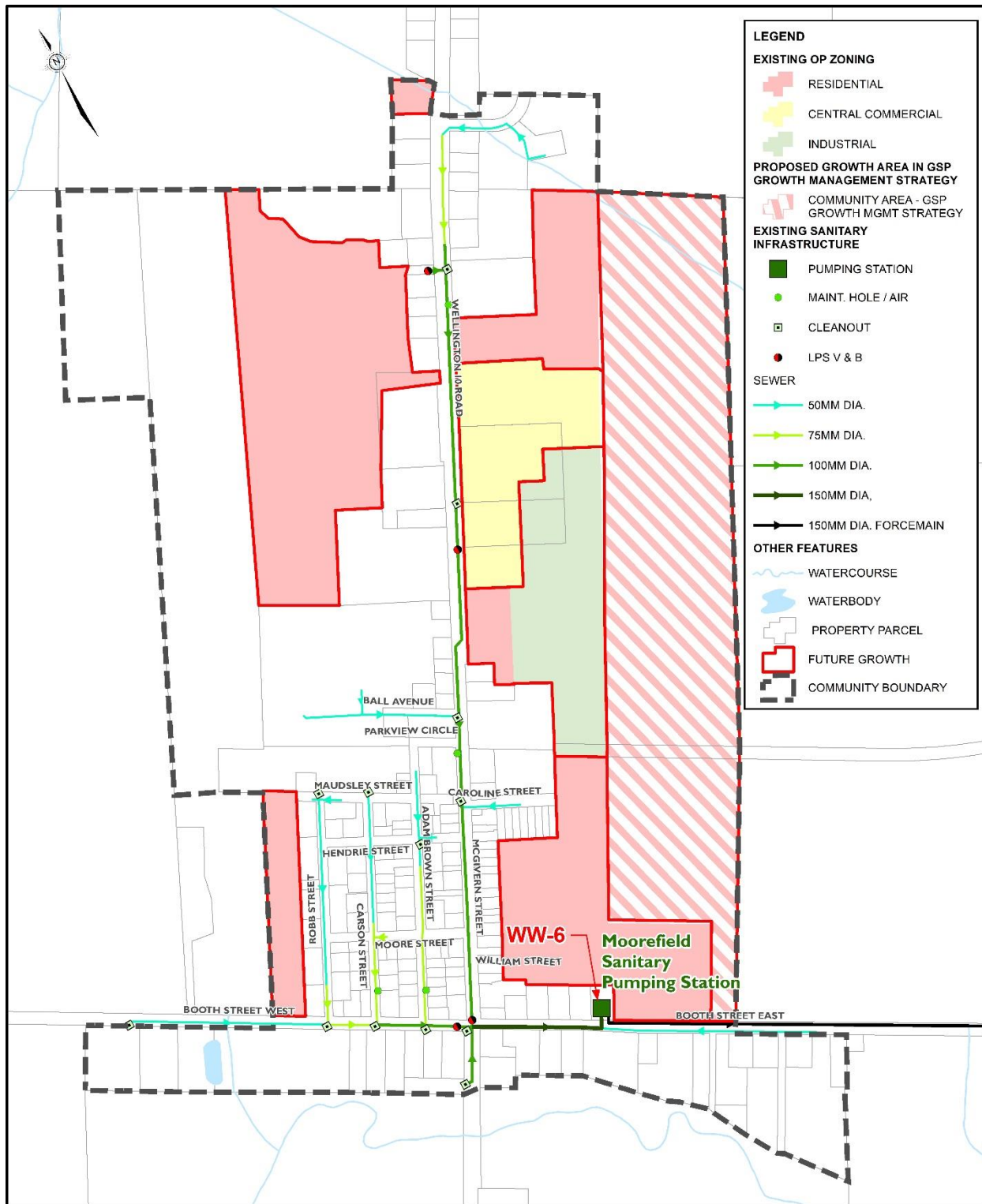


Figure ES- 3: Preferred Wastewater Servicing Strategy in Moorefield

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.

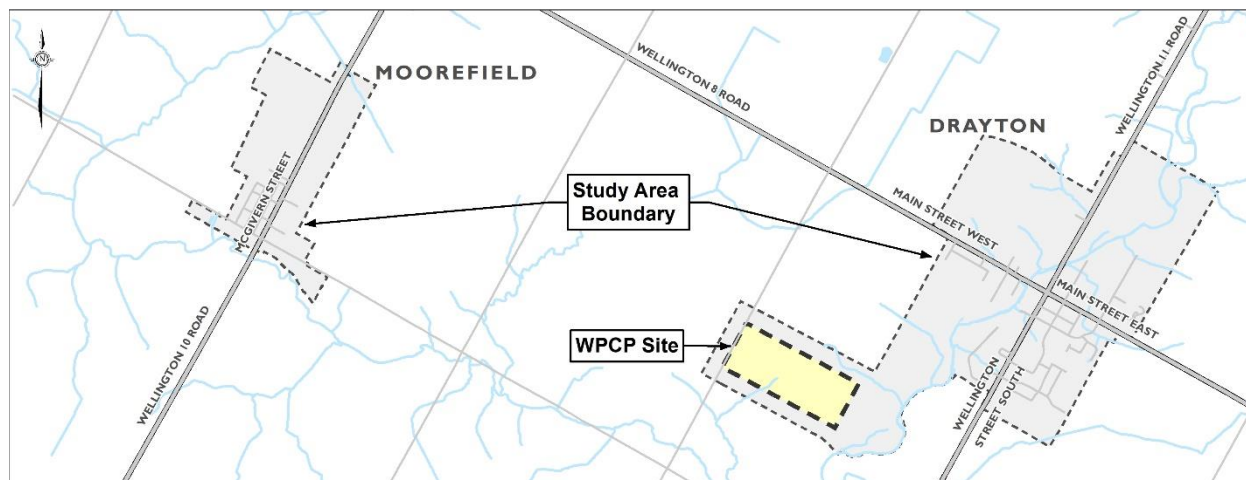


Figure 1-1: Study Area

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 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 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.

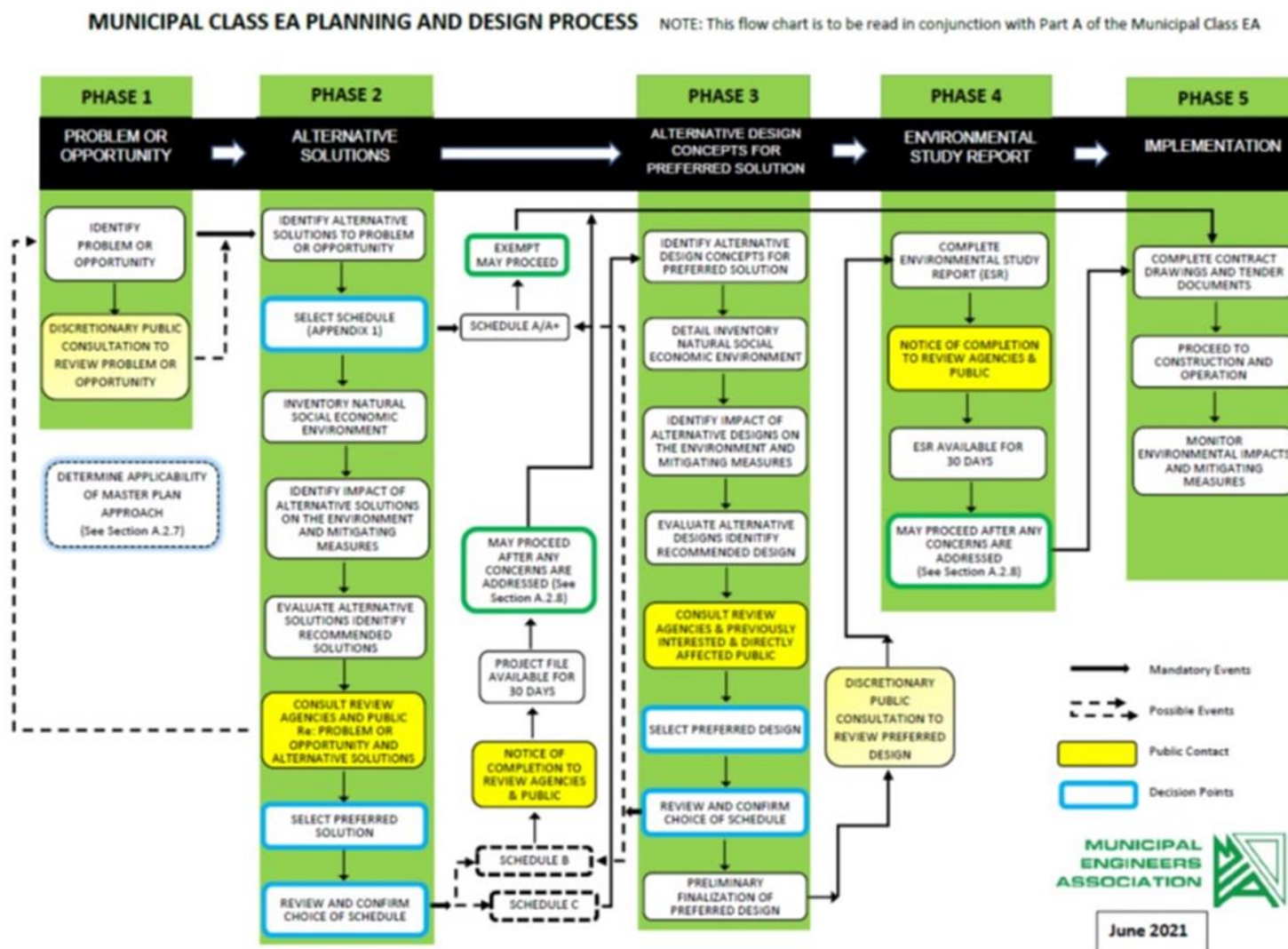


Figure 2-1: Municipal Class EA Planning and Design Process

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

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 study. The complete list of all public stakeholders contacted and correspondence with these agencies is included in Appendix C of this report. Members of the public that were in receiving updates were added to the contact list.

Members of the public were encouraged to review the PIC material and provide feedback/comments, enabling project team members to explain the main activities and findings up to this point.

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.

A summary of the main concerns expressed through the submission of comment sheets and inquiry emails are summarized below in Table 2-1.

Table 2-1: Summary of Public Concerns

Concerns	Project Team Response
Wastewater characteristics should be shown on PIC boards	The project team had determined that this was not a key piece of information to have within the PIC slides but ensured that these wastewater characteristics would be clearly outlined within Master Plan TM1.
Natural wastewater treatment methods should be considered	During the development of wastewater treatment alternatives, a focus was placed on biological wastewater treatment processes, which takes advantage of natural treatment processes already found in the environment. Ultimately, the preferred alternative would need to be a process that the MECF is familiar with and has full-scale facilities in operation.
Sustainable Water and Wastewater Management Strategies	Sustainability was a key factor of the developed water and wastewater management strategies and was included in the evaluation of alternatives by assessing the environmental impact of each option.
Timelines of upgrades to WPCP	Upgrades to the WPCP are currently planned to enter the design phase in 2024.

Concerns	Project Team Response
Should provide how many residential units are already committed/available as opposed to daily flow numbers	Growth projections for the Master Plan PIC were based on available data and at this time specific development plans were not available at the time.
Development in Drayton currently lacks capacity	A priority of future upgrades to the WPCP outlined in the Master Plan and PIC are to add capacity to the wastewater treatment plant and to construct a new sewage pump station to enable development.
Suggested a pump study be conducted to see how much flow the forcemain can handle.	Investigation of forcemain capacity will be conducted in the future.
Who will be responsible for the upgrade to the station/forcemain?	The person or group responsible for the future upgrades to the forcemain will be decided in the future by the Township.
Is the footprint of the pump station (land) large enough to accommodate future upgrades?	Yes, the existing footprint is large enough.
Gravity Sewers for Moorefield	Unfortunately, upgrading from grinder pump systems to gravity sewers would require the complete redesign of the Town's sewer network, which is currently prohibited by cost restraints.
Fire Protection for Moorefield	Unfortunately, upgrading to have fire protection in Moorefield would require the complete redesign of the Town's sewer network, which is currently prohibited by cost restraints.
Missing a constraints/opportunities slide for Moorefield	This slide was missing in the PIC slide deck, but a key constraint for Moorefield includes the cost for the ongoing maintenance for the individual grinder pump stations.

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

Evaluation Category	Criteria	Weighting
Socio-Cultural	<p>Healthy and Safety – Minimize potential impact of health and safety of operation staff and potential risks to public.</p> <p>Nuisance (short-term) Impacts – Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)</p> <p>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.</p> <p>Impacts on Businesses - Minimizes short-term and long-term impacts to business sector.</p> <p>Protects Cultural Heritage Features - Minimizes impact to built heritage resources and cultural heritage landscapes.</p> <p>Protects Archaeological Features - Minimizes impact to areas of archaeological potential sites.</p>	20%
Technical / Operational	<p>Existing and Future Demands - Able to meet existing and future demands and aligns with existing and planned infrastructure.</p> <p>Reliability and Security - Provides reliability, security, and robustness.</p> <p>Constructability – Ease of construction and integration with existing system(s)</p> <p>Operational Complexity – Improve operational efficiencies and operational and monitoring requirements.</p> <p>Existing and Planned Infrastructure - Aligns with existing and planned infrastructure.</p> <p>Existing and Planned Land Use - Aligns with existing and planned land use.</p> <p>Permits and Approvals - Ease of permits and approvals</p>	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.
1		Potential impacts are significant, and implementation of substantial mitigation measures are required to reduce

Performance Score	Score Representation	Description
		the risks; however, risk cannot be completely 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.

4.5 Impact Assessment and Mitigation Measures for Cultural Heritage Resources

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the Ontario Heritage Act. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out an archaeological assessment, in compliance with Section 48(1) of the Ontario Heritage Act.

The Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33 requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with Ontario Regulation 30/11 the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act.

4.6 Provincial Policy Statement

The province provides guidance for the identification of areas to be protected from urban uses/growth through the Provincial Policy Statement (PPS, 2020). With the PPS guidelines in mind and a review of updated Planning Documents for the Township has not identified any new or expanded Natural Environmental constraint areas.

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 m³/d.

The WTP consists of one drinking water treatment facility with iron sequestration and disinfection, 405 m³ 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 m³/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 m³ 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 m³) and at the Drayton Elevated Tank (2,400 m³). The total available drinking water storage in Drayton is 2,805 m³.

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 m³. With completion of the current upgrade Project, the available storage at the Moorefield WTP will be increased to 787 m³. 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.

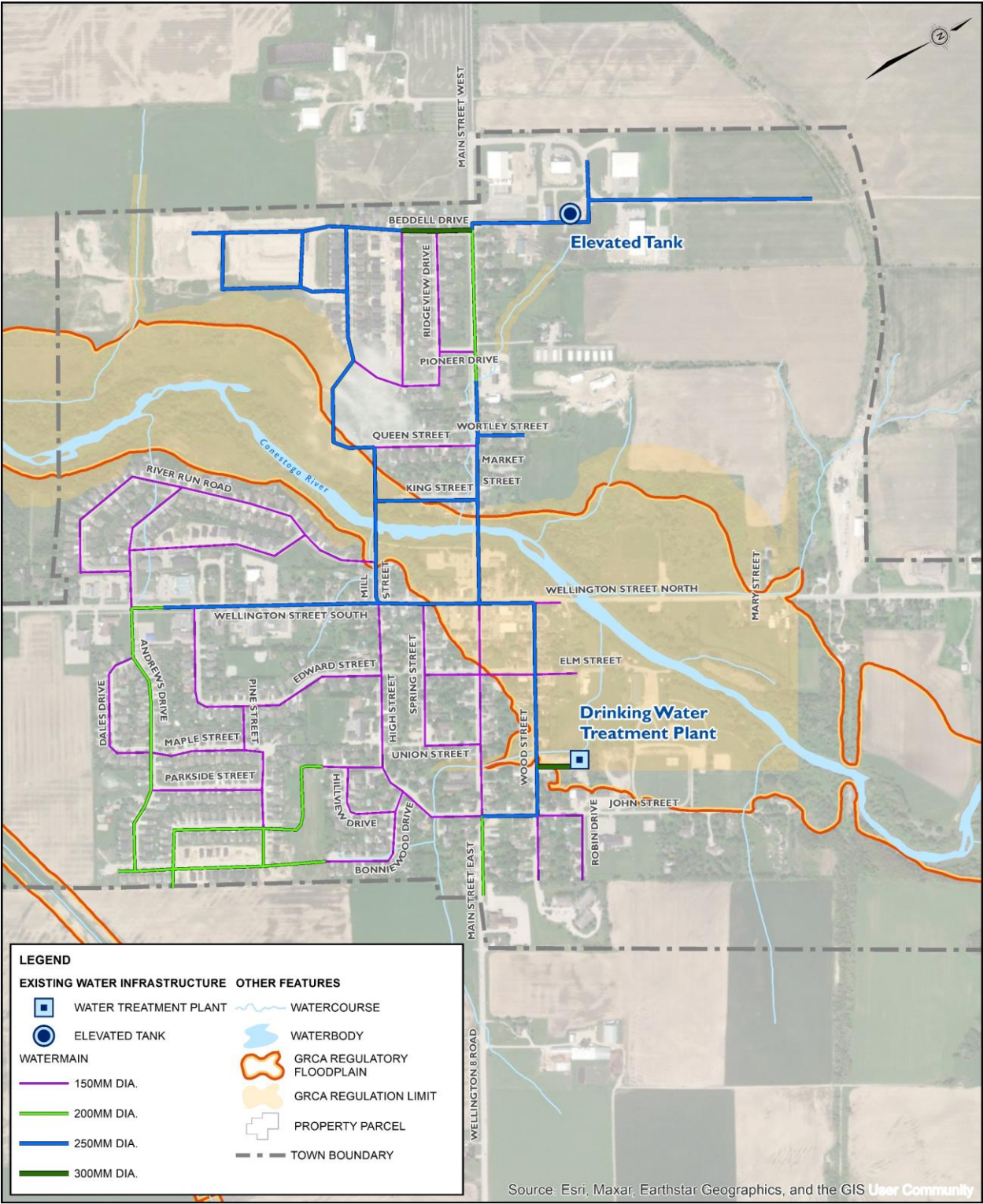


Figure 5-1: Drayton Drinking Water System

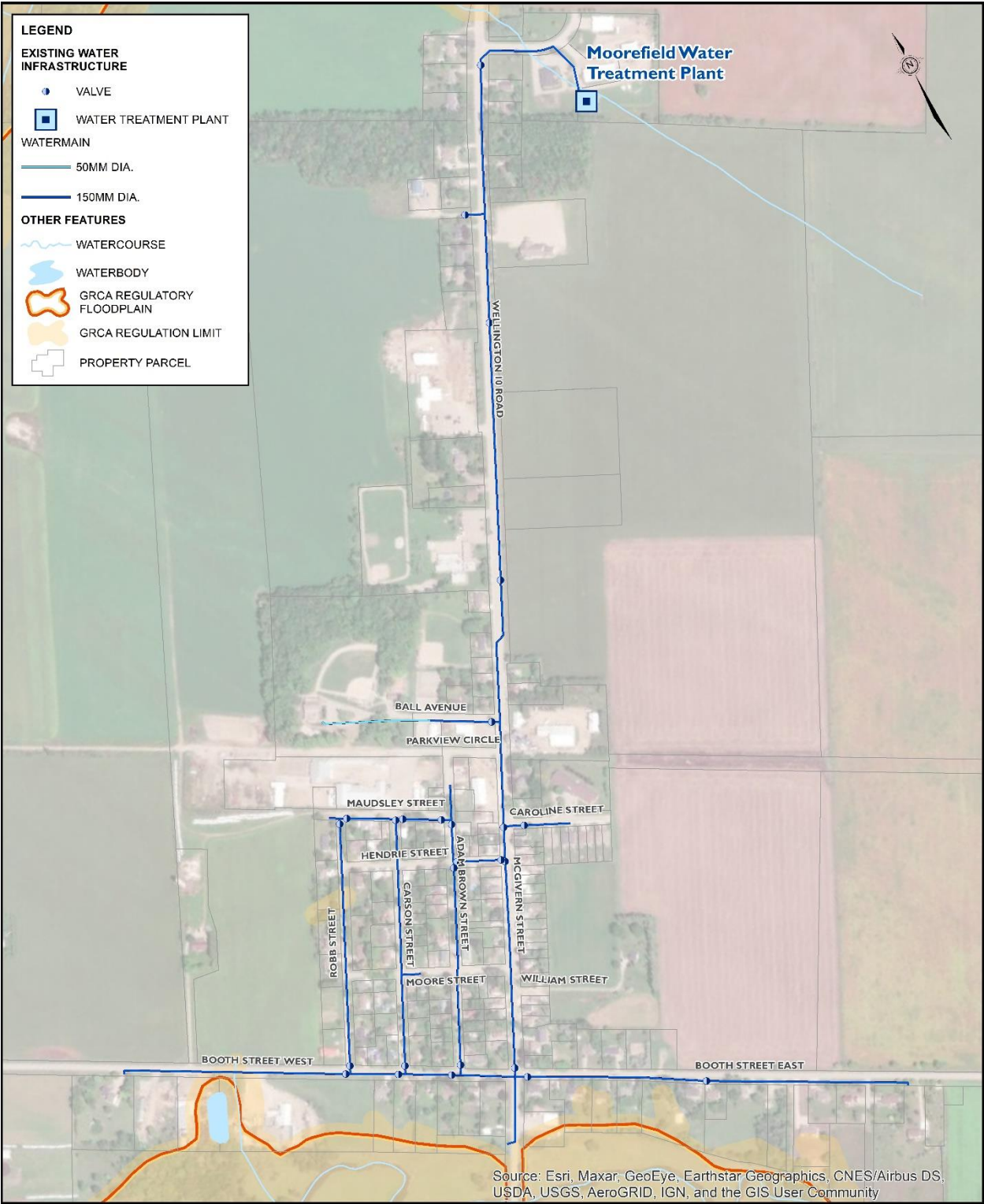


Figure 5-2: Moorefield Drinking Water System

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 m³/d to 900 m³/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 m³/d to 1,300 m³/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 m³/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 m³/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 m³/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 Conestoga 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.

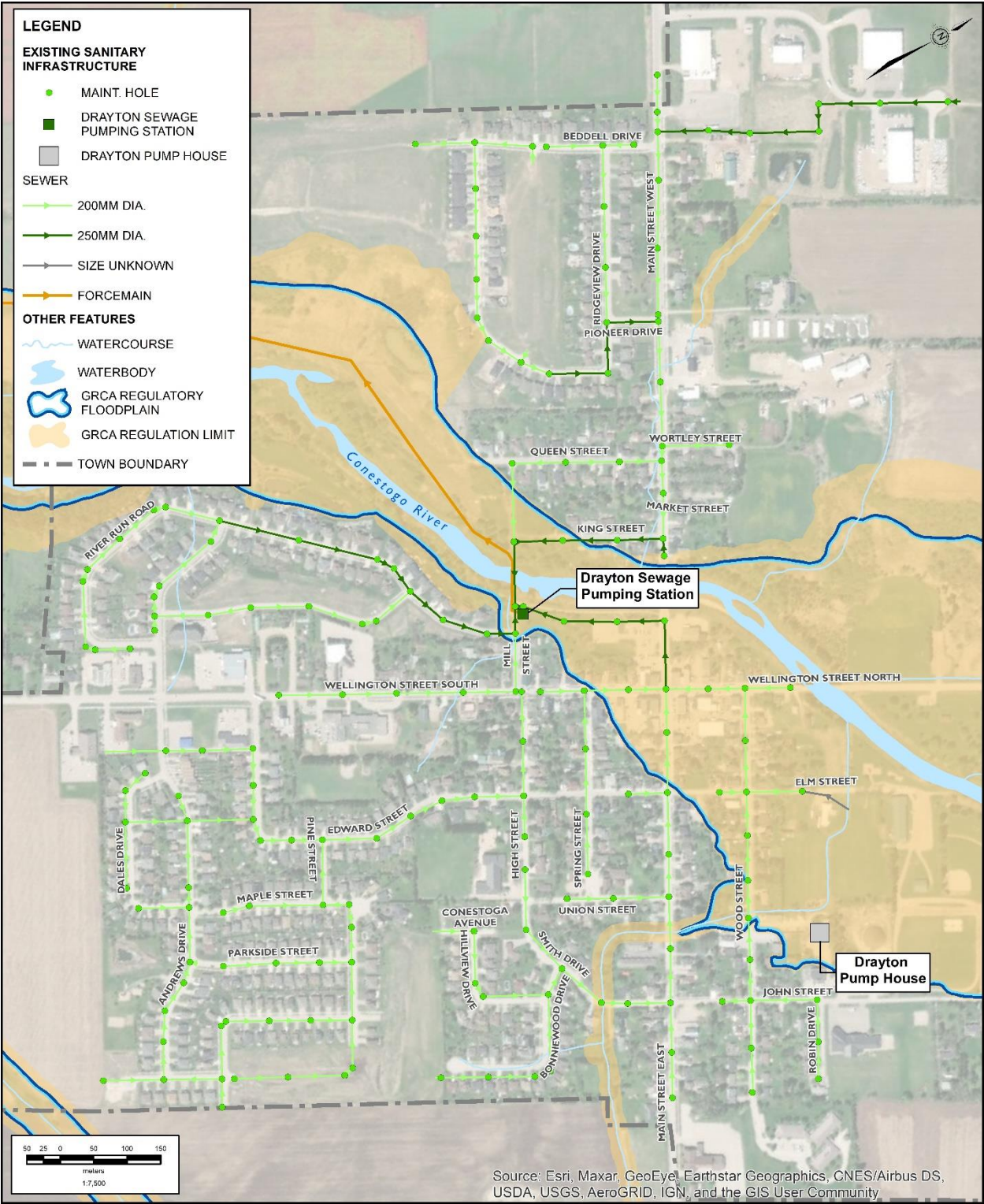


Figure 5-3: Drayton Wastewater Collection System

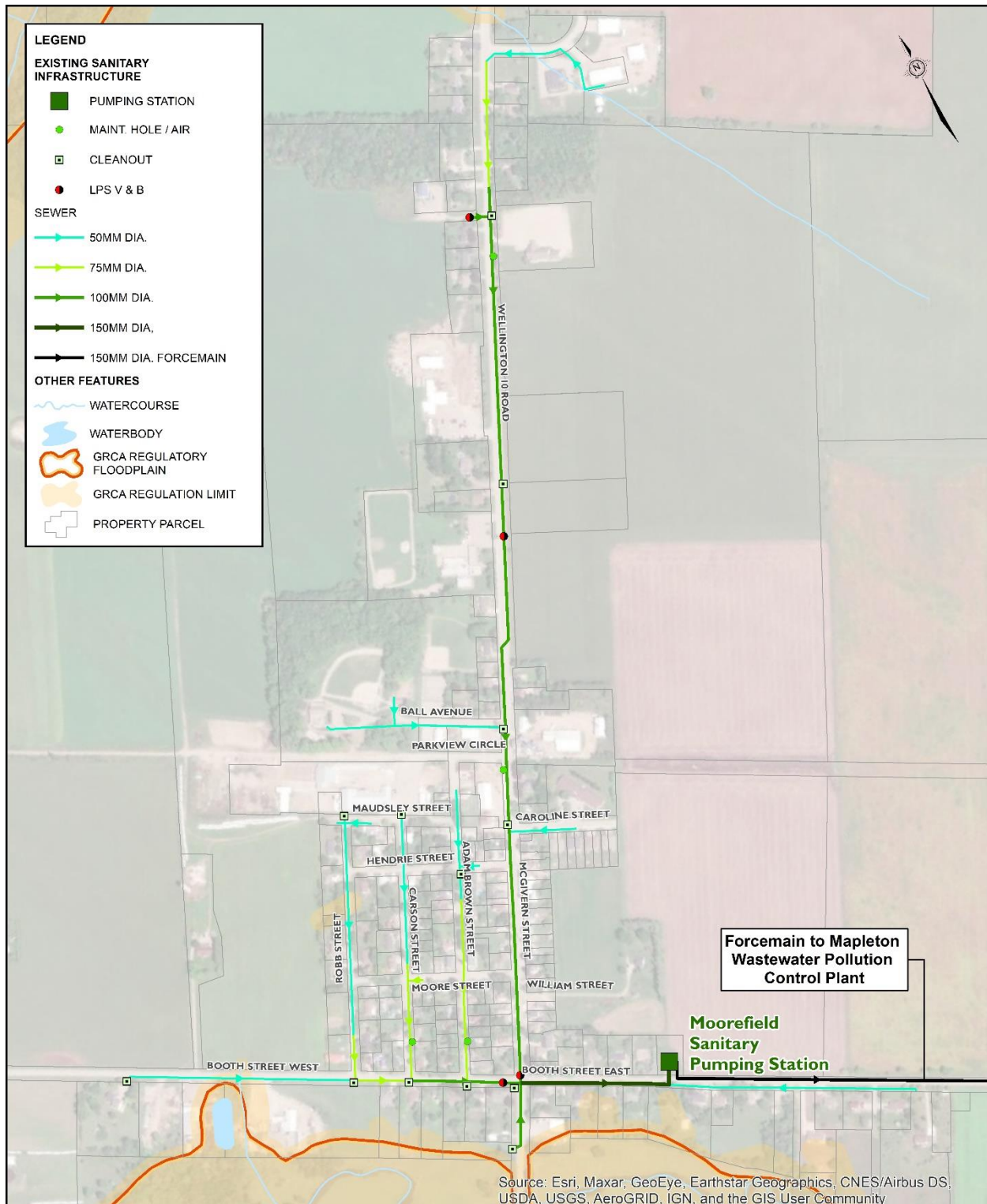


Figure 5-4: Moorefield Wastewater Collection System

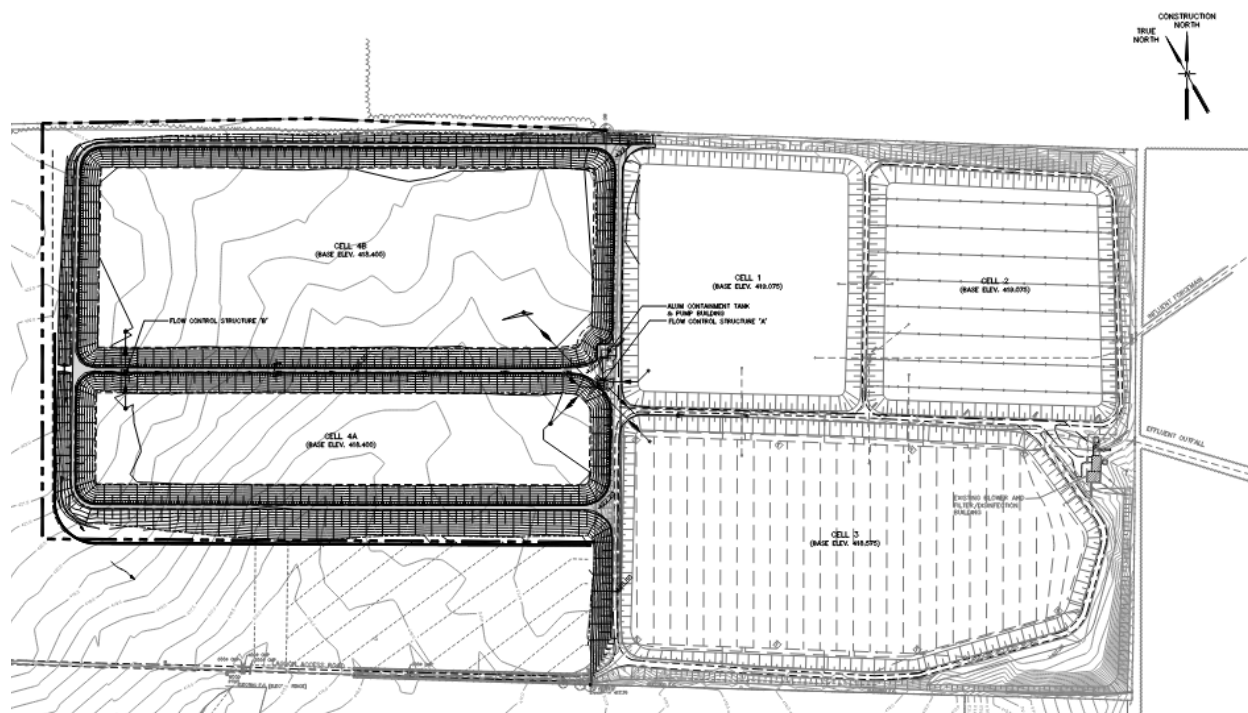


Figure 5-5: Mapleton WPCP Site Plan

5.6 Existing Baseline Cultural Heritage Conditions

5.6.1 Built Heritage Resources and Cultural Heritage Landscapes

Cultural heritage resources include archaeological resources, built heritage resources and cultural heritage landscapes. A Cultural Heritage Report- Existing Conditions and Preliminary Impact Assessment was not undertaken for these projects as the sites were not considered to have cultural heritage potential based on the criteria in Appendix H.

5.6.2 Archeological Resources

Stage 1 and 2 archaeological assessment and report (under Project Information Form (PIF) numbers PIFs P229-0130-2023 and P229-0130-2023) were undertaken on in September 2022 by Bluestone Research 2004 Ltd. (Bluestone) for the Study Area for the Drayton Sewage Pumping Station Upgrade Project (WW-1). This project is located at Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Township of Mapleton, Wellington County, Ontario. A Stage 1 and 2 AA consists of a review of geographic, land use and historical information for the property and the relevant surrounding area, a site visit, and contacting MCM to find out whether, or not, there are any known archaeological sites on

or near the property. Its purpose is to identify areas of archaeological potential and further archaeological assessment (e.g., Stage 3-4) as necessary.

A Stage 1 Background Assessment and Property Inspection was conducted in August 2023 by Bluestone under P229-0130-2023. In accordance with Section 1.3.1 of the Ministry of Citizenship and Multiculturalism (MCM) 2011 Standards and Guidelines for Consultant Archaeologists (Government of Ontario 2011), the Stage 1 archaeological assessment determined that the entire study area retained archaeological potential and recommended a Stage 2 archaeological assessment in the form of test pit survey at 5-metre intervals.

The Stage 2 assessment was conducted 11 August 2023 under archaeological consulting license P229 issued to Allan Morton of Bluestone by the MCM. No archaeological resources were identified during the Stage 2 archaeological assessment of the study area, and as such no further archaeological assessment of the property is recommended. The Stage 1 and Stage 2 AA are included in Appendix I.

The screening checklist Criteria for Evaluating Archaeological Potential, developed by MCM was completed as part of the project file (see Appendix H). The study area for the new well at the existing Drinking Water Supply (DWS) site (W-1), was determined to have low potential for archaeological resources. The existing DWS (shown in Figure 5-6) was originally constructed in 1984 and includes a pumphouse facility that houses the groundwater well pumps, high-lift pumps for water distribution and an underground concrete reservoir for drinking water storage. The DWS also has an access roadway extending through the site to the adjacent Township roads garage. The DWS site is also situated in the middle of a developed residential area demonstrating the site has been extensively disturbed. See the original As-Built drawings for the Drayton DWS in Appendix K.



Figure 5-6: Aerial image of Drayton DWS site

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	Drayton	Drayton	Moorefield	Moorefield	Moorefield
	Population ¹	MDD Factor ²	PHD Factor ²	Population ¹	MDD Factor ²	PHD Factor ²
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 in available storage. Approximately 790 m³ 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	Ranking
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	Representation	
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 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

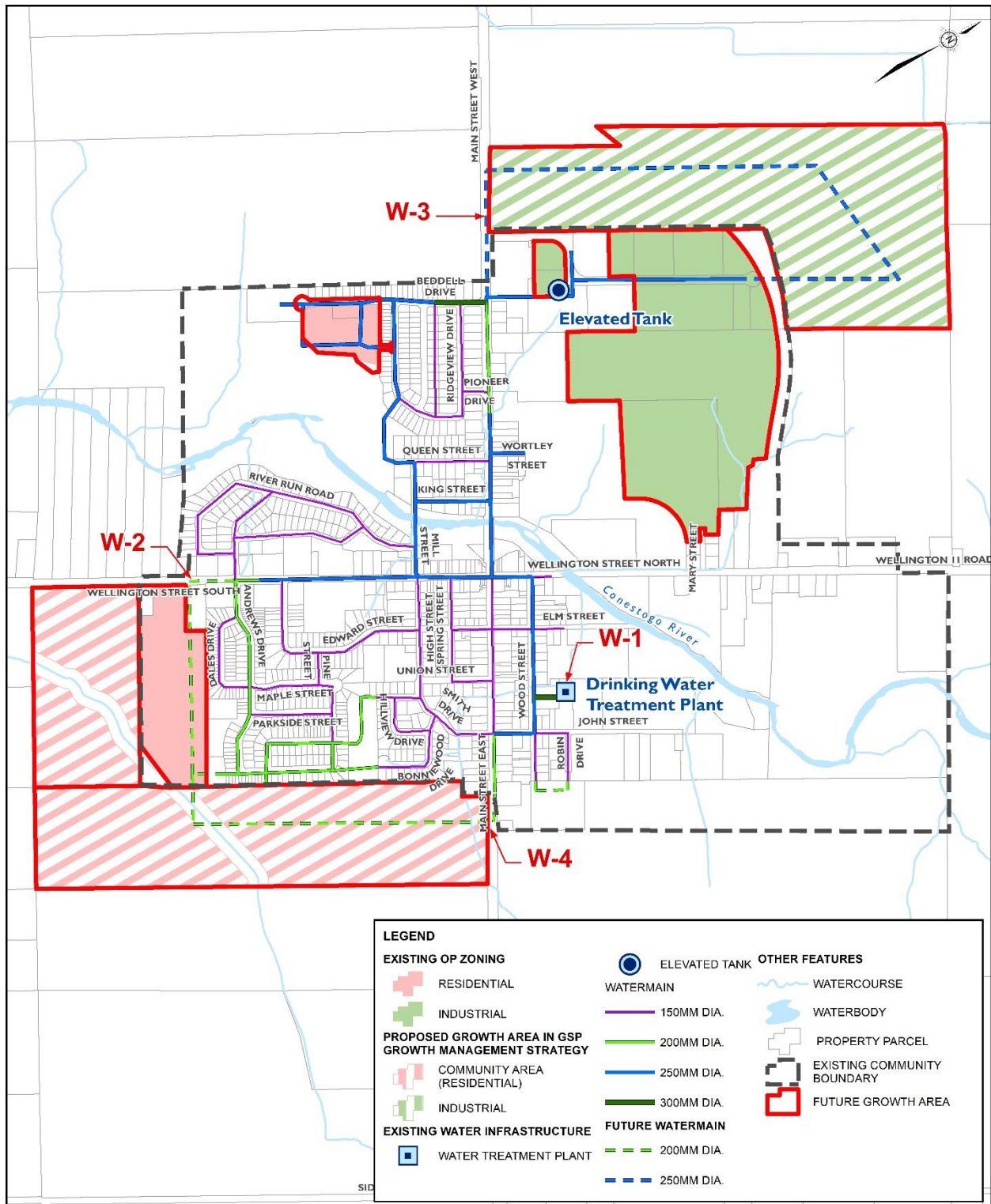


Figure 6-1: Drayton Water Servicing Strategy

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 m³/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 inflow and infiltration (I&I) in the system in order to better utilize the existing conveyance and treatment capacities within the wastewater system. I&I refers to the additional flow from stormwater that enters 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 m³/d to 1,300 m³/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 m³/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 (m ³ /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 m³/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 m³/d to 1,300 m³/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 m 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 4 – 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. The construction of other sewage pump stations within the development areas would be completed by the Township and OCWA would operate the pump station(s). The SPS will be designed for build-out conditions, and under these conditions, the forcemain will require capacity upgrades in the future. Twinning of the forcemain from Drayton would be Development Charges (DC) eligible.

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 m³/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. An amendment to the existing ECA for wastewater treatment and disposal system will be required to facilitate the proposed upgrades. A pre-submission consultation with the MECP district and regional staff will be conducted to determine whether a ground or surface water impact assessment is required.

7.8.8 WW-8 – Future WWTP Upgrade to 2,300 m³/d

The proposed effluent total phosphorus objectives of 0.17 mg/L at an expanded capacity of 1,300 m³/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 m³/d. A study should be initiated to determine the Preferred Solution for provision of Wastewater treatment Capacity In excess of 1,300 m³/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

PROJECT NAME	PROJECT ID	LOCATION	CLASS EA SCHEDULE	COST (\$MILLION)
Inflow / Infiltration monitoring program	WW-2	Drayton	N/A	\$0.38
Upgrade gravity sewers on Wellington Street South	WW-3	Drayton	A+	\$0.70
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

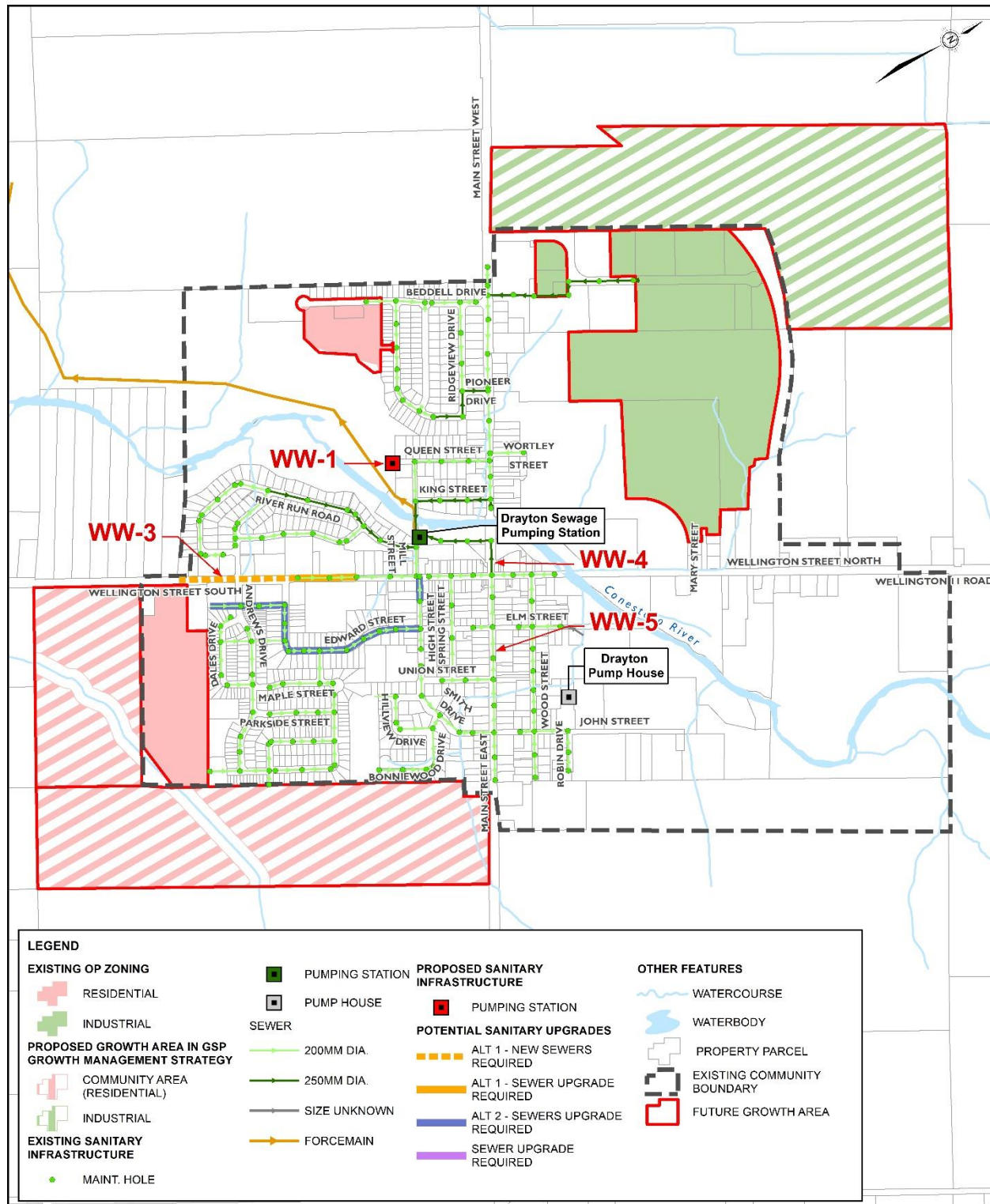


Figure 7-1: Preferred Wastewater Servicing Strategy - Drayton

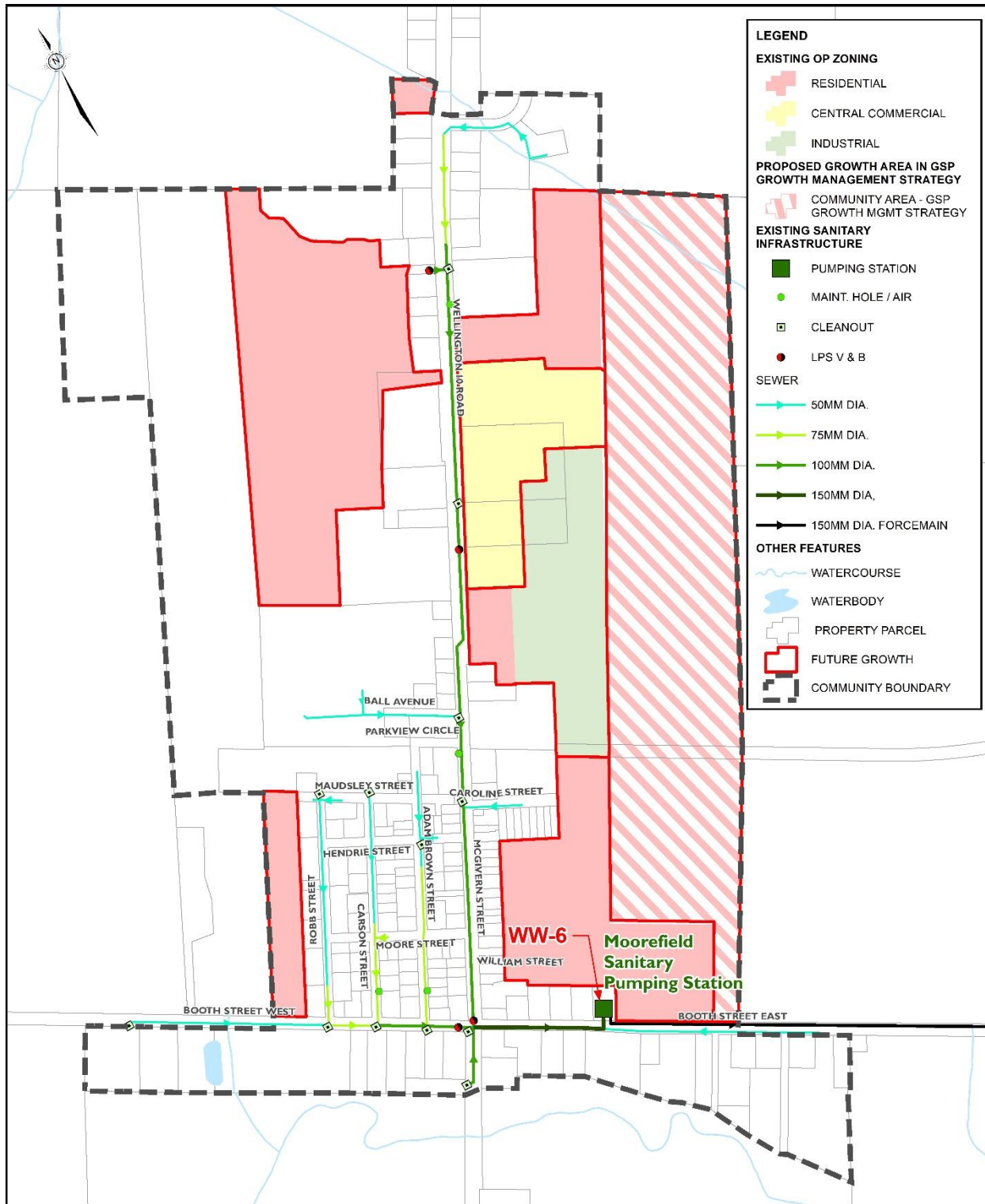


Figure 7-2: Preferred Wastewater Servicing Strategy - Moorefield

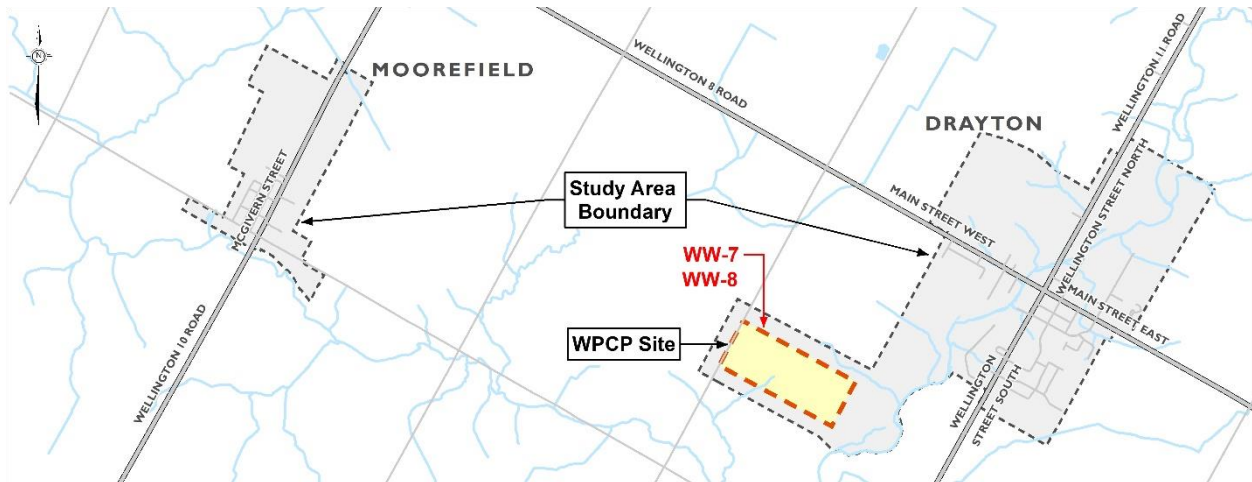


Figure 7-3: Preferred Wastewater Servicing Strategy – Township

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.

Moving forward with implementation of the projects below, it is important that Species at Risk (SAR) are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site. If the proposed projects cannot avoid impacting protected species and their habitats, then an application for an authorization under the Endangered Species Act (ESA) will need to be filed to undergo a formal review under the ESA.

Temporary construction dewatering may be required to facilitate construction of the proposed additional water and wastewater infrastructure. Should the anticipated dewatering rates be above 50,000 L/day, but less than 400,000 L/day, then the taking will be subject to registration with the Environmental Activity and Sector Registry (EASR). However, should the Township of Mapleton anticipate dewatering rates be greater than 400,000 L/day, an application must be made to the MECP for a Category 3 Permit-To-Take-Water subject to the requirements set forth in the PTTW Manual (MOE, 2005), and in accordance with the Technical Guidance Document for Hydrogeological Studies In Support of Category 3 Applications for Permit To Take Water (MOE, 2008).

During construction, dust suppressants shall be applied as necessary, to minimize dust nuisance to the surrounding properties. Water shall be the only dust suppressant applied within two weeks before the placement of any asphaltic concrete materials or the application of surface treatments. Approved dust suppressants other than water, and non-chloride solutions is recommended, and blends shall be applied according to the manufacturer's guidelines and application rates.

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 m³/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 m³/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 m³/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.

8.4 Summary

A summary of the preferred Water/Wastewater alternatives for Drayton and how they address the problems, 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 m³/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 m³/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 m³/d. A study should be completed leading up to this flow to further evaluate tertiary treatment options to replace the filters.

A summary of the preferred Water/Wastewater alternatives for Moorefield 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.

The Master Plan report was issued with a Notice of Completion on June 9, 2023 and comments were received on July 9, 2023.

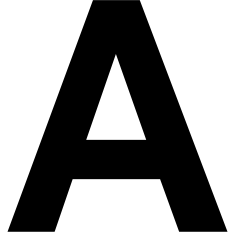
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Appendix A: Technical Memorandum

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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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 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 (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 Environmental 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.

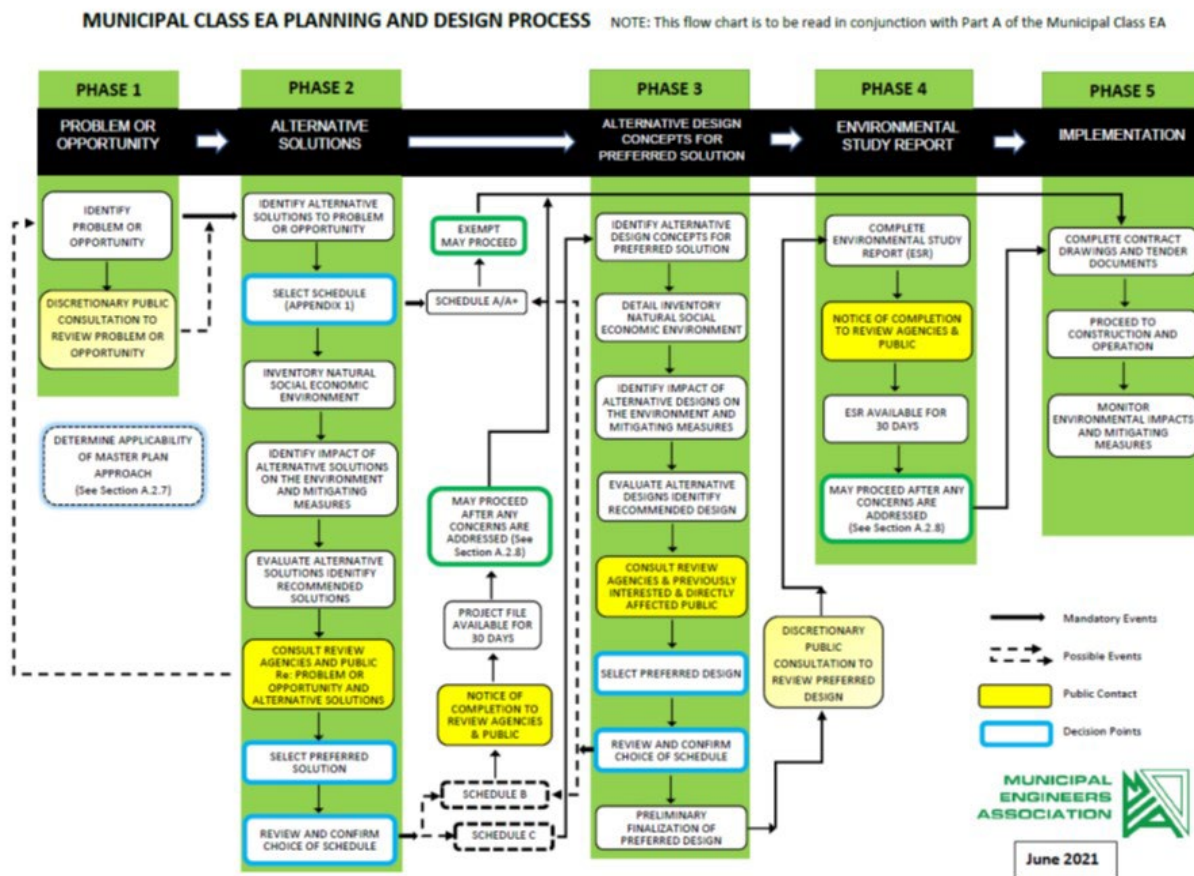


Figure 1: Municipal Class Environmental Assessment Process

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 m³/d) and total station capacity of 45.5 L/s (3,928 m³/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 m³ 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 m³ 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.

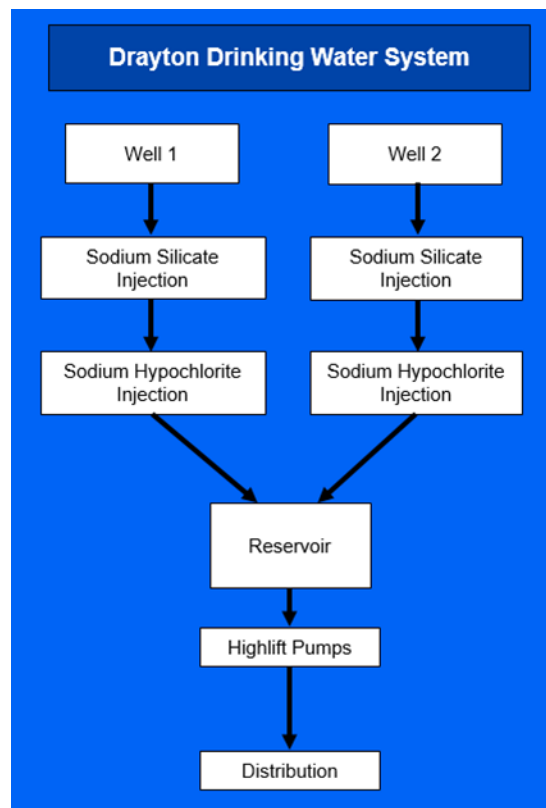


Figure 2: Overview of Drayton DWS Process System

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 m³/d) and total station capacity of 45.5 L/s (3,928 m³/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 m³. The high lift pumping station has a design capacity of 3,928 m³/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 m³/d while the maximum day flow was 1,061 m³/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.

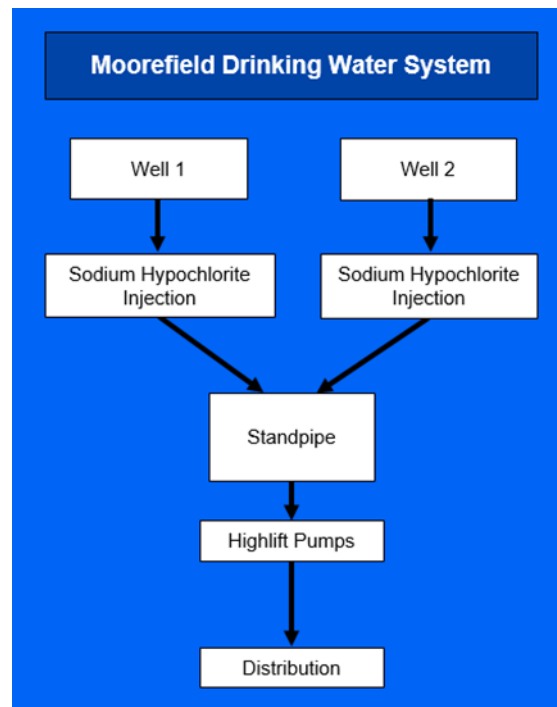


Figure 3: Overview of Moorefield DWS Process System

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 m³/d) and the total capacity is 18 L/s (1,555 m³/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 m³. 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 m³/d while the maximum day flow was 354 m³/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 commenced 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.

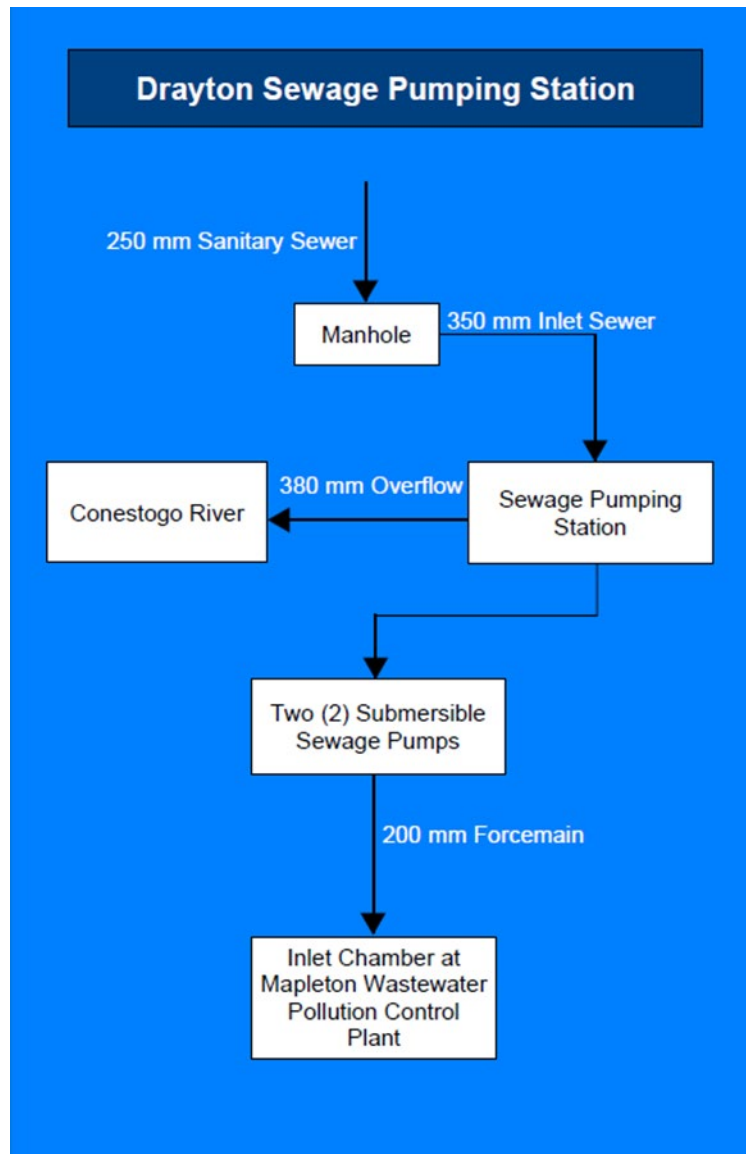


Figure 4: Overview of Drayton SPS Process System

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.

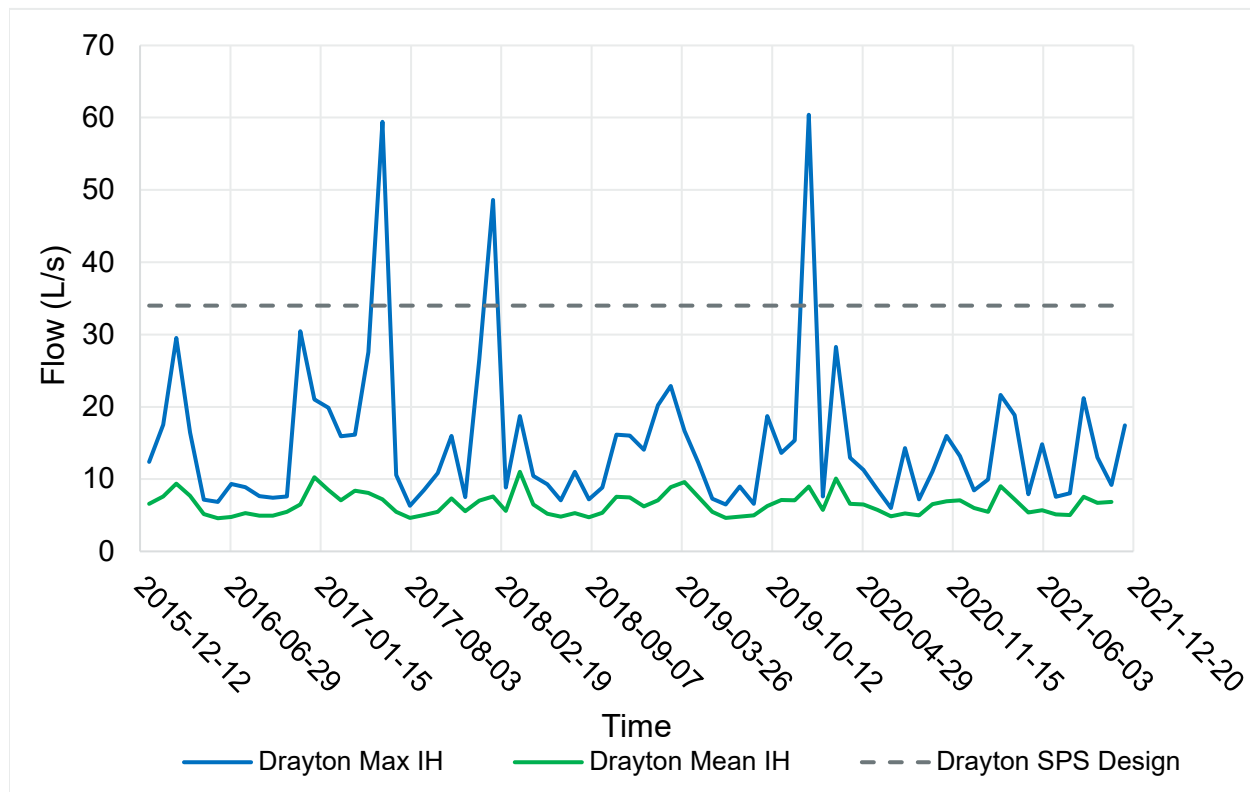


Figure 5: Mean and Max IH Flows with Drayton SPS Design Flow

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.

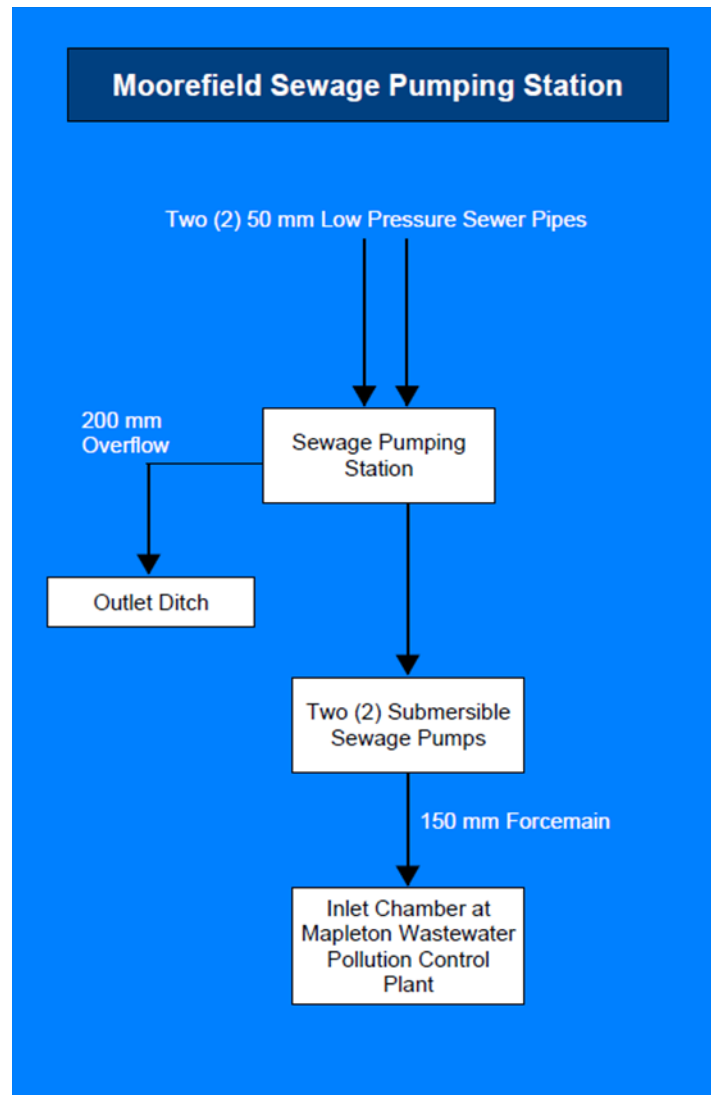


Figure 6: Overview of Moorefield SPS Process System

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 m³/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 m³/d to 900 m³/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 m³/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.

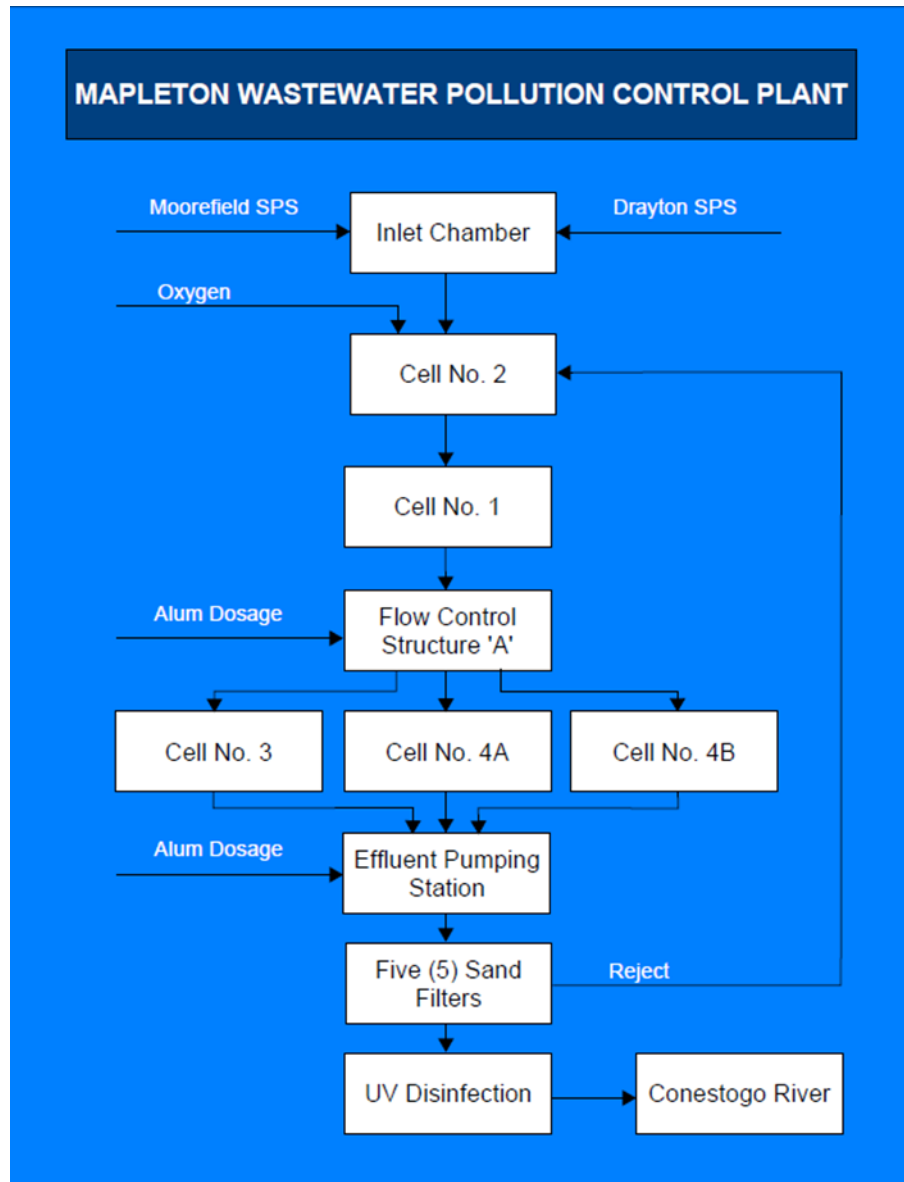


Figure 7: Overview of Mapleton WPCP Process System

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 m³/d to 900 m³/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.

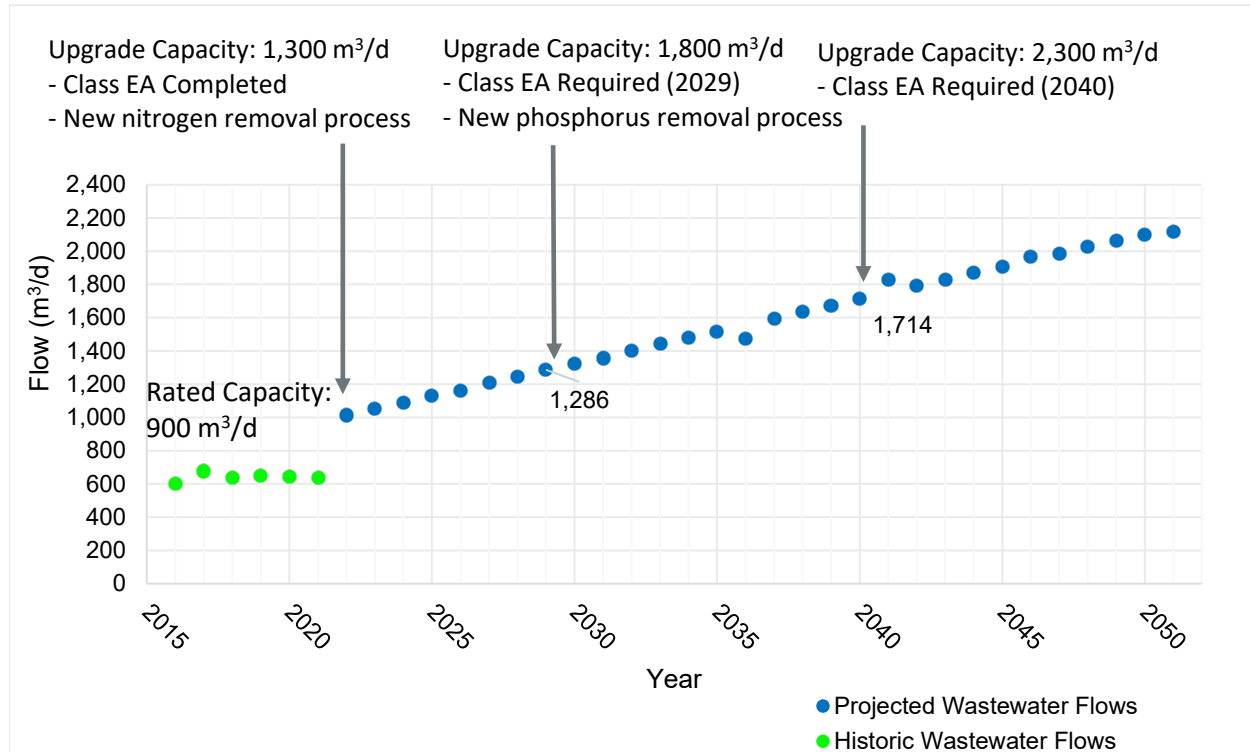


Figure 8: Mapleton WPCP Capacity Assessment

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 m² and a design capacity of 800 m³/d according to the current ECA (1391-B38PLA, August 2, 2018). The filters have a total capacity of 4,000 m³/d or Peak Hourly Flow (PHF) of 167 m³/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 m³/d (167 m³/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 BOD₅, 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 50 th 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 m³/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 m³/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 m³/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
<i>E.coli</i> (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 m³/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 m³/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 m³/d to 900 m³/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 m³/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 m³/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 m³/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	<p>Revised Drinking Water Works Permits may be required for the Drayton DWS and Moorefield DWS if capacity increases are recommended during this study.</p> <p>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.</p> <p>A Permit to Take Water may be required during construction activities if dewatering activities are required in excess of 400 m³/d. An EASR may be required during construction if dewatering over 50 m³/d but less than 400 m³/d is required.</p> <p>Relocation permits, for wildlife or fish, may be required if removals are needed during construction.</p> <p>Permit or other authorization may be required to conduct an activity that could impact an endangered or threatened plant or animal or its habitat.</p>
Ministry of Heritage, Tourism, Culture and Sport Industries	<p>Archaeological and Cultural Heritage assessments, including fieldwork and reporting, are required to comply with the Ministry's 2011 Standards and Guidelines for Consultant Archaeologists.</p> <p>Additional surveys may be required contingent on the Ministry's review of the Project File Report.</p>
Grand River Conservation Authority	<p>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.</p> <p>Construction staging plans will be required to consider impacts to the regulatory floodplain.</p>

Agency	Description of Permit / Approval
Wellington County	<p>A building permit will be required for alterations to the existing assets or construction of a new facility.</p> <p>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.</p>
Electrical Safety Authority	<p>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.</p>

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.

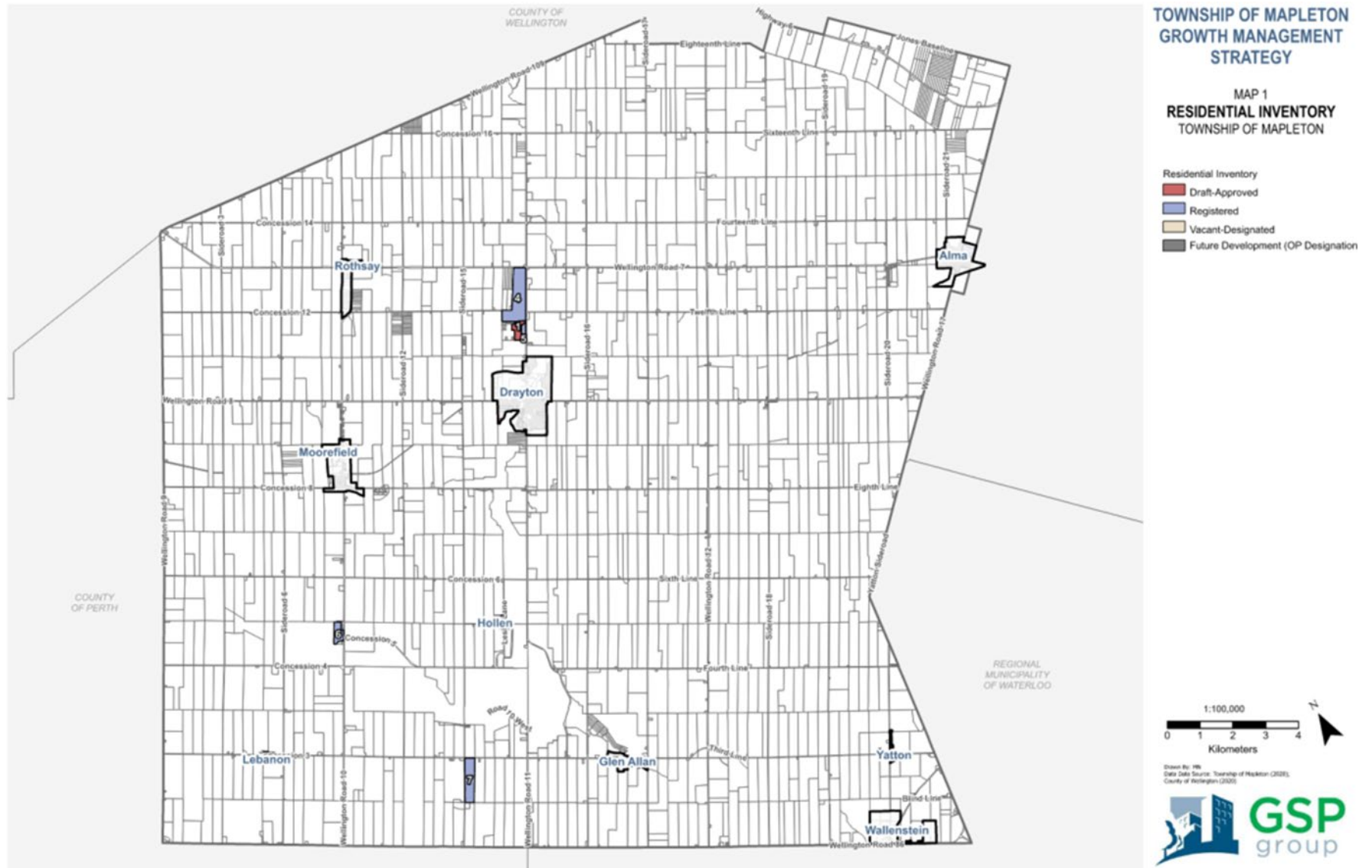


Figure 9: Mapleton Water and Wastewater Servicing Master Plan Study Area

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:

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

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

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.

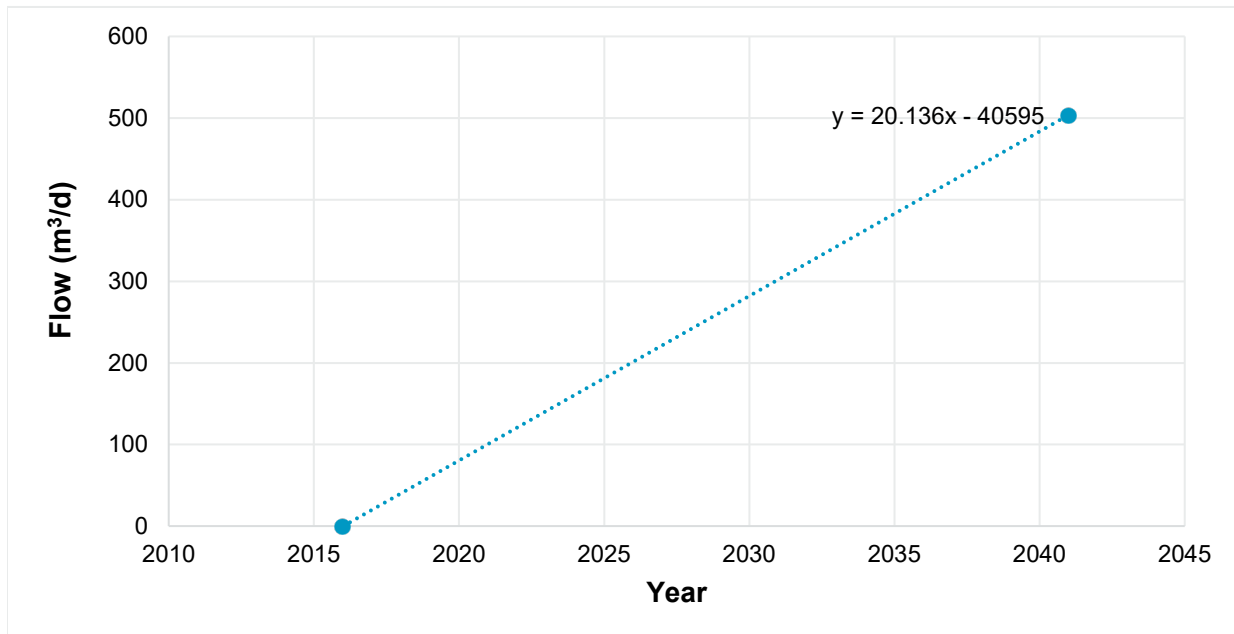


Figure 10: Linear Growth in ICI Demand in Drayton from 2016 to 2041

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:

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

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

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 (m³/d)	ADD (L/s)	MDD (m³/d)	MDD (L/s)	PHD (m³/d)	PHD (L/s)	MDD+FF (m³/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 (m³/d)	ADD (L/s)	MDD (m³/d)	MDD (L/s)	PHD (m³/d)	PHD (L/s)	MDD+FF (m³/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 m³/d, which is elevated but similar the 1,300 m³/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

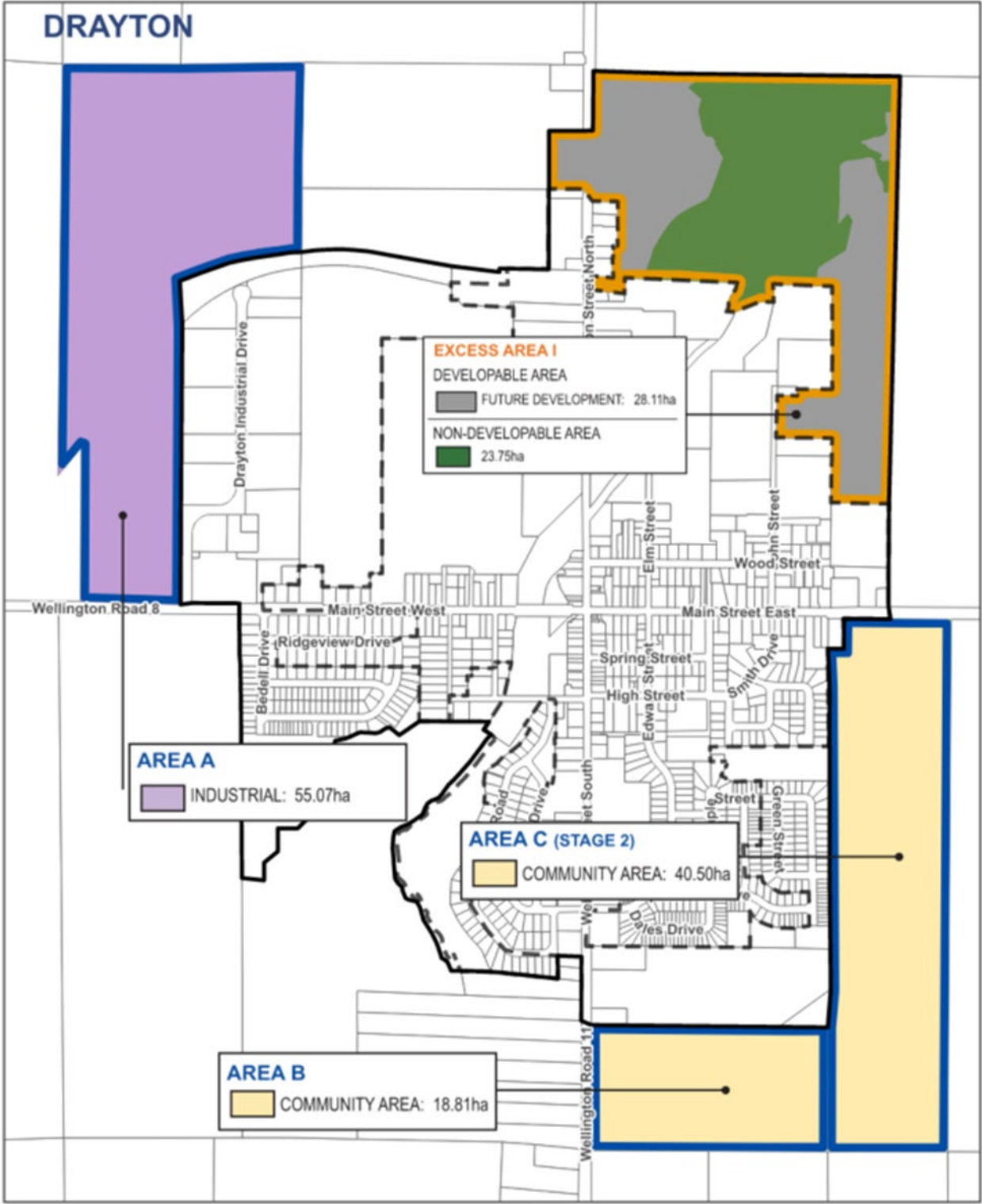


Figure 11: Drayton Mapping (GSP Group, 2022)

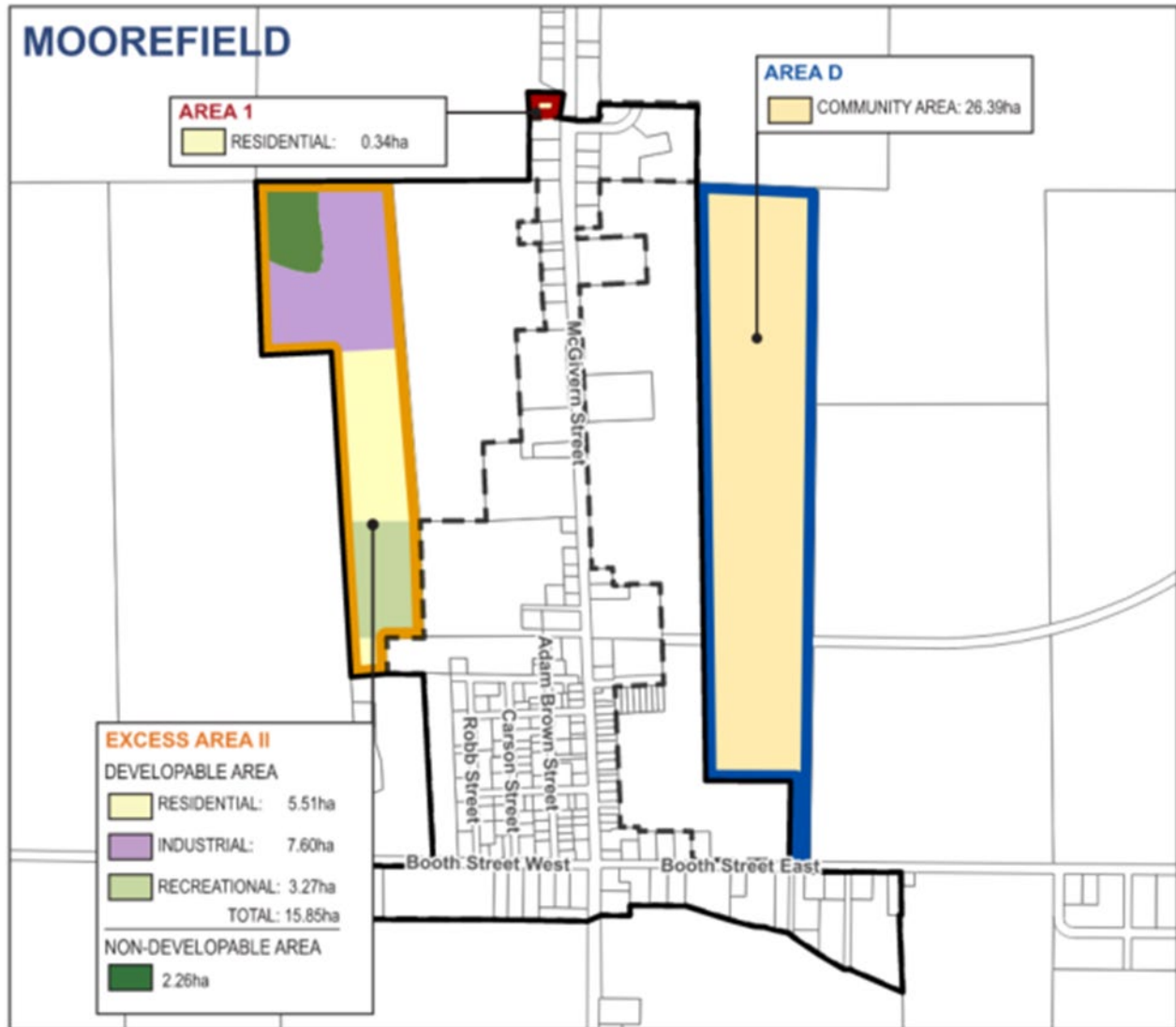


Figure 12: Moorefield Mapping (GSP Group, 2022)

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.

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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

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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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Appendix A: Cost Estimates

Appendix B: Design Flow Calculations

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 m³/d) and total supply capacity of 45.4 L/s (3,931 m³/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

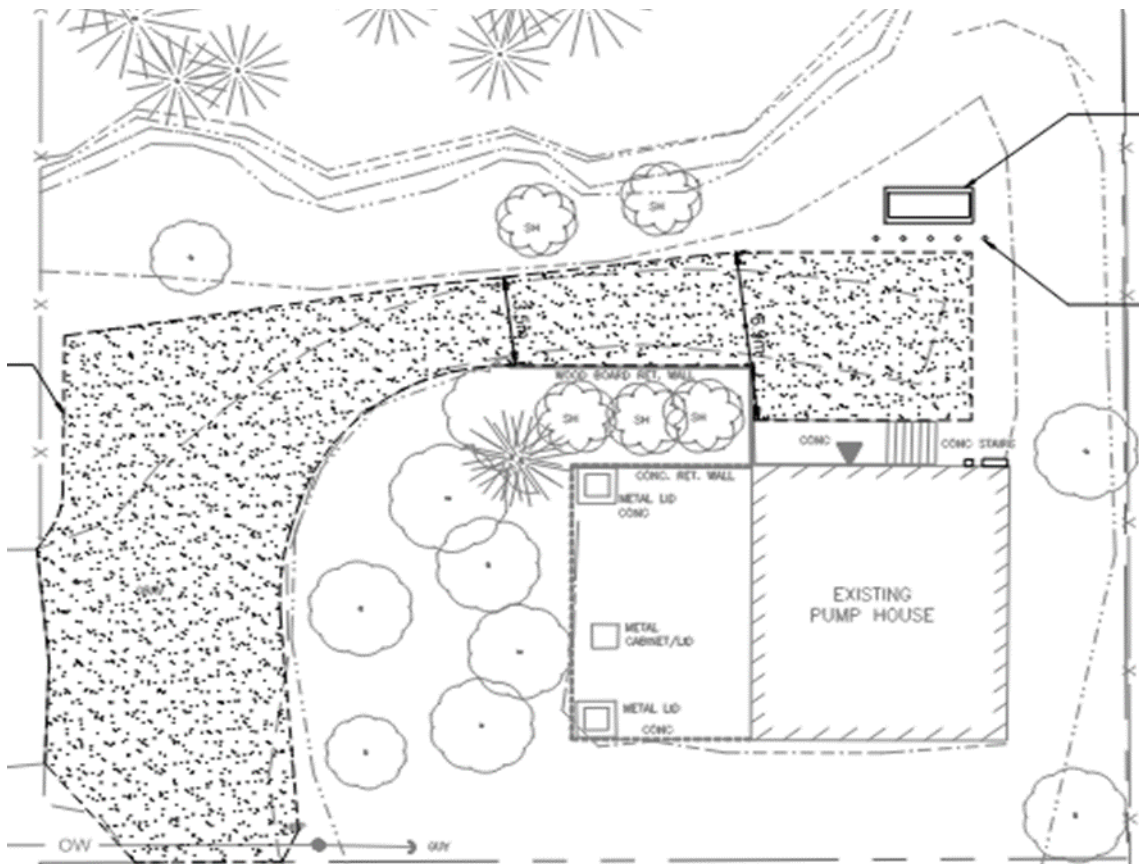


Figure 2-1: Drayton WTP Site Plan

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.

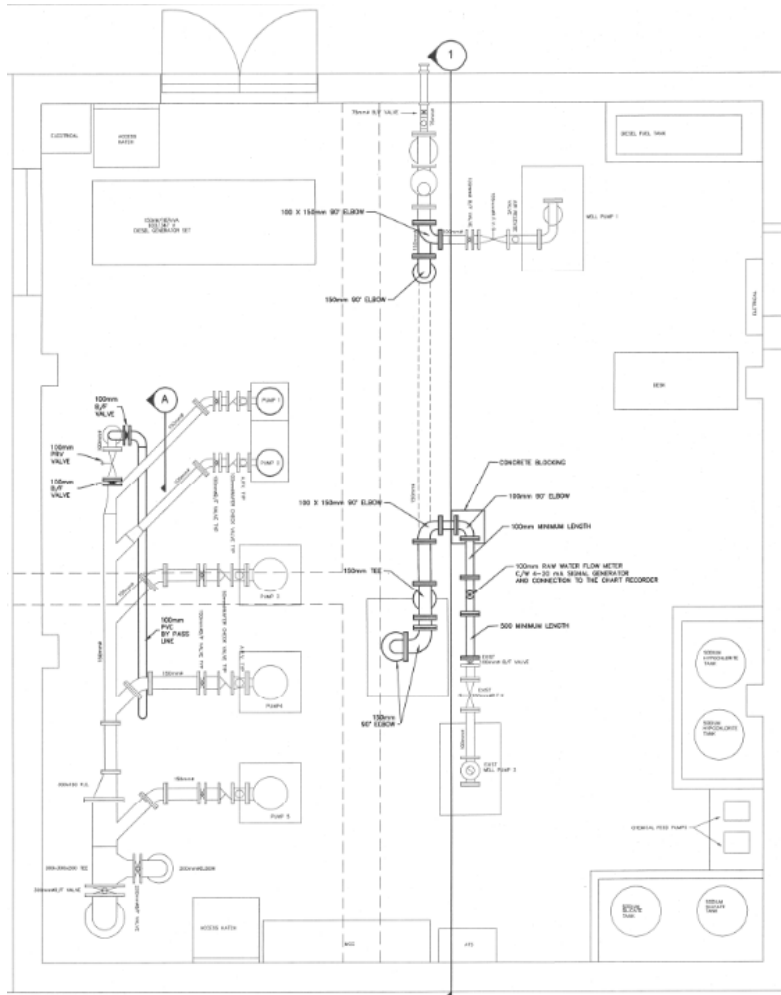


Figure 2-2: Drayton DWS Pumphouse Layout

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 m³. 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 m³ 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.

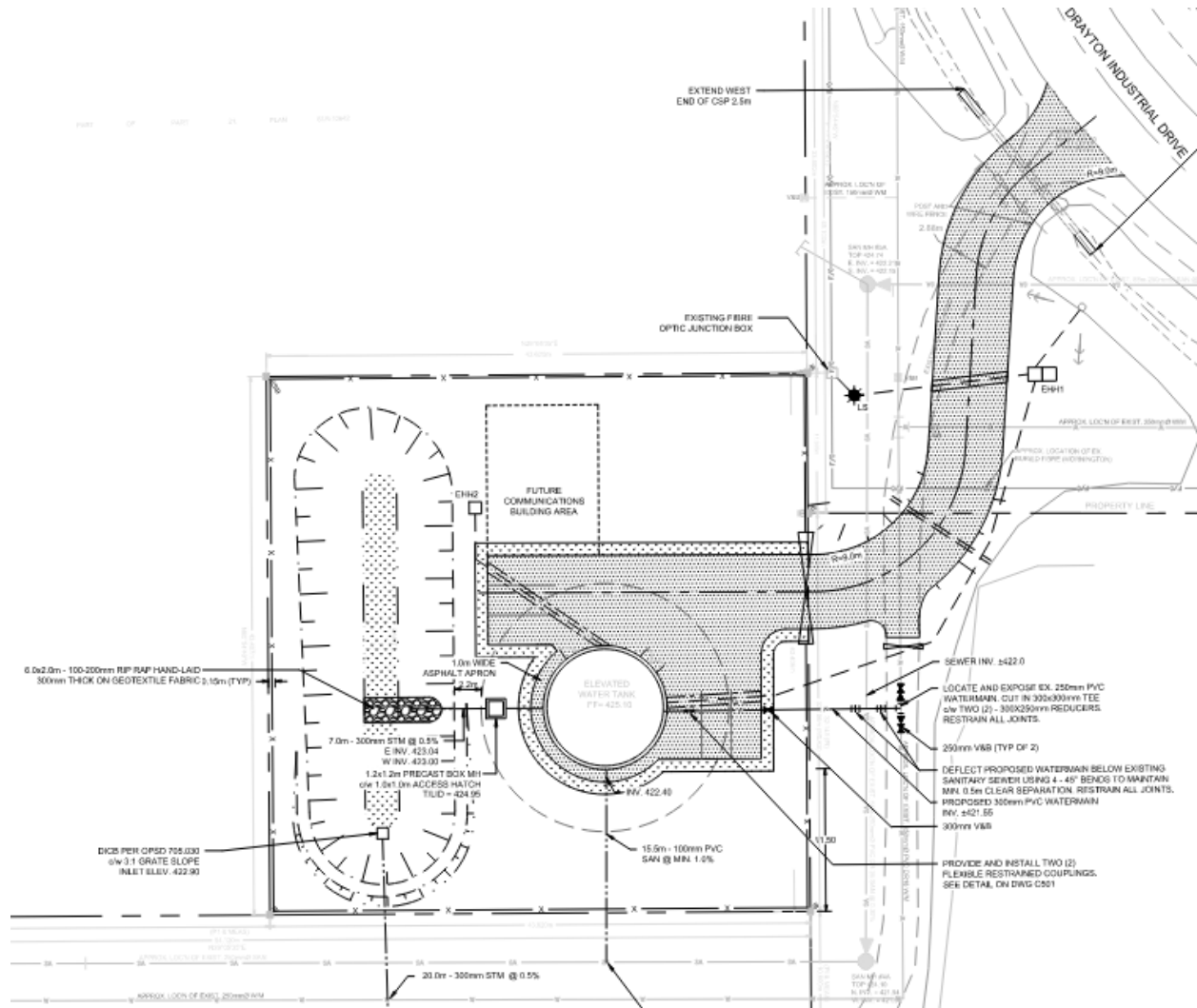


Figure 2-3: Drayton Elevated Tank Site Plan

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.

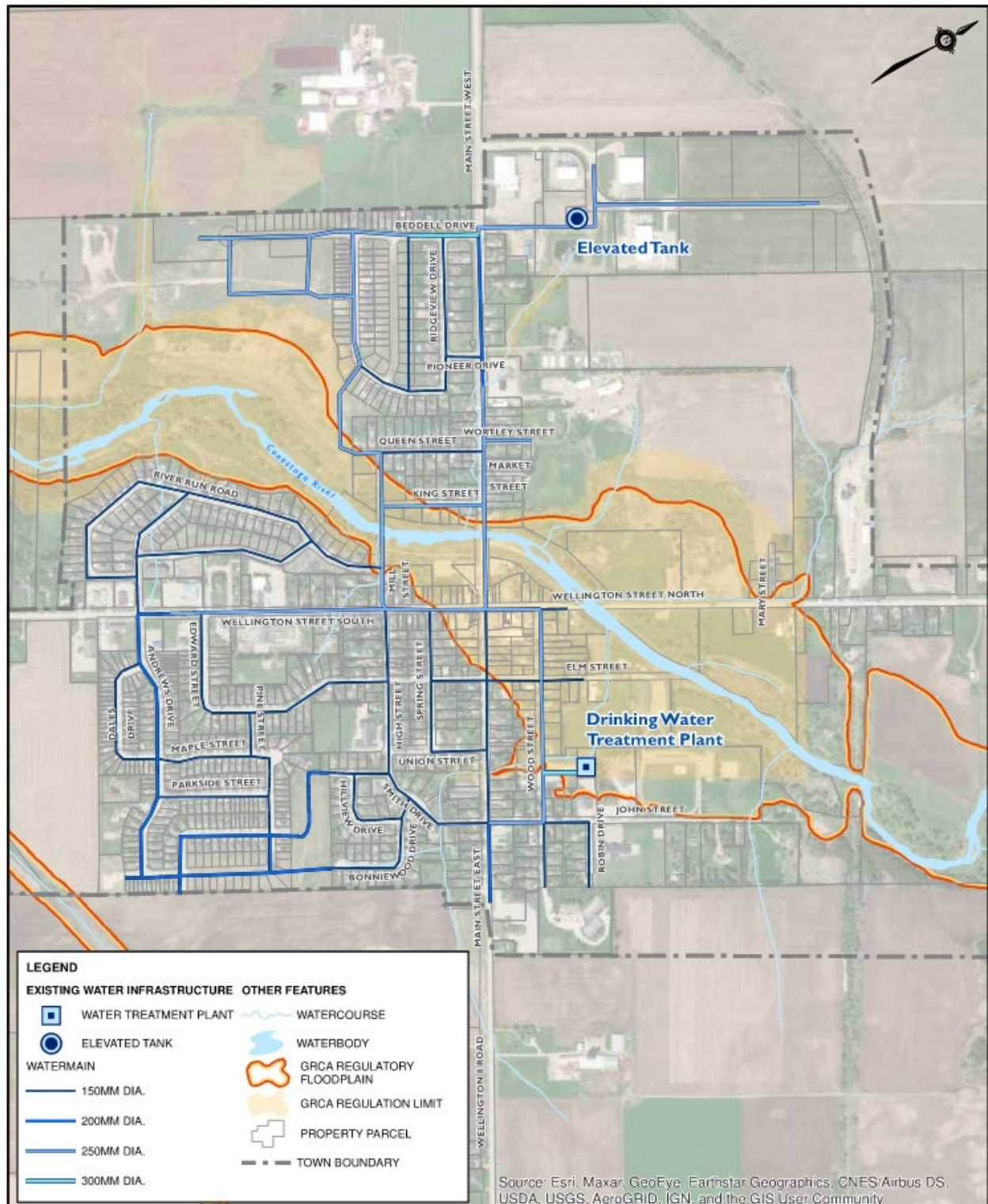


Figure 2-4: Drayton Drinking Water Distribution System

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 m³/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 m³/d) combined. The existing firm capacity of the station is 7.0 L/s (605 m³/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 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 firm capacity for the groundwater supply is only 7.0 L/s (605 m³/d), which is insufficient to meet current peak hour rate demands from the system (620 m³/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.

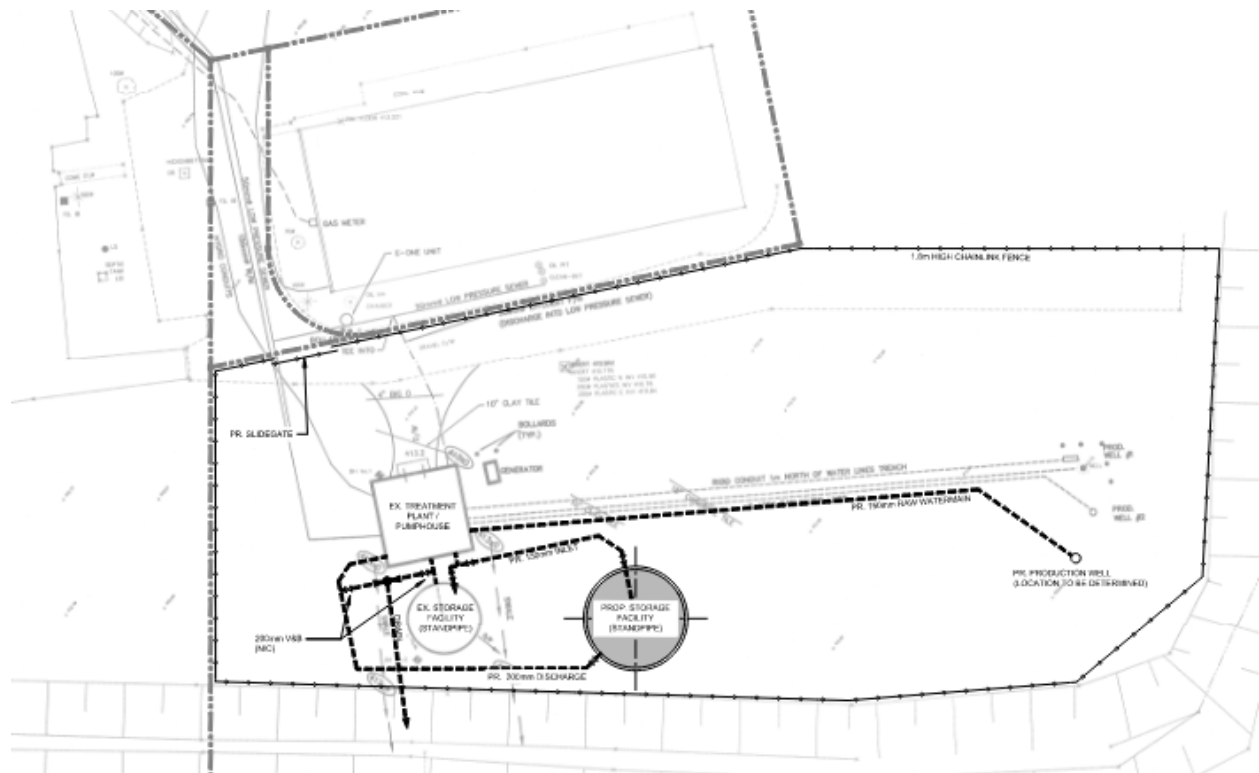


Figure 2-5: Moorefield Water Treatment Plant Site Plan

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 m³. 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.

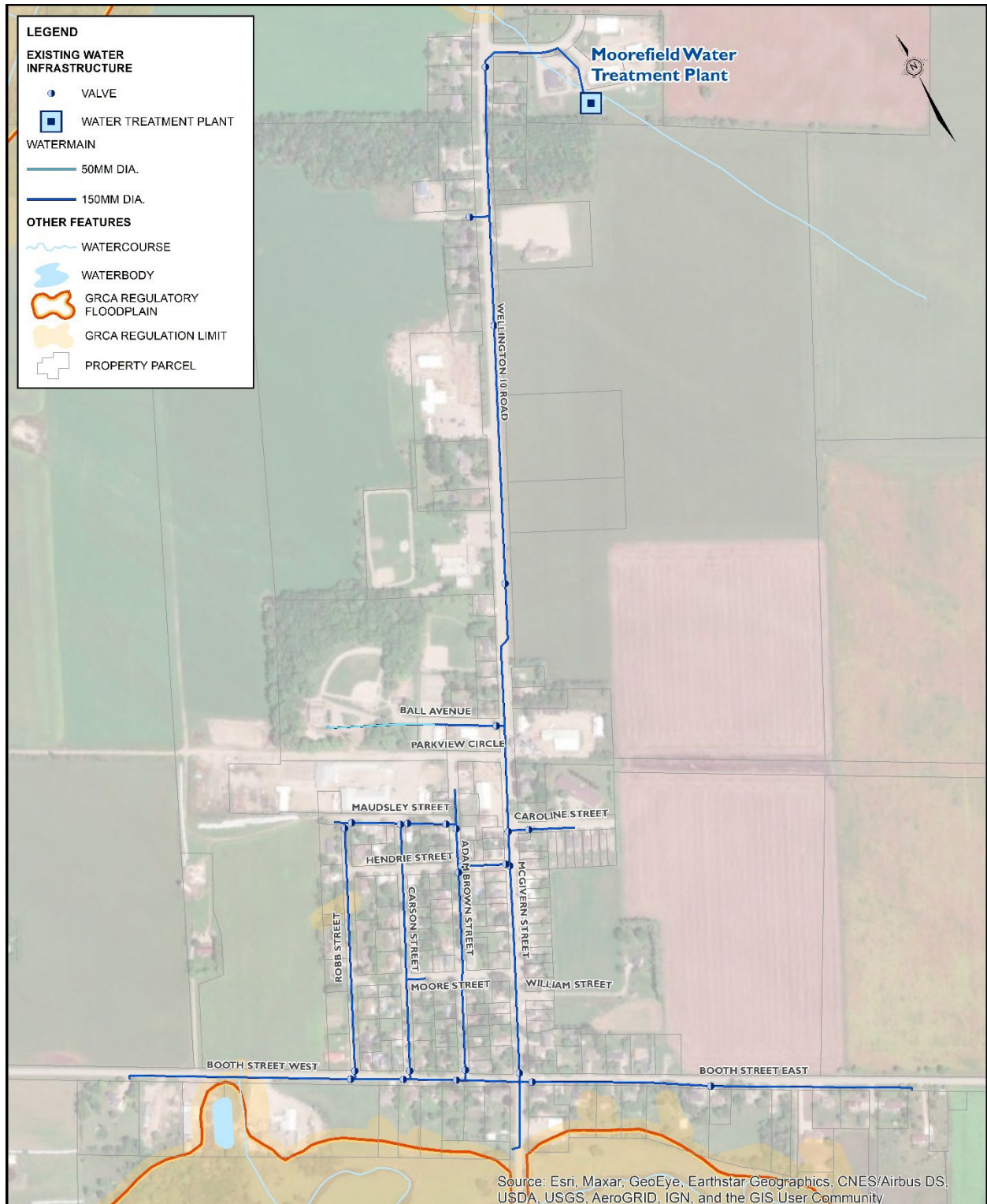


Figure 2-6: Moorefield Existing Water System

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 m³/d to 900 m³/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 m³/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 m³/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 m³/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 m³/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 m³/d by the year 2029.

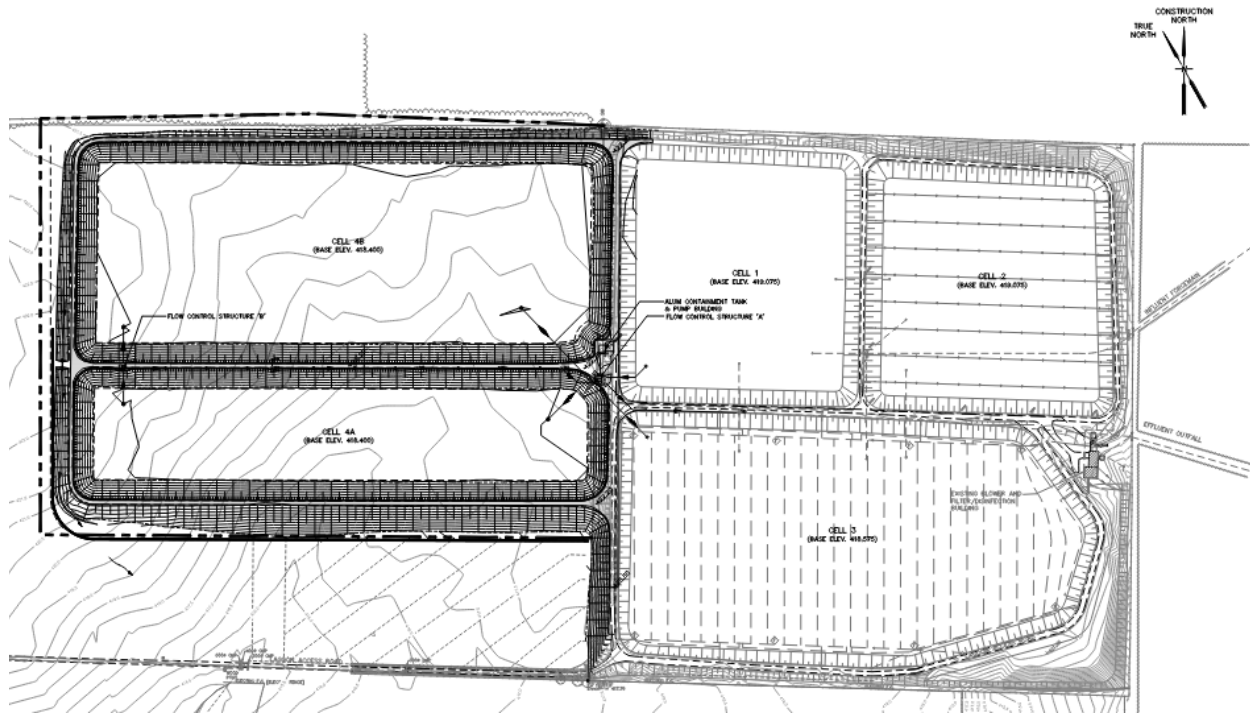


Figure 3-1: Mapleton WPCP Site Plan

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

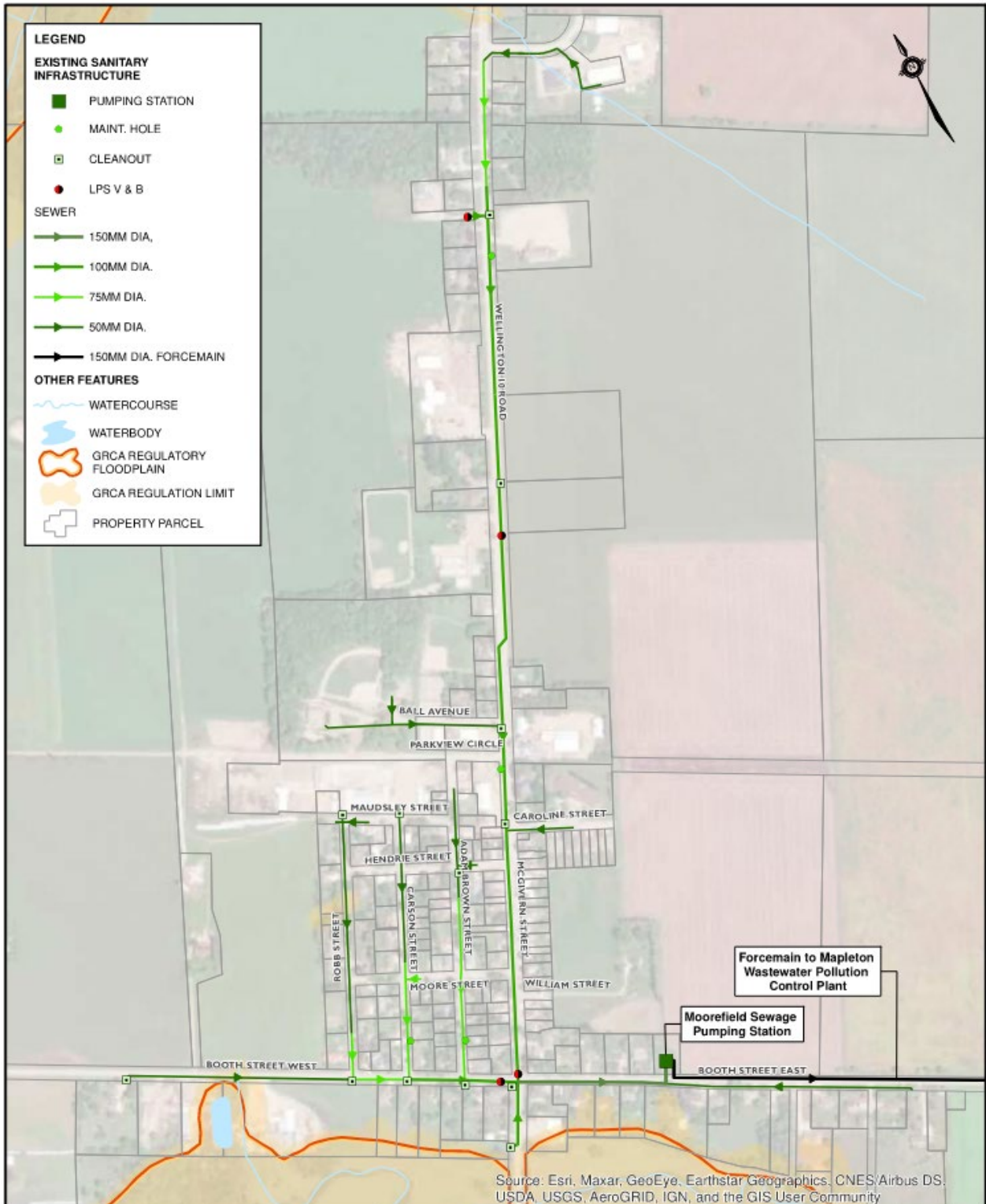


Figure 3-3: Moorefield Low-Pressure Sanitary System

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 m³/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

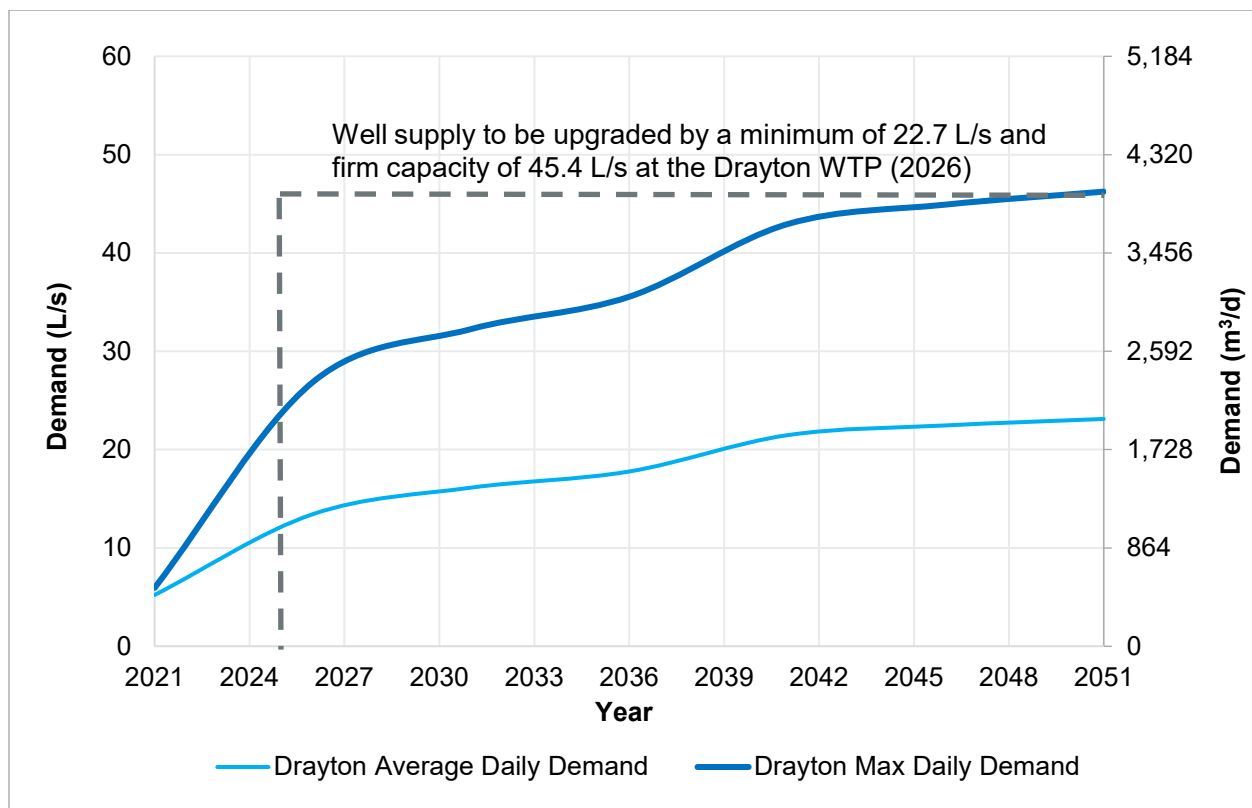
	Population	Max Day Demand (L/s)	PTTW	Firm Well Capacity
Existing	2,868	15.8	Adequate	Adequate
Year 2041	4,507	39.3	Adequate	Inadequate
Ultimate (Year 2051)	4,983	44.1	Inadequate	Inadequate

Notes: Values are from TM1 and include ICI demands.

The Drayton Elevated Tank will increase Drayton's total storage capacity to 2,400 m³ 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.

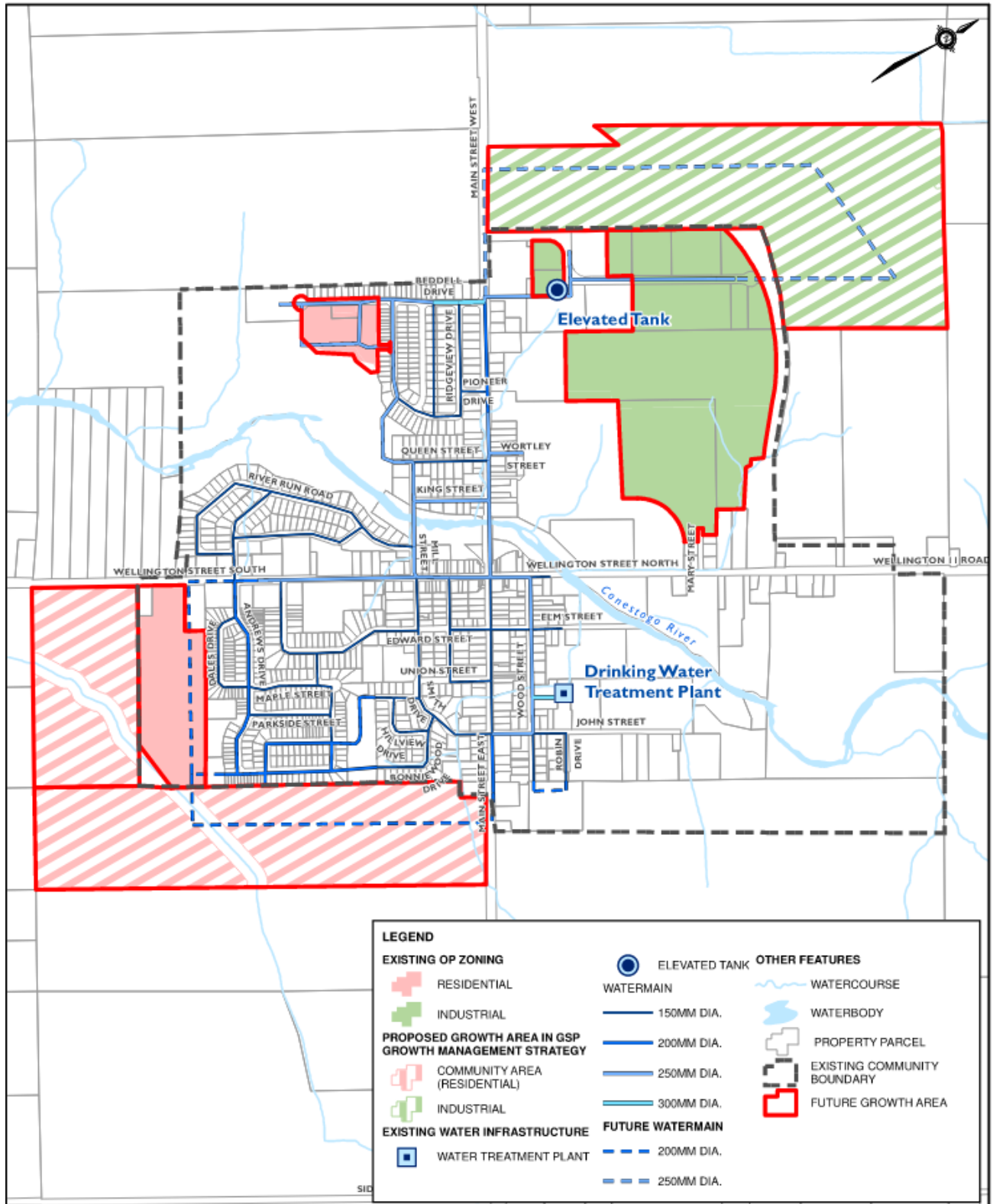


Figure 4-3: Drayton Distribution System Upgrades

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 m³/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.

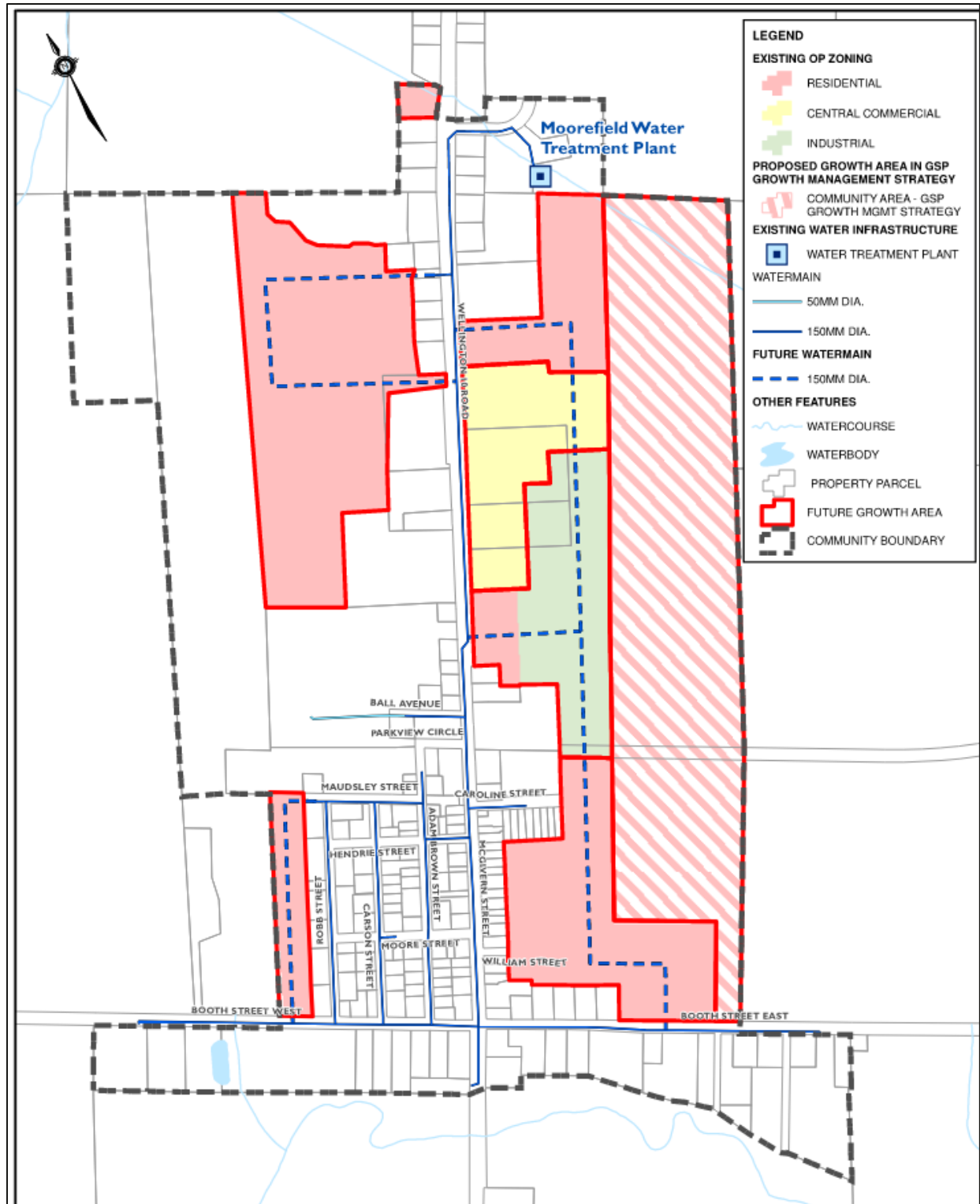


Figure 4-4: Moorefield Distribution System Upgrades – No Municipal Fire Protection

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.

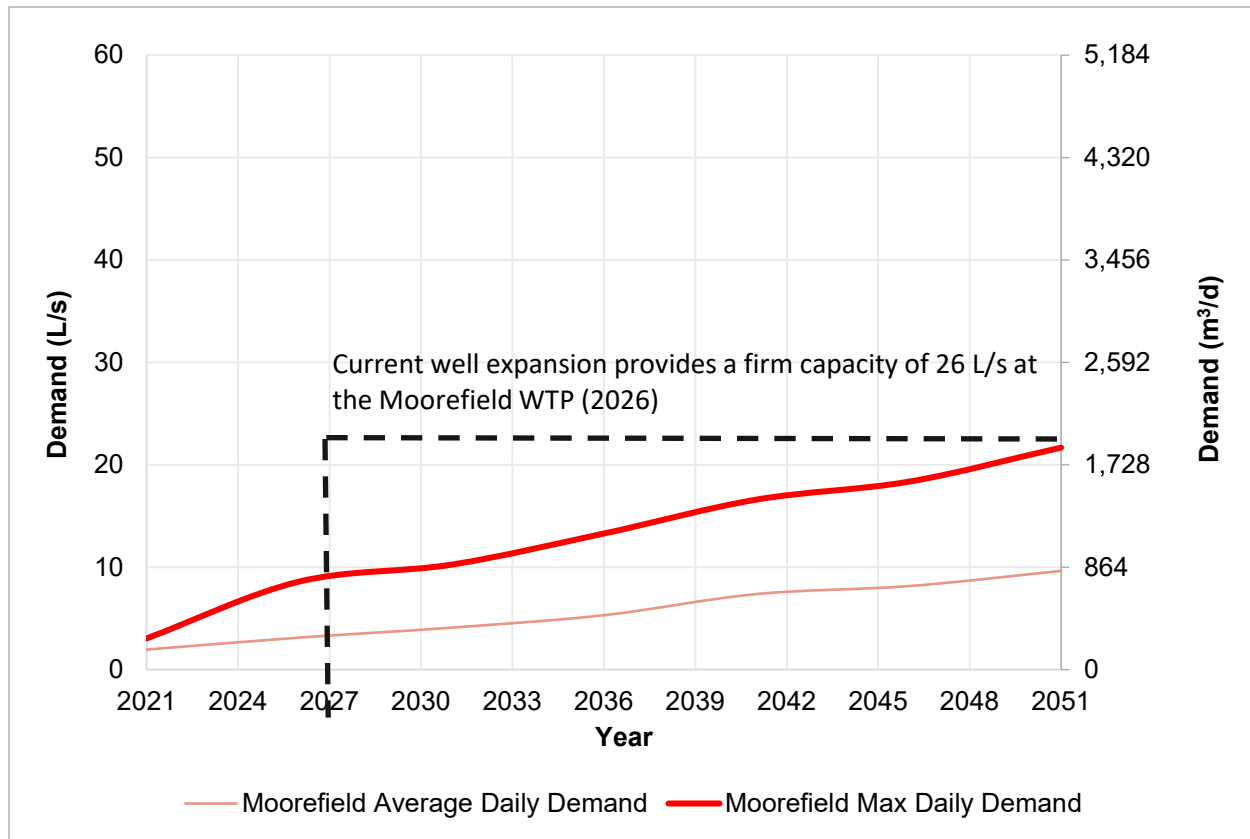


Figure 4-5: Water Demand in Moorefield from 2021 to 2051

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 m³, 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:

$$\text{Total Storage Requirement} = A + B + C$$

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) (m³)	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) (m³)	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) (m³)	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) (m³)	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

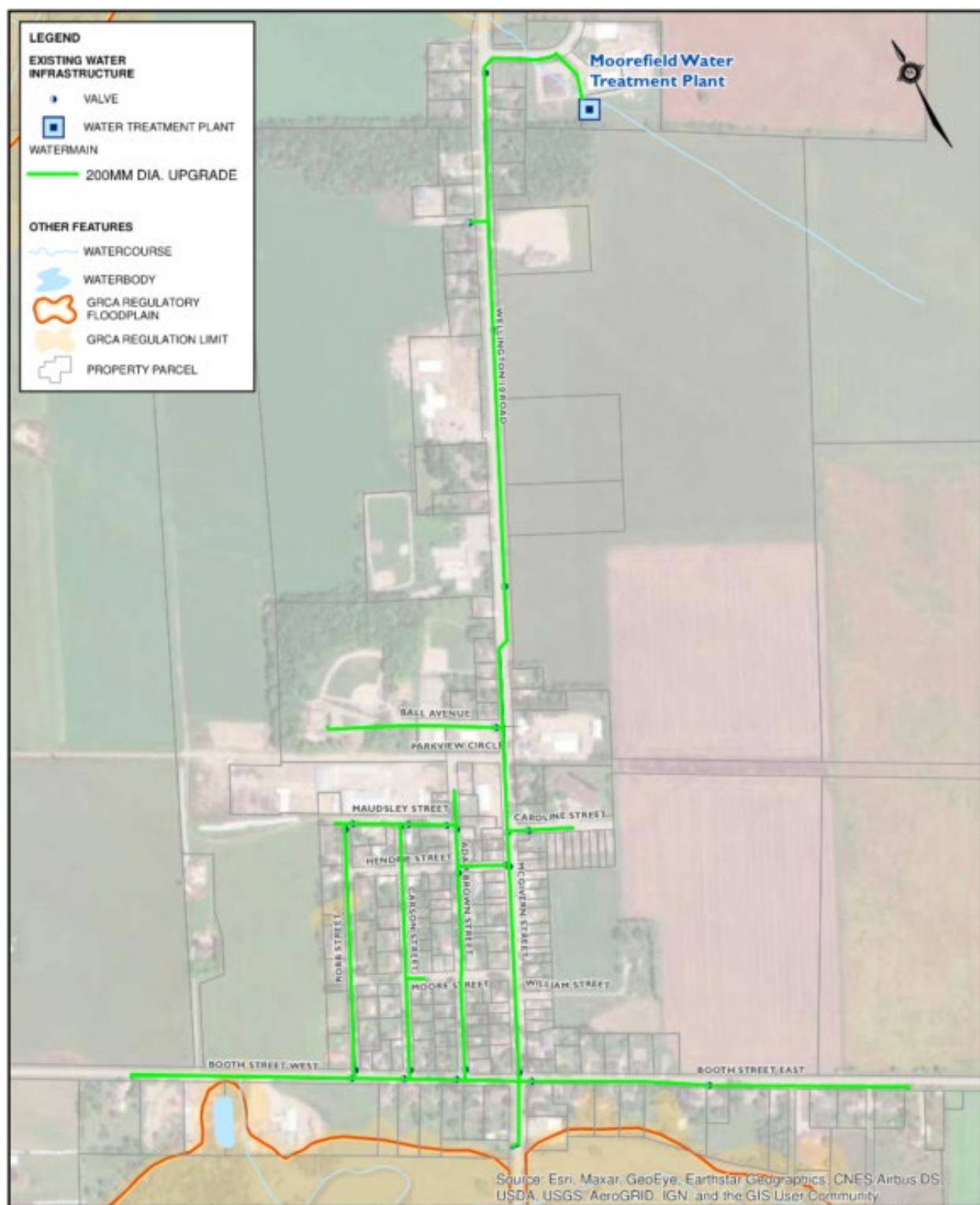


Figure 4-6: Fire Protection Upgrades

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 m³/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 m³/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

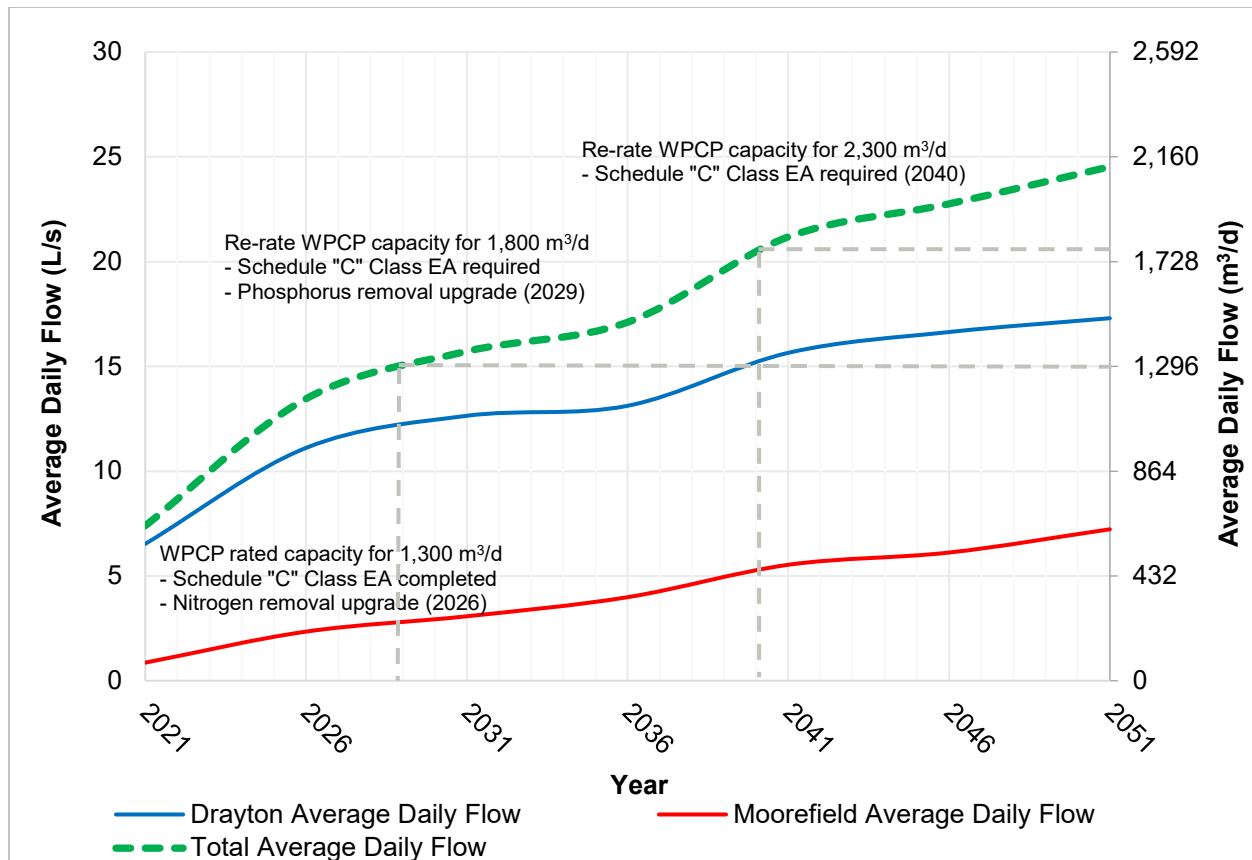


Figure 5-1: Projected Wastewater Flows for Mapleton WPCP

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 insufficient 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 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 BOD₅ 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 m³/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.

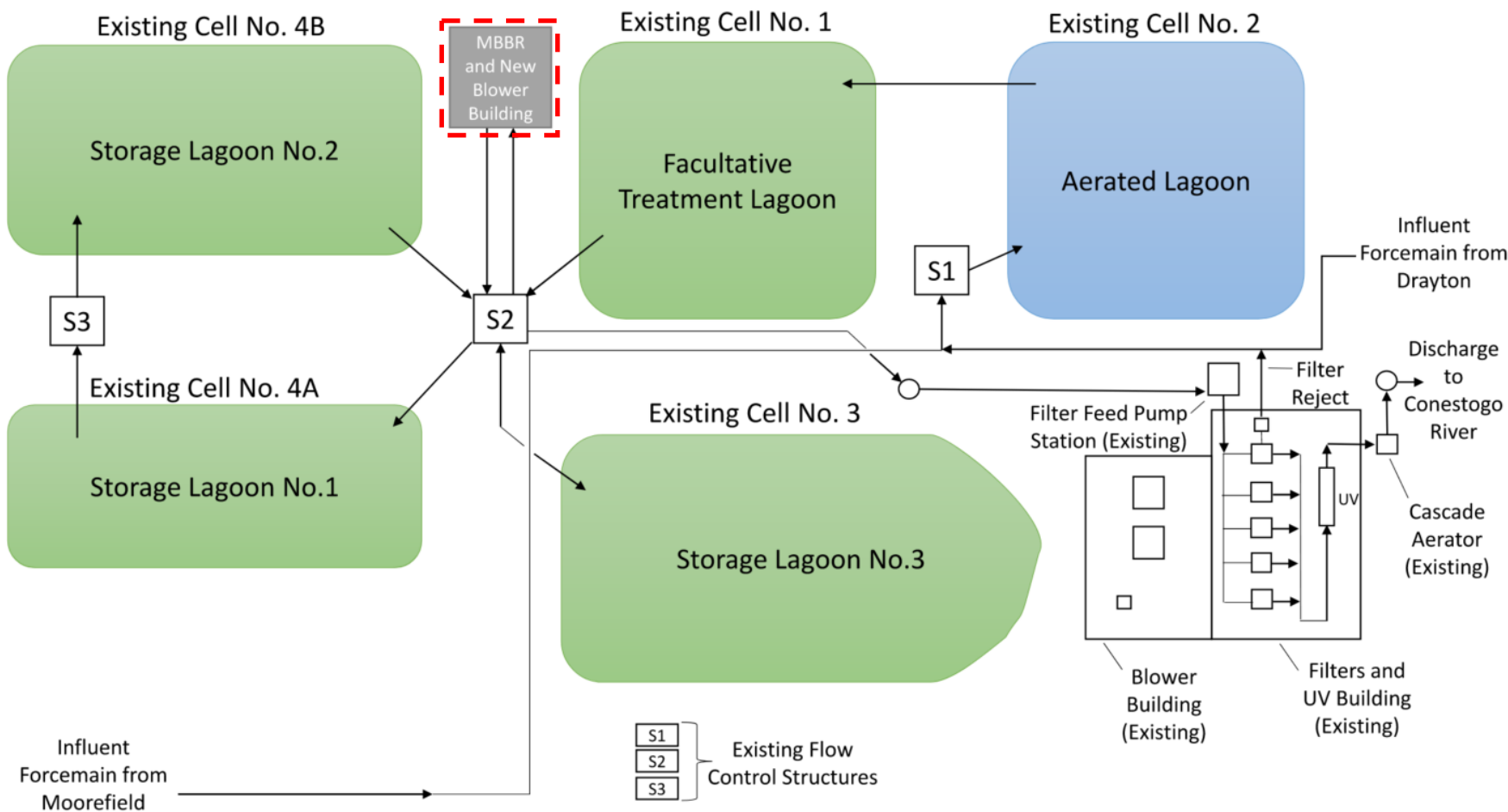


Figure 5-2: Preliminary MBBR Process Flow Diagram

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.

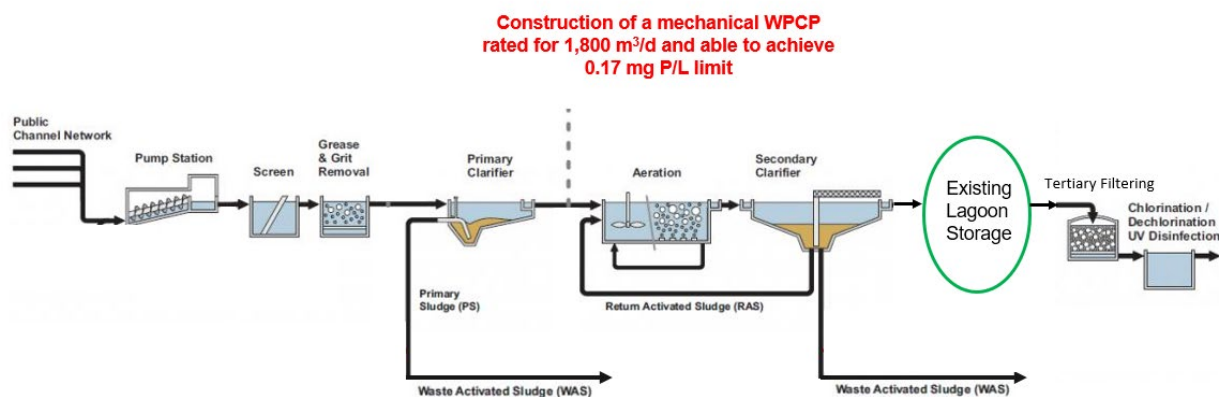


Figure 5-3: Alternative 1 – Build a New Mechanical Treatment Plant

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 Services 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 m³/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).

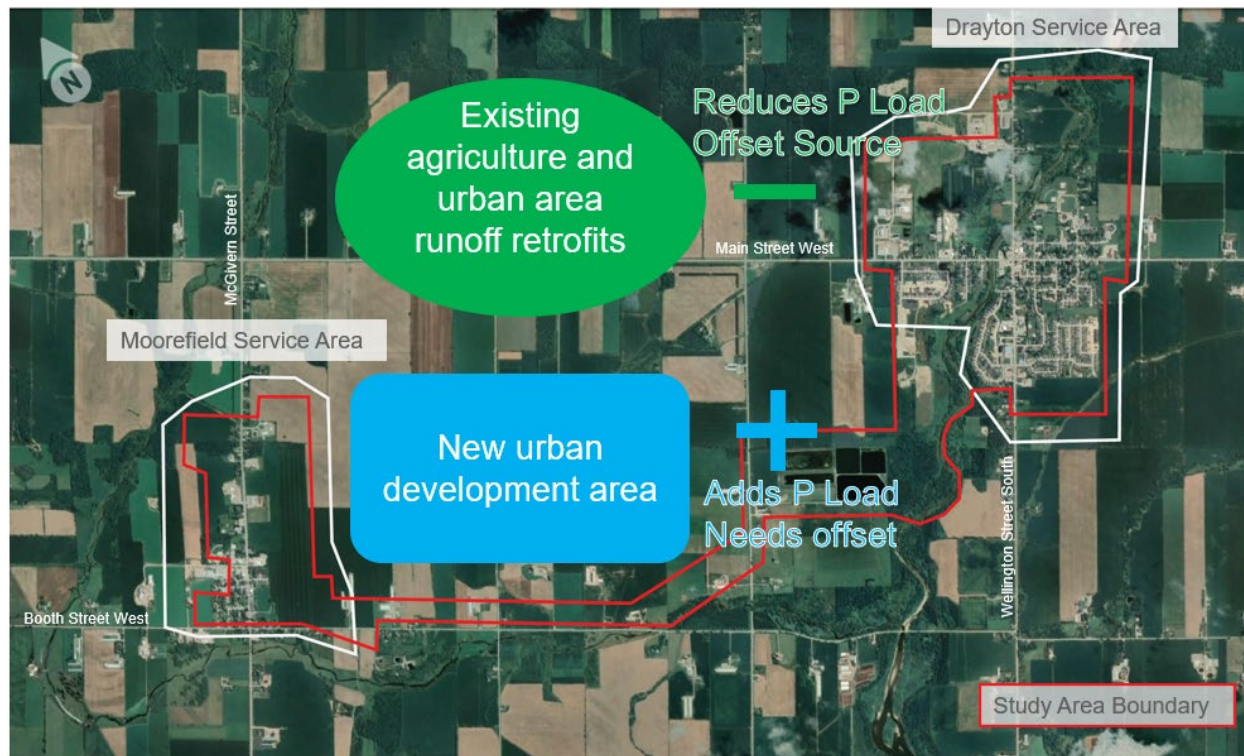


Figure 5-4: Alternative 2 – Phosphorus Offsetting Framework

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 m³/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.

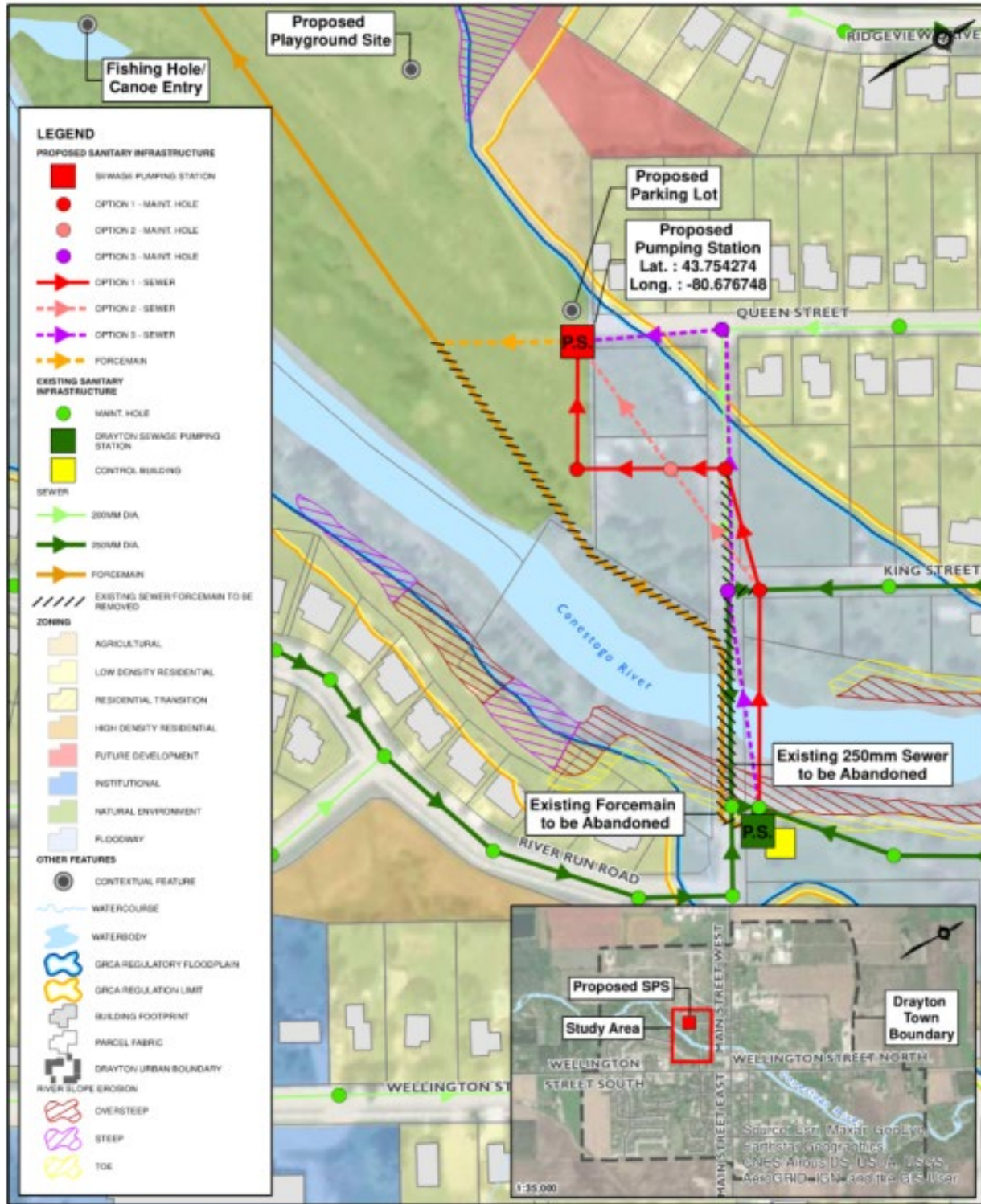


Figure 5-5: Location of the new Drayton SPS alternative on North side of the Conestoga River

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.

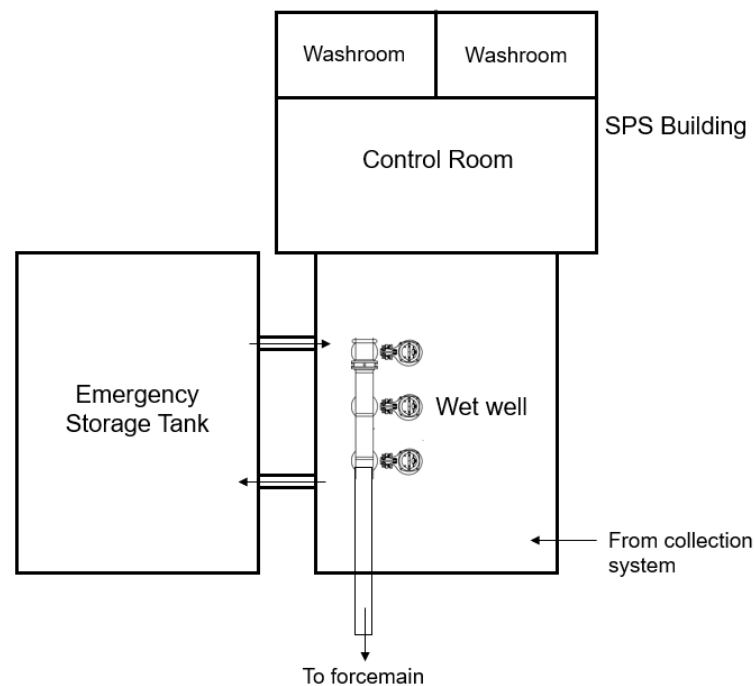


Figure 5-6: Alternative 4 Example for an Emergency Storage Tank and Wet Well Configuration for the New SPS

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.

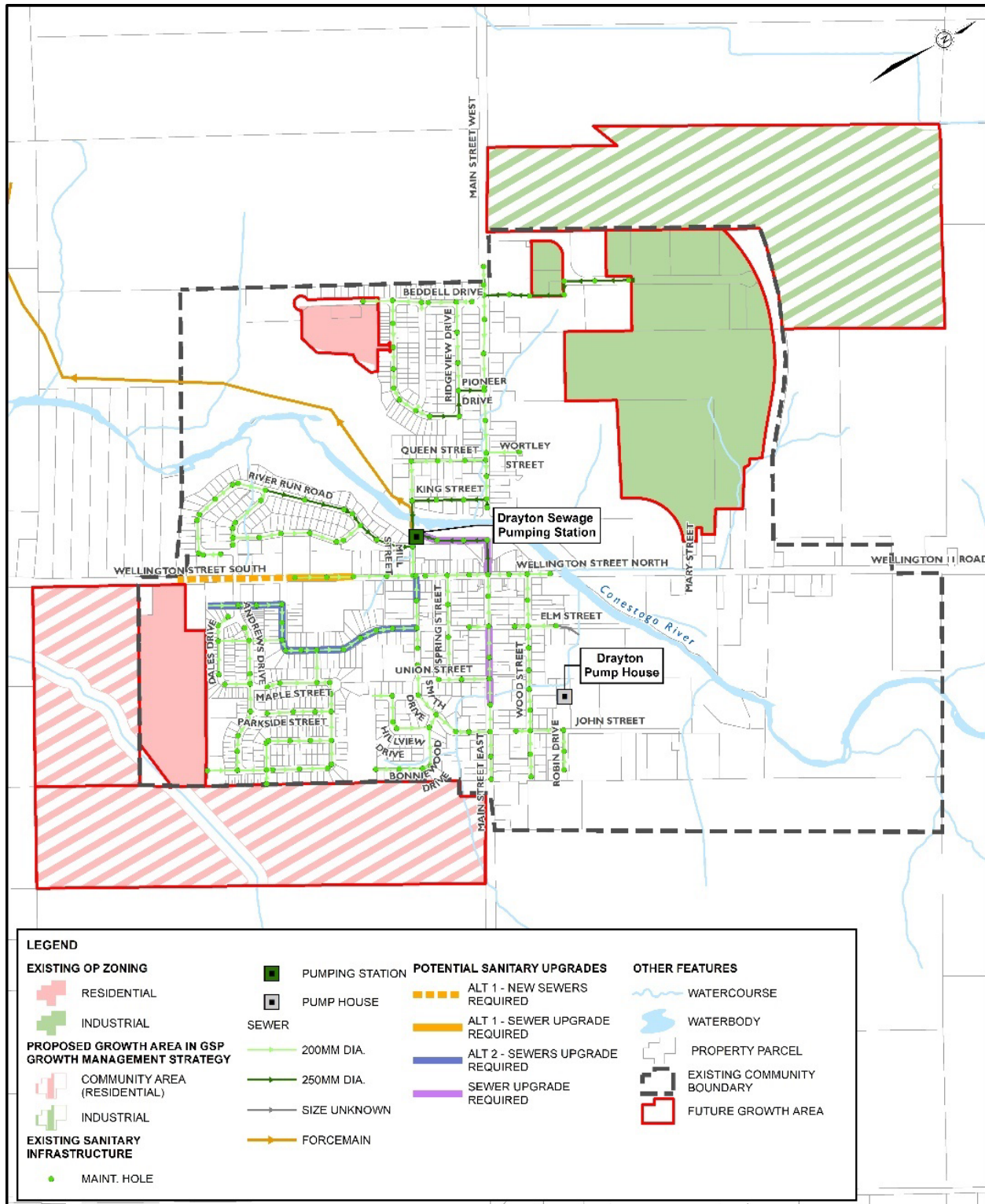


Figure 5-7: Drayton Wastewater Gravity Sewer Upgrades

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 of 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.

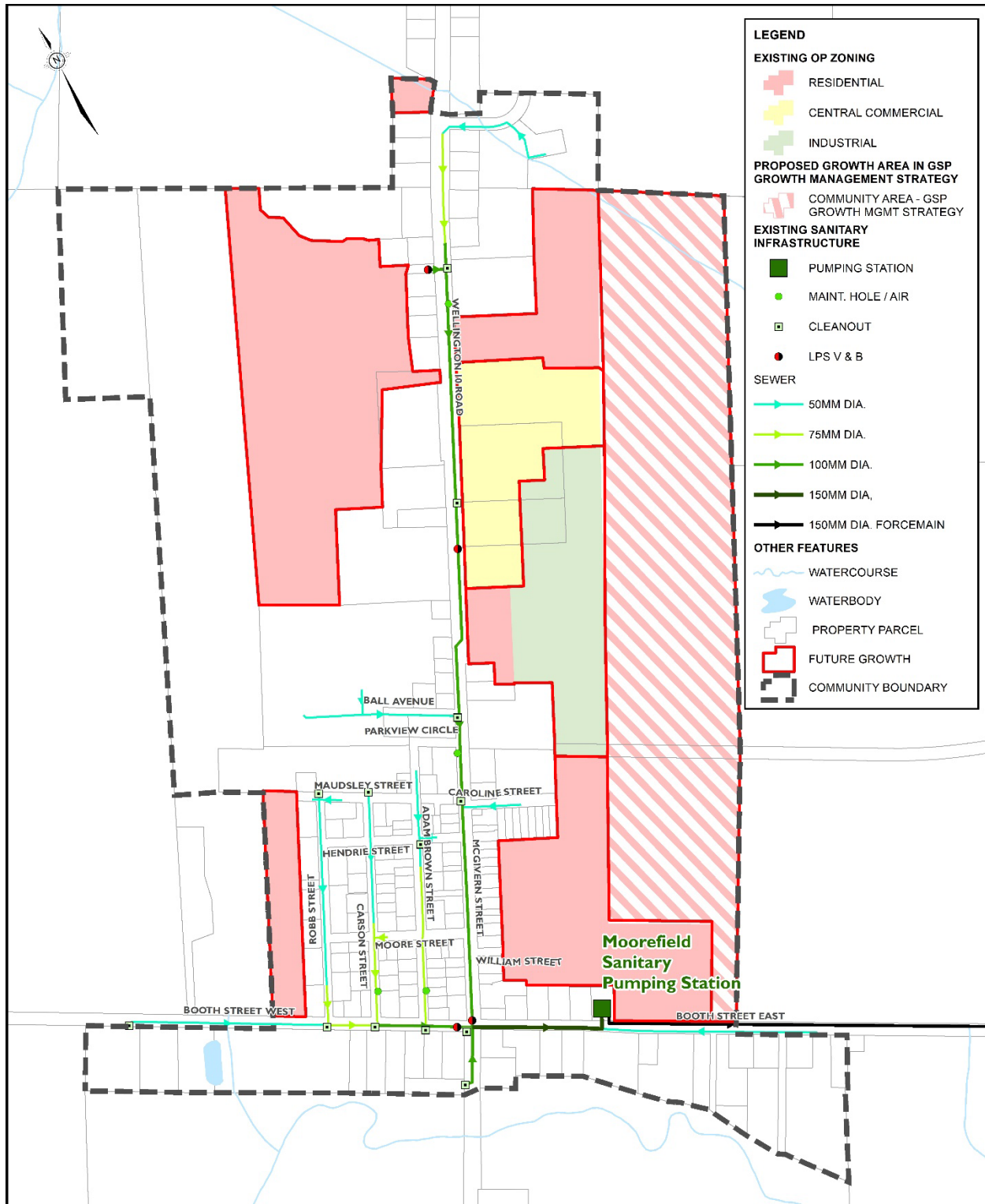


Figure 5-8: Moorefield Wastewater Low-Pressure Sewers

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

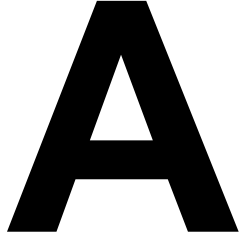
6 Next Steps

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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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	
Revision No.:		0	
		Date: 1-Dec-22	
		Revision Date:	
Costs for Tech Memo #2			
Water Servicing Alternatives	Capital Cost	O&M Costs	Calculated Life Cycle Costs
	Year 2023	Year 2023	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 existing 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 watermain	N/A	N/A	N/A
Alternative 2: Watermain 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	O&M Costs	Calculated Life Cycle Costs
	Year 2023	Year 2023	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							
Revision No.:		0							
		Date: 1-Dec-22							
		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				
Revision No.:		0				
		Date: 1-Dec-22				
		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				
Revision No.:		0				
		Date: 2-Aug-22				
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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							
Revision No.:		0							
								Date: 1-Dec-22	
								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						
Revision No.: 0					Date: 1-Dec-22	
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						
Revision No.: 0					Date: 2-Aug-22	
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							
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	\$ 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					
Revision No.:	0					
						Date: 1-Dec-22
						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					
Revision No.:	0					
						Date: 2-Aug-22
						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							
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	\$ 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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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				
Revision No.:	0				
				Date: 1-Dec-22	
				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				
Revision No.:	0				
				Date: 2-Aug-22	
				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							
Revision No.:		0							
								Date: 1-Dec-22	
								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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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				
Revision No.:	0				
				Date: 1-Dec-22	
				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				
Revision No.:	0				
				Date: 2-Aug-22	
				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							
Revision No.:		0							
								Date: 1-Dec-22	
								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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
		Date: 1-Dec-22							
		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					
Revision No.:		0					
		Date: 1-Dec-22					
		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					
Revision No.:		0					
		Date: 2-Aug-22					
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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					
Revision No.:	0					
				Date: 1-Dec-22		
				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					
Revision No.:	0					
				Date: 2-Aug-22		
				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							
Revision No.:		0							
								Date: 1-Dec-22	
								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					
Revision No.:	0				Date:	1-Dec-22
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					
Revision No.:					Date:	2-Aug-22
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							
Revision No.:		0							
								Date: 1-Dec-22	
								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				
Revision No.:	0				
				Date: 1-Dec-22	
				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				
Revision No.:	0				
				Date: 2-Aug-22	
				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							
Revision No.:		0							
		Date: 1-Dec-22							
		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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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		Chlorine 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				
Revision No.:		0				
		Date: 1-Dec-22				
		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				
Revision No.:		0				
		Date: 2-Aug-22				
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								Revision Date:	
CAPITAL AND OPERATION & MAINTENANCE COST									
Alternative 2: Extend the existng 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		Chlorine 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				
Revision No.:		0				
		Date: 1-Dec-22				
		Revision Date:				
CAPITAL AND OPERATION & MAINTENANCE COST						
Alternative 2: Extend the existng 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				
Revision No.:		0				
		Date: 2-Aug-22				
		Revision Date:				
LIFE CYLCE COST						
Alternative 2: Extend the existng 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							
Revision No.:		0							
								Date: 1-Dec-22	
								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		Chlorine 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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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				
Revision No.:		0				
		Date: 1-Dec-22				
		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				
Revision No.:		0				
		Date: 2-Aug-22				
		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							
Revision No.:		0							
		Date: 1-Dec-22							
		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				
Revision No.:	0				
				Date: 1-Dec-22	
				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				
Revision No.:	0				
				Date: 2-Aug-22	
				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
Revision No.:	0
	Date: 1-Dec-22
	Revision Date:

Alternative 2: Build a new SPS

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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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								
Revision No.:		0								
		Date: 1-Dec-22								
		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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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					
Revision No.:	0					
				Date:	1-Dec-22	
				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					
Revision No.:	0					
				Date:	2-Aug-22	
				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							
Revision No.:		0							
								Date: 1-Dec-22	
								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							
Revision No.:		0							
								Date: 1-Dec-22	
								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				
Revision No.:	0				
				Date: 1-Dec-22	
				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				
Revision No.:					
				Date: 2-Aug-22	
				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							
Revision No.:		0							
								Date: 1-Dec-22	
								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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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				
Revision No.:		0				
						Date: 1-Dec-22
						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				
Revision No.:		0				
						Date: 2-Aug-22
						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

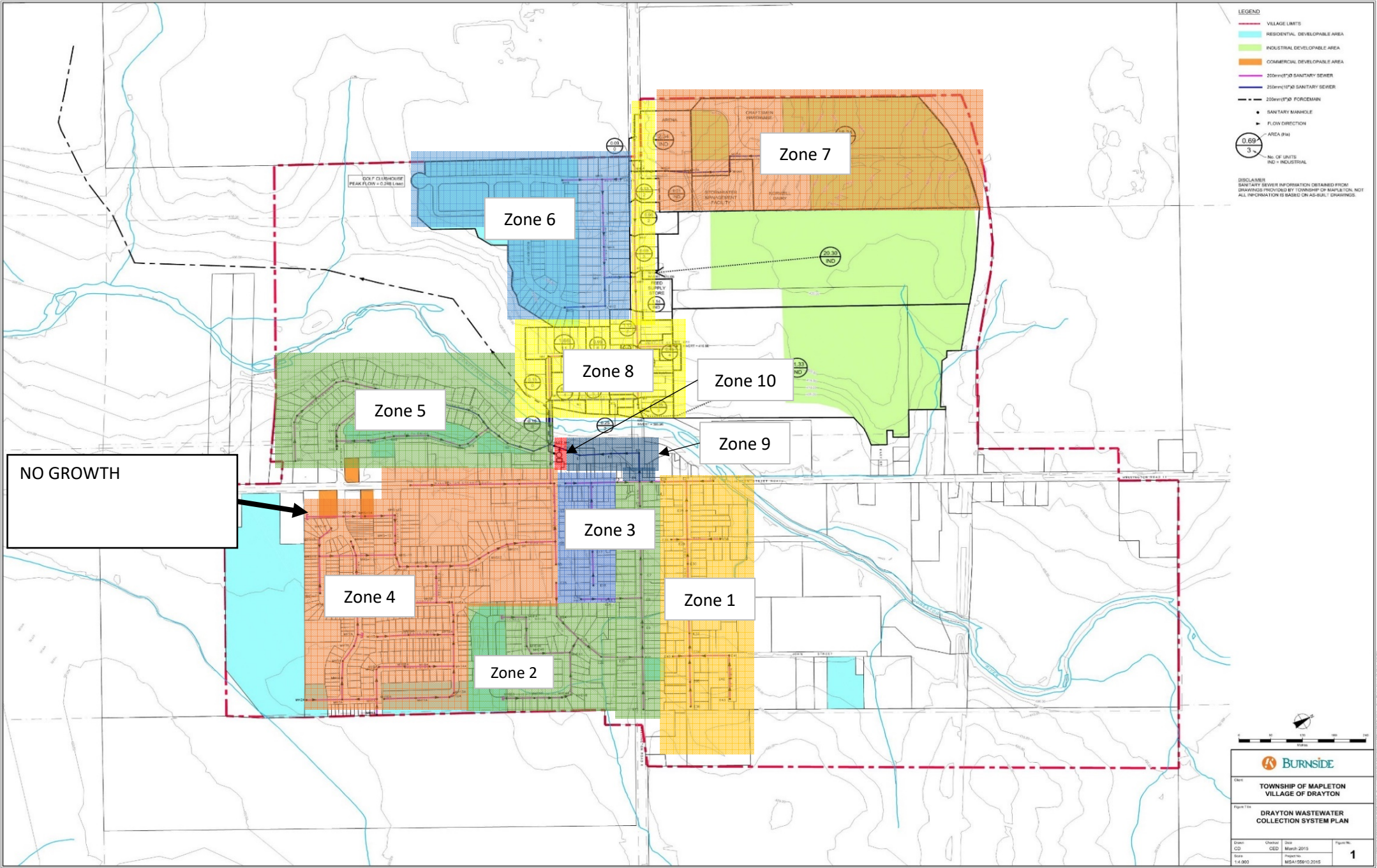
Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

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 Densi 25 ppha

Total SAN Catchment Area
91.37 ha
Total Population
2802.00 ppl

3795.00



Designed By:

2023-02-21

Date:

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:

25

ppha

Zone 1

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)
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

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:

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 Dr.	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

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:

25

ppha

Zone 3

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)
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
					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 Density	25	ppha

[illegible]

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 Density:

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)
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 Density	25	ppha

[illegible]

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:

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)
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

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:

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)
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

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:

25

ppha

Zone 5

	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

[illegible]

Bedell Dr.	From Bedell Dr./ Street "A"	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
			MH 306A			1.21	31											
Ridgeview Dr.	From Unnamed Inner Easement	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
			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.	From Street "A"	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
			MH 300A			1.77	45											
Ridgeview Dr.	From 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
			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

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 (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)
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

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:

25

ppha

Zone 8

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)
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

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:

25

ppha

Zone 9

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)
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

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:

25

ppha

Zone 10

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)
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

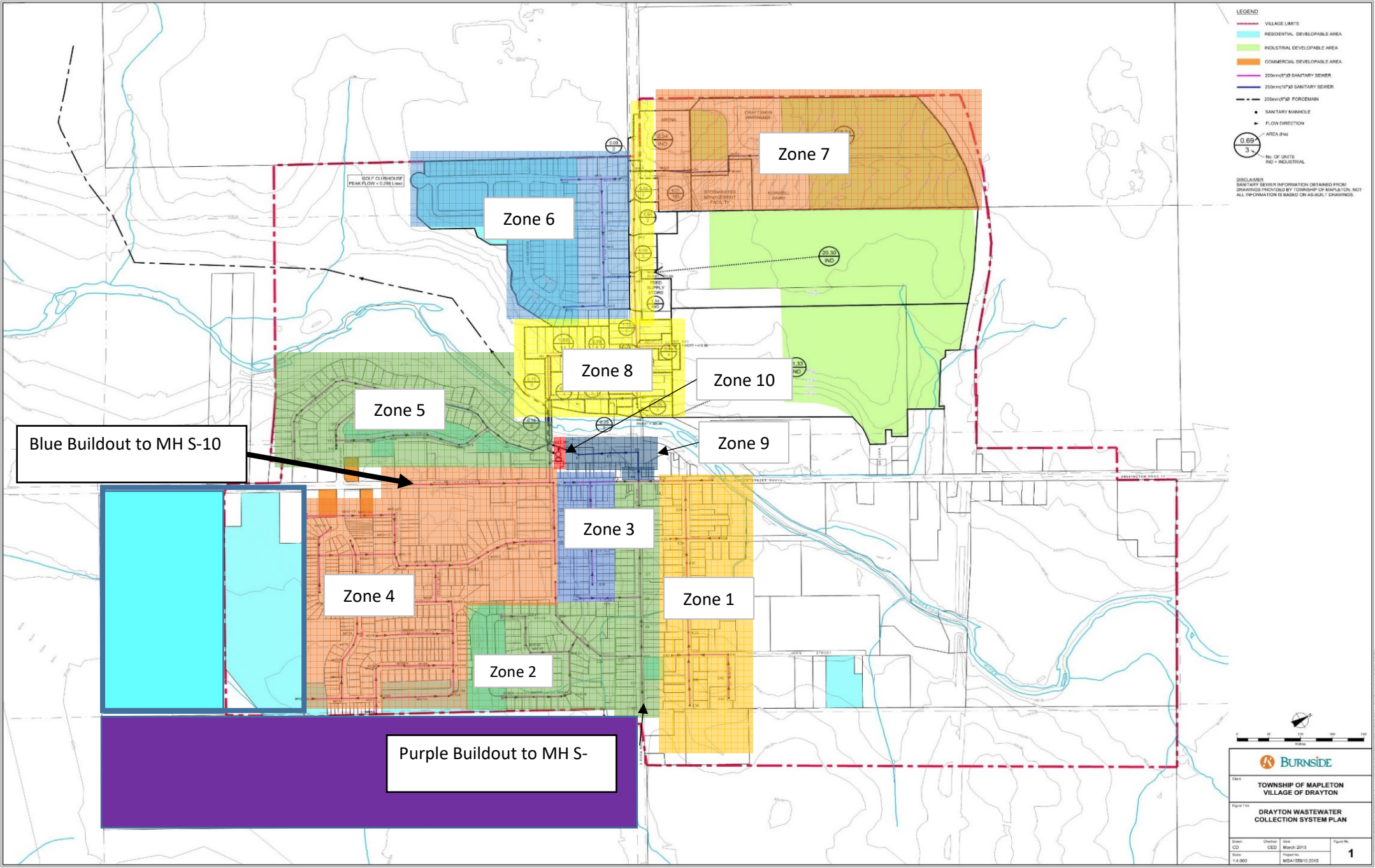
Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
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.
Project Number: T000974B
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 Densi 25 ppha

Total SAN Catchment Area
161.24 ha
Total Population
5597.00 ppl

3795.00



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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

25

ppha

Zone 1

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)
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

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

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 Dr.	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

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

25

ppha

Zone 3

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)
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
					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 Allowance:	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 Density:	25	ppha

[illegible]

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 Density:

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)
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				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 Density	25	ppha

[illegible]

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

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)
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

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

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)
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

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

25

ppha

Zone 5

	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						Domestic Flow:		300		L/cap/d	
Date:		2023-02-21		Project Number:		T000974B						Infiltration Allowance:		0.2		L/s/ha	
Checked By:				Municipality:		Township of Mapleton						Peak Factor:		Harmon's Formula			
Date:												Manning's "n":		0.013			
												Population Density:		25		ppha	
Zone 6																	
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)
"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.	

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

Designed By:

Date:

Checked By:

Date:

2023-02-21

Project:

Project Number:

Municipality:

Drayton Sanitary Collection System - 20-Year Buildout

T000974B

Township of Mapleton

Domestic Flow:

Infiltration Allowance:

Peak Factor:

Manning's "n":

Population Density:

300

0.2

Harmon's Formula

0.013

50

L/cap/d

L/s/ha

ppha

Zone 7

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)
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

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Jennifer McDonald

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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:

25

ppha

Zone 8

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)
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

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

25

ppha

Zone 9

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

25

ppha

Zone 10

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)
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



Engineering
for **people**

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.

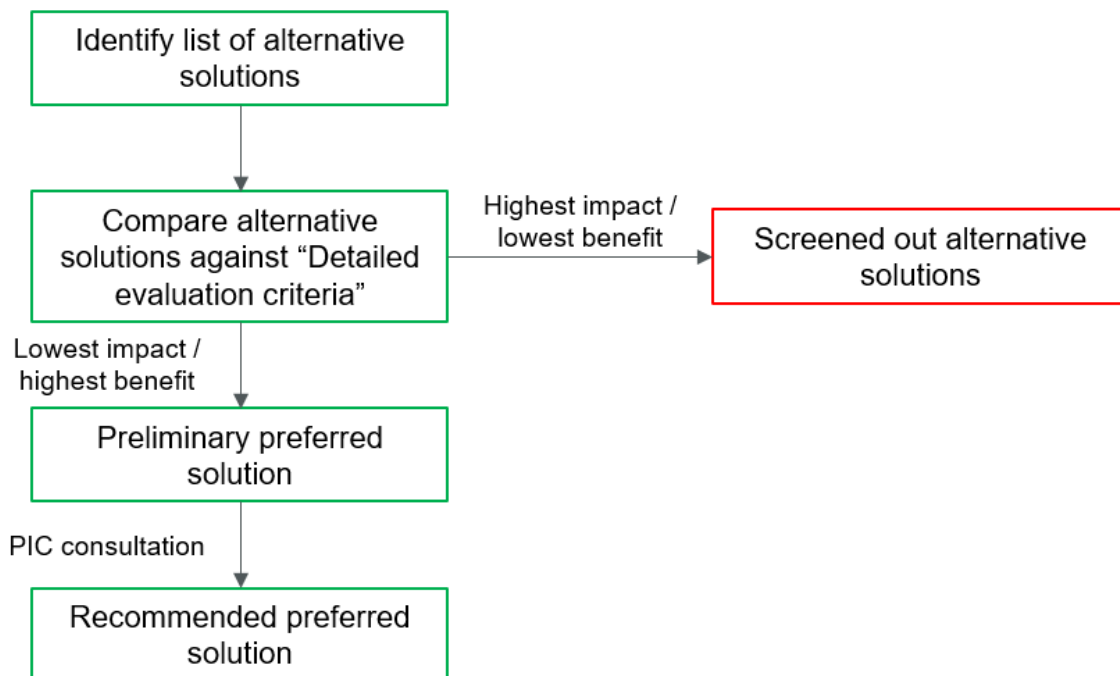


Figure 2-1: Overview of Evaluation Approach

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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> Potential impact to historical, cultural, and architecturally significant features Potential impact to First Nations communities
Protects Archaeological Features	Minimizes impact to archaeological features	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Optimize existing property ownership • Requirement to acquire new land or expand ownership
Permits and Approvals	Ease of permits and approvals	<ul style="list-style-type: none"> • Complexity of and time spent to obtain approvals from various regulatory agencies
Financial/Economic		30%
Life Cycle Cost	20-year life cycle cost	<ul style="list-style-type: none"> • 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 completely 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.



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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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Technical Memorandum 4 – Evaluation of Alternatives

Mapleton Water and Wastewater Servicing Master Plan

File no T000974D

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Appendix A: Detailed Evaluation Matrix

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.

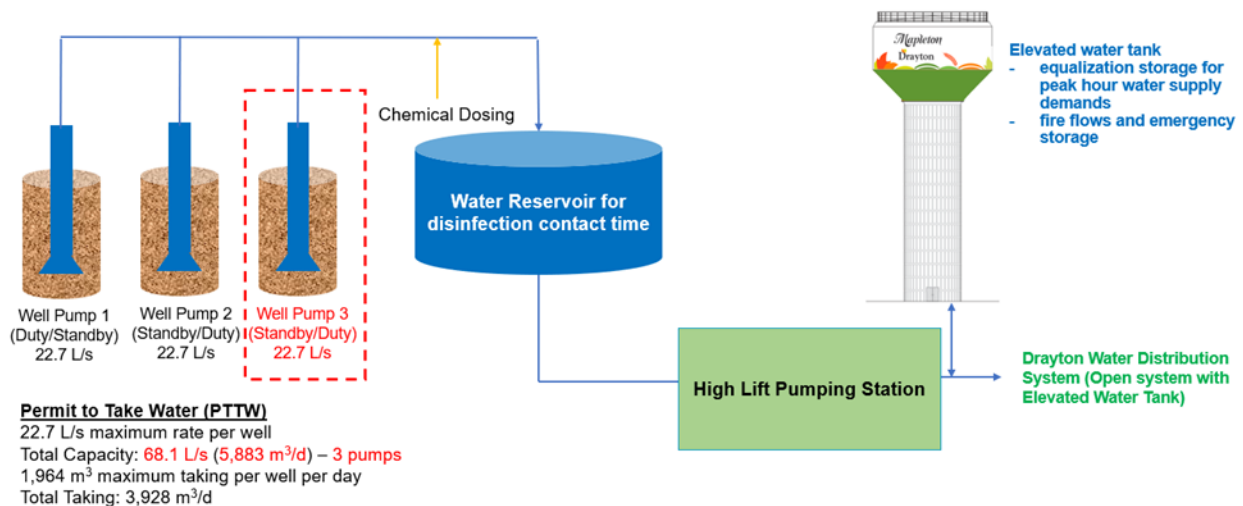


Figure 2-1: Build a New Well to Increase Supply Capacity

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.

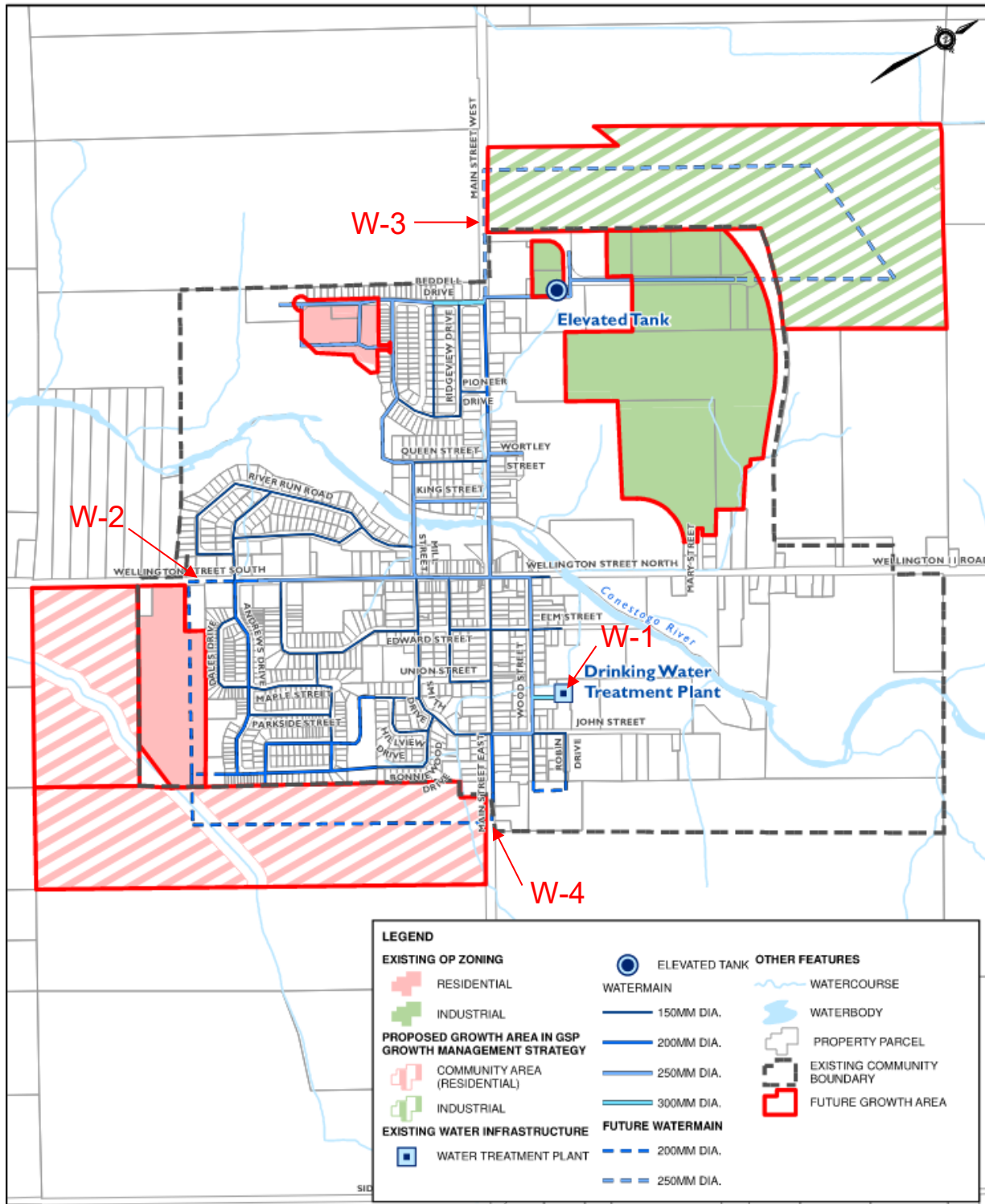


Figure 2-2: Drayton Drinking Water Distribution Strategy

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 m³/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 m³/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 m³/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 m³/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.

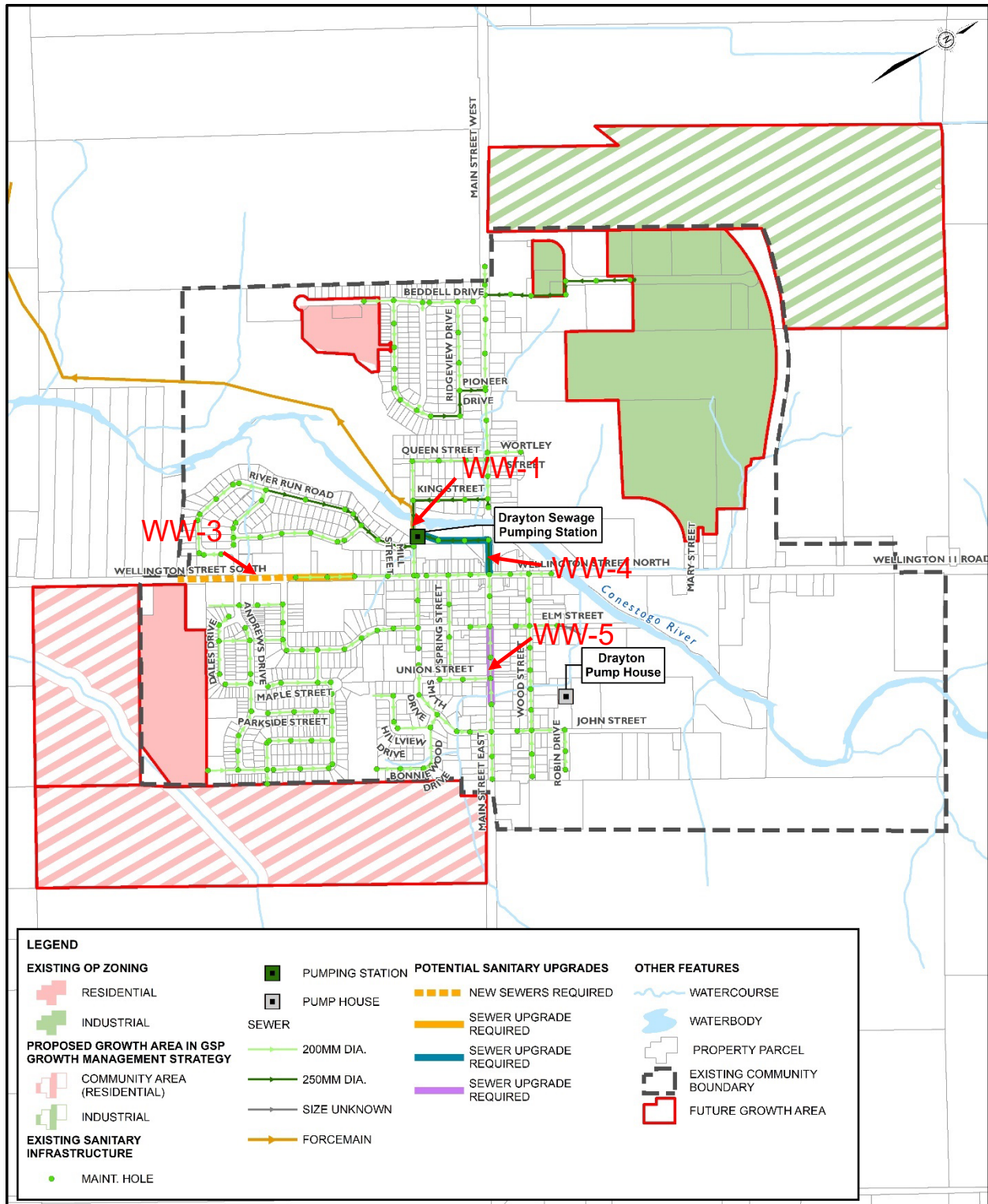


Figure 3-1: Drayton Collection System Strategy

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 Conestoga 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

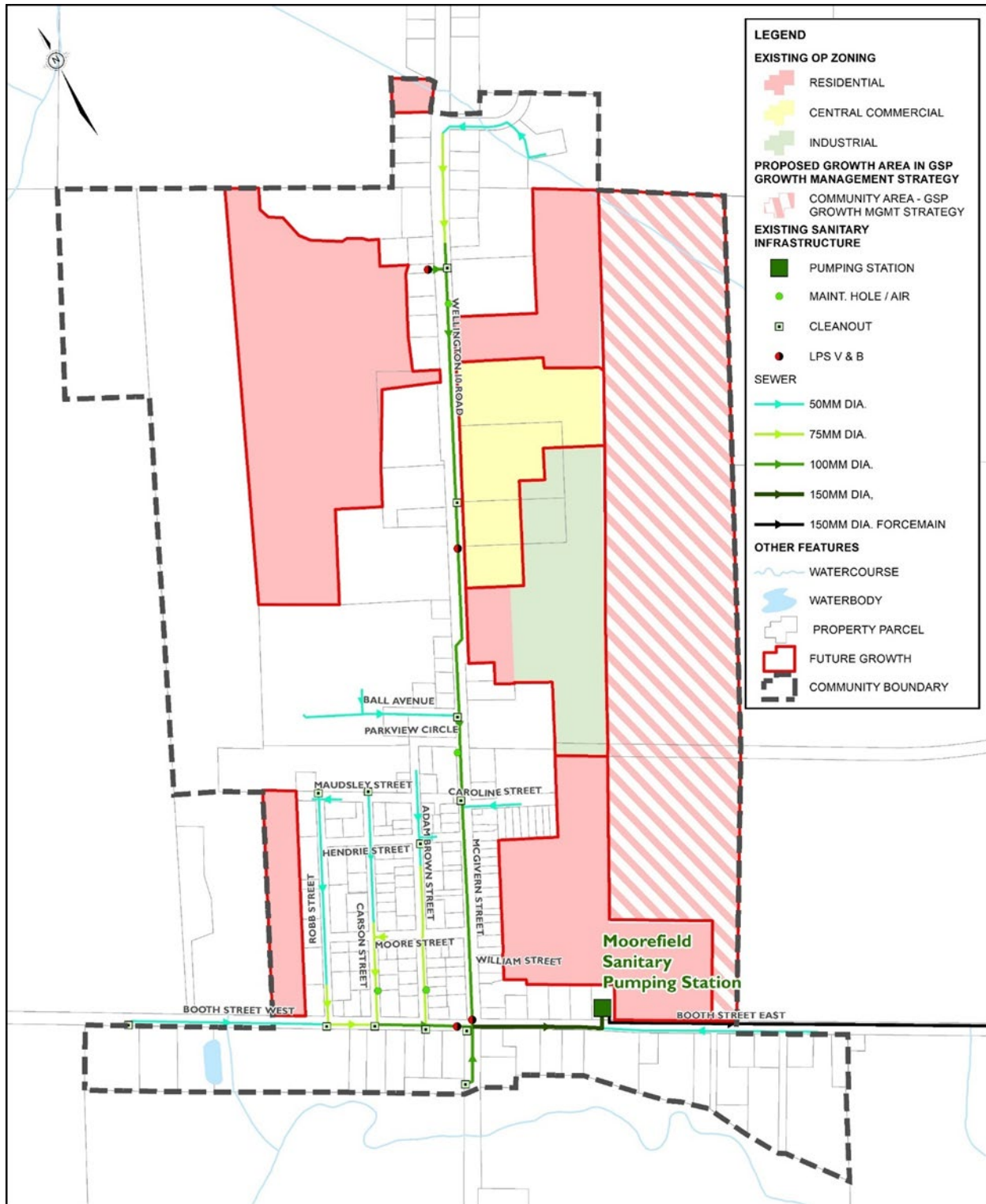


Figure 3-2: Moorefield Wastewater Low-Pressure Sewers

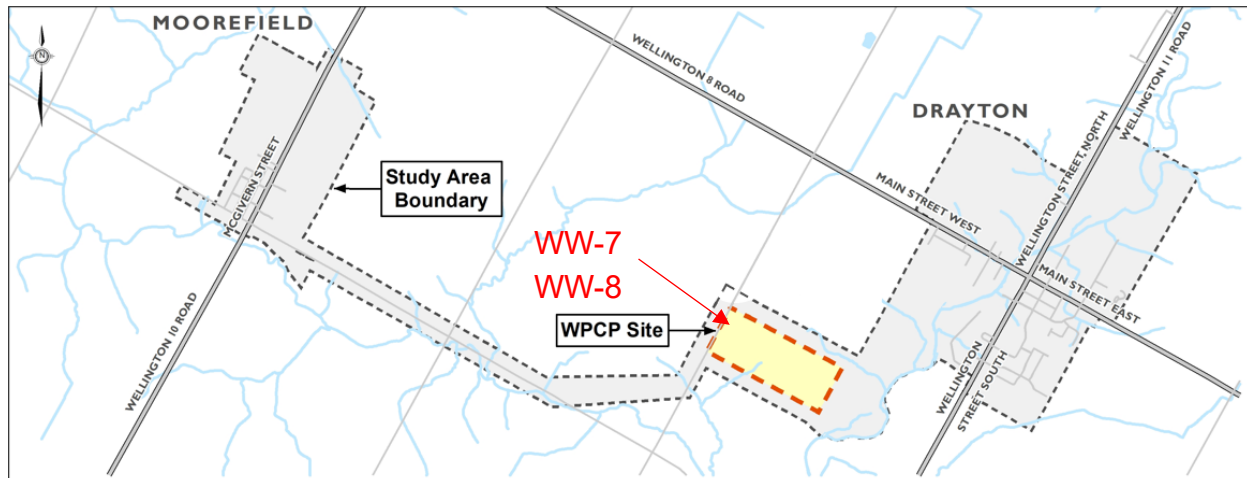


Figure 3-3: Wastewater Treatment Servicing Strategy

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



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	<div></div>	2
Alternative 2: Build a New Well on the Existing Site to Increase Capacity	96.3	<div></div>	1
Alternative 3: Build a New Well on another site to Increase Capacity	67.1	<div></div>	3
Moorefield Drinking Water System			
Storage and Distribution Alternatives			
Alternative 1: No Fire Flow Service	95.0	<div></div>	1
Alternative 2: Fire Flow Service	65.1	<div></div>	2
Wastewater System			
Phosphorus Removal Alternatives			
Alternative 1: Build a new mechanical treatment plant	74.0	<div></div>	1
Alternative 2: Phosphorus offsetting	73.0	<div></div>	2
Drayton Collection System			
SPS Alternatives			
Alternative 2: New SPS on the North Side of the River	77.1	<div></div>	2
Alternative 3: Maintain existintg SPS and Construct a New SPS on the North Side of the River	75.6	<div></div>	3
Alternative 4: New SPS with onsite emergency storage	78.0	<div></div>	1
Collection System and Forcemain Alternatives			
Alternative 1: Upgrade Existing Gravity Sewers	92.0	<div></div>	1
Alternative 2: Build Local Pumping Station and Forcemain to the Existing Drayton SPS or New SPS	72.7	<div></div>	2
Alternative 3: Build Local Pumping Station and Forcemain to the Mapleton WPCP	65.0	<div></div>	3
Moorefield Collection System			
SPS Alternatives			
Alternative 1: Expand SPS on Existing Site	98.1	<div></div>	1
Alternative 2: Build a New SPS on a New or Existing Site	85.8	<div></div>	2
Alternative 3: Build a Local SPS and New Forcemain to the Mapleton WPCP	77.5	<div></div>	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	<div></div>	4
Collection System and Forcemain Alternatives			
Alternative 1: Low-pressure Sewers	91.2	<div></div>	1
Alternative 2: All Gravity Sewers	71.2	<div></div>	3
Alternative 3: Combination Gravity Sewer and Low-pressure Sewers	87.6	<div></div>	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 comaprabable 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	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	<ul style="list-style-type: none">Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areasProvides 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	<ul style="list-style-type: none">Reduced likelihood of disrupted service, process upset, and/or mechanical breakdownProvide 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)	<ul style="list-style-type: none">Compatibility with existing systemLength of construction periodEase of implementation (construction schedule and phasing opportunities)Scalability and ability for future expansion and upgradesAbility to maintain water servicing during constructionAbility 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	<ul style="list-style-type: none">Maximize water stability in distribution systemFlexibility to respond to variable raw water qualityFlexibility 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	<ul style="list-style-type: none">Compatibility with existing systemComplexity of treatment processesOperational flexibility and ability to respond to future treatment objectivesOperation 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	<ul style="list-style-type: none">Optimize existing infrastructure investment including structures, tanks, and equipmentAligns 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	<ul style="list-style-type: none">Optimize existing property ownershipRequirement 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	<ul style="list-style-type: none">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			
Financial / Economic	30	Life Cycle Cost: 20-year life cycle cost	<ul style="list-style-type: none">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						
					Score 1 to 5	Weighted Score					Score 1 to 5	Weighted Score		
Rationale								Rationale						
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 upsizewatermains as existing utility corridor, predominantly 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 upsizewatermains as existing utility corridor, predominantly 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 heritage, 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	• Competibility 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 Pumpouse 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. Additioanly, 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 faciilities 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 curtual heritage, minimizing potential for impacts.	5.0	3.3	●	Unknown curtual heritage 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	<ul style="list-style-type: none">Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areasProvides 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	<ul style="list-style-type: none">Reduced likelihood of disrupted service, process upset, and/or mechanical breakdownProvide 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)	<ul style="list-style-type: none">Compatibility with existing systemLength of construction periodEase of implementation (construction schedule and phasing opportunities)Scalability and ability for future expansion and upgradesAbility to maintain water servicing during constructionAbility 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	<ul style="list-style-type: none">Proven record of phosphorus removal performanceFlexibility to respond to variable raw water qualityFlexibility 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	<ul style="list-style-type: none">Compatibility with existing systemComplexity of treatment processesOperational flexibility and ability to respond to future treatment objectivesOperation 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	<ul style="list-style-type: none">Optimize existing infrastructure investment including structures, tanks, and equipmentAligns 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	<ul style="list-style-type: none">Optimize existing property ownershipRequirement 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 additional land would need to be purchased for the phosphorus offsetting program.	1.0	1.0	○
		Permits and Approvals: Ease of permits and approvals	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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										Collection System and Foremain Alternatives																													
Category	Weight	Criteria	Indicators	SPS Alternatives										Collection System and Foremain Alternatives																									
				Alternative 2: New SPS on the North Side of the River					Alternative 3: Maintain existing SPS and Construct a New SPS on the North Side of the River					Alternative 1: New SPS with onsite emergency storage					Alternative 2: Upgrade Existing Gravity Sewers					Alternative 1: Build Local Pumping Station and Foremain to the Existing Drayton SPS or New SPS					Alternative 1: Build Local Pumping Station and Foremain 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				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 impact 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 foremain 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.	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 foremain 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 foremain 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	●			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 foremain would be required to cross the river. If connected to new SPS, a second foremain 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 foremain 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	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	●			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. Protect fisheries and aquatic health	Little to no impacts to wildlife. Lower risk to fisheries and aquatic health with no foremain river crossing.	3.0	1.5	⬇️			Little to no impacts to wildlife. Higher risk to fisheries and aquatic health with the existing foremain river crossing.	3.0	1.5	⬇️			Little to no impacts to wildlife. Lower risk to fisheries and aquatic health with no foremain river crossing. Emergency storage provides overflow protection.	4.5	2.3	●			Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the work will be 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 foremain. 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 foremain. 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	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 ecosystem's 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 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 follows 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.	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						6.3						6.5						9.0						6.0						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)	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 existing 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.	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.	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	●			Upized 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 foremain 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 foremain 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. 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	⬇️			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 foremain to the Drayton 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. Long-term construction impacts from noise and dust are expected while building the new local SPS and foremain to the WPCP. 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 foremain 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	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 industrial 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	●			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	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. 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, maintaining public support.	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, maintaining 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. 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, maintaining public support.	4.5	3.0	●			Some disruption to roadway access is possible while routing foremain 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 foremain 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 foremain 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	Potential impact to historical, cultural, and architecturally significant features or 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 cultural 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	●			Construction will be constrained to the existing locations, which is previously disturbed and retains little to no cultural 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	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 cultural 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	●			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						16.3						16.3						17.0						14.7						14.3									
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 Aligns with existing and planned infrastructure	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	●			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, foremain) and 20-year capacity (pumps).	5.0	5.7	●			The new SPS will be sized appropriately for the ultimate buildout (wet well, foremain) 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	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	●			New upized gravity sewers would increase operational reliability, reduce flow/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 foremain 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 foremain would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Second foremain to WPCP increases operational redundancy and system robustness.	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	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. Longest construction duration compared to other alternatives. Construction will have to be staged 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. Some constructability challenges with emergency storage tank and wet well footprints, 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	●			Upized 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 foremain 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 existing infrastructure	3.5	4.0	⬇️			The new local SPS and foremain 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 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	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 foremain river crossing. Ability to use existing foremain and no additional costs associated with an upgraded river crossing. Would eliminate the existing operational and maintenance issues with the existing 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 suppress 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 foremain river crossing. Ability to use existing foremain and no additional 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 suppress peak flows.	5.0	5.7	●	</																			

Matrix 2: Detailed Evaluation of Wastewater Servicing Alternatives																			
Category	Weight	Criteria		Indicators	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 Foremain to the Mapleton WPCP			Alternative 4: Build a Local SPS and new foremain 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	<ul style="list-style-type: none">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 foremain corridor. Vegetation removal not expected, other than ornamental grasses. Construction area to be re-sodded 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 foremain to the Mapleton WPCP must be added. For the existing site, the existing foremain could be upgraded or a second foremain 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 foremain 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 foremain 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	<ul style="list-style-type: none">Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifersConformity with policies and requirements of existing source water protection programPotential significant drinking water threatsPotential 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	<ul style="list-style-type: none">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 be 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 foremain 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 foremain 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	<ul style="list-style-type: none">Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demandsGreenhouse 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 impactsPrioritizes 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	<ul style="list-style-type: none">Potential risk to health and safety of operator and maintenance staffPotential 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)	<ul style="list-style-type: none">Noise and dust production from constructionPotential 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 foremain. 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 foremain. 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 SPS and foremain 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 foremain, and building the new SPS and foremain. 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	<ul style="list-style-type: none">Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operationPresence of existing natural or other features around proposed infrastructure that may help reduce visibilityAbility to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping featuresDistance 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	<ul style="list-style-type: none">Maintain access for businesses during construction and operationPotential 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	<ul style="list-style-type: none">Potential impact to historical, cultural, and architecturally significant featuresPotential impact to First Nations communities	Construction will be constrained to the existing site, which is previously disturbed and retains little to no cultural 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 foremain 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	<ul style="list-style-type: none">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 foremain 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	<ul style="list-style-type: none">Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areaProvides 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, foremain) 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	<ul style="list-style-type: none">Reduced likelihood of disrupted service, process upset, and/or mechanical breakdownProvide 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 foremain does not increase operational redundancy.	4.5	5.1	●	The new SPS and foremain would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Second foremain 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)	<ul style="list-style-type: none">Compatibility with existing systemLength of construction periodEase of implementation (construction schedule and phasing opportunities)Scalability and ability for future expansion and upgradesAbility to maintain water servicing during constructionAbility 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 minimizes the existing building footprint.	3.0	3.4	●
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	<ul style="list-style-type: none">Compatibility with existing systemComplexity of treatment processesOperational flexibility and ability to respond to future treatment objectivesOperation 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	<ul style="list-style-type: none">Optimize existing infrastructure investment including structures, tanks, and equipmentAligns 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	<ul style="list-style-type: none">Optimize existing property ownershipRequirement to acquire new land or expand ownership	Optimizes existing property ownership, does not require land acquisition.	5.0	5.7	●	Optimizes existing property ownership, land acquisition may be required.	4.5	5.1	●	Land acquisition may be required.	4.0	4.6	●	Optimizes existing property ownership, land acquisition may be required.	4.5	5.1	●
		Permits and Approvals: Ease of permits and approvals	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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							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			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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifersConformity with policies and requirements of existing source water protection programPotential significant drinking water threatsPotential 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demandsGreenhouse 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 impactsPrioritizes 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	<ul style="list-style-type: none">Potential risk to health and safety of operator and maintenance staffPotential 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)	<ul style="list-style-type: none">Noise and dust production from constructionPotential 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	<ul style="list-style-type: none">Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operationPresence of existing natural or other features around proposed infrastructure that may help reduce visibilityAbility to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping featuresDistance 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	<ul style="list-style-type: none">Maintain access for businesses during construction and operationPotential 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	<ul style="list-style-type: none">Potential impact to historical, cultural, and architecturally significant featuresPotential 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areasProvides 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	<ul style="list-style-type: none">Reduced likelihood of disrupted service, process upset, and/or mechanical breakdownProvide 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 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)	<ul style="list-style-type: none">Compatibility with existing systemLength of construction periodEase of implementation (construction schedule and phasing opportunities)Scalability and ability for future expansion and upgradesAbility to maintain water servicing during constructionAbility 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 involve 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 involve 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	<ul style="list-style-type: none">Compatibility with existing systemComplexity of treatment processesOperational flexibility and ability to respond to future treatment objectivesOperation 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	<ul style="list-style-type: none">Optimize existing infrastructure investment including structures, tanks, and equipmentAligns 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	<ul style="list-style-type: none">Optimize existing property ownershipRequirement 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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						91.2			71.2			87.6			



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Township of Mapleton

Mapleton Water and Wastewater Servicing Master Plan

Technical Memorandum 5 – Implementation Plan

Friday, April 14, 2023

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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.

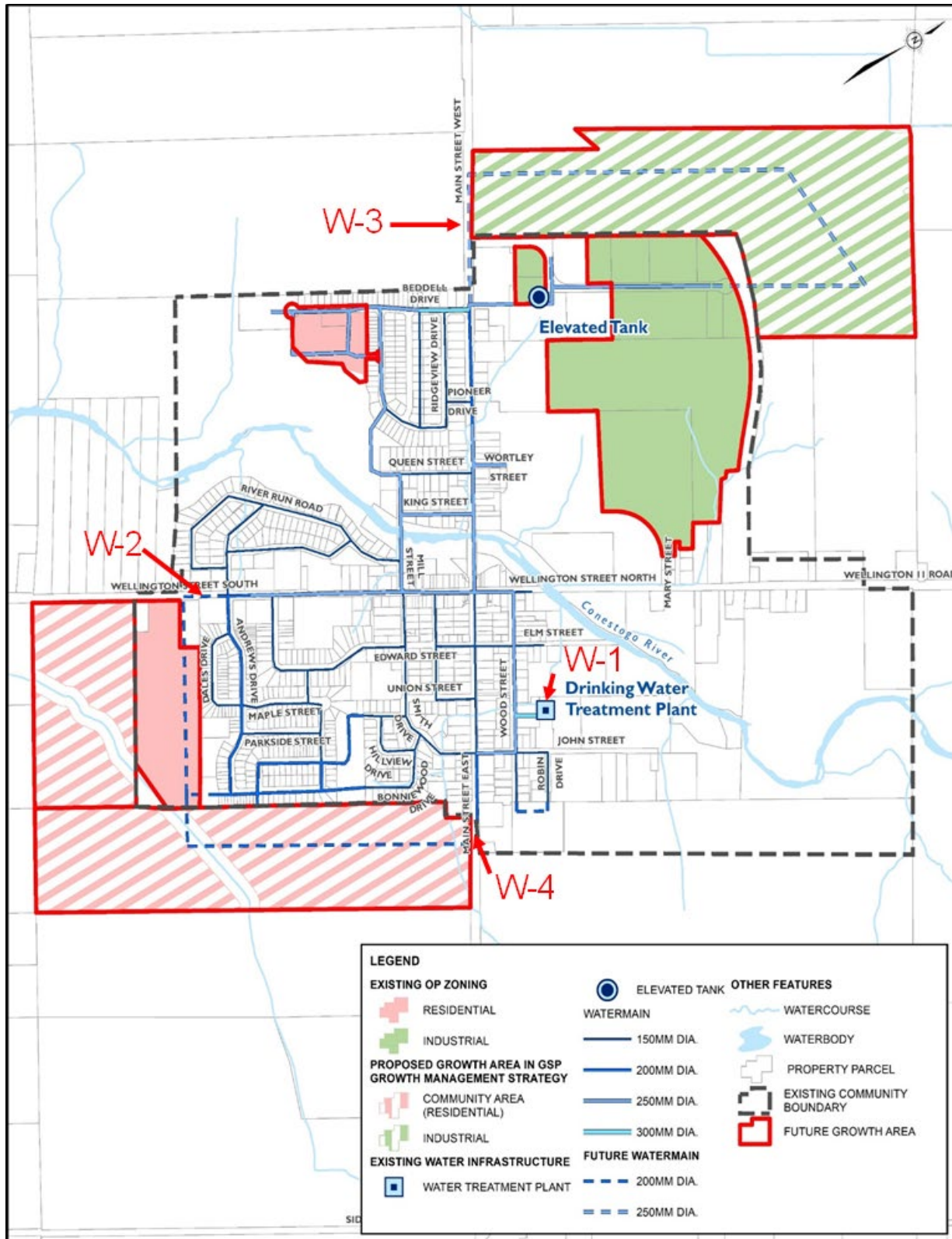


Figure 2-1: Drayton Water Servicing Implementation Plan

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.

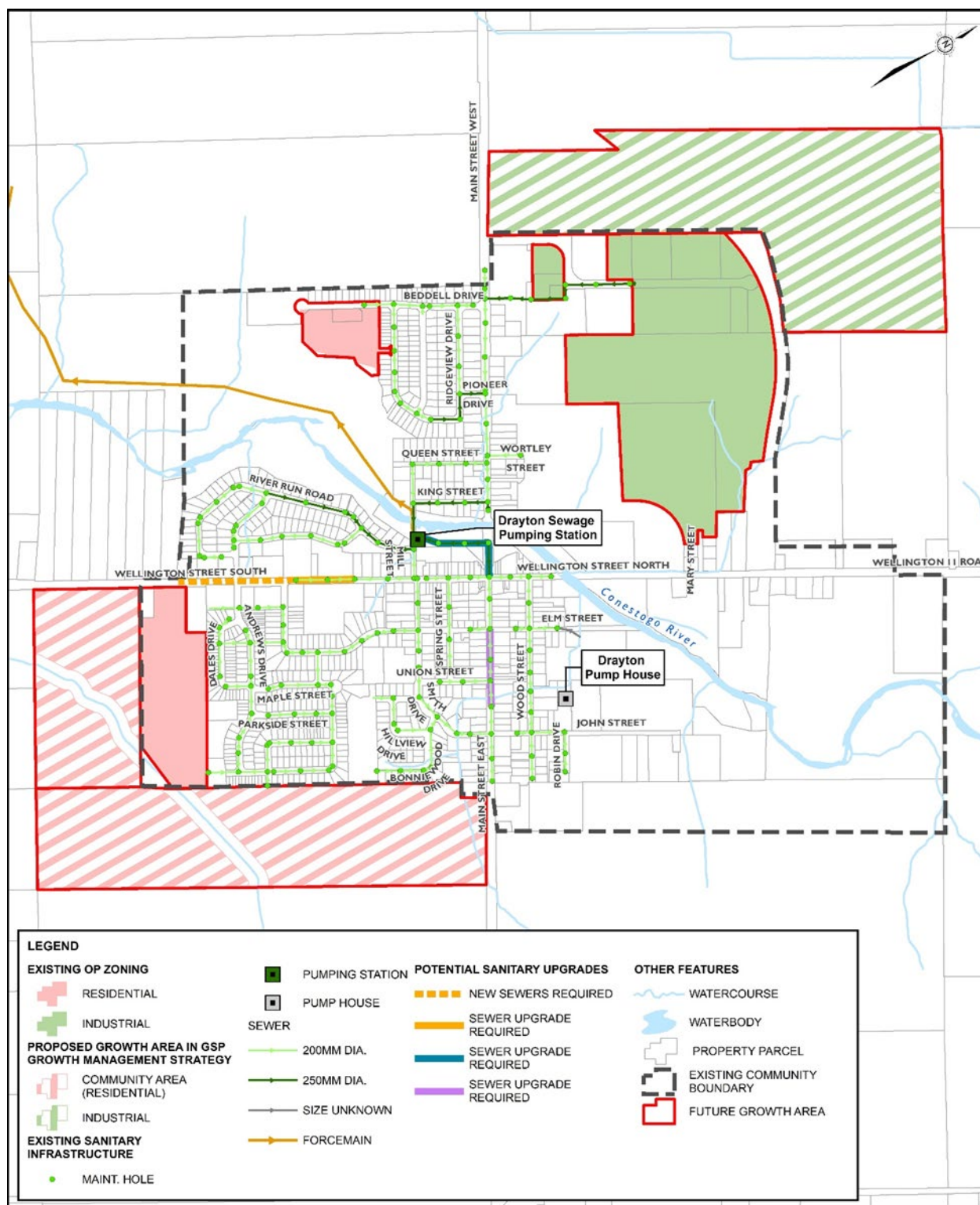


Figure 2-2: Drayton Wastewater Servicing Implementation Plan

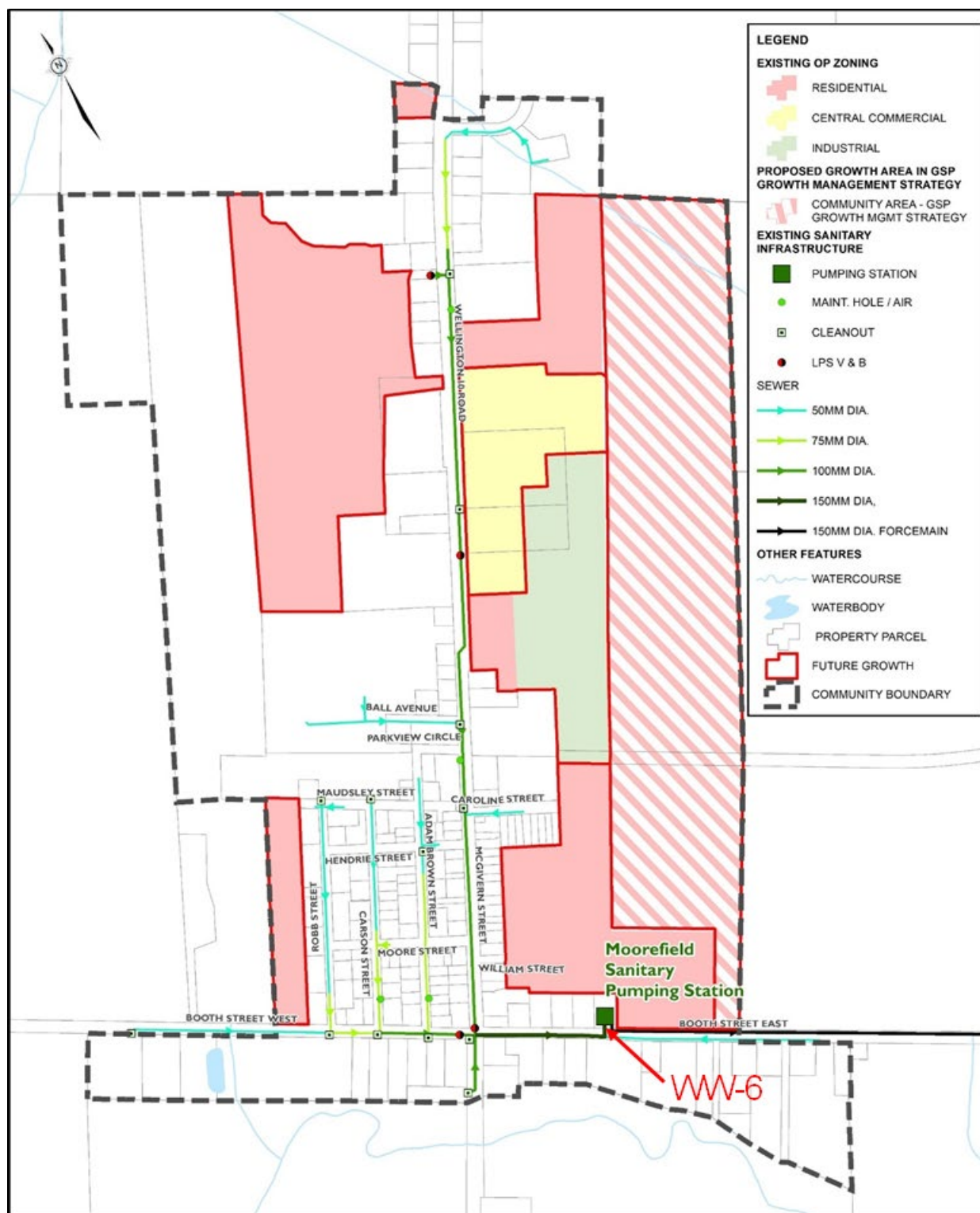


Figure 2-3: Moorefield Wastewater Servicing Implementation Plan

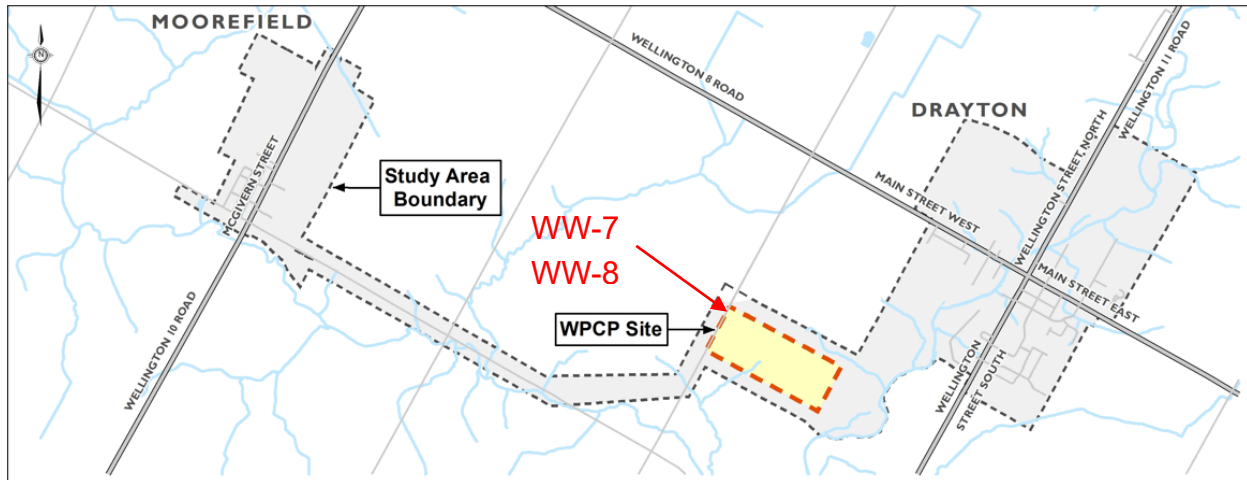


Figure 2-4: Township Wastewater Servicing Implementation Plan

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 m³/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 m³/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 m³/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.

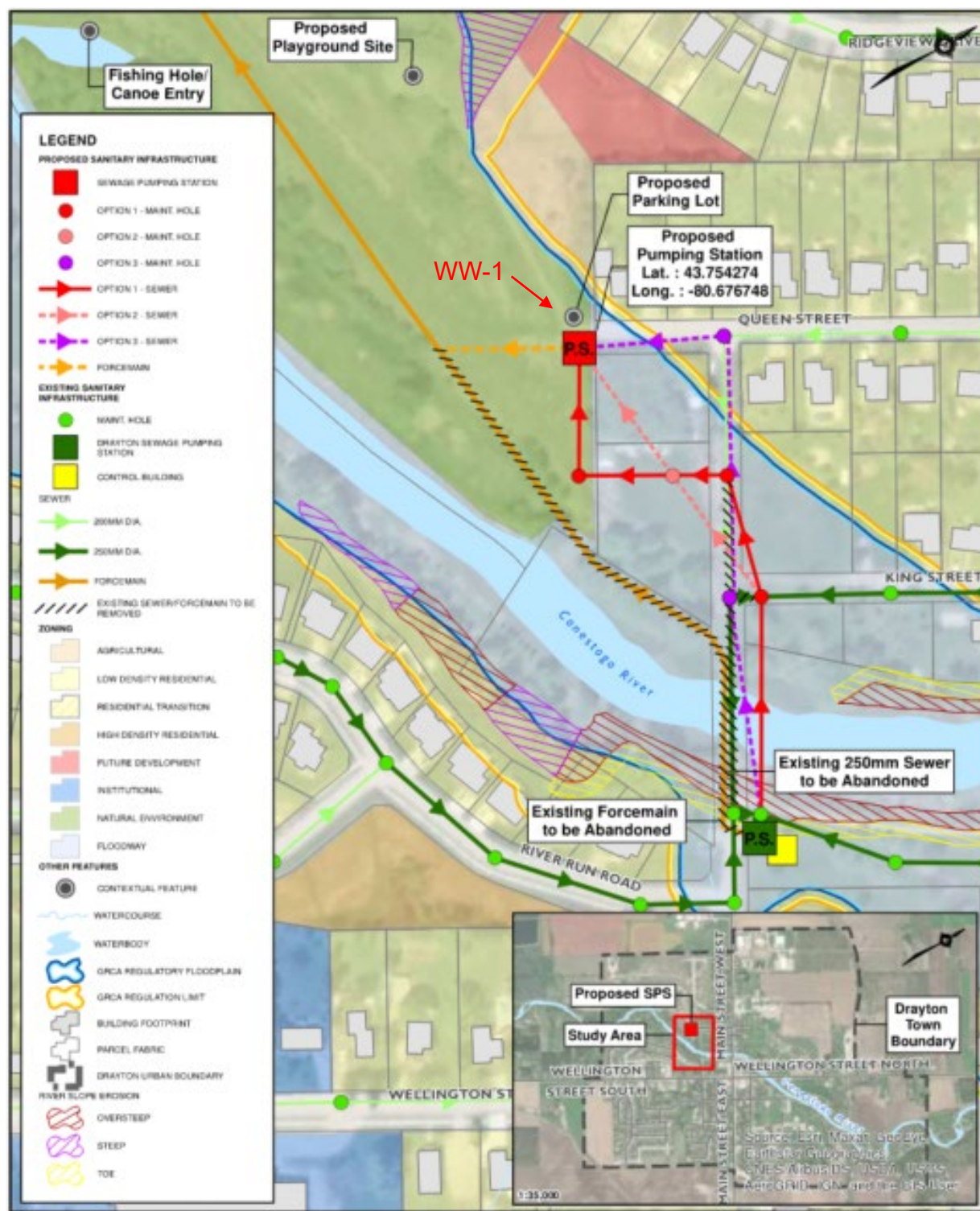


Figure 2-5: Drayton SPS Study Area and Collection System Routing Alternative

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.



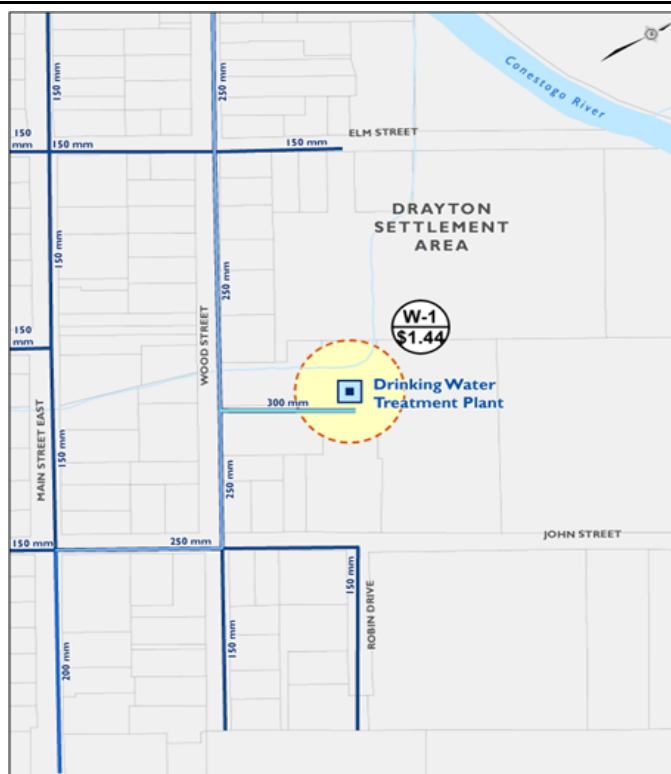
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B

Appendix B: Project Datasheets

**MAPLETON WATER AND WASTEWATER SERVICING MASTER PLAN
RECOMMENDED PROJECT DATA SHEET (WATER)**

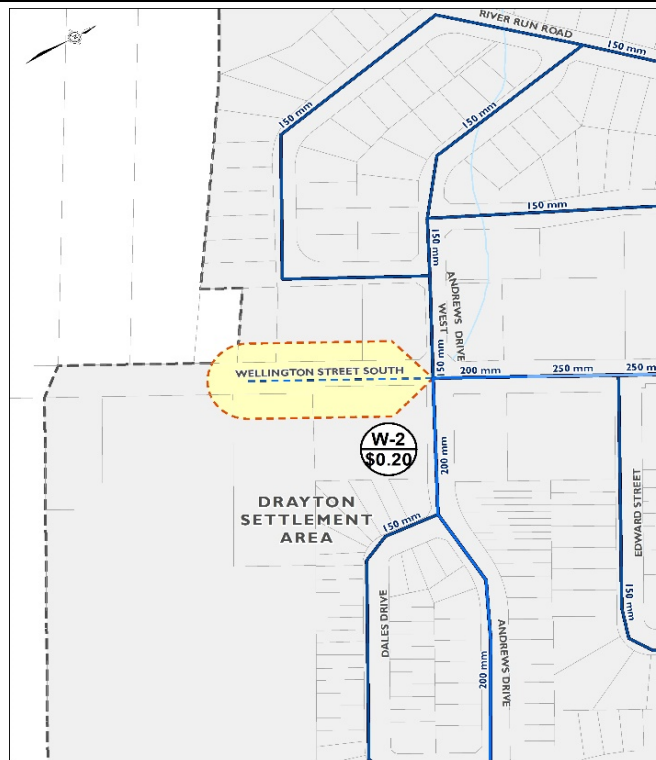
Project Name:	New well at Existing Drinking Water Supply site to increase capacity	Project No.:	W-1
Project Timing:	2024-2028		
Project Location:	Drayton		
Project Description:	Construction of a third well pump would be added to the Drayton Water Treatment Plant subject to confirmatory investigations . 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)**

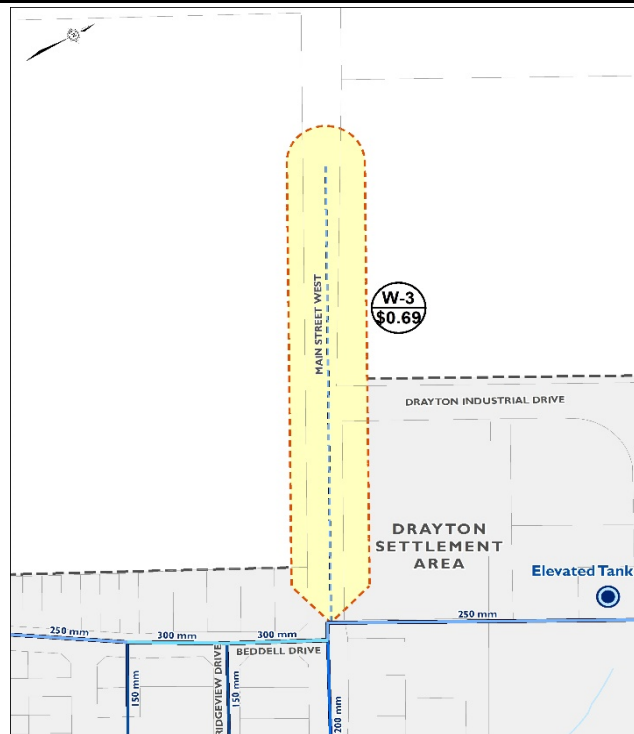
Project Name:	Wellington Street South Water Distribution Extension	Project No.:	W-2
Project Timing:	2024-2028		
Project Location:	Drayton		
Project Description:	Construction of a 250mm diameter watermain extension along Wellington Street South (Wellington County Road 11), to provide conveyance capacity 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 supply conveyance capacity and fire flow service to the existing and proposed industrial employment lands growth area.		

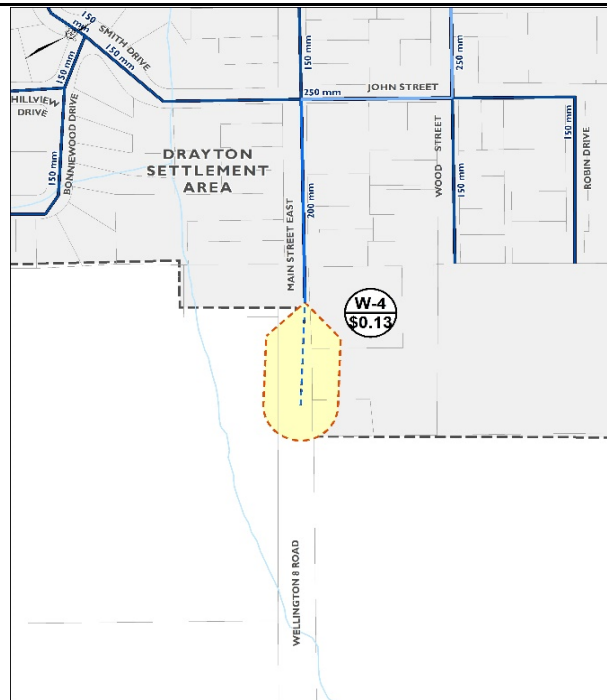


Project Details:

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)**

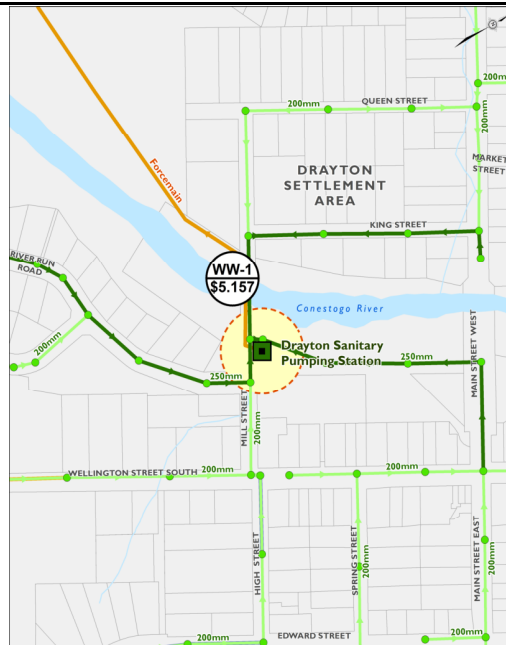
Project Name:	Main Street East Water Distribution Extension	Project No.:	W-4
Project Timing:	2029-2033		
Project Location:	Drayton		
Project Description:	Construction of a 200mm diameter watermain extension along Main Street East (Wellington County Road 8), to provide conveyance capacity to planned residential 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)**

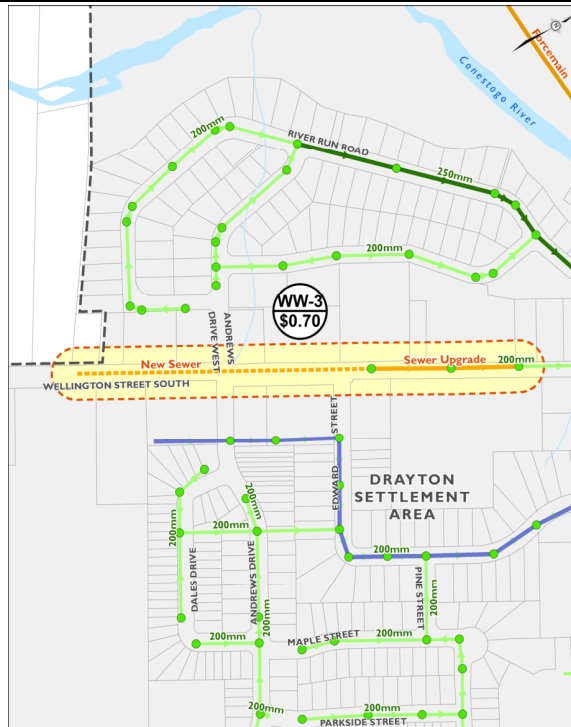
Project Name:	Inflow/Infiltration Monitoring Program	Project No.:	WW-2
Project Timing:	2024-2028		
Project Location:	Drayton		
Project Description:	An Inflow/Infiltration (I/I) monitoring program is currently in progress to collect flow data from throughout the collection system in Drayton. The study 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)**

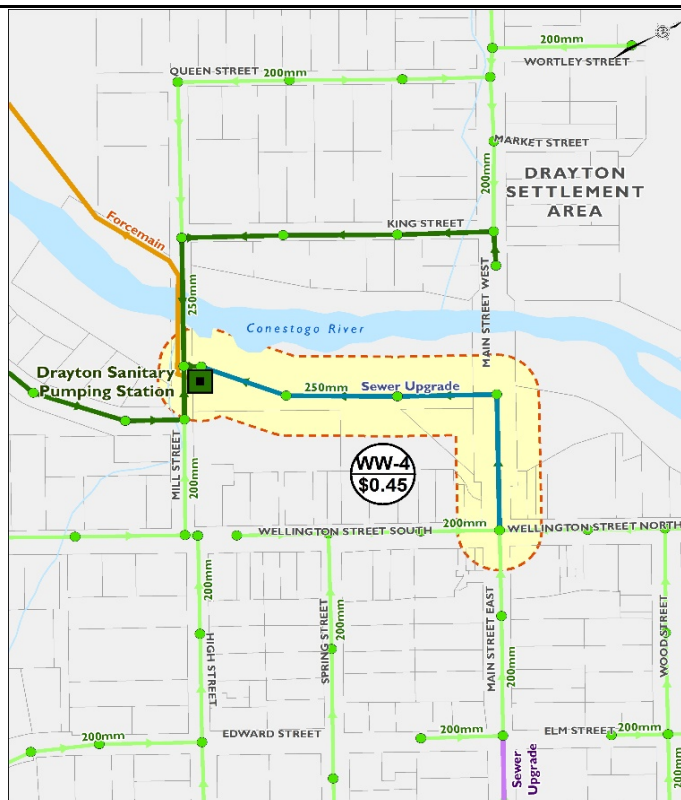
Project Name:	Wellington Street South Wastewater Sewer Upgrade	Project No.:	WW-3
Project Timing:	2024-2028		
Project Location:	Drayton		
Project Description:	Construction of a gravity collection system extension along Wellington Street South (Wellington County Road 11), will provide service connection 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		

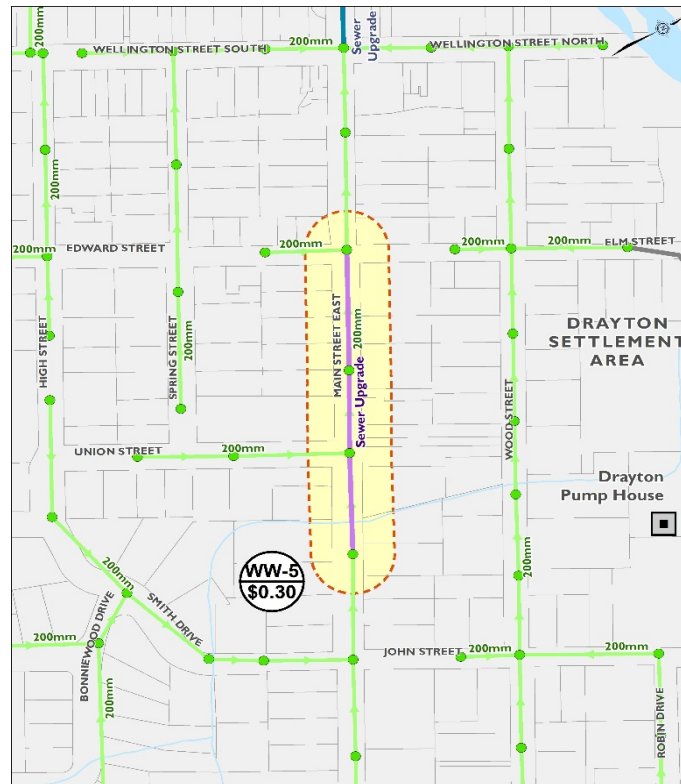


Project Details:

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)**

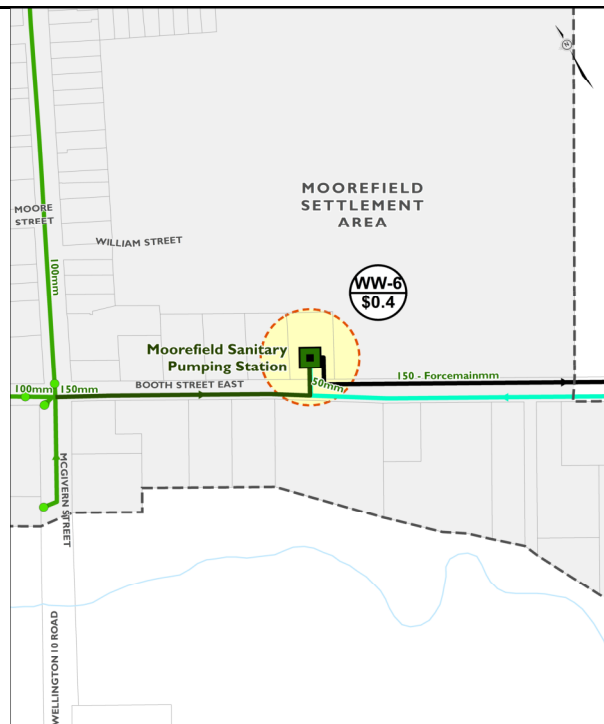
Project Name:	Main Street East Wastewater Gravity Sewer Upgrade	Project No.:	WW-5
Project Timing:	2029-2034		
Project Location:	Drayton		
Project Description:	Upgrade of the gravity collection system along Main Street East (Wellington County Road 8) between Elm Street and John Street to accommodate additional 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)**

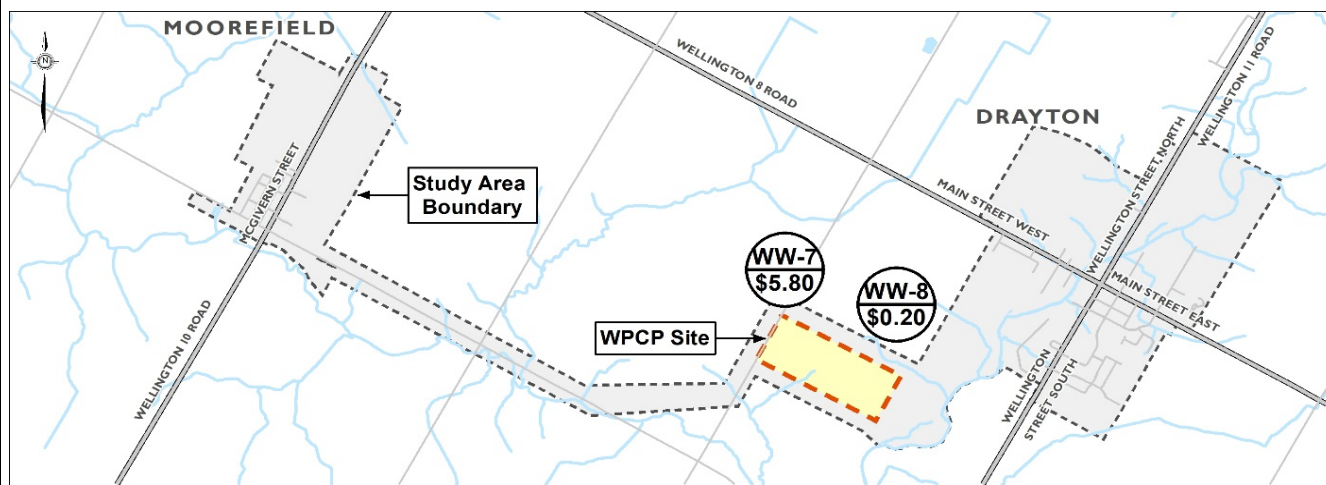
Project Name:	Moorefield Sewage Pumping Station Upgrade	Project No.:	WW-6
Project Timing:	2033-2034		
Project Location:	Moorefield		
Project Description:	Upgrade of the existing SPS equipment to service the projected population of 2,000 persons, which is at the reasonable conveyance capacity of the forcemain. 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.		

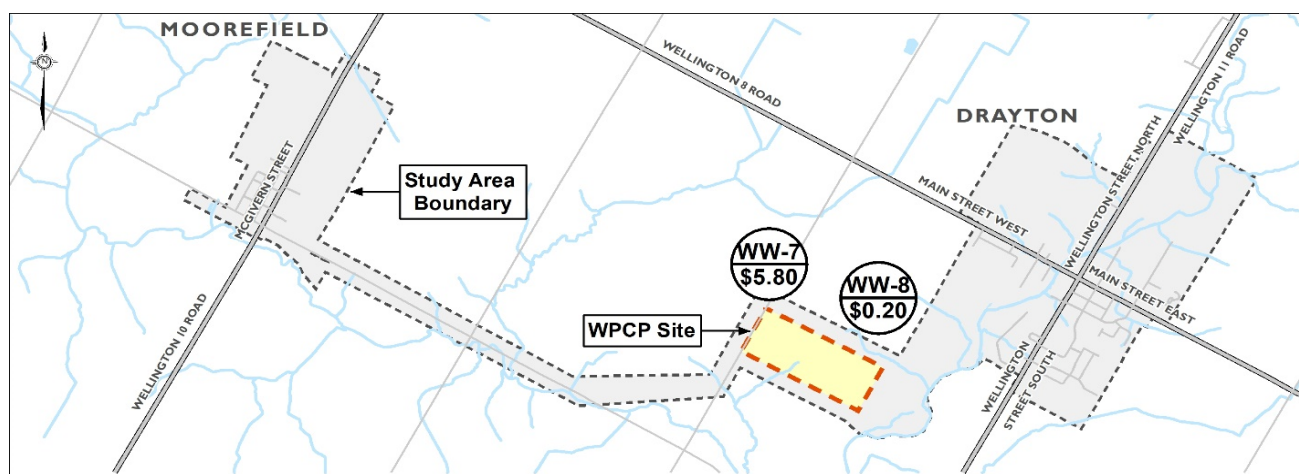


Project Details:

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

Township of Mapleton

Mapleton Water and Wastewater Servicing Master Plan

Consultation Records

Wednesday, January 24, 2024

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:

A handwritten signature in black ink, appearing to read "Adam Moore", written over a horizontal line.

Adam Moore, M.A.Sc., P.Eng.

VERIFIED BY:

A handwritten signature in blue ink, appearing to read "Stuart Winchester", written over a horizontal line.

Stuart Winchester, P.Eng.

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- Appendix C-3: Public Correspondence
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- Appendix C-5: First Nation Correspondence

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 Citizenship and Multiculturalism	Joseph	Harvey	Heritage Planner	400 University Ave, Floor 5	Toronto	ON	M7A 1T7
Provincial Agencies	Ministry of the Environment Conservation and Parks	Joan	Del Villar Cuicas	Regional Environmental Planner	135 St. Clair Ave W, Floor 1	Toronto	ON	M4V 1P5
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, Archaeology 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

Stakeholder Group	Organization Name	First	Last	Title	Address	City	Prov	Postal Code
Provincial Agencies	Ministry of Infrastructure	Payal	Kapur	Manager, Program Delivery Unit	777 Bay St, 4th Flr., Suite 425	Toronto	ON	M5G 2E5
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	Linda	Norheim	Consultation Assessment Coordinator			ON	
Indigenous Communities	Metis Nation of Ontario	Justin	Hunt				ON	
Indigenous Communities	Grand River Metis Council	Jennifer	Parkinson	President	65 Hanson Road	Kitchener	ON	N2C 2H6
Indigenous Communities	Haudenosaunee Confederacy Chiefs Council	Todd E.	Williams	Monitoring Program Coordinator		Ohsweken	ON	N0A 1M0
Indigenous Communities	Haudenosaunee Confederacy Chiefs Council	Hohahes Leroy	Hill	Secretary		Ohsweken	ON	N0A 1M0
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

Stakeholder Group	Organization Name	First	Last	Title	Address	City	Prov	Postal Code
Indigenous Communities	Mississauga of the Credit First Nation	R. Stacey	LaForme	Chief	2789 Mississauga Road, RR#6	Hagersville	ON	N0A 1H0
Indigenous Communities	Mississauga of the Credit First Nation	Fawn	Sault	Consultation Manager	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
Indigenous Communities	Six Nations of the Grand River	Mark	Hill	Chief		Ohsweken	ON	N0A 1M0
Indigenous Communities	Six Nations of the Grand River	Mark	Hill	Chief		Ohsweken	ON	N0A 1M0
Indigenous Communities	Six Nations of the Grand River	Robbin	Vanstone	Consultation Supervisor of Land Use Unit		Ohsweken	ON	N0A 1M0
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

Stakeholder Group	Organization Name	First	Last	Title	Address	City	Prov	Postal Code
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	Neyaashiinigmii ng	ON	N0H 2T0
Indigenous Communities	Chippewas of Nawash First Nation	Pam	Linklater	Officer	135 Lakeshore Boulevard	Neyaashiinigmii ng	ON	N0H 2T0
Indigenous Communities	Saugeen Ojibway Nation	Emily	Martin	Manager of Operations				
Indigenous Communities	Saugeen Ojibway Nation	Juanita	Meekins	Resources and Infrastructure Associate				
Indigenous Communities	Saugeen First Nation	Lester	Anoquot	Chief				
Indigenous Communities	Saugeen First Nation	Trish	Meekins	Band Administrator				
Indigenous Communities	Saugeen First Nation	Leona	Roote	Executive Assistant			ON	

Stakeholder Group	Organization Name	First	Last	Title	Address	City	Prov	Postal Code
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
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

Stakeholder Group	Organization Name	First	Last	Title	Address	City	Prov	Postal Code
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
Utility Providers	Hydro One Networks Inc.	--	--	Secondary Land Use Asset Optimization Strategy & Integrated Planning	483 Bay Street, 8 th Floor South Tower	Toronto	ON	M5G 2P5
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:

<p>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</p>	<p>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</p>
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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.

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.

<p>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</p>	<p>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</p>
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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. This Notice first issued September 28, 2022.

Figure 2: Notice of Public Information Centre Issued September 28, 2022

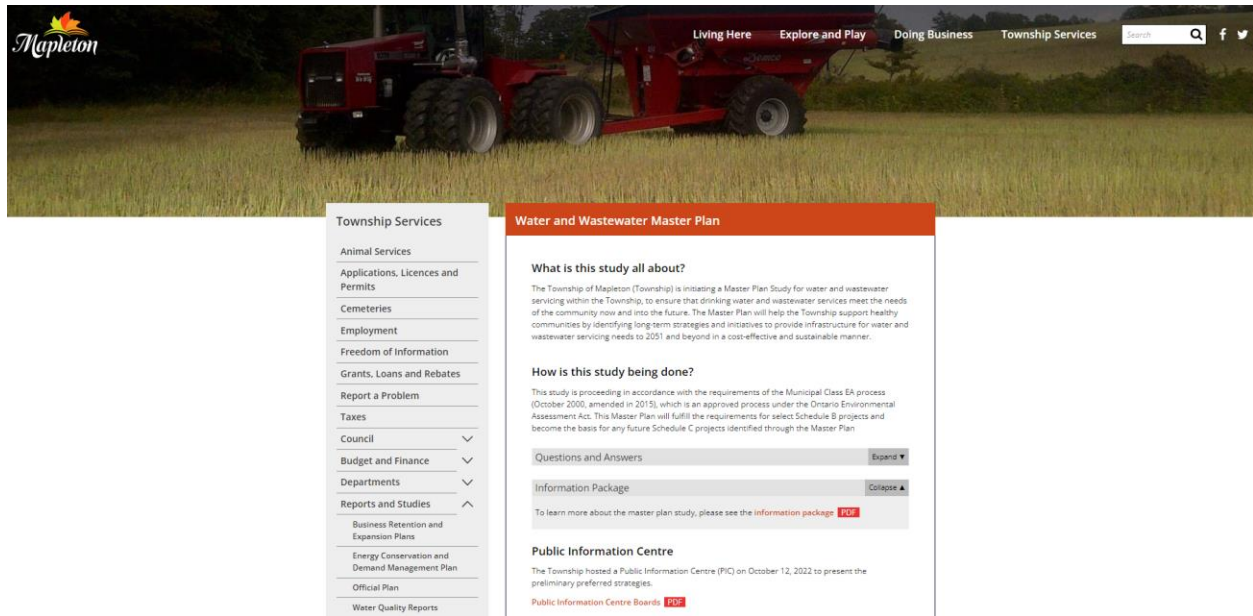


Figure 3: Notice of Public Information Centre Advertised on the Township of Mapleton Website September 28, 2022

THE WELLINGTON ADVERTISER
FREE PRESS - NEWS WEEKLY™
EDITION(s): September 29 & October 6
By: Alicia Roza



**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.

<p>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</p>	<p>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</p>
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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

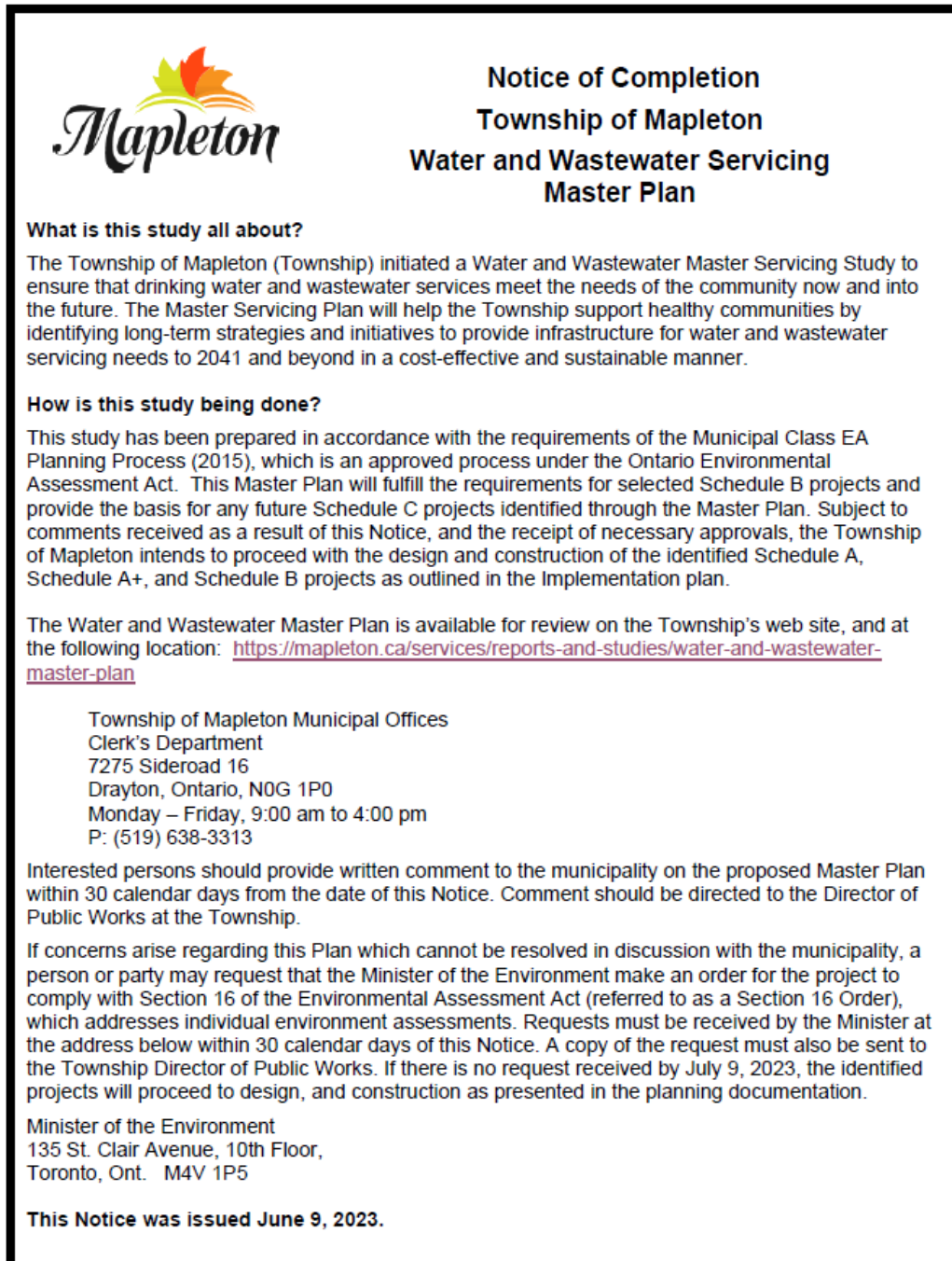


Figure 5: Notice of Study Completion Issued June 9, 2023.

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.



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



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.



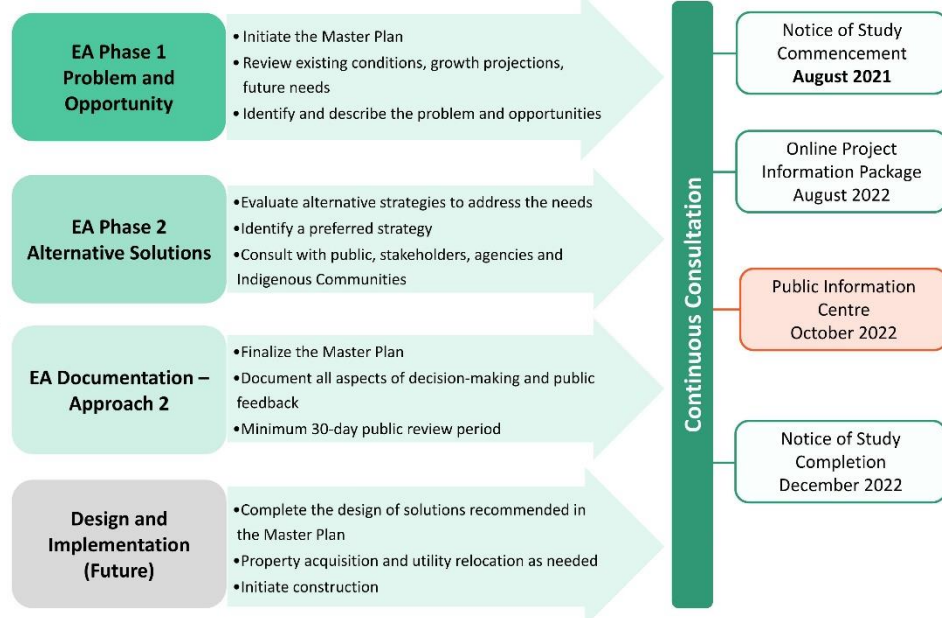
Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

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.

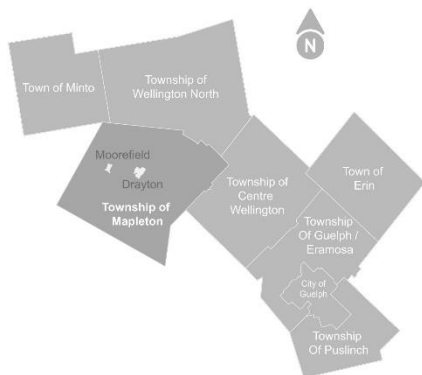
Public participation is an integral part of the Class EA process. This meeting provides an opportunity for the public to participate in the process.

Public, agency, stakeholder and Indigenous Community consultation is embedded throughout this process and around key milestones.



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 10,839 | Drayton 2,569 | Moorefield 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

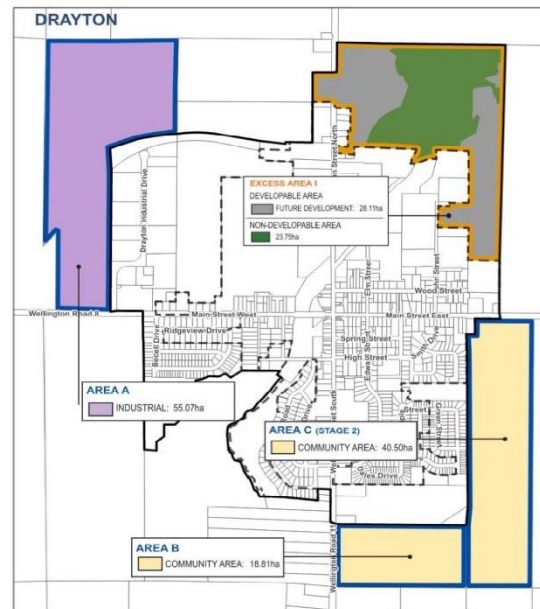


Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

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.

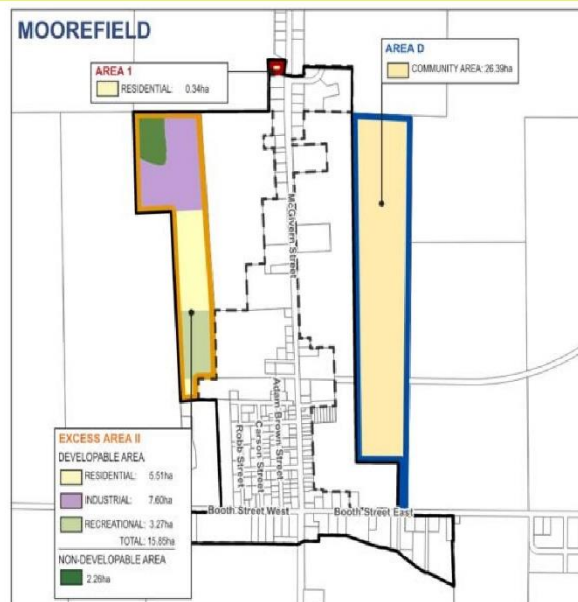


Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

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.

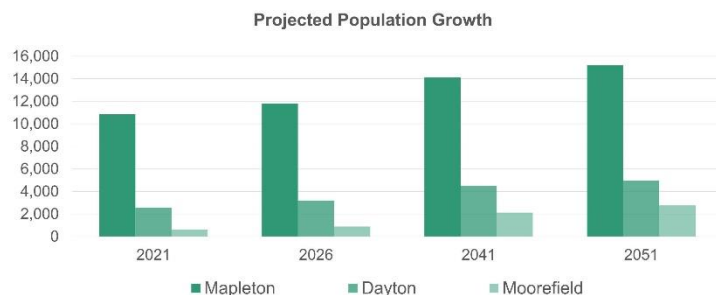


Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Growth Projections

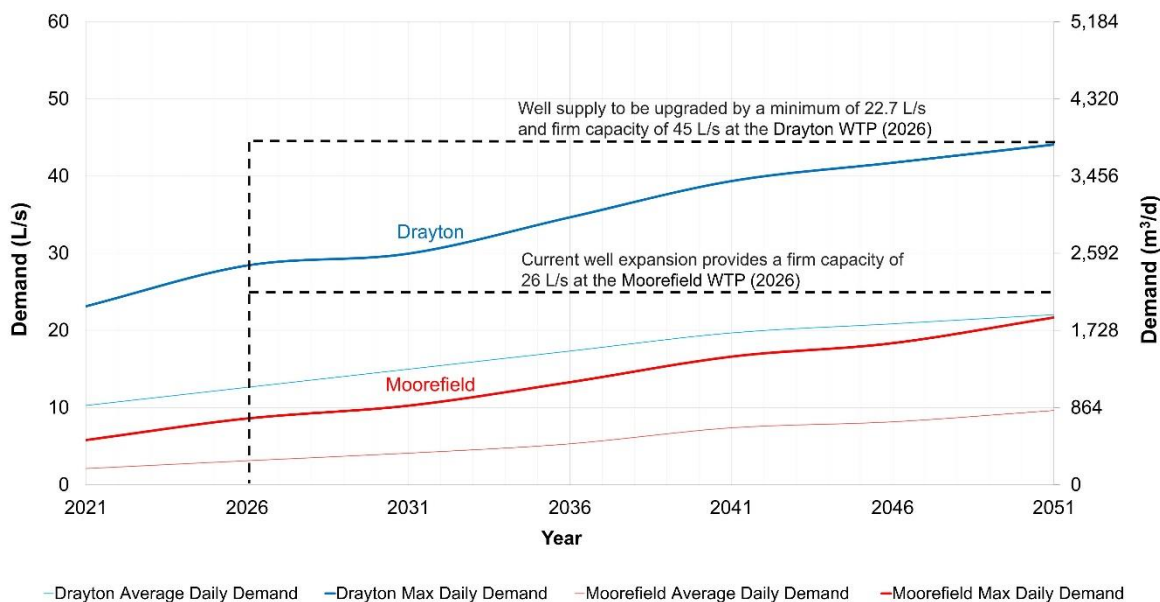
	Existing Population (2021)	Projected Population (2026)	Projected Population (2041)	Projected Population (2051)
Drayton	2,569	3,200	4,507	4,983
Moorefield	620	900	2,125	2,775
Sub-Total – Urban Areas	3,189	4,100	6,632	7,758
Rural and Hamlet Areas	7,650	7,700	7,468	7,442
Total – Township	10,839	11,800	14,100	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.



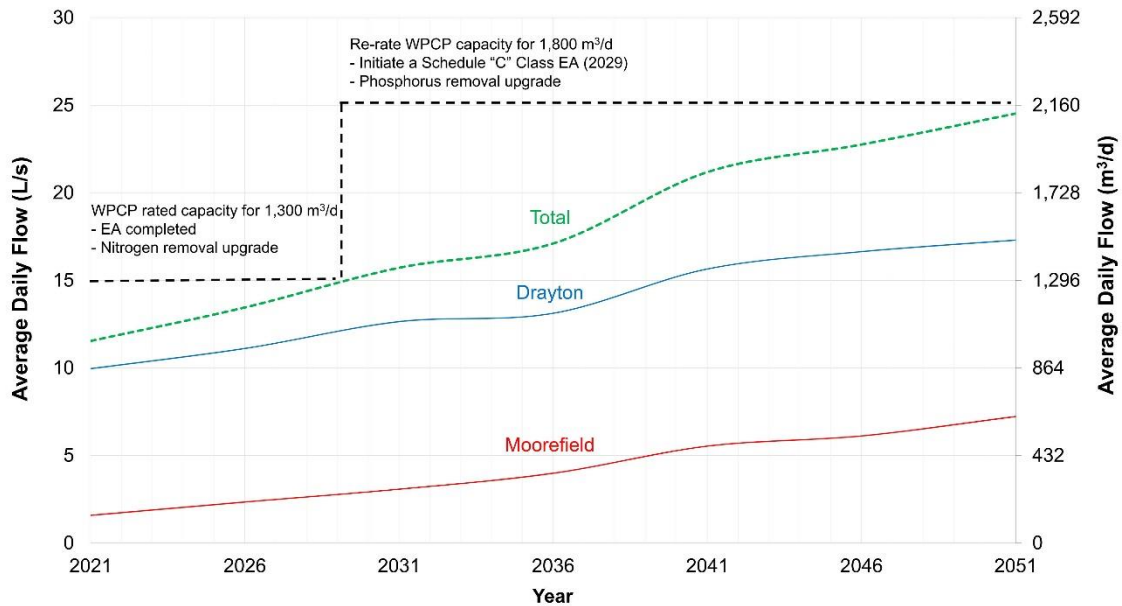
Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Water Demand Projections - Drayton & Moorefield



Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

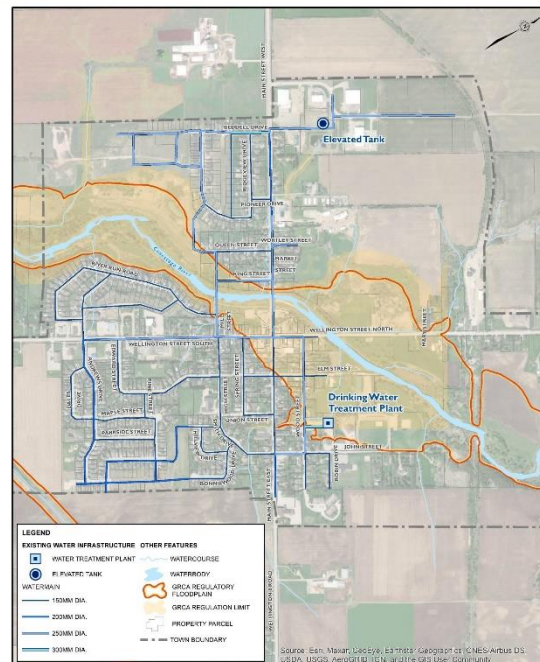
Wastewater Flow Projections - Drayton & Moorefield



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 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.



Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

-
- LEGEND**
- EXISTING WATER INFRASTRUCTURE**
- Water Treatment Plant
 - Water Main
 - 3000V D/A
 - 1500V D/A
- OTHER FEATURES**
- Watercourse
 - Waterbody
 - SRCA Regulatory Floodplain
 - SRCA Regulatory Limit
 - Property Parcel
- Map of the Moorefield Water Treatment Plant Area**
- Scale: 1" = 100' (Not to Scale)
- Copyright © 2010, City of Moorefield, All Rights Reserved.



- ✦ 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

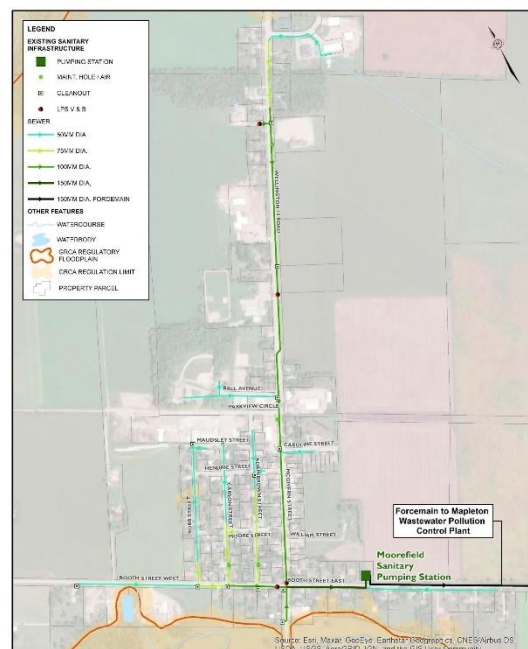
- Drayton is serviced with a conventional gravity collection system that conveys wastewater from each serviced property to a centralized sewage pumping station located at 20 Mill Street.
- The Drayton Sewage Pumping Station (SPS) was originally constructed in 1984 as a duplex submersible station with 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.



Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Existing Wastewater Collection System - Moorefield

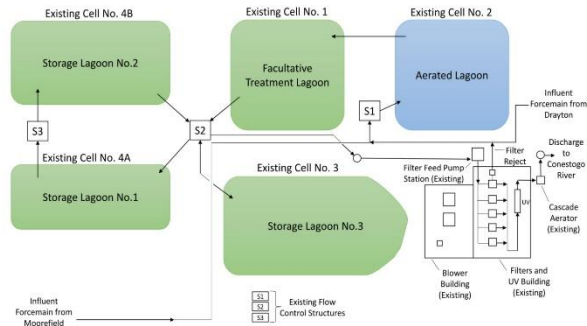
- Moorefield is serviced with a low-pressure sewer system that conveys wastewater from each serviced property to a centralized sewage pumping station located at 20 Booth Street.
- Each serviced property has an individual grinder pump that conveys the raw sewage through small diameter sewers (forcemains).
- 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 m³/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 m³/d capacity
- Future upgrade of wastewater treatment facility to 1,800 m³/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.

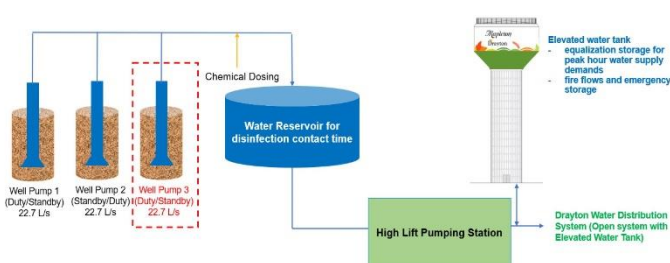


Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Evaluation Criteria

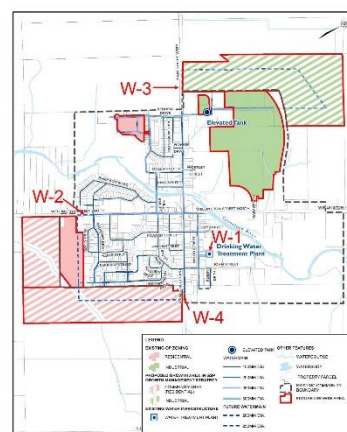
Factor Area	Consideration
Natural Environment	<ul style="list-style-type: none"> Potential impacts to existing natural environment Potential temporary and permanent effects on surface water and groundwater quantity / quality Resiliency to extreme conditions and ability to minimize greenhouse gas emissions Protects wildlife and species at risk Minimize contribution to climate change and maximize resiliency to extreme conditions
Socio-Cultural	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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



Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

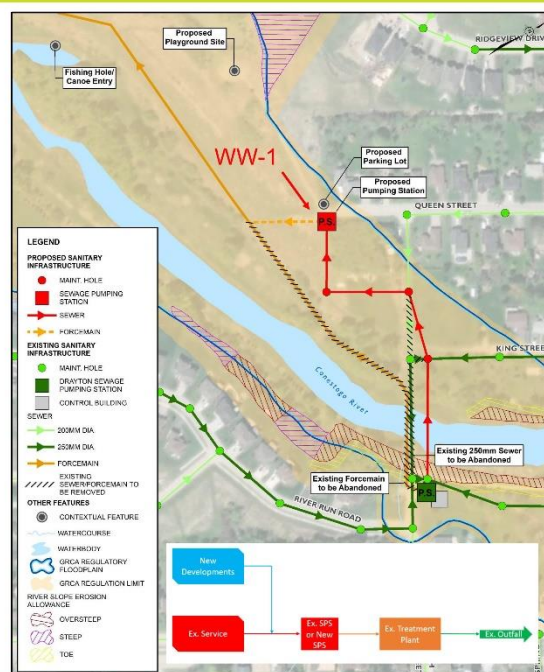
Wastewater Servicing Strategy - Drayton

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

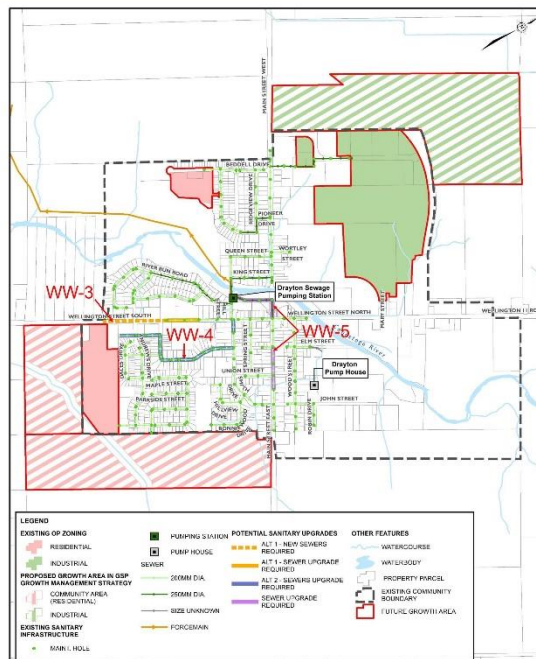


Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Wastewater Servicing Strategy - Drayton

Drayton Collection System and Forcemain Alternative

- Upgrade the existing collection system
 - Wellington Street South
 - Edward Street
 - Main Street East

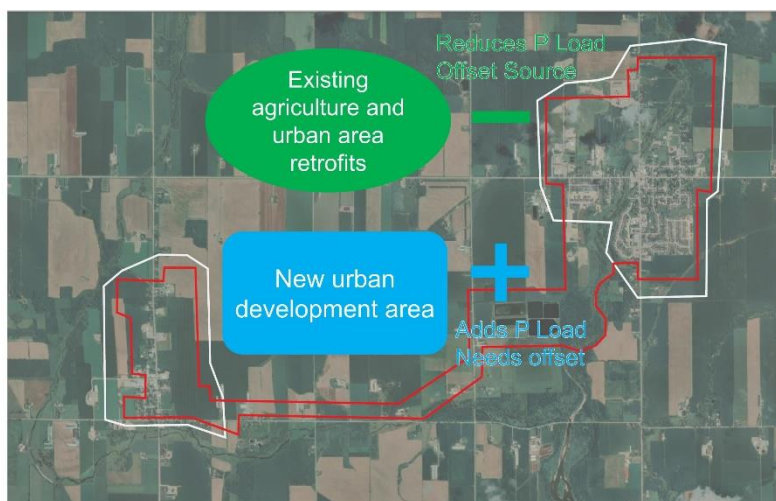


Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

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 m³/d
- A Schedule "C" EA study should be completed prior to 2029 to access phosphorus removal upgrades and increase capacity beyond 1,300 m³/d



Phosphorus off-setting concept



Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022



Wastewater Servicing Strategy - Capital Program

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
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.
		June 9, 2023 – Notice of Completion Sent via email.
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
		June 9, 2023 – Notice of Completion Sent via email.
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.
		June 9, 2023 – Notice of Completion Sent via email.
Six Nations of The Grand River		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 Bomberly with the Land and Resource Department.	December 7, 2021 – Followed up with phone call to ask if Mr. Bomberly had received the Notice of Commencement and had any preliminary questions or concerns.
	December 7, 2021 – Spoke with Mr. Bomberly 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
		June 9, 2023 – Notice of Completion Sent via email.
Haudenosaunee Confederacy of Chiefs		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.
	June 5, 2023 – Received draft of the Haudenosaunee Development Institute's 2023 Monitoring Agreement	June 9, 2023 – Followed up with Todd with a question regarding the number of monitoring staff that would participate in site visits.
	June 9, 2023 – Todd replied to say that at least one monitor would be present when the archeological consultant would be onsite but the amount can vary based on the company. This monitor would be present at least once a week but this would also vary based on the company in question	June 28, 2023 – Returned the signed agreement to Todd.
		June 9, 2023 – Notice of Completion Sent via email.
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.

First Nation	First Nation Correspondence	Project Team Correspondence
		December 16, 2021 – Notice of Commencement sent via email.
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.
Walpole Island First Nation, Bkejwanong Territory		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.
		June 9, 2023 – Notice of Completion Sent via email.
Chippewas of Kettle and Stony Point		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 30, 2022 – asked that further updates be sent to consultation@kettlepoint.org and asked if the PIC meeting would be broadcasted virtually.	September 26, 2022 – Notice of PIC Sent via email.

First Nation	First Nation Correspondence	Project Team Correspondence
		October 11, 2022 – Replied that the meeting would be in person, but that this could be broadcasted virtually for CKSPFN.
	October 12, 2022 – Stated they would be interested in a virtual meeting.	October 31, 2022 – Provided a virtual recording of the PIC meeting.
		June 9, 2023 – Notice of Completion Sent via email.
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.
	July 5, 2023 – Fallon Burch confirmed that the Notice of Completion was received and that the project was outside their area of priority	June 9, 2023 – Notice of Completion Sent via email.
	July 5, 2023 – Stated that an invoice would be sent for the time spent on the consultation process	
Chippewas of Nawash First Nation		November 24, 2021 – Notice of Commencement sent via mail.
		December 7, 2021 – Followed up with phone call.

First Nation	First Nation Correspondence	Project Team Correspondence
	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.
		June 9, 2023 – Notice of Completion Sent via email.
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	
Saugeen First Nation	n/a	September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion 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			

Question	Yes	No	Notes
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?			
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
Grand River Conservation Authority		August 13, 2021 – Notice of Commencement sent via email
	October 26, 2022 – Requested to be notified for further development of project	September 26, 2022 – Notice of PIC set via email.
	June 30, 2023 – Provided feedback on future requirements and permitting for projects outlined.	June 9, 2023 – Notice of Completion Sent via email.
Record # - Ministry of Citizenship and Multiculturalism		August 13, 2021 – Notice of Commencement sent via email
	July 7, 2023 – Provided comments regarding including a cultural heritage component for the Schedule B undertakings under the Master Plan.	June 9, 2023 – Notice of Completion Sent via email.
Record # - Ministry of Environment, Conservation and Parks		August 18, 2022 – Notice of addition to mailing list and project webpage update
	October 4, 2021 – Acknowledgement of PIC	September 26, 2022 – Notice of PIC Sent via email.
	July 10, 2023 – Provided comments regarding updating the Notice of Completion to the final version, Provincial Policy Statement (PPS), and providing clarification to the Approach of the Master Plan. They also stated that correspondence from Haudenosaunee Confederacy Chiefs Council was provided but is missing in Table 1 and Table 2. Additionally, they state that the report should include a brief summary of how these public concerns have been addressed through the planning process. Other comments were included formatting, as well as information about approvals and permitting.	June 9, 2023 – Notice of Completion Sent via email.
Record # - Ministry of Northern Development, Mines, Natural Resources and Forestry		August 13, 2021 – Notice of Commencement sent via email
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.
Record # - Ministry of Agriculture, Food, and Rural Affairs		August 13, 2021 – Notice of Commencement sent via email
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.
Record # - Ministry of Tourism, Culture and Sport		August 13, 2021 – Notice of Commencement sent via email
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.

Stakeholder	Stakeholder Correspondence	Project Team Correspondence
Record # - Ministry of Municipal Affairs and Housing		August 13, 2021 – Notice of Commencement sent via email
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.
Record # - Ministry of Infrastructure		August 13, 2021 – Notice of Commencement sent via email
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.
Record # - Ministry of Transportation		August 13, 2021 – Notice of Commencement sent via email
		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
		June 9, 2023 – Notice of Completion Sent via email.
Record # - Infrastructure Ontario		August 13, 2021 – Notice of Commencement sent via email
		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
		June 9, 2023 – Notice of Completion Sent via email.
Record # - Ontario Provincial Police		August 13, 2021 – Notice of Commencement sent via email
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.
Record # – Wellington County		August 13, 2021 – Notice of Commencement sent via email
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.
Record # – Wellington Dufferin Guelph Public Health		August 13, 2021 – Notice of Commencement sent via email
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.
Record # – Drayton/Moorefield Fire Station		August 13, 2021 – Notice of Commencement sent via email
		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
		June 9, 2023 – Notice of Completion Sent via email.
Record # – Guelph-Wellington Paramedic Service		August 13, 2021 – Notice of Commencement sent via email
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.

Stakeholder	Stakeholder Correspondence	Project Team Correspondence
Record # – Enbridge Gas Distribution Inc.		August 13, 2021 – Notice of Commencement sent via email
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.
Record # – Trans Canada Pipeline		August 13, 2021 – Notice of Commencement sent via email
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.
Record # – Rogers Communications		August 13, 2021 – Notice of Commencement sent via email
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.
Record # – Bell Canada		August 13, 2021 – Notice of Commencement sent via email
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.
Record # – Mornington Communications Cooperative Limited		August 13, 2021 – Notice of Commencement sent via email
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.
Record # – Hydro One Inc.	August 17, 2023 – Request to stay informed of projected via email secondarylanduse@hydroone.com	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.
		June 9, 2023 – Notice of Completion Sent via email.
Record # – Upper Grand District School Board		August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion 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.
		June 9, 2023 – Notice of Completion 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.
		June 9, 2023 – Notice of Completion Sent via email.

Stakeholder	Stakeholder Correspondence	Project Team Correspondence
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.
		June 9, 2023 – Notice of Completion 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.
		June 9, 2023 – Notice of Completion Sent via email.
Record # – Apex Building & Contracting		August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion 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.
		June 9, 2023 – Notice of Completion 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.
		June 9, 2023 – Notice of Completion 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.
		June 9, 2023 – Notice of Completion 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.
		June 9, 2023 – Notice of Completion 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.
		June 9, 2023 – Notice of Completion Sent via email.
Record # – Van De Pol's		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.
		June 9, 2023 – Notice of Completion 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.
		June 9, 2023 – Notice of Completion Sent via email.
Record # – Moorefield Excavating	October 11, 2022 – Requested to be added to the mailing list.	October 11, 2022 – Notice of addition to the mailing list.
	October 11, 2022 – Requested to be sent the PIC notice.	October 11, 2022 – Notice of PIC sent via email.
	October 17, 2022 – Sent comments regarding the PIC.	June 9, 2023 – Notice of Completion Sent via email.
Record # - Heather Smith		August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
		June 9, 2023 – Notice of Completion Sent via email.

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.



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+
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.

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

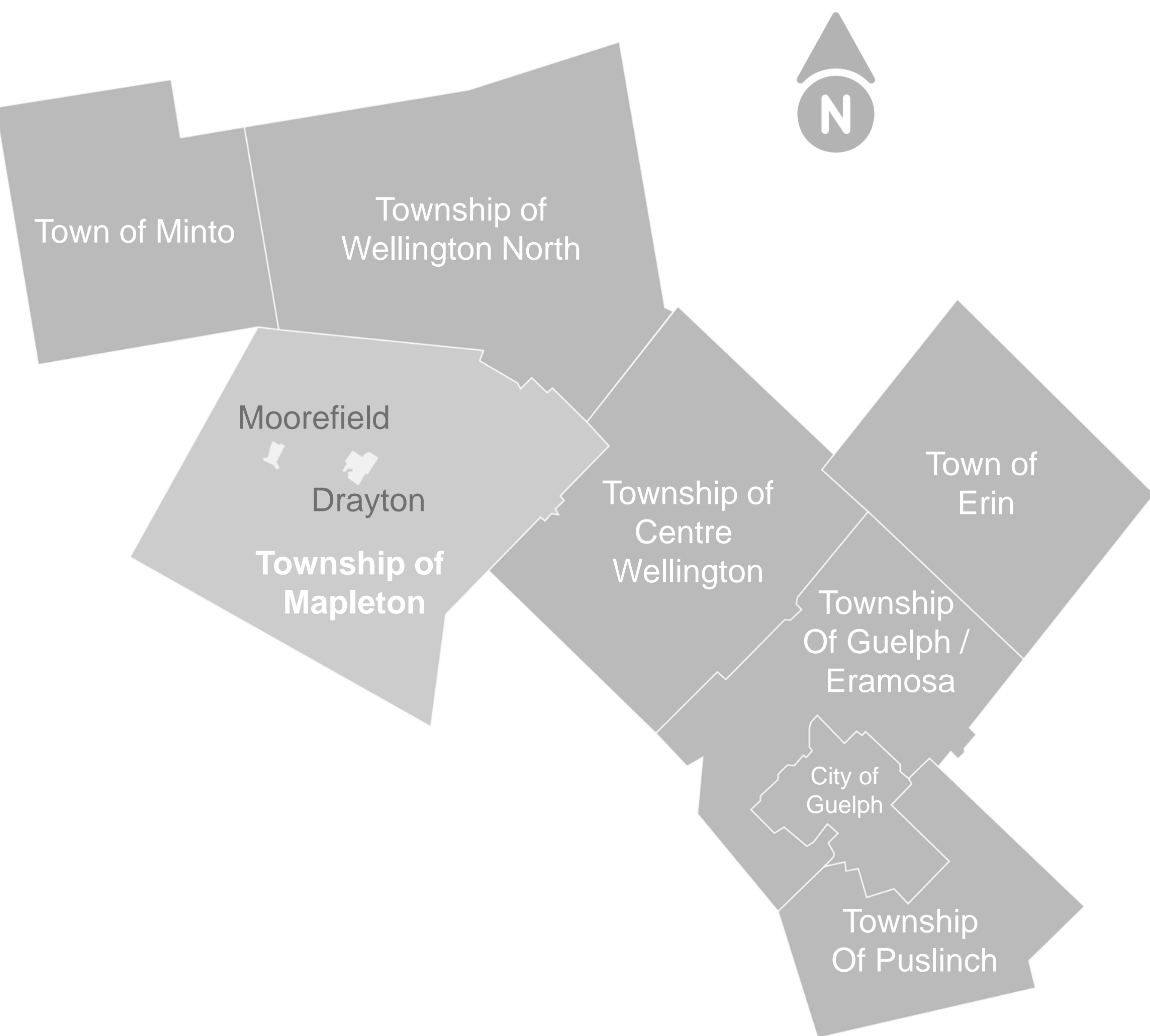
Notice of Study Commencement
August 2021

Online Project Information Package
August 2022

Public Information Centre
October 2022


Notice of Study Completion
December 2022


Community Context and Growth Projections




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:


 Within the County of Wellington land area of approximately 535.6 km²

	Mapleton 10,839	Dayton 2,569	Moorefield 620
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 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

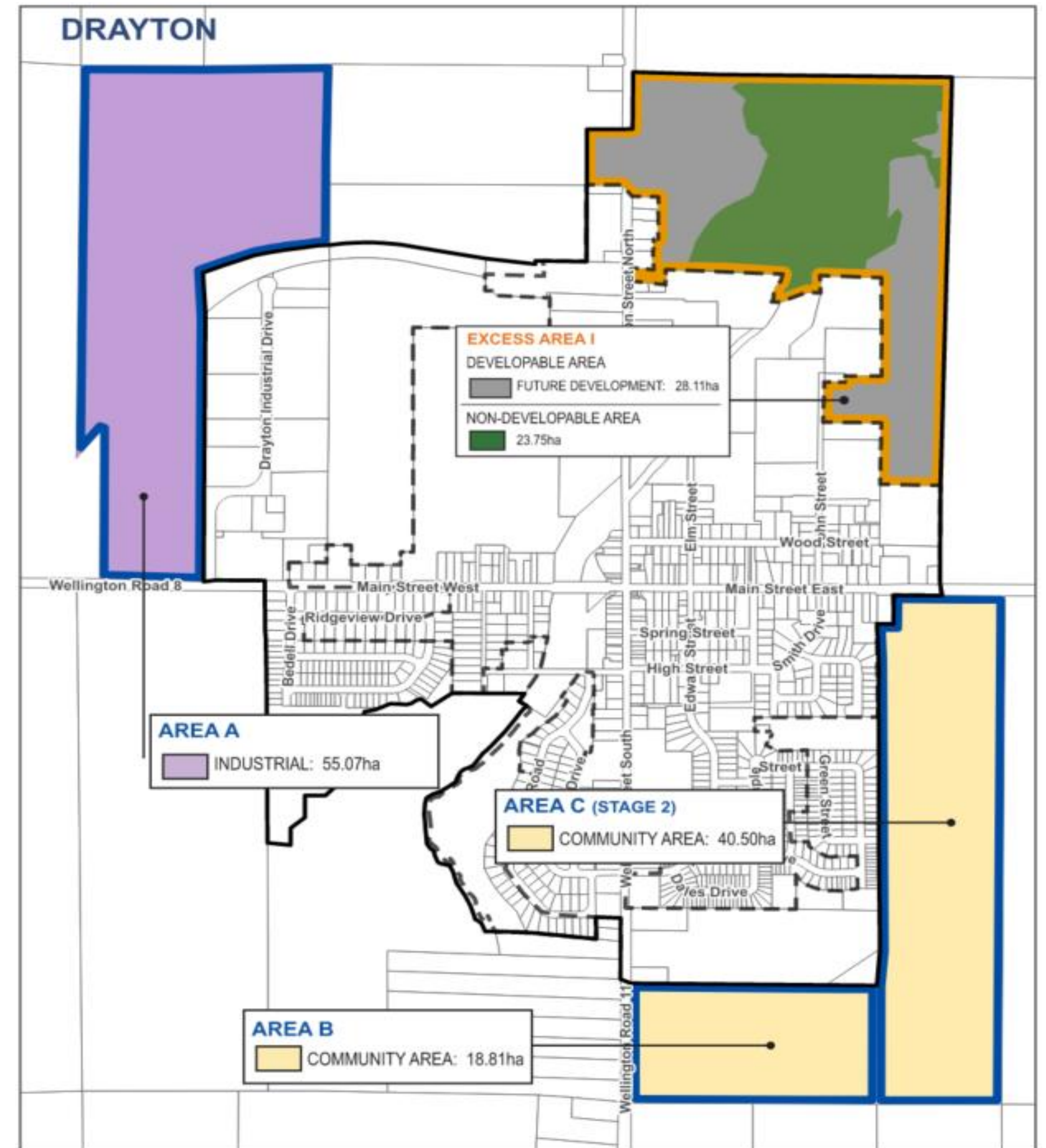
 Promote intensification while preserving historic streetscapes

 Encourage increased densities in designated Greenfield areas of urban centres

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.

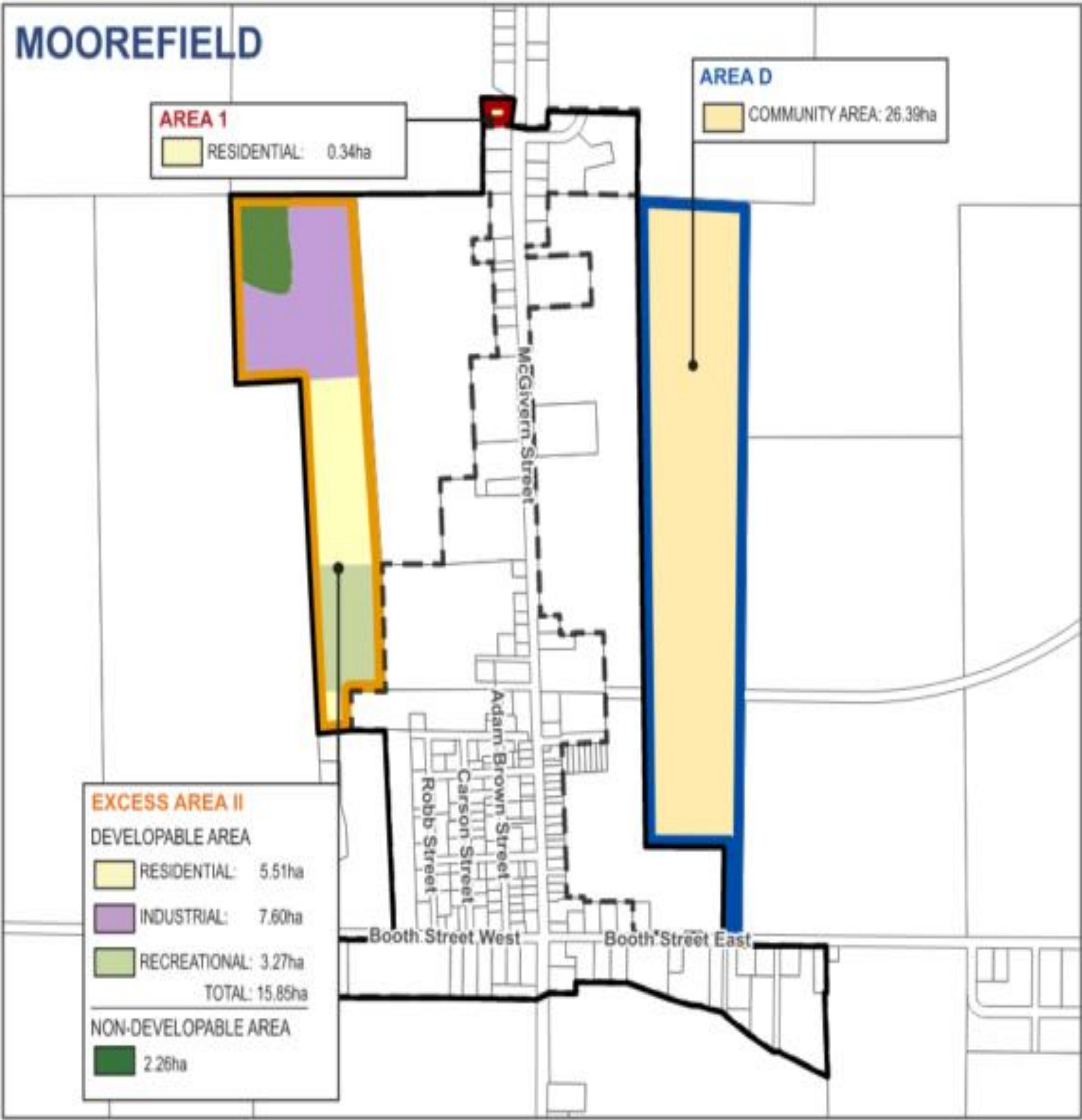


Mapping Source: GSP Group. (2022). Township of Mapleton Growth Management Summary - Final Report. Township of Mapleton.

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.

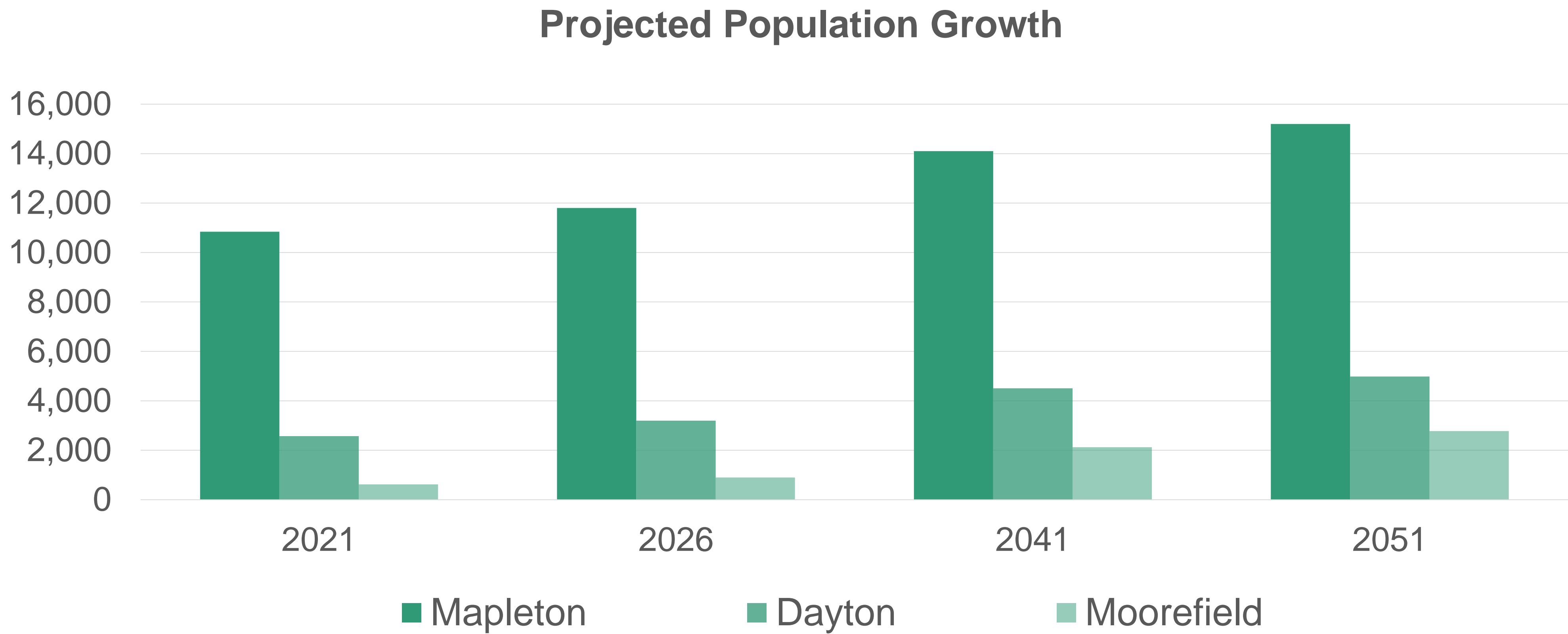


Mapping Source: GSP Group. (2022). Township of Mapleton Growth Management Summary - Final Report. Township of Mapleton.

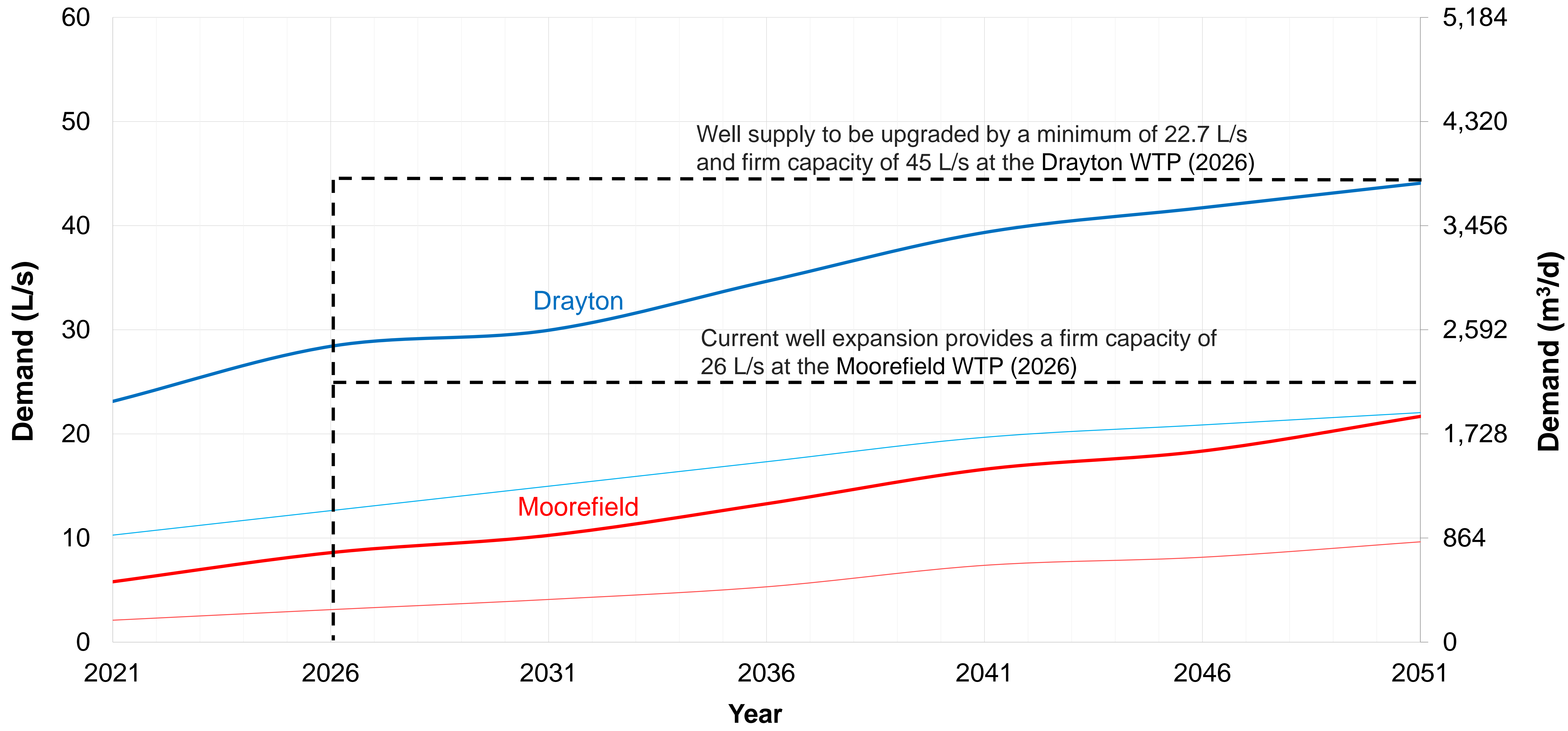
Growth Projections

	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.

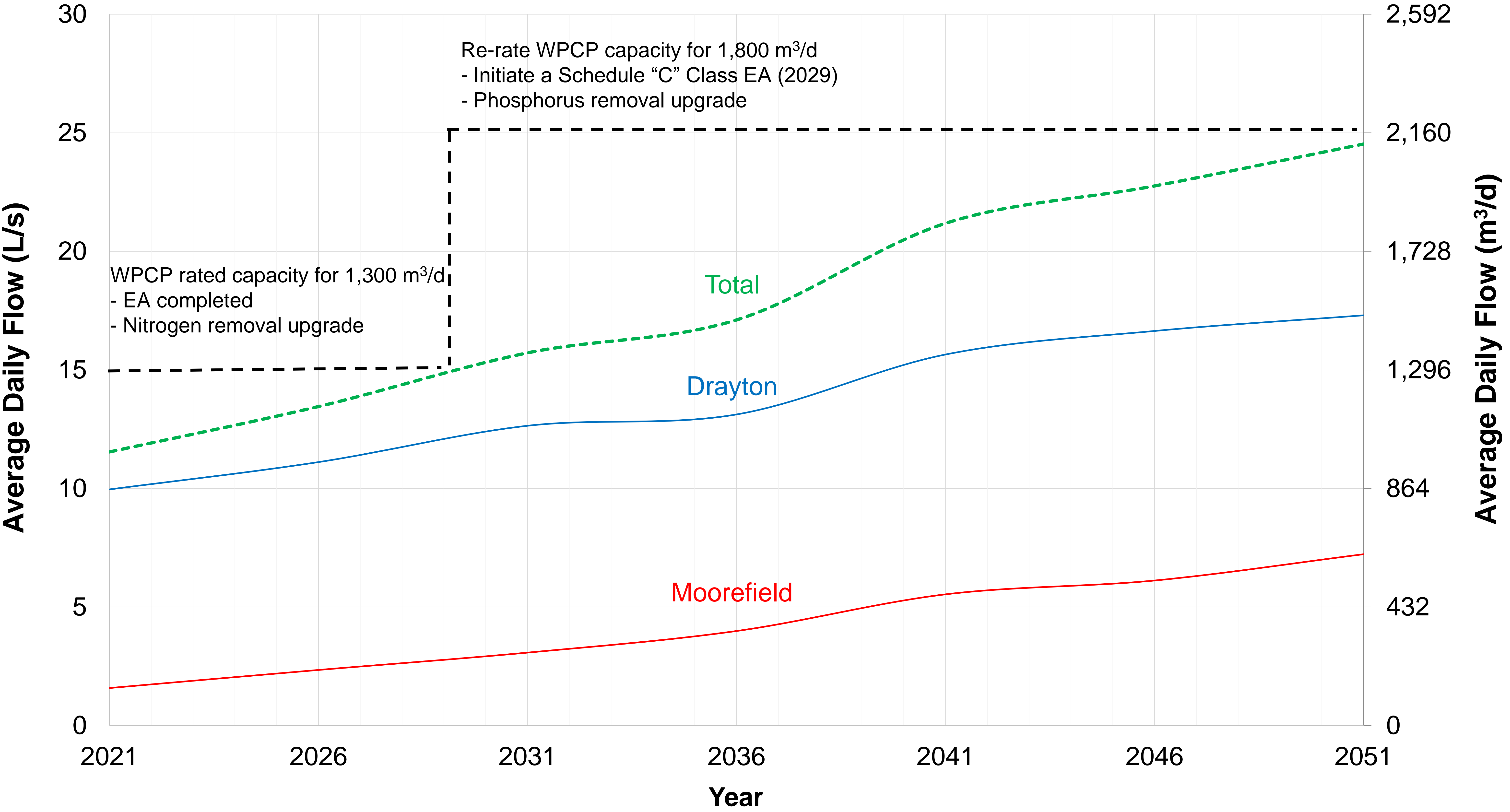


Water Demand Projections - Drayton & Moorefield



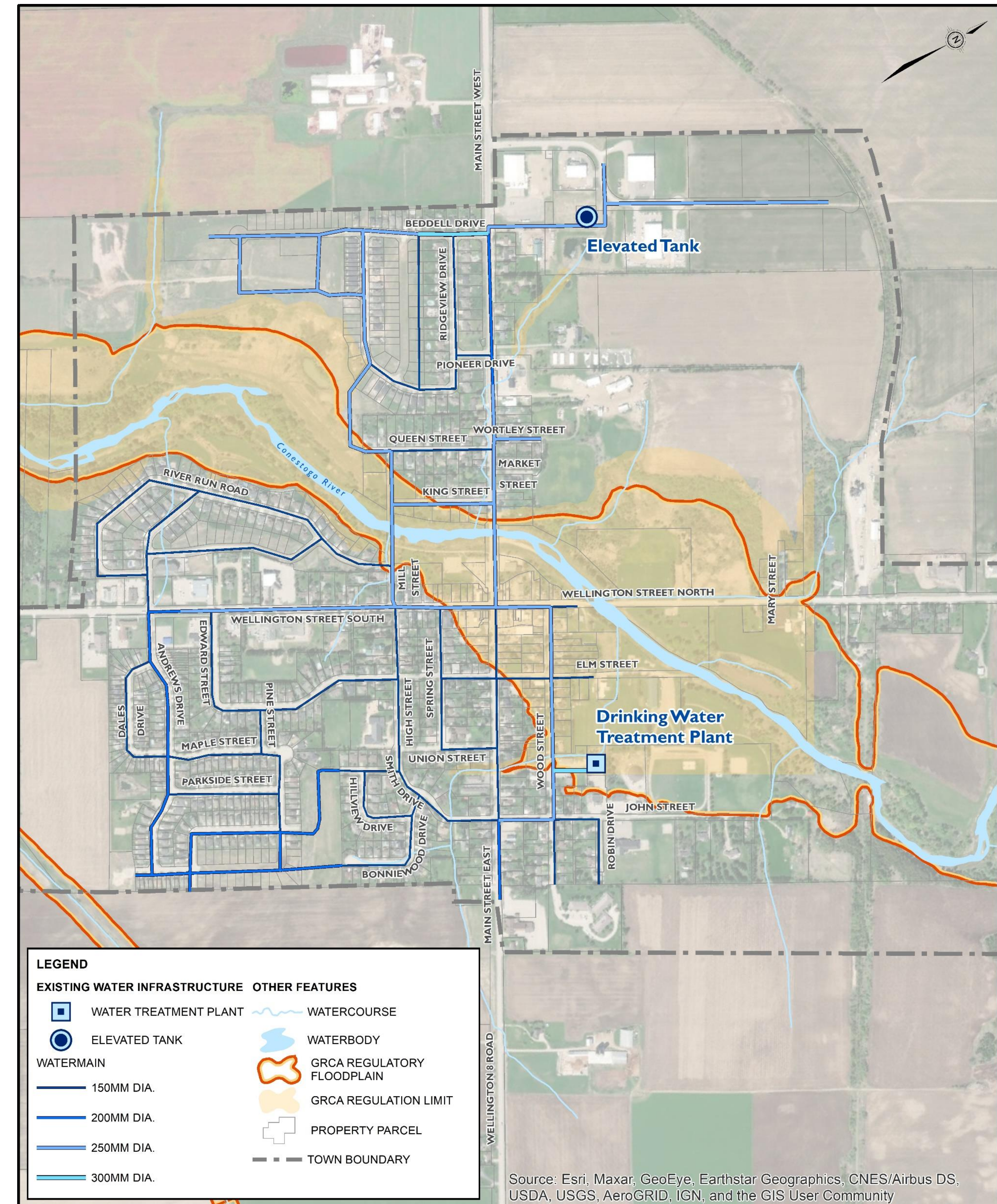
—Drayton Average Daily Demand —Drayton Max Daily Demand —Moorefield Average Daily Demand —Moorefield Max Daily Demand

Wastewater Flow Projections - Drayton & Moorefield



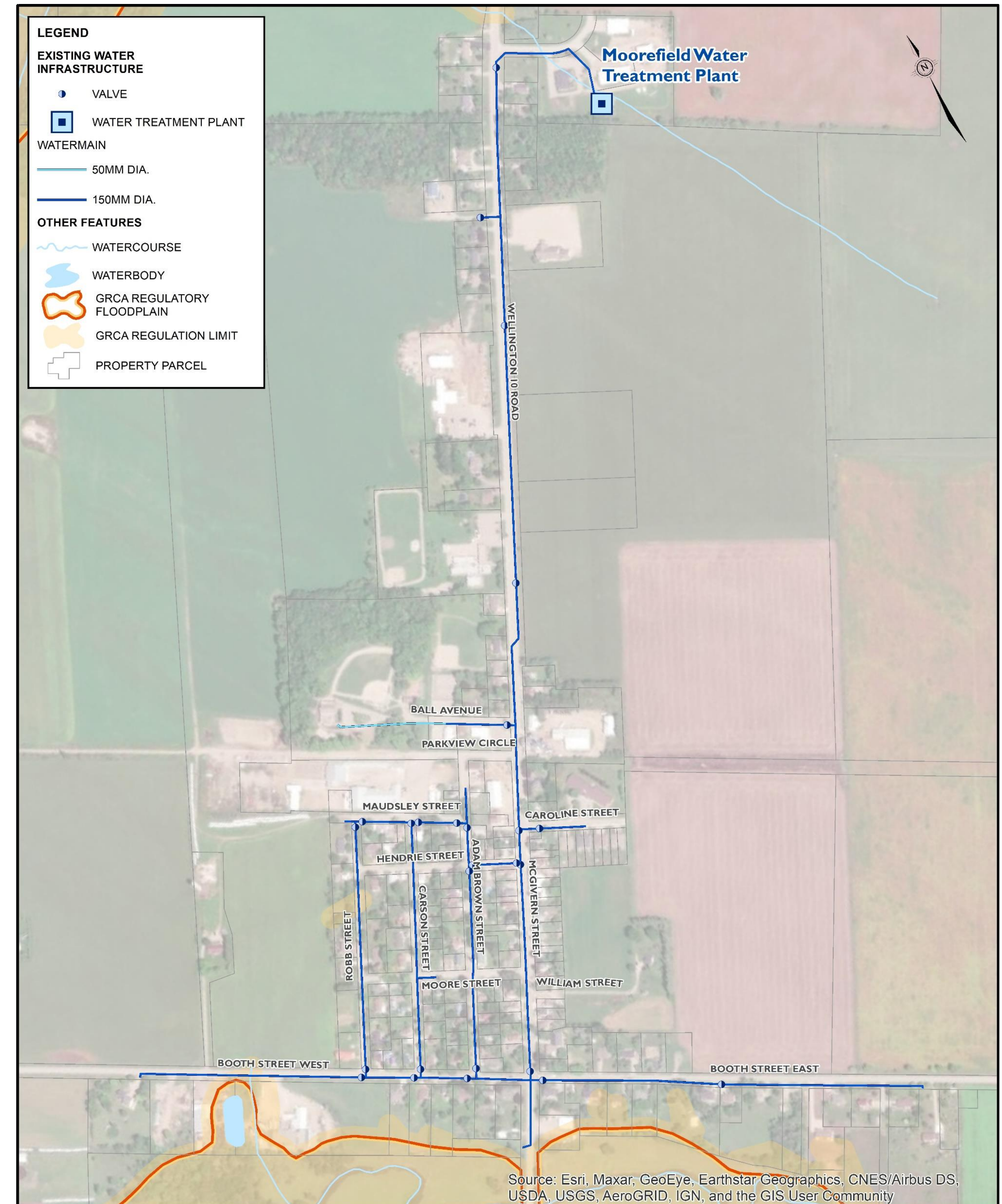
Existing Drinking Water System - Drayton

- 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 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.



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 m³ 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 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.



Water Servicing Constraints and Opportunities

Constraints

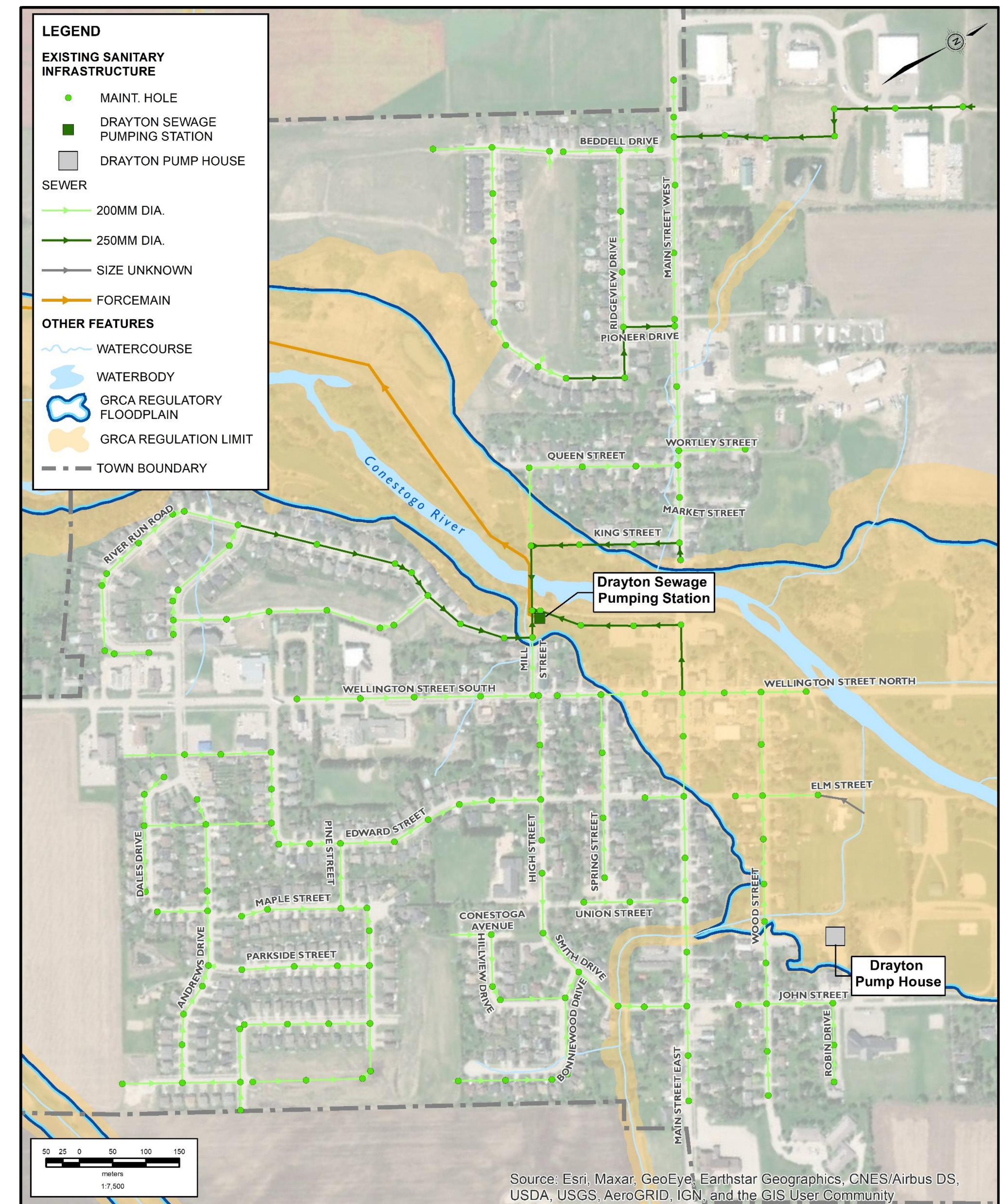
- + The existing Drinking Water Supply System in Drayton does not have sufficient capacity to meet future demands.
- + Growth areas in A, B and C in Drayton have no direct access to the drinking water distribution system.

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.

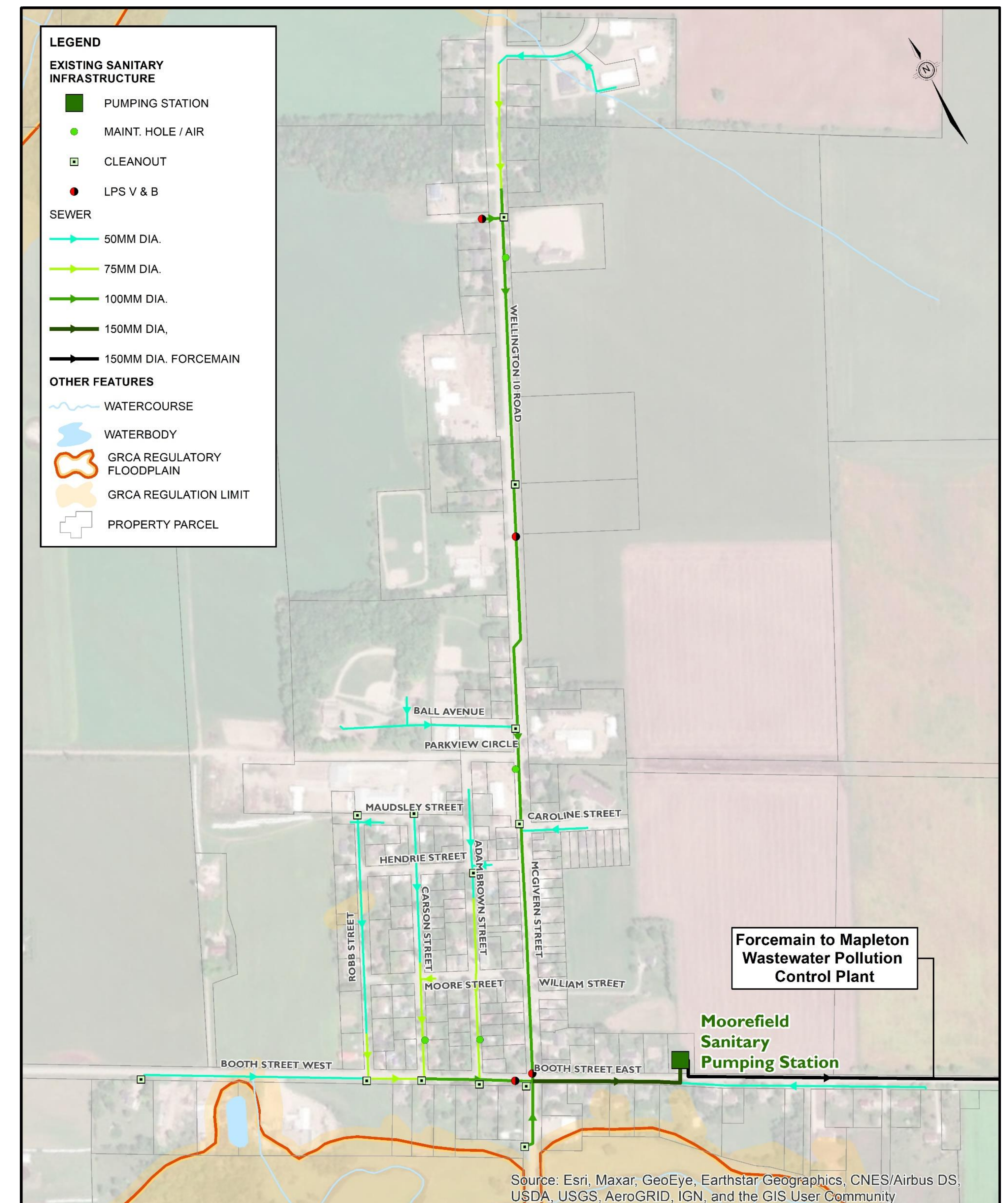
Existing Wastewater Collection System - Drayton

- 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.



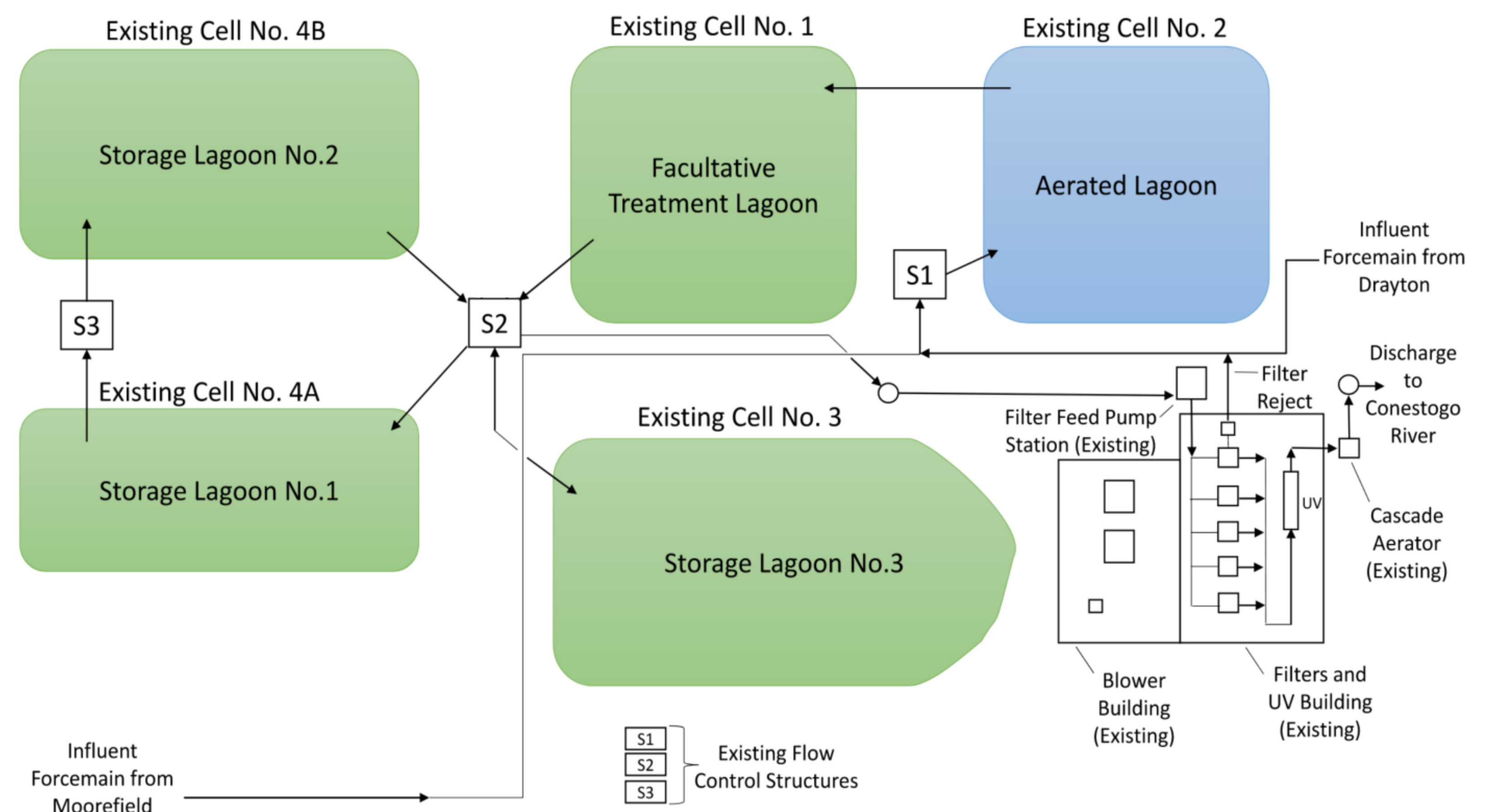
Existing Wastewater Collection System - Moorefield

- 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.



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 m³/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 m³/d capacity
- + Future upgrade of wastewater treatment facility to 1,800 m³/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

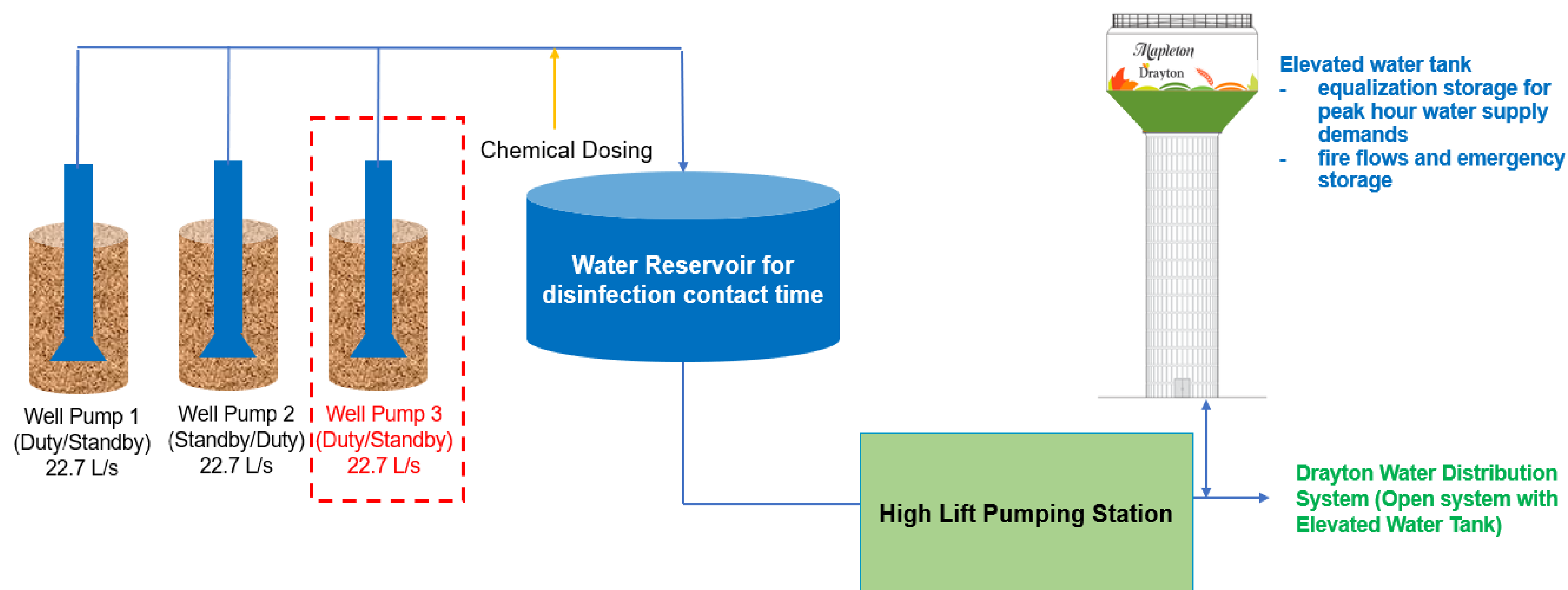
Wastewater Servicing Objectives

- 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

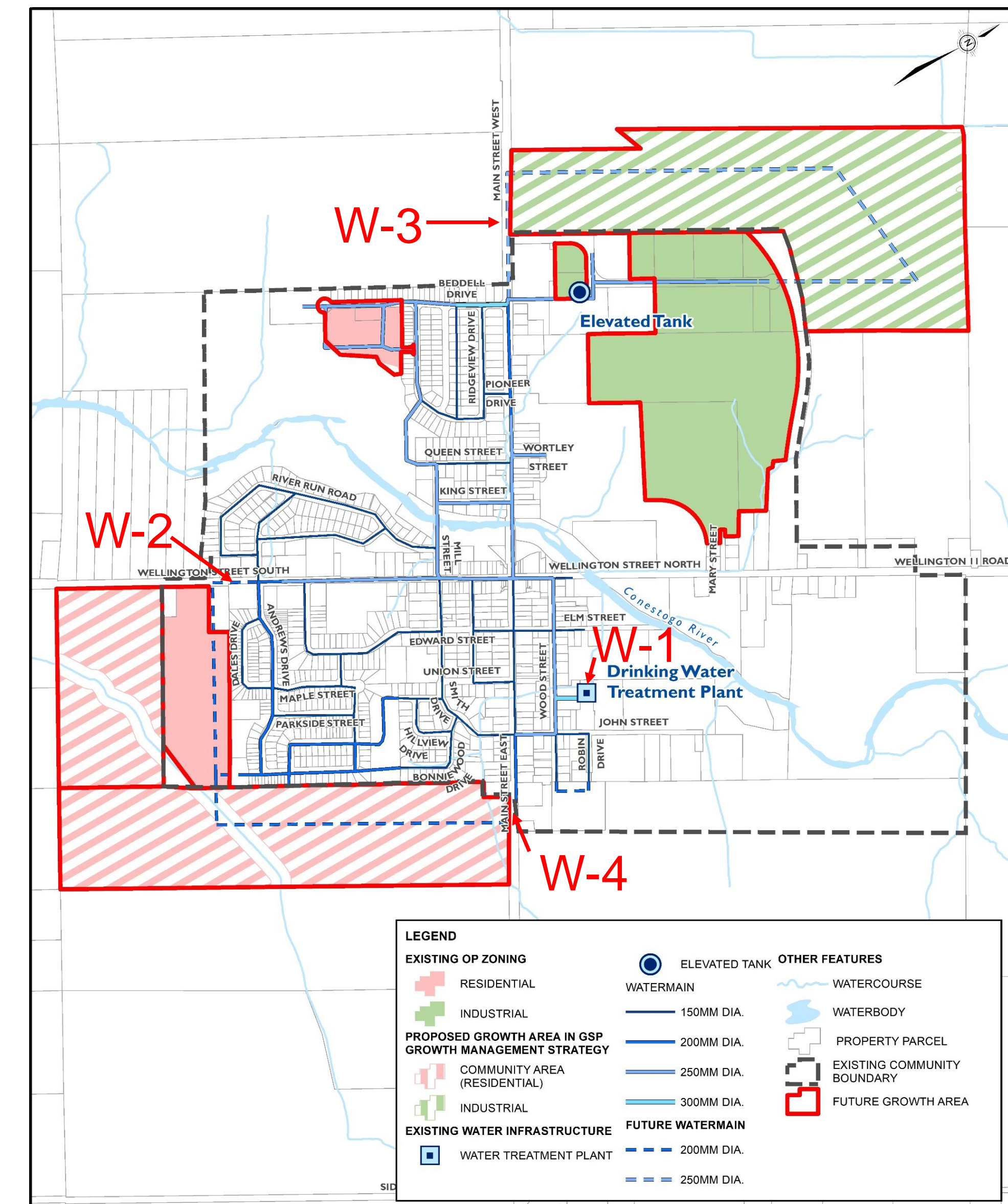
Factor Area	Consideration
Natural Environment	<ul style="list-style-type: none">● Potential impacts to existing natural environment● Potential temporary and permanent effects on surface water and groundwater quantity / quality● Resiliency to extreme conditions and ability to minimize greenhouse gas emissions● Protects wildlife and species at risk● Minimize contribution to climate change and maximize resiliency to extreme conditions
Socio-Cultural	<ul style="list-style-type: none">● 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	<ul style="list-style-type: none">● 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	<ul style="list-style-type: none">● 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

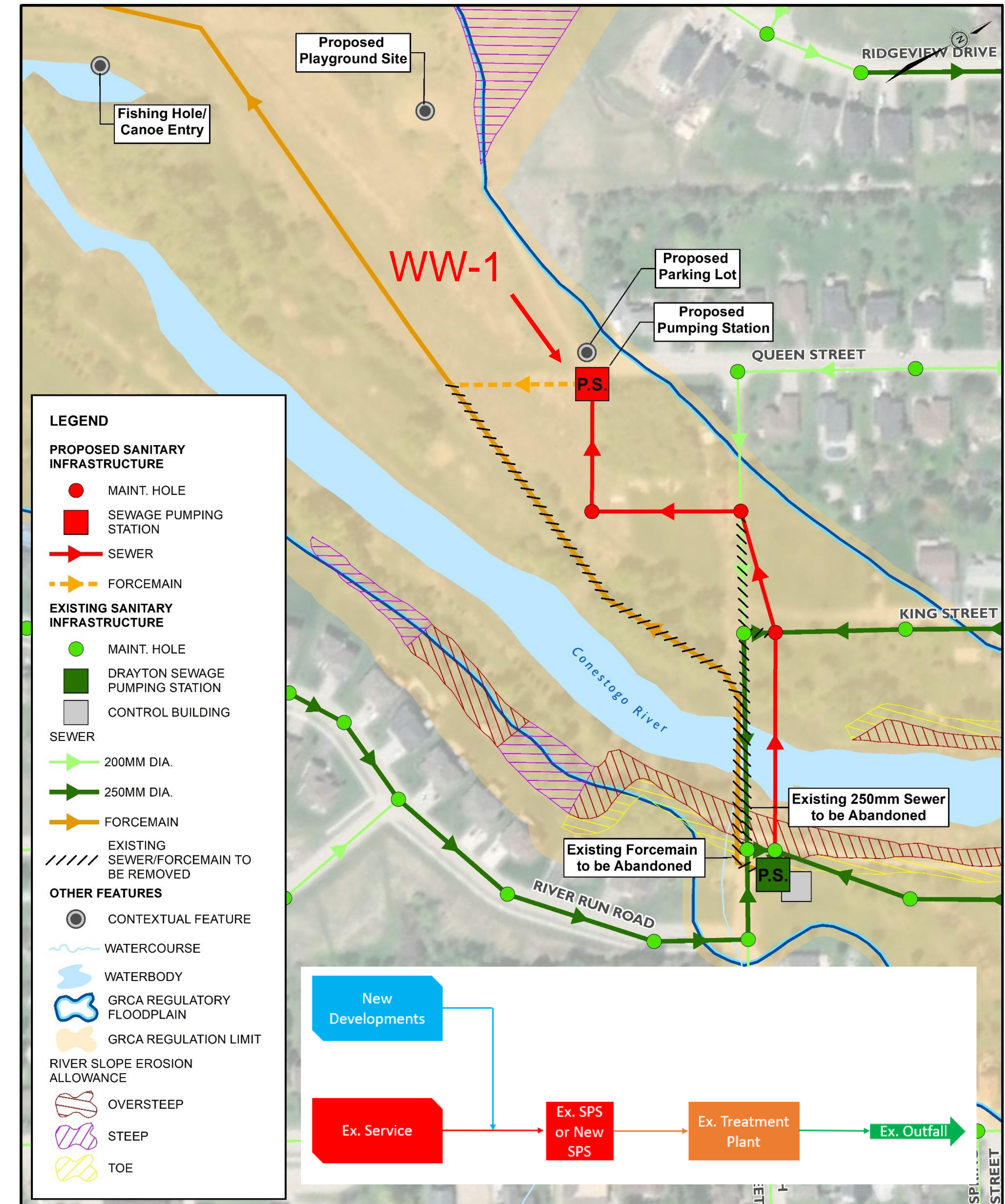
Wastewater Servicing Strategy - Drayton

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

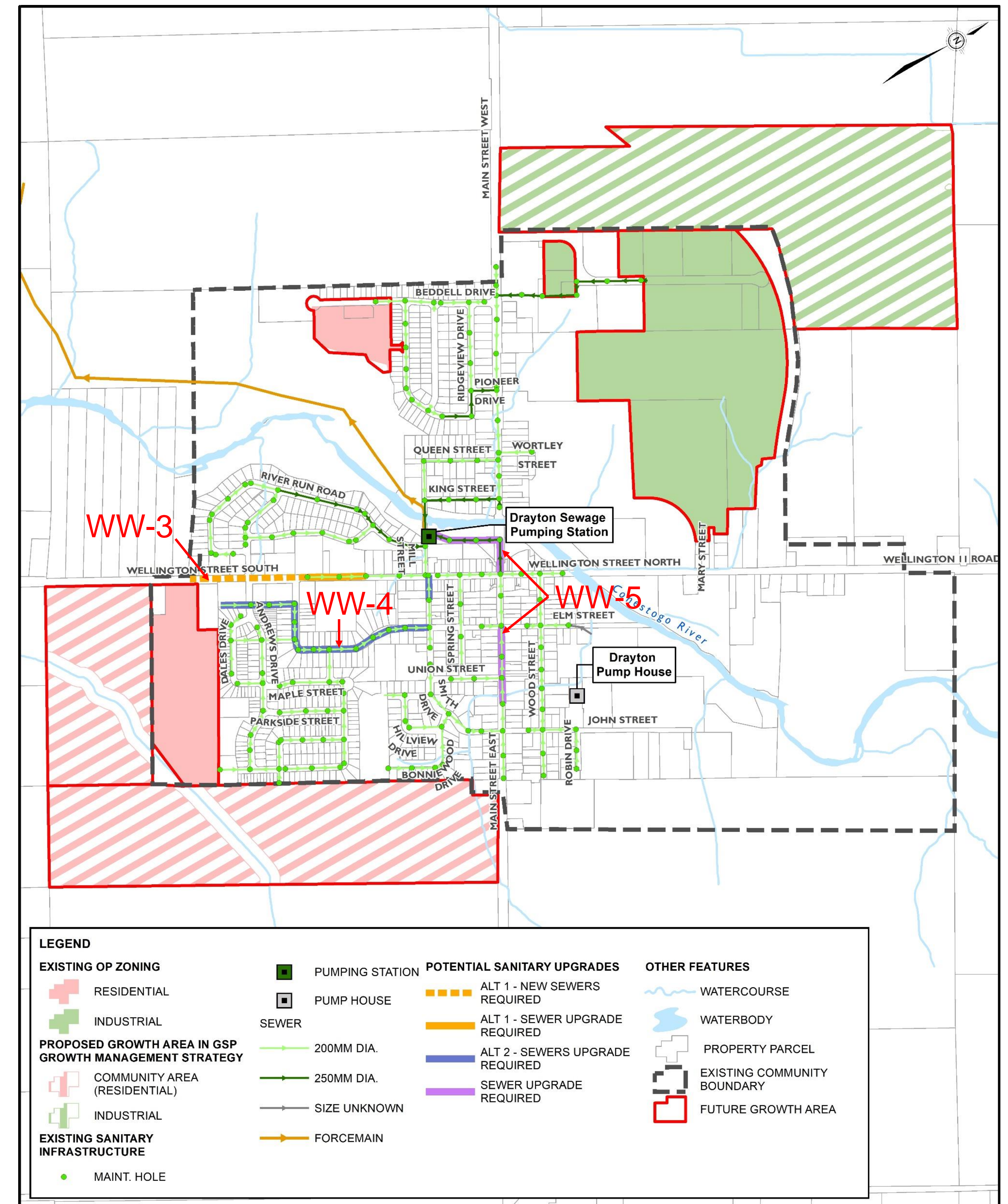
- Install flow monitoring equipment to access I&I sources for 5 years



Wastewater Servicing Strategy - Drayton

Drayton Collection System and Forcemain Alternative

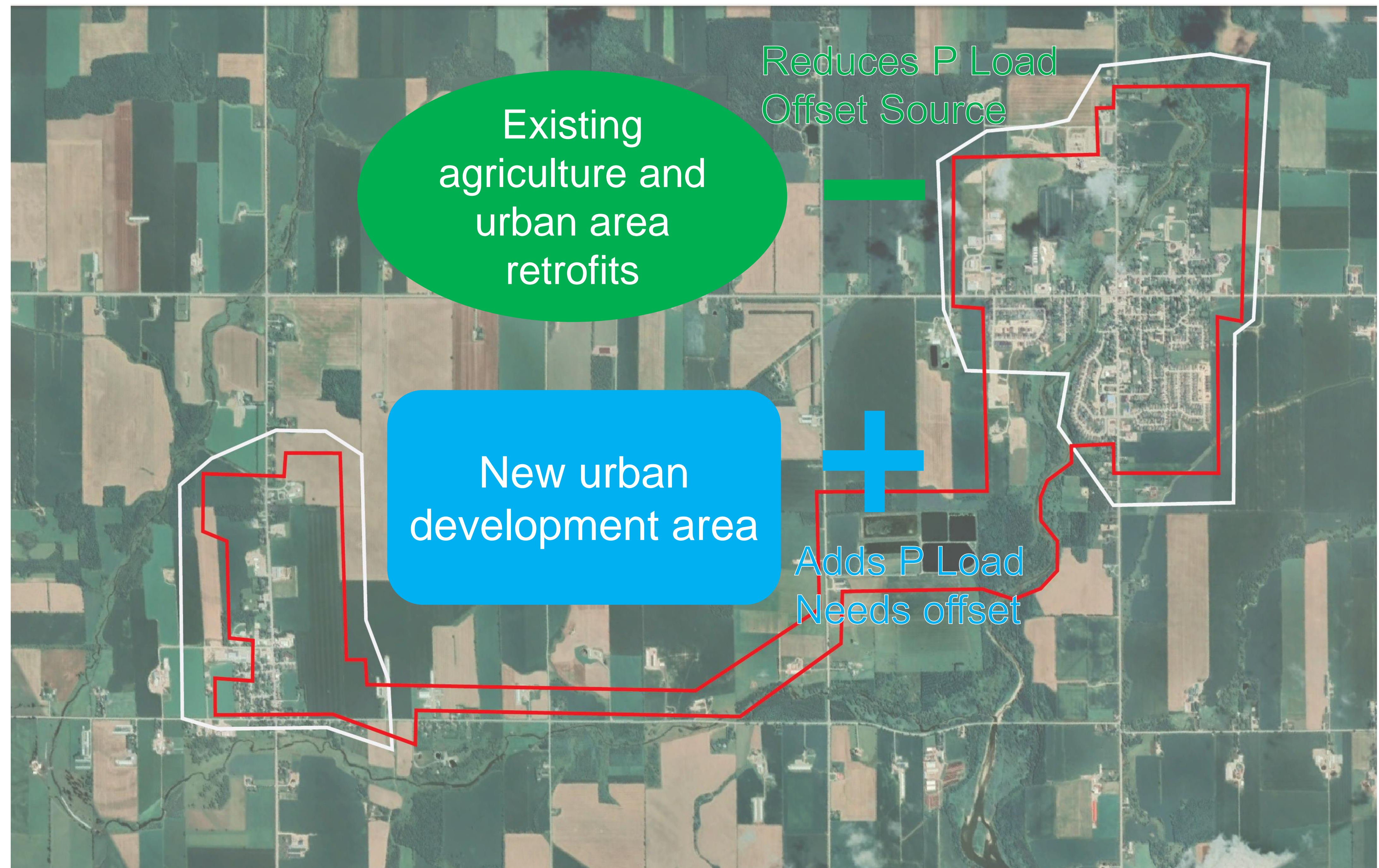
- Upgrade the existing collection system
 - Wellington Street South
 - Edward Street
 - Main Street East



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 m³/d
- A Schedule “C” EA study should be completed prior to 2029 to access phosphorus removal upgrades and increase capacity beyond 1,300 m³/d



Phosphorus off-setting concept

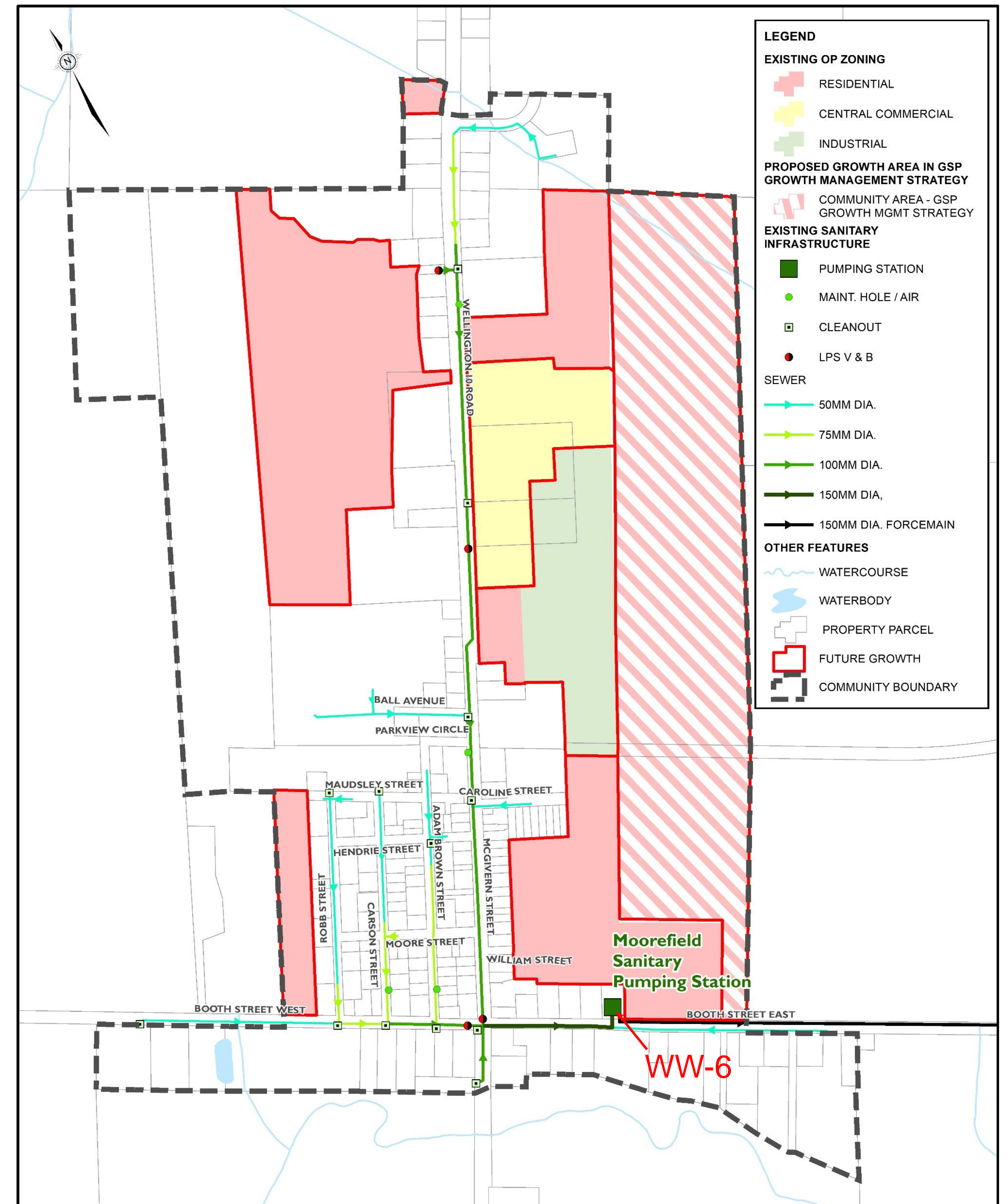
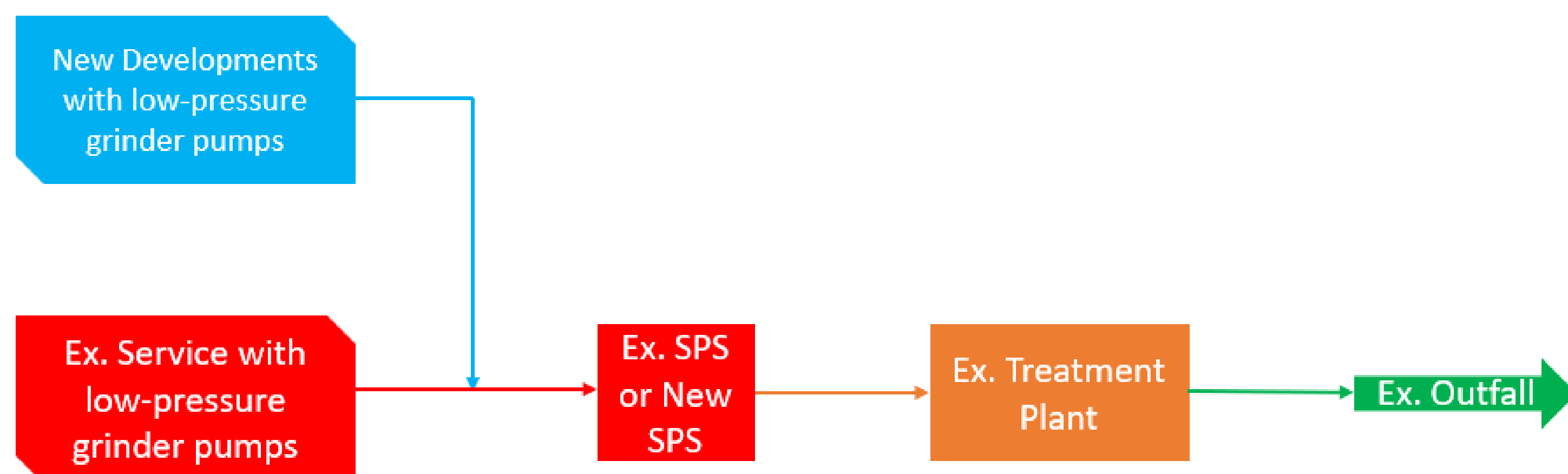
Wastewater Servicing Strategy - Moorefield

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



Township of Mapleton

Water and Wastewater Servicing Master Plan

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

Water and Wastewater Servicing Master Plan
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:

Water and Wastewater Servicing Master Plan

- 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

Water and Wastewater Servicing Master Plan

- 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.

Water and Wastewater Servicing Master Plan

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.

Water and Wastewater Servicing Master Plan

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 m³/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 m³/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 m³/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



Township of Mapleton

Water and Wastewater Servicing Master Plan

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 m³ 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.

Water and Wastewater Servicing Master Plan

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 m³/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.

Water and Wastewater Servicing Master Plan

- 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 m³/d capacity
- Future upgrade of wastewater treatment facility to 1,800 m³/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

Water and Wastewater Servicing Master Plan

- 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

Water and Wastewater Servicing Master Plan

- 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:

Water and Wastewater Servicing Master Plan

- 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

Water and Wastewater Servicing Master Plan

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 offset additional phosphorus load using stormwater controls ponds, engineered wetlands, low-impact-developments (LIDs), rainwater harvesting, and green roofs could be

Water and Wastewater Servicing Master Plan

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

Water and Wastewater Servicing Master Plan

- 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 rationale 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.

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>

EDITION(s): September 29 & October 6

By: Alicia Roza



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



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



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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



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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



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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



Engineering
for people



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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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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



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CONFIDENTIALITY WARNING This email is confidential. If you are not the intended recipient, please notify the sender immediately and delete it in its entirety.

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



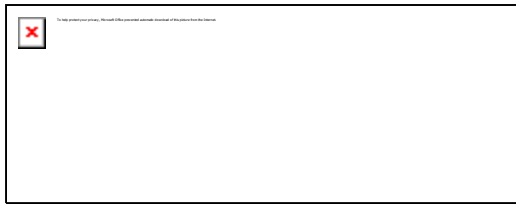
Decisive Action Drives Development

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

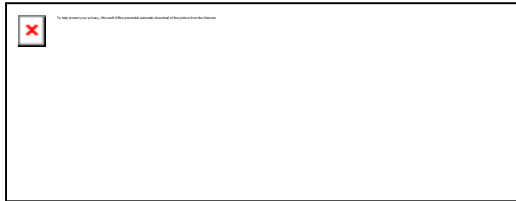
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Knowledge Exchange



Dreaming the Possible with Data

By Natasha Wiseman

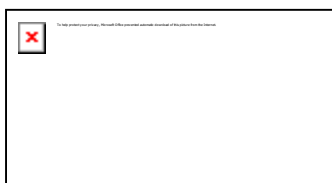


Nigeria: NCDC Calls for Improved Water Sanitation, As Cholera Kills 233 in 2022

By AllAfrica

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Sydney, Australia by **Vapar**

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Michigan USA

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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](#)

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Adam Moore

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

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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

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CONFIDENTIALITY WARNING This email is confidential. If you are not the intended recipient, please notify the sender immediately and delete it in its entirety.

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

EXTERNAL EMAIL

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
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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



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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



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,

A handwritten signature in dark ink, appearing to read "Joan Del Villar C", with a stylized flourish extending from the end.

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 mitigate 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,

A handwritten signature in black ink, appearing to read "Ben Kissner", is written above the printed name.

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
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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 its 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

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. MHSTCI makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MHSTCI be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

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***

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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).

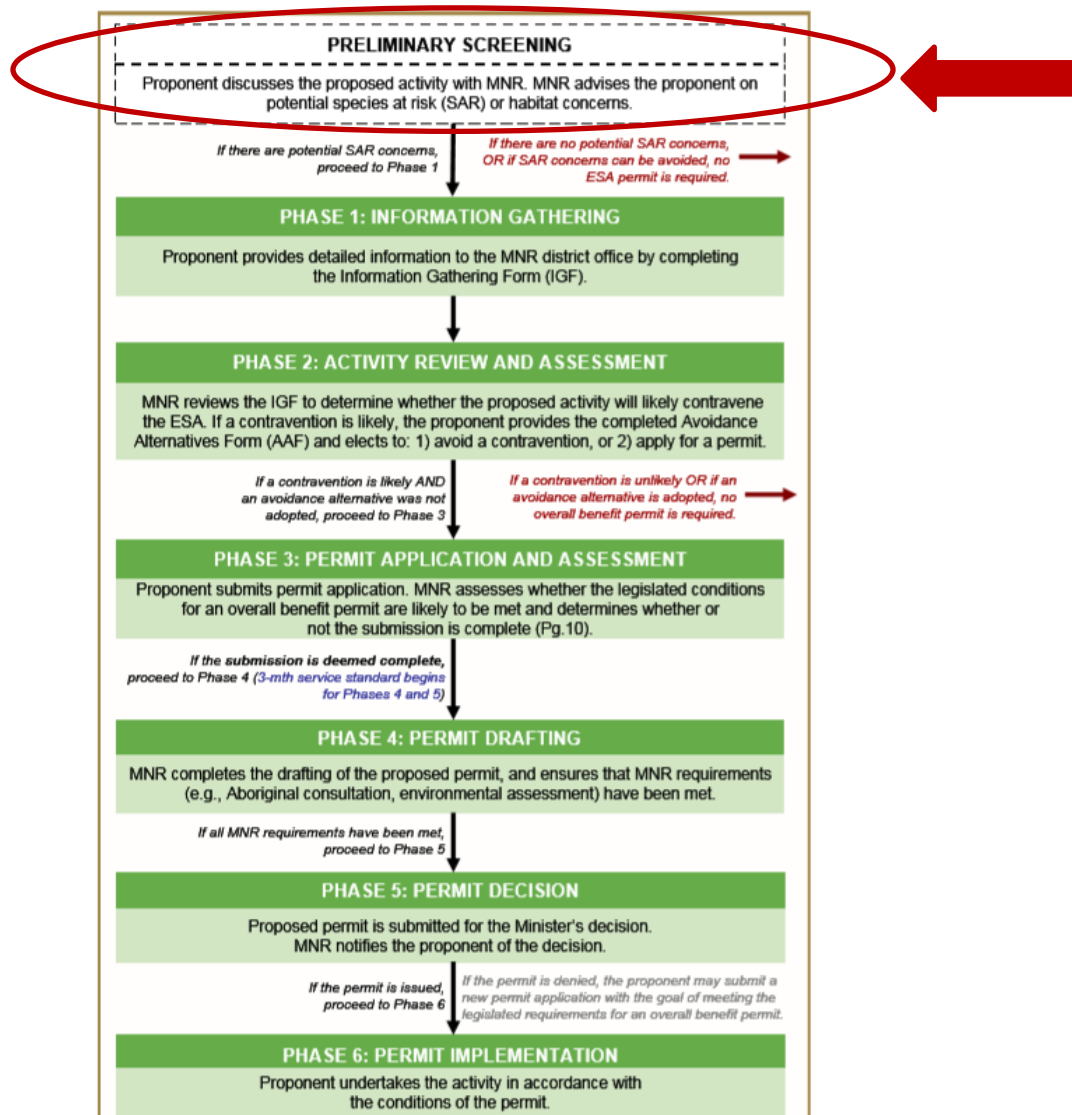
To provide the most efficient service, clients should initiate species at risk screenings and seek information from all applicable information sources identified in this guide, at a minimum, prior to contacting Government of Ontario ministry offices for further information or advice.

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>. 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 it 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

Adam 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.



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>

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.

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>

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CONFIDENTIALITY WARNING This email is confidential. If you are not the intended recipient, please notify the sender immediately and delete it in its entirety.

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>

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CONFIDENTIALITY WARNING This email is confidential. If you are not the intended recipient, please notify the sender immediately and delete it in its entirety.

<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



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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: 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



Engineering
for people



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CONFIDENTIALITY WARNING This email is confidential. If you are not the intended recipient, please notify the sender immediately and delete it in its entirety.

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:

notice@infrastructureontario.ca

Regards,

Valerie



Valerie Naso (she, her)

Infrastructure Ontario

Co-op, Environmental Management

valerie.naso@infrastructureontario.ca

Phone: +1 647-695-5119

www.infrastructureontario.ca

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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



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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
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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

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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

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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

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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



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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



Adam 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

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CONFIDENTIALITY WARNING This email is confidential. If you are not the intended recipient, please notify the sender immediately and delete it in its entirety.

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



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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



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
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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



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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
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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

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Charlotte Creron

From: Adam Moore
Sent: June 9, 2023 12:03 PM
To: Adam Moore
Cc: Roxanne Clark
Subject: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion
Attachments: T000974D-090-230414-PN-Notice of Completion-e04.pdf

Good afternoon,

Please find attached a copy of the Notice of Completion for the Mapleton Water and Wastewater Master Plan study. The Township of Mapleton has completed the Servicing Master Plan to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The final study materials are available on the Township's website through the link listed below.

<https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan>

If you would like more information about the study or would like to provide comments, please contact the Director of Public Works for the Township.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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Charlotte Creron

From: Charlotte Creron
Sent: August 31, 2023 3:27 PM
To: Charlotte Creron
Subject: FW: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion
Attachments: 2023-06-30 Mapleton W-WW Master Plan GRCA comments.pdf; GRCA Map.pdf

From: Trevor Heywood <theywood@grandriver.ca>
Sent: Friday, June 30, 2023 2:08 PM
To: jmorgan@mapleton.ca; Adam Moore <Adam.Moore@cima.ca>
Cc: Jessica Conroy <jconroy@grandriver.ca>
Subject: RE: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Hi Jamie, Adam,

Please see our comments attached.

Regards,

Trevor Heywood B.Sc.(Env.)
Resource Planner
Grand River Conservation Authority

400 Clyde Road, PO Box 729
Cambridge, ON N1R 5W6
Phone: 519-621-2763 ext. 2292
Email: theywood@grandriver.ca
www.grandriver.ca | [Connect with us on social media](#)

From: Adam Moore <Adam.Moore@cima.ca>
Sent: Friday, June 9, 2023 12:03 PM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Roxanne Clark <Roxanne.Clark@cima.ca>
Subject: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

Good afternoon,

Please find attached a copy of the Notice of Completion for the Mapleton Water and Wastewater Master Plan study. The Township of Mapleton has completed the Servicing Master Plan to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The final study materials are available on the Township's website through the link listed below.

<https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan>

If you would like more information about the study or would like to provide comments, please contact the Director of Public Works for the Township.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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June 30, 2023

Jamie Morgan
Director of Public Works
Township of Mapleton
7275 Sideroad 16
Drayton, ON N0G 1P0
jmorgan@mapleton.ca

**Re: Mapleton Water and Wastewater Servicing Master Plan
Township of Mapleton, Wellington County**

Dear Jamie Morgan,

The Grand River Conservation Authority (GRCA) is in receipt of the Notice of Completion and final Master Plan report for the above-noted Class Environmental Assessment (Class EA).

The study areas contain multiple resource features regulated by the GRCA under Ontario Regulation 150/06. We have reviewed the preferred servicing strategies and can provide the following feedback:

1. W-1 and WW-1 are within the Conestoga River floodplain. Attention will need to be paid to any new or expanded outbuildings, as well as associated grading, to support the new wells and sewage pumping stations. In addition to ensuring adequate floodproofing of operational and physical components, the Township will need to demonstrate (through detailed design plans and/or additional studies) that:
 - Adverse hydraulic or fluvial impacts are limited;
 - Any risk of flood damage to upstream or downstream properties is not increased; and,
 - There is no loss of flood storage wherever possible.

2. W-1, W-2, W-4, WW-4 and WW-5 will cross or be adjacent to watercourses and/or floodplains. During detailed design, we request details on grading and the construction method. Generally, the GRCA does not have concerns with linear underground infrastructure if existing grades are restored, and watercourse crossings have satisfactory erosion and sediment controls in place.
3. In terms of permitting:
 - a. W-3 and WW-6 are not regulated by the GRCA, and no permit is required.
 - b. We understand WW-7 and WW-8 require further evaluation through a Schedule C Municipal Class EA, and we can comment further at that time.
 - c. All other projects will require a GRCA permit prior to construction.

Please continue to consult us as projects in GRCA-regulated areas move forward through detailed design. If you have any questions or require additional information, please contact Jessica Conroy, Resource Planner, at 519-621-2763 ext. 2230 or jconroy@grandriver.ca.

Sincerely,



Trevor Heywood
Resource Planner
Grand River Conservation Authority

Encl. Resource Mapping

cc: Jessica Conroy, GRCA
Adam Moore, CIMA+



Drayton



Legend

- Regulation Limit (GRCA)
- Regulated Watercourse (GRCA)
- Regulated Waterbody (GRCA)
- Wetland (GRCA)
- Floodplain (GRCA)
 - Engineered
 - Estimated
 - Approximate
 - Special Policy Area
- Slope Valley (GRCA)
 - Steep
 - Oversteep
 - Steep
- Slope Erosion (GRCA)
 - Oversteep
 - Toe
- Lake Erie Flood (GRCA)
- Lake Erie Shoreline Reach (GRCA)
- Lake Erie Dynamic Beach (GRCA)
- Lake Erie Erosion (GRCA)
- Parcel - Assessment (MPAC/MNRF)

This legend is static and may not fully reflect the layers shown on the map. The text of Ontario Regulation 150/06 supercedes the mapping as represented by these layers.

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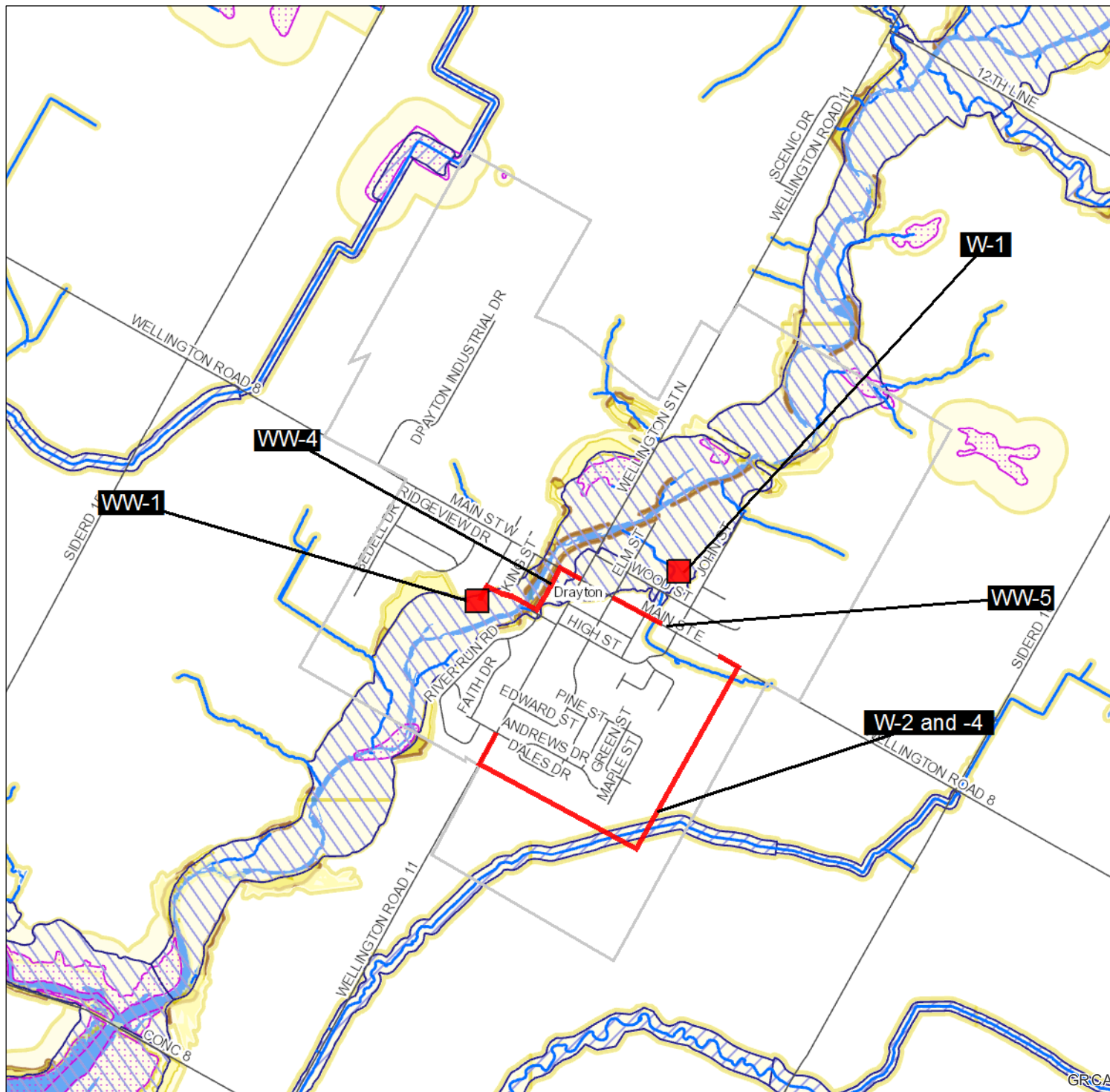
Disclaimer: This map is for illustrative purposes only. Information contained herein is not a substitute for professional review or a site survey and is subject to change without notice. The Grand River Conservation Authority takes no responsibility for, nor guarantees, the accuracy of the information contained on this map. Any interpretations or conclusions drawn from this map are the sole responsibility of the user.

The source for each data layer is shown in parentheses in the map legend. For a complete listing of sources and citations go to: <https://maps.grandriver.ca/Sources-and-Citations.pdf>

0 145 290 580 870 Metres

NAD 1983 UTM Zone 17N

Scale: 24,252



Charlotte Creron

From: Charlotte Creron
Sent: August 31, 2023 3:26 PM
To: Charlotte Creron
Subject: FW: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion
Attachments: T000974D-090-230414-PN-Notice of Completion-e04.pdf; 2023-07-07_WWMP-Mapleton-MCM-Comments.pdf

From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent: Friday, July 7, 2023 9:45 AM
To: jmorgan@mapleton.ca
Cc: Adam Moore <Adam.Moore@cima.ca>; Roxanne Clark <Roxanne.Clark@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (MCM) <Karla.Barboza@ontario.ca>
Subject: FW: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Jamie Morgan,

Please find attached our comment on the above referenced Master Plan.

Please note that the responsibility for administration of the *Ontario Heritage Act* and matters related to cultural heritage have been transferred from the Ministry of Tourism, Culture and Sport (MTCS) to the Ministry of Citizenship and Multiculturalism (MCM). Individual staff roles and contact information remain unchanged. Please continue to send any notices, report and/or documentation to both Karla Barboza and myself.

Please do not hesitate to contact me with any questions or concerns.

Regards,

Joseph Harvey | Heritage Planner
Citizenship, Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit
Ministry of Citizenship and Multiculturalism
613.242.3743
Joseph.Harvey@ontario.ca

From: Adam Moore <Adam.Moore@cima.ca>
Sent: June-09-23 12:03 PM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Roxanne Clark <Roxanne.Clark@cima.ca>
Subject: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

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Good afternoon,

Please find attached a copy of the Notice of Completion for the Mapleton Water and Wastewater Master Plan study. The Township of Mapleton has completed the Servicing Master Plan to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The final study materials are available on the Township's website through the link listed below.

<https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan>

If you would like more information about the study or would like to provide comments, please contact the Director of Public Works for the Township.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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**Ministry of Citizenship
and Multiculturalism**

Heritage Planning Unit
Heritage Branch
Citizenship, Inclusion and
Heritage Division
5th Flr, 400 University Ave
Tel.: 613.242.3743

**Ministère des Affaires civiques
et du Multiculturalisme**

Unité de la planification relative au
patrimoine
Direction du patrimoine
Division des affaires civiques, de
l'inclusion et du patrimoine
Tél.: 613.242.3743



July 7, 2023

EMAIL ONLY

Jamie Morgan
Director of Public Works
Township of Mapleton
jmorgan@mapleton.ca

MCM File : 0014845
Proponent : Township of Mapleton
Subject : Municipal Class EA – Master Plan Approach 2
Project : Water and Wastewater Servicing Master Plan
Location : Township of Mapleton, County of Wellington

Dear Jamie Morgan:

Thank you for providing the Ministry of Citizenship and Multiculturalism (MCM) with the Notice of Completion and making the Water and Wastewater Master Plan (dated May 31, 2023, by CIMA+) available for our review.

MCM's interest in this project relates to its mandate of conserving Ontario's cultural heritage.

Project Summary

The Township of Mapleton (Township) initiated a Water and Wastewater Master Servicing Study to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The Master Servicing 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 study has been prepared in accordance with the requirements of the Municipal Class EA Planning Process (2015), which is an approved process under the Ontario Environmental Assessment Act. This Master Plan will fulfill the requirements for selected Schedule B projects and provide the basis for any future Schedule C projects identified through the Master Plan. The Township of Mapleton intends to proceed with the design and construction of the identified Schedule A, Schedule A+, and Schedule B projects as outlined in the Implementation Plan.

Comments

A Master Plan study under Approach #2 in the Municipal Class EA is intended to satisfy all EA requirements for Schedule B undertakings that are components of the master plan. This should address the cultural heritage component of the environment which includes technical cultural heritage studies where necessary. Technical cultural heritage studies should be completed prior to the completion of the Master plan to inform the selections and design of preferred alternatives. We understand that Schedule C undertakings will proceed as a separate process.

We have reviewed the Master Plan and have the following observations and recommendations to help support fulfillment of the municipality's obligations under Municipal Class EA process:

- The documentation requirements for schedule B projects are outlined under [section A.4.1 of the MCEA](#).

In order to fulfill the requirements for Schedule B MCEA undertakings the Master Plan should:

- identify existing baseline environmental conditions,
 - identify expected environmental impacts, and
 - Include measures to mitigate potential negative impacts.
- The following headings correspond to section headings typically used in Master Plans:

1. *Description of Existing Conditions: Cultural Heritage Resources (Master Plan Section 5)*

1.1 Archaeological Resources

This section should describe the existing conditions as it relates to archaeology, e.g., if the Master Planning study area has archaeological potential. The Description of Existing Conditions will be based on the archaeological assessment (AA) report(s) completed. It will include the conclusions and recommendations of the archaeological assessment(s) completed in support of this undertaking.

The selected Schedule B MCEA undertakings being carried out as part of the preferred alternative will need to be screened for impacts to archaeological resources. It is not clear whether the [Criteria for Evaluating Archaeological Potential](#) (MCM, 2017) was completed to determine whether AA was required or if any archaeological assessments have been completed in support of this undertaking. To assist us in tracking archaeological assessment reports, please provide us with the Project Information Form (PIF) number(s) for any AA undertaken in support of this EA.

Where there is archaeological potential, at a minimum, a Stage 1 AA will be undertaken during the planning phase. If the Stage 1 AA recommends further AA(s), then MCM recommends that further stages of AA be completed as early as possible during the design phase of the project, and prior to the completion of detailed design.

Please note that archaeological concerns have not been addressed until reports have been entered into the Ontario Public Register of Archaeological Reports where those reports recommend that:

1. the archaeological assessment of the project area is complete and
2. all archaeological sites identified by the assessment are either of no further cultural heritage value or interest (as per Section 48(3) of the *Ontario Heritage Act*) or that mitigation of impacts has been accomplished through an excavation or an avoidance and protection strategy

Approval authorities (such as the municipality or the Ministry of the Environment, Conservation and Parks - MECP) typically wait to receive the ministry's review letter for an archaeological assessment report before issuing a decision on the application as it can be used, for example, to document that due diligence has been undertaken.

1.2 Built Heritage Resources and Cultural Heritage Landscapes

This section should describe any known and potential built heritage resources and cultural heritage landscapes within the study area. MCM has developed screening criteria that may assist with this exercise: [Criteria for Evaluating for Potential Built Heritage Resources and Cultural Heritage Landscapes](#) (MCM, 2017).

MCM recommends that a *Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment* be undertaken for the entire study area. This report will:

- Describe the existing baseline cultural heritage conditions within the study area by identifying all known or potential built heritage resources and cultural heritage landscapes,
- Identify preliminary potential project-specific impacts on the known and potential built heritage resources and/or cultural heritage landscapes that have been identified within the Schedule B's MCEAs study areas.
- Recommend measures to avoid or mitigate potential negative impacts to known or potential built heritage resource or cultural heritage landscapes that has been identified.

Cultural Heritage Reports will 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.

Community input should be sought to identify locally recognized and potential cultural heritage resources. Sources include, but are not limited to, municipal heritage committees, 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.

2. Evaluation of a Preferred Alternative - Cultural Heritage Resources (Master Plan Section 4.3 (Appendix D))

The evaluation of alternatives should consider impacts to the three types of cultural heritage resources; archaeological resources, built heritage resources and cultural heritage landscapes. The preferred solution should be identified by considering public and review agency input as well as the findings of any technical cultural heritage studies.

The findings and recommendations of technical cultural heritage studies (including archaeological assessments) should inform this section.

3. Impact Assessment and Mitigation Measures – Cultural Heritage Resources (Suggested New Section)

This section should include recommendations and mitigation strategies addressing any identified or potential impacts of the preferred alternative on the cultural heritage environment. The findings and recommendations of technical cultural heritage studies will help inform this section.

We have attached a table with more detailed comments, and we would be pleased to discuss them further and/or provide additional information.

Please note that the responsibility for administration of the *Ontario Heritage Act* and matters related to cultural heritage have been transferred from the Ministry of Tourism, Culture and Sport (MTCS) to the Ministry of Citizenship and Multiculturalism (MCM). Individual staff roles and contact information remain unchanged. Please continue to send any notices, report and/or documentation electronically to both Karla Barboza and myself.

- Karla Barboza, Team Lead - Heritage | Heritage Planning Unit (Citizenship and Multiculturalism) | 416-660-1027 | karla.barboza@ontario.ca
- Joseph Harvey, Heritage Planner | Heritage Planning Unit (Citizenship and Multiculturalism) | 613-242-3743 | joseph.harvey@ontario.ca

Thank you for providing us with the opportunity to review the Master Plan. If you have any questions or require clarification, please do not hesitate to contact me.

Sincerely,

Joseph Harvey
Heritage Planner
Heritage Planning Unit
joseph.harvey@Ontario.ca

Copied to: Adam Moore, Project Engineer, CIMA+

Roxanne Clark, CIMA+

Joan Del Villar Cuicas, Environmental Resource Planner & EA Coordinator, MECF

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. The Ministry of Citizenship and Multiculturalism (MCM) makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MCM be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out an archaeological assessment, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33* requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with *Ontario Regulation 30/11* the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*.

Item No.	Section	Original Text	Comment
1.	3.3 (Relevant Policies, Legislation, Regulations, and Permitting) Table 3 p. 23	<p>Agency</p> <ul style="list-style-type: none"> Ministry of Heritage, Tourism, Culture and Sport Industries <p>Description of Permit / Approval</p> <ul style="list-style-type: none"> 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. 	<p>We recommend revising this section to align with MCM's current role.</p> <p>Agency</p> <ul style="list-style-type: none"> Ministry of <u>Citizenship and Multiculturalism</u> Heritage, Tourism, Culture and Sport Industries <p>Description of Permit / Approval / Legislative Requirements</p> <ul style="list-style-type: none"> Archaeological and Cultural Heritage assessments, including fieldwork and reporting, are required to comply with the Ministry's 2011 Standards and Guidelines for Consultant Archaeologists. <u>Additional surveys may be required contingent on the Ministry's review of the Project File Report.</u> <u>Archaeological assessment(s) are required for areas of archaeological potential. Archaeological concerns have not been addressed until MCM's letter is received indicating that an archaeological assessment report has been entered into the Ontario Public Register of Archaeological Reports where those reports recommend that:</u> <ul style="list-style-type: none"> <u>the archaeological assessment of the project area is complete and</u> <u>all archaeological sites identified by the assessment are either of no further cultural heritage value or interest (as per Section 48(3) of the <i>Ontario Heritage Act</i>) or that mitigation of impacts has been accomplished through an excavation or an avoidance and protection strategy.</u> <u>Cultural Heritage Evaluation Reports are required for any potential built heritage resources and cultural heritage landscapes impacted by any of the Schedule B's MCEAs proceeding as part of the master plan. If a property is determined to be of cultural heritage value or interest and alterations or development is proposed, a Heritage Impact Assessment (HIA), prepared by a qualified consultant, will be completed to assess potential project impacts. CHERs (and HIAs, if recommended) will be sent to MCM and the Township of Mapleton for review and comment as early as possible during detailed design.</u>

2.	4.3.1 (Evaluation Criteria) Table 4-1 p. 18	<p>Evaluation Category</p> <ul style="list-style-type: none"> • Socio-Cultural Criteria • ... • Protects Cultural Heritage Features - Minimizes impact to cultural heritage features. • Protects Archaeological Features - Minimizes impact to archaeological features 	<p>We recommend revising this section to align with current legislation and terminology:</p> <p>Evaluation Category</p> <ul style="list-style-type: none"> • Socio-Cultural Criteria • ... • Protects Cultural Heritage Features - Minimizes impact to <u>built heritage resources and cultural heritage landscapes</u> features. • Protects Archaeological <u>Resources</u> Features - Minimizes impact to <u>areas of archaeological potential and archaeological sites</u> features
3.	5 (Existing Conditions) p. 21	n/a	<p>A new subsection should be included which describes the existing baseline cultural heritage conditions within the study area by identifying all known or potential cultural heritage resources within the study area.</p> <p>The new subsection should include the following text:</p> <p>Cultural Heritage Environment:</p> <p style="padding-left: 40px;">Cultural heritage resources include archaeological resources, built heritage resources and cultural heritage landscapes.</p> <p>Archaeological Resources</p> <p style="padding-left: 40px;">Stage 1 archaeological assessment (under Project Information Form number xx) was undertaken on [date] by [consultant archaeologist] for all proposed Schedule B undertakings, that were considered to have archaeological potential, as part of the Master Plan. A Stage 1 AA consists of a review of geographic, land use and historical information for the property and the relevant surrounding area, and contacting MCM to find out whether, or not, there are any known archaeological sites on or near the property. Its purpose is to identify areas of archaeological potential and further archaeological assessment (e.g., Stage 2-4) as necessary. The Stage 1 AA is included in Appendix X [Please include the Stage 1 AA and MCM letter indicating that the report has been entered into the Register].</p>

			<p>[Include the outcomes and recommendations of the report, as is in the Executive Summary – just copy and paste, don't summarize]</p> <p>Built Heritage Resources and Cultural Heritage Landscapes</p> <p><i>A Cultural Heritage Report- Existing Conditions and Preliminary Impact Assessment</i> was undertaken on [date] by [heritage consultant] for the project or study area. The assessment for this report consisted of data collection, background historic research, review of secondary source material and field review. A total of # (known and potential) cultural heritage landscapes and built heritage resources were identified within or adjacent to the project area.</p> <p>Cultural Heritage Evaluation Reports (and Heritage Impact Assessments if recommended) were recommended for the # properties that could be directly impacted by the MCEA schedule B project proceeding as part of the Master Plan. All CHERs were undertaken on [date] by [heritage consultant].</p> <p>The <i>Cultural Heritage Report- Existing Conditions and Preliminary Impacts Assessment</i> is included in Appendix X.</p> <p>See also comments in the cover letter</p> <p>MCM may have additional advice on how to articulate the existing conditions section of this report pending the completion of any archaeological assessments or other technical cultural heritage studies.</p>
4.	<p>Impact Assessment and Mitigation Measures – Cultural Heritage Resources</p> <p><i>Recommended New Section</i></p>	n/a	<p>MCM recommends including the following mitigations measures addressing cultural heritage resources in a new section of the Master Plan:</p> <p>Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the <i>Ontario Heritage Act</i>. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out an archaeological assessment, in compliance with Section 48(1) of the <i>Ontario Heritage Act</i>.</p>

			<p>The <i>Funeral, Burial and Cremation Services Act</i>, 2002, S.O. 2002, c.33 requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with Ontario Regulation 30/11 the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the <i>Ontario Heritage Act</i>.</p> <p>[Insert the recommendations of the Cultural Heritage Report – Copy and Paste, do not summarize]</p>
5.	Appendix D (Evaluation Matrix)	n/a	<p>The terminology in Appendix D should be revised for consistency with our edits to Master Plan section 4.3.1 (See comment 2 above). The evaluation will need to be updated to reflect the findings of the Cultural Heritage Report and any Stage 1 archaeological assessment undertaken.</p>

Charlotte Creron

From: Charlotte Creron
Sent: August 31, 2023 3:27 PM
To: Charlotte Creron
Subject: FW: Mapleton Water and Wastewater Servicing Master Plan MECP Comments
Attachments: MECP PRU comments_ Township of Mapleton W &W Masterplan.pdf

From: Safar, Jasmine (MECP) <Jasmine.Safar@ontario.ca>
Sent: Monday, July 10, 2023 10:05 AM
To: Adam Moore <Adam.Moore@cima.ca>; Manny Baron <mbaron@mapleton.ca>
Cc: Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>
Subject: Mapleton Water and Wastewater Servicing Master Plan MECP Comments

EXTERNAL EMAIL

Good afternoon,

Thank you for circulating the MCEA Water and Wastewater Servicing Master Plan for The Township of Mapleton for review. MECP provides the attached comments for your consideration.

Should you or any members of your project team have any questions regarding the comments, please contact Joan Del Villar Cuicas at joan.delvillarcuicas@ontario.ca.

Regards,

Jasmine Safar (she/her)
Assistant Project Officer
Environmental Assessment Branch
Ontario Ministry of the Environment, Conservation and Parks
jasmine.safar@ontario.ca

**Ministry of the Environment,
Conservation and Parks**

**Ministère de l'Environnement,
de la Protection de la nature
et des Parcs**

Environmental Assessment
Branch

Direction des évaluations
environnementales

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Télec. : 416 314-8452

Via E-mail Only

July 10, 2023

Adam Moore
Consultant Project Engineer
CIMA+
adam.moore@cima.ca

Manny Baron
Chief Administrative Officer
Township of Mapleton
mbaron@mapleton.ca

Re: Water and Wastewater Master Plan
Township of Mapleton
Municipal Class Environmental Assessment – Master Plan
Project Review Unit Comments – Master Plan

Dear Project Team,

Thank you for providing the ministry with an opportunity to comment on the Master Plan for the above noted Class Environmental Assessment (EA) project. Our understanding is that in order to service the increasing amount of future residential and non-residential lands due to the projected population growth, the Township of Mapleton (the proponent) has determined that the preferred alternative is to implement 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. These projects include building a third well and expanding the watermain for the Drayton Water Supply System, building a new sewer pump and upgrading gravity sewers in the Drayton Wastewater Collection System, and an upgrade of the sewer pumping equipment for the Moorefield Wastewater Collection System. The Ministry

of the Environment, Conservation and Parks (ministry) provides the following comments for your consideration.

General

- Please update the Notice of Study Completion contained in Appendix C from the draft to the final version.
- A discussion on the provincial planning and policy context, particularly of the Provincial Policy Statement (PPS), is missing from the Master Plan. As noted in section C.1.1.1 and C.3.1 of the Municipal Class EA document (www.municipalclassea.ca/manual/index.html), the PPS is a key land-use planning objective that shall be considered when evaluating alternative solutions in Phases 2 and 3 of the Class EA process. The ministry notes that the County of Wellington Official Plan, discussed on several pages of the Master Plan, is expected to be kept up-to-date with the PPS in order to protect provincial interests, as per section 4.6 of the PPS, 2020 (www.ontario.ca/page/provincial-policy-statement-2020). Regardless, the ministry notes that policies of the PPS continue to apply even after adoption and approval of an official plan.
- It is noted in Table ES-3 on Page 13 that two proposed projects will undergo Schedule C designation, but is stated on page 10 in the Master Planning Process that the Township of Mapleton is electing to undergo Approach 2 of the Master Plan which includes only Schedule B projects. We advise including a clarification within Table ES-3 or the corresponding section explaining why the schedule projects are not a part of the master plan.

Indigenous Consultation

- It appears that the Haudenosaunee Confederacy Chiefs Council has been provided notices of the project, however this correspondence is missing from Table 1: Project Stakeholders on page 393, and Table 2: Summary of Responses from Indigenous Communities on page 423.

Species at Risk

- Please note that it is the responsibility of the proponent to ensure that Species at Risk (SAR) are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site. If the proposed

activities cannot avoid impacting protected species and their habitats, then the proponent will need to apply for an authorization under the Endangered Species Act (ESA). As is noted in the Report, if the proponent believes that their proposed activities are going to have an impact or are uncertain about the impacts, they should contact SAROntario@ontario.ca to undergo a formal review under the ESA.

Public Consultation

- Appendix C of the Report discusses the comments, questions and concerns raised during the public consultation process. The Report should include a brief summary of how these public concerns have been addressed through the planning process in order to best meet the requirements of the Municipal Class EA document, such as Section A.4 (accessible online here: www.municipalclassea.ca/manual/page29.html) which states, *“One of the key principles of successful planning under the EA Act is “to provide clear and complete documentation of the planning process followed, to allow for the traceability of decision making with respect to the project.”*

Groundwater

- Based on the information provided, temporary construction dewatering may be required to facilitate construction of the proposed additional water and wastewater infrastructure. Should the anticipated dewatering rates be above 50,000L/day, but less than 400,00L/day, then the taking will be subject to registration with the Environmental Activity and Sector Registry (EASR). However, should the Township of Mapleton Water and Wastewater Master Plan ECHO Task #: 1-214680092 3 anticipated dewatering rates be greater than 400,000 L/day, an application must be made to the MECP for a Category 3 Permit-To-Take-Water subject to the requirements set forth in the PTTW Manual (MOE, 2005), and in accordance with the Technical Guidance Document For Hydrogeological Studies In Support of Category 3 Applications for Permit To Take Water (MOE, 2008).
- Based on the information provided, amendment to the existing ECA for wastewater treatment and disposal system may be required to facilitate the proposed upgrades. The proponent is referred to the Ministry's Guide to Applying for an Environmental Compliance Approval for information about the supporting documentation and technical requirements relating to addressing potential environmental impacts (<https://www.ontario.ca/document/guide-applying-environmental-compliance-approval-0>). The proponent is also referred to the Ministry's Design Guidelines for Sewage Works (MOE, 2008) and is encouraged to engage in pre-submission consultation with Ministry district and regional staff to determine whether a ground or surface water impact assessment is required.

Air Quality and Odour

- Pages 349-351, 354-356, 600, 603, and 606-608 identify potential dust impacts during construction. Please note that the ministry recommends that non-chloride dust suppressants be applied during construction. For a comprehensive list of fugitive dust prevention and control measures, 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.

Conclusion

- The ministry recommends that a conclusion be included to summarize important information, including the preferred alternative, how the alternative meets the problem, when the file was received or approved by MECP, etc.

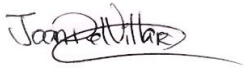
Other

- There is a formatting error on page 62 where Figure 6-1 is listed as Figure 6 1. This should be adjusted to the correct formatting.
- Section 7.3.2 on page 67 and Section 7.7.2 on page 71 state that, “the Township initiated a flow monitoring program to attempt to identify the source(s) of I&I in the system...”. Please include the definition of I&I in the Report.
- Table 7-5 (page 72) indicates Alternative 4 as the highest ranked, but then lists Alternative 3 as the preferred alternative. This should be corrected to say Alternative 4.
- Table 6-2 has 2 notes, but only the first one is indicated on the table.

Thank you for circulating this Report for the ministry’s consideration. We look forward to receiving a written response from the Township of Mapleton to address our comments provided above.

Should you or any members of your project team have any questions regarding the material above, please contact me at joan.delvillarcuicas@ontario.ca.

Sincerely,

A handwritten signature in black ink, appearing to read "Joan Del Villar Cuicas". The signature is stylized with a large, looping initial "J" and a horizontal line extending from the end.

Joan Del Villar Cuicas
Regional Environmental Planner
Project Review Unit, Environmental Assessment Branch
Ontario Ministry of the Environment, Conservation and Parks



Hydro One Networks Inc.

483 Bay Street
8th Floor South Tower
Toronto, Ontario M5G 2P5

HydroOne.com

August 17, 2023

Re: Water and Wastewater Servicing Master Plan

Attention:
Jamie Morgan
Director of Public Works
Township of Mapleton

Thank you for sending us notification regarding (Water and Wastewater Servicing Master Plan). In our preliminary assessment, we have confirmed that Hydro One has existing distribution assets within your study area.

At this time, we do not have sufficient information to comment on the potential resulting impacts that your project may have on our infrastructure. As such, we must stay informed as more information becomes available so that we can advise if any of the alternative solutions present actual conflicts with our assets, and if so; what resulting measures and costs could be incurred by the proponent. Note that this response does not constitute approval for your plans and is being sent to you as a courtesy to inform you that we must continue to be consulted on your project.

Hydro One must be consulted during all stages of your project. Please ensure that all future communications about this and future project(s) are sent to us electronically to secondarylanduse@hydroone.com

Sent on behalf of,

**Secondary Land Use
Asset Optimization
Strategy & Integrated Planning
Hydro One Networks Inc.**

Charlotte Creron

From: Charlotte Creron
Sent: August 31, 2023 3:26 PM
To: Charlotte Creron
Subject: FW: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion
Attachments: T000974D-090-230414-PN-Notice of Completion-e04.pdf; 2023-07-07_WWMP-Mapleton-MCM-Comments.pdf

From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent: Friday, July 7, 2023 9:45 AM
To: jmorgan@mapleton.ca
Cc: Adam Moore <Adam.Moore@cima.ca>; Roxanne Clark <Roxanne.Clark@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (MCM) <Karla.Barboza@ontario.ca>
Subject: FW: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Jamie Morgan,

Please find attached our comment on the above referenced Master Plan.

Please note that the responsibility for administration of the *Ontario Heritage Act* and matters related to cultural heritage have been transferred from the Ministry of Tourism, Culture and Sport (MTCS) to the Ministry of Citizenship and Multiculturalism (MCM). Individual staff roles and contact information remain unchanged. Please continue to send any notices, report and/or documentation to both Karla Barboza and myself.

Please do not hesitate to contact me with any questions or concerns.

Regards,

Joseph Harvey | Heritage Planner
Citizenship, Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit
Ministry of Citizenship and Multiculturalism
613.242.3743
Joseph.Harvey@ontario.ca

From: Adam Moore <Adam.Moore@cima.ca>
Sent: June-09-23 12:03 PM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Roxanne Clark <Roxanne.Clark@cima.ca>
Subject: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good afternoon,

Please find attached a copy of the Notice of Completion for the Mapleton Water and Wastewater Master Plan study. The Township of Mapleton has completed the Servicing Master Plan to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The final study materials are available on the Township's website through the link listed below.

<https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan>

If you would like more information about the study or would like to provide comments, please contact the Director of Public Works for the Township.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



Engineering
for people



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Charlotte Creron

From: Adam Moore
Sent: March 3, 2025 3:28 PM
To: Charlotte Creron
Subject: FW: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

Follow Up Flag: Follow up
Flag Status: Flagged

From: Adam Moore
Sent: January 30, 2025 12:24 PM
To: Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Jamie Morgan <jmorgan@mapleton.ca>; Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

Good afternoon, Joan,

Hope all is well with you!

Just wanted to circle back to the above noted Master Plan to confirm acceptance of the updates to the report to address the previous comments?
We would like to issue the final version of the Master Plan to the Township to present to council.

 [T000974D-081-230105-Master Plan Report-FINAL-e06.pdf](#)

Adam Moore, M.A.Sc., P.Eng.
Project Manager / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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From: Adam Moore
Sent: November 22, 2024 4:39 PM
To: Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Jamie Morgan <jmorgan@mapleton.ca>; Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

Good afternoon, Joan,

We have made the updates to the report to address these comments.

 [T000974D-081-230105-Master Plan Report-FINAL-e06.pdf](#)

Adam Moore, M.A.Sc., P.Eng.
Project Manager / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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CONFIDENTIALITY WARNING This email is confidential. If you are not the intended recipient, please notify the sender immediately and delete it in its entirety.

From: Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>
Sent: November 21, 2024 12:56 PM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Jamie Morgan <jmorgan@mapleton.ca>; Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Good afternoon Adam,

There are still a few outstanding items. Please refer to the comments below for further details:

4. The comment has been addressed; however, the correspondence emails begin on page 606 (Appendix C-5) instead of pages 581 to 606

10. A summary in Section 8 of the preferred alternative conclusion has not been included.

12. The definition of "I&I" has not been added to the report.

Thanks,

Joan Del Villar Cuicas (she/her)
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: Adam Moore <Adam.Moore@cima.ca>
Sent: Tuesday, November 19, 2024 5:20 PM
To: Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Jamie Morgan <jmorgan@mapleton.ca>; Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

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Good afternoon, Joan,

We recently received an update from MCM that the archaeological assessment report included in the Master Plan has been approved and entered into the Ontario Public Register (#PIF P229-0130-2023). This Archaeological Report has now been updated in Appendix I of the Master Plan Report in the link below.

I wanted to follow-up on a couple outstanding comments highlighted below to confirm the changes to the Master Plan are acceptable. If you and your team are able to review, that would be greatly appreciated.

 [T000974D-081-230105-Master Plan Report-FINAL-e05.pdf](#)

Adam Moore, M.A.Sc., P.Eng.
Project Manager / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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CONFIDENTIALITY WARNING This email is confidential. If you are not the intended recipient, please notify the sender immediately and delete it in its entirety.

From: Adam Moore
Sent: June 18, 2024 11:04 AM
To: Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Jamie Morgan <jmorgan@mapleton.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

Good morning, Joan,

Thank you for the quick response on these comments. We have made the adjustments within the revised Master Plan.
See the link below.

 [T000974D-081-230105-Master Plan Report-FINAL-e04.pdf](#)

Adam Moore, M.A.Sc., P.Eng.
Project Manager / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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From: Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>

Sent: Tuesday, June 11, 2024 1:33 PM

To: Adam Moore <Adam.Moore@cima.ca>

Cc: Stuart Winchester <stuart.winchester@cima.ca>; Jamie Morgan <jmorgan@mapleton.ca>

Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Hello Adam,

Thank you for sending the revised masterplan, just a couple comments:

- Issue #6 addresses the need to include information about how public concerns are being addressed, the added section 2.2.3 was very helpful but Table 2-1: Summary of Public Concerns, pg. 36 of PDF, in this section the "Project Team Response" column is blank. Please fill it in to address this issue.
- Issue #1 addresses the need to update the Notice of Study Completion contained in Appendix C from the draft to the final version. The Notice of Study Completion has been updated but the table of contents still says "Draft Notice of Study Completion". MECP recommends that this table be updated.

Thank you,

Joan Del Villar Cuicas (she/her)
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: Adam Moore <Adam.Moore@cima.ca>

Sent: Friday, May 24, 2024 5:02 PM

To: Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>

Cc: Stuart Winchester <stuart.winchester@cima.ca>; Jamie Morgan <jmorgan@mapleton.ca>


Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

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Good afternoon, Ms. Del Villar Cuicas,

Please see the attached comment tracking log and link to the updated Mapleton Water and Wastewater Servicing Master Plan below. If you could please review and let us know if these comments have been addressed, that would be greatly appreciated.

Have a good weekend!

 [T000974D-081-230105-Master Plan Report-FINAL-e04.pdf](#)

Regards,

ADAM MOORE, M.A.Sc., P.Eng.
Project Manager / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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From: Adam Moore
Sent: Friday, May 24, 2024 4:51 PM
To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Jamie Morgan <jmorgan@mapleton.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

Thank you, Mr. Harvey.

ADAM MOORE, M.A.Sc., P.Eng.
Project Manager / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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CONFIDENTIALITY WARNING This email is confidential. If you are not the intended recipient, please notify the sender immediately and delete it in its entirety.

From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent: Friday, May 17, 2024 11:56 AM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Jamie Morgan <jmorgan@mapleton.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Hi Adam,

Thanks for the providing us with the additional information. We have reviewed your response and have no further concerns.

Thanks,

Joseph Harvey

Heritage Planner | Heritage Branch | Citizenship Inclusion and Heritage Division
Ministry of Citizenship and Multiculturalism | Ontario Public Service
613.242.3743 | Joseph.Harvey@ontario.ca



From: Adam Moore <Adam.Moore@cima.ca>

Sent: April 25, 2024 5:29 PM

To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>

Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Jamie Morgan <jmorgan@mapleton.ca>

Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

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Good afternoon, Mr. Harvey,

Thank you for the follow-up conversation regarding your comments below for the Mapleton Water and Wastewater Servicing Master Plan. I have included a link below to the updated Master Plan report to address comment #2. Information has been provided in section 5.6.2 and Appendix K to show the disturbance of the study area at the existing Drinking Water Supply (DWS) site in Drayton (W-1).

Regarding comment #1 for the Stage 1 and 2 AA report submitted for the Drayton Sewage Pumping Station (SPS) Upgrade Project (WW-1), I have been in contact with our sub-consultant (Bluestone Research), and they have confirmed that no comments have been received yet from MCM on the report (under P229-0130-2023). Bluestone has submitted an expedited review request, and I will continue to follow-up with them regarding any comments.

[T000974D-081-230105-Master Plan Report-FINAL-e04.pdf](#)

ADAM MOORE, M.A.Sc., P.Eng.
Project Manager / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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CONFIDENTIALITY WARNING This email is confidential. If you are not the intended recipient, please notify the sender immediately and delete it in its entirety.

From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent: Friday, April 5, 2024 2:55 PM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Jamie Morgan <jmorgan@mapleton.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Hi Adam,

Thanks for providing us with the link to the revised report. We have reviewed to the revised report (dated March 25, 2024, prepared by CIMA+) and note that the majority of our concerns have been addressed. However, we have the following comments and recommendations to support the documentation of cultural heritage due diligence for the two Schedule B MCEA undertakings completed as part of the Master Plan:

- A Stage 1 and 2 archaeological assessment (AA) (under Project Information Form number P229-0130-2023) prepared for the *Drayton Sewage Pumping Station (SPS) Upgrade Project (WW-1)* has been submitted for MCM's review.

Please note that archaeological concerns have not been addressed until reports have been entered into the Ontario Public Register of Archaeological Reports where those reports recommend that:

1. the archaeological assessment of the project area is complete, and
2. all archaeological sites identified by the assessment are either of no further cultural heritage value or interest (as per Section 48(3) of the *Ontario Heritage Act*) or that mitigation of impacts has been accomplished through an excavation or an avoidance and protection strategy.

Approval authorities (such as the municipality or the Ministry of the Environment, Conservation and Parks - MECP) should wait to receive the MCM's review letter indicating that the report(s) has been entered into the Register before issuing a decision or proceeding with any ground disturbing activities.

- The Ministry Checklist [Criteria for Evaluating Archaeological Potential](#) was completed for the *new well at the existing Drinking Water Supply (DWS) site (W-1)* and included in Appendix H of the Master Plan. Question 8 of the completed checklist indicates that the study area has been subject to recent, extensive and intensive disturbance. However, no documentation was included to support this conclusion. Please note that a disturbance that is both extensive and intensive includes activities such as quarrying, deep foundations, and building footprints and associated construction areas. Common activities that do not qualify as ground disturbances include agricultural cultivation, gardening or landscaping. For partial disturbances such as utility lines, sewers and roadways it is important to note that this criterion applies only to the excavated right of way.

If the project area has been subjected to recent, extensive and intensive disturbance, the Master Plan should include a rationale/summary of documentation that supports this conclusion. We note that the section 5.6.2 (Archaeological Resources – Existing Baseline

Cultural Heritage Conditions) of the Master Plan does not include a reference to the checklist. Please see the suggested language to be incorporated into section 5.6.2 below:

The screening checklist Criteria for Evaluating Archaeological Potential, developed by MCM was completed as part of the project file (see Appendix H). The study area was determined to have low potential for archaeological resources. [Insert rationale/ summary of documentation that provides evidence of the recent disturbance].

We hope this clarifies. Let us know if you have any questions or concerns.

Thanks,

Joseph Harvey

Heritage Planner | Heritage Branch | Citizenship Inclusion and Heritage Division
Ministry of Citizenship and Multiculturalism | Ontario Public Service
613.242.3743 | Joseph.Harvey@ontario.ca



From: Adam Moore <Adam.Moore@cima.ca>
Sent: March 25, 2024 10:59 AM
To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Jamie Morgan <jmorgan@mapleton.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

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Good morning Mr. Harvey,

Hope all is well with you!

We have revised the Water and Wastewater Servicing Master Plan report for the Township of Mapleton based on the comments from MCM that were received during the comment period. Please see the link below to the revised Report. The key changes include the recently completed Archeological Assessment report for one of the identified Schedule B projects (included in Appendix I) as well as inclusion of the completed checklists for cultural resources and archaeological potential regarding the other Schedule B projects (included in Appendix H).

If you would be able to review these updates and confirm the original comments have been addressed, that would be greatly appreciated.

If you have any questions or clarifications, please let me know.

[T000974D-081-230105-Master Plan Report-FINAL-e03.pdf](#)

ADAM MOORE, M.A.Sc., P.Eng.
Project Manager / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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CONFIDENTIALITY WARNING This email is confidential. If you are not the intended recipient, please notify the sender immediately and delete it in its entirety.

From: Adam Moore
Sent: Friday, August 18, 2023 7:34 AM
To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (MCM) <Karla.Barboza@ontario.ca>; Jamie Morgan <jmorgan@mapleton.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

Hi Joseph,

Thanks for the chat yesterday regarding the completed checklists for the evaluating potential for cultural resources and archaeological potential. We will include these as appendices in the Master Plan Report.

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent: Monday, July 24, 2023 3:42 PM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Hi Adam,

I am able to view the completed checklists now.

Thanks!

Joseph Harvey | Heritage Planner
Citizenship, Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit
Ministry of Citizenship and Multiculturalism
613.242.3743
Joseph.Harvey@ontario.ca

Effective October 17, 2022, units responsible for cultural heritage matters have been transferred from the Ministry of Tourism, Culture and Sport (MTCSS) to the Ministry of Citizenship and Multiculturalism (MCM). Responsibility for the Ontario Heritage Act and associated Provincial functions is now held by MCM. Individual staff roles and contact information remain unchanged.

From: Adam Moore <Adam.Moore@cima.ca>
Sent: July 21, 2023 11:46 AM

To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>

Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (MCM) <Karla.Barboza@ontario.ca>; jmorgan@mapleton.ca

Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

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Apologies Mr. Harvey, we were viewing the checklist in another PDF viewer. I have reattached the checklist saved with Adobe. I hope the fields are now viewable, if you can let me know, that would be appreciated.

ADAM MOORE, M.A.Sc., P.Eng.

Project Engineer / Infrastructure – Water and Wastewater

M 519-830-7015

900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>

Sent: Friday, July 21, 2023 11:12 AM

To: Adam Moore <Adam.Moore@cima.ca>

Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (MCM) <Karla.Barboza@ontario.ca>; jmorgan@mapleton.ca

Subject: FW: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Hi Adam,

Thank you for providing us with the additional information and sending the screening checklists.

Unfortunately, when we open the attached screening checklists they appear blank to us.

It is our understanding that this master plan is following Approach 2 and therefore Schedule B projects identified in this master plan would be deemed approved. If the completed screening checklist [Criteria for Evaluating Archaeological Potential](#) indicates that there is potential for archaeological resources within the study area of any of the schedule B projects identified in the Master Plan, then an archaeological assessment (AA) shall be completed as part of the master plan. Archaeological assessments are to be undertaken by an archaeologist licensed under the *Ontario Heritage Act* (OHA), who is responsible for submitting the report directly to MCM for review.

Similarly, if the completed checklist [Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes](#) indicates that there is potential for built heritage resources and/or cultural heritage landscapes within the study area of any of the schedule B projects identified in the Master Plan, then a Cultural Heritage Evaluation Report (CHER) should be undertaken by a qualified person to determine the cultural heritage value or interest of the property (or project area). If the property (or

project area) is determined to be of cultural heritage value or interest and alterations or development is proposed, MCM recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant, be completed to assess potential project impacts. The CHER shall be completed and summarized as part of the Master Plan. The HIA, if recommended, can be completed during detailed design.

Hope this is of assistance. Let me know if you have any further questions or would like to discuss the advice above.

Thanks,

Joseph Harvey | Heritage Planner
Citizenship, Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit
Ministry of Citizenship and Multiculturalism
613.242.3743
Joseph.Harvey@ontario.ca

Effective October 17, 2022, units responsible for cultural heritage matters have been transferred from the Ministry of Tourism, Culture and Sport (MTCSS) to the Ministry of Citizenship and Multiculturalism (MCM). Responsibility for the Ontario Heritage Act and associated Provincial functions is now held by MCM. Individual staff roles and contact information remain unchanged.

From: Adam Moore <Adam.Moore@cima.ca>
Sent: July 13, 2023 3:11 PM
To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (MCM) <Karla.Barboza@ontario.ca>; jmorgan@mapleton.ca
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

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Good afternoon Mr. Harvey,

Thank you for the call earlier this week regarding the comments on the Mapleton Water and Wastewater Servicing Master Plan. As discussed, I've gone ahead and completed the checklists for Archaeological and Cultural Heritage potential for the two Schedule B projects, based on our understanding of those two sites. I have included some background information on the two projects and their locations within the community of Drayton.

Based on the information provided in these checklists, the two main items I would like to confirm for the Schedule B projects identified in the Master Plan are:

- Would an Archaeological Assessment and Cultural Heritage study be required for these projects?
- If so, would those Archaeological and Cultural Heritage studies need to be completed under the Master Plan project and summarized in the report OR could those studies be initiated when those Schedule B projects are expected to occur?

Regards,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>

Sent: Friday, July 7, 2023 9:45 AM

To: jmorgan@mapleton.ca

Cc: Adam Moore <Adam.Moore@cima.ca>; Roxanne Clark <Roxanne.Clark@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (MCM) <Karla.Barboza@ontario.ca>

Subject: FW: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Jamie Morgan,

Please find attached our comment on the above referenced Master Plan.

Please note that the responsibility for administration of the *Ontario Heritage Act* and matters related to cultural heritage have been transferred from the Ministry of Tourism, Culture and Sport (MTCS) to the Ministry of Citizenship and Multiculturalism (MCM). Individual staff roles and contact information remain unchanged. Please continue to send any notices, report and/or documentation to both Karla Barboza and myself.

Please do not hesitate to contact me with any questions or concerns.

Regards,

Joseph Harvey | Heritage Planner

Citizenship, Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit

Ministry of Citizenship and Multiculturalism

613.242.3743

Joseph.Harvey@ontario.ca

From: Adam Moore <Adam.Moore@cima.ca>

Sent: June-09-23 12:03 PM

To: Adam Moore <Adam.Moore@cima.ca>

Cc: Roxanne Clark <Roxanne.Clark@cima.ca>

Subject: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good afternoon,

Please find attached a copy of the Notice of Completion for the Mapleton Water and Wastewater Master Plan study. The Township of Mapleton has completed the Servicing Master Plan to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The final study materials are available on the Township's website through the link listed below.

<https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan>

If you would like more information about the study or would like to provide comments, please contact the Director of Public Works for the Township.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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Charlotte Creron

From: Adam Moore
Sent: May 6, 2025 3:21 PM
To: Charlotte Creron
Subject: FW: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

Follow Up Flag: Follow up
Flag Status: Flagged

From: Adam Moore
Sent: May 24, 2024 4:51 PM
To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Jamie Morgan <jmorgan@mapleton.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

Thank you, Mr. Harvey.

ADAM MOORE, M.A.Sc., P.Eng.
Project Manager / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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Sent: Friday, May 17, 2024 11:56 AM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Jamie Morgan <jmorgan@mapleton.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Hi Adam,

Thanks for the providing us with the additional information. We have reviewed your response and have no further concerns.

Thanks,

Joseph Harvey

Heritage Planner | Heritage Branch | Citizenship Inclusion and Heritage Division
Ministry of Citizenship and Multiculturalism | Ontario Public Service
613.242.3743 | Joseph.Harvey@ontario.ca




From: Adam Moore <Adam.Moore@cima.ca>
Sent: April 25, 2024 5:29 PM
To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Jamie Morgan <jmorgan@mapleton.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

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Good afternoon, Mr. Harvey,

Thank you for the follow-up conversation regarding your comments below for the Mapleton Water and Wastewater Servicing Master Plan. I have included a link below to the updated Master Plan report to address comment #2. Information has been provided in section 5.6.2 and Appendix K to show the disturbance of the study area at the existing Drinking Water Supply (DWS) site in Drayton (W-1).

Regarding comment #1 for the Stage 1 and 2 AA report submitted for the Drayton Sewage Pumping Station (SPS) Upgrade Project (WW-1), I have been in contact with our sub-consultant (Bluestone Research), and they have confirmed that no comments have been received yet from MCM on the report (under P229-0130-2023). Bluestone has submitted an expedited review request, and I will continue to follow-up with them regarding any comments.

 [T000974D-081-230105-Master Plan Report-FINAL-e04.pdf](#)

ADAM MOORE, M.A.Sc., P.Eng.
Project Manager / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent: Friday, April 5, 2024 2:55 PM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Jamie Morgan <jmorgan@mapleton.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Hi Adam,

Thanks for providing us with the link to the revised report. We have reviewed to the revised report (dated March 25, 2024, prepared by CIMA+) and note that the majority of our concerns have been addressed. However, we have the following comments and recommendations to support the documentation of cultural heritage due diligence for the two Schedule B MCEA undertakings completed as part of the Master Plan:

- A Stage 1 and 2 archaeological assessment (AA) (under Project Information Form number P229-0130-2023) prepared for the *Drayton Sewage Pumping Station (SPS) Upgrade Project (WW-1)* has been submitted for MCM's review.

Please note that archaeological concerns have not been addressed until reports have been entered into the Ontario Public Register of Archaeological Reports where those reports recommend that:

1. the archaeological assessment of the project area is complete, and
2. all archaeological sites identified by the assessment are either of no further cultural heritage value or interest (as per Section 48(3) of the *Ontario Heritage Act*) or that mitigation of impacts has been accomplished through an excavation or an avoidance and protection strategy.

Approval authorities (such as the municipality or the Ministry of the Environment, Conservation and Parks - MECP) should wait to receive the MCM's review letter indicating that the report(s) has been entered into the Register before issuing a decision or proceeding with any ground disturbing activities.

- The Ministry Checklist [Criteria for Evaluating Archaeological Potential](#) was completed for the *new well at the existing Drinking Water Supply (DWS) site (W-1)* and included in Appendix H of the Master Plan. Question 8 of the completed checklist indicates that the study area has been subject to recent, extensive and intensive disturbance. However, no documentation was included to support this conclusion. Please note that a disturbance that is both extensive and intensive includes activities such as quarrying, deep foundations, and building footprints and associated construction areas. Common activities that do not qualify as ground disturbances include agricultural cultivation, gardening or landscaping. For partial disturbances such as utility lines, sewers and roadways it is important to note that this criterion applies only to the excavated right of way.

If the project area has been subjected to recent, extensive and intensive disturbance, the Master Plan should include a rationale/summary of documentation that supports this conclusion. We note that the section 5.6.2 (Archaeological Resources – Existing Baseline Cultural Heritage Conditions) of the Master Plan does not include a reference to the checklist. Please see the suggested language to be incorporated into section 5.6.2 below:

The screening checklist Criteria for Evaluating Archaeological Potential, developed by MCM was completed as part of the project file (see Appendix H). The study area was determined to have low potential for archaeological resources. [Insert rationale/ summary of documentation that provides evidence of the recent disturbance].

We hope this clarifies. Let us know if you have any questions or concerns.

Thanks,

Joseph Harvey

Heritage Planner | Heritage Branch | Citizenship Inclusion and Heritage Division
Ministry of Citizenship and Multiculturalism | Ontario Public Service
613.242.3743 | Joseph.Harvey@ontario.ca



From: Adam Moore <Adam.Moore@cima.ca>

Sent: March 25, 2024 10:59 AM

To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>

Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (She/Her) (MCM) <Karla.Barboza@ontario.ca>; Jamie Morgan <jmorgan@mapleton.ca>

Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

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Good morning Mr. Harvey,

Hope all is well with you!

We have revised the Water and Wastewater Servicing Master Plan report for the Township of Mapleton based on the comments from MCM that were received during the comment period. Please see the link below to the revised Report. The key changes include the recently completed Archeological Assessment report for one of the identified Schedule B projects (included in Appendix I) as well as inclusion of the completed checklists for cultural resources and archaeological potential regarding the other Schedule B projects (included in Appendix H).

If you would be able to review these updates and confirm the original comments have been addressed, that would be greatly appreciated.

If you have any questions or clarifications, please let me know.

 [T000974D-081-230105-Master Plan Report-FINAL-e03.pdf](#)

ADAM MOORE, M.A.Sc., P.Eng.

Project Manager / Infrastructure – Water and Wastewater

M 519-830-7015

900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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From: Adam Moore

Sent: Friday, August 18, 2023 7:34 AM

To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>

Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (MCM) <Karla.Barboza@ontario.ca>; Jamie Morgan <jmorgan@mapleton.ca>

Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

Hi Joseph,

Thanks for the chat yesterday regarding the completed checklists for the evaluating potential for cultural resources and archaeological potential. We will include these as appendices in the Master Plan Report.

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent: Monday, July 24, 2023 3:42 PM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Hi Adam,

I am able to view the completed checklists now.

Thanks!

Joseph Harvey | Heritage Planner
Citizenship, Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit
Ministry of Citizenship and Multiculturalism
613.242.3743
Joseph.Harvey@ontario.ca

Effective October 17, 2022, units responsible for cultural heritage matters have been transferred from the Ministry of Tourism, Culture and Sport (MTCS) to the Ministry of Citizenship and Multiculturalism (MCM). Responsibility for the Ontario Heritage Act and associated Provincial functions is now held by MCM. Individual staff roles and contact information remain unchanged.

From: Adam Moore <Adam.Moore@cima.ca>
Sent: July 21, 2023 11:46 AM
To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (MCM) <Karla.Barboza@ontario.ca>; jmorgan@mapleton.ca
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

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Apologies Mr. Harvey, we were viewing the checklist in another PDF viewer. I have reattached the checklist saved with Adobe. I hope the fields are now viewable, if you can let me know, that would be appreciated.

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>

Sent: Friday, July 21, 2023 11:12 AM

To: Adam Moore <Adam.Moore@cima.ca>

Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (MCM) <Karla.Barboza@ontario.ca>; jmorgan@mapleton.ca

Subject: FW: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Hi Adam,

Thank you for providing us with the additional information and sending the screening checklists.

Unfortunately, when we open the attached screening checklists they appear blank to us.

It is our understanding that this master plan is following Approach 2 and therefore Schedule B projects identified in this master plan would be deemed approved. If the completed screening checklist [Criteria for Evaluating Archaeological Potential](#) indicates that there is potential for archaeological resources within the study area of any of the schedule B projects identified in the Master Plan, then an archaeological assessment (AA) shall be completed as part of the master plan. Archaeological assessments are to be undertaken by an archaeologist licensed under the *Ontario Heritage Act* (OHA), who is responsible for submitting the report directly to MCM for review.

Similarly, if the completed checklist [Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes](#) indicates that there is potential for built heritage resources and/or cultural heritage landscapes within the study area of any of the schedule B projects identified in the Master Plan, then a Cultural Heritage Evaluation Report (CHER) should be undertaken by a qualified person to determine the cultural heritage value or interest of the property (or project area). If the property (or project area) is determined to be of cultural heritage value or interest and alterations or development is proposed, MCM recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant, be completed to assess potential project impacts. The CHER shall be completed and summarized as part of the Master Plan. The HIA, if recommended, can be completed during detailed design.

Hope this is of assistance. Let me know if you have any further questions or would like to discuss the advice above.

Thanks,

Joseph Harvey | Heritage Planner
Citizenship, Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit
Ministry of Citizenship and Multiculturalism
613.242.3743
Joseph.Harvey@ontario.ca

Effective October 17, 2022, units responsible for cultural heritage matters have been transferred from the Ministry of Tourism, Culture and Sport (MTCSS) to the Ministry of Citizenship and Multiculturalism (MCM). Responsibility for the Ontario Heritage Act and associated Provincial functions is now held by MCM. Individual staff roles and contact information remain unchanged.

From: Adam Moore <Adam.Moore@cima.ca>
Sent: July 13, 2023 3:11 PM
To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Cc: Stuart Winchester <stuart.winchester@cima.ca>; Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (MCM) <Karla.Barboza@ontario.ca>; jmorgan@mapleton.ca
Subject: RE: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

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Good afternoon Mr. Harvey,

Thank you for the call earlier this week regarding the comments on the Mapleton Water and Wastewater Servicing Master Plan. As discussed, I've gone ahead and completed the checklists for Archaeological and Cultural Heritage potential for the two Schedule B projects, based on our understanding of those two sites. I have included some background information on the two projects and their locations within the community of Drayton.

Based on the information provided in these checklists, the two main items I would like to confirm for the Schedule B projects identified in the Master Plan are:

- Would an Archaeological Assessment and Cultural Heritage study be required for these projects?
- If so, would those Archaeological and Cultural Heritage studies need to be completed under the Master Plan project and summarized in the report OR could those studies be initiated when those Schedule B projects are expected to occur?

Regards,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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CONFIDENTIALITY WARNING This email is confidential. If you are not the intended recipient, please notify the sender immediately and delete it in its entirety.

From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent: Friday, July 7, 2023 9:45 AM
To: jmorgan@mapleton.ca
Cc: Adam Moore <Adam.Moore@cima.ca>; Roxanne Clark <Roxanne.Clark@cima.ca>; Del Villar Cuicas, Joan (MECP)

<Joan.DelVillarCuicas@ontario.ca>; Barboza, Karla (MCM) <Karla.Barboza@ontario.ca>

Subject: FW: File 0014845: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

EXTERNAL EMAIL

Jamie Morgan,

Please find attached our comment on the above referenced Master Plan.

Please note that the responsibility for administration of the *Ontario Heritage Act* and matters related to cultural heritage have been transferred from the Ministry of Tourism, Culture and Sport (MTCS) to the Ministry of Citizenship and Multiculturalism (MCM). Individual staff roles and contact information remain unchanged. Please continue to send any notices, report and/or documentation to both Karla Barboza and myself.

Please do not hesitate to contact me with any questions or concerns.

Regards,

Joseph Harvey | Heritage Planner

Citizenship, Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit

Ministry of Citizenship and Multiculturalism

613.242.3743

Joseph.Harvey@ontario.ca

From: Adam Moore <Adam.Moore@cima.ca>

Sent: June-09-23 12:03 PM

To: Adam Moore <Adam.Moore@cima.ca>

Cc: Roxanne Clark <Roxanne.Clark@cima.ca>

Subject: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good afternoon,

Please find attached a copy of the Notice of Completion for the Mapleton Water and Wastewater Master Plan study. The Township of Mapleton has completed the Servicing Master Plan to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The final study materials are available on the Township's website through the link listed below.

<https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan>

If you would like more information about the study or would like to provide comments, please contact the Director of Public Works for the Township.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.

Project Engineer / Infrastructure – Water and Wastewater

M 519-830-7015

900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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Comment Tracking Log



QUALITY REVIEW FORM														
Project:		Mapleton Water & Wastewater Servicing Master Plan												
Purpose:		Comments Received from MECP to be addressed												
Log Date:		07-May-25												
Issue No.	Document	Section	Sub-Section	Table/Figure	Page Number	MECP Comment	Commenter	CIMA+ Response	Responder	MECP to confirm comment has been accepted/addressed	CIMA+ Response	Responder	MECP to confirm comment has been accepted/addressed	
1	Mapleton Water and Wastewater Servicing Master Plan	Appendix C	2 Project Notices and Advertisements	Figure 5: Draft Notice of Study Completion	404	Please update the Notice of Study Completion contained in Appendix C from the draft to the final version.	Joan Del Villar Cuicas	Notice of Study Completion has been updated in Appendix C.	Adam Moore	Issue #1 addresses the need to update the Notice of Study Completion contained in Appendix C from the draft to the final version. The Notice of Study Completion has been updated but the table of contents still says "Draft Notice of Study Completion". MECP recommends that this table be updated.	The table of contents for Appendix C has been updated to remove "Draft Notice of Completion"	Adam Moore	Accepted	
2	Mapleton Water and Wastewater Servicing Master Plan					A discussion on the provincial planning and policy context, particularly of the Provincial Policy Statement (PPS), is missing from the Master Plan. As noted in section C.1.1.1 and C.3.1 of the Municipal Class EA document (www.municipalclass.ca/manual/index.html), the PPS is a key land-use planning objective that shall be considered when evaluating alternative solutions in Phases 2 and 3 of the Class EA process. The ministry notes that the County of Wellington Official Plan, discussed on several pages of the Master Plan, is expected to be kept up-to-date with the PPS in order to protect provincial interests, as per section 4.6 of the PPS, 2020 (www.ontario.ca/page/provincial-policy-statement-2020). Regardless, the ministry notes that policies of the PPS continue to apply even after adoption and approval of an official plan.	Joan Del Villar Cuicas	A Provincial Policy Statement has been added to Section 4.6 of the Report.	Adam Moore	Approved.				
3	Mapleton Water and Wastewater Servicing Master Plan	Executive Summary	Drayton Wastewater Collection System	Table ES- 3: Wastewater System Servicing Strategy in Drayton	15	It is noted in Table ES-3 on Page 13 that two proposed projects will undergo Schedule C designation, but is stated on page 10 in the Master Planning Process that the Township of Mapleton is electing to undergo Approach 2 of the Master Plan which includes only Schedule B projects. We advise including a clarification within Table ES-3 or the corresponding section explaining why the schedule C projects are not a part of the master plan.	Joan Del Villar Cuicas	A clarification has been provided before Table ES-3 on why the Schedule C project is not part of the Master Plan.	Adam Moore	Approved.				
4	Mapleton Water and Wastewater Servicing Master Plan	Appendix C	1 Project Stakeholders	Table 1: Project Stakeholders Table 2: Summary of Responses from Indigenous Communities	393 / 423	It appears that the Haudenosaunee Confederacy Chiefs Council has been provided notices of the project, however this correspondence is missing from Table 1: Project Stakeholders on page 393, and Table 2: Summary of Responses from Indigenous Communities on page 423.	Joan Del Villar Cuicas	Tables 1 and 2 have been updated and the correspondence has been included in Appendix C and correspondence regarding the notices that were sent out have been included in Appendix C-5 (pages 581 to 606.	Adam Moore	The comment has been addressed; however, the correspondence emails begin on page 606 (Appendix C-5) instead of pages 581 to 606	Tables 1 and 2 have been updated and the correspondence has been included in Appendix C and correspondence regarding the notices that were sent out have been included in Appendix C-5 (pages 606 to 681).	Adam Moore	Accepted	
5	Mapleton Water and Wastewater Servicing Master Plan					Please note that it is the responsibility of the proponent to ensure that Species at Risk (SAR) are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site. If the proposed activities cannot avoid impacting protected species and their habitats, then the proponent will need to apply for an authorization under the Endangered Species Act (ESA). As is noted in the Report, if the proponent believes that their proposed activities are going to have an impact or are uncertain about the impacts, they should contact SAROntario@ontario.ca to undergo a formal review under the ESA.	Joan Del Villar Cuicas	A statement that the Township's requirements for ensuring Species At Risk (SAR) are not harmed has been added to Section 8 Implementation Plan of the Master Plan report.	Adam Moore	Approved.				
6	Mapleton Water and Wastewater Servicing Master Plan	Appendix C			573	Appendix C of the Report discusses the comments, questions and concerns raised during the public consultation process. The Report should include a brief summary of how these public concerns have been addressed through the planning process in order to best meet the requirements of the Municipal Class EA document, such as Section A.4 (accessible online here: www.municipalclass.ca/manual/page29.html) which states, "One of the key principles of successful planning under the EA Act is "to provide clear and complete documentation of the planning process followed, to allow for the traceability of decision making with respect to the project."	Joan Del Villar Cuicas	Section 2.2.3 of the Report provides a summary of how these public concerns have been addressed through the planning process in order to best meet the requirements of the Municipal Class EA.	Adam Moore	Issue #6 addresses the need to include information about how public concerns are being addressed, the added section 2.2.3 was very helpful but Table 2-1: Summary of Public Concerns, pg. 36 of PDF, in this section the "Project Team Response" column is blank. Please fill it in to address this issue.	Section 2.2.3 Table 2-1 has been updated to include the Project Team's responses.	Adam Moore	Accepted	
7	Mapleton Water and Wastewater Servicing Master Plan					Based on the information provided, temporary construction dewatering may be required to facilitate construction of the proposed additional water and wastewater infrastructure. Should the anticipated dewatering rates be above 50,000L/day, but less than 400,00L/day, then the taking will be subject to registration with the Environmental Activity and Sector Registry (EASR). However, should the Township of Mapleton Water and Wastewater Master Plan ECHO Task #: 1-214680092 3 anticipated dewatering rates be greater than 400,000 L/day, an application must be made to the MECP for a Category 3 Permit-To-Take-Water subject to the requirements set forth in the PTTW Manual (MOE, 2005), and in accordance with the Technical Guidance Document For Hydrogeological Studies In Support of Category 3 Applications for Permit To Take Water (MOE, 2008).	Joan Del Villar Cuicas	A statement of the temporary construction dewatering requirements has been added to Section 8 Implementation Plan of the Master Plan report.	Adam Moore	Approved.				
8	Mapleton Water and Wastewater Servicing Master Plan					Based on the information provided, amendment to the existing ECA for wastewater treatment and disposal system may be required to facilitate the proposed upgrades. The proponent is referred to the Ministry's Guide to Applying for an Environmental Compliance Approval for information about the supporting documentation and technical requirements relating to addressing potential environmental impacts (https://www.ontario.ca/document/guide-applying-environmental-compliance-approval-0). The proponent is also referred to the Ministry's Design Guidelines for Sewage Works (MOE, 2008) and is encouraged to engage in pre-submission consultation with Ministry district and regional staff to determine whether a ground or surface water impact assessment is required.	Joan Del Villar Cuicas	An amendment to the existing ECA for wastewater treatment and disposal system will be required to facilitate the proposed upgrades. A pre-submission consultation with the MECP district and regional staff will be conducted to determine whether a ground or surface water impact assessment is required.	Adam Moore	Approved.				
9	Mapleton Water and Wastewater Servicing Master Plan	Appendix A, Appendix D		Matrix 1: Detailed Evaluation of Drayton Water Servicing Alternatives Matrix 2: Detailed Evaluation of Moorefield Water Servicing Alternatives	349-351, 354-356, 600, 603, and 606-608	Pages 349-351, 354-356, 600, 603, and 606-608 identify potential dust impacts during construction. Please note that the ministry recommends that non-chloride dust suppressants be applied during construction. For a comprehensive list of fugitive dust prevention and control measures, 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.	Joan Del Villar Cuicas	A statement of the dust suppressents to be used during construction has been provided in Section 8 Implementation Plan of the Master Plan report. .	Adam Moore	Approved.				
10	Mapleton Water and Wastewater Servicing Master Plan					The ministry recommends that a conclusion be included to summarize important information, including the preferred alternative, how the alternative meets the problem, when the file was received or approved by MECP, etc.	Joan Del Villar Cuicas	A conclusion section has been added to Section 8 Implementation Plan to summarize when the Master Plan file was received and comments provided. Section 8 contained a summary of the preferred alternatives and how the alternatives address the problem. Once the Master Plan is approved by the MECP and these comments addressed, the date on which approval was recieved can then be updated in the report.	Adam Moore	A summary in Section 8 of the preferred alternative conclusion has not been included.	Section 8 has been updated with the preferred alternative. Section 8.4 has a summary of when the report was received by the MECP and will be updated to include the date of approval once that is confirmed.	Adam Moore	Accepted	
11	Mapleton Water and Wastewater Servicing Master Plan	6 Water System Criteria and Strategy Review	6.6 Recommended Water Servicing Strategy	Figure 6 1	62	There is a formatting error on page 62 where Figure 6-1 is listed as Figure 6 1. This should be adjusted to the correct formatting.	Joan Del Villar Cuicas	Formatting error has been corrected.	Adam Moore	Approved.				
12	Mapleton Water and Wastewater Servicing Master Plan	7 Wastewater System Criteria and Strategy Review	7.3.2 Collection System Capacity 7.7.2 Drayton Wastewater Collection System		67, 71	Section 7.3.2 on page 67 and Section 7.7.2 on page 71 state that, "the Township initiated a flow monitoring program to attempt to identify the source(s) of I&I in the system...". Please include the definition of I&I in the Report.	Joan Del Villar Cuicas	The definition for inflow and infiltration (I&I) has been added.	Adam Moore	The definition of "I&I" has not been added to the report.	The I&I definition has been added to section 7.3.2 of the report.	Adam Moore	Accepted	

13	Mapleton Water and Wastewater Servicing Master Plan	7 Wastewater System Criteria and Strategy Review	7.7.3 Drayton Sewage Pumping Station	Table 7-5: Summary of Drayton SPS Upgrade Alternatives	72,73	Table 7-5 (page 72) indicates Alternative 4 as the highest ranked, but then lists Alternative 3 as the preferred alternative. This should be corrected to say Alternative 4.	Joan Del Villar Cuicas	The text below Table 7-5 has been updated to reflect the preferred alternative (Alternative 4).	Adam Moore	Approved.			
14	Mapleton Water and Wastewater Servicing Master Plan	6 Water System Criteria and Strategy Review	6.1 Water Demand Criteria	Table 6-2: MDD and PHD Factors (Government of Ontario, 2019)	54	Table 6-2 has 2 notes, but only the first one is indicated on the table.	Joan Del Villar Cuicas	Note 2 has been added to Table 6-2.	Adam Moore	Approved.			

C-5

Appendix C-5: First Nation Consultation

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

Bcc: katherine.hess@hc-sc.gc.ca; khatera.safi@ontario.ca; dan.carlow@ontario.ca; karla.barboza@ontario.ca; kathryn.bryant@ontario.ca; tyler.shantz@ontario.ca; payal.kapur@ontario.ca; michael.nadeau@ontario.ca; noticereview@infrastructureontario.ca; lisa.myslicki@infrastructureontario.ca; lise.chabot@ontario.ca; consultations@metisnation.org; mno@metisnation.org; stacey.laforme@newcreditfirstnation.com; fawn.sault@mncfn.ca; markhill@sixnations.ca; lonnybomberry@sixnations.ca; rvanstone@sixnations.ca; aldos@wellington.ca; scottw@wellington.ca; dpressley@mhbcplan.com; marion.wright@rci.rogers.com; wendy.lefebvre@bell.ca; walter.kloostra@hydroone.com; donnab@wellington.ca; Nathan.hyde@erin.ca; Lisa.campion@erin.ca; derrick@town.minto.on.ca; annilene@town.minto.on.ca; agoldie@centrewellington.ca; kokane@centrewellington.ca; iroger@get.on.ca; aknight@get.on.ca; gschwendinger@puslinch.ca; mgivens@welington-north.com; kwallace@wellington-north.com; lwheeler@mapleton.ca; Manny Baron

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



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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 not 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



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CONFIDENTIALITY WARNING This email is confidential. If you are not the intended recipient, please notify the sender immediately and delete it in its entirety.

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,

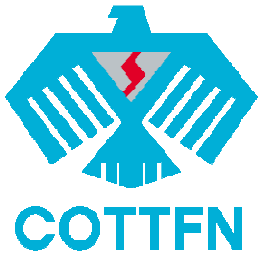
The Chippewas of the Thames First Nation has transitioned to using NationsConnect to receive consultation and engagement requests. **Notifications or requests sent over email, mail or fax are not considered submitted and will not be reviewed.**

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

[Visit us online at cottfn.com](http://cottfn.com)

This communication is intended for the use of the recipient to whom it is addressed and may contain confidential and/or privileged information. If you are not the intended recipient of this communication any information received should be deleted or destroyed.

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.

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Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

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Charlotte Creron

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Fallon Burch
Consultation Coordinator
Chippewas of the Thames First Nation
Email: fburch@cottfn.com
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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

Bcc: erick.boyd@ontario.ca; payal.kapur@ontario.ca; michael.nadeau@ontario.ca; noticereview@infrastructureontario.ca; lisa.myslicki@infrastructureontario.ca; jennifer.davey@opp.ca; Ben Kissner; consultations@metisnation.org; president@grandrivermetis.ca; Mark.Laforme@mncfn.ca; Abby.LaForme@mncfn.ca; Megan.DeVries@mncfn.ca; lonnybomberry@sixnations.ca; tanyahill-montour@sixnations.ca; tayler.hill@sixnations.ca; laurenjones@sixnations.ca; petergraham@sixnations.ca; info@hdi.land; jmaness@aamjiwnaang.ca; charles.sampson@wifn.org; dean.jacobs@wifn.org; Jason.Henry@kettlepoint.org; fdesk@kettlepoint.org; valerie.george@kettlepoint.org; Consultation; sao@nawash.ca; operationsmanager@nawash.ca; emily.martin@saugeenobjibwaynation.ca; sfn@saugeen.org; scottw@wellington.ca; aldos@wellington.ca; info@wdgpublichealth.ca; rrichardson@mapleton.ca; stephen.dewar@guelph.ca; joanne.vanpanhuis@enbridge.com; tcenergy@mhbcplan.com; info@tnpi.ca; marion.wright@rci.rogers.com; wendy.lefebvre@bell.ca; lena.demarco@bell.ca; sales@mornington.ca; nairm.mcqueen@hydroone.com; w.d.klootra@hydroone.com; FBCWoodstock@hydroone.com; inquiry@ugdsb.on.ca; kfergin@heritagehomes.com; abrahamb@meritech.ca; Peter.armbruster@activa.ca; info@remleyhomes.com; duane@apexbuilding.ca; clnspaling@gmail.com; rtrapp@emeralhomesltd.com; g.l.carp.95@gmail.com; priordevelopment@rogers.com; duimeringhomes@gmail.com; flvandepol@hotmail.com; jmohle@wellingtonconstruction.on.ca; jkoetsier@wellingtonconstruction.on.ca; heatherandbill@outlook.com; derrick@apexbuilding.ca; tyler.shantz@ontario.ca; kathryn.bryant@ontario.ca; karla.barboza@ontario.ca; dan.carlow@ontario.ca; khatera.safi@ontario.ca; eanotification.wcregion@ontario.ca

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.

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Thank you,

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Project Engineer / Infrastructure – Water and Wastewater

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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

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Thank you for your cooperation.

If you would prefer to not receive future emails, please reply to: president@grandrivermetiscouncil.com with your desire to be removed from this email list.

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

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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
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Thank you,

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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.

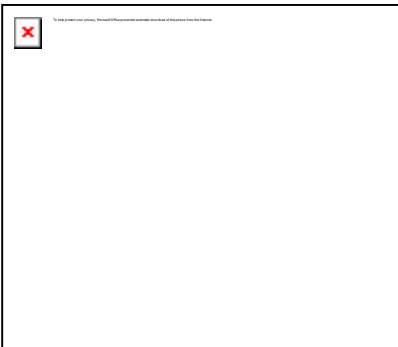
We have no further comments on this project. If at any point anything of archeological interest is revealed on site, please contact the SON Environment Office immediately.

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](https://www.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

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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

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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

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Charlotte Creron

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

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Sent from my iPhone

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Regards,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

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Jennifer

Marsii, Merci, Thank you, Miigwetch
Jennifer Parkinson
President
Grand River Métis Council
www.grandrivermetisCouncil.com

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Adam Moore

From: Adam Moore
Sent: June 9, 2023 12:03 PM
To: Adam Moore
Cc: Roxanne Clark
Subject: T000974D Mapleton Water and Wastewater Servicing Master Plan - Notice of Completion
Attachments: T000974D-090-230414-PN-Notice of Completion-e04.pdf

Bcc: eanotification.wcregion@ontario.ca; khatera.safi@ontario.ca; dan.carlow@ontario.ca; karla.barboza@ontario.ca; kathryn.bryant@ontario.ca; tyler.shantz@ontario.ca; erick.boyd@ontario.ca; payal.kapur@ontario.ca; michael.nadeau@ontario.ca; noticereview@infrastructureontario.ca; lisa.myslicki@infrastructureontario.ca; Naso, Valerie (IO); jennifer.davey@opp.ca; clorenz@grandriver.ca; consultations@metisnation.org; Jennifer Parkinson; Mark.LaForme@mncfn.ca; Abby.LaForme@mncfn.ca; Megan.DeVries@mncfn.ca; lonnybomberry@sixnations.ca; tanyahill-montour@sixnations.ca; tayler.hill@sixnations.ca; laurenjones@sixnations.ca; petergraham@sixnations.ca; info@hdi.land; jmaness@aamjiwnaang.ca; charles.sampson@wifn.org; dean.jacobs@wifn.org; Jason.Henry@kettlepoint.org; fdesk@kettlepoint.org; valerie.george@kettlepoint.org; Consultation; sao@nawash.ca; operationsmanager@nawash.ca; emily.martin@saugeenobjibwaynation.ca; sfn@saugeen.org; aldos@wellington.ca; scottw@wellington.ca; info@wdgpublichealth.ca; Rick Richardson; stephen.dewar@guelph.ca; joanne.vanpanhuis@enbridge.com; tcenergy@mhbcplan.com; info@tnpi.ca; marion.wright@rci.rogers.com; wendy.lefebvre@bell.ca; lena.demarco@bell.ca; sales@mornington.ca; nairm.mcqueen@hydroone.com; w.d.kloostra@hydroone.com; fbcwoodstock@hydroone.com; inquiry@ugdsb.on.ca; kfergin@heritagehomes.com; abrahamb@meritech.ca; Peter.armbruster@activa.ca; info@remleyhomes.com; duane@apexbuilding.ca; clnspaling@gmail.com; rtrapp@emeralhomesltd.com; g.l.carp.95@gmail.com; Trevor Prior; duimeringhomes@gmail.com; flvandepol@hotmail.com; jmohle@wellingtonconstruction.on.ca; jkoetsier@wellingtonconstruction.on.ca; Kim Pilon; heatherandbill@outlook.com; nrduimering; Kunuthur Srinivasa Reddy; Amanda Reid; Maha.Mankal@HydroOne.com

Good afternoon,

Please find attached a copy of the Notice of Completion for the Mapleton Water and Wastewater Master Plan study. The Township of Mapleton has completed the Servicing Master Plan to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The final study materials are available on the Township's website through the link listed below.

<https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan>

If you would like more information about the study or would like to provide comments, please contact the Director of Public Works for the Township.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

M 519-830-7015

900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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Charlotte Creron

From: Chippewas of the Thames First Nation <no-reply-cottfn@knowledgekeeper.ca>
Sent: July 5, 2023 3:48 PM
To: fburch@cottfn.com; jmills@cottfn.com; Adam Moore; jmorgan@mapleton.ca
Subject: Decision regarding consultation: T000974D - Mapleton Water/Wastewater Master Plan - Notice of Completion
Attachments: consultation-response-33468-t000974d-20230705-1546.pdf; wiindmaagewin-consultation-protocol-120623-approved.pdf

EXTERNAL EMAIL

Please see attached PDF response letter. As per 'Appendix C' of the Wiindmaagewin Consultation Protocol, we will be sending an invoice based on our time to engage in the consultation process. The invoice will be sent from COTTFN's Finance Department.

Charlotte Creron

From: Charlotte Creron
Sent: August 31, 2023 3:26 PM
To: Charlotte Creron
Subject: FW: HDI Monitoring Agreement for Drayton SPS Upgrade Project - Mapleton
Attachments: Signed Agreement.pdf

From: Jamie Morgan <JMorgan@mapleton.ca>
Sent: Wednesday, June 28, 2023 12:25 PM
To: Todd Williams <toddwilliams@hdi.land>; Adam Moore <Adam.Moore@cima.ca>
Cc: archaeology@hdi.land; Stuart Winchester <stuart.winchester@cima.ca>; owengreene@hdi.land; shannonhill@hdi.land; jake@detlorlaw.com; Manny Baron <mbaron@mapleton.ca>; Sharann Martin <sharannmartin@hdi.land>
Subject: RE: HDI Monitoring Agreement for Drayton SPS Upgrade Project - Mapleton

EXTERNAL EMAIL

Hi Todd,

Sorry for the delay in getting the signed agreement back to you.

Thanks, and have a great day.

From: Todd Williams <toddwilliams@hdi.land>
Sent: Friday, June 9, 2023 1:35 PM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: archaeology@hdi.land; Stuart Winchester <stuart.winchester@cima.ca>; owengreene@hdi.land; shannonhill@hdi.land; jake@detlorlaw.com; Manny Baron <mbaron@mapleton.ca>; Jamie Morgan <JMorgan@mapleton.ca>; Sharann Martin <sharannmartin@hdi.land>
Subject: Re: HDI Monitoring Agreement for Drayton SPS Upgrade Project - Mapleton

Adam,

Typically, one HDI arch monitor attends when the Arch Consultant (Bluestone) is on site but depending on Bluestone's crew size we have included the 4:1 ratio, which can vary depending on the company and their quality of work.

The HDI supervisor will attend a minimum of once a week depending on site complexity, site conditions and the chosen Arch consultant.

To date only archaeology monitoring services have been agreed to by both parties, so the other listed areas of services are not applicable at this time.

Hope this is helpful, let me know if you have any other questions.

Todd

On Fri, Jun 9, 2023 at 1:14 PM Adam Moore <Adam.Moore@cima.ca> wrote:

Hi Todd,

Thanks for sending this agreement. I just had a quick question.

How many monitoring staff would typically participate for the site visits?

ADAM MOORE, [M.A.Sc.](mailto:M.A.Sc), P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA



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From: Archaeology Department <archaeology@hdi.land>
Sent: Monday, June 5, 2023 12:13 PM
To: Manny Baron <mbaron@mapleton.ca>; jmorgan@mapleton.ca
Cc: Adam Moore <Adam.Moore@cima.ca>; Stuart Winchester <stuart.winchester@cima.ca>; Sharann Martin <sharannmartin@hdi.land>; Owen Greene <owengreene@hdi.land>; Shannon Hill <shannonhill@hdi.land>; Jake Linklater <jake@detlorlaw.com>; Todd Williams <toddwilliams@hdi.land>
Subject: HDI Monitoring Agreement for Drayton SPS Upgrade Project - Mapleton

EXTERNAL EMAIL

Afternoon Manny and Jamie,

Sorry for the delay in getting this out to you.

I've attached a draft copy of HDI's 2023 monitoring agreement for your review.

If agreed too, please sign and return a copy.

Thanks,

Todd E. Williams, P.Eng

Monitoring Program Coordinator

Haudenosaunee Development Institute (HDI)

Haudenosaunee Confederacy Chiefs Council (HCCC)
Haudenosaunee 1755 Treaty Territory

O: [519-445-4222](tel:519-445-4222)

M: [519-761-1794](tel:519-761-1794)

<https://www.haudenosauneeconfederacy.com/>

<https://www.haudenosauneeconfederacy.com/departments/haudenosaunee-development-institute/>



Deshkan Zibiing
Chippewas of the Thames
First Nation Treaties, Lands
and Environment

320 Chippewa Road
Muncey, ON, N0L 1Y0
Tel: 519-289-5555
Fax: 519-289-2230
info@cottfn.com

Project Name:

Mapleton Water/Wastewater Master Plan - Notice of Completion

FN Consultation ID:

T000974D

Consulting Org Contact:

Adam Moore

Consulting Organization:

[CIMA+ Engineering](#)

Date Received:

Wednesday, June 14, 2023

July 5, 2023

Dear: Adam,

We have received information concerning the Mapleton Water/Wastewater Master Plan - Notice of Completion, dated June 14, 2023.

In our screening of your project, the project has been identified as being outside of our area of priority due to the proximity of your project to our First Nation. Due to capacity, we ask that you continue to engage and consult with First Nations that are located within the area of the project.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Original Signed

Fallon Burch

Consultation Coordinator

Chippewa of the Thames First Nation

320 Chippewa Road, Muncey, ON, N0L 1Y0

(519) 289-5555 Ext 251

consultation@cottfn.com

Deshkan Ziibiing/Chippewas of the Thames First Nation

Wiindmaagewin

CONSULTATION PROTOCOL



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PART I: Introduction and Purpose

1. History of Deshkan Zibiing Aki (Chippewas of the Thames First Nation)

The watersheds of southwestern Ontario have been the home of Anishinaabe people for millennia. Deshkan Zibiing edbendaagzijig, “those that belong to Antler River,” comprise one of the traditional Anishinaabe nations governing the territory of Waawayaatanong or “Round Lake.” This region is known as the third stopping place of the Water Drum on its sacred journey to Madeline Island, centuries before the era of colonization.

The purpose of this protocol is to ensure that our relationships with others develops in ways that respect Deshkan Zibiing’s responsibilities to mother earth and protects the full range of our rights. This protocol shall serve to guide governments and third-party proponents who are interested in pursuing healthy and mutually beneficial relationships with Deshkan Zibiing within our traditional territory.

2. Territory

Deshkan Zibiing edbendaagzijig’s traditional territory was recognized and affirmed by Canada in the Big Bear Creek Land Claim Settlement Agreement (2013). Within this territory, we are also signatory to pre-Confederation Treaties with the British Crown. Traditional Anishinaabe territory in southwestern Ontario includes lands addressed in the McKee Treaty (1790), the London Township Treaty (1796), the Sombra Township Treaty (1796), the Longwoods Treaty (1822), and the Huron Tract Treaty (1827). Deshkan Zibiing is party with other Anishinaabe nations to several of these treaties but is the sole Anishinaabe party to the Longwoods Treaty.

A comprehensive description of our ancestral lands is attached as Appendix “A” together with a map.

We who are Deshkan Zibiing edbendaagzijig continue our commitment to protect the watersheds of the Thames River, Bear Creek, the Au Sable River, and the Erie and Huron

lakeshores. We regard all of our ancestral lands as part of our consultation territory. Our treaties did not “surrender” our lands or waters.

3. Community Profile

As a community, Deshkan Zibiing has always welcomed and incorporated people from other nations. Our families have always shared a common world around the Great Lakes with the families of the Pottawatomis and the Odawas. Delawares (Lenape) and Oneidas were welcomed here between 1791 and 1840 and allowed to create their own communities on land adjacent to and within our homeland. At various times, other Haudenosaunee, Shawnees, Huron/Wendats, as well as Anglo or French traders and settlers marrying our people, have all been incorporated into our society. Today, our population is approximately 3,200 people, with 1,000 residing within Deshkan Zibiing’s unceded reserve land.

4. Historical Relationships

Deshkan Zibiing’s relationships with other nations have generally been pursued through the creation of Treaty partnerships.

The great Treaty of Niagara (1764) emerged from this long practice and is the template for all subsequent treaties between Britain and Deshkan Zibiing. The Two Row Wampum, a belt the Haudenosaunee first used with the Dutch in 1613, recognized a relationship of equals.

The imposition of colonialism and Canada’s shameful conduct in breaking sacred promises contained in our Treaties have had a lasting effect on the people of Deshkan Zibiing. Colonial rule presumed the ‘surrender’ of well over 90% of our traditional territory. Efforts to ‘civilize’ and assimilate our people, through Canada’s unilateral imposition of legislation, harsh policies, and the residential school system have taken a toll on our people and have unlawfully infringed our human rights as well as our Aboriginal and Treaty rights.

However, despite Canada’s assertions of sovereignty over our lands and people, we have remained resilient and have continued to assert our inherent rights as a sovereign nation.

Deshkan Zibiing remains intent on protecting our traditional territory. Our vision for the engagement formalized in this protocol remains that of Tecumseh, our Treaty chiefs, and the Two Row Wampum.

We are fundamentally committed to self-determination and the preservation and restoration of our Anishinaabe jurisdiction and heritage. We expect that those with whom we engage in matters respecting our traditional territories will act in a manner consistent with the principles contained in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and shall seek to fulfil the objectives of reconciliation.

We are focused on fair partnerships based on our free, prior, and informed consent and the wise and respectful use of our traditional lands and waters.

5. Principles of Intersocietal Governance and Communication

Our engagement with other communities stems from our recognition of several principles, which derive from our Creator's gifts to us of life and land, and from our Creator having placed us within a world full of relationships with others. Our responsibility to maintain these relationships, in accordance with principles derived from our creation story, is central to our continued wellbeing as a people. These principles guided our ancestors in their Treaty partnerships historically, and they remain foundational today in our dealings with federal, provincial, and municipal bodies. They indicate our fundamental orientation towards all matters of discussion concerning our rights and responsibilities and underpin our approach to "the duty to consult" as articulated by the Supreme Court of Canada in *Haida Nation* (2004) and subsequent cases.

Our principles provide a basis for fruitful and healthy intersocietal development, governance, and communication.

a. Principles of Governance

(1) Gdinawendimi: "We are all related." A basic truth of our creation story is that we are related to everything that shares the world with us. We expect that all consultation and

discussion with governments and third parties will focus on how the proposed project will foster this relatedness.

(2) Mno-bmaadiziwin: “The good life.” We understand that the Creator placed us within our world’s web of spiritual and bio-physical relationships in order for life to flourish. Life flourishes when we base our relationships on the gifts of the Seven Grandfathers: Nbwaakaawin “wisdom,” Zaagidiwin “love,” Minaadendamowin “respect,” Aakde’ewin – or Zoongide’ewin “bravery,” Gwakwaadiziwin “honesty,” Dbaadendiziwin “humility,” Debwewin “truth.” Proposals should enhance the good life for all our relations and discussions regarding those proposals should be grounded in the Seven Grandfather teachings.

(3) Naaknigewin: “Law”. We expect that all consultation and discussion with governments and third parties will aim to respect and embody our laws, including our Chi-Inaakonigewin, as the measure for our decisions provided by the Creator.

(4) Anishinaabe dbendizawin: “Anishinaabe independence,” or “self-determination.” We were created to live as an independent people, and are therefore able to ally with, but not to become subject to, other independent peoples. The Two Row Wampum embodies this alliance of equals, each party free to follow its own way without interference, but each also attentive to the wellbeing of the other. We expect that all proposals from governments will respect this most basic tenet of the Two Row Wampum.

b. Principles of communication

(1) Zgaswediwin: “To smoke together.” When Anishinaabeg met in council, they began with the ceremony of smoking. In our stories, Nanabush provided our ancestors with the pipe of peace to help us foster the path of goodwill and reconciliation towards earth, plants, animals, and our fellow humans. Asemaa, “tobacco,” carries our thoughts and prayers to the Creator, and demonstrates our desire to speak the truth, and to build relationships that reflect

gratitude in our dependence on the natural order. We expect that all consultation will be grounded in truth, reconciliation, and gratitude.

(2) Ginoondiwin: “talk to each other.” Our practice has been to reach decisions in common, after full and satisfying discussion addressing the concerns of all involved. Consultation must be designed and implemented with flexibility, respecting the nature of the rights potentially impacted and the scope of the possible impacts. Deshkan Zibiing expects to determine the level of consultation that is necessary and appropriate where our rights and interests are potentially impacted.

(3) Gii-nenmaasiinaawaan: “they didn’t let them”. In all consultations which impact our Treaty and traditional lands, we expect Crown and Proponents to adhere to the principle of Free, Prior, and Informed Consent, embodied in article 32(2) of the United Nations Declaration on the Rights of Indigenous Peoples (2007).

Chi-dibaakinigewin: a “great judgment,” Our ancestors negotiated with settler governments to reach mutually beneficial agreements. However, colonial governments have ignored obligations under these solemn agreements and have justified erosion of our rights over time. We expect that governments will adhere to the true intent of treaties and agreements and will respect the gravity of the promises that are made.

c. Principles of Co-Existence and Economy

(1) Gdoonaaganinaan: “Our Dish,” the agreement reached with the Haudenosaunee in 1701, enabled our respective peoples to hunt and harvest in mutual safety, and ensured mutual wellbeing, within our ancestral lands. We expect all Proponents to demonstrate how proposed projects will promote mutual safety and wellbeing.

(2) Maatookiiwin: “sharing”. Our Treaties concern our sharing of the lands that the Creator has shared with us. There are no Anishinaabemowin transcriptions of treaties that

use the word *adaawaage*, meaning “to sell.” It is our expectation that in the spirit of sharing what the Creator has provided, benefits related to projects will also be shared.

(3) Gnawenjigewin: “to take care of things.” Our use of the lands and waters of our territory is subject to Anishinaabe principles of stewardship, derived from our creation story, and instilled through the growth of Traditional Knowledge. We expect that all project proposals will respect and incorporate conservation practices and Traditional Knowledge of Deshkan Ziiibiing.

(4) Niigaan-inaabiwin: “looking ahead”. Decision-making that respects the full web of relationships within which the Creator has placed us, and aims to chart the impacts of our choices as far as possible into the future to ensure harmony and balance. We expect project proposals with the potential to affect our lands, waters, air, health and wellbeing to demonstrate as concretely as possible the long- term implications for Deshkan Ziiibiing.

6. Statement of Reserved Rights

The rights that Deshkan Ziiibiing exercises in relation to our traditional lands, Treaty lands, reserve lands, and Addition to Reserve lands, are inherent - grounded most basically in the Creator’s gift of lands, waters, and way of life to *ndodeminaanig*, “our clans.” These rights are embodied in our historical and ongoing occupation of our territory, and in our practice of self- determination as a people.

Our rights as a self-determining people are recognized in several instruments, including, the Royal Proclamation of 1763, our Treaties, s.35(1) of *Canada’s Constitution Act* and the *United Nations Declaration of the Rights of Indigenous Peoples (UNDRIP)(2007)*.

UNDRIP recognizes, among other things, the need to respect and promote the inherent rights of Indigenous peoples, including our right to self-determination within our traditional lands and territories. Our rights derive from our political, economic, and social structures and from our cultures, spiritual traditions, histories, and philosophies. UNDRIP encourages States to comply

with and effectively implement all their obligations as they apply to Indigenous peoples under international instruments in consultation and cooperation with the peoples concerned. Relevant articles include, but are not limited to:

Article 11

1. Indigenous peoples have the right to practise and revitalize their cultural traditions and customs. This includes the right to maintain, protect and develop the past, present and future manifestations of their cultures, such as archaeological and historical sites, artefacts, designs, ceremonies, technologies and visual and performing arts and literature.
2. States shall provide redress through effective mechanisms, which may include restitution, developed in conjunction with indigenous peoples, with respect to their cultural, intellectual, religious and spiritual property taken without their free, prior and informed consent or in violation of their laws, traditions and customs.

Article 12

1. Indigenous peoples have the right to manifest, practise, develop and teach their spiritual and religious traditions, customs and ceremonies; the right to maintain, protect, and have access in privacy to their religious and cultural sites; the right to the use and control of their ceremonial objects; and the right to the repatriation of their human remains.
2. States shall seek to enable the access and/or repatriation of ceremonial objects and human remains in their possession through fair, transparent and effective mechanisms developed in conjunction with indigenous peoples concerned.

Article 26:

Indigenous peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired.

Article 32:

1. Indigenous peoples have the right to determine and develop priorities and strategies for the development or use of their lands or territories and other resources.
2. States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free and informed consent prior to the approval of any project affecting their lands or

territories and other resources, particularly in connection with the development, utilization or exploitation of mineral, water or other resources.

3. States shall provide effective mechanisms for just and fair redress for any such activities, and appropriate measures shall be taken to mitigate adverse environmental, economic, social, cultural or spiritual impact.

In June 2021, Canada passed into law the *United Nations Declaration on the Rights of Indigenous Peoples Act* which affirmed UNDRIP as a universal international human rights instrument with application in Canadian law; thereby providing a framework for Canada's implementation of UNDRIP.

This legislation represents a step toward implementing UNDRIP as a framework for reconciliation as recommended by the Truth and Reconciliation Commission of Canada in their "Calls to Action" – which Canada committed to addressing.

Within the *UNDRIP Act*, Canada rejects all forms of colonialism and commits to advancing relations with Indigenous peoples that are based on good faith and on the principles of justice, democracy, equality, non-discrimination, good governance, and respect for human rights. Canada further committed to taking effective measures including legislative, policy and administrative measures, in consultation and cooperation with Indigenous peoples, to achieve the objective of UNDRIP.

This Wiindmaagewin represents a framework for consultation which is consistent with the principles of UNDRIP and Canada's stated commitment to implementing these principles to achieve reconciliation; however, the Wiindmaagewin is based on the Nation's inherent rights which are not dependent on Canada's legal system or recognition.

PART II Obligation to Consult

7. Purpose and Application

7.1. This Consultation Process balances Deshkan Zibiing's laws with the legal principles derived from the western common law as well as international instruments, such as UNDRIP. We adhere to the principle of Free, Prior, and Informed Consent. Therefore, where any proposed Activity within Deshkan Zibiing's Traditional or Treaty Territory, Additions to Reserve Land or any land over which Deshkan Zibiing claims Aboriginal title, may potentially cause an impact to the environment, health or Deshkan Zibiing's rights or asserted rights, including changes to laws, regulations or policies, Deshkan Zibiing expects the Crown and Proponents to respect and follow the processes set forth in this Wiindmaagewin.

7.2. Nothing in this Protocol, nor the process or documents derived from it shall be construed to abrogate or derogate from the rights of Deshkan Zibiing, regardless of whether such rights are recognized, established or defined.

7.3. Nothing in this Protocol may be construed to limit any consultation or accommodation obligations owed to Deshkan Zibiing by the Crown or any Proponent.

7.4. Deshkan Zibiing retains the right to challenge through the legal process, any Activity having the potential to impact the citizens or lands of Deshkan Zibiing.

8. Definitions

- a. Activity** means any Crown or Proponent activity.
- b. Crown** means either or both of the governments of Canada and Ontario and its component parts and agents, as well as its designates including municipalities.

c. Crown Activity means:

- New or changes to legislation, regulations, policies, programs and plans that provide authority to or are implemented or to be implemented by the Crown;
- Issuance, variation, approval, suspension or cancellation of permits, licenses, authorizations, renewals or anything similar by the Crown;
- Any unfunded mandate or obligation sought to be imposed by the Crown upon Deshkan Zibiing without provision of corresponding adequate resources, financial or otherwise;
- Any failure to act by the Crown where the Crown is obligated to take action to protect or given effect to Deshkan Zibiing's Aboriginal or Treaty rights; and
- Any other action which may be authorized or undertaken by the Crown.

d. Proponent means the party (which could include the Crown, a municipality, a Land Use Planning Authority, a corporation, partnership, sole proprietorship, association, organization, person or the like) that proposes to undertake or is undertaking the Proponent Activity but excludes any business in which Deshkan Zibiing has a majority interest or financial control.

e. Proponent Activity means any Activity pursuant or incidental to anything authorized or ordered by the Crown or that the Crown is contemplating authorizing or ordering. This includes Planning Authorities who are required to engage and coordinate with Indigenous communities on land use planning matters and consider our interests when identifying, protecting, and managing cultural heritage and archaeological resources. It does not include any Activity of Deshkan Zibiing or a member of the Nation or a business in which members of the Nation have majority control or interest which Activity Deshkan Zibiing has authorized.

f. Impact means any effect that an Activity may have on the land, economy or environment within or around Deshkan Zibiing's Reserve, Additions to Reserve, Traditional or Treaty territory or any adverse effect on the health of any Deshkan Zibiing member or on the Aboriginal or Treaty rights of Deshkan Zibiing or any of its

citizens. This assessment of impact may relate to the cumulative impacts (long-term, ongoing, intermittent or repetitive) of a Proponent's proposed Activity or it may relate to the cumulative impacts of development generally which, as a whole will have an adverse impact on the right(s) of Deshkan Ziiibiing.¹

g. **Protocol** means this Wiindmaagewin, the Deshkan Ziiibiing Consultation Protocol.

9. Objectives and Responsibilities

9.1. Objectives of Consultation

Appropriate consultation is a dialogue between communities, a mutual engagement, rather than a mere notification of an external party's intention. Consultation ensures Deshkan Ziiibiing is fully informed about Activities that may affect our Nation's rights and interests; it promotes and deepens the path of reconciliation that will ensure a healthier future for both settler and Anishinaabe communities; it encourages the development of projects that are mutually beneficial to all parties; and it ensures that projects have wide legitimacy both within Deshkan Ziiibiing, and also within the larger network of Anishinaabe nations at home around the Great Lakes.

9.2. Responsibilities of the Parties

All parties engaged in consultation activities have responsibilities in common. Among these are the responsibilities to participate in good faith, and to treat each other with respect, transparency, and honesty. In addition, each party has its own unique responsibilities to ensure that the outcome of consultation is successful and good relations endure.

9.2.1 Crown Responsibilities

Where Deshkan Ziiibiing asserts rights or interests which may potentially be impacted, the

¹ This is consistent with evolving case law on cumulative impacts: See *Yahey v British Columbia*, 2021 BCSC 1287 ([Yahey](#))

Crown must act honourably. This requires that any rights that are protected or potentially protected by s.35 of the Constitution are recognized and respected. In all situations, the honour of the Crown requires reasonable, good faith efforts to engage in meaningful consultation and, where appropriate, accommodation to reconcile the interests at stake. Consultation is an ongoing obligation, and this duty may change during the course of consultation based on changing circumstances and information.

Specific Crown responsibilities include, but are not limited to:

- a) Full and complete collaboration with Deshkan Ziiibiing, taking into account the Community's input and perspective in designing and implementing the consultation and accommodation process, respecting Deshkan Ziiibiing 's laws and Traditional Knowledge, and acting with transparency, honour, and good faith, all in the spirit of reconciliation;
- b) Full and timely disclosure of all relevant information from the earliest stages of any contemplated Activity/project and as it becomes available throughout the consultation process;
- c) Effective oversight and coordination with other Crown agencies, departments, and Proponents as required;
- d) Timely and transparent communications with Deshkan Ziiibiing, including whether and how aspects of consultation are being delegated and the scope of that delegation;
- e) Where delegation occurs, ensuring an appropriate designate is appointed to oversee the effectiveness of the consultation process and ensuring the honour of the Crown is maintained during consultation and accommodation;
- f) Approaching every project/Activity with an open mind and an intention to be flexible and accommodate Deshkan Ziiibiing by substantially addressing legitimate concerns raised by the community including concerns related to

- cumulative impacts or effects;
- g) Incorporating Deshkan Ziiibiing as a partner into the strategic planning and decision-making process related to the project; and
- h) Funding for all reasonable costs associated with Deshkan Ziiibiing's meaningful participation, including costs associated with receiving, reviewing, and processing initial notices of proposed activities in the form of reasonable application or processing fees.

9.2.2 Proponent Responsibilities

Deshkan Ziiibiing acknowledges that Proponents are often delegated certain procedural aspects of the Crown's duty to consult when proposed activities potentially affect our asserted rights and interests.

Specific Proponent Responsibilities include, but are not limited to:

- a) Providing full, accurate, and up-to-date information about their projects on an ongoing basis. Such information should be provided as it becomes available and should not be dependent on explicit requests from Deshkan Ziiibiing staff;
- b) Facilitating Deshkan Ziiibiing's full participation in any necessary consultation activities and collaborating on Activity specific protocols which will detail consultation activities, timelines, and funding, including access to resources and expertise where required;
- c) Building consultation capacity within the Nation;
- d) Considering alternative approaches, including potential changes which may mitigate impacts;
- e) Respecting our role as steward and taking into account our Traditional Knowledge, practices, and perspectives;
- f) Responding to requests for information and adjusting timelines to facilitate the consultation process; and

- g) Exploring opportunities to share meaningfully in the range of benefits that might result from the Activity contemplated.

Should consultation proceed past the initial stage, we expect project Proponents to provide us with the following written acknowledgements, as requested:

- i. a statement fully acknowledging our inherent and Treaty rights, and our responsibilities to our territory, as they relate to the Activity;
- ii. a statement indicating that the Proponent will share this acknowledgement of our rights and responsibilities in all subsequent communication about the project with shareholders, the public, government departments, lenders, and others, and that the Proponent's subcontractors would function within the same framework.

9.2.3. Deshkan Ziibiing Responsibilities:

Our Elders have conveyed from the Creator our obligations to protect the land and waters of our traditional territory. Our responsibilities to our partners in consultation are similar to those we undertook together with our historic partner in Treaty.

Specific Deshkan Ziibiing Responsibilities include, but are not limited to:

- a) Upholding the terms of this protocol, as well as of any subsequent agreements arising in regard to the consultation process;
- b) Reciprocal good faith engagement with the Crown and Proponents;
- c) Providing timely information and responses as our capacity allows;
- d) Engaging leadership and our people in a meaningful way regarding proposed Activities;
- e) Stating our rights clearly and facilitating an understanding of how any potential impacts will adversely affect us; and,
- f) Providing input about how Proponents and governments might resolve our concerns in good faith, including participation in commercial relationships and/or

partnerships where appropriate.

PART III: Consultation Process

10. Triggering the Consultation Process

The duty to consult is triggered when the Crown contemplates or becomes aware of any Activity which has the potential to affect our Aboriginal or Treaty rights. At the earliest possible moment, notice of this Activity shall be submitted to Deshkan Zibiing by the Crown and/or Proponents in accordance with the contact procedures outlined below. If any Activity has begun or is underway before the consultation process is initiated, Deshkan Zibiing expects the Crown or Proponent to suspend such Activity until Deshkan Zibiing has been appropriately notified and engaged.

11. Submitting Notice to Deshkan Zibiing

Deshkan Zibiing uses the “NationsConnect” platform to receive consultation and engagement requests.

All inquiries and initial proposals for activities from the Crown and/or Proponents must be submitted to the NationsConnect portal, at the earliest possible moment in the development of a project idea. Notifications sent through regular mail, email, or fax will not receive a response and will not be considered submitted for consultation.

To submit, first go to <https://nationsconnect.ca/> to register. Click on the Sign Up Now button to get started.

Proponents will be required to submit information about their project. A spatial file in .kml, .kmz, or .zip shapefile formats are also required for submission. Once the project has been submitted, additional files can be attached. Communications can also be kept up to date through the Conversations feature on NationsConnect.

Consultation staff will respond to NationsConnect submissions within 45 days. Proponents are prompted to select a response date in the NationsConnect portal. Staff will attempt to respond

by the date noted, but it may not be possible due to capacity restraints.

If you need to contact Consultation staff and are NOT submitting a new consultation, email consultation@cottfn.com or call the office at 519-289-5555. A staff member will respond to emails within seven business days. If you do not receive a response within that time frame, please resend.

Reasonable processing and/or consultation service fees will be charged in accordance with the fee schedule outlined in the appendix of this Protocol. The updated Protocol can be found on Deshkan Zibiing's Website at: cottfn.com under "Duty to Consult."

No action or inaction on the part of Deshkan Zibiing in regard to a failure to provide proper Notice shall be deemed to be a waiver of Deshkan Zibiing's right to be consulted.

12. Notifications for Archaeology Requests

12.1. Deshkan Zibiing participates in archaeological fieldwork occurring within the Nation's Traditional and Treaty Territory by sending Archaeological Field Liaisons (AFLs) to sites. By participating in archaeological fieldwork, the Nation's AFLs help protect the Nation's rights and interests, material culture, and, where applicable, ancestors' remains and sacred items.

Treaties, Lands and Environment is developing further protocols around the care of ancestors' remains and potential repatriation of sacred bundles and Anishinaabe material culture.

Protocols will be shared when they are finalized.

12.2. The AFL program is managed by the Consultation Unit. Deshkan Zibiing expects to participate in all archaeological fieldwork from Stage 2 to 4. In order to participate in fieldwork, COTTFN and the Proponent or Consultant must execute an Archaeology Field Liaison Agreement. Proponents or Consultants may obtain a copy of this agreement by contacting consultation@cottfn.com.

12.3. Invitations to participate in archaeological fieldwork must be emailed to consultation@cottfn.com. Due to technical and time constraints, archaeology requests must NOT be submitted to the NationsConnect portal. Proponents may submit a copy of archaeology-related documents to an existing project in the NationsConnect portal for record-keeping, as long as the documents are first submitted via email.

12.4. Given the time required to complete the agreement, archaeology requests should be submitted at least two weeks prior to the proposed commencement of fieldwork. Once an agreement is in place, the Consultation Unit requires fieldwork notification at least 48 hours prior to the scheduled start time. If insufficient time is given, COTTFN expects the Proponent/Consultant to reschedule the fieldwork to allow for COTTFN's participation.

12.5. COTTFN requests the opportunity to review draft Archaeological Assessments prior to final submission to the Ontario government, whether the Nation was able to send AFLs to the site or not. The Consultation Unit typically requires one month to review and respond to Archaeological Assessments.

12.6. Proponents and consultants should refer to the AFL agreement for comprehensive terms.

13. Evaluation of Activity and Scope of Consultation

13.1. Upon receiving the Notice, Deshkan Zibiing will undertake an assessment of the Activity and categorize it as follows:

Minimal impact, (a routine or low risk Activity that is unlikely to substantively impact the Aboriginal or Treaty rights and claims of Deshkan Zibiing, for instance: road repair and resurfacing)

Moderate impact (e.g. aggregate pits)

Extensive impact (e.g. nuclear energy waste storage facilities, alternative energy

developments, oil and gas pipelines or facilities, and landfills)

13.2. Minimal Impact Consultation

- a) The Proponent registers through the NationsConnect portal and submits the required information about the Project to the Consultation Department.
- b) The Consultation Department responds within 45 days.
- c) The Consultation Department requests to send Archaeological Field Liaisons to any archaeological fieldwork occurring from Stages 2-4, at the expense of the Proponent.
- d) The Consultation Department screens the proposal and logs details.
- e) Generally, for minimal impact activities, status reports will be requested from the Proponent.
- f) Processing/Consultation Service fees will apply.

13.3. Moderate Impact Consultation

- a) The Proponent registers through the NationsConnect portal and submits the required information about the Project to the Consultation Department.
- b) The Consultation Department responds within 45 days.
- c) The Consultation Department requests to send Archaeological Field Liaisons to any archaeological fieldwork occurring from Stages 2-4, at the expense of the Proponent.
- d) The Consultation Department screens the proposal and logs details.
- e) Within 60 days, and following an internal review of the Activity, the Consultation Department will communicate the results of its assessment of the Activity and its requirements for next steps based on its assessment.
- f) The party may be invited to meet with the Lands & Environment department and may be asked to provide additional information to determine the extent of concern.
- g) Where appropriate, a consultation plan will be developed.
- h) Processing/Consultation Service fees will apply.

13.4. Extensive Impact Consultation

- a) The Proponent registers through the NationsConnect portal and submits the required information about the Project to the Consultation Department.
- b) The Consultation Department responds within 45 days.
- c) The Consultation Department requests to send Archaeological Field Liaisons to any archaeological fieldwork occurring from Stages 2-4, at the expense of the Proponent.
- d) The Consultation Department screens the proposal and logs details.
- e) Processing/Consultation Service fees will apply.
- f) Within 60 days, and following an internal review of the Activity, the Consultation Coordinator will communicate the results of its assessment of the Activity and its requirements for next steps based on its assessment.
- g) For all Extensive Impact Activities, the Proponent will be required to engage in developing a consultation framework together with Deshkan Zibiing.
- h) In this event, Deshkan Zibiing expects that within 30 days following the notice that a consultation framework is required, a meeting will occur between the Crown, Deshkan Zibiing, and the Proponent to discuss:
 - i. the Activity and the sufficiency of the information provided;
 - ii. Deshkan Zibiing's history, rights, claim, and interests that may be impacted by the Activity;
 - iii. Traditional knowledge, laws, values, and stewardship obligations and how these will be considered and respected as part of the Activity design conditions or approvals;
 - iv. Identification of any gaps in information and a process to address those gaps including by considering whether additional studies, environmental assessment monitoring or other studies or reports are required;
 - v. The timeline for the Activity and approvals; and
 - vi. The development of a workplan, schedules and associated budgets in

collaboration with the relevant Crown agency/ department and the project Proponent.

14. Workplan

14.1 The Workplan should include, but not be limited to the following:

- a) Identification of significant milestones and timelines associated with achieving those milestones;
- b) Funding throughout the phases of the proposed Activity to ensure and support effective, meaningful participation of Deshkan Ziiibiing in the consultation process. Deshkan Ziiibiing expects that reasonable costs associated with travel, hosting community engagement sessions, distributing information and providing Elder honoraria would be provided;
- c) Further information required from each party and a process identified to ensure timely information exchange throughout;
- d) Identification of studies, assessments, technical reviews or reports that may be required to collect additional information about potential impacts;
- e) Archaeological monitoring by Deshkan Ziiibiing including through the participation of the Archaeological Field Liaisons;
- f) Identification of community engagement processes;
- g) Mechanisms to incorporate Traditional Knowledge and ensuring same is obtained in accordance with Deshkan Ziiibiing's internal protocols;
- h) Identifying schedule for future meetings and objectives including work plan monitoring; and
- i) Mechanisms for joint and /or independent monitoring of the Activity and its impacts.

14.2. Work plans may need to be revised as consultation proceeds and should be done collaboratively. Should Parties not be able to reach agreement following good faith discussions, the assistance of a mediator may be sought.

15. Nation to Nation Engagement.

15.1. Deshkan Zibiing expects the Crown to respect the Nation to Nation relationship. For any Activity that has been identified as “Extensive Impact”, Deshkan Zibiing expects the Crown will participate in consultation processes, even where consultation or engagement is being undertaken primarily by a Proponent. While administrative staff will be involved, negotiations involving rights will be with the rights-holders.

16. Traditional Knowledge and Confidentiality

16.1. Deshkan Zibiing will advise how Traditional Knowledge informs our assessment of an Activity. Deshkan Zibiing will engage citizens, including Elders and Knowledge Keepers as appropriate in the assessment of the project. We expect the Crown and Proponents to fully respect the internal protocols we have developed regarding the gathering of information from our community members.

16.2. Traditional Knowledge and data collected through the consultation process in relation to the Activity will remain the sole property of Deshkan Zibiing. To the extent that confidential information is shared, parties shall be required to enter into a confidentiality agreement prior to gaining access to this information.

16.3 Where Deshkan Zibiing determines that the knowledge is of such a nature that it should not be in the public realm, the parties shall meet to discuss the concerns regarding this information and the mechanisms to protect same and thereafter, only Deshkan Zibiing shall determine whether any part of it shall be shared.

17. Internal Community Engagement

17.1. Deshkan Zibiing’s practice of governance reflects a long history of community-based decision making. Depending upon the matter for consultation, government departments and project Proponents will need to embrace our approach to internal

community engagement and be willing to work with the processes necessary for Deshkan Ziibiing edbendaagzijig to determine their level of trust and support for the project.

18. Conditions for Providing Consent

18.1. Decisions regarding a project may be achieved in two ways. Those projects having little impact on Deshkan Ziibiing lands, air, waters, health, and wellbeing may be evaluated completely through the efforts of administrative staff, select committees of Council, and/or Chief and Council.

18.2. Those projects with significant potential to impact Deshkan Ziibiing lands, air, waters, health, and wellbeing, will require the scrutiny of the community as whole. Our traditions of governance charge our leaders with gathering and articulating the voices of the community as a whole. Thus, projects raising significant concerns for Deshkan Ziibiing edbendaagzijig will need to be accepted by the community in order for Chief and Council to speak in favour of them.

19. Ongoing Consultation

19.1. In certain cases, consultation may be required past the life of a particular Activity. Where, for instance, decommissioning or cumulative effects raise continuing or additional concerns regarding our rights and interests, we expect consultation to continue.

20. Capacity Requirements:

20.1 Deshkan Ziibiing receives many notifications regarding proposed activities daily. As the duty to consult is reciprocal, Deshkan Ziibiing is required to respond. In an effort to meet the increasing demands, Deshkan Ziibiing has acquired data management systems and employed staff in an effort to respond and handle information flow more efficiently. In order to offset the infrastructure and labour costs associated with the consultation process, Deshkan Ziibiing is required to charge processing and/or consultation service fees in accordance with the services provided.

A complete breakdown of consultation service fees for the varying levels of project impact is attached as Appendix C.

21. Deshkan Ziiibiing Initiated Research

21.1 In addition to the Crown or Proponent studies, it may be necessary for Deshkan Ziiibiing to supplement our understanding of the impacts. For instance, we may require additional research on the cumulative effects of an Activity or further assessments of the impacts on biodiversity, endangered species, or water quality. This may be the case where either the existing reports or assessments are deemed deficient or not objective, or where a project is especially contentious. We expect that the costs to engage in such research will be reimbursed by the Crown and Proponents.

22. Crown Delegation

22.2. Although the Crown may delegate aspects of Consultation and Accommodation to a Proponent, the Crown cannot delegate its duty to act honourably or its responsibility to ensure that consultation has been adequately and effectively carried out. In cases where a Proponent has been delegated aspects of the duty to consult, the Crown shall maintain oversight over this process and shall ensure that all Parties involved have received Notice of the Crown's intention to delegate, the scope of the delegation and the name of the designate who shall remain charged with oversight over the Crown's duty to consult.

23. Mitigation Measures and Accommodation

23.1. The protection of our inherent and Treaty rights, and the respect for our obligations to preserve the lands and waters of Deshkan Ziiibiing, are matters to resolve prior to any discussion of potential benefits that might result from an Activity. Where our lands, waters, health, and wellbeing may be adversely impacted, the Activity cannot proceed without our determining in advance the nature and scope of impacts, how adverse effects will be mitigated, and how our concerns will be accommodated.

23.2. If, through consultation, it is agreed the Activity may proceed, the following represent a non-exhaustive list of measures through which Deshkan Ziibiing edbendaagzijig may embrace the legitimacy of the Activity:

- a) Environmental and protection/monitoring agreements
- b) Stewardship agreements
- c) Co-Management or Recognition agreements respecting resources/jurisdiction
- d) Impact benefits/revenue sharing/ agreements
- e) Compensation
- f) Equity and Partnership agreements
- g) Protection of Intellectual Property and Confidentiality agreements
- h) Lease/royalty/licensing agreements
- i) Training/employment/education and scholarship opportunities

Deshkan Ziibiing expects the Crown to act honourably and provide assistance as requested in the consultation process including in the negotiation of accommodation measures which must be agreed to before the Activity begins.

24. Dispute Resolution Mechanisms

24.1. In the event that Parties have disagreements throughout the consultation process, Deshkan Ziibiing's expects:

- a) Good faith discussions would take place between senior decision makers in an attempt to resolve the dispute.
- b) In the event those efforts fail, the parties may resort to mediation where a mediator is agreed to by all Parties.

- c) Where mediation fails to resolve the disagreement within 60 days, parties may resort to the appropriate court for adjudication of the issue.
- d) The Crown and/or Proponent shall bear all costs of dispute resolution.

Deshkan Ziibiing expects a hold will be placed on the Activity, pending resolution of the issue in dispute.

25. APPENDICES

A. COTTFN Consultation Map

B. Consultation Flow Chart

C. Consultation Service Fees

This protocol is subject to revision and further development as determined by Chief and Council reflecting the consent of Deshkan Ziibiing edbendaagzijig.

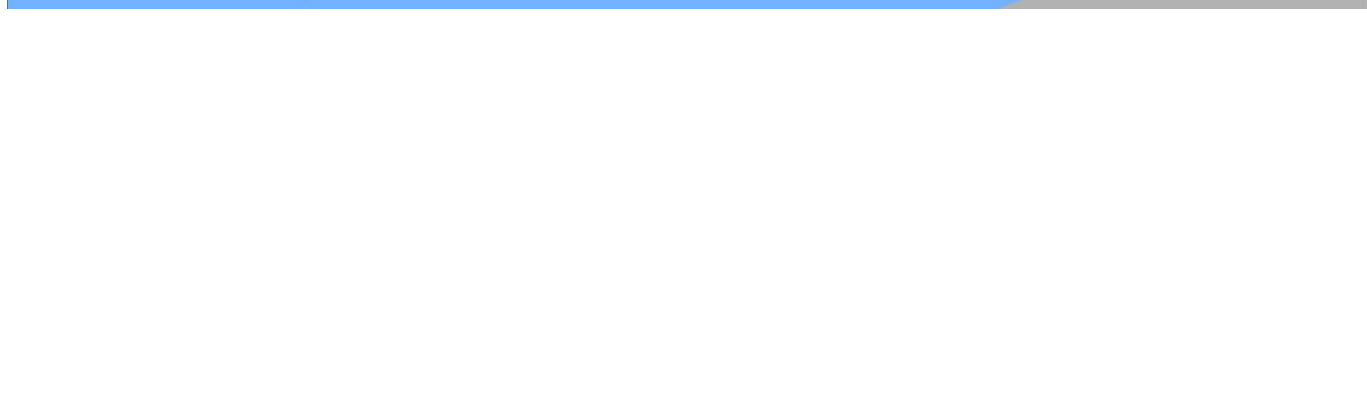
For use with permission of Deshkan Ziibiing/Chippewas of the Thames.

APPENDIX “A”

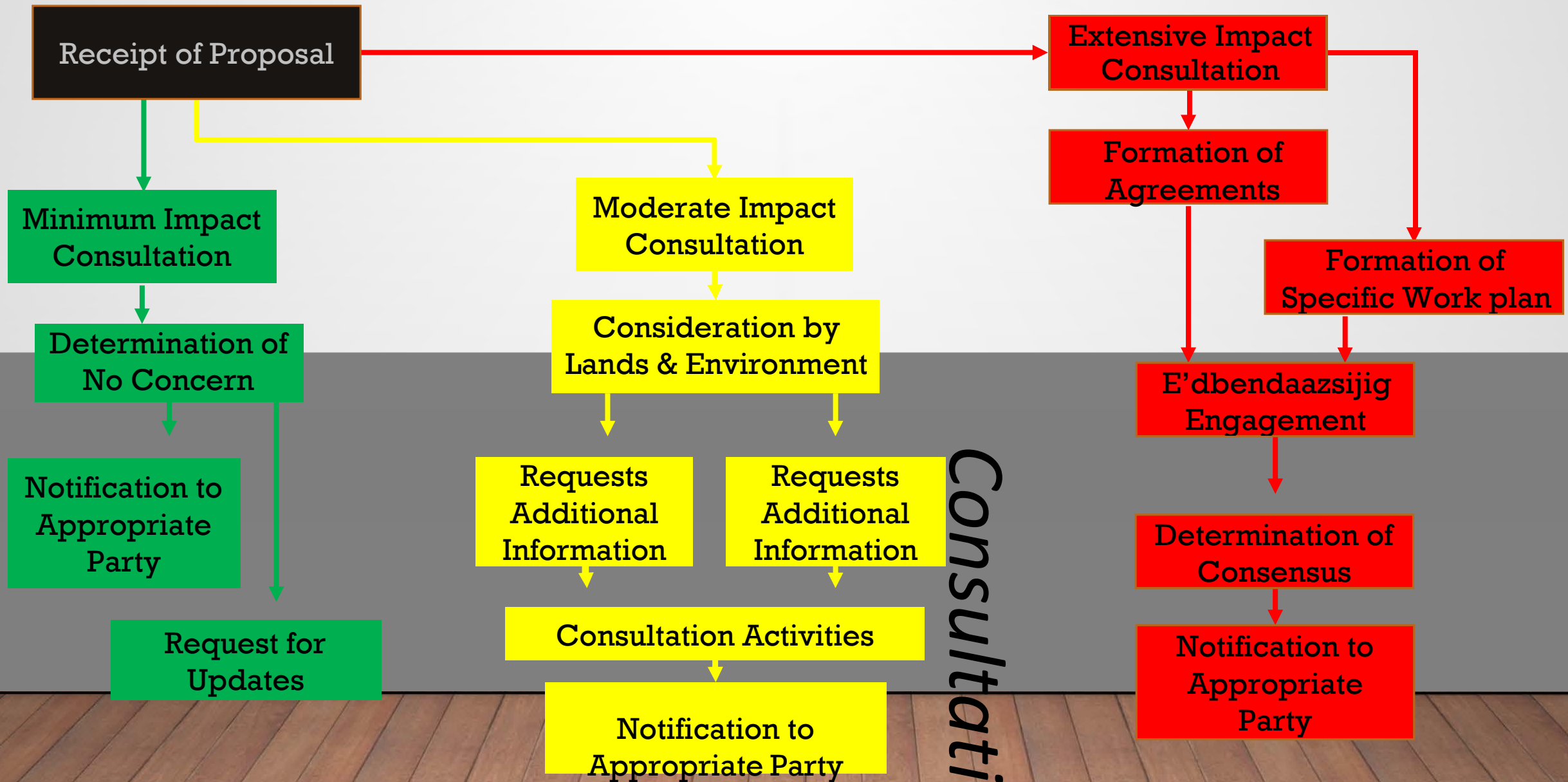
COTTFN Consultation Map

As recognized in these treaties, the ancestral lands of Deshkan Zibiing includes all the lands and waters between Lake Huron to the north and Lake Erie to the south and stretching eastward from the eastern banks of the St. Clair and Detroit rivers to the Mississaugas of New Credit 1792 treaty lands (see Appendix A for Consultation map). In addition, Deshkan Zibiing’s territory extends into what are now the American states of Michigan and Ohio. Historically, Deshkan Zibiing managed portions of our territory in common with other Anishinaabe nations, and at times in partnership with the Haudenosaunee. However, the lands bordering the northern bank of the Thames River have been solely in the stewardship and possession of Deshkan Zibiing since before the treaty era.

NOTE – COTTFN engages in consultation in the area within the dotted black line (see map on next page). The boundary line for Big Bear Creek Land Selection Area is an approximation, not the exact outline. The Consultation Map is not a comprehensive or definitive outline of the Nation’s Traditional Territory. It is used for consultation purposes.



Deshkan Ziibiing Consultation Flow Chart



Appendix C – Consultation Service Fees

As a department within COTTFN’s Administration, Treaties, Lands & Environment is tasked with carrying out the administrative aspects of Consultation for the Nation. The Nation responds to requests for engagement under the Duty to Consult to protect its rights and interests. The Consultation Unit receives minimal government funding that has not kept pace with the scale of activities occurring within the Nation’s Treaty and Traditional Territory. First Nations should not bear the financial burden of consultation, as affirmed in case law.² For this reason, the Consultation Unit operates on the principle of cost recovery, whereby proponents are invoiced for the time and effort involved in engaging on the project. The payment of fees does not fulfill the Duty to Consult.

COTTFN has developed three levels of response based on the impacts of the project, which are in turn based on several factors that the First Nation has developed to ensure appropriate risk identification and response required on behalf of the Nation.

By identifying various response levels to project proponents, the First Nation is better able to plan for the resourcing that each project requires and to communicate to project proponents the supports or resourcing that may be required for more complex, high impact projects.

The rates listed below are subject to change.

Colour Coded Ranking of Projects

Definition	Colour
Level 1: Minimal Impact	Costs Associated-Standard
Level 2: Moderate Impact	Costs Associated-Standard
Level 3: Extensive Impact	Costs Associated-Standard

² For example, Saugeen First Nation v. Ontario (MNR), 2017 ONSC 3456
Revision: 5 Revision Date: June 12, 2023

LIST OF STANDARD RATES

ITEM	DESCRIPTION OF ACTIVITY	RATE
Filing fee	Fee charged to accept a project for processing and filing retention. Multiple sites for the same project may be submitted as one project with one filing.	\$500 per project
COTTFN staff time (excluding members of COTTFN Senior Management)	Hourly rate for technical services, including assessing project risks, issuing correspondence, meeting with proponents, preparing briefings for Chief and Council, etc.	\$200/hour
TLE Director or another member of COTTFN Senior Management (excluding Executive Administrator)	Hourly rate for project review or meeting attendance.	\$250/hour
Executive Administrator	Hourly rate for project review or meeting attendance.	\$300/hour
Introductory meeting	Flat rate for an introductory meeting for a new project, up to 2 hours in length. The standard staff time rate applies for subsequent meetings and correspondence.	\$500 per meeting
Treaties, Lands and Environment Committee	Reviews projects that have been submitted by the Treaties, Lands and Environment Department and approves recommendations by staff and/or provides further direction on the project.	\$500 per meeting
COTTFN Council meeting	Reviews projects, deliberates, and provides overall direction to Department.	\$1000 per meeting
Councillor	Attendance by a member of Council on a project-related committee	\$250 per meeting (subject to change without notice per Council's <u>honorarium policy</u>)
Travel	For proponent meetings, open houses, site visits.	0.58 per km (subject to change without notice based on CRA quarterly rates)
Community engagement costs	Venue rental, catering costs, Elder honoraria, door prizes, etc.	Varies by item At cost
Administration Charge	Charge that contributes to central mail, phone and internet service, as well as financial services (e.g. payroll, accounts payable and receivable).	15% applied to sub-total

LEVEL 1-ENGAGEMENT EXAMPLE

ENGAGEMENT, CONSULTATION AND ACCOMMODATION					
Level 1					
Project Notice					
Minimal Impact					
Task/Persons Involved	Activity	Daily	Hourly	Units Estimated	
Filing Fee	Fee charged to accept a document for processing and filing retention.	\$ 500.00		1	\$ 500.00
Introductory Meeting	Introductory meeting for new project, up to 2 hours.	\$ 500.00		1	\$ 500.00
Senior Environment Officer	Environmental review for impacts to traditional territory and based on First Nation concerns, such as, but not limited to: noise, air, waste, contaminants, discharges, greenhouse gases, permitting required, cumulative effects. Development of Recommendations and support to the COTTFN Environment Committee.		\$ 200.00	2	\$ 400.00
Consultation Coordinator	Receipt of Information, Risk Identification, Internal Notification of Projects, Entry into Database, Issuing Correspondence, Maintenance of filing system, Library Services. Report production for the COTTFN Environment Committee and administrative support.		\$ 200.00	4	\$ 800.00
				SUB-TOTAL	\$ 2200.00
ADMINISTRATION CHARGE 15%	Central Mail, Financial Services: payroll, reimbursement procedures, accounts payable and receivable, production of financial statements, year-end audit. Photocopying, phone and internet service.			15%	\$ 330.00
				TOTAL:	\$ 2530.00

**These prices are effective June 12, 2023.

LEVEL 2-CONSULTATION EXAMPLE

ENGAGEMENT, CONSULTATION AND ACCOMMODATION					
Level 2					
Project Notice					
Moderate Impact					
	Activity	Daily	Hourly	Units Estimated	Projected Cost
Filing Fee	Fee charged to accept a document for processing and filing retention.	\$ 500.00		1	\$ 500.00
Introductory meeting	Introductory meeting for new project, up to 2 hours.	\$ 500.00		1	\$ 500.00
Director	Review, attending meetings and providing high level direction to staff on the First Nation's response.		\$ 250.00	1	\$ 250.00
Senior Environment Officer	Environmental review for impacts to traditional territory and based on First Nation concerns, such as, but not limited to: noise, air, waste, contaminants, discharges, greenhouse gases, permitting required, cumulative effects.		\$ 200.00	4	\$ 800.00
Consultation Coordinator	Receipt of Information, Risk Identification, Internal Notification of Projects, Entry into Database, Issuing Correspondence, Maintenance of filing system, Library Services. Report production for the COTTFN Environment Committee and administrative support.		\$ 200.00	5	\$ 1000.00
Events Coordinator	Development of internal community consultation communication website and social media update, and event planning		\$ 200.00	5	\$ 1000.00
Treaty Research	Identification of project in relation to traditional territory, Treaty areas, unceded areas, historical occupation.		\$ 200.00	1	\$ 200.00
COTTFN Environmental Committee	Reviews projects that have been submitted by the Treaty, Lands and Environment Department and approves recommendations by staff; and/or provides further direction on the project.	\$ 500.00		1	\$ 500.00
COTTFN Band Council	Reviews projects, deliberates, and provides overall direction to Treaty, Lands & Environment	\$ 1000.00		1	\$ 1000.00
SUB-TOTAL				\$	5750.00
ADMINISTRATION CHARGE 15%	Central Mail, Financial Services: payroll, reimbursement procedures, accounts payable and receivable, production of financial statements, year-end audit. Photocopying, phone and internet service.			15%	\$ 862.50
TRAVEL	For proponent meetings, workshops, open houses, public meetings.			0.58 / km	TBD
GRAND TOTAL:				\$	6612.50

***These prices are effective June 12, 2023.*
**This does not include all engagement costs, such as venue rentals or Elder honoraria.*
**These prices do not include any archaeological monitoring costs.*

LEVEL 3- HIGH IMPACT EXAMPLE

ENGAGEMENT, CONSULTATION AND ACCOMMODATION					
Level 3					
Negotiations and/or Hearings					
Extensive Impact					
Tasks/Persons Involved	Activity	Daily	Hourly	Units Estimated	Projected Cost
Filing Fee	Fee charged to accept a document for processing and filing retention.	\$ 500.00		1	\$ 500.00
Introductory meeting	Introductory meeting for new project, up to 2 hours.	\$ 500.00		1	\$ 500.00
Director	Reviewing, attending meetings, and providing high level direction to staff on the First Nation's response.		\$ 250.00	2	\$ 500.00
Senior Environment Officer	Environmental review for impacts to traditional territory and based on First Nation concerns, such as, but not limited to: noise, air, waste, contaminants, discharges, greenhouse gases, permitting required, cumulative effects. Development of Recommendations and support to the COTTFN Environment Committee.		\$ 200.00	6	\$ 1200.00
Consultation Coordinator	Receipt of Information, Risk Identification, Internal Notification of Projects, Entry into Database, Issuing Correspondence, Maintenance of filing system, Library Services. Report production for the COTTFN Environment Committee and administrative support.*		\$ 200.00	10	\$ 2000.00
Events Coordinator	Development of internal community consultation communication website and social media update, and event planning		\$ 200.00	5	\$ 1000.00
Treaty Research	Identification of project in relation to traditional territory, Treaty areas, unceded areas, historical occupation		\$ 200.00	1	\$ 200.00
COTTFN Environmental Committee	Reviews projects that have been submitted by the Treaty, Lands and Environment Department and approves recommendations by staff; and/or provides further direction on the project.	\$ 500.00		2	\$ 1000.00
COTTFN Band Council	Reviews projects, deliberates, and provides overall direction to Treaty, Lands & Environment	\$ 1000.00		2	\$ 2000.00
Executive Administrator	Reviewing, attending meetings, and providing high level direction to staff on the First Nation's response.		\$ 300.00	3	\$ 900.00
				SUB-TOTAL	\$ 9800.00
ADMINISTRATION CHARGE	Central Mail, Financial Services: payroll, reimbursement procedures, accounts payable and receivable, production of financial statements, year-end audit. Photocopying, phone and internet service.			15%	\$ 1470.00
TRAVEL	For proponents meetings, workshops, open houses, public meetings.			0.58 / km	TBD
				GRAND TOTAL:	\$ 11270.00

**These prices are effective June 12, 2023.
*This does not include all engagement costs, such as venue rentals or Elder honoraria.
*These prices do not include any archaeological monitoring costs.

Fee Schedule Revision History

Revision Number	Date	Description of Changes	Requested By
N/A	3-Dec-13	Design of form	M. Alikakos
1	13-Jan-14	Edition of linked worksheets and COTTFN Band Council rates	M. Alikakos
2	02-Apr-16	Formatted, changed processing fee dates	M. Alikakos
3	14-Jul-16	Name change, removal of flow chart, removal of levels of concern.	F. Burch
4	29-Nov-18	Added filing fee and increased staff fees	F. Burch
5	12-June-23	Increased fees, unified staff hourly rate	F. Burch

Project #:

May 16, 2023

The Township of Mapleton ("THE TOWNSHIP")
Drayton Sewage Pumping Station (the "Project")
Project Monitoring

Subject: HDI Monitoring at Drayton Sewage Pumping Station Project.

This master monitoring agreement (this "Agreement") is entered into by THE TOWNSHIP and Haudenosaunee Development Institute ("HDI"). The purpose of this Agreement is for THE TOWNSHIP, to provide HDI with capacity funding for monitors to attend Project site and for the review of documents by HDI in connection with work required for the project being coordinated or undertaken by THE TOWNSHIP in accordance with the Rates set out at Schedule A attached hereto.

Note: This Agreement does not constitute consultation, engagement, and/or consent for the subject Project.

This agreement is to enable HDI to provide timely and meaningful comment with respect to upholding commitments and responsibilities arising from the Project. It is understood and acknowledged that all work on the Project will be undertaken in accordance with applicable industry standard requirements, protocols, thresholds, and practices. The terms contained in this agreement are binding only to this agreement.

Subject to the below terms and conditions, THE TOWNSHIP and HDI (collectively, the "Parties") hereby agree that THE TOWNSHIP will provide capacity funding, at the sole expense of THE TOWNSHIP, for the services on the terms set forth herein.

In addition, the Parties agree that the Monitor will be reimbursed for mileage and meals in accordance with the Canada Treasury Board guidelines. Amounts invoiced by HDI in accordance with Schedule A shall be payable to **the Haudenosaunee Development Institute** at the following:

Bank #: 001

Transit #: 37522

Bank Account Number #: 1100241

Email address for remittance – shannonhill@hdi.land

1. The Monitor selected by HDI shall have appropriate qualifications for the work required including training in monitoring, as set forth in **Schedule A**. Upon request by THE TOWNSHIP, HDI or the applicable Monitor shall provide written evidence of such Monitor's qualifications to THE TOWNSHIP. **Schedule B** is provided by HDI to THE TOWNSHIP and serves as the geographic and legal assertions the Haudenosaunee Confederacy Chiefs Council (HCCC) have over the territory that THE TOWNSHIP operates within.

2. The amount billed by HDI in respect of the Monitoring work shall not exceed the amounts indicated in **Schedule A**, attached hereto, with the exception of section 20 of this Agreement.
3. Any issues arising from this Agreement that requires the approval of both Parties, shall be brought to an Issues Management Committee (the "Committee"). The Committee shall be struck within 5 business days or less, and consensus will be sought. The members of the Committee are as follows and can be delegated to other members of their respective organization:

Jake Linklater, HDI
Director, Engagement & Approvals
jake@detlorlaw.com

Manny Baron
mbaron@mapleton.ca

Jamie Morgan
jmorgan@mapleton.ca

4. The Parties agree that the Monitor are not employees, contractors, or sub-contractors of THE TOWNSHIP or their consultant(s) and that the Monitor will be responsible for their own personal protective equipment, such as hard hats, safety boots, and safety vests, unless specific or otherwise unique personal protective equipment is required, in which case will be provided or reimbursed by THE TOWNSHIP.
5. All Monitors shall comply with the personal protective equipment requirements on the Project site. Monitors shall follow the reasonable instructions of THE TOWNSHIP and their consultant(s) conducting the work concerning safety practices, and the Monitors will attend "tailgate" safety meetings if requested.
6. Any costs associated with required special or additional training of HDI Monitors shall be borne by THE TOWNSHIP at the hourly rates specified in the Agreement.
7. If its use is deemed necessary by both Parties, THE TOWNSHIP agrees to reimburse the Monitor for their use of the 407ETR, all-inclusive fees, within 60 days of receipt of invoice including a copy of the bill.
8. THE TOWNSHIP shall provide payment for the cost of overnight accommodation for Monitors participating in monitoring at locations that would otherwise require more than 90 minutes of travel time at both the beginning and end of the workday, as determined using the HDI office as the place of departure.
9. THE TOWNSHIP will pay the Monitor a minimum of four (4) hours, plus travel time and mileage, when fieldwork has been cancelled either while travelling to site or upon arrival.
10. THE TOWNSHIP or the Project Consultant will coordinate site meeting locations and times directly with HDI's field supervisor. The contact information for the HDI field supervisor is:

Archaeology

Sharann Martin

(226) 456-2508

sharannmartin@hdi.land**Environmental**

Raechelle Williams

(519) 802-9402

raechellewilliams@hdi.land

11. THE TOWNSHIP will provide payment by cheque or bank transfer within thirty (30) days upon receipt of an invoice. Invoice shall explain in reasonable detail each Monitors time, fees, mileage and meal expenses and the nature and date of work performed.

All invoices should be addressed directly to The Township of Mapleton, the project name and purchase order number, if required should be noted in the text of each invoice.

Invoices to be submitted to the following:

Manny Baron

mbaron@mapleton.ca

Jamie Morgan

ca_jmorgan@mapleton.ca

PO#:

12. THE TOWNSHIP is not responsible for any direct or indirect damage or harm caused by HDI and vice versa.
13. This Agreement shall remain in place for the duration of the Project Development.
14. **This agreement may be terminated by HDI upon thirty (30) days written notice to the other party. Electronic communications constitute written notice.**

Jake Linklater, HDI

Director, Engagement & Approvals

jake@detlorlaw.com

Manny Baron/Jamie Morgan

mbaron@mapleton.ca jmorgan@mapleton.ca

15. HDI pays Workplace Safety and Insurance Board ("WSIB") contributions in respect of the Monitors and will, at its own expense, maintain for the term of this agreement a comprehensive general liability ("CGL") policy or policies with a limit of at least \$1 million and shall provide THE TOWNSHIP with evidence of such insurance within 30 days of the signing of this agreement.
16. The Parties agree that this Agreement and any amendments thereto, if any, constitute the entire agreement between the Parties as to the matters governed hereby and supersede and replaces all prior arrangements, agreements, or understandings with respect to such matters.
17. Each Party represents and warrants to the other that its undersigned signatories are authorized to execute this agreement on behalf of the respective Party.

18. Both parties will comply with the *Occupational Health and Safety Act*, R.S.O. 1990, C. 0.1, the *Ontario Human Rights Code*, R. S. O. 1990, c. H.19, and maintain a safe, harassment-free work environment. Nothing in this Agreement subjugates HDI to this legislation.

19. If, in the event that Indigenous artifacts are discovered, THE TOWNSHIP agrees to work with HDI to facilitate site visits to allow for the assessment of the heritage value by HDI, and in accordance with the applicable legislation, guidelines and standards that govern provincially licensed archeologists. THE TOWNSHIP acknowledges that at times, additional delegates may need to be brought to the site for their relevant expertise from the regions where HDI currently conducts their day-to-day business operations.

THE TOWNSHIP further acknowledges that it is their preference that all work ceases on an affected area within a site until HDI are able to conduct its heritage value assessment.

20. If HDI is of the view, that designated HDI staff are unable to complete a comprehensive technical review of Project materials, THE TOWNSHIP agrees to pay costs incurred by HDI to retain an external expert in the appropriate field to be chosen at HDI's sole discretion. The Parties agree that a review by an external expert will only commence following mutual acceptance by both Parties of an estimate of work and budget provided by the expert. The Issues Management Committee will determine this funding request and will be accepted if reasonable in order to fulfill THE TOWNSHIP's legal obligations.

21. It is a condition of this Agreement that THE TOWNSHIP has the right to release information about this Agreement and the Project.

22. HDI acknowledges that THE TOWNSHIP is an institution to which the *Freedom of Information and Protection of Privacy Act* (Ontario) (hereinafter, "FIPPA") applies and may have to disclose information relating to this Agreement in the event of an access request made under FIPPA, with the exception of the protection of Indigenous knowledge as laid out in s. 15.1 of the same Act.

23. This Agreement may be executed in counterparts (in either original or electronic form), each of which will be deemed to be an original and all of which when taken together will constitute the same agreement.

Signed on behalf of: **Haudenosaunee Development Institute**

The foregoing accurately reflects the terms of the arrangement which we hereby agree to enter into, and the undersigned agrees to be legally bound hereby.

Accepted at Drayton this 9th day of June, 2023

By: _____

The Township of Mapleton

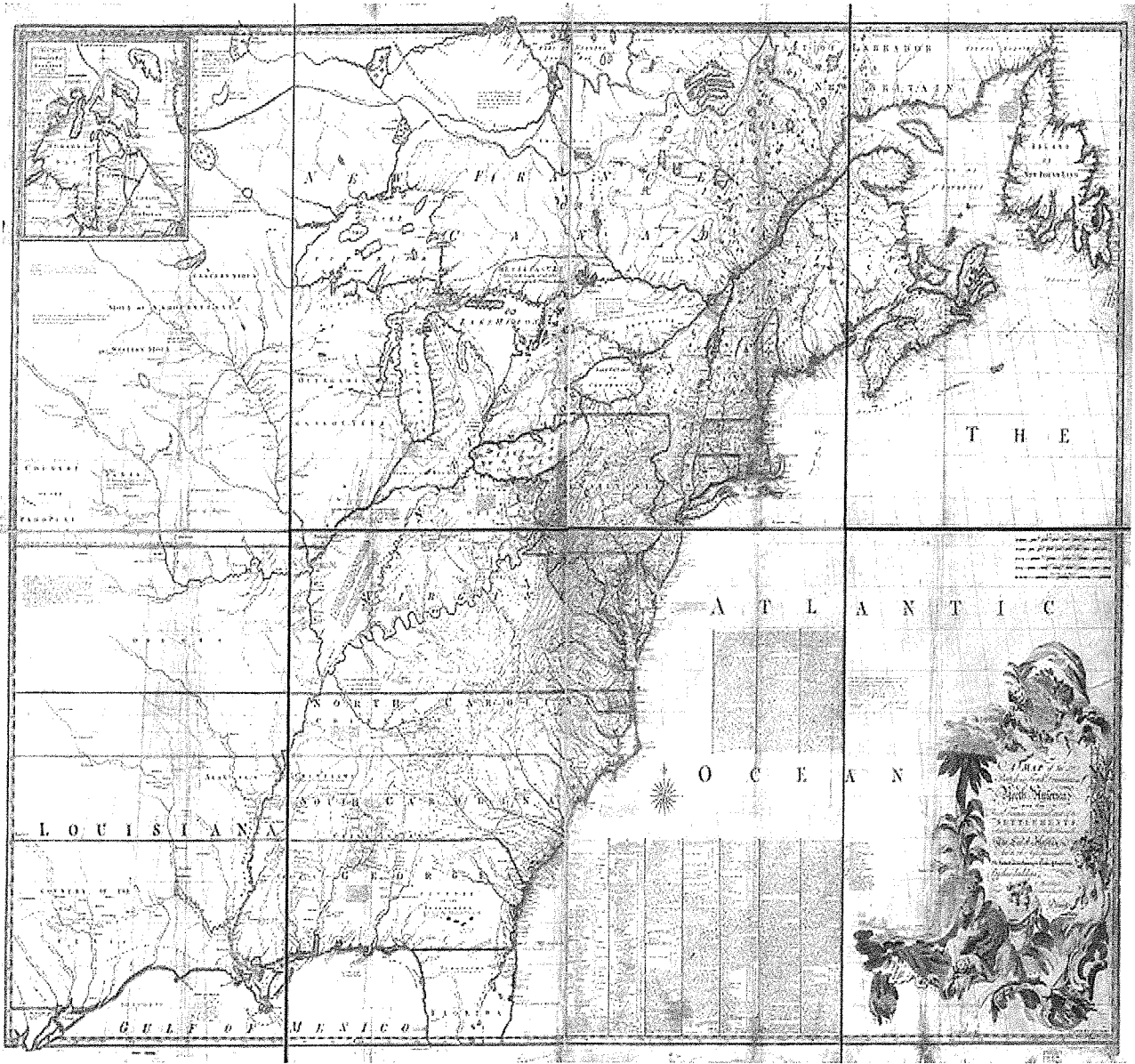
SCHEDULE A –HDI MONITOR RATES

<u>Title</u>	<u>Qualifications</u>	<u>Rate/Hour</u>	<u>Travel Allowance</u>
Archaeology Supervisor	Archaeology School Certificate & HCCC Archaeology Monitor Certificate	\$195.00	\$0.59/km
Archaeology Monitors	HCCC Archaeology Monitor Training Certificate	\$170.00	\$0.59/km
Environmental Supervisor	University/College Diploma/Certificate, CAN-CISEC Certified	\$210.00	\$0.59/km
Environmental Monitor	University/College Diploma/Certificate, Environmental or related fields	\$180.00	\$0.59/km
Construction Monitor	HCCC Construction Monitor Certificate	\$170.00	\$0.59/km
Technical Level I	Cumulative Impact Coordinator	\$260.00	\$0.59/km
Technical Level II	Cumulative Impact Analyst	\$375.00	\$0.59/km
Technical Level II	Cumulative Impact Expert	\$500.00	\$0.59/km
Meal Allowance per day, if applicable (per current Treasury Board rates)			\$123.40

One (1) Monitor per discipline for the duration of the project at the rates outlined above, unless the Consultant to Monitor ratio exceeds 4:1.

HDI Supervisory hours, as required for the duration of the project.

SCHEDULE B – Mitchell Map (1755)



CIMA CANADA INC.

900-101 Frederick Street

Kitchener, ON N2H 6R2

T 519 772-2299 F 519 772-2298

cima.ca



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	<div><div></div></div>	2
Alternative 2: Build a New Well on the Existing Site to Increase Capacity	96.3	<div><div></div></div>	1
Alternative 3: Build a New Well on another site to Increase Capacity	67.1	<div><div></div></div>	3
Moorefield Drinking Water System			
Storage and Distribution Alternatives			
Alternative 1: No Fire Flow Service	95.0	<div><div></div></div>	1
Alternative 2: Fire Flow Service	65.1	<div><div></div></div>	2
Wastewater System			
Phosphorus Removal Alternatives			
Alternative 1: Build a new mechanical treatment plant	74.0	<div><div></div></div>	1
Alternative 2: Phosphorus offsetting	73.0	<div><div></div></div>	2
Drayton Collection System			
SPS Alternatives			
Alternative 2: New SPS on the North Side of the River	77.1	<div><div></div></div>	2
Alternative 3: Maintain existing SPS and Construct a New SPS on the North Side of the River	75.6	<div><div></div></div>	3
Alternative 4: New SPS with onsite emergency storage	78.0	<div><div></div></div>	1
Collection System and Forcemain Alternatives			
Alternative 1: Upgrade Existing Gravity Sewers	92.0	<div><div></div></div>	1
Alternative 2: Build Local Pumping Station and Forcemain to the Existing Drayton SPS or New SPS	72.7	<div><div></div></div>	2
Alternative 3: Build Local Pumping Station and Forcemain to the Mapleton WPCP	65.0	<div><div></div></div>	3
Moorefield Collection System			
SPS Alternatives			
Alternative 1: Expand SPS on Existing Site	98.1	<div><div></div></div>	1
Alternative 2: Build a New SPS on a New or Existing Site	85.8	<div><div></div></div>	2
Alternative 3: Build a Local SPS and New Forcemain to the Mapleton WPCP	77.5	<div><div></div></div>	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	<div><div></div></div>	4
Collection System and Forcemain Alternatives			
Alternative 1: Low-pressure Sewers	91.2	<div><div></div></div>	1
Alternative 2: All Gravity Sewers	71.2	<div><div></div></div>	3
Alternative 3: Combination Gravity Sewer and Low-pressure Sewers	87.6	<div><div></div></div>	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 areas	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	●
		Built Heritage Resources and Cultural Landscapes: Potential impacts to known (previously recognized) or potential built heritage reasources and cultural heritage landscapes.	• Potential impact to built heritage resources and cultural heritage landscapes • 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	●
		Archaeological Resources: Potential impact to archaeological sites and areas of archaeological potential.	• Potential impact to archaeological resources	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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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)	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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 upsized watermains as existing utility corridor, predominantly 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 upsized watermains as existing utility corridor, predominantly 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 • Prioritize 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 ①
		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 ①
		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 business 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 ●
		Built Heritage Resources and Cultural Landscapes: Potential impacts to known (previously recognized) or potential built heritage resources and cultural heritage landscapes	• Potential impact to built heritage resources and cultural heritage landscapes • Potential impact to First Nations communities	No change to the existing distribution system. No impact to cultural heritage resources.	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 cultural heritage, minimizing potential for impacts.	4.5	3.0 ●
		Archaeological Resources: Potential impact to archaeological sites and areas of archaeological potential.	• Potential impact to archaeological resources	No change to the existing distribution system. No impact to archaeological resources	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 ①	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 future expansion or upgrades. For the elevated tank, more labour intensive to construct. Cannot accommodate future expansion or upgrades.	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 ●

		<p>Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements</p>	<ul style="list-style-type: none">• Compatibility with existing system• Complexity of treatment processes• Operational flexibility and ability to respond to future treatment objectives• Operation and maintenance requirements	<p>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.</p>	4.0	4.0	●	<p>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 pedestals, valves, and tanks.</p>	4.5	4.5	●
		<p>Existing and Planned Infrastructure: Aligns with existing and planned infrastructure</p>	<ul style="list-style-type: none">• 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	<p>Uses existing infrastructure and aligns with all other planned infrastructure projects.</p>	4.0	4.0	●	<p>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.</p>	4.0	4.0	●
		<p>Existing and Planned Land Use: Aligns with existing and planned land use</p>	<ul style="list-style-type: none">• Optimize existing property ownership• Requirement to acquire new land or expand ownership	<p>Land acquisition not required.</p>	5.0	5.0	●	<p>Land acquisition not required, but easements may be needed for fire hydrants.</p>	4.5	4.5	●
		<p>Permits and Approvals: Ease of permits and approvals</p>	<ul style="list-style-type: none">• Complexity of and time spent to obtain approvals from various regulatory agencies	<p>No permits required.</p>	5.0	5.0	●	<p>Some permits may be required, time spent expected to be minimal. Many permits required to build an elevated tank.</p>	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	<ul style="list-style-type: none">• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period	<p>Not life cycle costs associated</p>	5	30.0	●	<p>20-year life cycle cost of \$12,544,000</p>	1	6.0	○
Maximum Sub-total Score - Financial / Economic						30.0			6.0		
Total Overall Maximum Weighted Score						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 be 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. Additionally, 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 exisiting 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	●
		Built Heritage Resources and Cultural Landscapes: Potential impacts to known (previously recognized) or potential built heritage	• Potential impact to built heritage resources and cultural heritage landscapes • 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 heritage impacts.	3.0	2.0	◐
		Archaeological Resources: Potential impact to archaeological sites and areas of archaeological potential.	• Potential impact to archaeological resources	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	<ul style="list-style-type: none">Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areasProvides 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	<ul style="list-style-type: none">Reduced likelihood of disrupted service, process upset, and/or mechanical breakdownProvide 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)	<ul style="list-style-type: none">Compatibility with existing systemLength of construction periodEase of implementation (construction schedule and phasing opportunities)Scalability and ability for future expansion and upgradesAbility to maintain water servicing during constructionAbility 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	<ul style="list-style-type: none">Proven record of phosphorus removal performanceFlexibility to respond to variable raw water qualityFlexibility 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	<ul style="list-style-type: none">Compatibility with existing systemComplexity of treatment processesOperational flexibility and ability to respond to future treatment objectivesOperation 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	<ul style="list-style-type: none">Optimize existing infrastructure investment including structures, tanks, and equipmentAligns 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	<ul style="list-style-type: none">Optimize existing property ownershipRequirement 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 additional land would need to be purchased for the phosphorus offsetting program.	1.0	1.0	○
		Permits and Approvals: Ease of permits and approvals	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	◐

Category				Weight				Criteria				Indicators				SPS Alternatives												Collection System and Foremain Alternatives																							
																Alternative 2: New SPS on the North Side of the River						Alternative 3: Maintain existing SPS and Construct a New SPS on the North Side of the River						Alternative 4: New SPS with on-site emergency storage						Alternative 1: Upgrade Existing Gravity Sewers						Alternative 2: Build Local Pumping Station and Foremain to the Existing Drayton SPS or New SPS						Alternative 3: Build Local Pumping Station and Foremain 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		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 foremain river crossing. Wet wet/dry well requires larger footprint than Alternative 2. No other river crossings are anticipated in the future. Emergency storage provides overflow protection.		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 foremain river crossing. Wet wet/dry well requires larger 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 foremain river crossing. Wet wet/dry well requires larger footprint than Alternative 2. No other river crossings are anticipated in the future. Emergency storage provides overflow protection.		4.5	2.3	⬤			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 foremain would be required to cross the river. If connected to new SPS, a second foremain 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 foremain 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 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	⬤			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. Protect fisheries and aquatic health		Little to no impacts to wildlife. Lower risk to fisheries and aquatic health with no foremain river crossing.		3.0	1.5	⬇️			Little to no impacts to wildlife. Higher risk to fisheries and aquatic health with the existing foremain river crossing.		3.0	1.5	⬇️			Little to no impacts to wildlife. Lower risk to fisheries and aquatic health with no foremain river crossing. Emergency storage provides overflow protection.		4.5	2.3	⬤			Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the work will be 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 foremain. 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 foremain. 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		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 ecosystem's ability to sequester 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 Prioritize 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. Some vegetation removal is expected, therefore some 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	⬤			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. Drayton collection system. Appropriate standard construction techniques and mitigation measures will be implemented.		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. Appropriate standard construction techniques and mitigation measures will be implemented.		2.5	1.3	⬇️							
			Maximum Sub-total Score - Natural Environment				6.3								6.5								9.0								9.0								6.0								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		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 existing 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.		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.		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	⬤			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 foremain 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 foremain 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 Intermittent 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	⬇️			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 foremain 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 foremain 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 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 Able to maintain servicing at existing SPS while new SPS is constructed. 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 wet/dry well may have greater visual impacts than Alternative 2.		4.0	2.7	⬤			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		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. Refurbishing 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. Bus, 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	⬤			Disruptions to businesses during construction and operation minimized as existing SPS will be used until new SPS is built.		4.5	3.0	⬤			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 foremain 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 foremain and building new SPS. Construction will be phased to minimize service disruptions.		3.0	2.0	⬇️							
			Build Heritage Resources and Cultural Landscapes: Potential impacts to known (previously recognized) or potential built heritage resources and cultural heritage landscapes		Potential impact to built heritage resources and cultural heritage landscapes Potential impact to First Nations communities		Unknown impact to built heritage resources and cultural heritage landscapes or First Nations communities given these studies have not been completed for the new SPS site.		4.0	2.7	⬤			Unknown impact to built heritage resources and cultural heritage landscapes or First Nations communities given these studies have not been completed for the new SPS site.		4.0	2.7	⬤			Unknown impact to built heritage resources and cultural heritage landscapes or First Nations communities given these studies have not been completed for the new SPS site.		4.0	2.7	⬤			Construction will be constrained to the existing locations, which is previously disturbed and retains little to no cultural heritage, minimizing potential for impacts.		4.5	3.0	⬤	Unknown impact to built heritage resources, cultural heritage landscapes or First Nations communities given these studies have not been completed for the new SPS site.		4.0	2.7	⬤			Unknown impact to built heritage resources, cultural heritage landscapes or First Nations communities 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				17.0				14.7				14.3																											
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 RG 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 upgraded 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	⬤			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, foremain) and 20-year capacity (pumps).		5.0	5.7	⬤	The new SPS will be sized appropriately for the ultimate buildout (wet well, foremain) 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		A new SPS would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Having two stations in service provide some redundancy.		3.5	4.0	⬇️			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.		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	⬤			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 foremain 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 foremain would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Second foremain to WPCP increases operational redundancy and system robustness.		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		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 site capacity.		3.5	4.0	⬇️			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 footprints, 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	⬤			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 footprints, 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	⬤			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 foremain 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 existing infrastructure		3.5	4.0	⬇️			The new local SPS and foremain 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 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		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 foremain river crossing. Ability to use existing foremain and no additional costs associated with an upgraded river crossing. Would eliminate the existing operational and maintenance issues with the existing 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. Eliminates operational and maintenance risk associated with the foremain river crossing. Ability to use existing foremain and no additional 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 suppress 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 foremain river crossing. Ability to use existing foremain and no additional 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 suppress peak flows.		5.0	5.7	⬤			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		Optimize existing infrastructure investment including structures, tanks, and equipment Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Morefield Water System Renewal, and Mapleton WPCP upgrades		Aligns with planned infrastructure projects and goals, 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	⬤			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		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	⬤			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		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	⬤			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				30.3				34.3				37.7				36.0				29.1				29.7																											
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	⬇️	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				25.2				18.6				15.0				30.0				22.9				15.0																											
Total Overall Maximum Weighted Score				100				77.1				75.6				78.0				92.0				72.7				65.0																							

2: Detailed Evaluation of Wastewater Servicing Alternatives																			
Category	Weight	Criteria	Indicators	Alternative 1: Low-pressure Sewers			SPS Alternatives			Alternative 2: Build a Local SPS and New Foremain to the Mapleton WPCP			Alternative 3: Build a Local SPS and New Foremain to the existing Moorefield SPS			Alternative 4: Build a Local SPS and new foremain to the existing Moorefield SPS			
				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	Rationale	Score 1 to 5	Weighted Score	
Natural Environment	10	Natural Environmental Features: Potential impacts to existing natural environment	<ul style="list-style-type: none">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 foremain corridor. Vegetation removal not expected, other than ornamental grasses. Construction area to be re-sodded post-construction.	4.5	2.3	<ul style="list-style-type: none">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 foremain to the Mapleton WPCP must be added. For the existing site, the existing foremain could be upgraded or a second foremain 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	<ul style="list-style-type: none">A site for the new local SPS must be located and a foremain routed to the Mapleton WPCP. Vegetation removal may be required. Construction area will be re-sodded post-construction.	3.0	1.5	<ul style="list-style-type: none">A site for the new local SPS must be located and a foremain routed to the existing SPS. Vegetation removal may be required. Construction area will be re-sodded post-construction.	2.5	1.3	<ul style="list-style-type: none">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: Potential temporary and permanent effects of surface water and groundwater quantity/quality	<ul style="list-style-type: none">Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifersConformity with policies and requirements of existing source water protection programPotential significant drinking water threatsPotential 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	
		Wildlife: Protects wildlife and species at risk	<ul style="list-style-type: none">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 be contained on the existing site and will not disrupt any additional habitats and does not have any protected species.	5.0	2.5	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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 foremain sites. An aquatic and species survey would need to be conducted.	3.5	1.8	<ul style="list-style-type: none">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 foremain sites. An aquatic and species survey would need to be conducted.	3.0	1.5	<ul style="list-style-type: none">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	
		Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	<ul style="list-style-type: none">Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demandsGreenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystem's 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 impactsPrioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.)Maintains adaptive capacity and resiliency of surrounding areas	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	
Maximum Sub-total Score - Natural Environment					9.5			6.8			6.5		6.0		9.0				
Socio-Cultural	20	Health and Safety: Minimize potential impact of health and safety of operation staff	<ul style="list-style-type: none">Potential risk to health and safety of operator and maintenance staffPotential 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	
		Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	<ul style="list-style-type: none">Noise and dust production from constructionPotential 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 foremain. Appropriate standard construction techniques and mitigation measures will be implemented.	4.5	3.0	<ul style="list-style-type: none">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 foremain. Appropriate standard construction techniques and mitigation measures will be implemented.	3.5	2.3	<ul style="list-style-type: none">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 SPS and foremain, and building the new SPS and foremain. Appropriate standard construction techniques and mitigation measures will be implemented.	3.0	2.0	<ul style="list-style-type: none">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 foremain, and building the new SPS and foremain. Appropriate standard construction techniques and mitigation measures will be implemented.	2.5	1.7	<ul style="list-style-type: none">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	
		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	<ul style="list-style-type: none">Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operationPresence of existing natural or other features around proposed infrastructure that may help reduce visibilityAbility to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping featuresDistance between proposed infrastructure and the closest sensitive receptor(s)Air emissions	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector and development	<ul style="list-style-type: none">Maintain access for businesses during construction and operationPotential 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">Minimal disruption to roadway access is possible while installing new sewer pipes. Construction will be phased to minimize disruptions.	4.5	3.0	
		Built Heritage Resources and Cultural Landscapes: Potential impacts to known (previously recognized) or potential built heritage resources and cultural heritage landscapes.	<ul style="list-style-type: none">Potential impact to built heritage resources and cultural heritage landscapesPotential impact to First Nations communities	Construction will be constrained to the existing site, which is previously disturbed and retains little to no cultural heritage, minimizing potential for impacts.	5.0	3.3	<ul style="list-style-type: none">Unknown impact to built heritage resources, cultural heritage landscapes or First Nations communities given these studies have not been completed for the new SPS site.	4.0	2.7	<ul style="list-style-type: none">Unknown impact to built heritage resources and cultural heritage landscapes or First Nations communities given these studies have not been completed for the new SPS and foremain sites.	4.0	2.7	<ul style="list-style-type: none">Unknown impact to built heritage resources and cultural heritage landscapes or First Nations communities given these studies have not been completed for the new SPS site.	4.0	2.7	<ul style="list-style-type: none">For new sites (system expansion), unknown impact to built heritage resources, cultural heritage landscapes or First Nations communities given these studies have not been completed for the new sites.	4.0	2.7	
		Archaeological Resources: Potential impact to archaeological sites and areas of archaeological potential.	<ul style="list-style-type: none">Potential impact to archaeological resources	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	<ul style="list-style-type: none">Unknown impact to archaeological resources given these studies have not been completed for the new SPS site.	4.0	2.7	<ul style="list-style-type: none">Unknown impact to archaeological resources given these studies have not been completed for the new SPS and foremain sites.	4.0	2.7	<ul style="list-style-type: none">Unknown impact to archaeological resources given these studies have not been completed for the new SPS site.	4.0	2.7	<ul style="list-style-type: none">For new sites (system expansion), unknown impact to archaeological resources given these studies have not been completed for the new sites.	4.0	2.7	
Maximum Sub-total Score - Socio-Cultural					19.3			17.0			16.7		16.3		17.3				
Technical / Operational	40	Existing and Future Demands: Able to meet existing and future demands and aligns with existing and planned infrastructure	<ul style="list-style-type: none">Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areasProvides 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	<ul style="list-style-type: none">The upgraded SPS and new SPS will be sized appropriately for the buildout (wet well) and 20-year capacity (pumps).	5.0	5.7	<ul style="list-style-type: none">The new SPS will be sized appropriately for the buildout (wet well, foremain) and 20-year capacity (pumps).	5.0	5.7	<ul style="list-style-type: none">The upgraded SPS and new SPS will be sized appropriately for the buildout (wet well) and 20-year capacity (pumps).	5.0	5.7	<ul style="list-style-type: none">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	
		Reliability and Security: Provides reliability, security, and robustness	<ul style="list-style-type: none">Reduced likelihood of disrupted service, process upset, and/or mechanical breakdownProvide operational redundancy to allow for maintenance and clearing 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	<ul style="list-style-type: none">The new SPS would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Use of existing foremain does not increase operational redundancy.	4.5	5.1	<ul style="list-style-type: none">The new SPS and foremain would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Second foremain increases operational redundancy.	5.0	5.7	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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 components (grinder pumps). Additionally, the number of pumps that can come on at the same time (foremain sharing) is limited.	3.0	3.4	
		Constructability: Maximize ease of construction and facilitate integration with existing system(s)	<ul style="list-style-type: none">Compatibility with existing systemLength of construction periodEase of implementation (construction schedule and phasing opportunities)Scalability and ability for future expansion and upgradesAbility to maintain water servicing during constructionAbility to maximize existing footprint / site capacity	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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.	3.5	4.0	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	<ul style="list-style-type: none">Compatibility with existing systemComplexity of treatment processesOperational flexibility and ability to respond to future treatment objectivesOperation and maintenance requirements	Upgraded SPS will maintain same operational and maintenance requirements.	5.0	5.7	<ul style="list-style-type: none">The addition of the new SPS will increase operational and maintenance requirements as two stations will now require maintenance.	4.0	4.6	<ul style="list-style-type: none">The addition of the new SPS will increase operational and maintenance requirements as two stations will now require maintenance.	4.0	4.6	<ul style="list-style-type: none">The upgraded SPS and new SPS will increase operational and maintenance requirements as two stations will now require maintenance.	4.0	4.6	<ul style="list-style-type: none">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	
		Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	<ul style="list-style-type: none">Optimize existing infrastructure investment including structures, tanks, and equipmentAligns 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	<ul style="list-style-type: none">Optimizes existing infrastructure and aligns with planned infrastructure projects.	5.0	5.7	<ul style="list-style-type: none">Makes use of existing infrastructure and aligns with planned infrastructure projects.	4.5	5.1	<ul style="list-style-type: none">Makes use of existing infrastructure and aligns with planned infrastructure projects.	4.5	5.1	<ul style="list-style-type: none">Optimizes existing infrastructure. Aligns with planned infrastructure projects.	5.0	5.7	
		Existing and Planned Land Use: Aligns with existing and planned land use	<ul style="list-style-type: none">Optimize existing property ownershipRequirement to acquire new land or expand ownership	Optimizes existing property ownership, does not require land acquisition.	5.0	5.7	<ul style="list-style-type: none">Optimizes existing property ownership, land acquisition may be required.	4.5	5.1	<ul style="list-style-type: none">Land acquisition may be required.	4.0	4.6	<ul style="list-style-type: none">Optimizes existing property ownership, land acquisition may be required.	4.5	5.1	<ul style="list-style-type: none">Land acquisition is possible.	4.5	5.1	
Permits and Approvals: Ease of permits and approvals				<ul style="list-style-type: none">Complexity of and time spent to obtain approvals from various regulatory agencies	Time spent is expected to be minimal.	5.0	5.7	<ul style="list-style-type: none">Moderate amount of time may be required to obtain permits.	4.0	4.6	<ul style="list-style-type: none">Moderate amount of time may be required to obtain permits.	4.0	4.6	<ul style="list-style-type: none">Moderate amount of time may be required to obtain permits.	4.0	4.6	<ul style="list-style-type: none">Time spent is expected to be minimal.	5.0	5.7
Maximum Sub-total Score - Technical / Operational					39.2			35.4			34.3		34.9		34.9				
Financial / Economic	30	Life Cycle Cost: 20-year life cycle cost	<ul style="list-style-type: none">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	<ul style="list-style-type: none">20-year life cycle cost of \$3,712,000	4.4	26.6	<ul style="list-style-type: none">20-year life cycle cost of \$7,718,000	3.34	20.1	<ul style="list-style-type: none">20-year life cycle cost of \$10,838,000	2.5	15.0	<ul style="list-style-type: none">20-year life cycle cost of \$151,000	5	30.0	
Maximum Sub-total Score - Financial / Economic					30.0			26.6			20.1		15.0		30.0				
Total Overall Maximum				100		88.1		85.8			77.5		71.6		91.2				

Matrix 2: Detailed Evaluation of Wastewater Servicing Alternatives				Collection System and Forcemain Alternatives							
Category	Weight	Criteria	Indicators	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		
Natural Environment	10	Natural Environmental Features: Potential impacts to existing natural environment	<ul style="list-style-type: none">Impacts during construction on environmental features such as terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, species at risk, etc.	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	⓪	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	⓪
		Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	<ul style="list-style-type: none">Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifersConformity with policies and requirements of existing source water protection programPotential significant drinking water threatsPotential impacts to existing and future land use	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	<ul style="list-style-type: none">Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health	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	<ul style="list-style-type: none">Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demandsGreenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystem's 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 impactsPrioritizes 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 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	⓪	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						6.3			8.0		
Socio-Cultural	20	Health and Safety: Minimize potential impact of health and safety of operation staff	<ul style="list-style-type: none">Potential risk to health and safety of operator and maintenance staffPotential risk to public health and safety, particularly on downstream users (including for recreation and tourism)	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)	<ul style="list-style-type: none">Noise and dust production from constructionPotential 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. 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	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	<ul style="list-style-type: none">Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operationPresence of existing natural or other features around proposed infrastructure that may help reduce visibilityAbility to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping featuresDistance between proposed infrastructure and the closest sensitive receptor(s)Air emissions	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	⓪
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	<ul style="list-style-type: none">Maintain access for businesses during construction and operationPotential negative effects on short-term and long-term business vitality, and community growth and development	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	●
		Built Heritage Resources and Cultural Landscapes: Potential impacts to known (previously recognized) or potential built heritage resources and cultural heritage landscapes.	<ul style="list-style-type: none">Potential impact to built heritage resources and cultural heritage landscapesPotential impact to First Nations communities	For new sites (system expansion), unknown impact to built heritage resources, cultural heritage landscapes 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 built heritage resources, cultural heritage landscapes or First Nations communities given these studies have not been completed for the new sites.	4.0	2.7	●
		Archaeological Resources: Potential impact to archaeological sites and areas of archaeological potential.	<ul style="list-style-type: none">Potential impact to archaeological resources	For new sites (system expansion), unknown impact to archaeological resources given these studies have not been completed for the new sites.	4.0	2.7	●	For new sites (system expansion), unknown impact to archaeological resources given these studies have not been completed for the new sites.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural						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	<ul style="list-style-type: none">Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areasProvides 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.	4.5	5.1	●
		Reliability and Security: Provides reliability, security, and robustness	<ul style="list-style-type: none">Reduced likelihood of disrupted service, process upset, and/or mechanical breakdownProvide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure	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)	<ul style="list-style-type: none">Compatibility with existing systemLength of construction periodEase of implementation (construction schedule and phasing opportunities)Scalability and ability for future expansion and upgradesAbility to maintain water servicing during constructionAbility to maximize existing footprint / site capacity	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 involve 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	⓪	Upgrades are somewhat compatible with the existing system. Construction period for this alternative is expected to be moderate. Implementation will involve 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	⓪
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	<ul style="list-style-type: none">Compatibility with existing systemComplexity of treatment processesOperational flexibility and ability to respond to future treatment objectivesOperation and maintenance requirements	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	<ul style="list-style-type: none">Optimize existing infrastructure investment including structures, tanks, and equipmentAligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades	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	<ul style="list-style-type: none">Optimize existing property ownershipRequirement to acquire new land or expand ownership	Land acquisition is possible.	4.5	5.1	●	Land acquisition is possible.	4.5	5.1	●
		Permits and Approvals: Ease of permits and approvals	<ul style="list-style-type: none">Complexity of and time spent to obtain approvals from various regulatory agencies	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						34.3			35.4		
Financial / Economic	30	Life Cycle Cost: 20-year life cycle cost	<ul style="list-style-type: none">Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period	20-year life cycle cost of \$8,079,000	2.5	15.0	⓪	20-year life cycle cost of \$1,127,000	4.69	28.2	●
Maximum Sub-total Score - Financial / Economic						15.0			28.2		
Total Overall Maximum						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		
Revision No.:		0		
Date: 01-Dec-22				
Revision Date:				
Costs for Tech Memo #2				
Water Servicing Alternatives		Capital Cost	O&M Costs	Calculated Life Cycle Costs
Drayton Drinking Water System		Year 2023	Year 2023	20 Years
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 existing 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 watermain		N/A	N/A	N/A
Alternative 2: Watermain 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	O&M Costs	Calculated Life Cycle Costs
		Year 2023	Year 2023	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 existintg 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							
Revision No.:		0							
								Date: 1-Dec-22	
								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				
Revision No.:		0				
		Date: 1-Dec-22				
		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				
Revision No.:		0				
		Date: 2-Aug-22				
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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							
Revision No.:		0							
								Date: 1-Dec-22	
								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						
Revision No.: 0					Date: 1-Dec-22	
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						
Revision No.: 0					Date: 2-Aug-22	
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							
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	\$ 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					
Revision No.:	0					
						Date: 1-Dec-22
						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					
Revision No.:	0					
						Date: 2-Aug-22
						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							
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	\$ 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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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				
Revision No.:	0				
Date: 1-Dec-22					
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				
Revision No.:	0				
Date: 2-Aug-22					
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							
Revision No.:		0							
		Date: 1-Dec-22							
		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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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				
Revision No.:	0				
				Date: 1-Dec-22	
				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				
Revision No.:	0				
				Date: 2-Aug-22	
				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							
Revision No.:		0							
								Date: 1-Dec-22	
								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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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				
Revision No.:		0				Date: 1-Dec-22 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				
Revision No.:		0				Date: 2-Aug-22 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							
Revision No.:		0							
								Date: 1-Dec-22	
								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					
Revision No.:	0					
				Date: 1-Dec-22		
				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					
Revision No.:	0					
				Date: 2-Aug-22		
				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							
Revision No.:		0							
		Date: 1-Dec-22							
		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					
Revision No.:	0				Date:	1-Dec-22
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					
Revision No.:					Date:	2-Aug-22
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							
Revision No.:		0							
								Date: 1-Dec-22	
								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				
Revision No.:	0				
					Date: 1-Dec-22
					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				
Revision No.:	0				
					Date: 2-Aug-22
					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							
Revision No.:		0							
		Date: 1-Dec-22							
		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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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		Chlorine 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							
Revision No.:		0							
								Date: 1-Dec-22	
								Revision Date:	
CAPITAL AND OPERATION & MAINTENANCE COST									
Alternative 2: Extend the existng 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		Chlorine 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				
Revision No.:		0				
		Date: 1-Dec-22				
		Revision Date:				
CAPITAL AND OPERATION & MAINTENANCE COST						
Alternative 2: Extend the existng 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				
Revision No.:		0				
		Date: 2-Aug-22				
		Revision Date:				
LIFE CYLCE COST						
Alternative 2: Extend the existng 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							
Revision No.:		0							
								Date: 1-Dec-22	
								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		Chlorine 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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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				
Revision No.:		0				
		Date: 1-Dec-22				
		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				
Revision No.:		0				
		Date: 2-Aug-22				
		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							
Revision No.:		0							
		Date: 01-Dec-22							
		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			
Revision No.:		0			
		Date: 01-Dec-22			
		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			
Revision No.:		0			
		Date: 02-Aug-22			
		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							
Revision No.:		0							
		Date: 1-Dec-22							
		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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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								
Revision No.:		0								
		Date: 1-Dec-22								
		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				
Revision No.:		0				
		Date: 1-Dec-22				
		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				
Revision No.:		0				
		Date: 2-Aug-22				
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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					
Revision No.:	0				Date: 1-Dec-22	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					
Revision No.:	0				Date: 2-Aug-22	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							
Revision No.:		0							
								Date: 1-Dec-22	
								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				
Revision No.:		0				
		Date: 1-Dec-22				
		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				
Revision No.:		0				
		Date: 2-Aug-22				
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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							
Revision No.:		0							
								Date: 1-Dec-22	
								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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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			
Revision No.:		0			
		Date: 1-Dec-22			
		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			
Revision No.:		0			
		Date: 2-Aug-22			
		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							
Revision No.:		0							
								Date: 1-Dec-22	
								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				
Revision No.:		0				
		Date: 1-Dec-22				
		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				
Revision No.:		0				
		Date: 2-Aug-22				
		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			
Revision No.:	0			
				Date: 01-Dec-22
				Revision Date:

Month	Drayton DWS (m ³ /d)		Moorefield DWS (m ³ /d)		IH: In-House
	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:

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

IH: In-House

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:

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
2019	411	1061	4.8	163	150	433
2020	446	975	5.2	177	105	253
2021	451	820	5.2	171	113	263
Average	418	863	4.8	164	141	307

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:

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 linearly interpolated from the above data, taken from the Township of Mapleton Growth Management Summary (January 2022)

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:****Projection - Calculated**

	Population		Residential Average Daily Demand (m³/d)		ICI Average Daily Demand (m³/d)		Total Average Daily Demand (m³/d)		Total Average Daily Demand (L/s)		Max Day Factor (Guidelines)		Max Day Demand (ADD x MDF) (m³/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

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:****Projection - Calculated**

Year	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) (m³/d)		Fire Flow (L/s)		Max Day Demand (MDD) + Fire Flow (FF) (m³/d)		Max Day Demand (MDD) + Fire Flow (FF) (L/s)	
	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													
Revision No.: 0													
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	684		1422.20	16.46	7.69	16.46	138	84	1.60	0.97	1580	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	695
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	92	75	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	8.49	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										Date: 01-Dec-22	
Revision No.: 0										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												
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Revision No.: 0												
										Date: 01-Dec-22		
										Revision Date:		
Projected Generation:												
	Population		Households (GSP)				Average Flow (m³/d)		Total Average Daily Flow (m³/d)	ICI Average Flow (m³/d)		Total Average Daily Flow (m³/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.: 0Revision Date:											
Projected Generation:											
	Average Flow (m³/d)		Average Flow (L/s)		Total Average Daily Flow (m³/d)	Total Average Daily Flow (L/s)	Maximum Daily Flow (m³/d)		Total Maximum Daily Flow (m³/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 (m³/d)		Total Maximum Daily Flow (m³/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

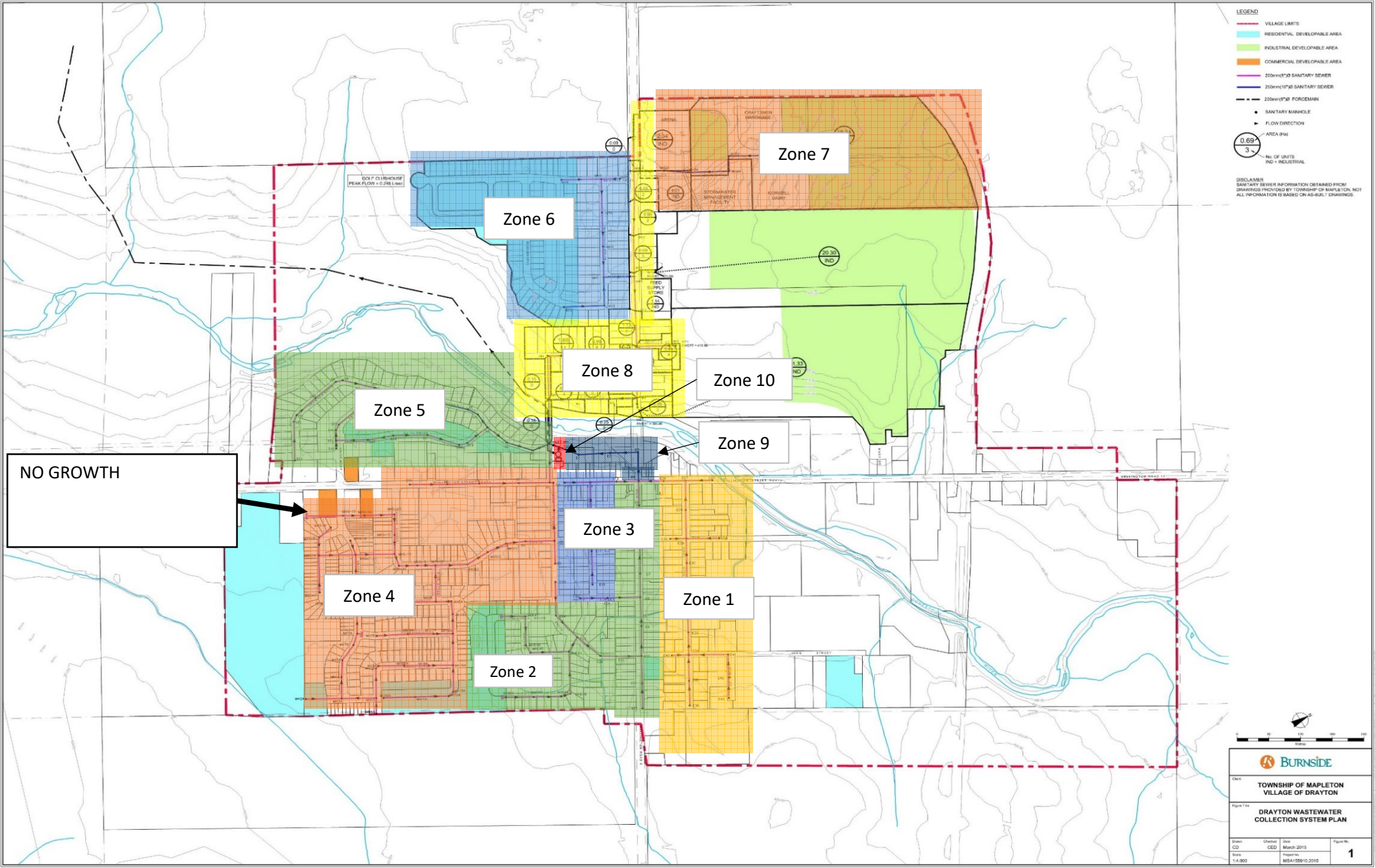
Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

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 Densi 25 ppha

Total SAN Catchment Area
91.37 ha
Total Population
2802.00 ppl

3795.00



Designed By:

2023-02-21

Date:

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:

25

ppha

Zone 1

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)
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

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:

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 Dr.	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

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:

25

ppha

Zone 3

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)
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
					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

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:	25	ppha

[illegible]

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 Density:

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)
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 Allowance:	0.2	L/s/ha
Peak Factor:	Harmon's Formula	
Manning's "n":	0.013	
Population Density	25	ppha

Zone 4

[illegible]

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:

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)
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

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:

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)
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

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:

25

ppha

Zone 5

	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

[illegible]

Bedell Dr.	From Bedell Dr./ Street "A"	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
			MH 306A			1.21	31											
Ridgeview Dr.	From Unnamed Inner Easement	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
			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.	From Street "A"	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
			MH 300A			1.77	45											
Ridgeview Dr.	From 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
			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

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 (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)
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

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:

25

ppha

Zone 8

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)
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

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:

25

ppha

Zone 9

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)
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

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:

25

ppha

Zone 10

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)
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

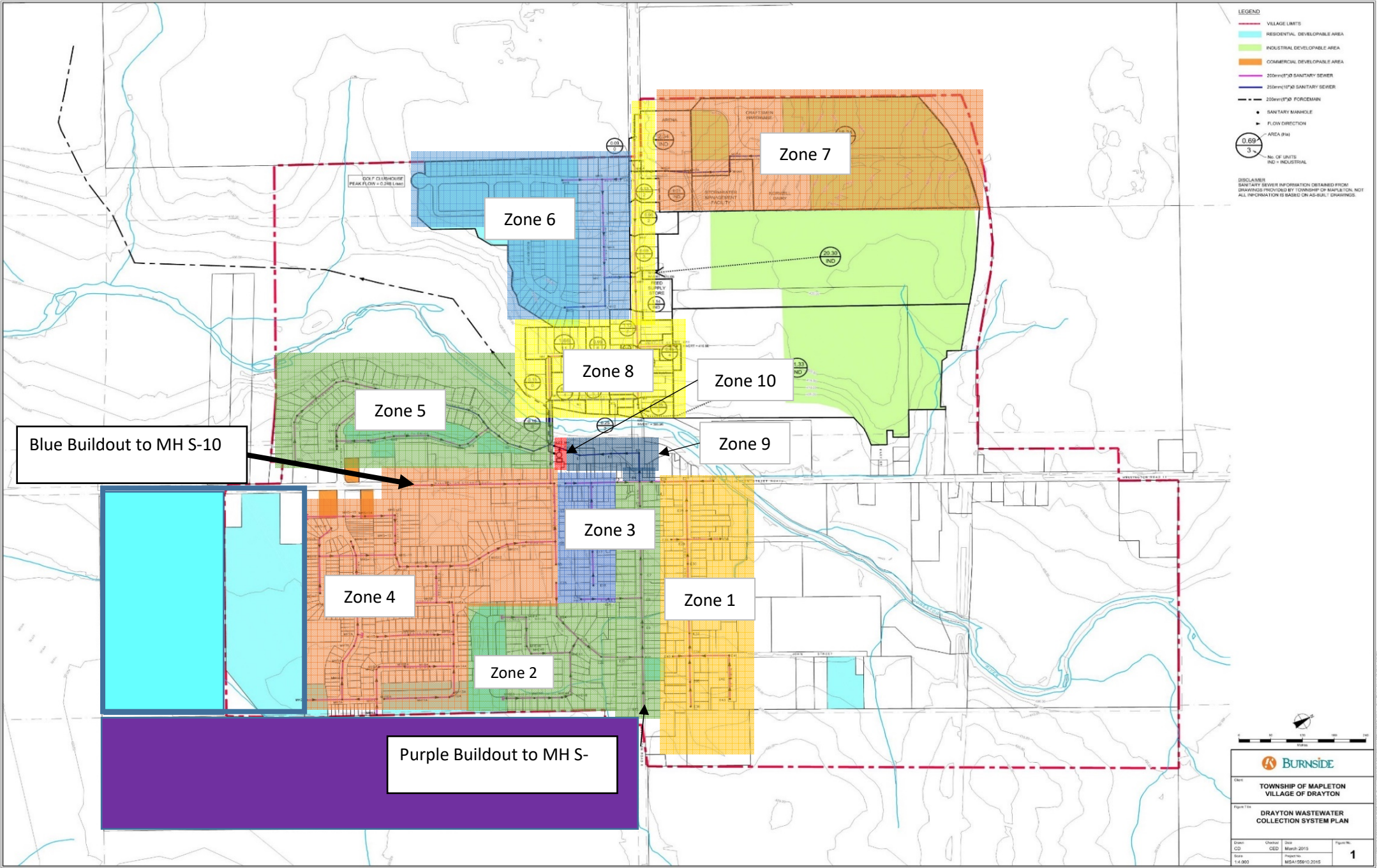
Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
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.
Project Number: T000974B
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 Densi 25 ppha

Total SAN Catchment Area
161.24 ha
Total Population
5597.00 ppl

3795.00



Designed By:

2023-02-21

Date:

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:

25

ppha

Zone 1

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)
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

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

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 Dr.	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

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

25

ppha

Zone 3

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)
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
					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 Density	25	ppha

[illegible]

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

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)
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 Allowance:	0.2	L/s/ha
Peak Factor:	Harmon's Formula	
Manning's "n":	0.013	
Population Density	25	ppha

Zone 4

[illegible]

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

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)
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

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 Density

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)
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

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

25

ppha

Zone 5

River Run Rd. River Run Rd. River Run Rd.	From Faith Dr.		S3			1.17	32											
		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
		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
		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

[illegible]

Bedell Dr.	From Bedell Dr./ Street "A"	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
			MH 306A			1.21	31											
Ridgeview Dr.	From Unnamed Inner Easement	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
			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.	From Street "A"	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
			MH 300A			1.77	45											
Ridgeview Dr.	From 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
			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

Designed By:

Date:

Checked By:

Date:

2023-02-21

Project:

Project Number:

Municipality:

Drayton Sanitary Collection System - 20-Year Buildout

T000974B

Township of Mapleton

Domestic Flow:

Infiltration Allowance:

Peak Factor:

Manning's "n":

Population Density:

300

0.2

Harmon's Formula

0.013

50

L/cap/d

L/s/ha

ppha

Zone 7

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)
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

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

25

ppha

Zone 8

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)
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

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

25

ppha

Zone 9

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)
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

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 Allowance:

0.2

L/s/ha

Peak Factor:

Harmon's Formula

Manning's "n":

0.013

Population Density:

25

ppha

Zone 10

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)
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

H

Appendix H: Evaluation Checklists for Archaeological Potential and Built Heritage Resources and Cultural Heritage Landscapes for Schedule B Projects

The **purpose of the checklist** is to determine:

- if a property(ies) or project area may contain archaeological resources i.e., have archaeological potential
- it includes all areas that may be impacted by project activities, including – but not limited to:
 - the main project area
 - temporary storage
 - staging and working areas
 - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Archaeological assessment

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a licensed consultant archaeologist (see page 4 for definitions) to undertake an archaeological assessment.

The assessment will help you:

- identify, evaluate and protect archaeological resources on your property or project area
- reduce potential delays and risks to your project

Note: By law, archaeological assessments **must** be done by a licensed consultant archaeologist. Only a licensed archaeologist can assess – or alter – an archaeological site.

What to do if you:

- **find an archaeological resource**

If you find something you think may be of archaeological value during project work, you must – by law – stop all activities immediately and contact a licensed consultant archaeologist

The archaeologist will carry out the fieldwork in compliance with the *Ontario Heritage Act* [s.48(1)].

- **unearth a burial site**

If you find a burial site containing human remains, you must immediately notify the appropriate authorities (i.e., police, coroner's office, and/or Registrar of Cemeteries) and comply with the *Funeral, Burial and Cremation Services Act*.

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – [separate checklist](#)
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages when completing this form.

Project or Property Name
Drayton SPS Upgrade

Project or Property Location (upper and lower or single tier municipality)
Drayton, Township of Mapleton

Proponent Name
Township of Mapleton

Proponent Contact Information
Jamie Morgan, Director of Public Works, 519-638-3313 ext. 041, jmorgan@mapleton.ca

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

	Yes	No
2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes, do **not** complete the rest of the checklist. You are expected to follow the recommendations in the archaeological assessment report(s).

The proponent, property owner and/or approval authority will:

- summarize the previous assessment
- add this checklist to the project file, with the appropriate documents that demonstrate an archaeological assessment was undertaken e.g., MTCS letter stating acceptance of archaeological assessment report

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., environmental assessment document
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Are there known archaeological sites on or within 300 metres of the property (or the project area)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Yes	No
4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property (or project area)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Yes	No
5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or project area)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Yes	No
6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Yes	No
7. Has the property (or project area) been recognized for its cultural heritage value?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes to any of the above questions (3 to 7), do **not** complete the checklist. Instead, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment of your property or project area.

If No, continue to question 8.

	Yes	No
8. Has the entire property (or project area) been subjected to recent, extensive and intensive disturbance?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes to the preceding question, do **not** complete the checklist. Instead, please keep and maintain a summary of documentation that provides evidence of the recent disturbance.

An archaeological assessment is not required.

If No, continue to question 9.

9. Are there present or past water sources within 300 metres of the property (or project area)? Yes ☒ No ☐

If Yes, an archaeological assessment is required.

If No, continue to question 10.

10. Is there evidence of two or more of the following on the property (or project area)? Yes ☐ No ☒

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

If Yes, an archaeological assessment is required.

If No, there is low potential for archaeological resources at the property (or project area).

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., under the *Environmental Assessment Act*, *Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
 - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

In this context, the following definitions apply:

- **consultant archaeologist** means, as defined in Ontario regulation as an archaeologist who enters into an agreement with a client to carry out or supervise archaeological fieldwork on behalf of the client, produce reports for or on behalf of the client and provide technical advice to the client. In Ontario, these people also are required to hold a valid professional archaeological licence issued by the Ministry of Tourism, Culture and Sport.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may be already in place for identifying archaeological potential, including:

- one prepared and adopted by the municipality e.g., archaeological management plan
- an environmental assessment process e.g., screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s. B.2.]

2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?

Respond 'yes' to this question, if all of the following are true:

- an archaeological assessment report has been prepared and is in compliance with MTCS requirements
 - a letter has been sent by MTCS to the licensed archaeologist confirming that MTCS has added the report to the Ontario Public Register of Archaeological Reports (Register)
- the report states that there are no concerns regarding impacts to archaeological sites

Otherwise, if an assessment has been completed and deemed compliant by the MTCS, and the ministry recommends further archaeological assessment work, this work will need to be completed.

For more information about archaeological assessments, contact:

- approval authority
- proponent
- consultant archaeologist
- Ministry of Tourism, Culture and Sport at archaeology@ontario.ca

3. Are there known archaeological sites on or within 300 metres of the property (or project area)?

MTCS maintains a database of archaeological sites reported to the ministry.

For more information, contact MTCS Archaeological Data Coordinator at archaeology@ontario.ca.

4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property?

Check with:

- Aboriginal communities in your area
- local municipal staff

They may have information about archaeological sites that are not included in MTCS' database.

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or property area)?

Check with:

- Aboriginal communities in your area
- local municipal staff

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulation Unit, Ontario Ministry of Consumer Services – for database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, 'adjacent' means 'contiguous', or as otherwise defined in a municipal official plan.

7. Has the property (or project area) been recognized for its cultural heritage value?

There is a strong chance there may be archaeological resources on your property (or immediate area) if it has been listed, designated or otherwise identified as being of cultural heritage value by:

- your municipality
- Ontario government
- Canadian government

This includes a property that is:

- designated under *Ontario Heritage Act* (the OHA), including:
 - individual designation (Part IV)
 - part of a heritage conservation district (Part V)
 - an archaeological site (Part VI)
- subject to:
 - an agreement, covenant or easement entered into under the OHA (Parts II or IV)
 - a notice of intention to designate (Part IV)
 - a heritage conservation district study area by-law (Part V) of the OHA
- listed on:
 - a municipal register or inventory of heritage properties
 - Ontario government's list of provincial heritage properties
 - Federal government's list of federal heritage buildings
- part of a:
 - National Historic Site
 - UNESCO World Heritage Site
- designated under:
 - *Heritage Railway Station Protection Act*
 - *Heritage Lighthouse Protection Act*
- subject of a municipal, provincial or federal commemorative or interpretive plaque.

To determine if your property or project area is covered by any of the above, see:

- Part A of the MTCS Criteria for Evaluating Potential for Built Heritage and Cultural Heritage Landscapes

Part VI – Archaeological Sites

Includes five sites designated by the Minister under Regulation 875 of the Revised Regulation of Ontario, 1990 (Archaeological Sites) and 3 marine archaeological sites prescribed under Ontario Regulation 11/06.

For more information, check [Regulation 875](#) and [Ontario Regulation 11/06](#).

8. Has the entire property (or project area) been subjected to recent extensive and intensive ground disturbance?

Recent: after-1960

Extensive: over all or most of the area

Intensive: thorough or complete disturbance

Examples of ground disturbance include:

- quarrying
- major landscaping – involving grading below topsoil
- building footprints and associated construction area
 - where the building has deep foundations or a basement
- infrastructure development such as:
 - sewer lines
 - gas lines
 - underground hydro lines
 - roads
 - any associated trenches, ditches, interchanges. **Note:** this applies only to the excavated part of the right-of-way; the remainder of the right-of-way or corridor may not have been impacted.

A ground disturbance does **not** include:

- agricultural cultivation
- gardening
- landscaping

Site visits

You can typically get this information from a site visit. In that case, please document your visit in the process (e.g., report) with:

- photographs
- maps
- detailed descriptions

If a disturbance isn't clear from a site visit or other research, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment.

9. Are there present or past water bodies within 300 metres of the property (or project area)?

Water bodies are associated with past human occupations and use of the land. About 80-90% of archaeological sites are found within 300 metres of water bodies.

Present

- Water bodies:
 - primary - lakes, rivers, streams, creeks
 - secondary - springs, marshes, swamps and intermittent streams and creeks
- accessible or inaccessible shoreline, for example:
 - high bluffs
 - swamps
 - marsh fields by the edge of a lake
 - sandbars stretching into marsh

Water bodies not included:

- man-made water bodies, for example:
 - temporary channels for surface drainage
 - rock chutes and spillways
 - temporarily ponded areas that are normally farmed
 - dugout ponds
- artificial bodies of water intended for storage, treatment or recirculation of:
 - runoff from farm animal yards
 - manure storage facilities
 - sites and outdoor confinement areas

Past

Features indicating past water bodies:

- raised sand or gravel beach ridges – can indicate glacial lake shorelines
- clear dip in the land – can indicate an old river or stream
- shorelines of drained lakes or marshes
- cobble beaches

You can get information about water bodies through:

- a site visit
- aerial photographs
- 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

10. Is there evidence of two or more of the following on the property (or project area)?

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

• **Elevated topography**

Higher ground and elevated positions - surrounded by low or level topography - often indicate past settlement and land use.

Features such as eskers, drumlins, sizeable knolls, plateaus next to lowlands, or other such features are a strong indication of archaeological potential.

Find out if your property or project area has elevated topography, through:

- site inspection
- aerial photographs
- topographical maps

• **Pockets of well-drained sandy soil, especially within areas of heavy soil or rocky ground**

Sandy, well-drained soil - in areas characterized by heavy soil or rocky ground - may indicate archaeological potential

Find out if your property or project area has sandy soil through:

- site inspection
- soil survey reports

- **Distinctive land formations**

Distinctive land formations include – but are not limited to:

- waterfalls
- rock outcrops
- rock faces
- caverns
- mounds, etc.

They were often important to past inhabitants as special or sacred places. The following sites may be present – or close to – these formations:

- burials
- structures
- offerings
- rock paintings or carvings

Find out if your property or project areas has a distinctive land formation through:

- a site visit
- aerial photographs
- 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

- **Resource extraction areas**

The following resources were collected in these extraction areas:

- food or medicinal plants e.g., migratory routes, spawning areas, prairie
- scarce raw materials e.g., quartz, copper, ochre or outcrops of chert
- resources associated with early historic industry e.g., fur trade, logging, prospecting, mining

Aboriginal communities may hold traditional knowledge about their past use or resources in the area.

- **Early historic settlement**

Early Euro-Canadian settlement include – but are not limited to:

- early military or pioneer settlement e.g., pioneer homesteads, isolated cabins, farmstead complexes
- early wharf or dock complexes
- pioneers churches and early cemeteries

For more information, see below – under the early historic transportation routes.

- **Early historic transportation routes** - such as trails, passes, roads, railways, portage routes, canals.

For more information, see:

- historical maps and/or historical atlases
 - for information on early settlement patterns such as trails (including Aboriginal trails), monuments, structures, fences, mills, historic roads, rail corridors, canals, etc.
 - Archives of Ontario holds a large collection of historical maps and historical atlases
 - digital versions of historic atlases are available on the Canadian County Atlas Digital Project
- commemorative markers or plaques such as local, provincial or federal agencies
- municipal heritage committee or other local heritage organizations
 - for information on early historic settlements or landscape features (e.g., fences, mill races, etc.)
 - for information on commemorative markers or plaques

The **purpose of the checklist** is to determine:

- if a property(ies) or project area may contain archaeological resources i.e., have archaeological potential
- it includes all areas that may be impacted by project activities, including – but not limited to:
 - the main project area
 - temporary storage
 - staging and working areas
 - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Archaeological assessment

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a licensed consultant archaeologist (see page 4 for definitions) to undertake an archaeological assessment.

The assessment will help you:

- identify, evaluate and protect archaeological resources on your property or project area
- reduce potential delays and risks to your project

Note: By law, archaeological assessments **must** be done by a licensed consultant archaeologist. Only a licensed archaeologist can assess – or alter – an archaeological site.

What to do if you:

- **find an archaeological resource**

If you find something you think may be of archaeological value during project work, you must – by law – stop all activities immediately and contact a licensed consultant archaeologist

The archaeologist will carry out the fieldwork in compliance with the *Ontario Heritage Act* [s.48(1)].

- **unearth a burial site**

If you find a burial site containing human remains, you must immediately notify the appropriate authorities (i.e., police, coroner's office, and/or Registrar of Cemeteries) and comply with the *Funeral, Burial and Cremation Services Act*.

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages when completing this form.

Project or Property Name
New well at Existing Drinking Water Supply site

Project or Property Location (upper and lower or single tier municipality)
Drayton, Township of Mapleton

Proponent Name
Township of Mapleton

Proponent Contact Information
Jamie Morgan, Director of Public Works, 519-638-3313 ext. 041, jmorgan@mapleton.ca

Screening Questions

1. Is there a pre-approved screening checklist, methodology or process in place? Yes ☐ No ☒

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS? Yes ☐ No ☒

If Yes, do **not** complete the rest of the checklist. You are expected to follow the recommendations in the archaeological assessment report(s).

The proponent, property owner and/or approval authority will:

- summarize the previous assessment
- add this checklist to the project file, with the appropriate documents that demonstrate an archaeological assessment was undertaken e.g., MTCS letter stating acceptance of archaeological assessment report

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., environmental assessment document
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

3. Are there known archaeological sites on or within 300 metres of the property (or the project area)? Yes ☐ No ☒

4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property (or project area)? Yes ☐ No ☒

5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or project area)? Yes ☐ No ☒

6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)? Yes ☐ No ☒

7. Has the property (or project area) been recognized for its cultural heritage value? Yes ☐ No ☒

If Yes to any of the above questions (3 to 7), do **not** complete the checklist. Instead, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment of your property or project area.

If No, continue to question 8.

8. Has the entire property (or project area) been subjected to recent, extensive and intensive disturbance? Yes ☒ No ☐

If Yes to the preceding question, do **not** complete the checklist. Instead, please keep and maintain a summary of documentation that provides evidence of the recent disturbance.

An archaeological assessment is not required.

If No, continue to question 9.

9. Are there present or past water sources within 300 metres of the property (or project area)? Yes ☐ No ☐

If Yes, an archaeological assessment is required.

If No, continue to question 10.

10. Is there evidence of two or more of the following on the property (or project area)? Yes ☐ No ☐

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

If Yes, an archaeological assessment is required.

If No, there is low potential for archaeological resources at the property (or project area).

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
 - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

In this context, the following definitions apply:

- **consultant archaeologist** means, as defined in Ontario regulation as an archaeologist who enters into an agreement with a client to carry out or supervise archaeological fieldwork on behalf of the client, produce reports for or on behalf of the client and provide technical advice to the client. In Ontario, these people also are required to hold a valid professional archaeological licence issued by the Ministry of Tourism, Culture and Sport.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may be already in place for identifying archaeological potential, including:

- one prepared and adopted by the municipality e.g., archaeological management plan
- an environmental assessment process e.g., screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s. B.2.]

2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?

Respond 'yes' to this question, if all of the following are true:

- an archaeological assessment report has been prepared and is in compliance with MTCS requirements
 - a letter has been sent by MTCS to the licensed archaeologist confirming that MTCS has added the report to the Ontario Public Register of Archaeological Reports (Register)
- the report states that there are no concerns regarding impacts to archaeological sites

Otherwise, if an assessment has been completed and deemed compliant by the MTCS, and the ministry recommends further archaeological assessment work, this work will need to be completed.

For more information about archaeological assessments, contact:

- approval authority
- proponent
- consultant archaeologist
- Ministry of Tourism, Culture and Sport at archaeology@ontario.ca

3. Are there known archaeological sites on or within 300 metres of the property (or project area)?

MTCS maintains a database of archaeological sites reported to the ministry.

For more information, contact MTCS Archaeological Data Coordinator at archaeology@ontario.ca.

4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property?

Check with:

- Aboriginal communities in your area
- local municipal staff

They may have information about archaeological sites that are not included in MTCS' database.

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or property area)?

Check with:

- Aboriginal communities in your area
- local municipal staff

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulation Unit, Ontario Ministry of Consumer Services – for database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, 'adjacent' means 'contiguous', or as otherwise defined in a municipal official plan.

7. Has the property (or project area) been recognized for its cultural heritage value?

There is a strong chance there may be archaeological resources on your property (or immediate area) if it has been listed, designated or otherwise identified as being of cultural heritage value by:

- your municipality
- Ontario government
- Canadian government

This includes a property that is:

- designated under *Ontario Heritage Act* (the OHA), including:
 - individual designation (Part IV)
 - part of a heritage conservation district (Part V)
 - an archaeological site (Part VI)
- subject to:
 - an agreement, covenant or easement entered into under the OHA (Parts II or IV)
 - a notice of intention to designate (Part IV)
 - a heritage conservation district study area by-law (Part V) of the OHA
- listed on:
 - a municipal register or inventory of heritage properties
 - Ontario government's list of provincial heritage properties
 - Federal government's list of federal heritage buildings
- part of a:
 - National Historic Site
 - UNESCO World Heritage Site
- designated under:
 - *Heritage Railway Station Protection Act*
 - *Heritage Lighthouse Protection Act*
- subject of a municipal, provincial or federal commemorative or interpretive plaque.

To determine if your property or project area is covered by any of the above, see:

- Part A of the MTCS Criteria for Evaluating Potential for Built Heritage and Cultural Heritage Landscapes

Part VI – Archaeological Sites

Includes five sites designated by the Minister under Regulation 875 of the Revised Regulation of Ontario, 1990 (Archaeological Sites) and 3 marine archaeological sites prescribed under Ontario Regulation 11/06.

For more information, check [Regulation 875](#) and [Ontario Regulation 11/06](#).

8. Has the entire property (or project area) been subjected to recent extensive and intensive ground disturbance?

Recent: after-1960

Extensive: over all or most of the area

Intensive: thorough or complete disturbance

Examples of ground disturbance include:

- quarrying
- major landscaping – involving grading below topsoil
- building footprints and associated construction area
 - where the building has deep foundations or a basement
- infrastructure development such as:
 - sewer lines
 - gas lines
 - underground hydro lines
 - roads
 - any associated trenches, ditches, interchanges. **Note:** this applies only to the excavated part of the right-of-way; the remainder of the right-of-way or corridor may not have been impacted.

A ground disturbance does **not** include:

- agricultural cultivation
- gardening
- landscaping

Site visits

You can typically get this information from a site visit. In that case, please document your visit in the process (e.g., report) with:

- photographs
- maps
- detailed descriptions

If a disturbance isn't clear from a site visit or other research, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment.

9. Are there present or past water bodies within 300 metres of the property (or project area)?

Water bodies are associated with past human occupations and use of the land. About 80-90% of archaeological sites are found within 300 metres of water bodies.

Present

- Water bodies:
 - primary - lakes, rivers, streams, creeks
 - secondary - springs, marshes, swamps and intermittent streams and creeks
- accessible or inaccessible shoreline, for example:
 - high bluffs
 - swamps
 - marsh fields by the edge of a lake
 - sandbars stretching into marsh

Water bodies not included:

- man-made water bodies, for example:
 - temporary channels for surface drainage
 - rock chutes and spillways
 - temporarily ponded areas that are normally farmed
 - dugout ponds
- artificial bodies of water intended for storage, treatment or recirculation of:
 - runoff from farm animal yards
 - manure storage facilities
 - sites and outdoor confinement areas

Past

Features indicating past water bodies:

- raised sand or gravel beach ridges – can indicate glacial lake shorelines
- clear dip in the land – can indicate an old river or stream
- shorelines of drained lakes or marshes
- cobble beaches

You can get information about water bodies through:

- a site visit
- aerial photographs
- 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

10. Is there evidence of two or more of the following on the property (or project area)?

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

• **Elevated topography**

Higher ground and elevated positions - surrounded by low or level topography - often indicate past settlement and land use.

Features such as eskers, drumlins, sizeable knolls, plateaus next to lowlands, or other such features are a strong indication of archaeological potential.

Find out if your property or project area has elevated topography, through:

- site inspection
- aerial photographs
- topographical maps

• **Pockets of well-drained sandy soil, especially within areas of heavy soil or rocky ground**

Sandy, well-drained soil - in areas characterized by heavy soil or rocky ground - may indicate archaeological potential

Find out if your property or project area has sandy soil through:

- site inspection
- soil survey reports

- **Distinctive land formations**

Distinctive land formations include – but are not limited to:

- waterfalls
- rock outcrops
- rock faces
- caverns
- mounds, etc.

They were often important to past inhabitants as special or sacred places. The following sites may be present – or close to – these formations:

- burials
- structures
- offerings
- rock paintings or carvings

Find out if your property or project areas has a distinctive land formation through:

- a site visit
- aerial photographs
- 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

- **Resource extraction areas**

The following resources were collected in these extraction areas:

- food or medicinal plants e.g., migratory routes, spawning areas, prairie
- scarce raw materials e.g., quartz, copper, ochre or outcrops of chert
- resources associated with early historic industry e.g., fur trade, logging, prospecting, mining

Aboriginal communities may hold traditional knowledge about their past use or resources in the area.

- **Early historic settlement**

Early Euro-Canadian settlement include – but are not limited to:

- early military or pioneer settlement e.g., pioneer homesteads, isolated cabins, farmstead complexes
- early wharf or dock complexes
- pioneers churches and early cemeteries

For more information, see below – under the early historic transportation routes.

- **Early historic transportation routes** - such as trails, passes, roads, railways, portage routes, canals.

For more information, see:

- historical maps and/or historical atlases
 - for information on early settlement patterns such as trails (including Aboriginal trails), monuments, structures, fences, mills, historic roads, rail corridors, canals, etc.
 - Archives of Ontario holds a large collection of historical maps and historical atlases
 - digital versions of historic atlases are available on the Canadian County Atlas Digital Project
- commemorative markers or plaques such as local, provincial or federal agencies
- municipal heritage committee or other local heritage organizations
 - for information on early historic settlements or landscape features (e.g., fences, mill races, etc.)
 - for information on commemorative markers or plaques

Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
 - is a recognized heritage property
 - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
 - the main project area
 - temporary storage
 - staging and working areas
 - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

Project or Property Name
Drayton SPS Upgrade

Project or Property Location (upper and lower or single tier municipality)
Drayton, Township of Mapleton

Proponent Name
Township of Mapleton

Proponent Contact Information
Jamie Morgan, Director of Public Works, 519-638-3313 ext. 041, jmorgan@mapleton.ca

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

	Yes	No
2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Is the property (or project area):		
a. identified, designated or otherwise protected under the <i>Ontario Heritage Act</i> as being of cultural heritage value?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. a National Historic Site (or part of)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. designated under the <i>Heritage Railway Stations Protection Act</i> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d. designated under the <i>Heritage Lighthouse Protection Act</i> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. has or is adjacent to a known burial site and/or cemetery?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. is in a Canadian Heritage River watershed?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d. contains buildings or structures that are 40 or more years old?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Part C: Other Considerations

	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. has a special association with a community, person or historical event?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. contains or is part of a cultural heritage landscape?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act*, *Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
 - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's [Ontario Heritage Toolkit](#) or [Standards and Guidelines for Conservation of Provincial Heritage Properties](#).

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's [Standards & Guidelines for Conservation of Provincial Heritage Properties \[s.B.2.\]](#)

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

- i. designated under the *Ontario Heritage Act*
 - individual designation (Part IV)
 - part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note:** To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
 - [Ontario Heritage Trust](#)
 - local land registry office (for a title search)
-

ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- [Ontario Heritage Trust](#) - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
 - municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
 - local land registry office (for a title search)
-

iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
 - municipal heritage planning staff
 - municipal heritage committee
-

iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act*. **Note:** To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
 - [Ontario Heritage Trust](#)
-

v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the [National Historic Sites website](#).

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the [Directory of Designated Heritage Railway Stations](#).

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the [Heritage Lighthouses of Canada website](#).

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the [Federal Heritage Buildings Review Office](#).

See a [directory of all federal heritage designations](#).

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – [World Heritage Site website](#).

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- [municipal heritage committees](#) or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's [Heritage directory](#) – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a [list of plaques](#) commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a [list of plaques](#) commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a [database of registered cemeteries](#)
- Ontario Genealogical Society (OGS) – to [locate records of Ontario cemeteries](#), both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to [locate early cemeteries](#)

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the [Canadian Heritage River System](#).

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide [Heritage Property Evaluation](#).

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- [municipal heritage committees](#) or local heritage organizations
- Ontario Historical Society's "[Heritage Directory](#)" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through [Ontario Trails](#).

Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
 - is a recognized heritage property
 - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
 - the main project area
 - temporary storage
 - staging and working areas
 - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – [separate checklist](#)
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

Project or Property Name

New well at Existing Drinking Water Supply site

Project or Property Location (upper and lower or single tier municipality)

Drayton, Township of Mapleton

Proponent Name

Township of Mapleton

Proponent Contact Information

Jamie Morgan, Director of Public Works, 519-638-3313 ext. 041, jmorgan@mapleton.ca

Screening Questions

- | | Yes | No |
|--|--------------------------|-------------------------------------|
| 1. Is there a pre-approved screening checklist, methodology or process in place? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

- | | Yes | No |
|--|--------------------------|-------------------------------------|
| 2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

- | | Yes | No |
|---|--------------------------|-------------------------------------|
| 3. Is the property (or project area): | | |
| a. identified, designated or otherwise protected under the <i>Ontario Heritage Act</i> as being of cultural heritage value? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b. a National Historic Site (or part of)? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c. designated under the <i>Heritage Railway Stations Protection Act</i> ? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d. designated under the <i>Heritage Lighthouse Protection Act</i> ? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. has or is adjacent to a known burial site and/or cemetery?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. is in a Canadian Heritage River watershed?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d. contains buildings or structures that are 40 or more years old?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Part C: Other Considerations

	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. has a special association with a community, person or historical event?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. contains or is part of a cultural heritage landscape?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If **Yes** to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If **No** to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
 - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's [Ontario Heritage Toolkit](#) or [Standards and Guidelines for Conservation of Provincial Heritage Properties](#).

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's [Standards & Guidelines for Conservation of Provincial Heritage Properties](#) [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

i. designated under the *Ontario Heritage Act*

- individual designation (Part IV)
- part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note:** To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
 - [Ontario Heritage Trust](#)
 - local land registry office (for a title search)
-

ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- [Ontario Heritage Trust](#) - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
 - municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
 - local land registry office (for a title search)
-

iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
 - municipal heritage planning staff
 - municipal heritage committee
-

iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act*. **Note:** To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
 - [Ontario Heritage Trust](#)
-

v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the [National Historic Sites website](#).

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the [Directory of Designated Heritage Railway Stations](#).

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the [Heritage Lighthouses of Canada website](#).

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the [Federal Heritage Buildings Review Office](#).

See a [directory of all federal heritage designations](#).

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – [World Heritage Site website](#).

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- [municipal heritage committees](#) or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's [Heritage directory](#) – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a [list of plaques](#) commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a [list of plaques](#) commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a [database of registered cemeteries](#)
- Ontario Genealogical Society (OGS) – to [locate records of Ontario cemeteries](#), both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to [locate early cemeteries](#)

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the [Canadian Heritage River System](#).

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide [Heritage Property Evaluation](#).

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- [municipal heritage committees](#) or local heritage organizations
- Ontario Historical Society's "[Heritage Directory](#)" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through [Ontario Trails](#).



Appendix I: Archaeological Assessment for Drayton Sewage Pump Station (WW-1)

**Stage 1 Archaeological Background Assessment and
Stage 2 Archaeological Property Assessment at the
Proposed Sanitary Pumping Station, Queen Street (Lot
18, Concession 10), Village of Drayton, Former
Geographic Township of Maryborough, now in the
Municipality of Mapleton, Wellington County, Ontario**

Submitted to

**CIMA Canada Inc.
900 - 101 Frederick Street
Kitchener, ON N2H 6R2**

and

Ministry of Citizenship and Multiculturalism

Prepared by

Bluestone Research 2004 Ltd.

Report Type: Original

Archaeological License Number P229, Allan Morton PhD, RPA, CAHP
PIF P229-0130-2023

13 February 2024

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Executive Summary

Bluestone Research 2004 Ltd. was retained by CIMA Canada Inc. to conduct a Stage 1 Background Study and Stage 2 Property Assessment. The assessment was undertaken as a result of a development plan application for the Drayton Sewage Pumping Station Upgrade Project located at Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Township of Mapleton, Wellington County, Ontario. This project is required by the Township of Mapleton based on the scope of Work approved through the Disaster Mitigation and Adaptation Fund. CIMA Canada Inc. (CIMA+) was retained by the Township to conduct a preliminary and detailed design for the construction of a new sewage pumping station on the west side of the Conestogo River, and to supervise the decommissioning of the existing pumping station.

This assessment was triggered by the Provincial Policy Statement that is informed by the *Planning Act* (Government of Ontario 1990a), which states that decisions affecting planning matters must be consistent with the policies outlined in the larger *Ontario Heritage Act* (1990b). According to Section 2.6.2 of the PPS, “*development and site alteration shall not be permitted on lands containing archaeological resources or areas of archaeological potential unless significant archaeological resources have been conserved.*”

A Stage 1 Background Assessment and Property Inspection was conducted in August 2023 by Bluestone under P229-0130-2023. In accordance with Section 1.3.1 of the Ministry of Citizenship and Multiculturalism (MCM) 2011 Standards and Guidelines for Consultant Archaeologists (Government of Ontario 2011), the Stage 1 archaeological assessment determined that the entire study area retained archaeological potential and recommended a Stage 2 archaeological assessment in the form of test pit survey at 5-metre intervals.

The Stage 2 assessment was conducted 11 August 2023 under archaeological consulting license P229 issued to Allan Morton of Bluestone by the MCM. No archaeological resources were identified during the Stage 2 archaeological assessment of the study area, and as such no further archaeological assessment of the property is recommended.

The MCM is asked to review the results presented and accept this report into the Ontario Public Register of Archaeological Reports.

Project Personnel

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Disclaimer on Word Usage from Quoted Material:

Bluestone Research 2004 Ltd. acknowledges that some historical sources, within this report, could include terms and descriptions of Indigenous individuals or groups which are influenced by the original author's historical biases. Bluestone rejects the use of these hurtful terms and the opinions they may represent. The quotations and excerpts are included in this document solely because they may provide beneficial descriptions and important historical context of the project area. Bluestone recognizes that some of the quoted historical material may be offensive.

Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

Project Context

Development Context

Bluestone Research 2004 Ltd. was retained by CIMA Canada Inc. to conduct a Stage 1 Background Study and Stage 2 Property Assessment. The assessment was undertaken as a result of a development plan application for the Drayton Sewage Pumping Station Upgrade Project located at Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Township of Mapleton, Wellington County, Ontario. This project is required by the Township of Mapleton based on the scope of Work approved through the Disaster Mitigation and Adaptation Fund. CIMA Canada Inc. (CIMA+) was retained by the Township to conduct a preliminary and detailed design for the construction of a new sewage pumping station on the west side of the Conestogo River, and to supervise the decommissioning of the existing pumping station. The study area consists of a square portion for the pumping station plus a corridor from the existing sewage line to the pumping station and onward to the north and east across the Conestogo River. It measures approximately 10 metres by 330 metres. It totals approximately 3300 square metres in size.

This assessment was triggered by the Provincial Policy Statement that is informed by the *Planning Act* (Government of Ontario 1990a), which states that decisions affecting planning matters must be consistent with the policies outlined in the larger *Ontario Heritage Act* (1990b). According to Section 2.6.2 of the PPS, “*development and site alteration* shall not be permitted on lands containing *archaeological resources* or *areas of archaeological potential* unless *significant archaeological resources* have been conserved.”

Objectives

In compliance with the provincial standards and guidelines set out in The Ministry of Citizenship and Multiculturalism (MCM) 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011), the objectives of the Stage 1 Archaeological Overview/Background Study are as follows:

- To provide information about the study area's geography, history, previous archaeological fieldwork, and current land conditions;
- To evaluate in detail the study area's archaeological potential which will support recommendations for Stage 2 survey for all or parts of the property; and
- To recommend appropriate strategies for Stage 2 survey.

Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

To meet these objectives Bluestone archaeologists employed the following research strategies:

- A review of relevant archaeological, historic and environmental literature pertaining to the study area;
- A review of the land use history, including pertinent historic maps;
- An examination of the Ontario Archaeological Sites Database (ASDB) to determine the presence of known archaeological sites in and around the project area.

The objective of the Stage 2 assessment was to provide an overview of archaeological resources on the property and to determine whether any of the resources might be archaeological sites with cultural heritage value or interest and to provide specific direction for the protection, management and/or recovery of these resources. In compliance with the provincial standards and guidelines set out in the MCM 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011), the objectives of the Stage 2 Property Assessment are as follows:

- To document all archaeological resources within the study area;
- To determine whether the study area contains archaeological resources requiring further assessment; and
- To recommend appropriate Stage 3 assessment strategies for archaeological sites identified.

Historical Context

The study area consists of a square portion for the pumping station plus a corridor from the existing sewage line, to the pumping station and onward to the east and south across the Conestogo River. It measures approximately 10 metres by 330 metres. It totals approximately 3300 square metres in size. The context is open grassed parkland, and manicured grass lawn. Closer to the river are modern river gravels on the west side and on the east side a modern inundated flat section and 40-degree slope leading to a paved section – part of the town's sewage system.

Pre and Early Post-Contact Aboriginal Resources

Our knowledge of past First Peoples settlement and land use in the Regional Municipality of Wentworth is incomplete. Nonetheless, using province wide (MCCR 1997) and region-specific archaeological data, a generalized cultural chronology for native settlement in the area can be

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proposed. The following paragraphs provide a basic textual summary of the known general cultural trends, and a tabular summary appears in Table 1.

The Paleoindian Period

The first human populations to inhabit Ontario came to the region between 12,000 and 10,000 years ago, coincident with the end of the last period of glaciation. Climate and environmental conditions were significantly different than they are today; local environs would not have been welcoming to anything but short-term settlement. Termed Paleoindians by archaeologists, Ontario first peoples would have crossed the landscape in small groups (i.e., bands or family units) searching for food, particularly migratory game species. In the area, caribou may have provided the staple of the Paleoindian diet, supplemented by wild plants, small game, birds and fish. Given the low density of populations on the landscape at this time and their mobile nature, Paleoindian sites are small and ephemeral. They are usually identified by the presence of fluted projectile points and other finely made stone tools.

Table1: Cultural Chronology for Indigenous Settlement Within Ontario

Period	Subperiod	-	Time Range (circa)	Diagnostic Features	Complexes
Paleoindian	Early	-	9000 – 8400 B.C.	fluted projectile points	Gainey, Barnes, Crowfield
-	Late	-	8400 – 8000 B.C.	non-fluted and lanceolate points	Holcombe, Hi-Lo, Lanceolate
Archaic	Early	-	8000 – 6000 B.C.	serrated, notched, bifurcate base points	Nettling, Bifurcate Base Horizon
-	Middle	-	6000 – 2500 B.C.	stemmed, side & corner notched points	Brewerton, Otter Creek, Stanly/Neville
-	Late	-	2000 – 1800 B.C.	narrow points	Lamoka
-	-	-	1800 – 1500 B.C.	broad points	Genesee, Adder Orchard, Perkiomen
-	-	-	1500 – 1100 B.C.	small points	Crawford Knoll

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Period	Subperiod	-	Time Range (circa)	Diagnostic Features	Complexes
-	Terminal	-	1100 – 850 B.C.	first true cemeteries	Hind
Woodland	Early	-	800 – 400 B.C.	expanding stemmed points, Vinette pottery	Meadowood
-	Middle	-	400 B.C. – A.D. 600	thick coiled pottery, notched rims; cord marked	Couture
-	Late	Western Basin	A.D. 600 – 900	Wayne ware, vertical cord marked ceramics	Riviere au Vase-Algonquin
-	-	-	A.D. 900 – 1200	first corn; ceramics with multiple band impressions	Young-Algonquin
-	-	-	A.D. 1200 – 1400	longhouses; bag shaped pots, ribbed paddle	Springwells-Algonquin
-	-	-	A.D 1400-1600	villages with earthworks; Parker Festoon pots	Wolf- Algonquin
Contact	-	Aboriginal	A.D. 1600 – 1700	early historic native settlements	Neutral Huron, Odawa, Wenro
-	-	Euro-Canadian	A.D. 1700-1760	fur trade, missionization, early military establishments	French
-	-	-	A.D. 1760-1900	Military establishments, pioneer settlement	British colonials, UELs

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Archaic

The archaeological record of early native life in Ontario indicates a change in lifeways beginning circa 10,000 years ago at the start of what archaeologists call the Archaic Period. The Archaic populations are better known than their Paleoindian predecessors, with numerous sites found throughout the area. The characteristic projectile points of early Archaic populations appear similar in some respects to early varieties and are likely a continuation of early trends. Archaic populations continued to rely heavily on game, particularly caribou, but diversified their diet and exploitation patterns with changing environmental conditions. A seasonal pattern of warm season riverine or lakeshore settlements and interior cold weather occupations has been documented in the archaeological record. Since the large cold weather mammal species that formed the basis of the Paleoindian subsistence pattern became extinct or moved northward with the onset of a warmer climate, Archaic populations had a more varied diet, exploiting a range of plant, bird, mammal and fish species. Reliance on specific food resources like fish, deer and nuts becomes more pronounced through time and the presence of more hospitable environs and resource abundance led to the expansion of band and family sizes. In the archaeological record, this is evident in the presence of larger sites and aggregation camps, where several families or bands would come together in times of resource abundance. The change to more preferable environmental circumstances led to a rise in population density. As a result, Archaic sites are more abundant than those from the earlier period. Artifacts typical of these occupations include a variety of stemmed and notched projectile points, chipped stone scrapers, ground stone tools (e.g., celts, adzes) and ornaments (e.g., bannerstones, gorgets), bifaces or tool blanks, animal bone and waste flakes, a by-product of the tool making process.

Woodland Period

Significant changes in cultural and environmental patterns are witnessed in the Woodland Period (circa 950 B.C to historic times). The coniferous forests of earlier times were replaced by stands of mixed and deciduous species. Occupations became increasingly more permanent in this period, culminating in major semi-permanent villages by 1,000 years ago. Archaeologically, the most significant changes by Woodland times are the appearance of artifacts manufactured from modeled clay and the construction of house structures. The Woodland Period is often defined by the occurrence of pottery, storage facilities and residential areas similar to those that define the incipient agricultural or Neolithic period in Europe. The earliest pottery was rather crudely made by the coiling method and house structures were simple enclosures.

The Middle Woodland period in southern Ontario has been traditionally associated with three separate cultures: (1) the Couture in the southwest, (2) the Saugeen in the northwestern portion of southwestern Ontario, and (3) Point Peninsula in the central and eastern parts of southern

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Ontario. The Middle Woodland period did not appear as uniform across the province as previous periods; likely a direct result of these peoples' mobile lifestyle and intergroup variation.

Middle Woodland artefacts were an extension of the techniques introduced in the Early Woodland period. Potters also developed new styles- still coiled and with pointed bases but featuring relatively short and thin, outflaring upper rims. The rims were frequently stamped with notched or bevelled tools that left scallop-shell or tooth-like impressions. Other common Middle Woodland artefacts include bone and antler harpoons, antler combs with incised decorations, antler hafted beaver incisors, bone fishhooks, and a variety of projectile point forms.

Settlement pattern changes from the Early Woodland period are rather gradual, as groups continued to maintain a nomadic existence. In autumn and winter single families lived in small hunting camps, located in prime areas for harvesting nuts and local animals. Family came together to form larger settlements in spring and summer, usually near seasonal resources such as spawning fish. Settlement sizes appear to increase in southern Ontario, specifically in the later Late Woodland period. These settlements can be characterized by people living in large, palisaded villages that were easily defensible from neighbouring and distant groups.

Burials provide additional hints that Middle Woodland peoples began to settle down more. Burial practices themselves changed over time, suggesting that the nature of society changed as well. While earlier burials were rare and isolated latter ones appear more common, where the deceased were communally buried in pits along with grave goods.

In Ontario, the Woodland period has been divided into two periods: known as (1) Initial and (2) Terminal Woodland. The Initial Woodland period, which coincides with the Middle Woodland of southern Ontario, is characterized by Laurel Tradition artefacts. Both Early (200 B.C.- A.D. 500) and Late (500-1000 A.D.) manifestations of this tradition have been identified. Initial Woodland settlements are often located along riverbanks or on the shores of lakes.

Iroquoian Period

In southern and eastern Ontario, the Late Woodland period is referred to by archaeologists as the Ontario Iroquois Tradition (Reid 1975; Wright 1966). There are three parts to this period and are commonly referred to as: Early, Middle and Late Iroquoian. Archaeological evidence suggests that subsistence and settlement patterns remained static from the earlier transitional woodland to the Early Woodland period. There were small communities with longhouses used by families. Temporary bases associated with these villages tended to be procurement areas for wild flora and fauna. Horticulture was practiced and apparently was not a mainstay, but a complement to wild foods.

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A system of agriculture developed by the Middle Iroquoian period. By this time, the “three sisters”, squash beans and corn became the main source of food. Village size increased throughout southern and eastern Ontario along with the size of structures – allowing for several families. Nearby procurement areas continued to be part of society for hunting, fishing, and gathering.

The Late Iroquoian period saw another increase in village size. Eastern and Southern Ontario archaeological sites from this period include material culture connected with Huron and St. Lawrence Iroquoians. The implication is that the St. Lawrence Iroquoians may have moved to the Trent and Kawartha area for security purposes after leaving their traditional territory on the north shore of the St. Lawrence River.

Archaeologists have long considered the Late Woodland occupation of the area as being Iroquoian peoples. It should be noted that Anishnaabeg as well as the Huron-Wendat peoples have a traditional history that indicates Huron-Wendat and Anishnaabeg cohabited the region (Kapyrka 2018).

Villages of smaller size came together to form larger fortified centres, suggesting an increase in political amalgamations. Confederacies tended to form post 1500 as communities neighbouring one another tended to reduce hostilities.

According to researchers Birch, Williamson and Dermarker, the area at the north shore of Lake Ontario was occupied by Iroquoian-speaking peoples (Birch and Williamson 2013; Birch 2015; Dermarker et al. 2016). This long-held assertion has more recently been questioned as concepts of regional identity and links between archaeology and ethnicity have been raised (Fox 2015:23; Gaudreau and Lesage 2016:9-12; Ramsden 2016:124). Understandings of cultural history before the 16th Century - based on First Nations sources have recently been modified. It is now understood that the region was co-habited by Anishnaabeg populations (Kapyrka 2018). These people had not been represented in earlier archaeological results probably because of the more ephemeral nature of their communities compared to the agricultural communities that were more densely populated.

There apparently was a reduction in permanent settlement in the region through the early 1600's but it is important to understand that this does not affect the fact that Anishnaabeg peoples lived in there. According to Trigger, warfare dispersed the Huron- Wendat, Tionontate (Petun) and Attiwandaron (Neutral) Nations in 1649 (Trigger 1978:354-356).

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The mid to late 17th Century saw Anishnaabeg people re-entering the area around the lower Great Lakes (Konrad 1981; Rogers 1978). The Mississaugas began to replace the Seneca as the dominant indigenous group along the north shore of Lake Ontario. The Five Nations Iroquois negotiated an alliance with the Mississaugas and it was agreed that hunting lands would be shared. The Mississaugas became trade emissaries between the British and French traders and more northern indigenous people. This activity gave the Mississaugas an increased access to materials from Europe at a more favourable cost.

The Métis people emerged in the eighteenth century as indigenous people mixed with French and other Europeans. The economic and socio-political aspects of the Métis cannot be understated. Due to their access to both Aboriginal and Euro-Canadian societies, the Métis acted as fur trade agents and interpreters. Métis people lived throughout Ontario, but predominantly in the north (Métis Nation of Canada n.d.; Stone and Chaput 1978:607).

The study area is situated within the lands of the Haudenosaunee Confederacy. Consisting of the Mohawks, Oneidas, Onondagas, Cayugas, and Senecas, the confederacy was intended to unite the disparate nations and to foster a peaceful means of making decisions. The union is described historically as being the oldest democracy on earth with the constitution of the Haudenosaunee being instrumental in the creation of the United States Constitution. The relevant treaty for the study area is the Huron Tract Purchase (Number 29) signed on 10 July 1827. The document was between the town and “certain Anishinaabe peoples”. According to the treaty, these people were, “Wawanosh, Osawip, Shashawinibisie, Puninince, Negig, Cheebican, Mukatwokijigo, Mshikinaibik, Animikince, Peetawtick, Shawanipinisse, Saganash, Anottowin, Penessiwagum, Shaioukima, Chekateyan, Mokeetchiwan and Quaikeegon, Chiefs and Principal Men of that part of the Chippewa Nation of Indians inhabiting and claiming the territory or tract of land hereinafter described” (Government of Canada, n.d.). The land on the one million acres of the Huron Tract was purchased by the Canada Company in order to be distributed to the pioneering settlers of Upper Canada.

It is important to point out certain aspects of the Huron Tract Purchase (Number 29) as it relates to the Mississaugas of the Credit First Nation (MCFN) (Darin Wybenga, MCFN).

- 1) The MCFN were not party to the treaty, but the treaty lands cover a portion of MCFN traditional territory.
- 2) As pointed out, the study area is situated within the lands of the Haudenosaunee Confederacy, but this was for an approximately 30 years during the latter part of the 17th century. The area became part of MCFN territory after the Mississaugas and their

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allies had expelled the Haudenosaunee prior to 1700. There is a complex series of occupations, control, and stewardship of the study area land by successive First Nation groups.

- 3) The statement above, referring to the “Dish with One Spoon” agreement (The Five Nations Iroquois negotiated an alliance with the Mississaugas and it was agreed that hunting lands would be shared), is typically referred to by the Haudenosaunee and settler groups as an arrangement to share the lands of the Great Lakes Region. This interpretation can be considered conjecture and is not accepted by the MCFN, and other Anishinaabe Nations. According to MCFN Traditional Land-use and Knowledge Coordinator, Darin Wybenga, it is “...merely a peace agreement between the Anishinaabe and the Haudenosaunee to end their period of intermittent warfare during the 17th century known as the Beaver Wars. Currently, there is no consensus amongst scholars - Indigenous and non-Indigenous, about the particulars of the “Dish” agreement.”

It is not within the scope of a technical archaeological report to comment on the social implications, intent, or fulfillment of the conditions of the various treaties which have been established in the province. First Nations should be consulted directly for additional information relating to the Treaties.

Study Area Specific History

The current Municipality of Mapleton was originally Peel Township. According to historian, J.E. Middleton, the area was originally held as a clergy reserve by the government of Upper Canada. It was surveyed in 1840's in two sections: Peel Township in the southeast and Maryborough in the northwest. Peel was surveyed by Robert Kerr in 1843 and Maryborough was surveyed by Patrick Callaghan in 1849. The first European pioneers began arriving in 1848. Wellington County was created in 1854, consisting of twelve townships including Maryborough and adjacent Peel. Drayton was incorporated as a village in 1875.

The 1860 historical map shows the owner of Lot 18, Concession 10 as T.D. Haight. The 1877 historical map of Maryborough Township shows the landowner as P. Henrey. Canada Census records were reviewed for the name 'Fawcett' and “Henrey (or Henry) in Drayton, or Maryborough Township, Wellington County. The names “Haight” “Henrey” or “Henry” do not appear in any of the Canada Census records for Maryborough Township or the Village of Drayton. No structures appear within or near to the study area in any of the historic maps.

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A Crown patent map does not exist for this location, but land registry documents were reviewed for land use information. A crown patent map could not be located. Land registry documents for the study area were located, but unfortunately, they were illegible.

Archaeological Context

The study area consists of a square portion for the pumping station plus a corridor from the existing sewage line to the pumping station and onward to the north and east across the Conestogo River. It measures approximately 10 metres by 330 metres. It totals approximately 3300 square metres in size and is located at Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Township of Mapleton, Wellington County, Ontario.

The Natural Environment

The study area is located within the Stratford Till Plain physiographic region of southern Ontario (Chapman and Putnam 1984). The Stratford Till Plain is fairly uniform throughout consisting of brown calcareous silty clay. It was a product of the Huron Ice lobe of the Wisconsin ice sheet. This region is part of the slope east of Lake Huron and received more precipitation than other areas of Southern Ontario. It tends to have muddy soils classified from the Huron group. Within the study area, the soil type is considered variable. This soil is considered as having well drained as well as poorly drained locations. Well-drained, sandy soils are considered suitable for pre-contact Aboriginal agriculture. The study area straddles Conestogo River.

Potable water is the single most important resource for any extended human occupation or settlement and since water sources in southwestern Ontario have remained relatively stable over time, proximity to drinkable water is regarded as a useful index for the evaluation of archaeological site potential. In fact, distance to water is one of the most commonly used variables for predictive modeling of archaeological site location in Ontario.

Previously Known Archaeological Sites and Surveys

Information concerning specific site locations is protected by provincial policy and is not fully subject to the *Freedom of Information and Protection of Privacy Act*. The release of such information in the past has led to looting or various forms of illegally conducted site destruction. Confidentiality extends to all media capable of conveying location, including maps, drawings, or textual descriptions of a site location. The MCM will provide information concerning site location to the party or an agent of the party holding title to a property, or to a licensed archaeologist with relevant cultural resource management interests.

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An examination of the ASDB has shown that there is one archaeological site registered within a one-kilometre radius of the study area (Site Data Search, 10 August 2023; Government Ontario n.d.). Site AkHe-2 is approximately 660 metres northwest of the study area. Table 3 summarizes the registered archaeological sites within 1 kilometre of the study area.

Table 2: Registered Archaeological Sites within One Kilometre of the Study Area

Borden #	Site Name	Time Period	Site Type
AkHe-2	Healey	Post Contact	Homestead

Summary of Past Archaeological Investigations within 50m

There have been no documented archaeological investigations within 50 metres of the subject property. It should be noted that the Ministry of Citizenship and Multiculturalism currently does not provide an inventory of archaeological assessments carried out within 50 metres of a property, so a complete inventory of assessments on lands adjacent to the subject property cannot be provided.

Archaeological Potential

Archaeological potential is established by determining the likelihood that archaeological resources may be present on a subject property. Bluestone applied archaeological potential criteria commonly used by MCM (Government of Ontario 2011) to determine areas of archaeological potential within the region under study. These variables include proximity to previously identified archaeological sites, distance to various types of water sources, soil texture and drainage, glacial geomorphology, elevated topography and the general topographic variability of the area.

Distance to modern or ancient water sources is generally accepted as the most important determinant of past human settlement patterns and considered alone, may result in a determination of archaeological potential. However, any combination of two or more other criteria, such as well-drained soils or topographic variability, may also indicate archaeological potential. Finally, extensive land disturbance can eradicate archaeological potential (Wilson and Horne 1995).

As discussed above, distance to water is an essential factor in archaeological potential modeling. When evaluating distance to water it is important to distinguish between water and

Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

shoreline, as well as natural and artificial water sources, as these features affect sites locations and types to varying degrees. The MCM categorizes water sources in the following manner:

- Primary water sources: lakes, rivers, streams, creeks;
- Secondary water sources: intermittent streams and creeks, springs, marshes and swamps;
- Past water sources: glacial lake shorelines, relic river or stream channels, cobble beaches, shorelines of drained lakes or marshes; and
- Accessible or inaccessible shorelines: high bluffs, swamp or marshy lake edges, sandbars stretching into marsh.

Soil texture can be an important determinant of past settlement, usually in combination with other factors such as topography. As indicated previously, the soils within the study area are considered variable and include both well drained and poorly drained. Portions of the study area would be ideal for pre-contact Aboriginal agriculture.

An examination of the ASDB has shown that there is one archaeological sites registered within a one-kilometre radius of the study area. Site AkHe-2 is approximately 660 metres northwest of the study area.

When the above listed criteria are applied to the study area, the archaeological potential for pre-contact Aboriginal, post-contact Aboriginal, and Euro-Canadian sites is deemed to be moderate to high. Apart from the house, driveway, and backyard shed, there is no evidence for ground disturbance. Thus, in accordance with Section 1.3.1 of the MCM 2011 Standards and Guidelines for Consultant Archaeologists (Government of Ontario 2011), the Stage 1 archaeological assessment of the study area at Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Township of Mapleton, Wellington County, Ontario determined that it exhibits potential for the identification and recovery of archaeological resources and a Stage 2 archaeological assessment was recommended. The area of archeological potential is shown in the archeological potential map.

Field Methods

The Stage 1-2 property assessment was conducted on 11 August 2023. The weather during the assessment was clear and warm. The temperature during the assessment was 25 degrees Celsius.

Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

The landowner gave permission to access the property. The property inspection revealed a section of a gravel parking lot and town park area with long grass. Other sections of the study area included a manicured residential lawn, a manicured town-owned section, a section on the west side of the river that consisted of modern gravels overgrown with reeds. On the east side of the river was a modern inundated flat section and 40-degree slope leading to a paved area – part of the town's sewage system. Soil disturbance include the gravel parking lot within the town park, the east-west section of existing water and sewer lines, the modern gravel and inundated soils on the west and east sections of the study area and the paved section on the corridor's east end. These topographical and soil disturbances amounted to approximately 1820 square metres or 55.2% of the study area.

The Stage 2 assessment at Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Township of Mapleton, Wellington County, Ontario. was conducted under PIF # P229-0130-2023 issued to Allan Morton, of Bluestone Research 2004 Ltd. by the MCM.

During the Stage 2 survey, assessment conditions were excellent and at no time were the field, weather, or lighting conditions detrimental to the recovery of archaeological material. Photos 1 to 14 confirm that field conditions met the requirements for a Stage 2 archaeological assessment, as per the MCM 2011 Standards and Guidelines for Consultant Archaeologists (Section 7.8.6 Standard 1a; Government of Ontario 2011). Figure 13 provides an illustration of areas of archaeological potential and the Stage 2 assessment methods, as well as photograph locations and directions.

Field and Weather Conditions:

Date, 11 August 2023

Activity, Test Pit survey

Weather, Clear and warm

Field Conditions, Soils dry and friable

The entire study area (except for structures and driveway) was recommended for Stage 2 assessment by the Stage 1 assessment and was subject to test pit survey at a 5-metre interval in accordance with Section 2.1.1 of the MCM 2011 Standards and Guidelines for Consultant Archaeologists (Government of Ontario 2011). Test pits were excavated 30 centimetre wide and excavated five centimetres into sterile subsoil. The soils and test pits were examined for stratigraphy, cultural features, or evidence of fill. All soil was screened through six-millimetre (mm) mesh hardware cloth to facilitate the recovery of small artifacts and then used to backfill the pit. The excavated test pits consisted of very dark brown sandy loam over dark yellowish-brown subsoil. All test pits were backfilled and returned to grade.

Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

Test pits were found to be disturbed at the east-west section in the already existing water and sewer corridor. This location was subject to shovel test pit survey at 10 metre intervals to confirm previous disturbance.

If an artifact was recovered from a test pit, the five-metre survey interval would have been maintained to determine the size of the artifact scatter and artifact recovery frequency. If an insufficient number of artifacts were recovered to inform a recommendation for further archaeological assessment, the survey interval would have been reduced to 2.5 metres around one or more of the positive test pits, and up to eight additional test pit and a single one-metre square unit excavated. If an artifact was identified during the pedestrian survey, survey intervals would have been reduced to one metre, for a 20-metre radius around the initial findspot.

Any recovered artifacts would have been inventoried by find spot locations recorded in the field with a *Trimble Catalyst DA2 GNSS*, using the North American Datum (NAD) 83, with a minimal accuracy of 0.6 metres. A field log was maintained for the duration of the investigations detailing pertinent information and digital photographs were taken of the surveyed areas and topography.

Photographs illustrate all aspects of the Stage 2 field work conducted as well as all field conditions encountered.

Record of Finds

The Stage 2 archaeological assessment was conducted employing the methods described in Section 2.0. An inventory of the documentary record generated by fieldwork is provided in the table below. No archaeological resources were identified during the Stage 2 archaeological assessment of the study area.

Inventory of Documentary Record

Document Type: 3 Pages of field notes

Current Location of Document Type: Bluestone office, York Region

Additional Comments: In original field book and photocopied in project file

Document Type: 1 Hand drawn maps

Bluestone office, York Region

Additional Comments: In original field book and photocopied in project file

Document Type: 1 map provided by Client

Bluestone office, York Region

Additional Comments: In original field book and photocopied in project file

Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

Document Type: 14 Digital photographs

Bluestone office, York Region

Additional Comments: In original field book and photocopied in project file

Analysis and Conclusions

Stage 1 Background Study and Property Inspection and Stage 2 Property Assessment was carried out in accordance with The Ministry of Citizenship and Multiculturalism *Standard's and Guidelines for Consultant Archaeologist's* Government of Ontario 2011). Except for areas of disturbance within the study area, the entire property was recommended for Stage 2 assessment was assessed using standard test pit survey at 5-metre intervals. The Stage 2 assessment did not result in the identification of any archaeological resources.

Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

Recommendations

All work met provincial standards and no archaeological sites were identified during the Stage 2 assessment. If construction plans change to incorporate new areas that were not subject to a Stage 2 field survey, these must be assessed prior to the initiation of construction. In keeping with legislative stipulations, all construction and demolition-related impacts (including, for example, machine travel, material storage and stockpiling, earth moving) must be restricted to the areas that were archaeologically assessed and cleared by The Ministry of Citizenship and Multiculturalism through acceptance of the assessment report into the provincial register.

The assessment consisted of a test pit survey at 5 m intervals throughout the entire study area (and 10 metre intervals to confirm disturbance in areas with existing sewer and water lines), with test pits measuring a minimum of 30 cm in diameter, excavated 5 centimetres into subsoil and all soil being screened through a minimum 6 mm mesh. As no archaeological resources were found on the subject property, no further archaeological assessment of the property is required.

Notwithstanding the results and recommendations presented in this study, Bluestone Research notes that no archaeological assessment, no matter how thorough or carefully completed, can necessarily predict, account for, or identify every form of isolated or deeply buried archaeological deposit. In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the Ministry of Citizenship and Multiculturalism should be notified.

Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

Advice on Compliance with Legislation

This report is submitted to the Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the Ontario Heritage Act, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of The Ministry of Citizenship and Multiculturalism, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeological Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48(1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological license.

Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

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Images

All images will follow on succeeding pages.

Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario



Plate 1: Northeast corner of proposed pumping station. View to the northeast.



Plate 2: North end of proposed pumping station. Grassed and wooded area subject to shovel test pit survey at 5 metre intervals. View to the southeast.



Plate 3: Southwest corner of proposed pumping station. Grassed area subject to shovel test pit survey at 5 metre intervals. View to the south.



Plate 4: Sewer line location from proposed pumping station to existing line. Cut grass area was subject to shovel test pit survey at 10 metre intervals to confirm disturbance. Area with long grass in background subjected to shovel test pit survey at 5 metre intervals. View to the south.

Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario



Plate 5: Sewer line location from proposed pumping station to existing line. Area subjected to shovel test pit survey at 5 metre intervals. View to the south.



Plate 6: Sewer line location from proposed pumping station southeast. Area subjected to shovel test pit survey at 5 metre intervals. View to the southeast.



Plate 7: Sewer line location from proposed pumping station. Area subjected to shovel test pit survey at 5 metre intervals. View to the southwest.



Plate 8: Sewer line location from proposed pumping station southeast. Area subjected to shovel test pit survey at 5 metre intervals. View to the southeast.

Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario



Plate 9: Typical shovel test pit in west side of study area.



Plate 10: Typical shovel test pit in east side of study area.



Plate 11: Location of existing water and sewer lines. Subject to shovel test pit survey at 10 metre intervals to confirm disturbance. View to the southeast.



Plate 12: East side of Conestogo River showing inundated area. View to the northwest.

Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario



Plate 13: East side of Conestogo River showing slope greater than 20%. View to the southeast.



Plate 14: East side of Conestogo River showing parking lot and disturbed area. Not manhole in front of gate. View to the southeast.

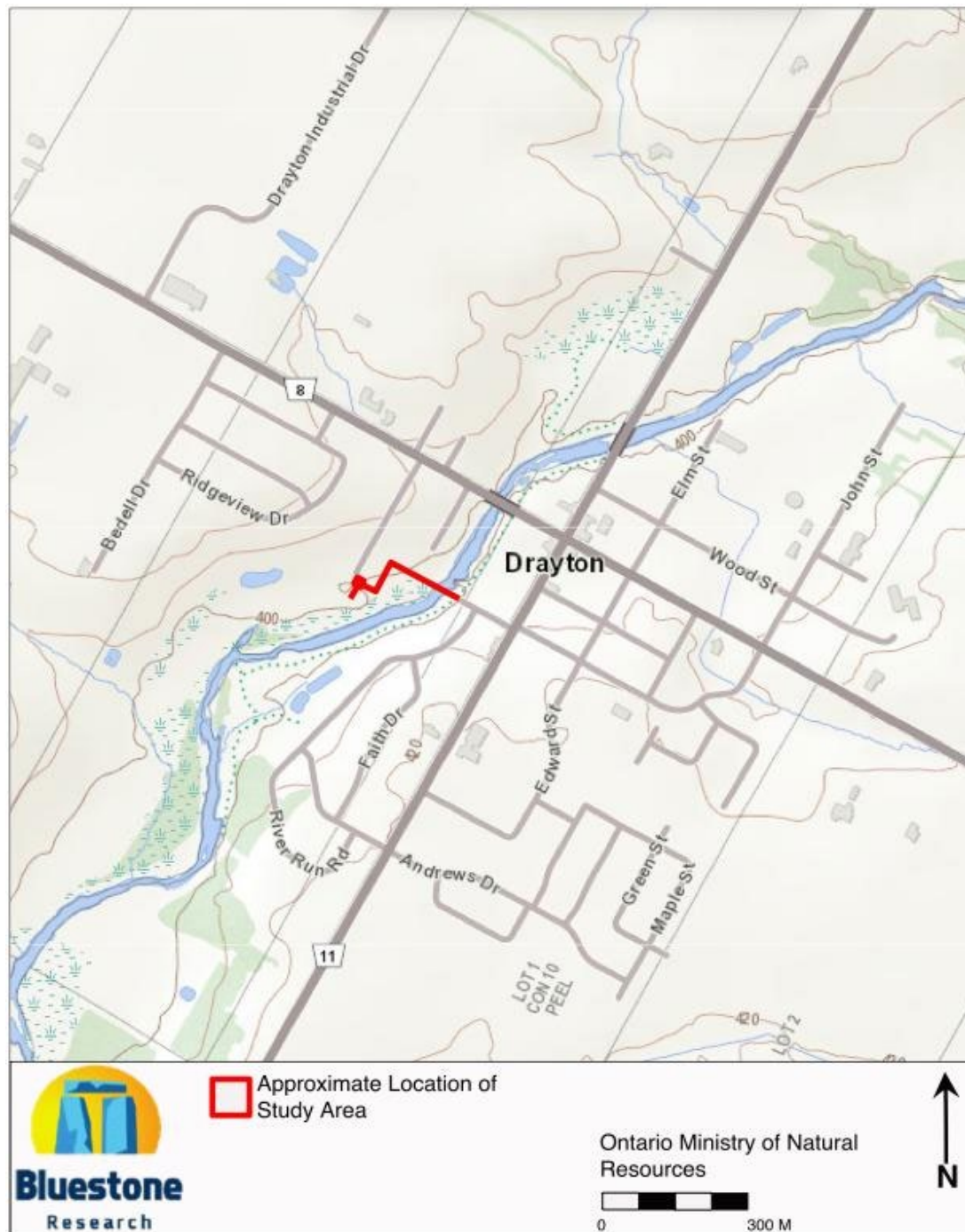
Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

Maps

All maps will follow on succeeding pages.

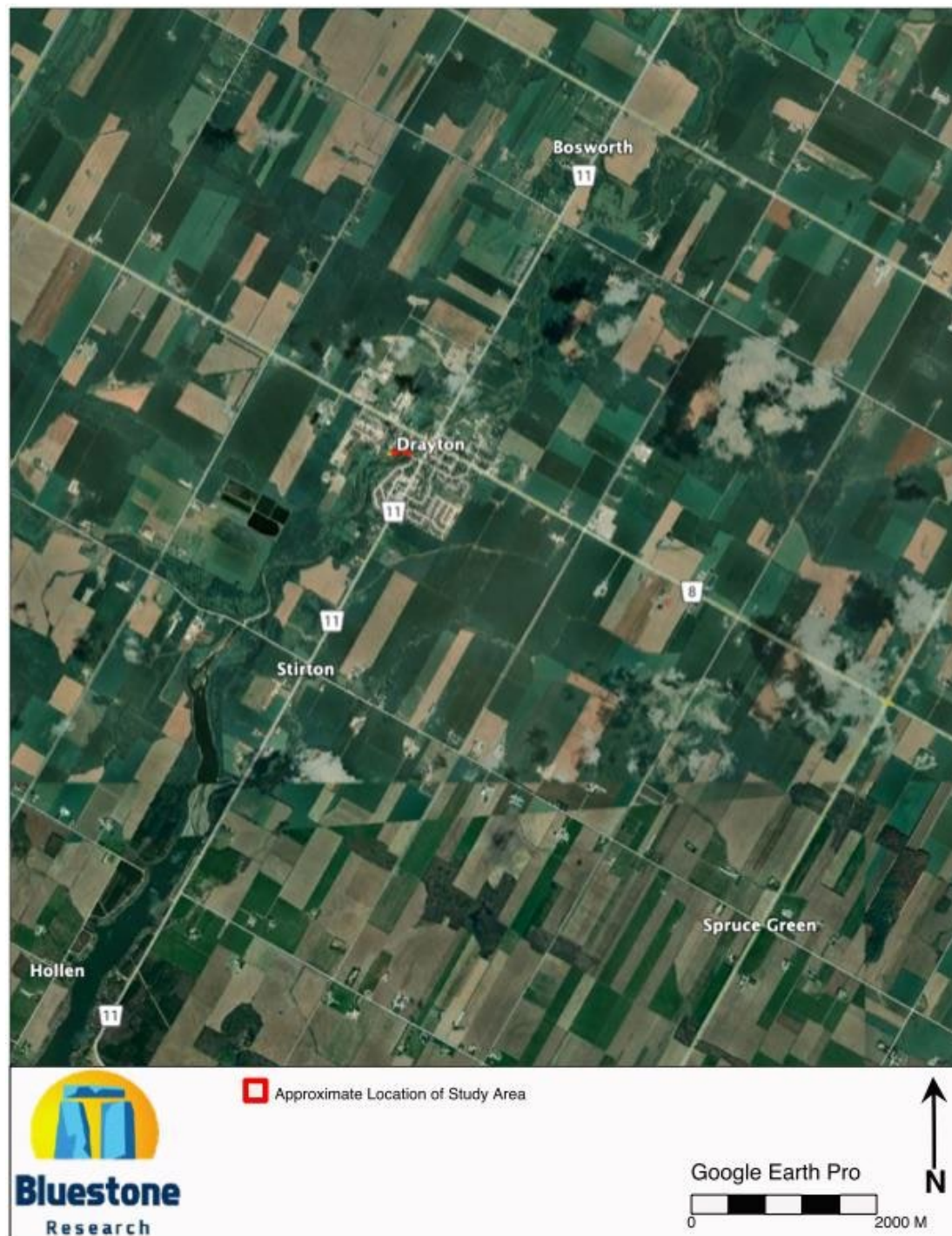
Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

Figure 1: Topographic Map of the Study Area



Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

Figure 2: Project Location, Air Photograph (from Google Earth Pro).



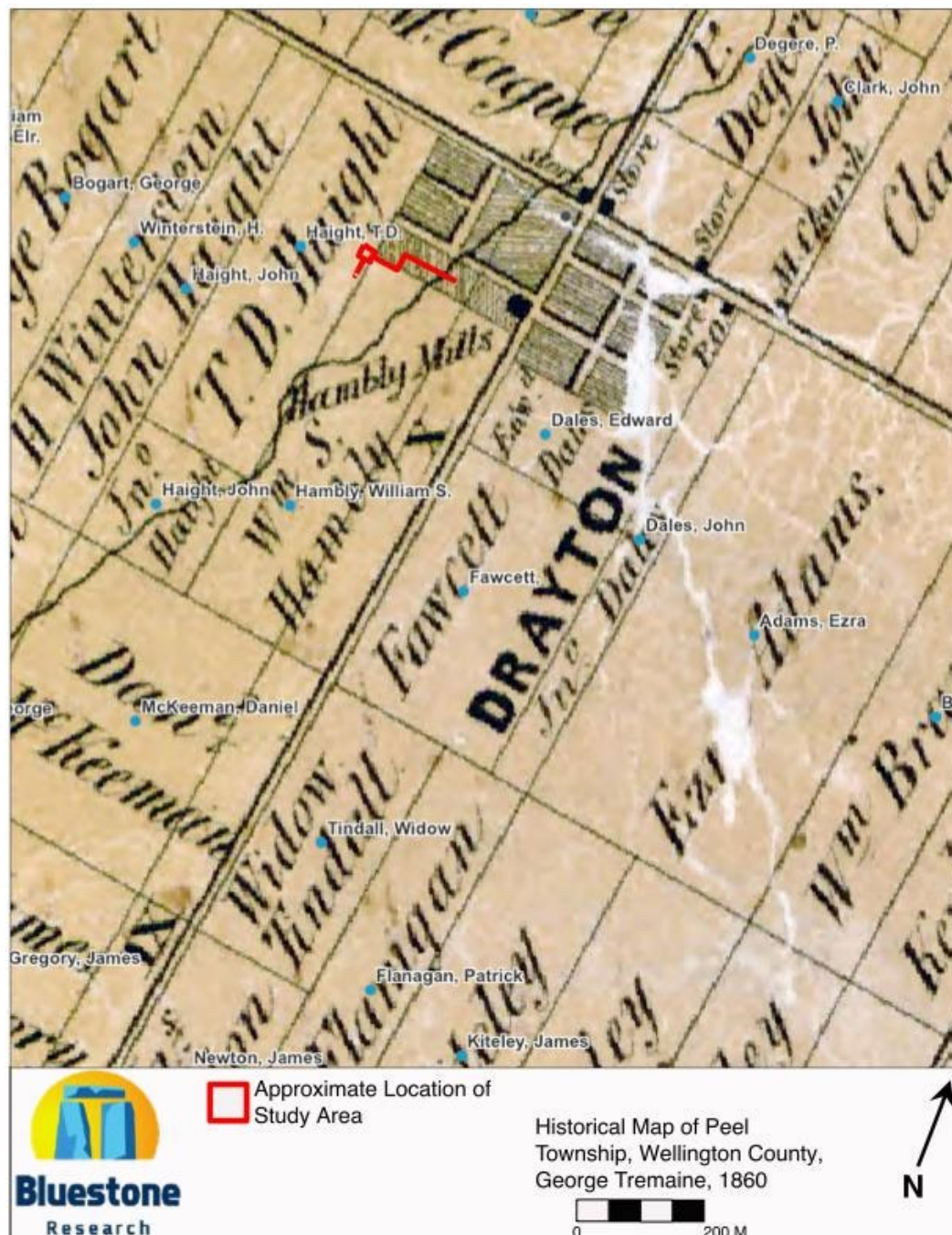
Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

Figure 3: Study area, Air Photograph (from Google Earth Pro).



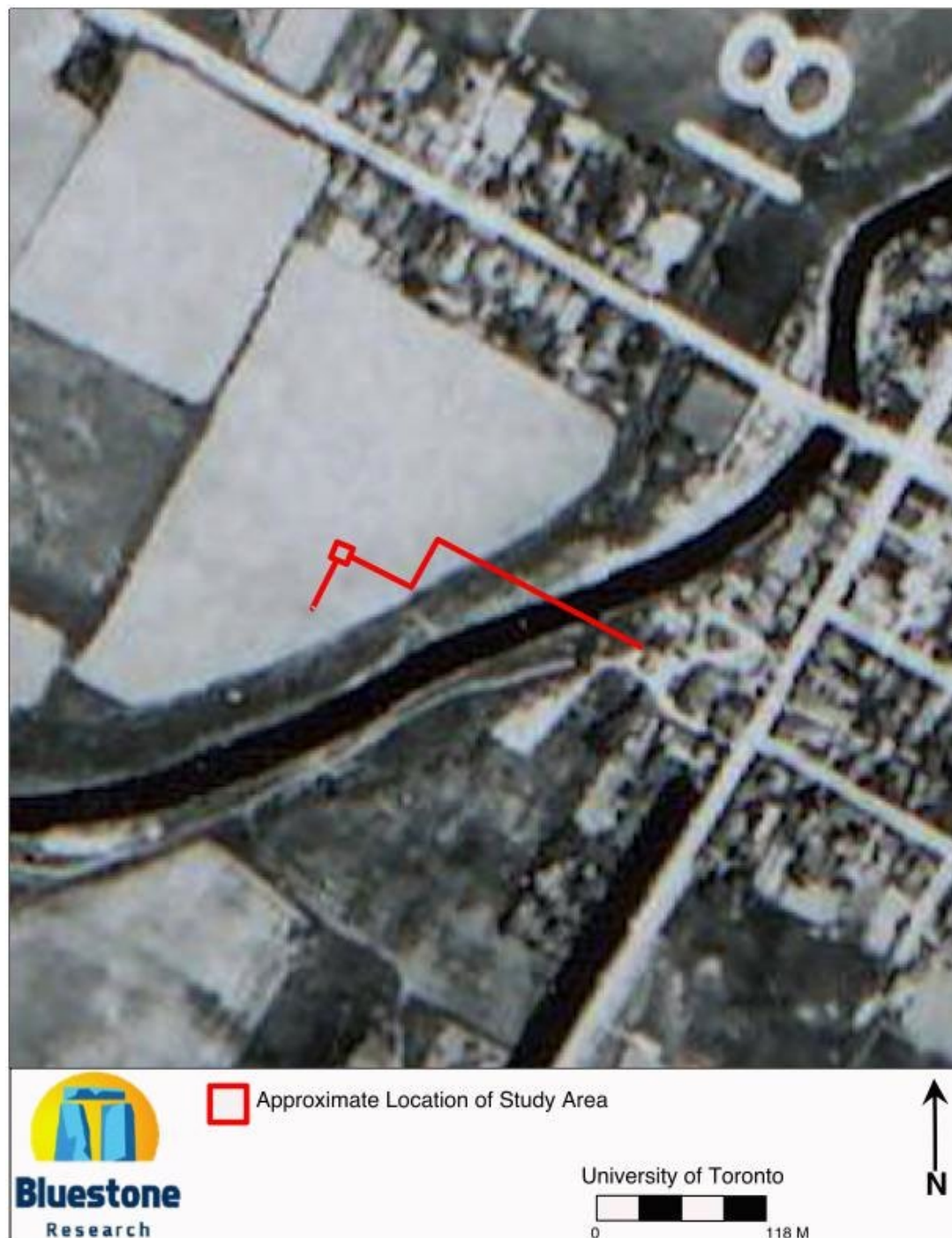
Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

Figure 5: Historical Map (1860) with the Study Area.



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Figure 7: 1954 Air Photograph Showing Study Area.



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Figure 8: Surficial Geology Showing the Study Area



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Figure 9: Soil Drainage Type with Study Area.



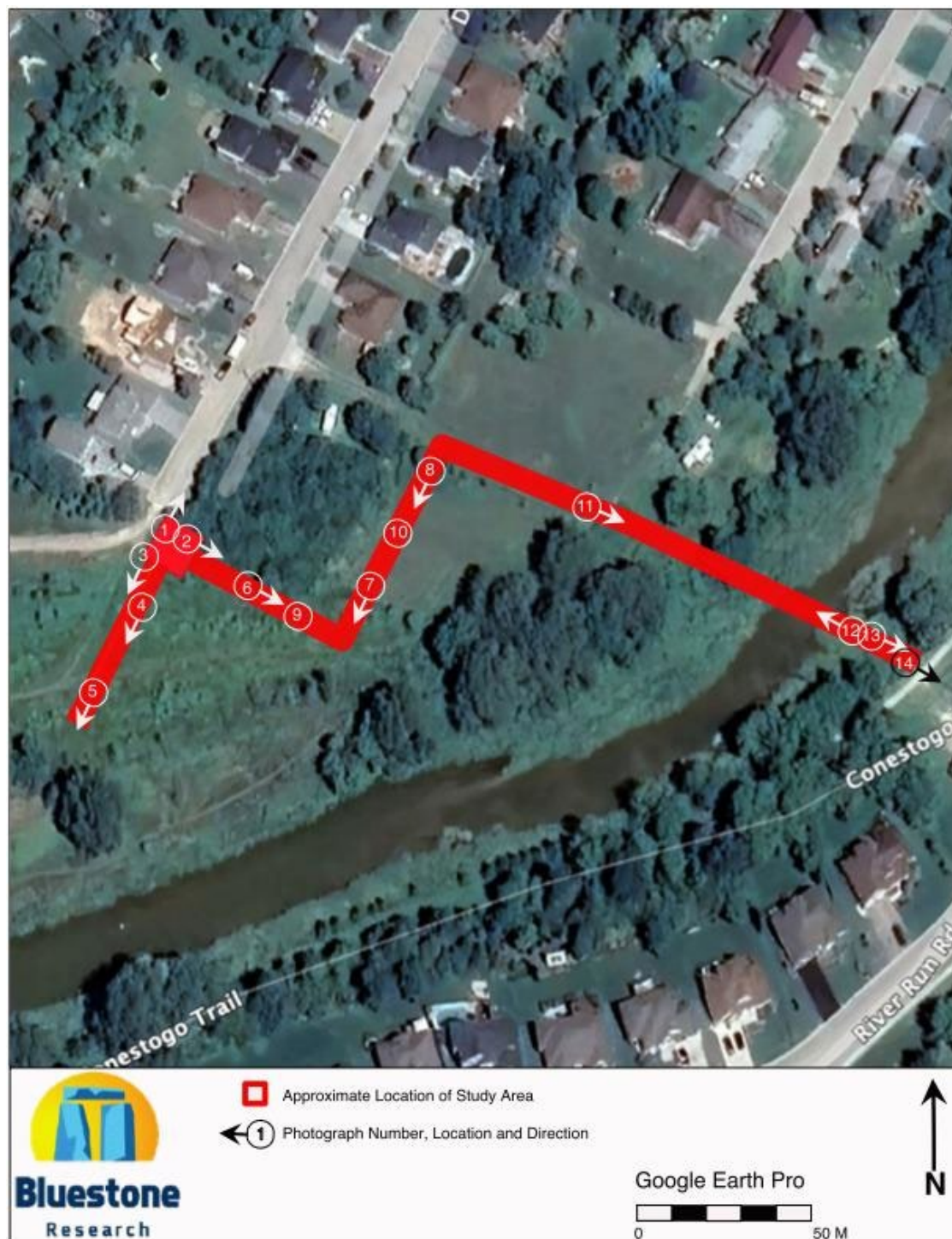
Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

Figure 10: Assessment Strategies Map Showing Areas of Disturbance and Potential.



Stage 1 Archaeological Background Assessment and Stage 2 Archaeological Property Assessment at the Proposed Sanitary Pumping Station, Queen Street (Lot 18, Concession 10), Village of Drayton, Former Geographic Township of Maryborough, now in the Municipality of Mapleton, Wellington County, Ontario

Figure 11: Photograph Locations, Number and Direction.



J

Appendix J: List of Abbreviations

List of Acronyms

Automatic Transfer Switch	ATS
Average Day Demand	ADD
Billing Records	BR
Biochemical Oxygen Demand	BOD
Drinking Water Works Permit	DWWP
Drinking Water Supply System	DWSS
Drinking Water System	DWS
Environmental Assessment	EA
Environmental Assessment Act	EAA
Environmental Activity and Sector Registry	EASR
Environmental Compliance Act	ECA
Environmental Study Report	ESR
Fire Flow	FF
Grand River Conservation Authority	GRCA
Greenhouse Gas	GHG
GSP Group	GSP
Inflow/Infiltration	I&I
Life cycle costs	LCCs
Maximum Day Demand	MDD
Ministry of Environment, Conservation and Parks	MECP
Motor Control Centre	MCC
Moving Bed Bioreactor	MBBR
Municipal Class Environmental Study	MCEA
Multi-Criteria Analysis	MCA
Municipal Engineers Association	MEA
Ontario Clean Water Agency	OCWA
Peak Hour Demand	PHD
Permit to Take Water	PTTW

Programmable Logic Controllers	PLC
Rural Water Quality Program	RWQP
Sequencing Batch Reactor	SBR
Submerged Aerated Growth Reactor	SAGR
Technical Memorandum	TM
Total Dynamic Head	TDH
Total Kjeldahl Nitrogen	TKN
Total Phosphorus	TP
Total Suspended Solids	TSS
Variable Frequency Drive	VFD
Wastewater Treatment Plant	WWTP
Waste Pollution Control Plant	WPCP
Water Distribution System	WDS
Water Treatment Plant	WTP
Sewage Pumping Station	SPS

K

Appendix K: As-Built Drawings for Drayton DWS (W-1)



MINISTRY OF THE ENVIRONMENT

VILLAGE OF DRAYTON

WATER PUMPING STATION

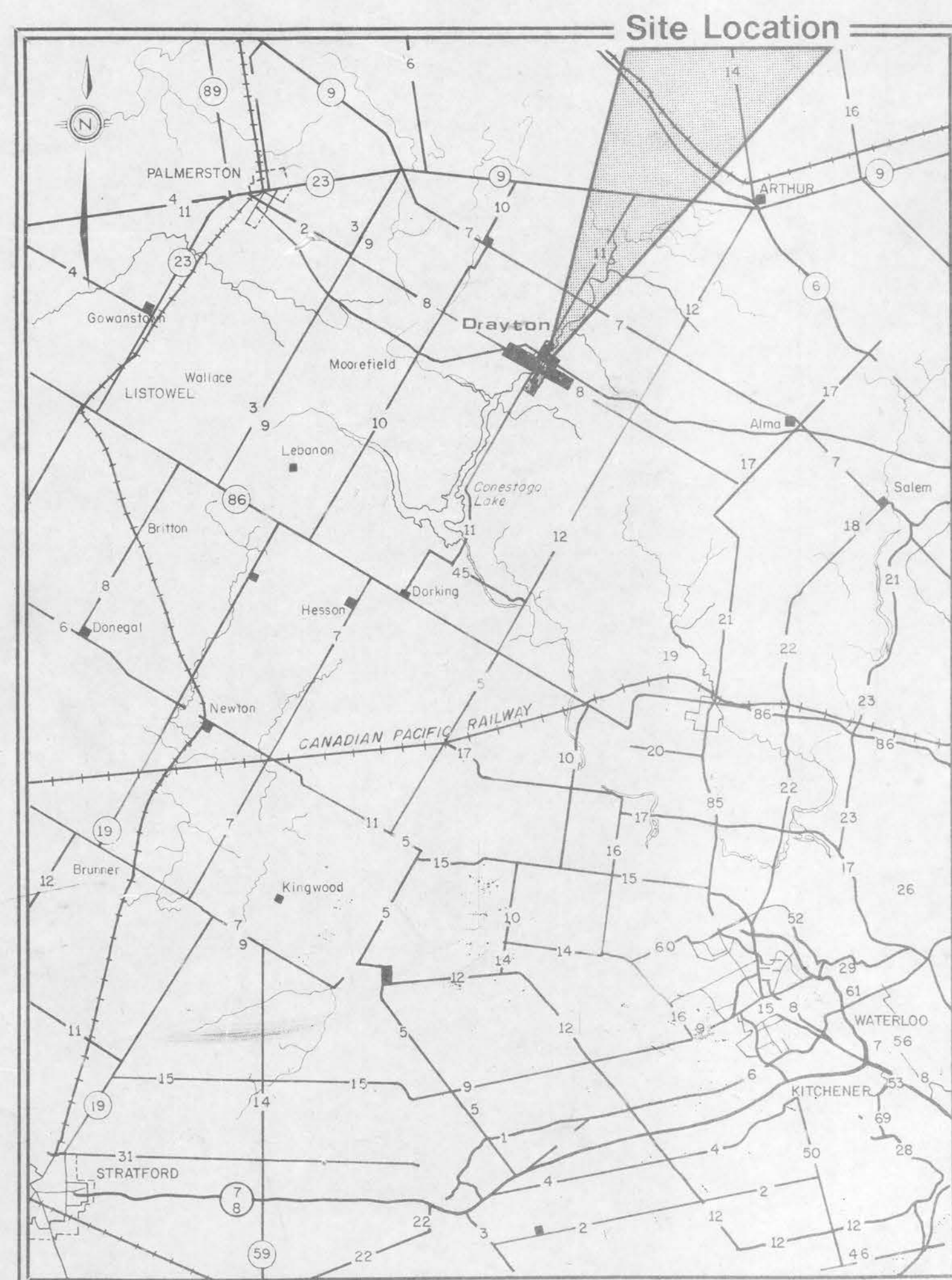
PROJECT No. WATER 7 - 0246

SEWAGE PUMPING STATION

PROJECT No. SEWAGE 3 - 0150

CONTRACT No. 84 - 1

DRAWING LIST



WATER 7-0246

- G1-W WATER PUMPING STATION - SITE PLAN
- G2-W WATERMAIN PLAN & PROFILE
- A1-W WATER PUMPING STATION - SECTIONS
- A2-W ELEVATIONS
- A3-W FLOOR PLAN
- A4-W SECTIONS
- A5-W WATER PUMPING STATION & GENERATOR BUILDING
- S1-W STRUCTURAL
- S2-W STRUCTURAL
- S3-W STRUCTURAL
- S4-W STAIRWAY STRUCTURAL DETAILS & GENERAL NOTES
- M1-W PLAN
- M2-W SECTION & DETAILS
- M3-W SECTIONS & DETAILS
- M4-W SECTIONS
- M5-W RESERVOIR SECTIONS & DETAILS, WELL PUMPS SECTIONS & DETAILS
- M6-W SECTIONS & DETAILS
- E1-W PROCESS & INSTRUMENTATION DIAGRAM
- E2-W SINGLE LINE DIAGRAM, MCC LAYOUT & LP LAYOUT
- E3-W POWER LAYOUT
- E4-W LIGHTING LAYOUT
- E5-W CONTROL SCHEMATICS

SEWAGE 3 - 0150

- G1-S MILL STREET, SERVICES, ACCESS ROAD & SITE
- G2-S SITE PLAN OF PROPOSED WORKS
- G3-S SITE CROSS SECTIONS & DETAILS
- A1-S GENERATOR BUILDING - ELEVATIONS
- A2-S PLAN & SECTION
- S1-S STRUCTURAL DETAILS
- M1-S PLANS & DETAILS
- M2-S SECTIONS
- M3-S PLAN, SECTION & DETAILS
- M4-S SEWAGE PUMPING STATION - COVER PLANS & DETAILS
- M5-S MISCELLANEOUS DETAILS
- E1-S GENERATOR BUILDING PLAN, SINGLE LINE DIAGRAM, MCC LAYOUT, LIGHTING PANEL LAYOUT & CONTROL SCHEMATICS



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CONSULTING ENGINEERS AND PLANNERS
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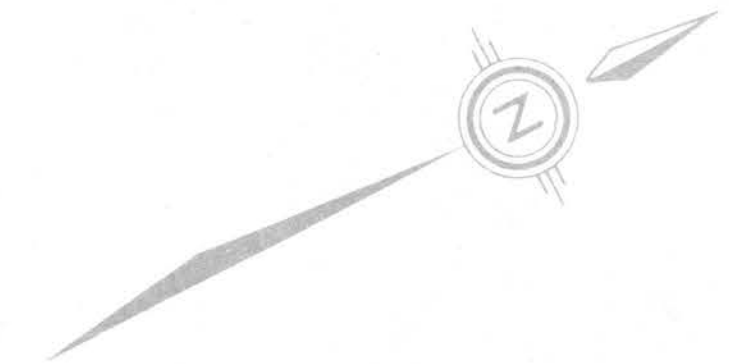
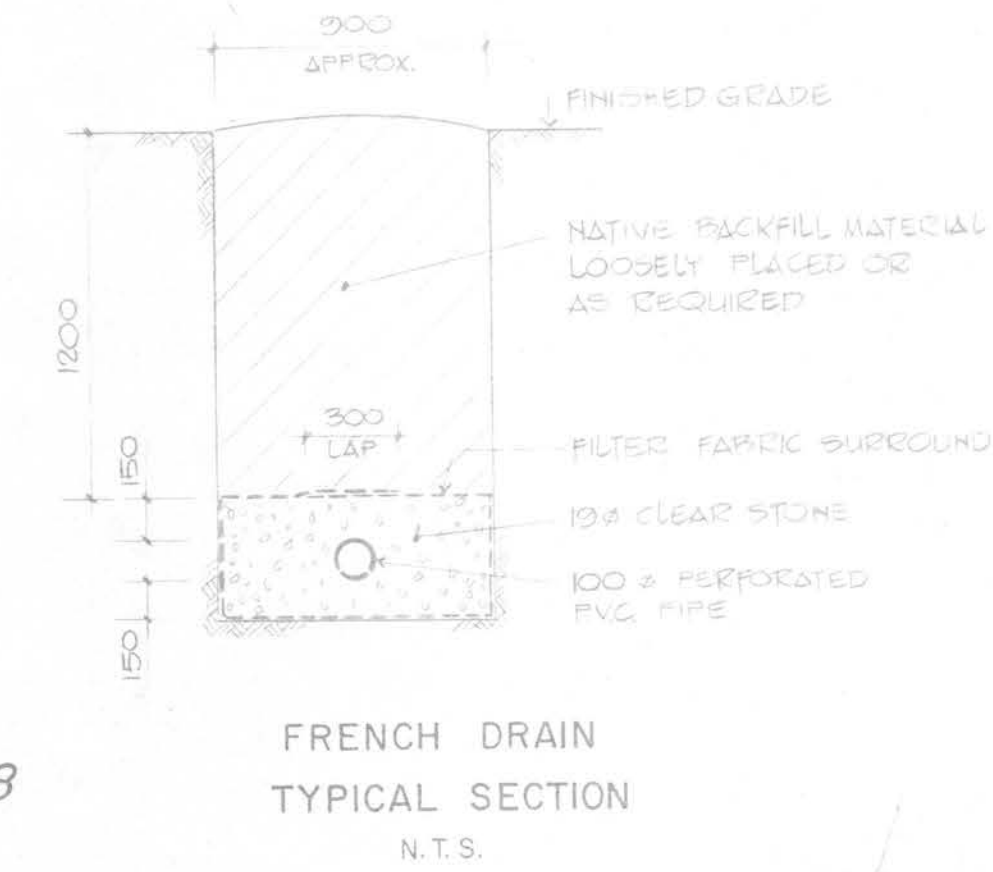
SIMCOE ENGINEERING
GROUP LTD.

NOTES:

- 1) THE CONTRACTOR IS RESPONSIBLE FOR THE LOCATION OF ALL EXISTING UNDERGROUND AND OVERHEAD UTILITIES. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCED NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. NO RESPONSIBILITY IS ASSUMED FOR THE ACCURACY OF THE LOCATION OF ANY EXISTING UTILITIES AS INDICATED ON THIS DRAWING.
- 2) CONTRACTOR TO ENCLOSE CONSTRUCTION SITE WITH SNOW FENCE SECURELY WIRED TO T BAR FENCE POSTS AT 2 METRE SPACING DURING CONSTRUCTION PERIOD.
- 3) ALL AREAS TO BE SEEDER AND/OR SODDED TO HAVE A MINIMUM OF 100 mm DEPTH OF TOPSOIL.
- 4) IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ANY ALL ELEVATIONS PRIOR TO COMMENCING WORK ON SITE.
- 5) BH-WH: BENCHMARK LOCATION OF BENCHMARKS ARE APPROXIMATE AND FOR INFORMATION ONLY. CONSULT SOILS REPORT FOR ALL PERTINENT INFORMATION ON BORE HOLES.

LEGEND:

- INDICATES AREA TO BE SODDED
- INDICATES AREA OF NEW GRAVEL & DRIVEWAY RECONSTRUCTION SEE SPECIFICATION
- INDICATES EXISTING SPOT ELEVATION
- INDICATES NEW CONTOUR LINES
- INDICATES SURVEY BARS
- INDICATES SHRUBS OR TREES
- INDICATES HYDRO LINE



WOOD ST.

PARK LOT 459

PARK LOT 458

FRENCH DRAIN
TYPICAL SECTION
N.T.S.

NOTE:

CONTRACTOR TO RESTRICT HIS OPERATIONS TO THE EAST SIDE OF DITCH. NO DEBRIS, FILL ETC TO BE PLACED IN DITCH.

CONTRACTOR SHALL RESTRICT VEHICULAR MOVEMENT TO EXISTING GRAVEL DRIVEWAY. ANY/DAMAGE DUE TO CONTRACTOR'S EQUIPMENT SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE. CONTRACTOR SHALL BE REQUIRED TO RECONSTRUCT DRIVEWAY IN ACCORDANCE WITH THE SPECIFICATIONS.

NOTE: PROVIDE UNINTERRUPTED ACCESS TO HYDRO COMMISSION BUILDING

PLACE NEW GRAVEL & EXTEND EDGE OF DRIVEWAY TO THIS POINT

REMOVE EXISTING 450mm CSP & INSTALL NEW 450mm CSP TO SUIT WIDTH OF DRIVEWAY

NEW 300mm CSP OVERFLOW TO DITCH

SPILL TO BE REMOVED & DEPOSITED BY THE CONTRACTOR

NEW 10 KILMIA LATIFOLIA 'MOUNTAIN LAUREL' 500 TO 600mm HT 50 CAL MIN.

NEW PLANTING SEE DETAIL TIC SHEET

NEW PRECAST M.H. SEE SPECIFICATION

NEW PILE-UP CONCRETE SUBS.

NOTE:

ANY ALL DEBRIS TO CHAIN-LINK FENCE OR OTHER PERIOD SHALL BE REMOVED OR DISPOSED TO THE SATISFACTION OF THE BUSINESS.

SPILL TO BE REMOVED AND DEPOSITED BY THE CONTRACTOR

FRENCH DRAIN - 500mm LENGTH, 100mm PERFORATED PVC PIPE

NEW 100mm CSP DEAN TO GUYAN BURN

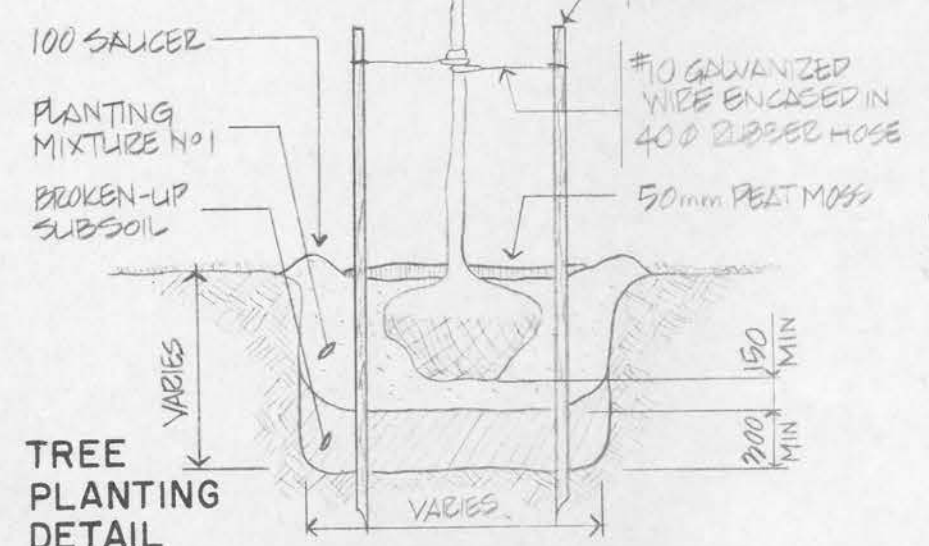
NEW 5 KILMIA LATIFOLIA 'MOUNTAIN LAUREL' 500 TO 600mm HT 50 CAL MIN 1500mm SPREAD

PUMPING STATION & RESERVOIR

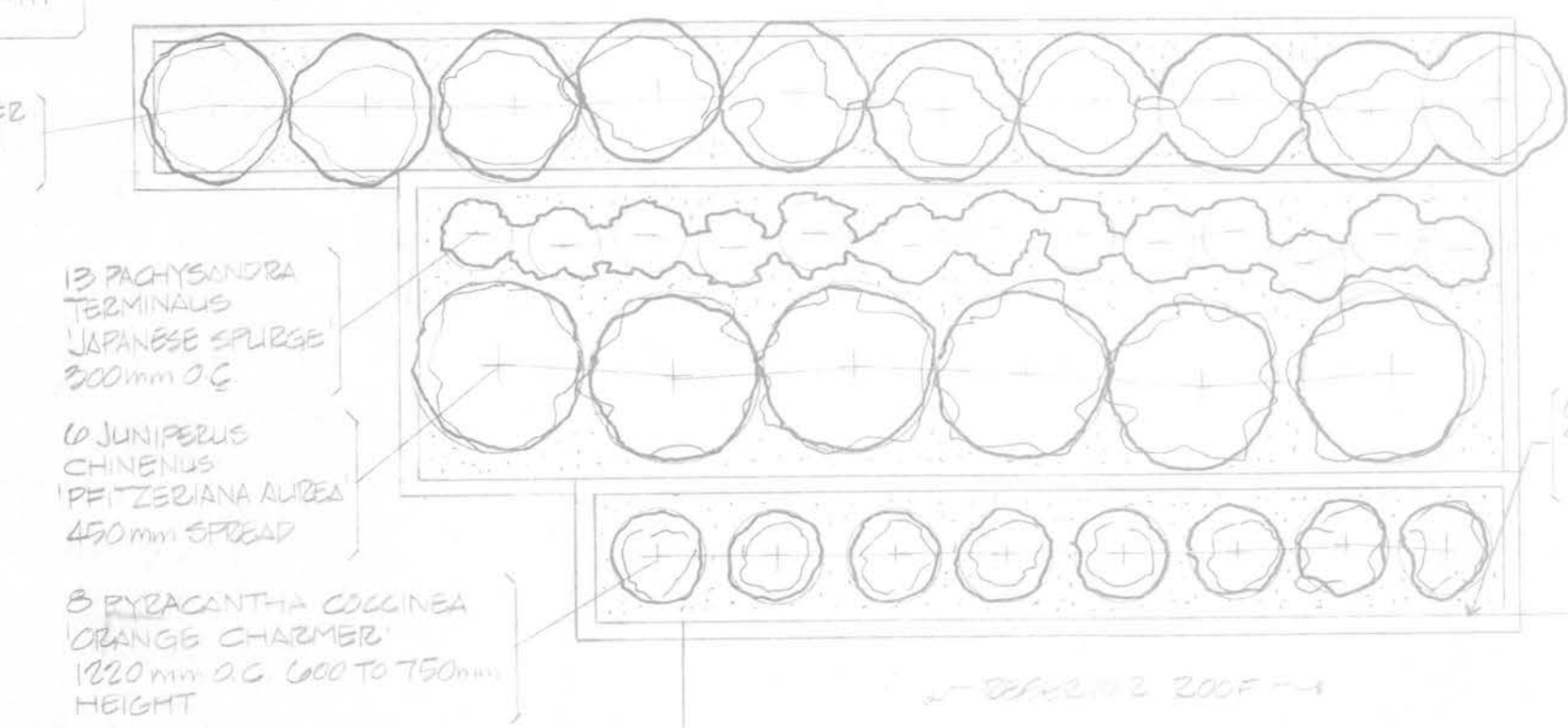
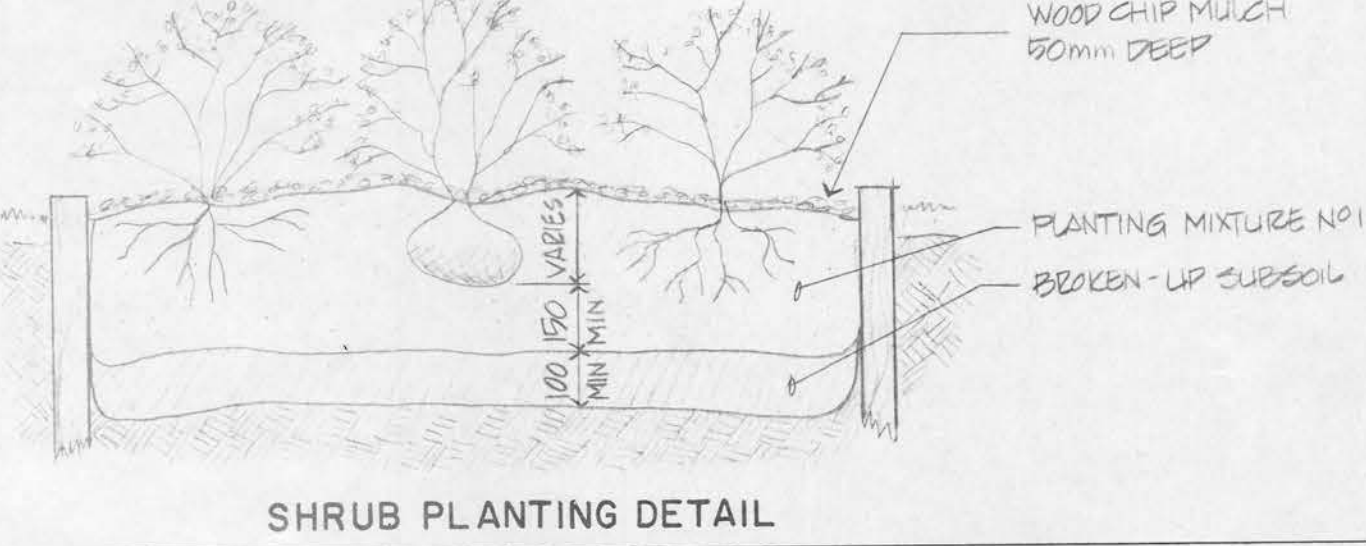
NEW 5 KILMIA LATIFOLIA 'MOUNTAIN LAUREL' 500 TO 600mm HT 50 CAL MIN 1500mm SPREAD

NOTES:

THIN BRANCHES & TWIGS BY 1/3 RETAINING NORMAL TREE SHAPE. DO NOT TRIM LEADER. PAINT ALL CUTS OVER 150mm WITH TREE PAINT.



SHRUB PLANTING DETAIL






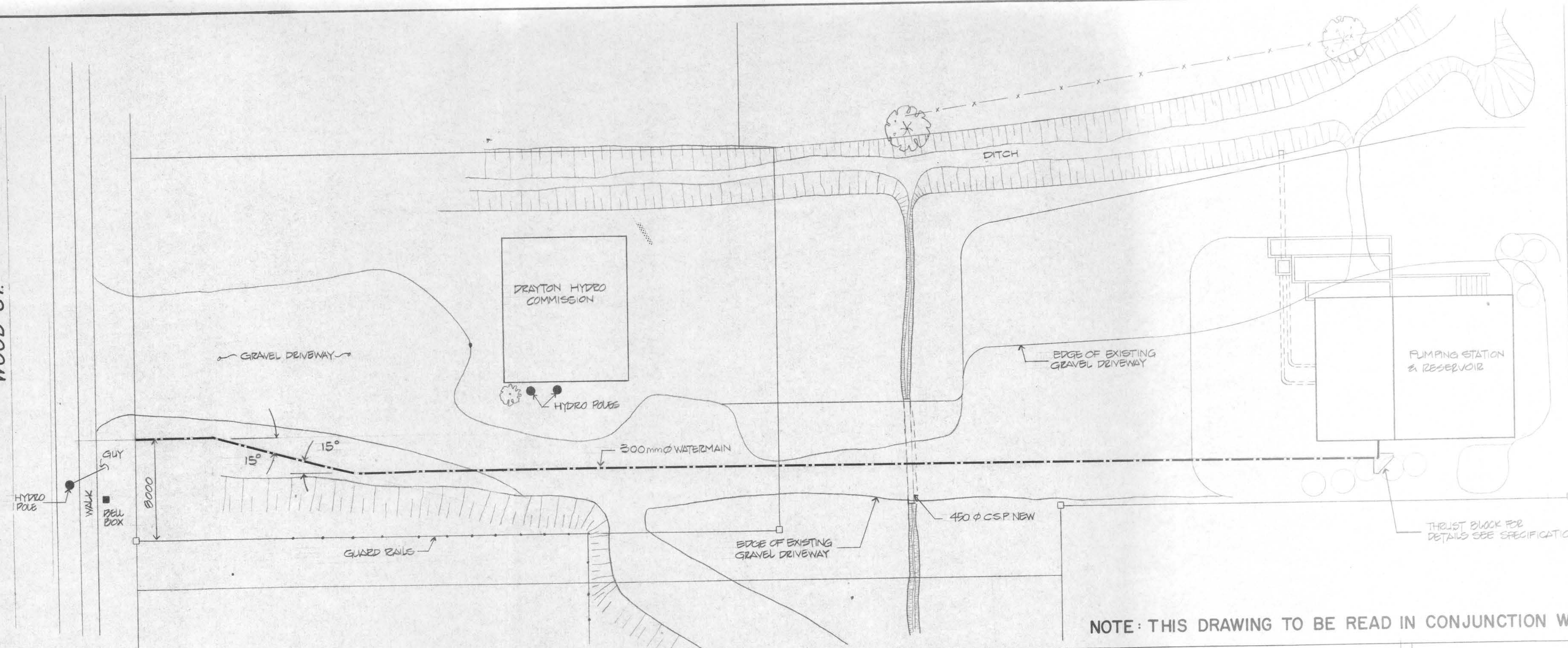
NOTES:

- 1) ALL EXPOSED NAILS & SCREWS TO BE HOT DIPPER GALVANIZED
- 2) 100mm DEEP SOIL IN PLANTER WITH 50mm MULCH TOPPING & 150mm GRAVEL AT BOTTOM

DETAIL OF PLANTERS

All Dimensions Are In Millimetres
All Elevations Are Geodetic Metric

Date	Revisions	<div><p>K. SMART ASSOCIATES LIMITED CONSULTING ENGINEERS AND PLANNERS 460 FREDERICK STREET KITCHENER, ONTARIO N2H 2P5</p></div>	<div><p>Ontario</p></div>	MINISTRY OF THE ENVIRONMENT		<div><p>Simcoe Simcoe Engineering Group Limited • Consulting Engineers</p></div>			
				VILLAGE OF DRAYTON PROJECT N° WATER 7-0246 CONTRACT N° 84-1			Design R.L.S.	Scale 1:200	Drawing No. GI-W
				WATER PUMPING STATION - SITE PLAN			Drawn T.F.T.	Date NOV. 1984	
					Checked D.D.B.C.				



NOTE: THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SPECIFICATIONS.

EL 405
EL 404
EL 403
EL 402
EL 401
EL 400
EL 399

WOOD STREET

1" OF VERTICAL DEFLECTION
6M @ 0.00%

15.5M @ 10.00%

1" OF VERTICAL DEFLECTION

100' (30.5M) - 300mm DIA.
84' (25.6M) @ 0.00%

FILL AS REQD

PVC SERIES 160 (502.25) CSA B137.3

EXISTING GRADE

NEW GRADE

450mm Ø CSP

DUCTILE IRON CLASS 50
AWWA C151-6 CEMENT LINED
RESTRAINED

90° ELBOW

REMOVE EXISTING 300Ø PLUG FROM EXISTING 300Ø PVC PIPE AT PROPERTY LINE AND CONNECT NEW WATERMAIN

1.8M MIN COVER

NOTE:
ALL FITTINGS CAST IRON TO AWWA C110

CONNECT TO FLANGED END STAINLESS STEEL 300mm Ø PIPE & WELD JOINT IN THE DENSOL TAPE SYSTEM

RESERVOIR

USE IN STABLE SOILS OTHER THAN SILTY CLAY

USE IN UNSTABLE SOILS OR SILTY CLAY

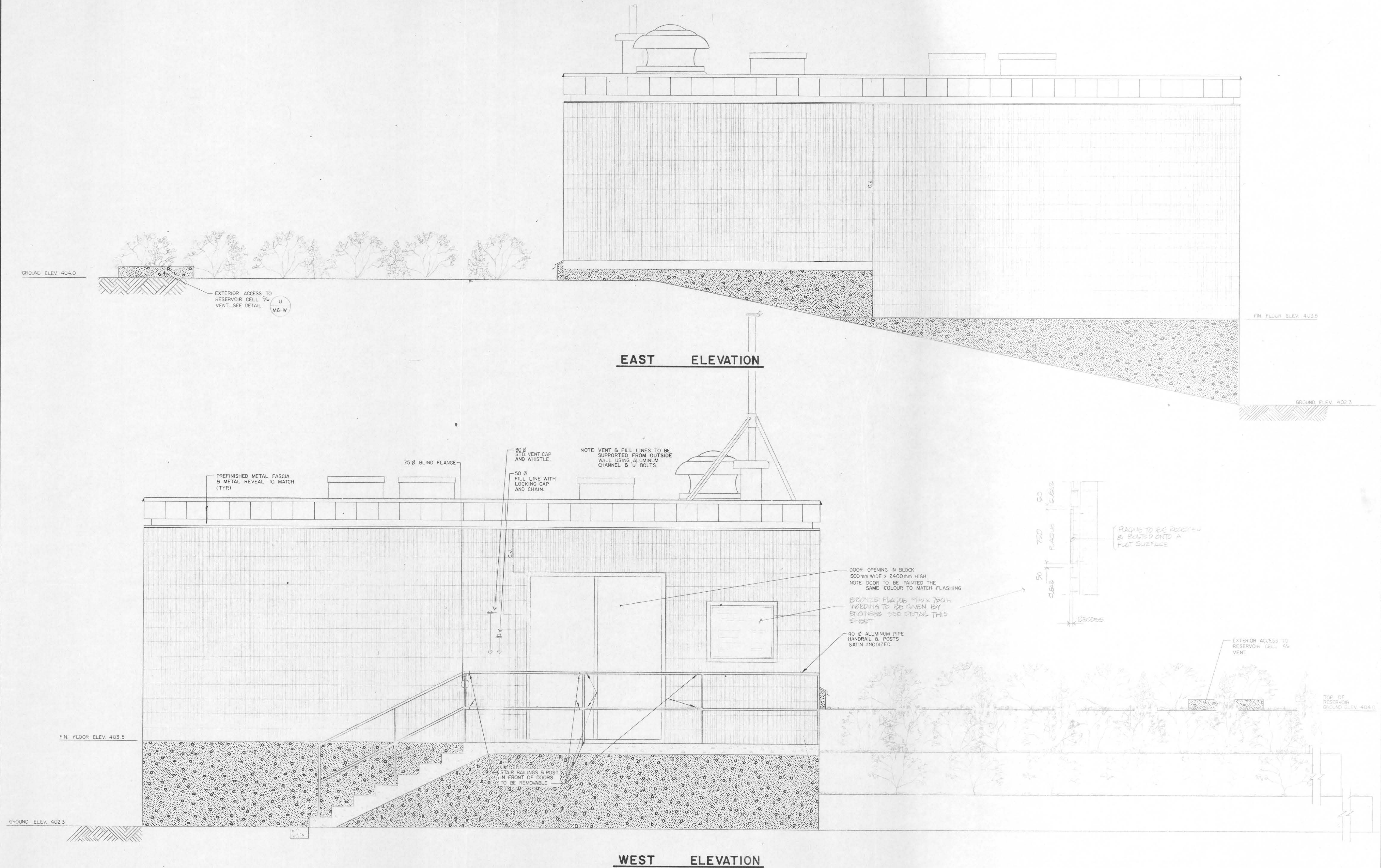
BEDDING DETAILS



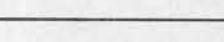

NOTES:
FOR PLASTIC PIPE MATERIALS
USE TRACER WIRE - 12 GAUGE
COPPER PLASTIC COATED TAPED
THE TOP OF IF WATERMAIN IN
FIBERGLASS TAPE

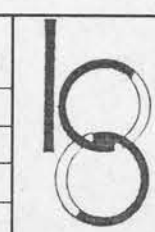
BEDDING MATERIAL PLACED IN
150mm LAYERS & COMPACTED
TO 95% STD PROCTOR DENSITY

STATION	TOP OF WATERMAIN ELEVATION	DRIVEWAY ELEVATION
00+00	401.1	403.05
00+06	401.1	402.8
01+00		402.3
02+50	400.0	402.3
02+00		402.3
03+00		402.16
04+00		402.5
05+00		401.75
06+00		401.65
07+00		401.56
08+00		401.56
08+30	400.0	401.36
09+00	400.0	401.28
09+9.2	400.0	401.14
10+00		401.00
10+350		401.14

Design	R.L.S.	Scale Horiz. 1:200 Vert. 1:50	Drawing No. G2-W
Drawn	T.F.T.		
Checked	D.D.B.C.	Date NOV.1984	

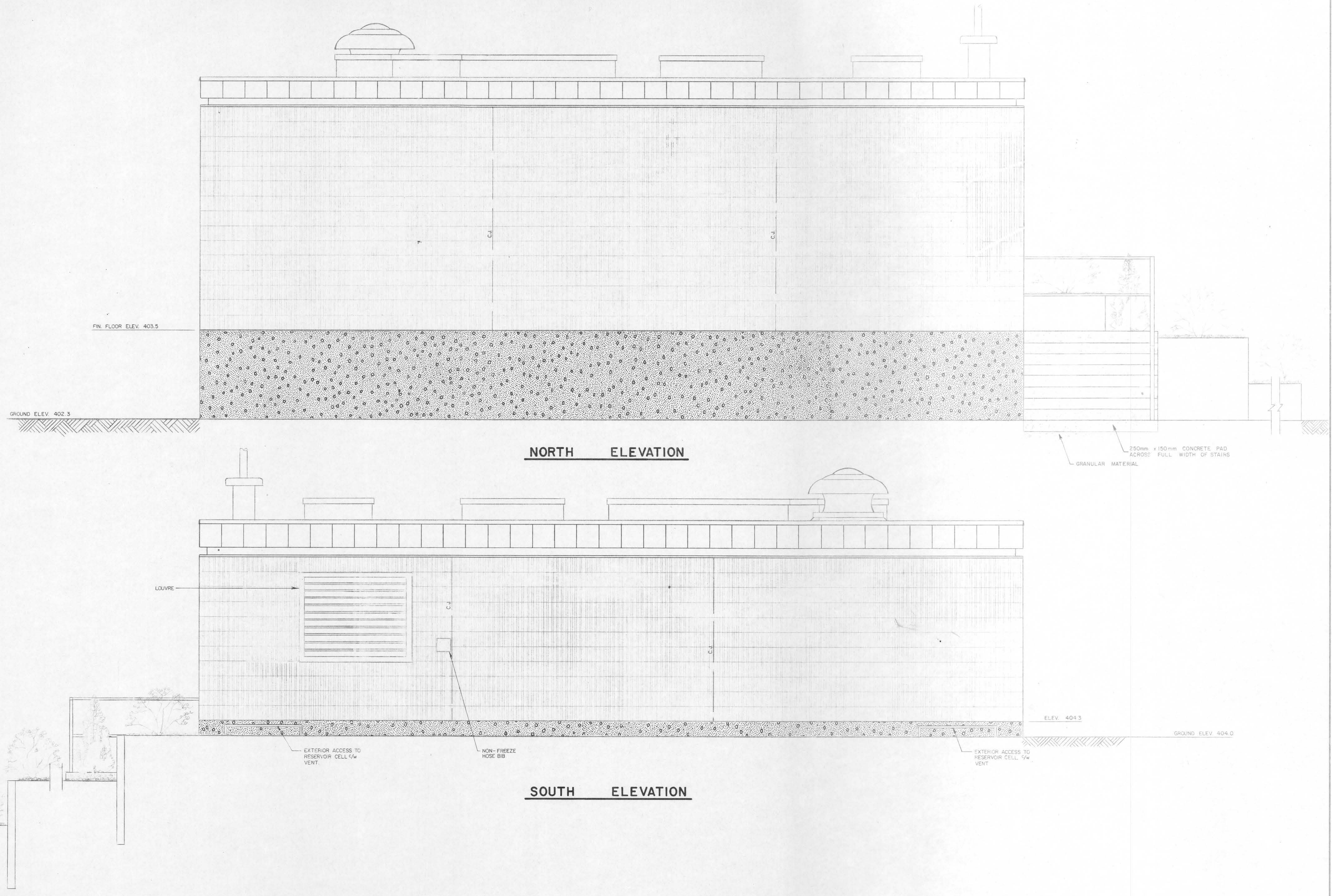






Date	Revisions	 K. SMART ASSOCIATES LIMITED CONSULTING ENGINEERS AND PLANNERS 460 FREDERICK STREET KITCHENER, ONTARIO N2H 2P5	 REGISTERED PROFESSIONAL ENGINEER E. M. ABRAHAM PROVINCE OF ONTARIO	 Ontario	MINISTRY OF THE ENVIRONMENT		 REGISTERED PROFESSIONAL ENGINEER R. L. SMITH PROVINCE OF ONTARIO	Simcoe	
					VILLAGE OF DRAYTON PROJECT N° WATER 7-0246 CONTRACT N° 84-1			Simcoe Engineering Group Limited • Consulting Engineers	
					WATER PUMPING STATION - ELEVATIONS			Design E. A.	Scale Horiz. 1:25 Vert. 1:25
					Drawn I. U.			AI-W	
					Checked E. A.	Date NOV. 1984			



K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
460 FREDERICK STREET
KITCHENER, ONTARIO N2H 2P5



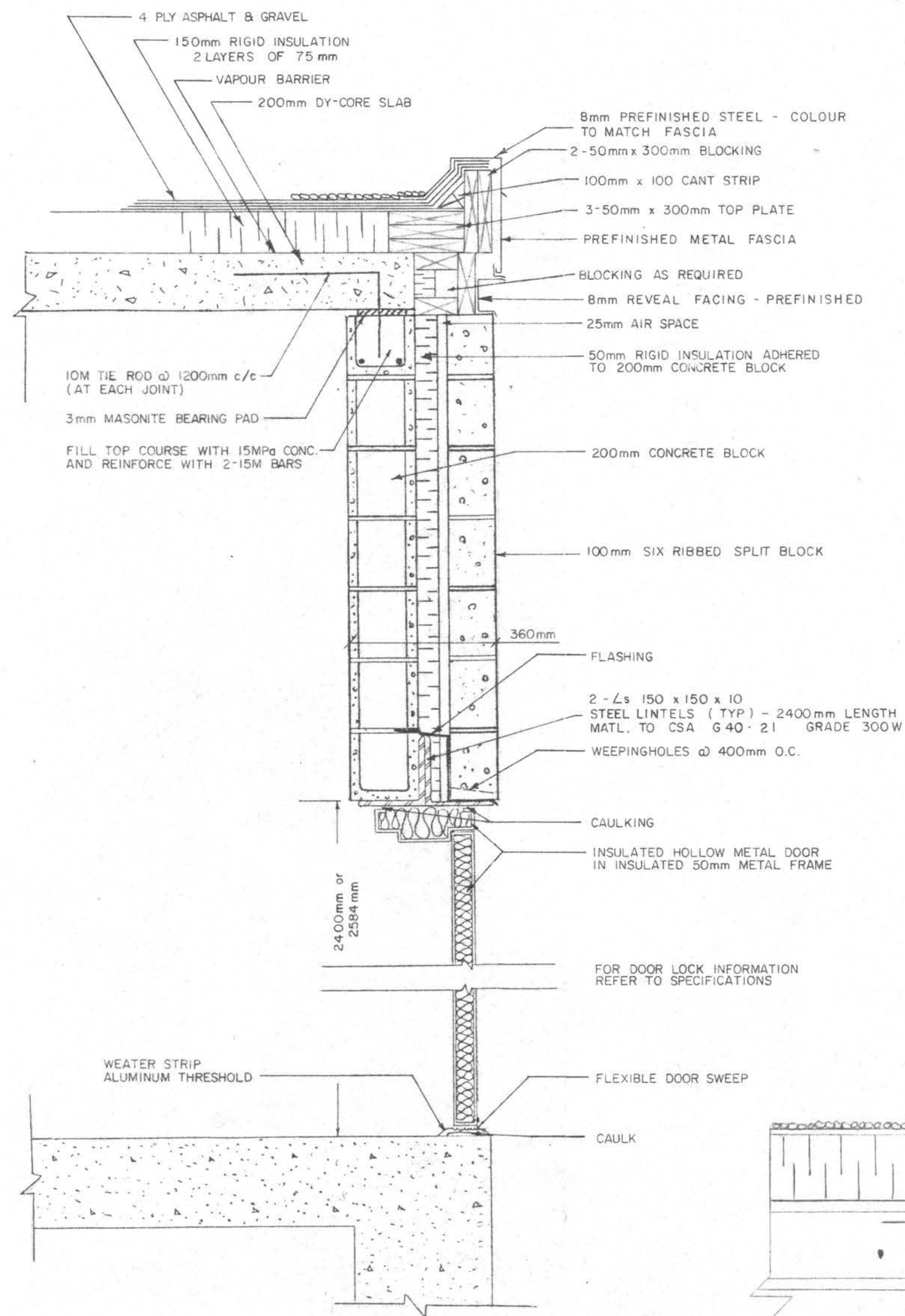


Date	Revisions	 K. SMART ASSOCIATES LIMITED CONSULTING ENGINEERS AND PLANNERS 460 FREDERICK STREET KITCHENER, ONTARIO N2H 2P5	 E. M. ABRAHAM PROV. OF ONTARIO	 Ontario	MINISTRY OF THE ENVIRONMENT		 R. L. SMITH PROV. OF ONTARIO	Simcoe		
					VILLAGE OF DRAYTON	PROJECT N° WATER 7-0246 CONTRACT N° 84-1		Simcoe Engineering Group Limited • Consulting Engineers		
					WATER PUMPING STATION - ELEVATIONS			Design E. A.	Scale	Drawing No. A2-W
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					Checked E. A.	Date NOV. 1984				

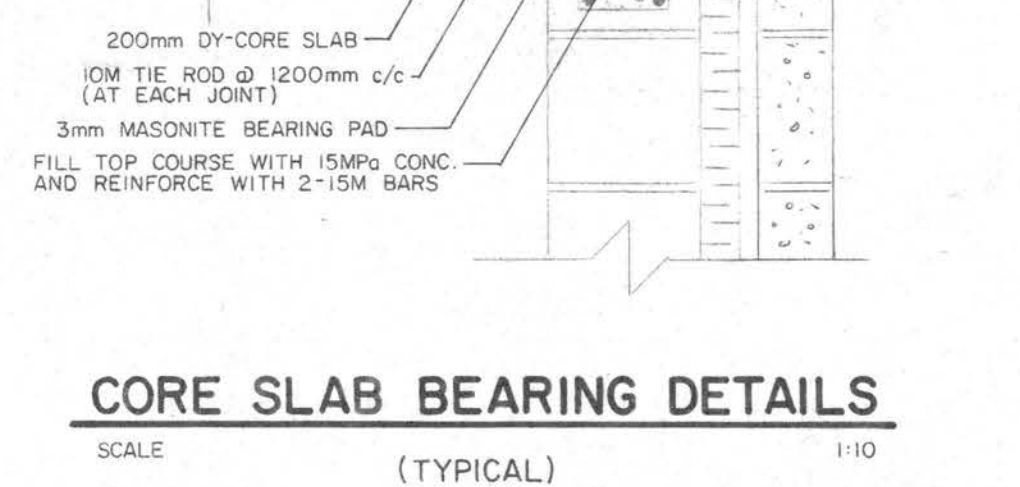


FOR GENERAL NOTES SEE DWG No. S4-W

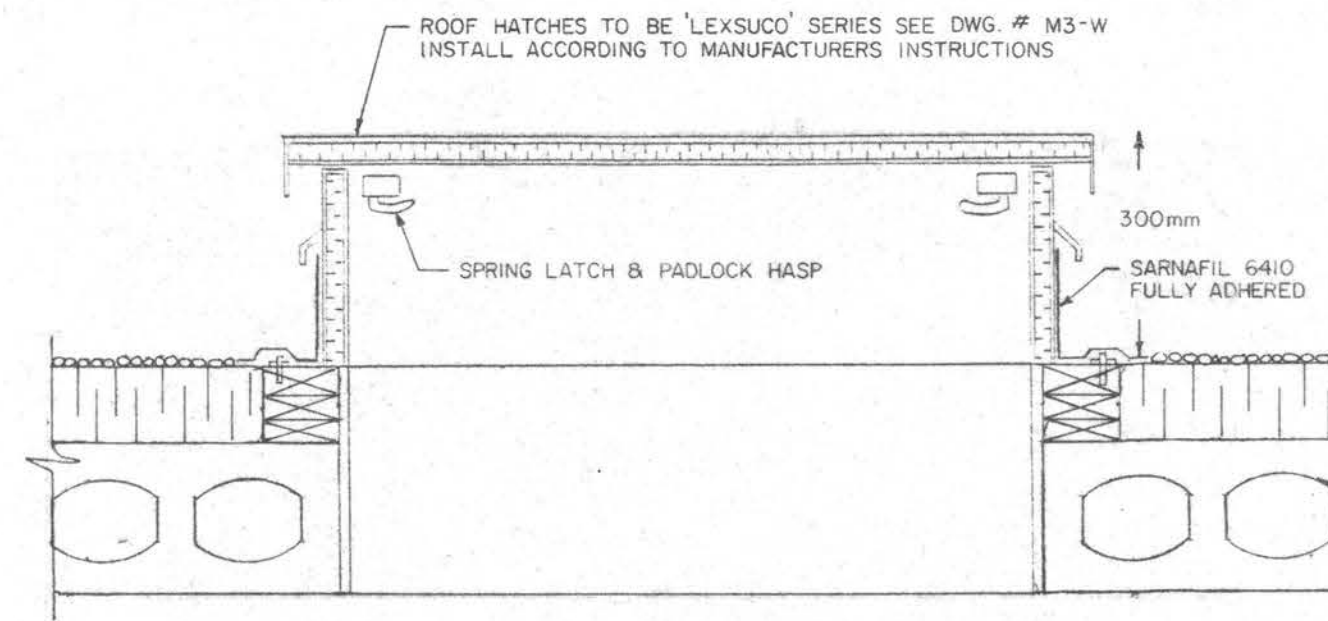
REGISTERED PROFESSIONAL ENGINEER
R. L. SMITH
PROVINCE OF ONTARIO



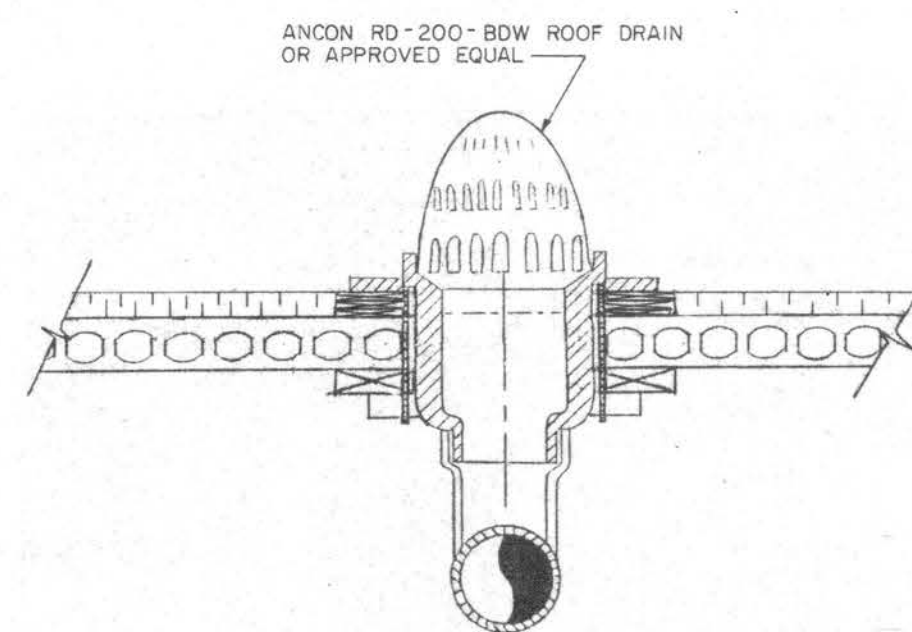
WALL SECTION
N.T.S.



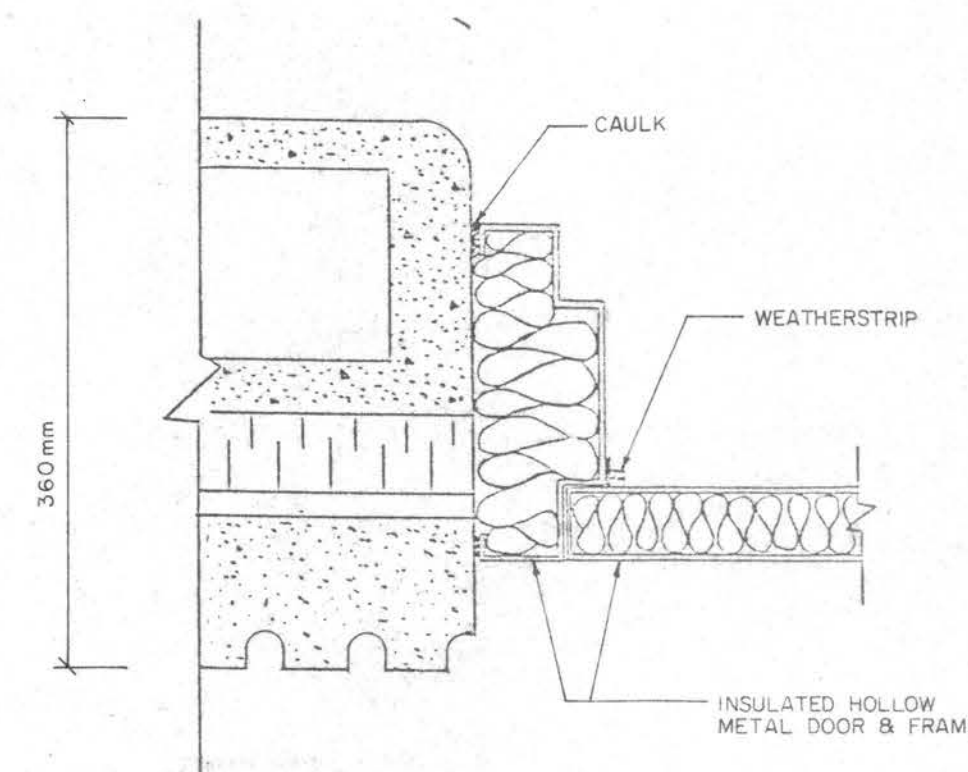
CORE SLAB BEARING DETAILS
SCALE (TYPICAL) 1:10



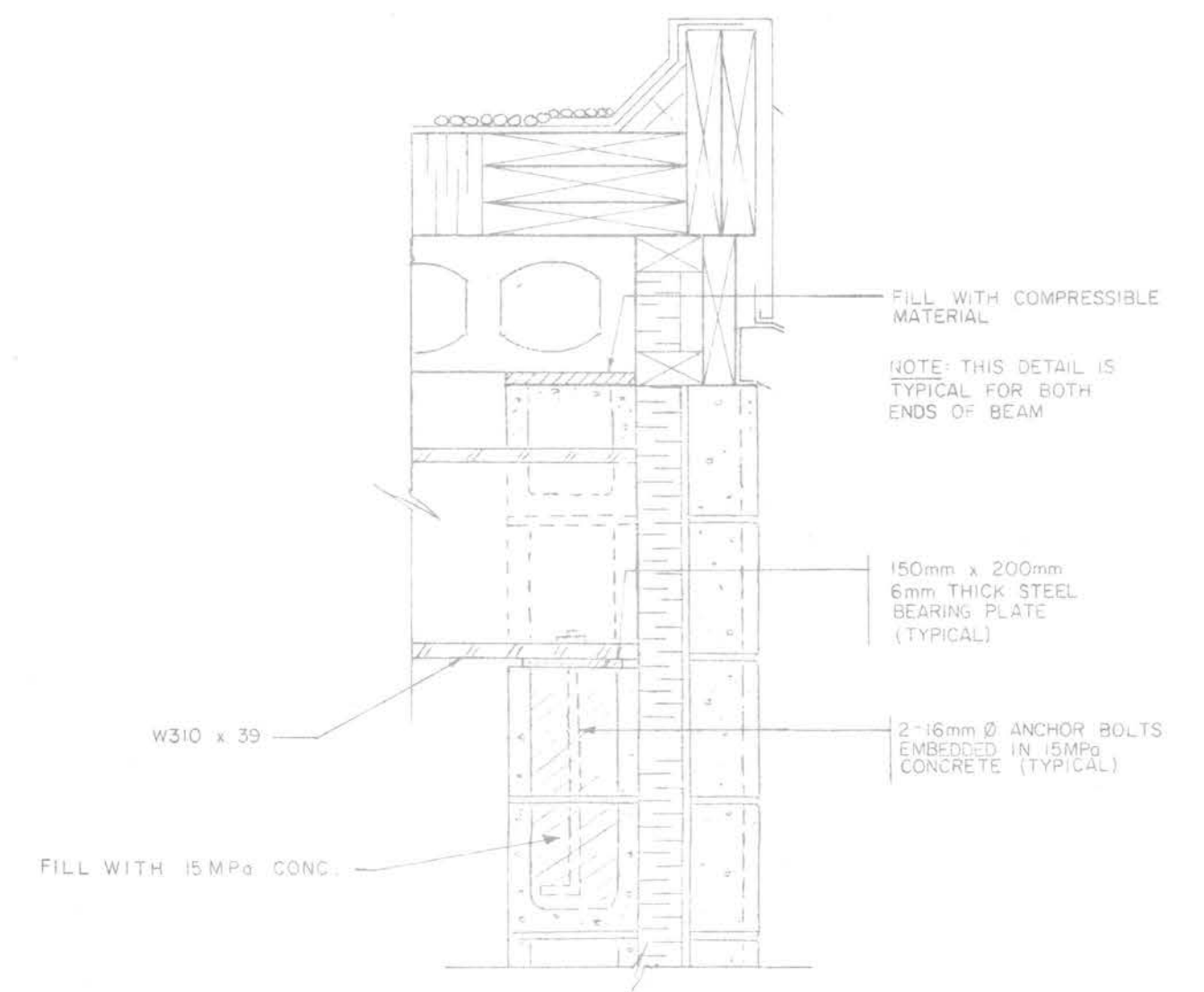
ROOF ACCESS HATCH DETAIL
SCALE 1:10



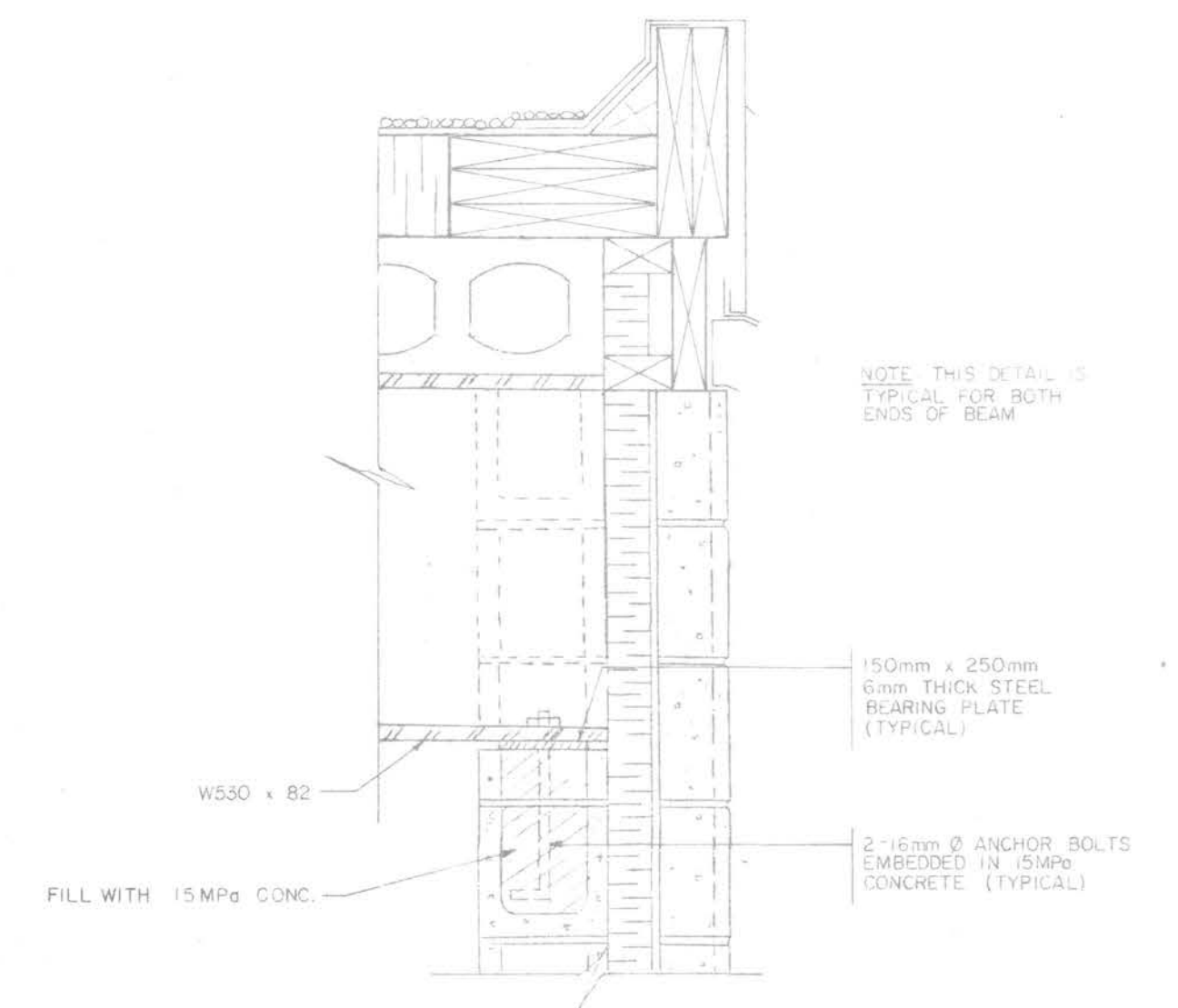
ROOF DRAIN DETAIL
SCALE N.T.S.



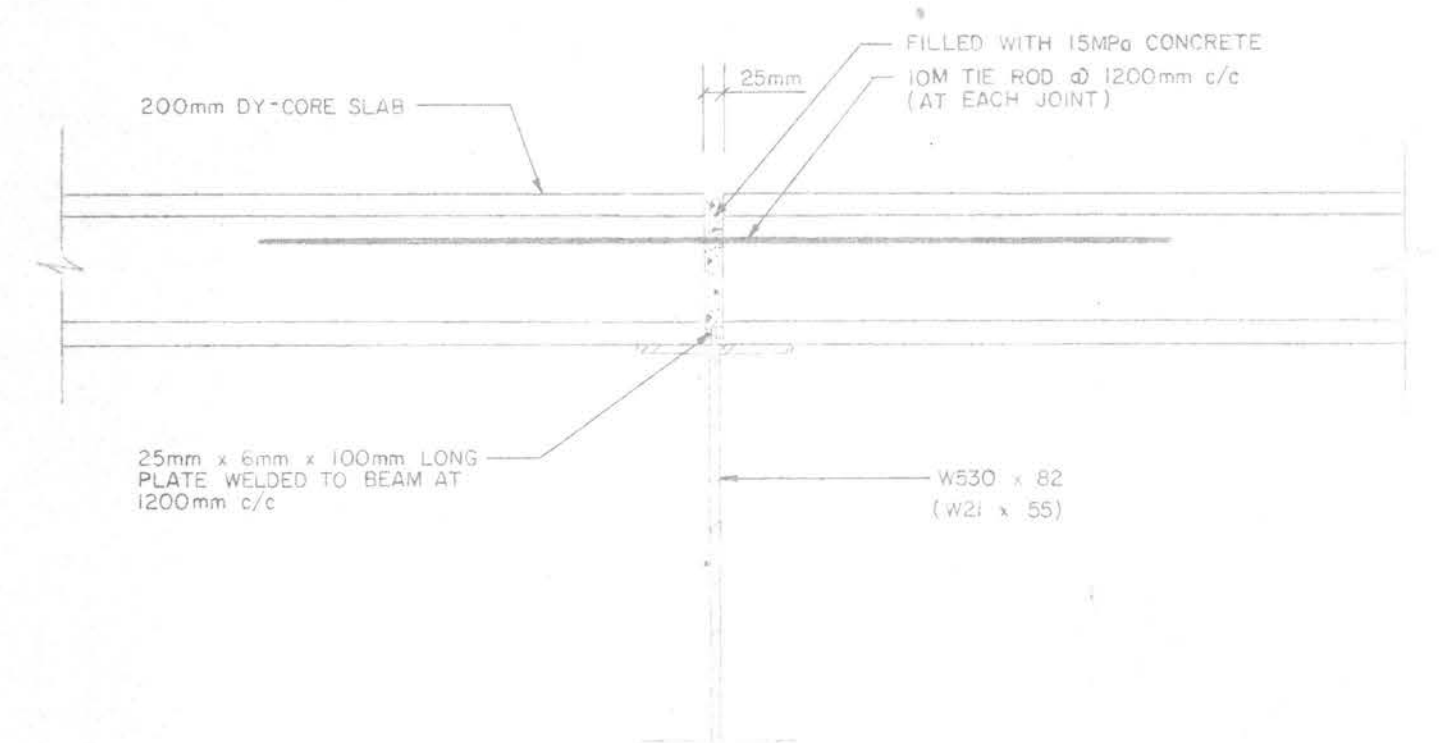
DOOR JAMB DETAIL
SCALE (TYPICAL) 1:5



STEEL BEAM BEARING DETAIL
SCALE (MONORAIL) 1:10







STEEL BEAM BEARING DETAIL
SCALE (WATER PUMPING STATION) 1:10



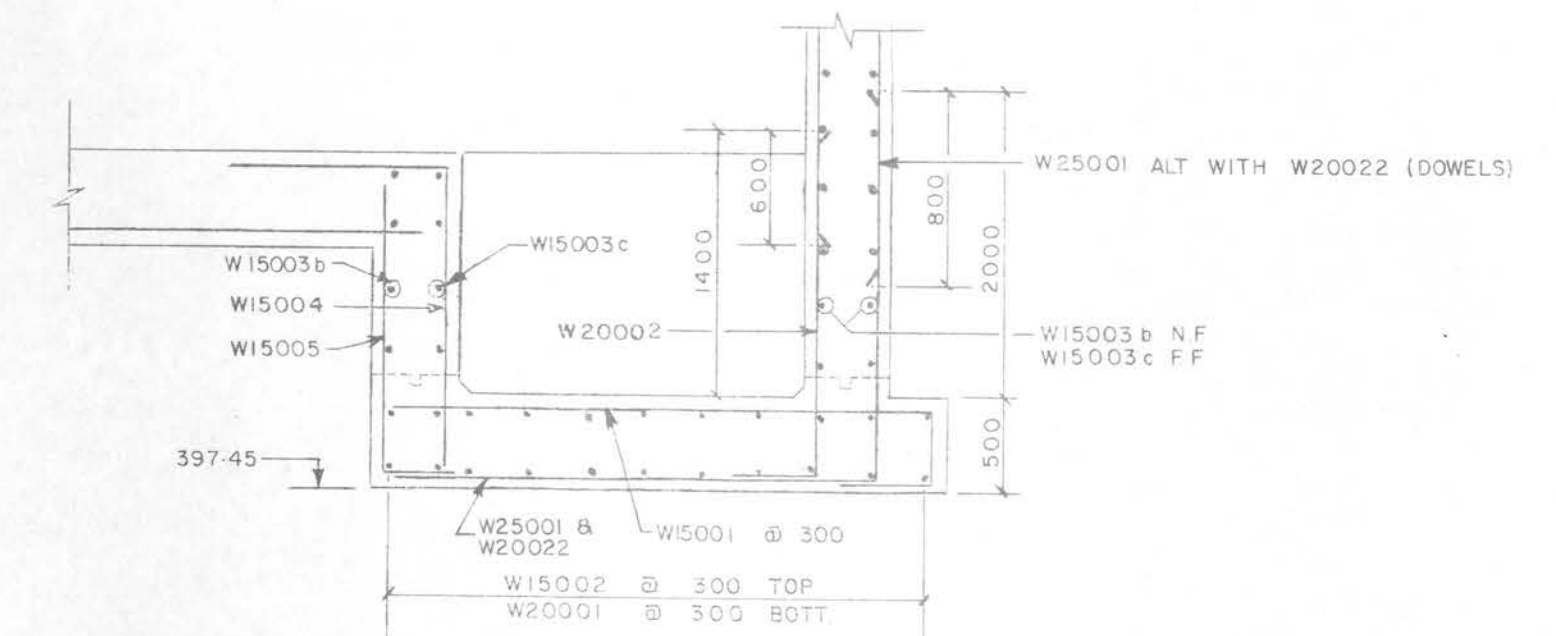
DETAIL OF CORE SLAB BEARING ON STEEL BEAM
SCALE 1:10

FOR GENERAL NOTES SEE DWG. No. S4-W

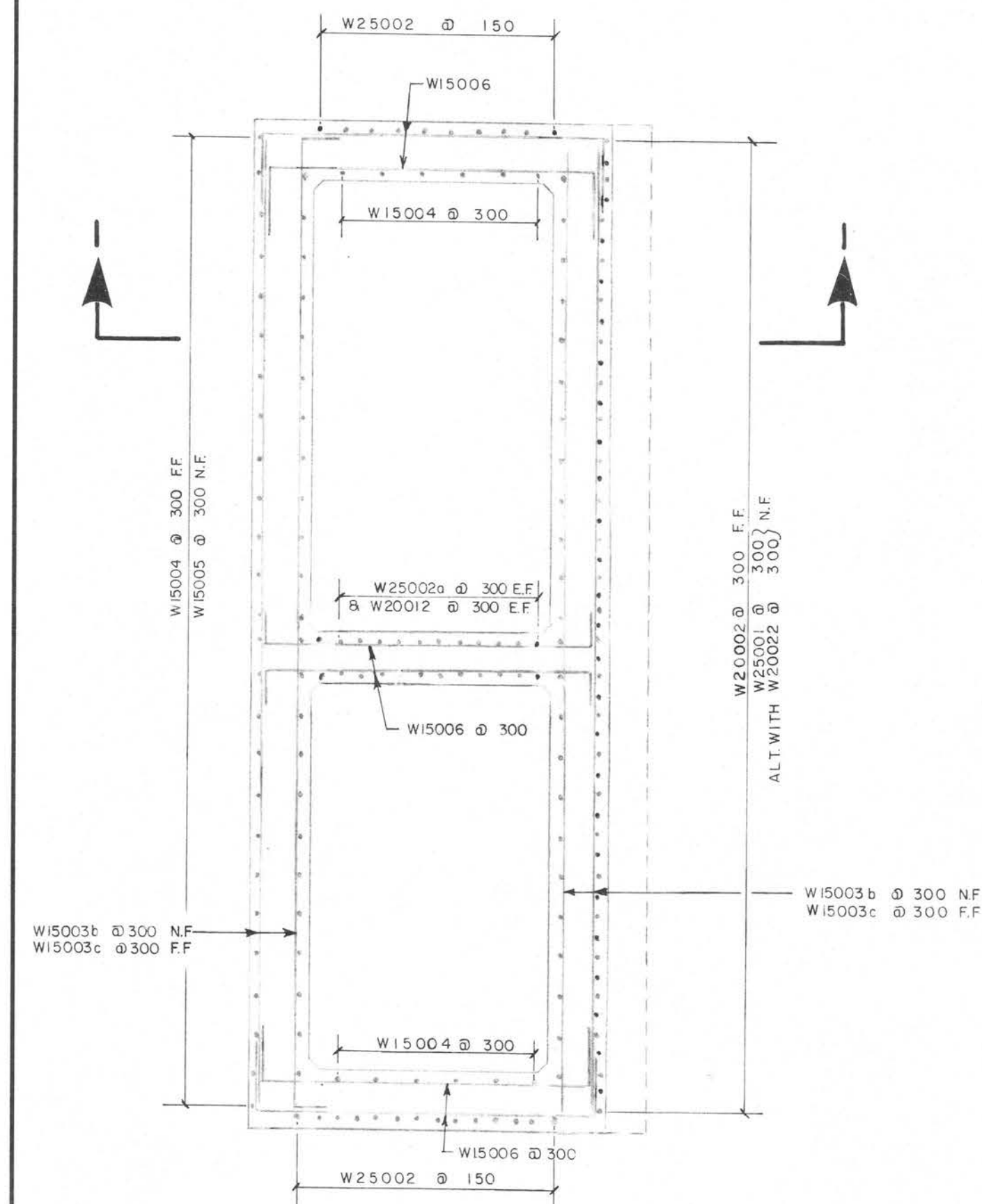
Date	Revisions	 K. SMART ASSOCIATES LIMITED CONSULTING ENGINEERS AND PLANNERS 460 FREDERICK STREET KITCHENER, ONTARIO N2H 2P5	 E. M. ABRABHAM PROVINCE OF ONTARIO	 Ontario	MINISTRY OF THE ENVIRONMENT		 R. L. SMITH PROVINCE OF ONTARIO	Simcoe		
					VILLAGE OF DRAYTON PROJECT N° 7-0246/3-0150 CONTRACT N° 84-1			Simcoe Engineering Group Limited • Consulting Engineers		
					WATER PUMPING STATION & GENERATOR BUILDINGS DETAILS			Design E.A.	Scale 1/8" NOTED	Drawing No.
								Drawn S.H., A.P.	Horiz. Vert.	A5-W
					Checked E.A.	Date DEC 1984				

C. J.	CONSTRUCTION JOINT
DWLS.	DOWELS
E. F.	EACH FACE
E. W.	EACH WAY
F. F.	FAR FACE
N. F.	NEAR FACE

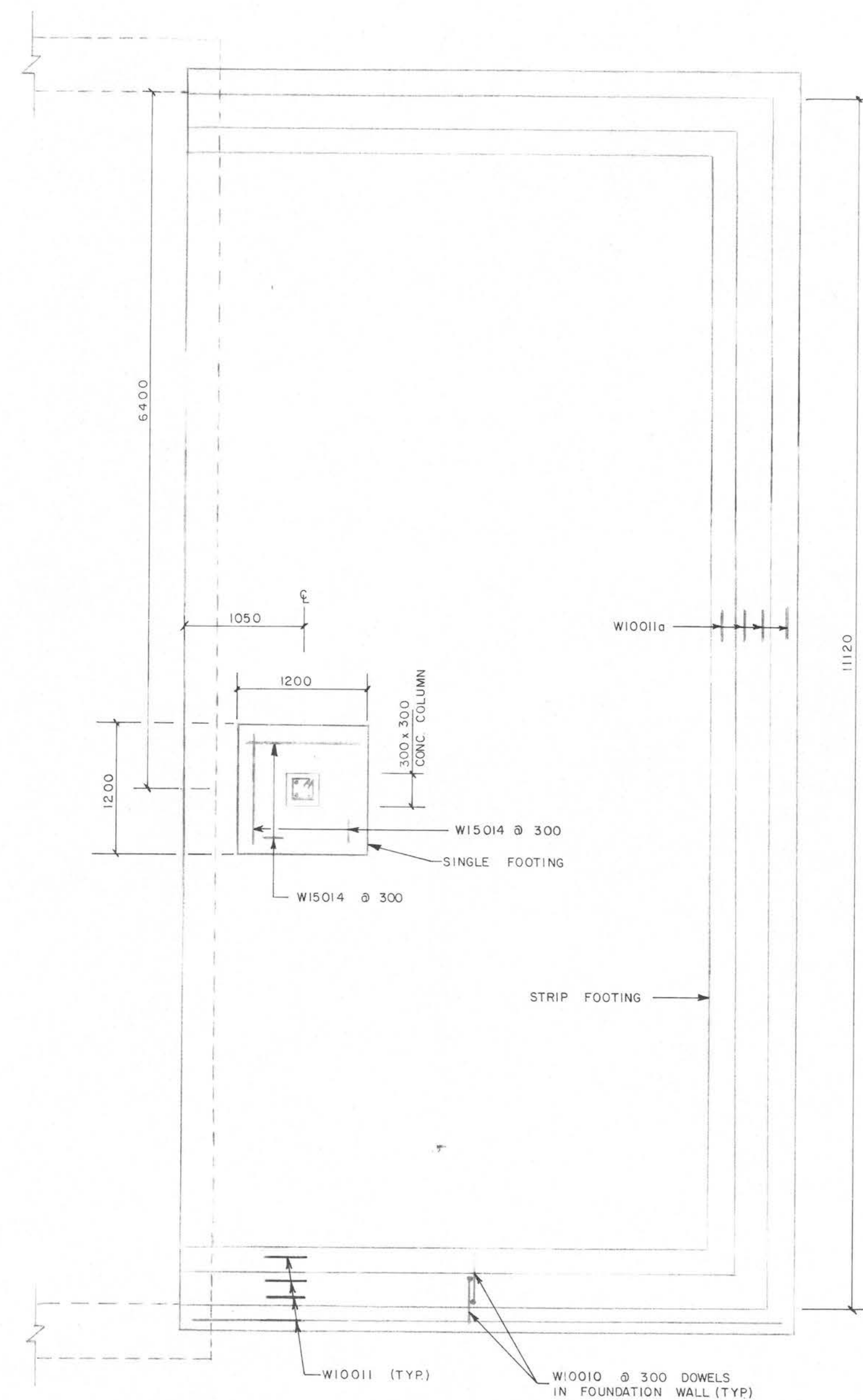
WATER PUMPING STATION, BAR SIZE, SEQUENCE NUMBER



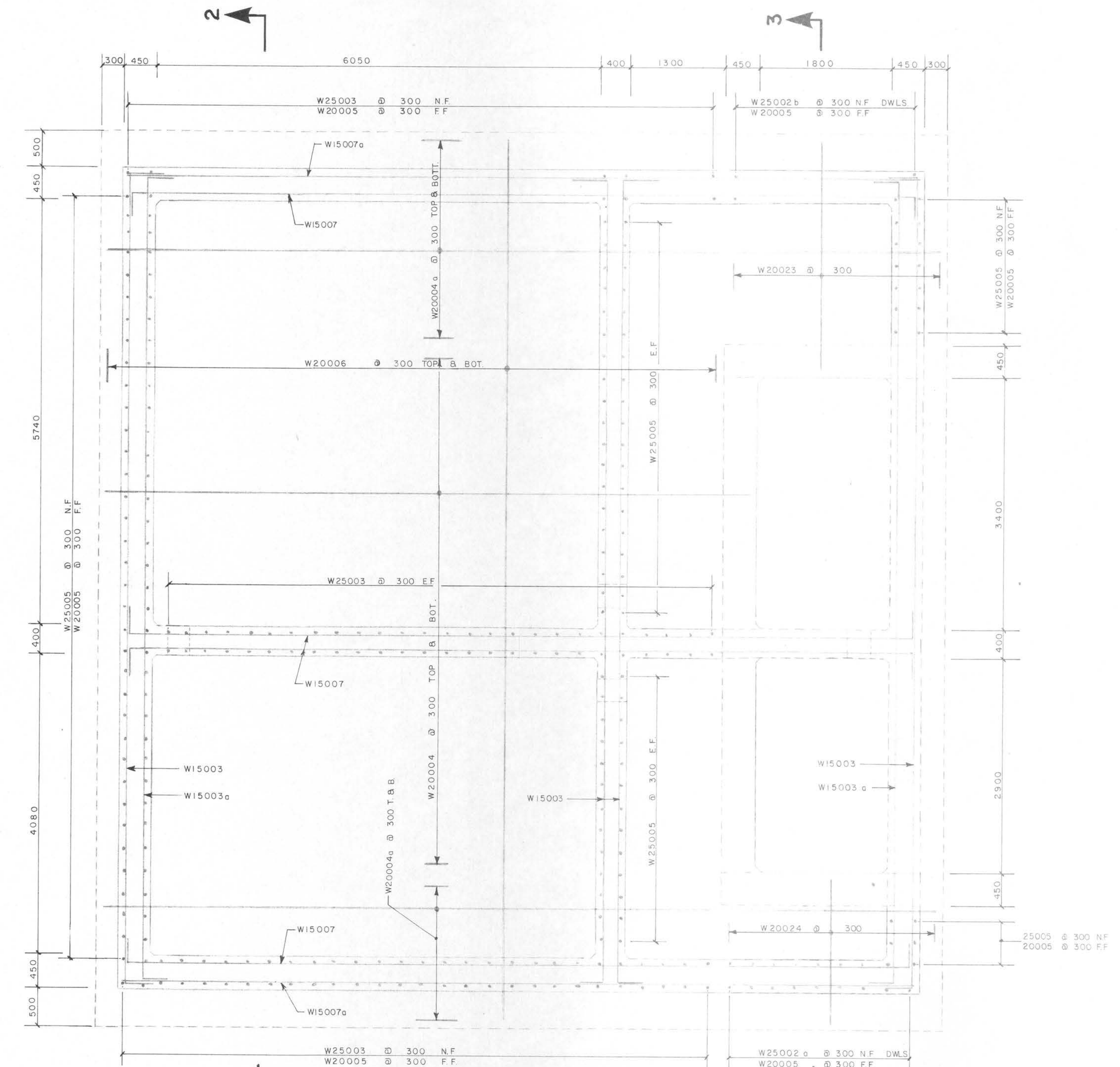
SECTION 1 - 1



FOUNDATION SLAB
AT ELEV. 397.45







FOOTINGS AT ELEV. 399.50



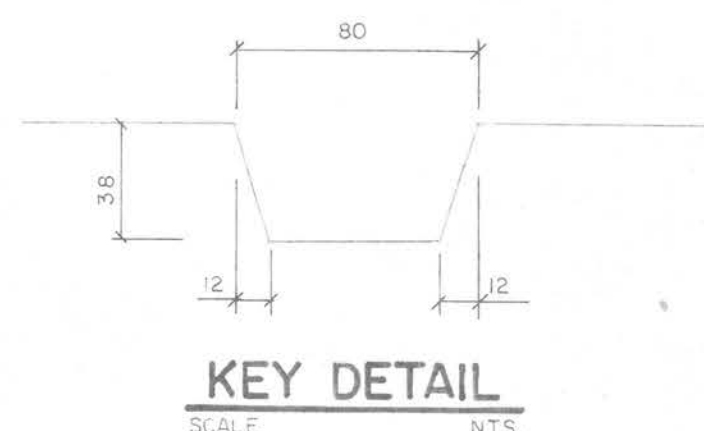
FOUNDATION SLAB AT ELEV. 398.70

FOR GENERAL NOTES SEE DWG No. S4-W

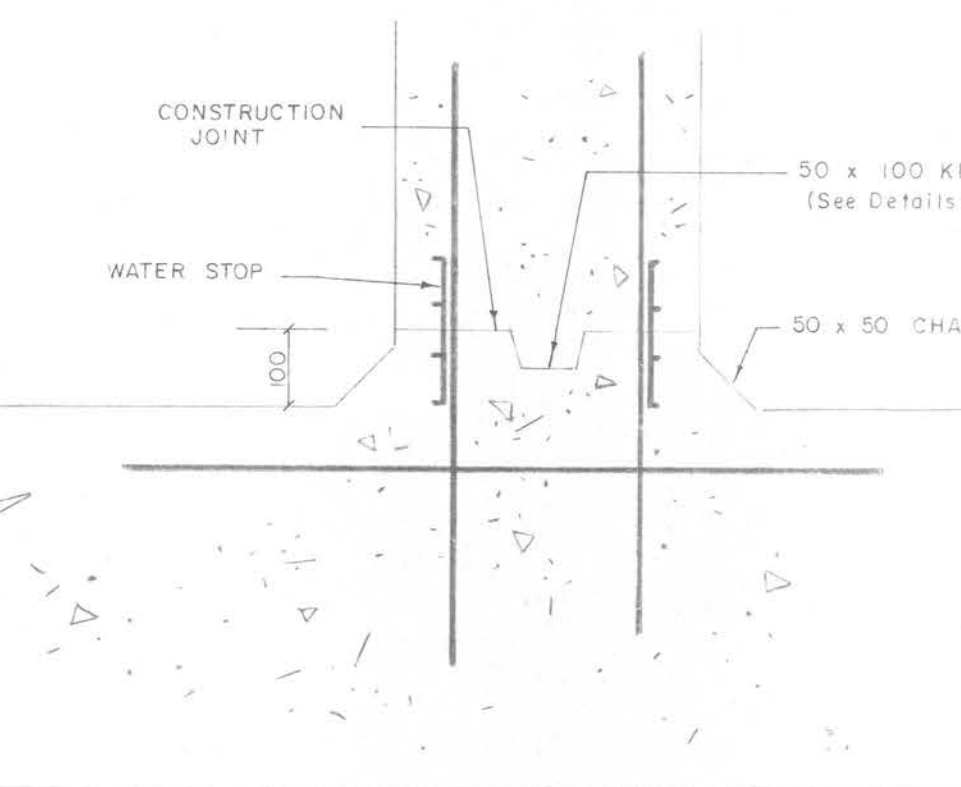
Date	Revisions	 K. SMART ASSOCIATES LIMITED CONSULTING ENGINEERS AND PLANNERS 460 FREDERICK STREET KITCHENER, ONTARIO N2H 2P5	 REGISTERED PROFESSIONAL ENGINEER R. L. SMITH PROVINCE OF ONTARIO	 Ontario	MINISTRY OF THE ENVIRONMENT		 REGISTERED PROFESSIONAL ENGINEER R. L. SMITH PROVINCE OF ONTARIO	Simcoe																	
					VILLAGE OF DRAYTON PROJECT N° 7-0246 CONTRACT N° 84-1			Simcoe Engineering Group Limited • Consulting Engineers																	
					WATER PUMPING STATION – STRUCTURAL			<table><tr><td>Design</td><td>E. A.</td><td rowspan="2">Scale</td><td>Horiz.</td><td>1:40</td><td rowspan="2">Drawing No.</td></tr><tr><td>Drawn</td><td>I. U.</td><td>Vert.</td><td>1:40</td></tr><tr><td>Checked</td><td>E. A.</td><td>Date</td><td>DEC</td><td>1984</td><td rowspan="2">SI-W</td></tr><tr><td colspan="5"></td></tr></table>	Design	E. A.	Scale	Horiz.	1:40	Drawing No.	Drawn	I. U.	Vert.	1:40	Checked	E. A.	Date	DEC	1984	SI-W	
Design	E. A.	Scale	Horiz.	1:40	Drawing No.																				
Drawn	I. U.		Vert.	1:40																					
Checked	E. A.	Date	DEC	1984	SI-W																				



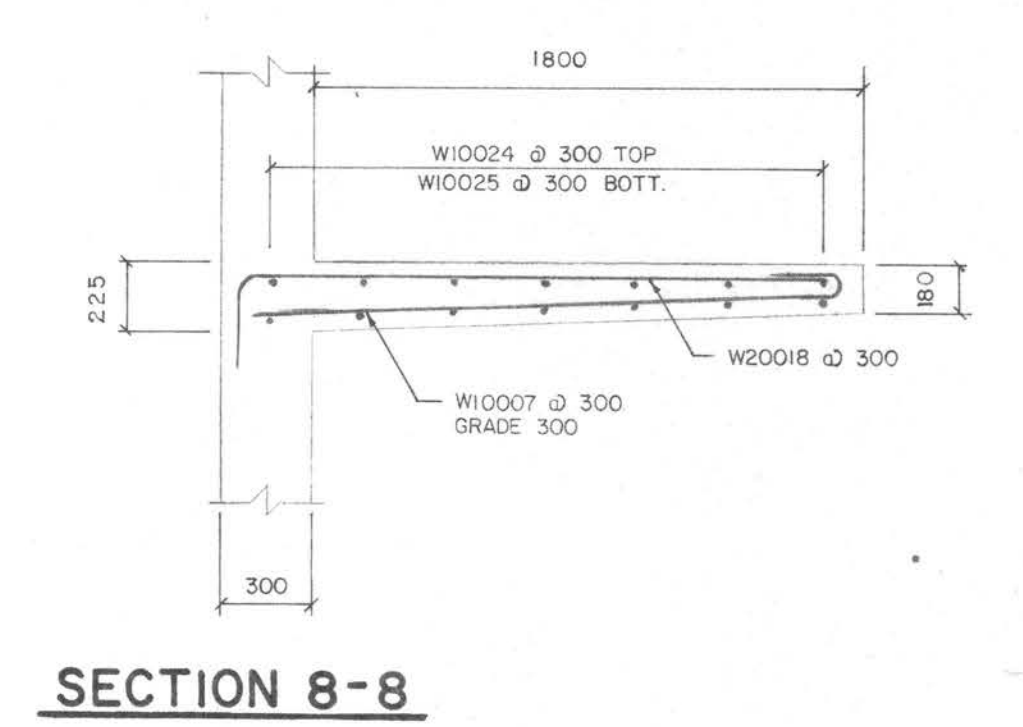
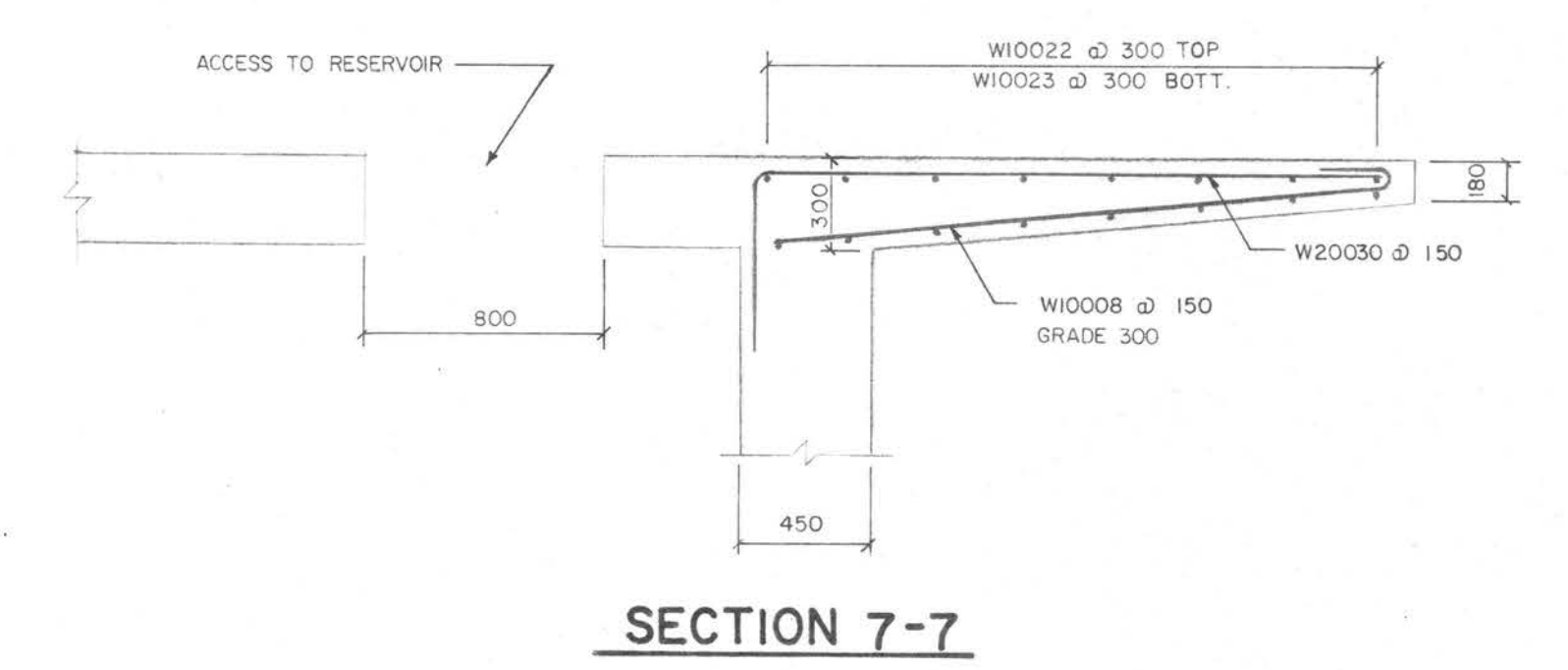
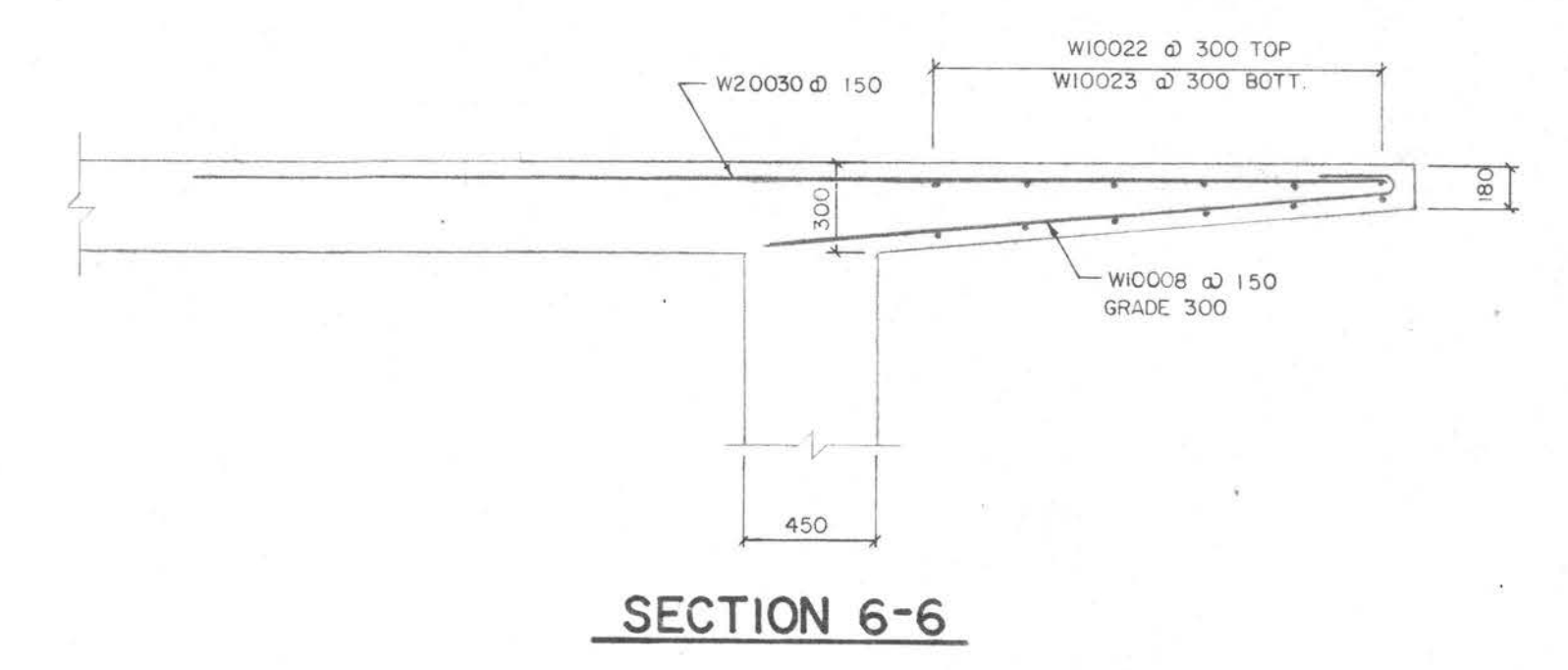
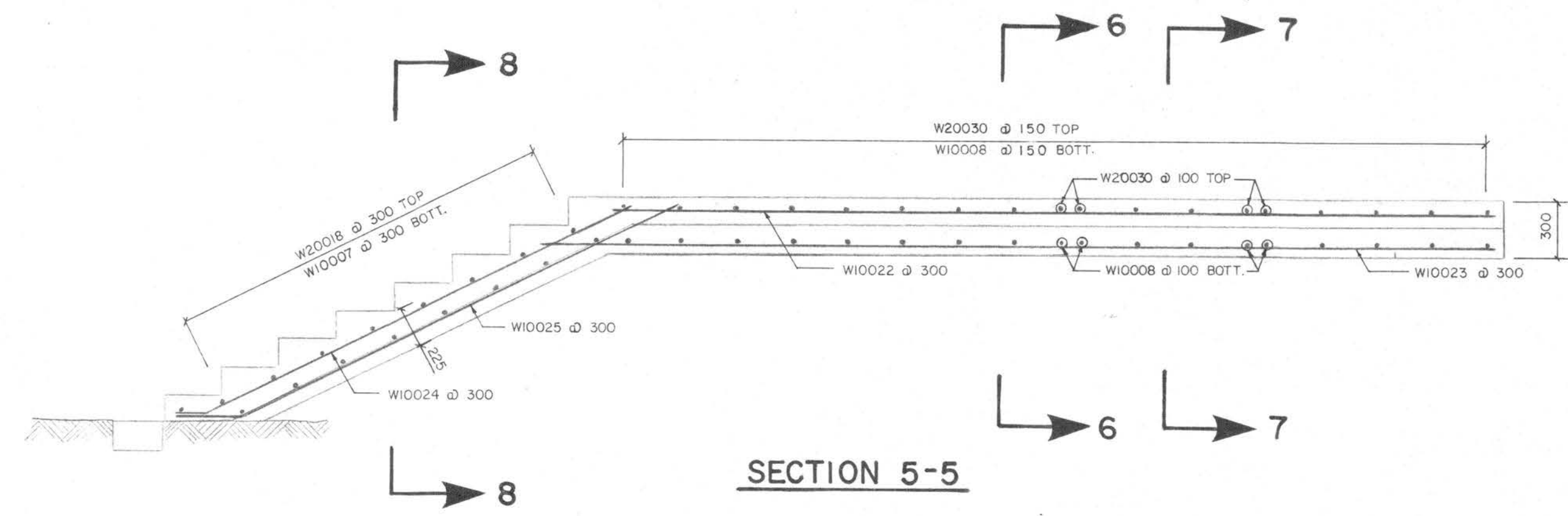
<h1 style="margin: 0;">Simcoe</h1>		
Simcoe Engineering Group Limited • Consulting Engineers		
Design E.A.	Scale Horiz. 1:40 Vert. 1:40	Drawing No. S2-W
Drawn I.U.	Date	Project



SCALE 1:10



Simcoe		Simcoe Engineering Group Limited • Consulting Engineer	
Design	E. A.	Scale Horiz. 1:10 Vert. 1:40	Drawing No. S3-W
Drawn	I. U.		



NOTES

- All concrete shall have 30 MPa compressive strength in 28 days unless otherwise specified.
- Reinforcing Steel: Grade 400 deformed, conforming to CSA G 30.12M. U.O.N.
- Reinforcing steel bars shall be lapped 30 bar diameters at splice unless otherwise indicated.
- All reinforcing shall be protected by the thickness of concrete specified on the drawings or as follows:

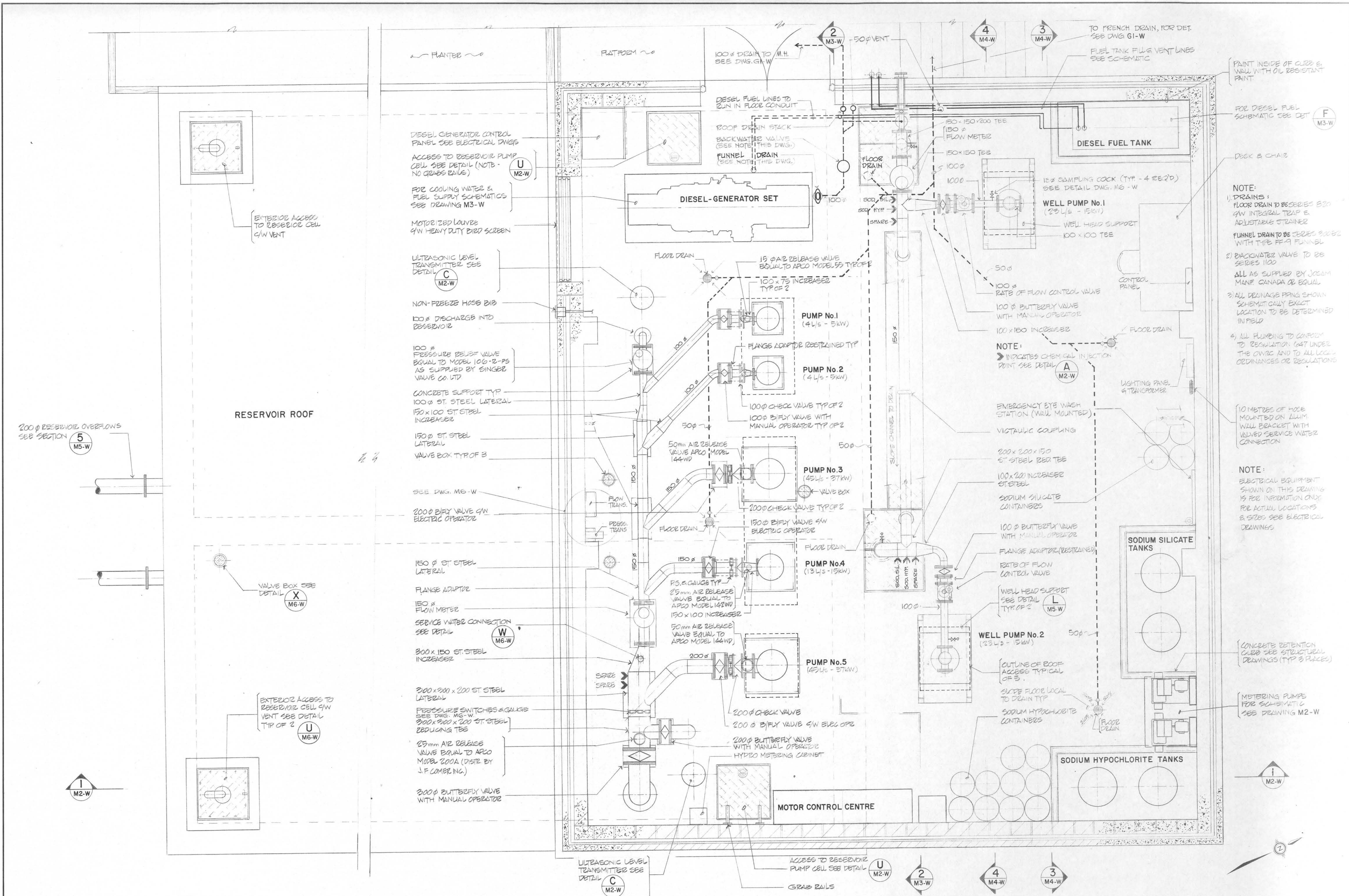
LOCATION	MIN. COVER
a) Concrete poured against the ground without forms.....	75 mm
b) Concrete exposed to weather, water or to ground but in forms: <ul style="list-style-type: none"> i) Bars larger than 15M..... ii) 15M bars or smaller..... 	50 mm 40 mm
c) Concrete in slabs and walls not exposed to the weather, water or ground.....	20 mm
d) Concrete in columns and beams not exposed to the weather, water or ground.....	40 mm
- Construction joints other than those shown on the drawings will not be permitted without the approval of the Engineer.
- All external concrete corners visible and above grade shall be chamfered 20 mm X 20 mm unless shown otherwise.
- Vertical and horizontal dowels at construction joints shall have minimum projection as detailed on the drawings and/or as follows:

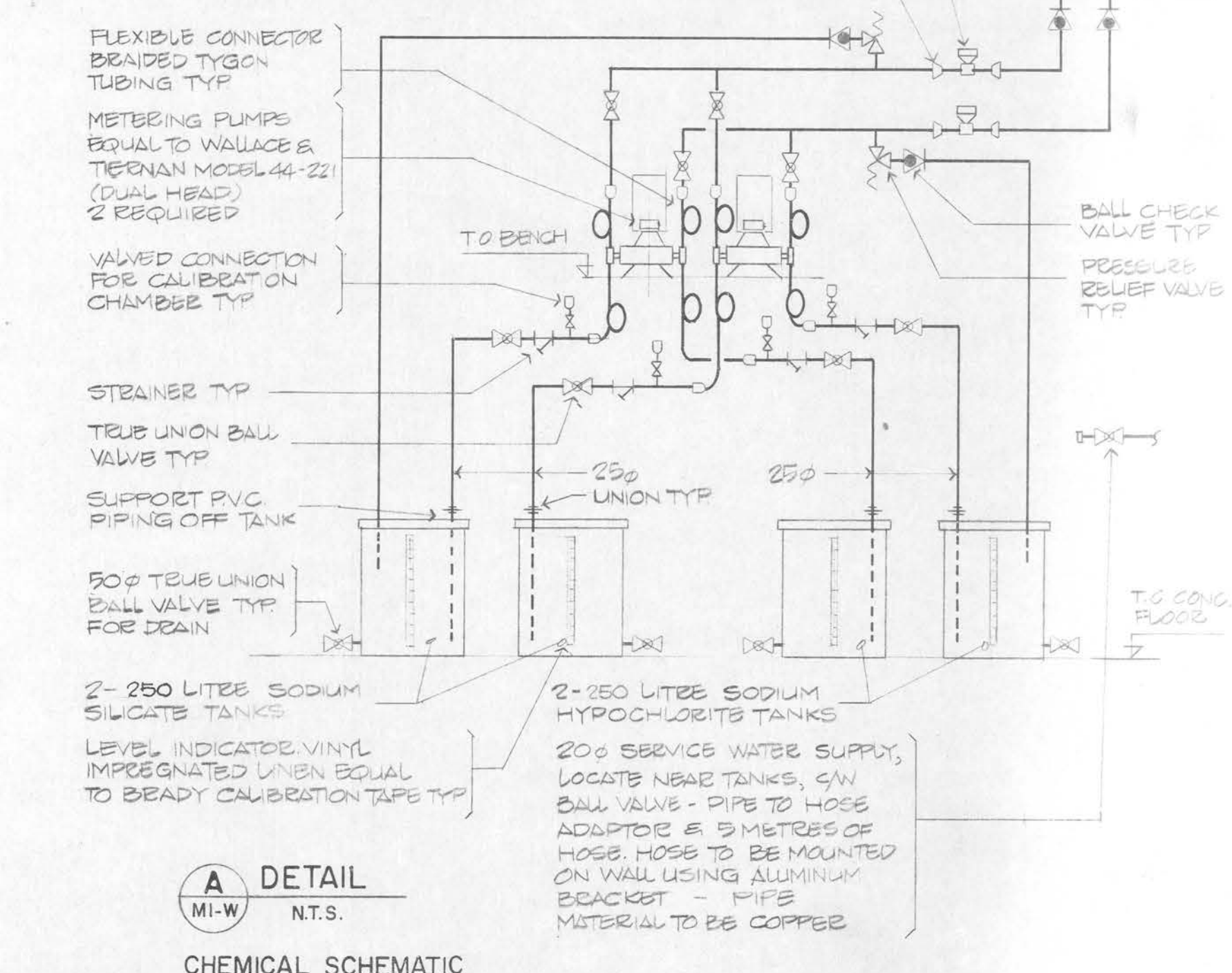
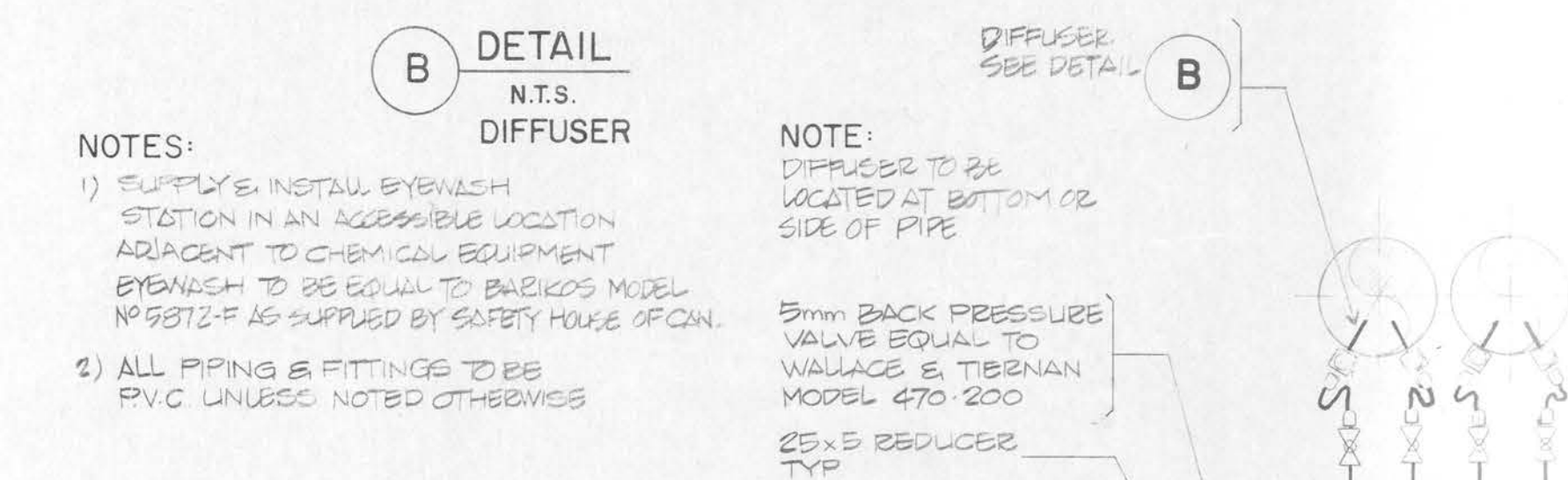
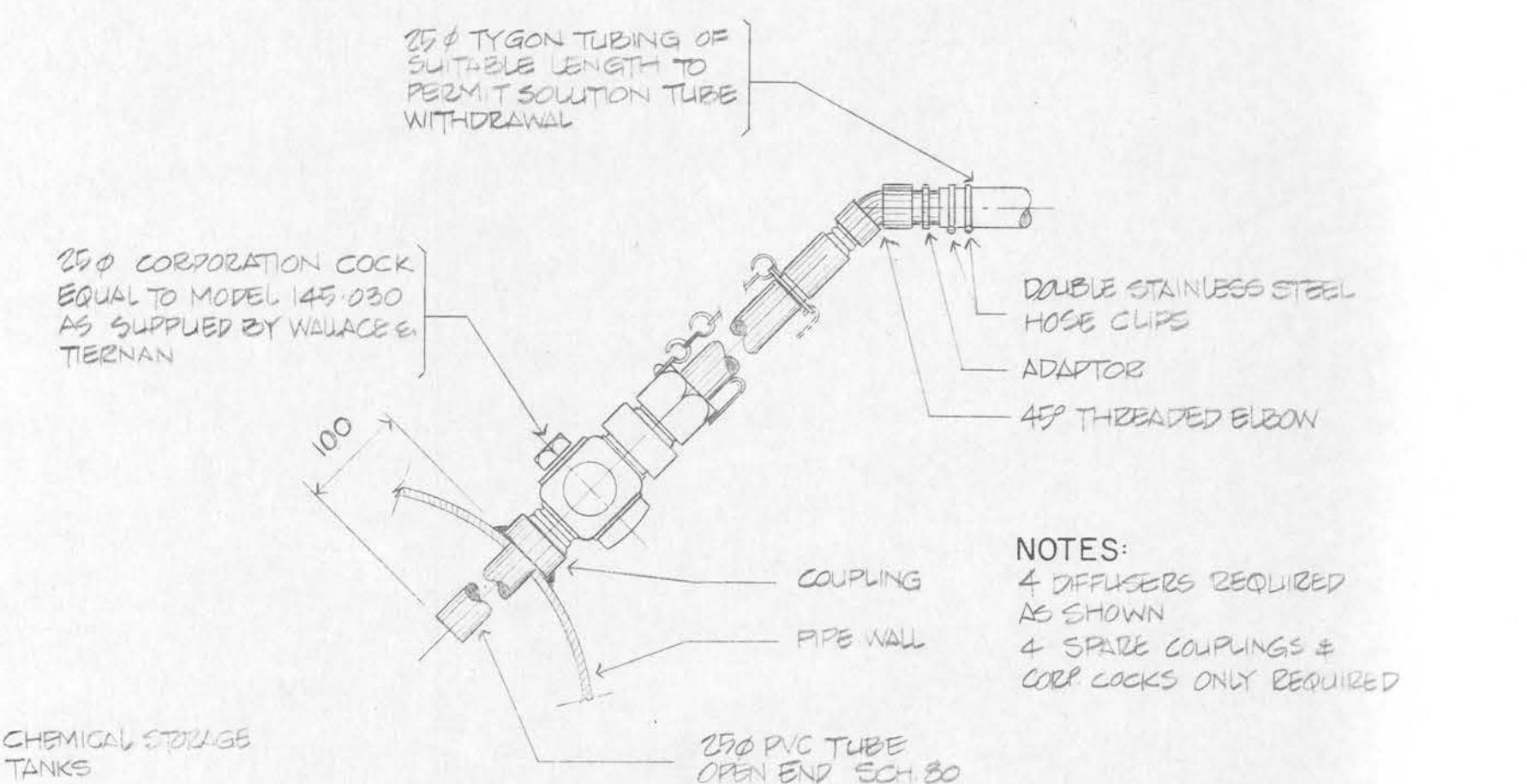
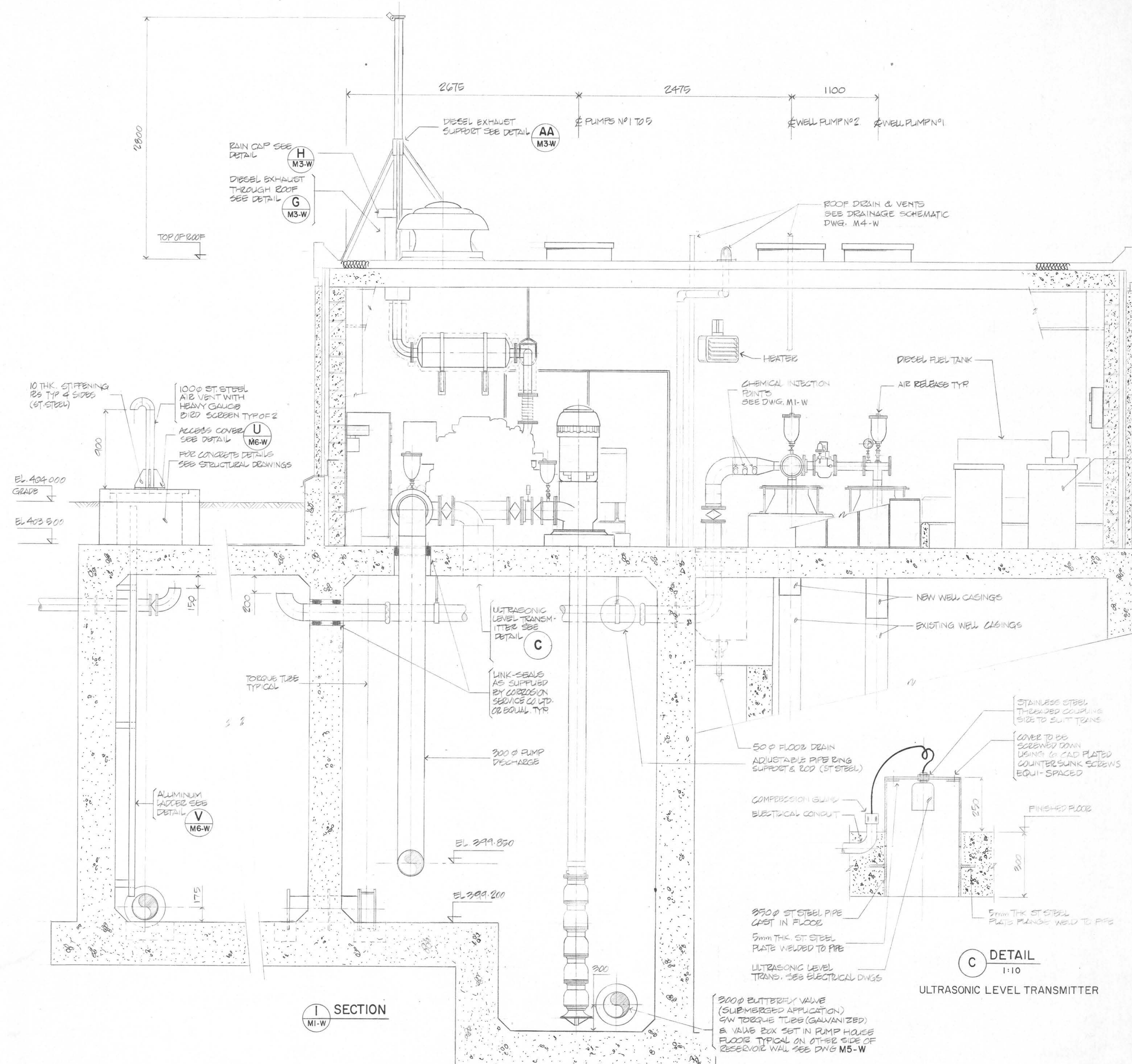
a) 15M bars or smaller.....	600 mm
b) 20M bars.....	700 mm
c) 25M bars.....	1100 mm
d) 30M bars.....	1500 mm
e) 35M bars.....	2100 mm
- Waterstops shall be type 9316 for construction joints as manufactured by W.R. Meadows of Canada Ltd. or approved equal.
- The dimensional requirements for all wall and slab openings, slots, recesses, etc. whether shown or not shall be co-ordinated with all other trades.
- Horizontal reinforcement at all intersections shall be as specified on Simcoe Standard Drawings S-3204 unless otherwise specified.
- Openings in walls and slabs shall be reinforced as specified on Simcoe Standard Drawings S-3201 and S-3202 unless otherwise detailed.
- Contractor shall refer to other drawings for items to be cast in concrete.
- In the event of discrepancies or inconsistencies between structural drawings and all other Contract Drawings the Contractor shall advise the Engineer for clarification.
- Prior to the start of masonry work the Contractor shall submit for Engineer's approval a comprehensive schedule of lintels required over all masonry openings.
- Masonry reinforcement = Standard "Block-Lok" or equivalent
- Roof live load (snow) = 3.1 kN/m²
- Prior to the fabrication of the concrete core slab, the contractor shall submit to the Engineer for review design calculations and detail shop drawings.
- No backfill to be placed behind the reservoir's walls before the complete placement of the top slab and after the approval of the Engineer.
- All backfill to be granular or approved backfilled earth materials.
- No concrete to be placed in the footings before the character of the soil and excavation for the footings have been approved by the Engineer.
- The contractor to submit a steel reinforcing bar list for the Engineer's review.
- All concrete to be placed in the dry. All excavations shall be dewatered, to the satisfaction of the Engineer. The ground water to be kept below the foundation of the reservoir until all backfilling has been completed.

Concrete Finished Schedule

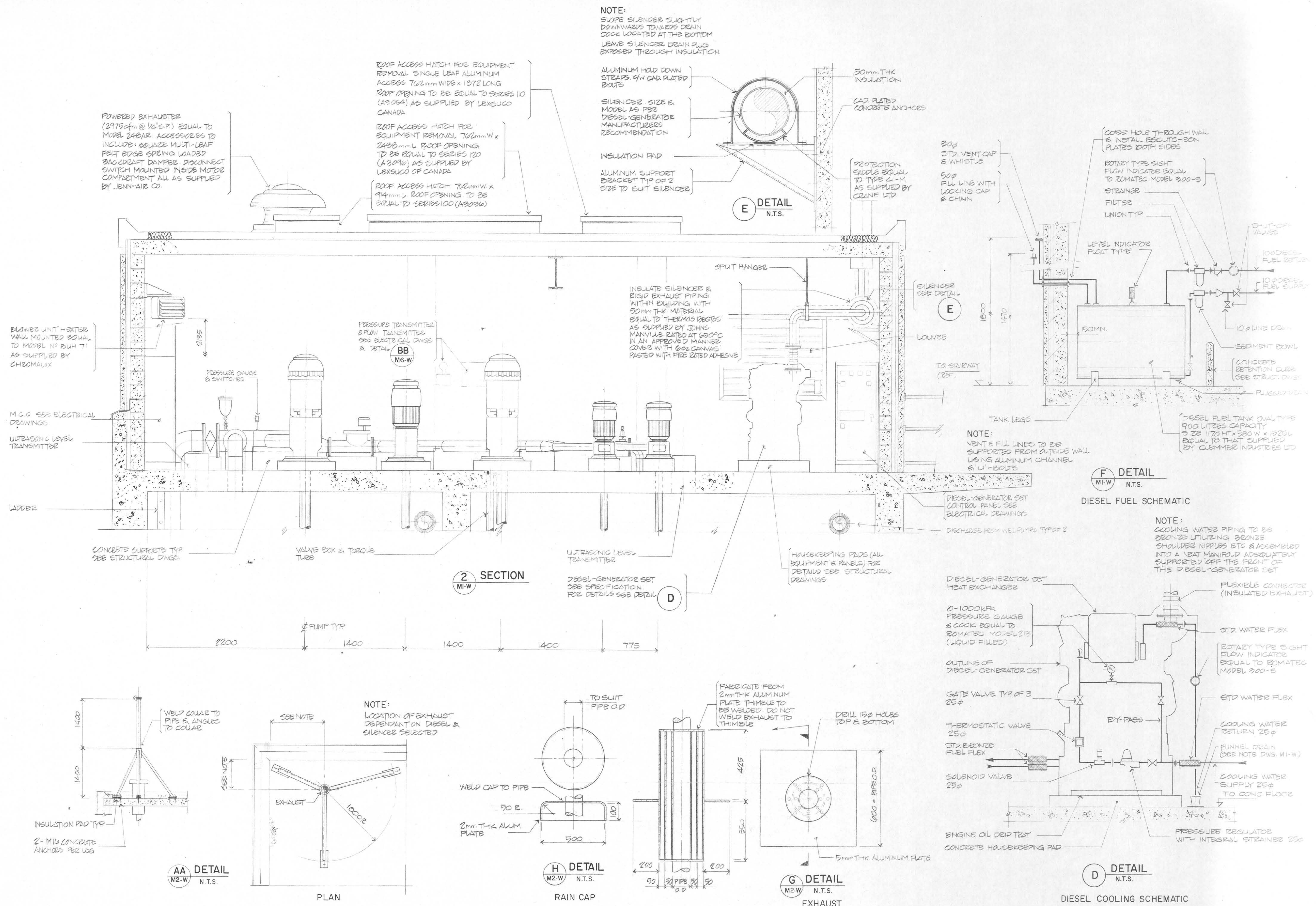
- Interior Walls - painted
- Exterior Walls - exposed concrete block - color to be selected by the Engineer
- Floors - exposed concrete - mechanical float surface (Type T3)
- Ceiling Bottom of Core Slab - smooth surface from steel casting bed
- Exterior Stairway - exposed concrete, slip resistance finish (Type T4)
- Floor of Reservoir - exposed concrete - mechanical swirl - Trowel Finish (Type T6)




The attention of the Contractor is drawn to the Ontario Regulation 419/73 for the design of forms and falsework. See Specifications - Division 3





Date Revisions	 K. SMART ASSOCIATES LIMITED CONSULTING ENGINEERS AND PLANNERS 480 FREDERICK STREET KITCHENER, ONTARIO N2H 2P5	 Ontario	MINISTRY OF THE ENVIRONMENT VILLAGE OF DRAYTON PROJECT N° WATER 7-0246 CONTRACT N° 84-1 SECTION AND DETAILS	 Simcoe Engineering Group Limited • Consulting Engineers <table border="1"> <tr> <td>Design</td><td>R.L.S.</td><td>Scale</td><td>1:25 UNO.</td><td>Drawing No.</td></tr> <tr> <td>Drawn</td><td>T.F.T.</td><td></td><td></td><td>M2-W</td></tr> <tr> <td>Checked</td><td>D.D.B.C.</td><td>Date</td><td>NOV. 1984</td><td></td></tr> </table>	Design	R.L.S.	Scale	1:25 UNO.	Drawing No.	Drawn	T.F.T.			M2-W	Checked	D.D.B.C.	Date	NOV. 1984	
Design	R.L.S.	Scale	1:25 UNO.	Drawing No.															
Drawn	T.F.T.			M2-W															
Checked	D.D.B.C.	Date	NOV. 1984																



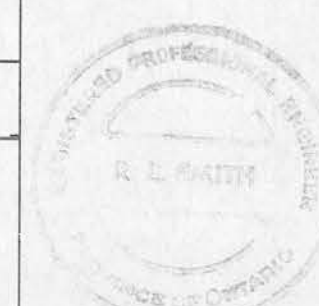
Date	Revisions	 K. SMART ASSOCIATES LIMITED CONSULTING ENGINEERS AND PLANNERS 460 FREDERICK STREET KITCHENER, ONTARIO N2H 2P5	 Ontario	EXTRACT			Simcoe		
				MINISTRY OF THE ENVIRONMENT			Simcoe Engineering Group Limited • Consulting Engineers		
				VILLAGE OF DRAYTON	PROJECT N° WATER 7-0246 CONTRACT N° 84-1		Design R.L.S.	Scale 1:25 UNO.	Drawing No.
				SECTIONS AND DETAILS			Drawn T.F.T.	Date NOV. 1984	M3-W
		Checked J.D.B.C.							



K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
480 FREDERICK STREET
KITCHENER, ONTARIO N2H 2P5

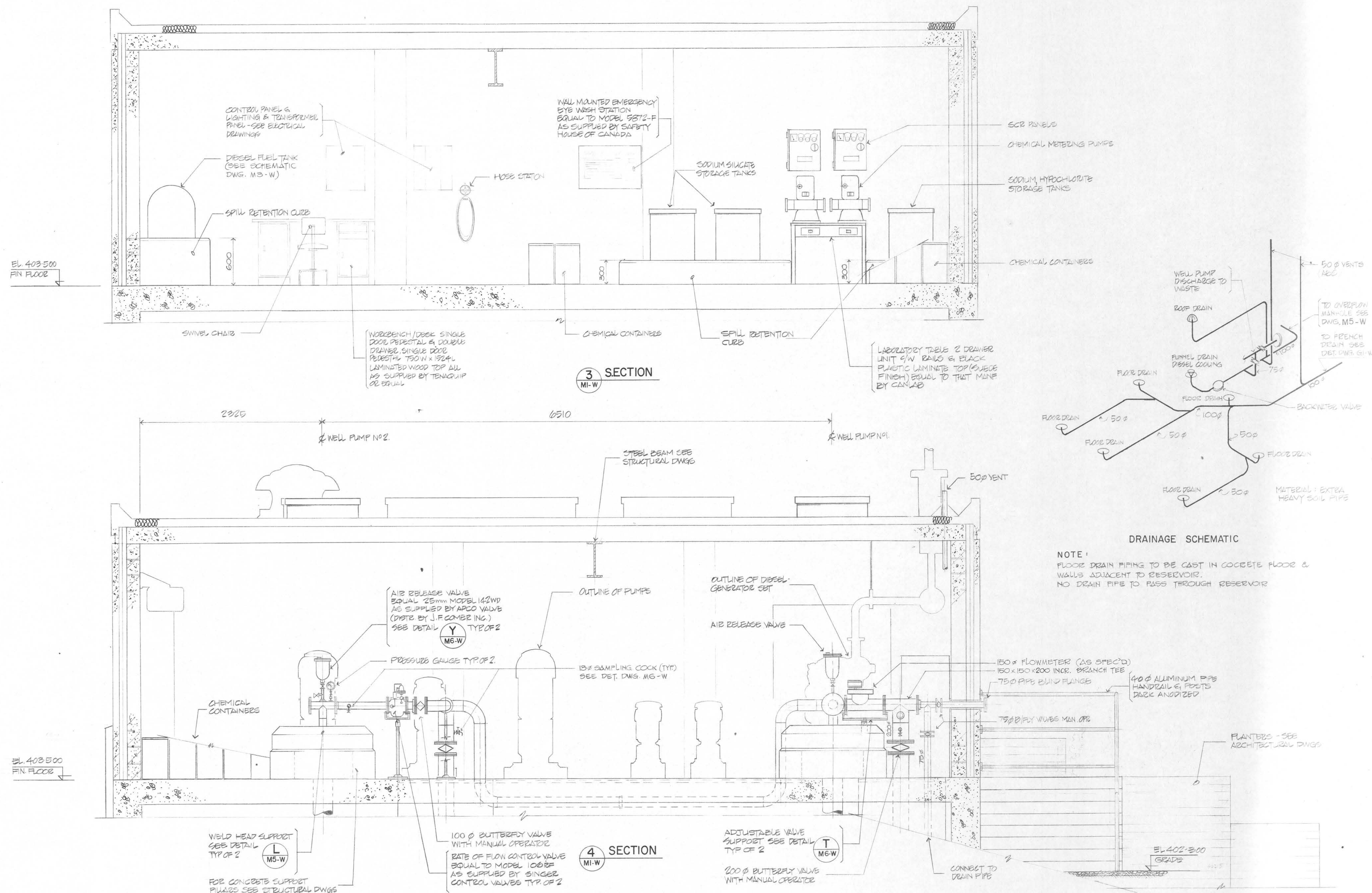





Ontario

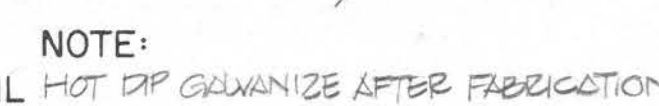
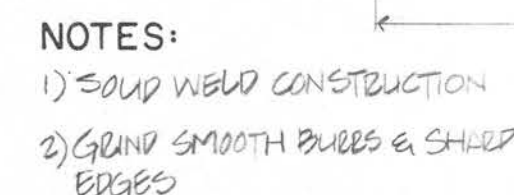


Simcoe

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Design R.L.S. Scale 1:25 UNO. Drawing No. M3-W
Drawn T.F.T.
Checked D.D.B.C. Date NOV. 1984



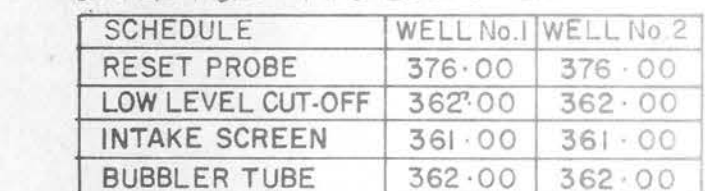
Date	Revisions	 K. SMART ASSOCIATES LIMITED CONSULTING ENGINEERS AND PLANNERS 480 FREDERICK STREET KITCHENER, ONTARIO N2H 2P5	 Ontario	MINISTRY OF THE ENVIRONMENT				Simcoe															
				VILLAGE OF DRAYTON PROJECT N° WATER 7-0246 CONTRACT N° 84-1				Simcoe Engineering Group Limited • Consulting Engineers															
				SECTIONS				<table><tr><td>Design</td><td>R.L.S.</td><td>Scale</td><td rowspan="2">1:25</td><td rowspan="2">Drawing No.</td><td rowspan="3">M4-W</td></tr><tr><td>Drawn</td><td>T.F.T.</td><td></td></tr><tr><td>Checked</td><td>D.D.B.C.</td><td>Date</td><td>NOV. 1984</td><td></td></tr></table>			Design	R.L.S.	Scale	1:25	Drawing No.	M4-W	Drawn	T.F.T.		Checked	D.D.B.C.	Date	NOV. 1984
Design	R.L.S.	Scale	1:25	Drawing No.	M4-W																		
Drawn	T.F.T.																						
Checked	D.D.B.C.	Date	NOV. 1984																				



N **DETAIL**
N.T.S.

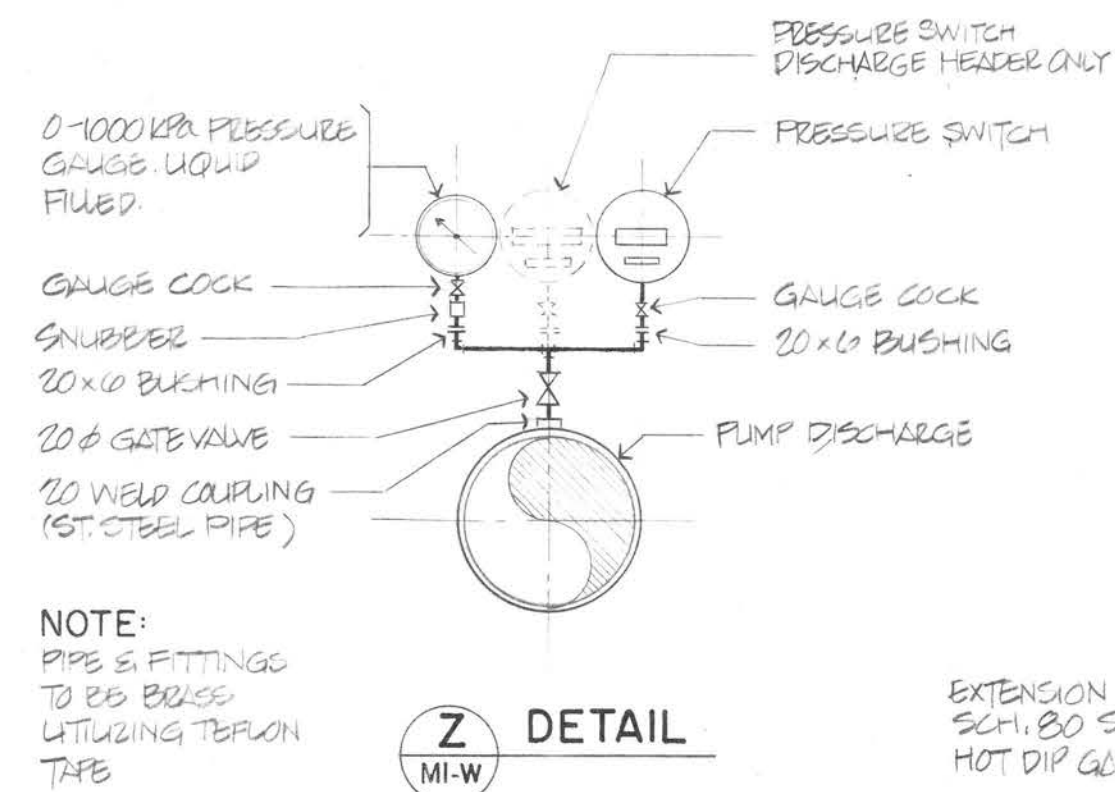
5 SECTION
GI-W

RESERVOIR OVERFLOWS

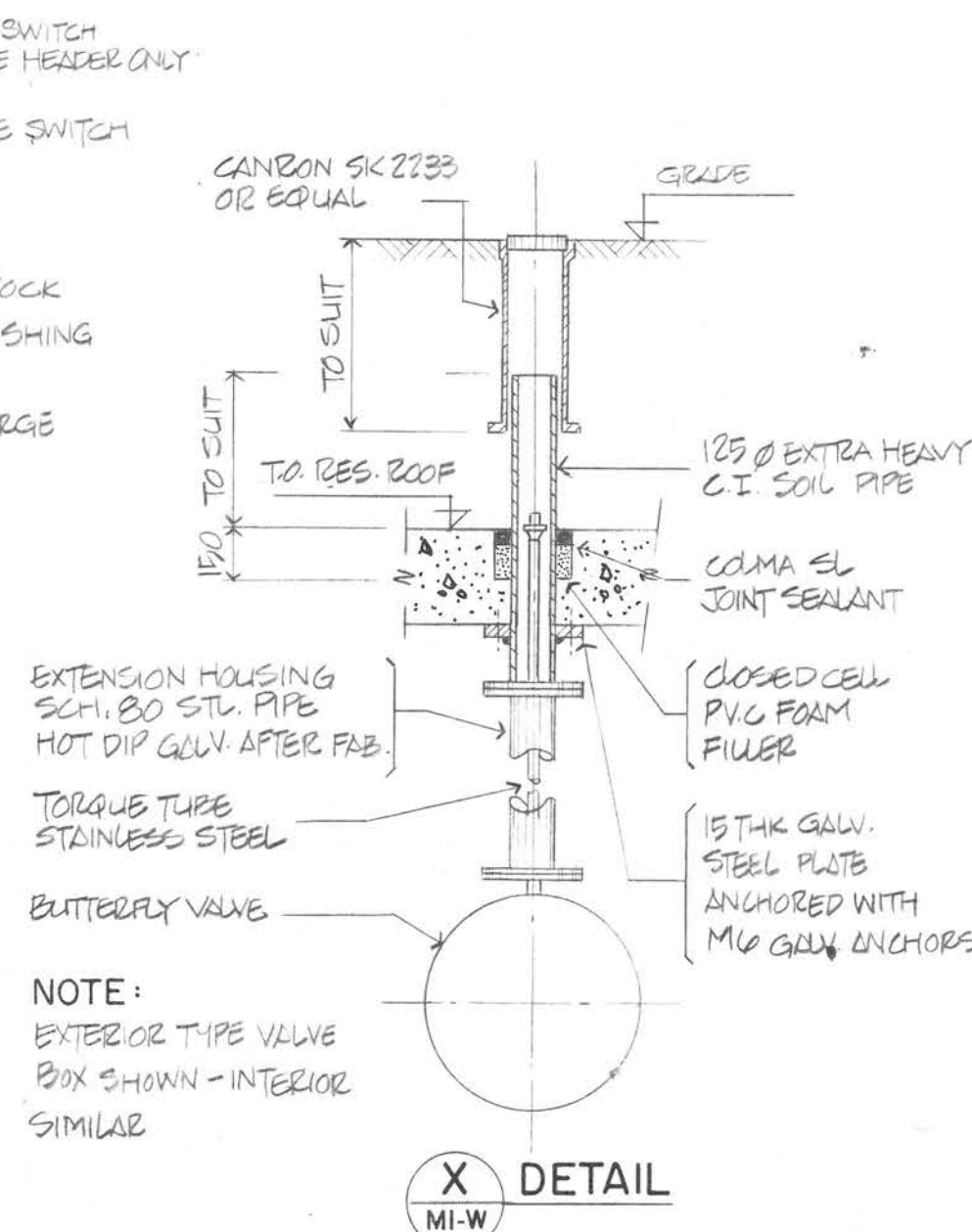


NOTE:
WELD NEW CASING TO EXISTING
WITH FULL PENETRATION (USE
WELDING BAND IF NECESSARY,
WELDS TO BE X-RAYED. CONTRACTOR
TO BEAR ALL COST IF WELD(S)
DEFECTIVE

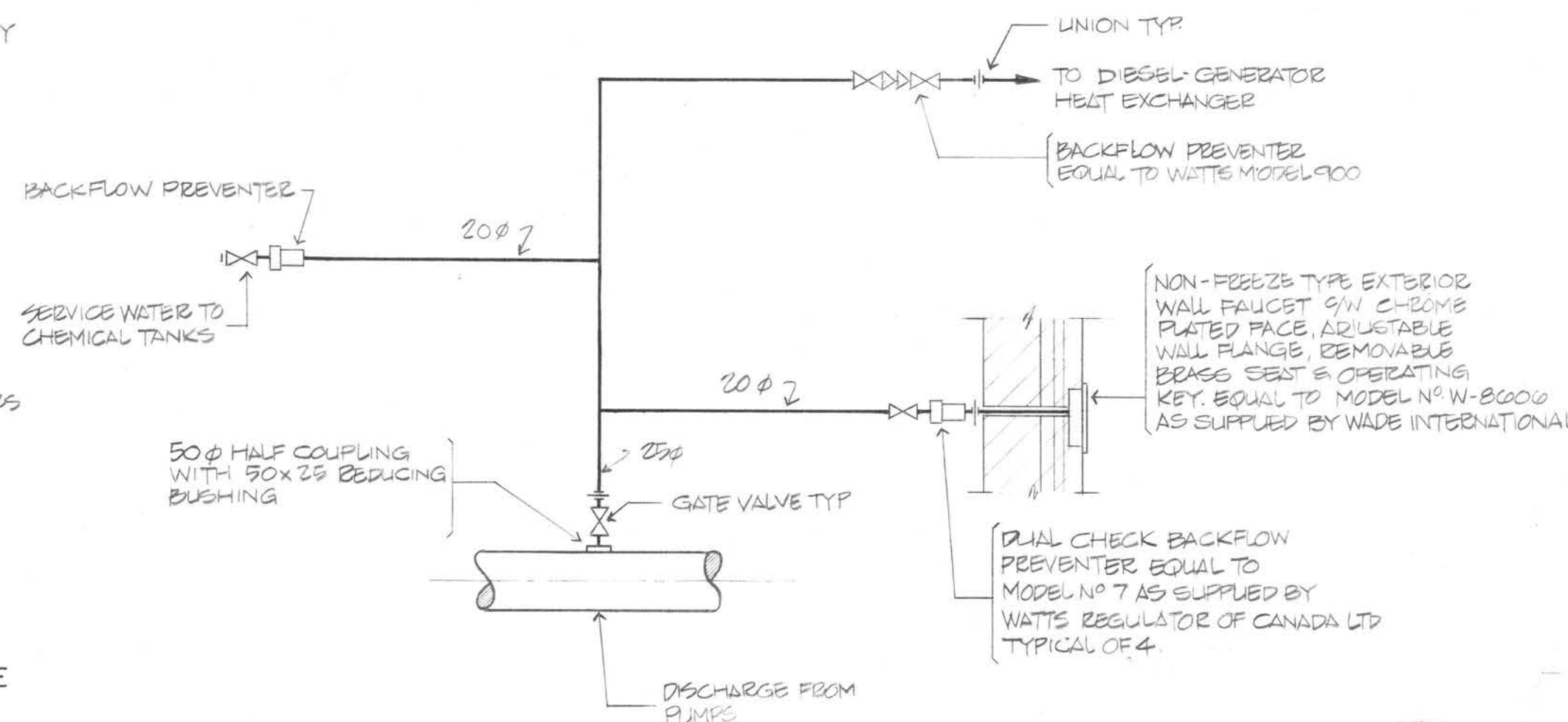
Design	R.L.S.	Scale 1:50 UNO.	Drawing No. M5-W
Drawn	T.F.T.		
Checked	D.D.B.C.	Date NOV. 1984	



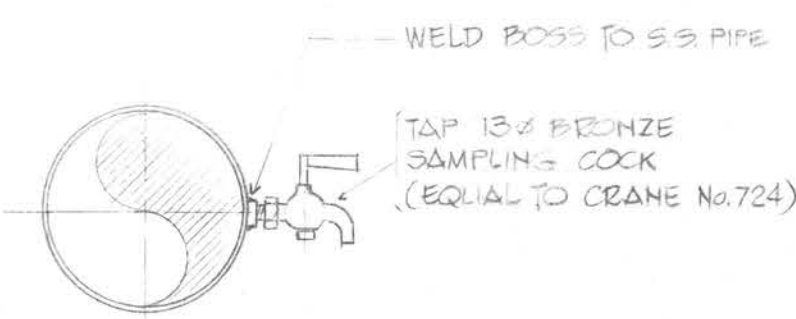
PRESSURE SWITCH & GAUGE ARRANGEMENT, TYPICAL FOR PUMPS 3, 4 & 5 AND DISCHARGE HEADER (5 PRESSURE SWITCHES TOTAL)



VALVE BOX EXTENSION & TORQUE TUBE



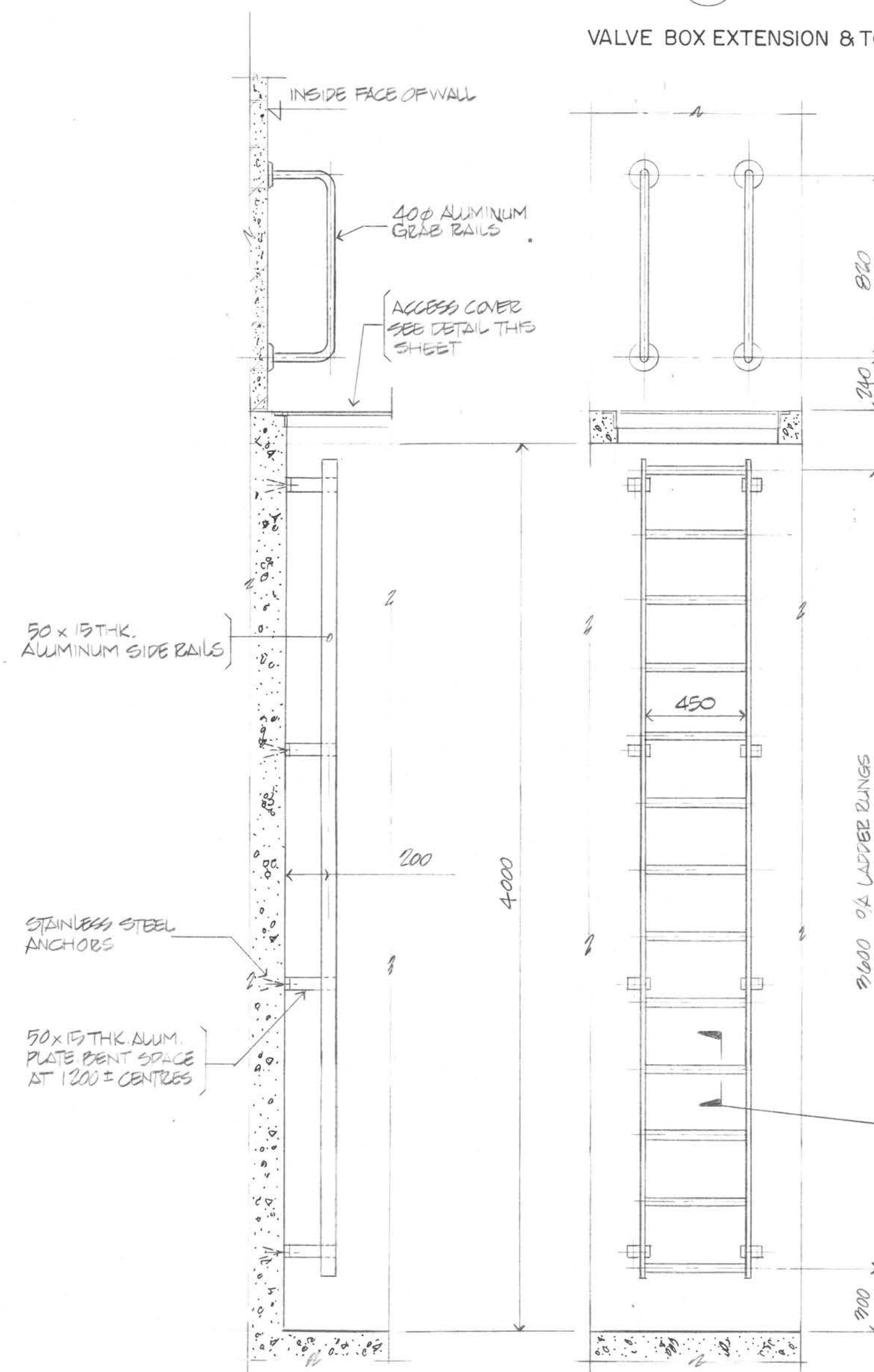
SERVICE WATER SCHEMATIC



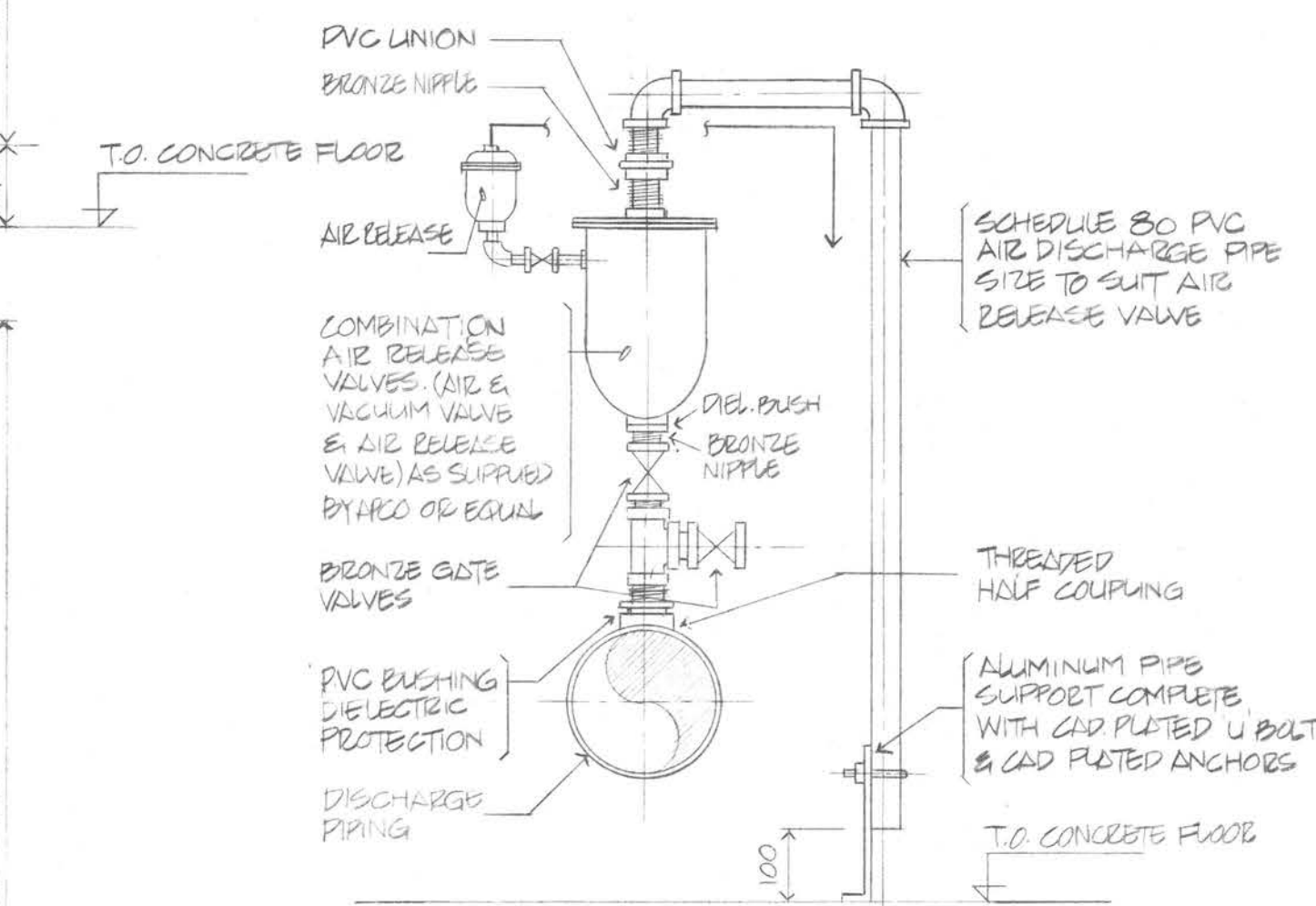
ADJUSTABLE VALVE SUPPORT



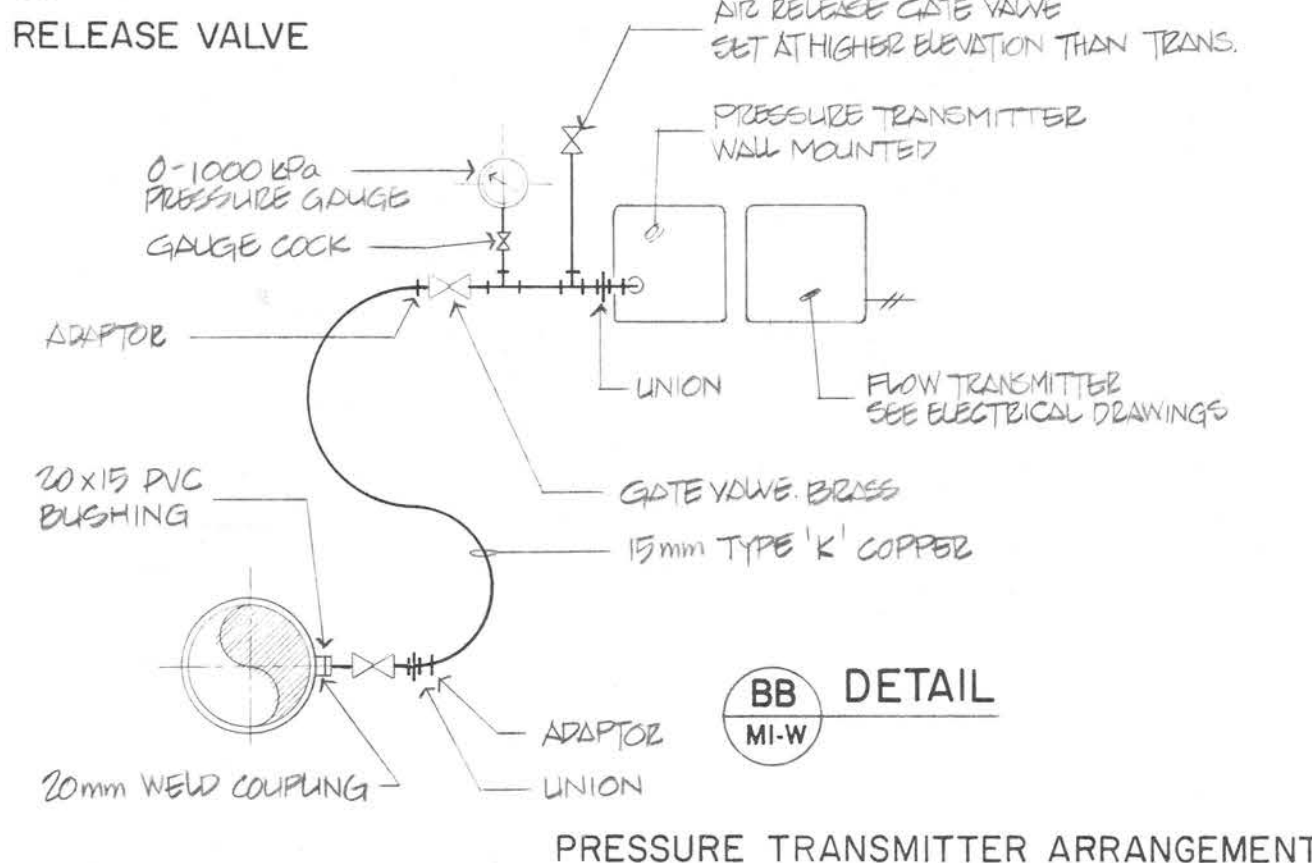
WATER SAMPLING COCK



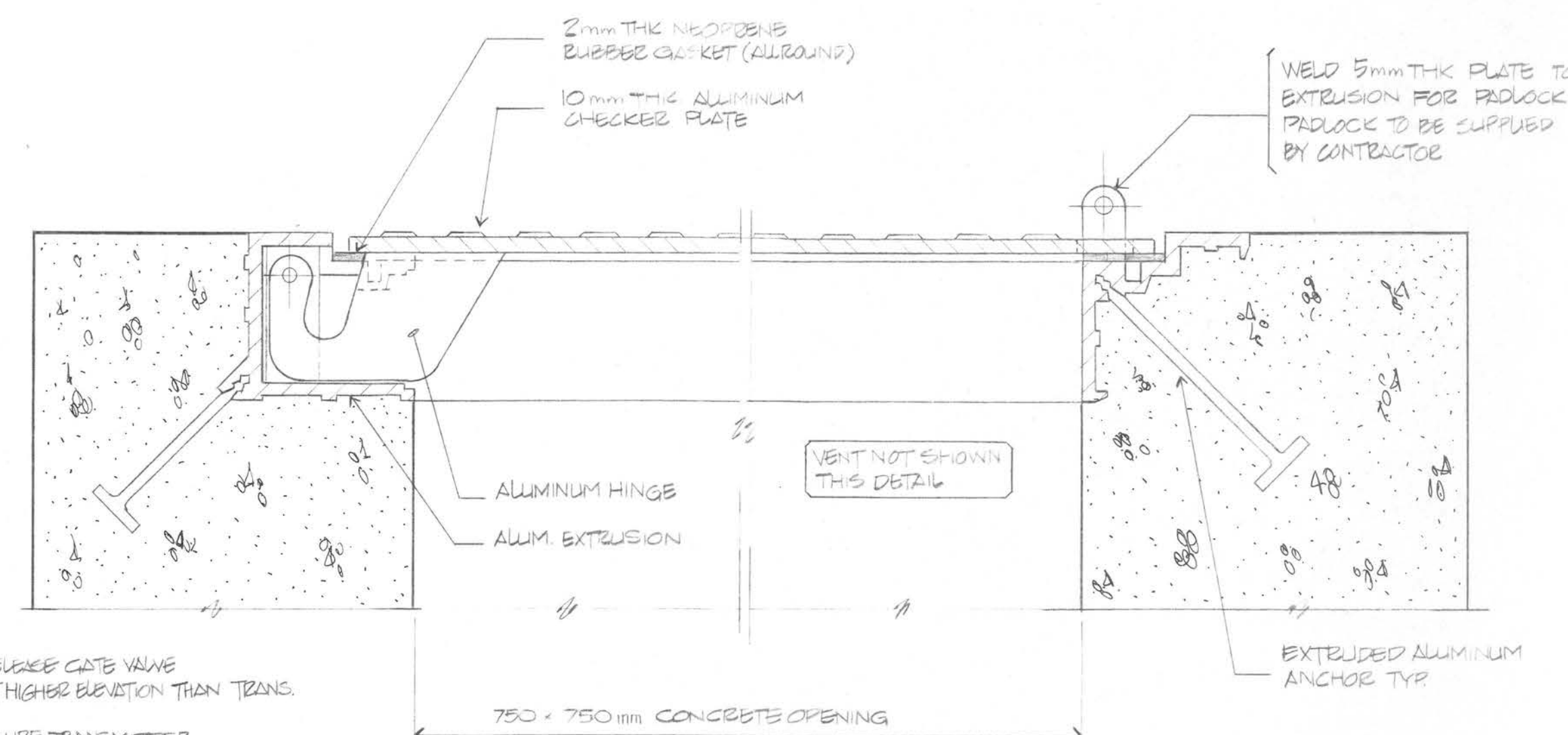
LADDER



AIR RELEASE VALVE



PRESSURE TRANSMITTER ARRANGEMENT



ACCESS

- NOTES:
- 1) ALL ACCESS COVER COMPONENTS TO BE EQUAL TO THAT SUPPLIED BY ABEL METAL PRODUCTS (1971) LTD.
 - 2) ACCESS COVER TO BE SCREENED DOWN USING 20# - 5mm Ø SCREENS
 - 3) EXTERIOR ACCESS SHOWN - INTERIOR ACCESS SIMILAR. FOR INTERIOR ACCESS DELETE: PLATE, PADLOCK, HINGE, VENT ADD: LIFTING HANDLE (RECESSED) AND USE 4 - 5mm Ø SCREWS

Date	Revisions

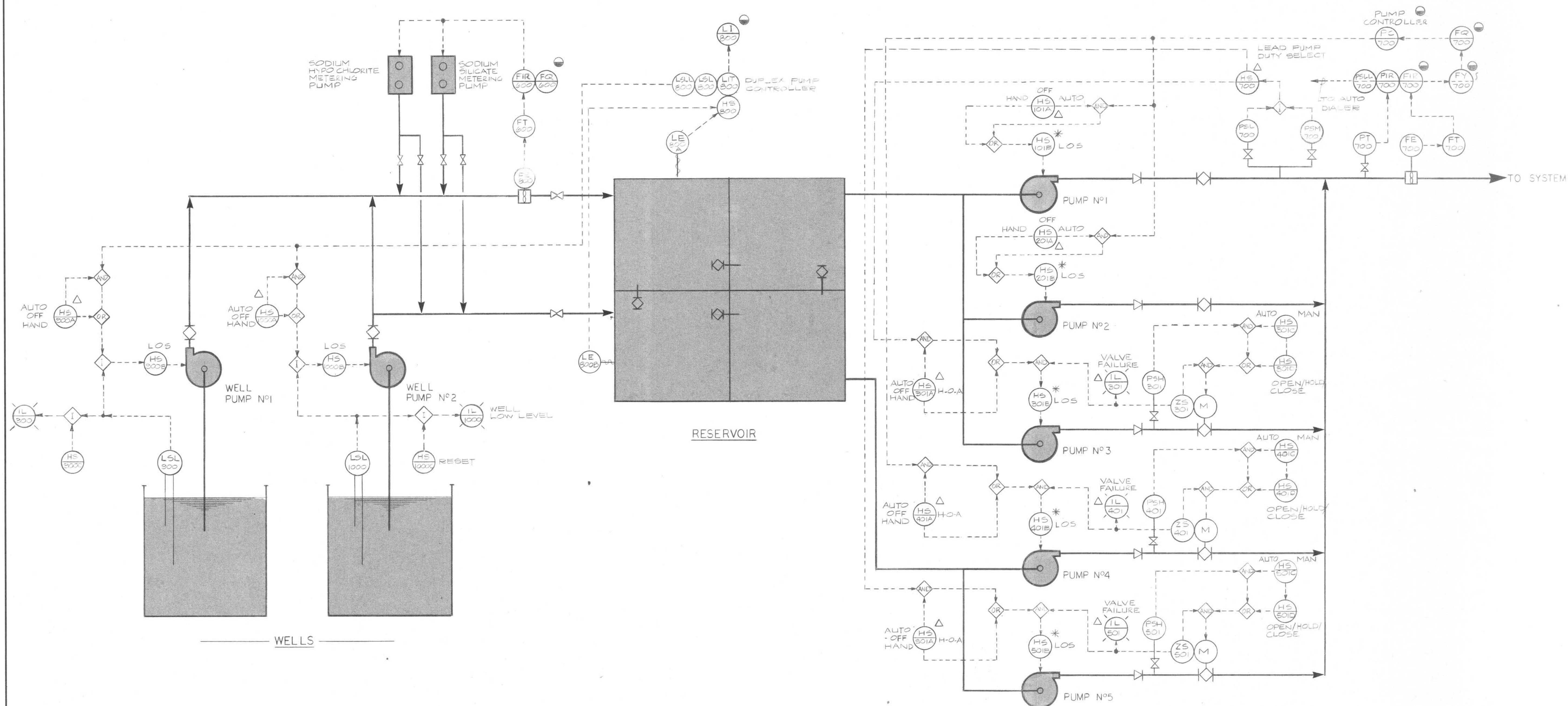
K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
480 FREDERICK STREET
KITCHENER, ONTARIO N2H 2P5









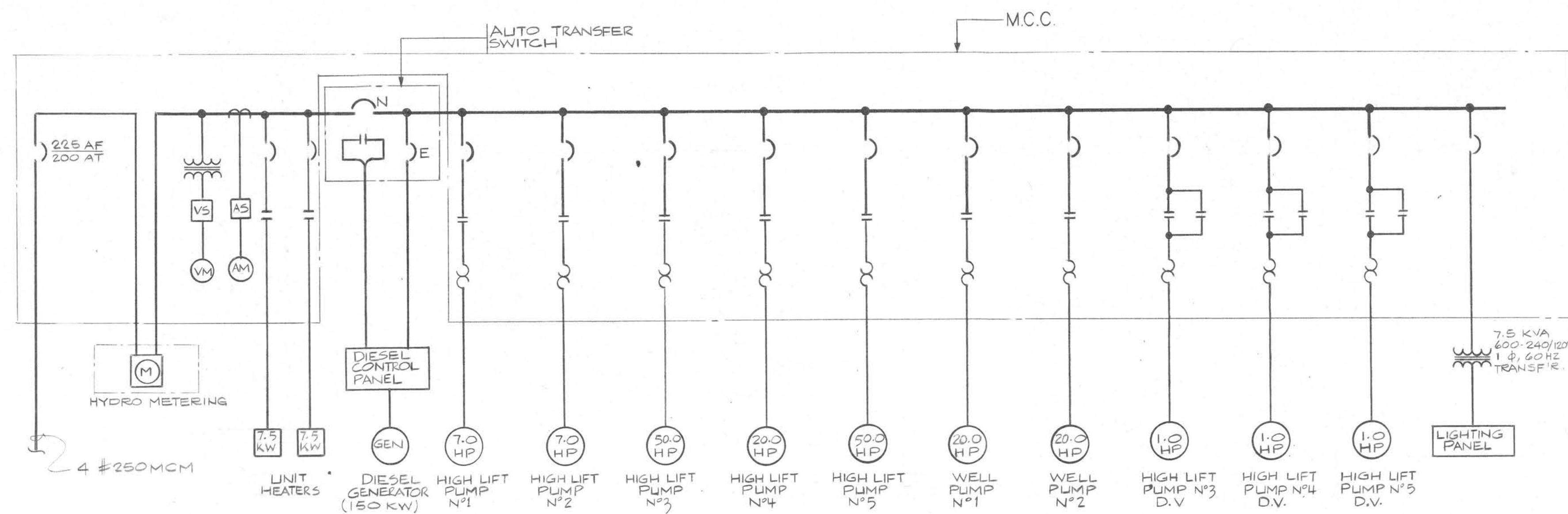
MINISTRY OF THE ENVIRONMENT		
VILLAGE OF DRAYTON	PROJECT N° WATER 7-0246	CONTRACT N° 84-1
SECTIONS AND DETAILS		

Simcoe		
Simcoe Engineering Group Limited • Consulting Engineers		
Design R.L.S.	Scale N.T.S.	Drawing No.
Drawn T.F.T.		
Checked D.D.B.C.	Date NOV. 1984	
		M6-W

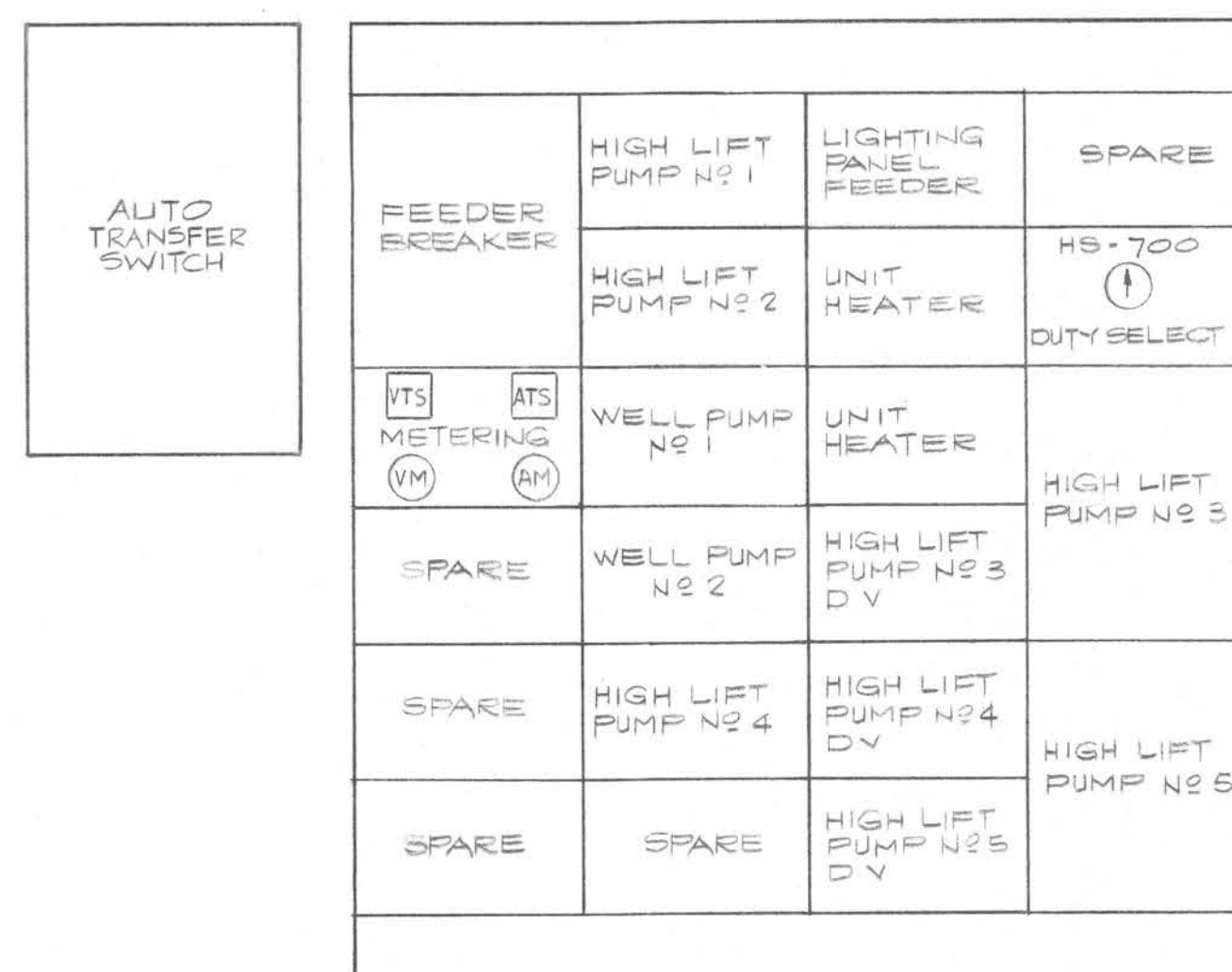
NOTE:
FOR LEGEND AND SYMBOLS
SEE DWG. ZIGER-2-W



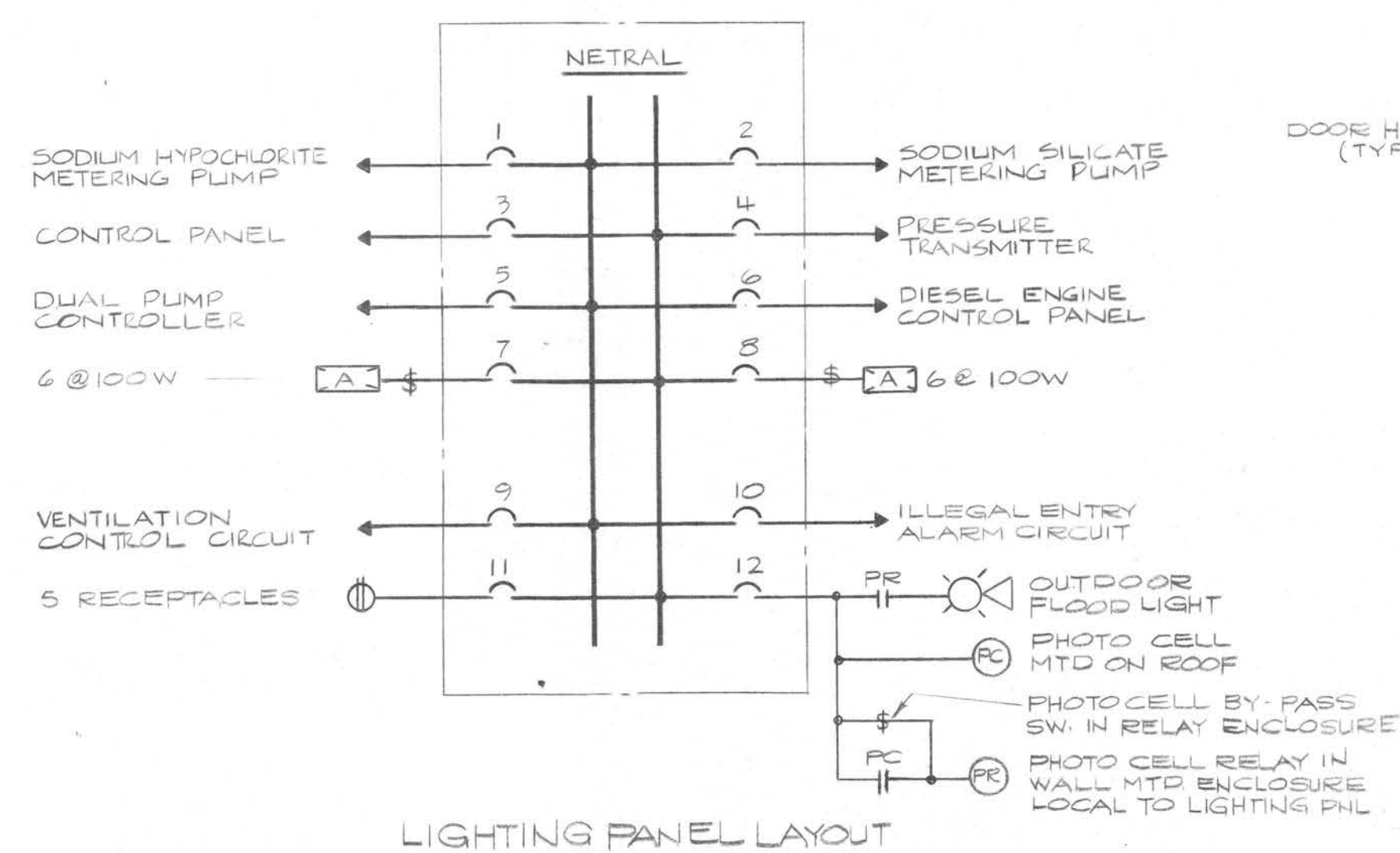
Date	Revisions	 K. SMART ASSOCIATES LIMITED CONSULTING ENGINEERS AND PLANNERS 180 FREDERICK STREET KITCHENER, ONTARIO N2H 2P5	 Ontario	MINISTRY OF THE ENVIRONMENT		 REGISTERED PROFESSIONAL ENGINEER G. A. RICHARDS PROVINCE OF ONTARIO	Simcoe Simcoe Engineering Group Limited • Consulting Engineers <table><tr><td>Design</td><td>AM</td><td>Scale</td><td rowspan="2">Horiz. Vert.</td><td rowspan="2">Drawing No.</td></tr><tr><td>Drawn</td><td>AM</td><td></td></tr><tr><td>Checked</td><td></td><td>Date</td><td>NOV/84</td><td rowspan="2">E1-W</td></tr><tr><td></td><td></td><td></td><td></td></tr></table>	Design	AM	Scale	Horiz. Vert.	Drawing No.	Drawn	AM		Checked		Date	NOV/84	E1-W				
Design	AM			Scale	Horiz. Vert.			Drawing No.																
Drawn	AM																							
Checked		Date	NOV/84	E1-W																				
				VILLAGE OF DRAYTON	PROJECT N°	CONTRACT N°																		
				PROCESS AND INSTRUMENTATION DIAGRAM																				



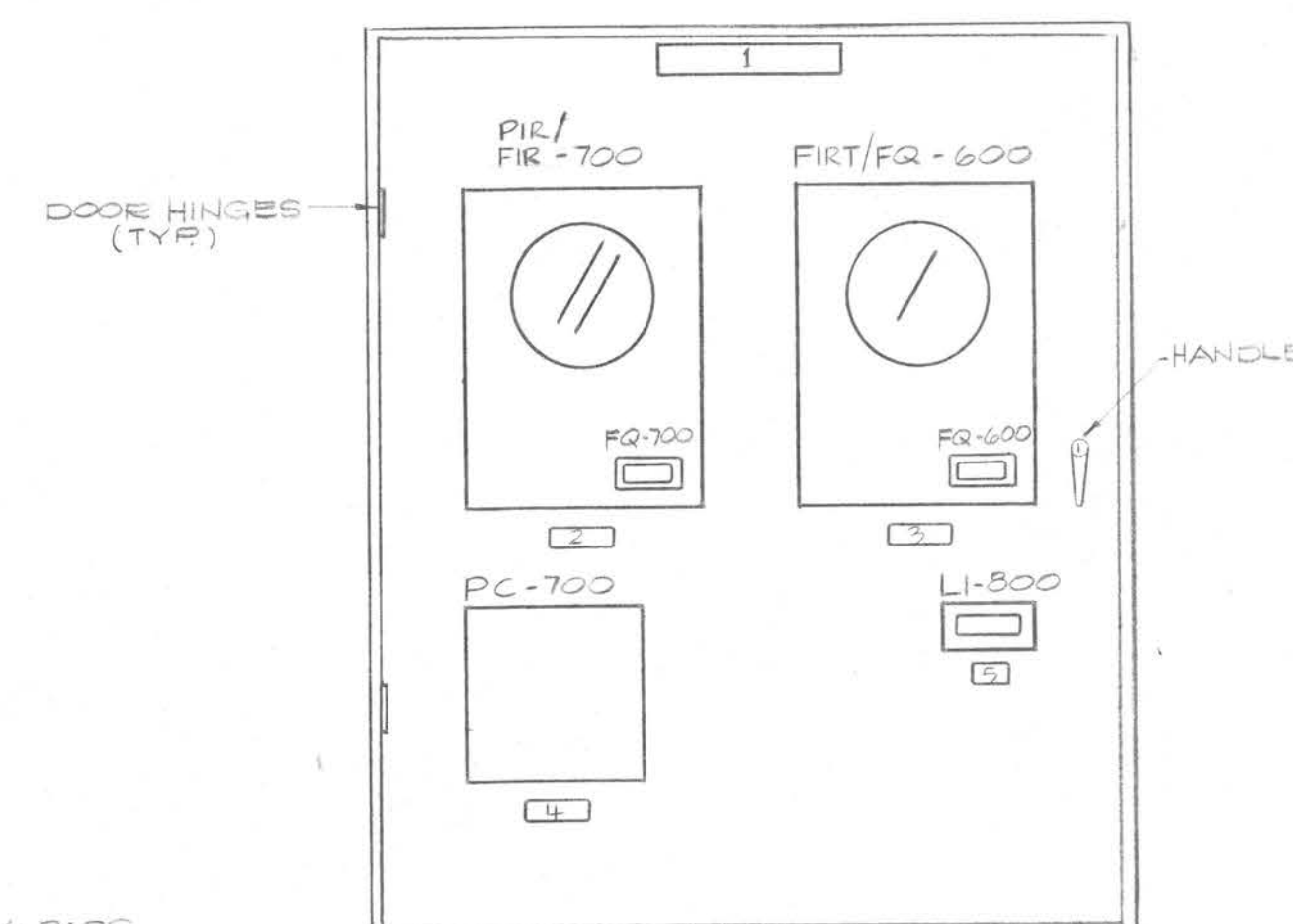
SINGLE LINE DIAGRAM



MCC LAYOUT



LIGHTING PANEL LAYOUT



CONTROL PANEL

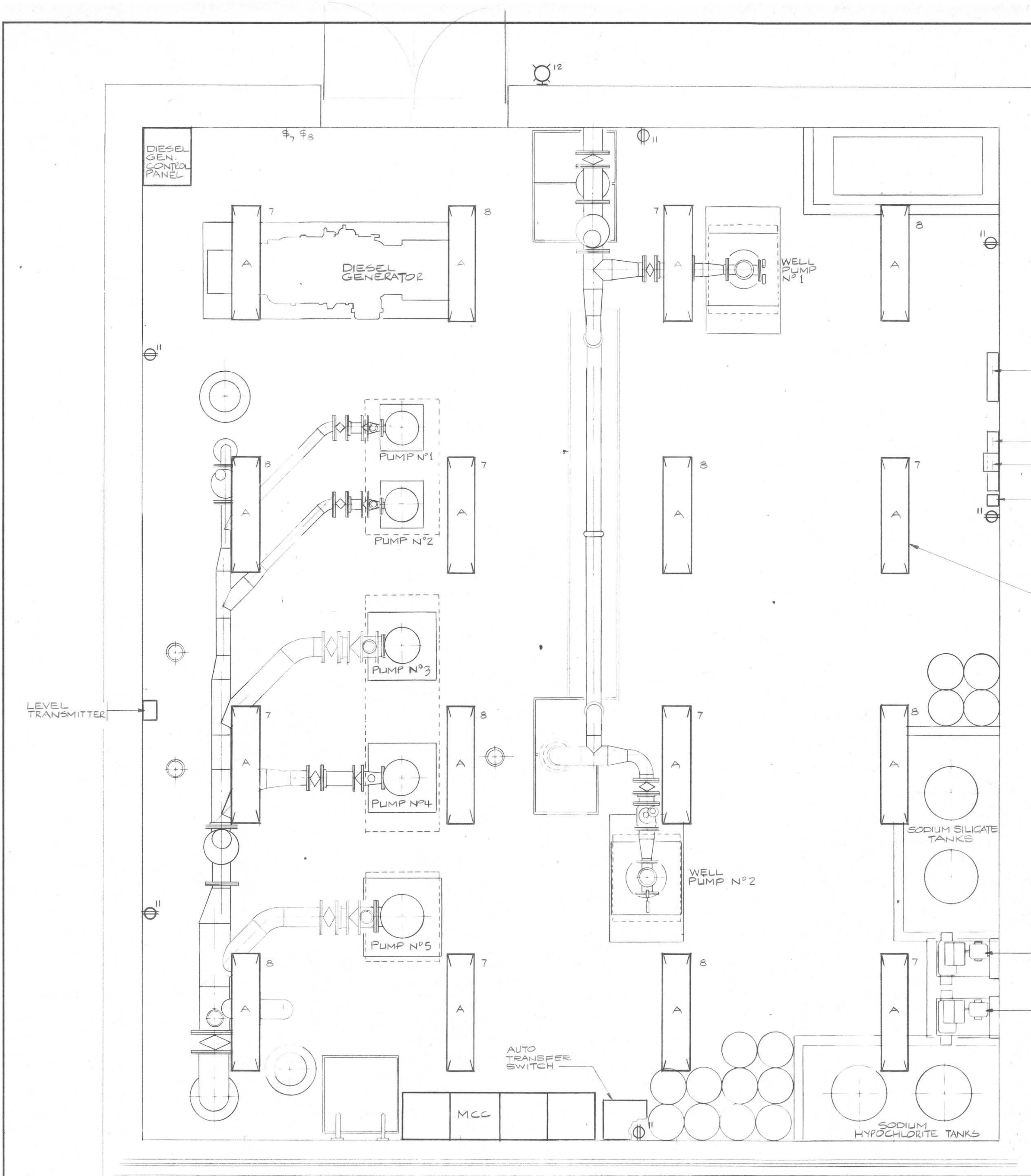
NAMEPLATE TO READ:

- CONTROL PANEL
- SYSTEM PRESSURE/FLOW
- WELLS FLOW
- PUMPS 1, 2, & 4 CONTROLLER
- CLEARWELL LEVEL

LEGEND & SYMBOLS

- FLUORESCENT LIGHTING FIXTURE (E.G. TYPE "C" CIRCUIT 3)
- FLOOD LIGHT
- INCANDESCENT OR HIGH INTENSITY DISCHARGE LIGHTING FIXTURE
- INDICATING LIGHT (E.G. A = AMBER, B = BLUE, G = GREEN, R = RED, W = WHITE, Y = YELLOW)
- EMERGENCY LIGHTING FIXTURE (PORTABLE)
- DUPLEX CONVENIENCE OUTLET
- S, S3, S4 SINGLE POLE, THREE WAY, FOUR WAY SWITCH
- FLOAT SWITCH, LIMIT SWITCH, PRESSURE SWITCH
- MANUAL STARTER, DISCONNECT SWITCH, THERMOSTAT
- ELAPSED TIME METER, PROGRAM TIMER, MULTIFLEX TIMER
- AMMETER, VOLTMETER, WATTMETER
- AMMETER, VOLTMETER TRANSFER SWITCH
- CT, PT CURRENT TRANSFORMER POTENTIAL TRANSFORMER
- LA LIGHTNING ARRESTER
- IP INSTRUMENT PANEL
- MCC MOTOR CONTROL CENTRE
- LP, CCT LIGHTING PANEL, CIRCUIT
- JB, OL JUNCTION BOX, OVERLOAD RELAY
- LOS, PB LOCK-OUT-STOP, PUSHBUTTON
- CP, CS CONTROL PANEL, CONTROL SCHEMATIC
- CONDUIT CONCEALED IN FLOOR OR BURIED CABLE
- EXPOSED CONDUIT
- OPENING, CLOSING, MOTOR STARTER HOLDING COIL
- CONTROL RELAYS
- DOUBLE VOLTAGE RELAY
- TIME DELAY RELAY
- HAND-OFF-AUTO, ON-OFF SELECTOR SWITCH
- START-LOCKOUT STOP, LOCK-OUT-STOP PUSHBUTTON STATION
- OPEN-CLOSE-LOCKOUT STOP PUSHBUTTON STATION
- SUPPLIED AND INSTALLED UNDER ANOTHER DIVISION BUT CONNECTED UNDER THIS DIVISION
- SUPPLIED UNDER ANOTHER DIVISION BUT INSTALLED AND CONNECTED UNDER THIS DIVISION
- IN MOTOR CONTROL CENTRE
- AT MOTOR OR VALVE OR SLUICE GATE
- FIELD MOUNTED INSTRUMENT
- FRONT OF PANEL MOUNTED INSTRUMENT
- REAR OF PANEL MOUNTED INSTRUMENT
- FLOW ELEMENT
- FE FLOW TRANSMITTER
- HS HAND OPERATED SWITCH
- IL INDICATING LIGHT
- IL COMPLEX LOGIC CIRCUIT
- IL OR LOGIC CIRCUIT
- PT PRESSURE TRANSMITTER
- LI LEVEL INDICATOR
- (S) SHIELDED CONDUCTOR
- IN CONTROL PANEL

NOTE:
FOR LEGEND AND SYMBOLS
SEE DWG. N° E2-W



- CONTROL PANEL
- LIGHTING PANEL
- LIGHTING TRANSFORMER
- WALL MOUNTED ENCLOSURE FOR PHOTO CELL RELAY

TYPE "A" FLUORESCENT
FIXTURE TO BE SURFACE MTD.
1200MM, VAPOR PROOF WITH
MOULDED FIBRE GLASS
BODY, OPAL ACRYLIC DIFFUSER
AND 2-40W R/S LAMP
ELECTROLIER "AQUA SEAL"
KCP-79-248 OR EQUAL.
(TYPICAL)

- SODIUM SILICATE
METERING PUMP
- SODIUM
HYPOCHLORITE
METERING PUMP

Date	Revisions

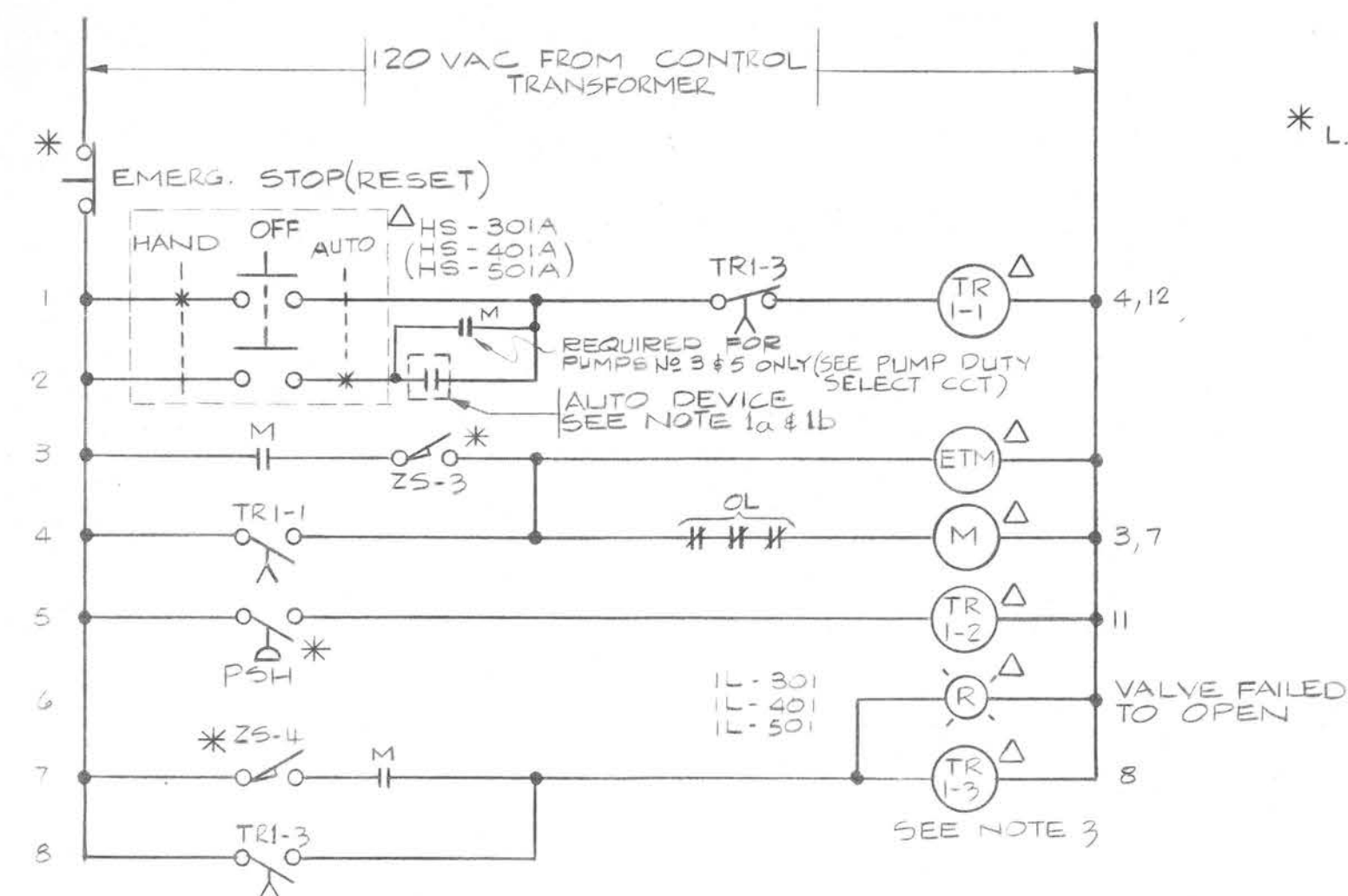
K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
460 FREDERICK STREET
KITCHENER, ONTARIO N2H 2P5



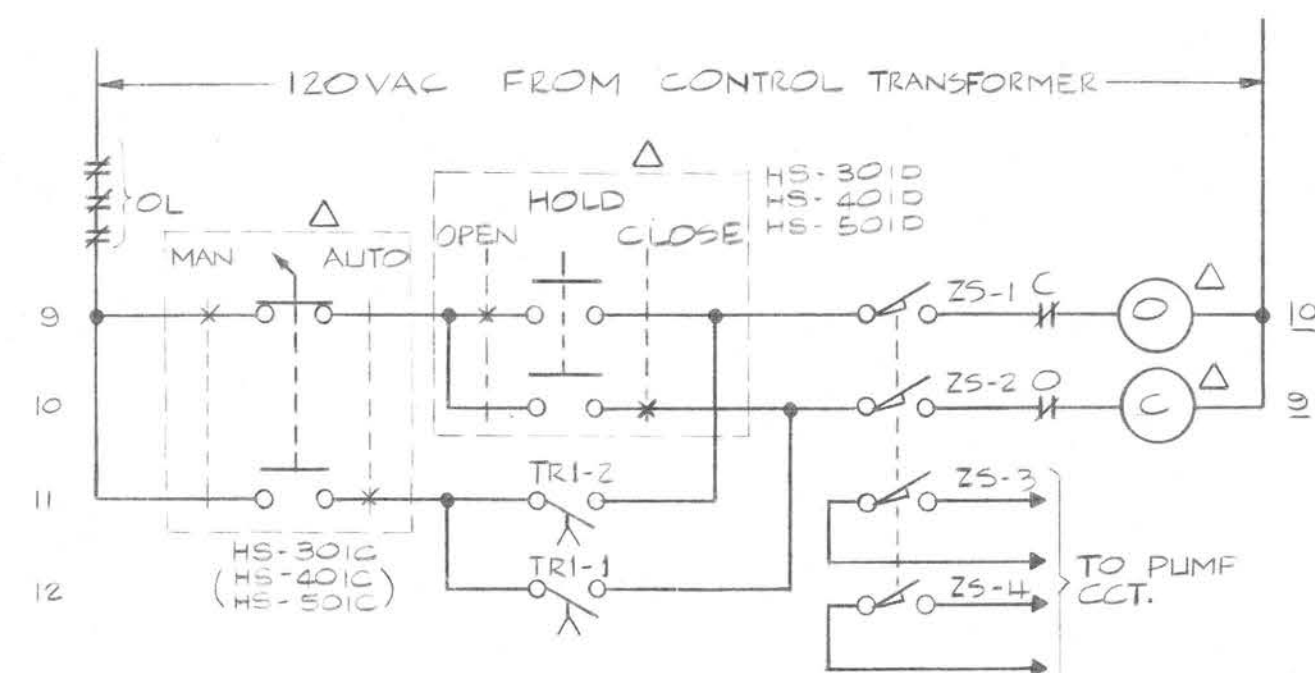
MINISTRY OF THE ENVIRONMENT		
VILLAGE OF DRAYTON	PROJECT N°	CONTRACT N°
LIGHTING LAYOUT		

Simcoe
Simcoe Engineering Group Limited • Consulting Engineers

Design AM	Scale Horiz.	Drawing No.
Drawn AM	Vert.	E4-W
Checked <i>[Signature]</i>	Date NOV/34	



PUMPS CONTROL CIRCUIT
(TYP FOR H.L. PUMPS 3, 4 & 5)



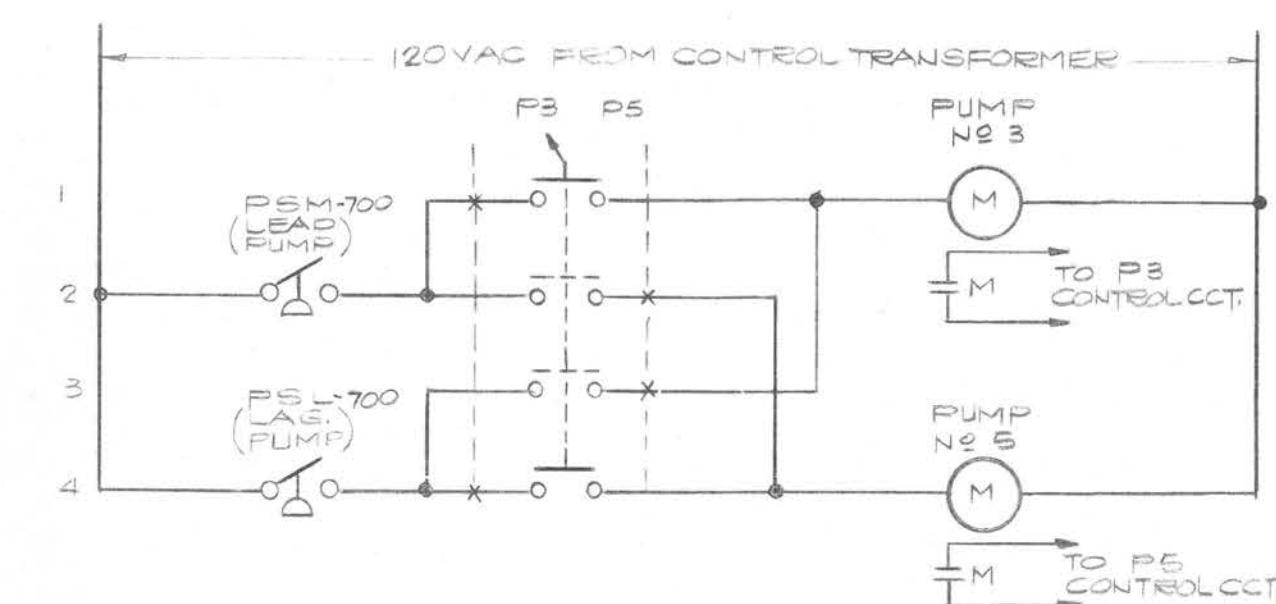
DISCH. VALVE CONTROL CIRCUIT
(TYP FOR H.L. PUMPS 3, 4 & 5)

LIMIT SWITCH SEQUENCE		
SWITCH	OPEN	CLOSE
ZS-1		
ZS-2		
ZS-3		
ZS-4		

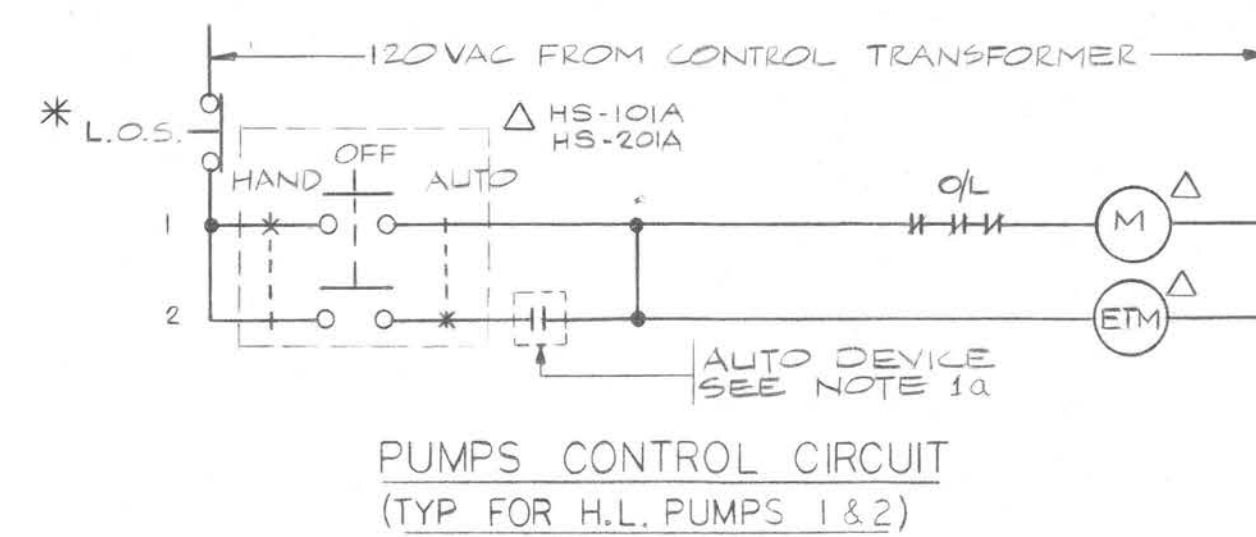
95%
— DENOTES SWITCH CLOSED

NOTES

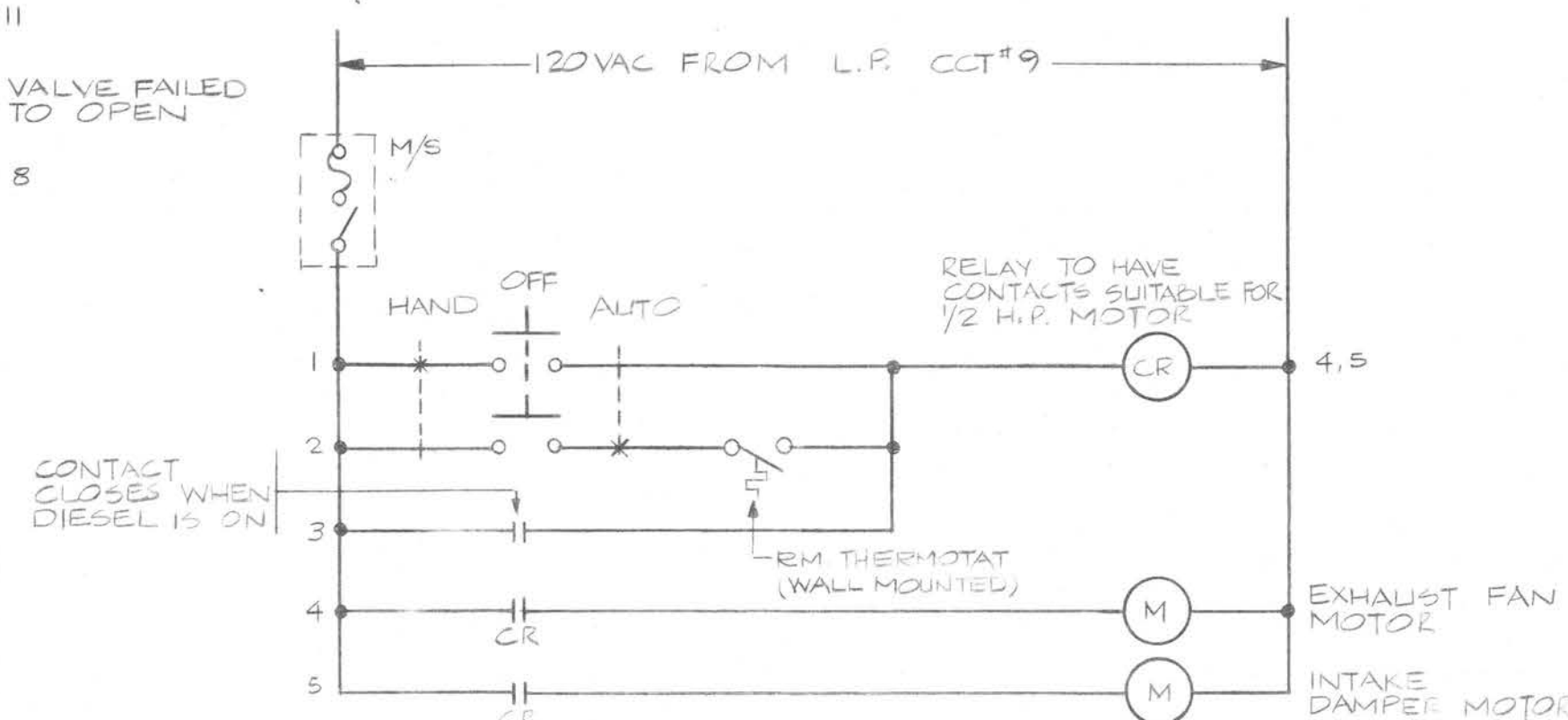
- (a) FOR H.L. PUMPS 1, 2, & 4, THE AUTO DEVICES ARE CONTACTS IN FLOW CONTROLLER (SEE DWG E5-W).
- (b) FOR H.L. PUMPS 3 & 5 THE AUTO DEVICES ARE PRESSURE SWITCHES ON STATION DISCHARGE PRESSURE. (SEE DWG N2).
- (c) FOR LOW LIFT PUMPS THE AUTO DEVICES ARE CONTACTS IN LEVEL CONTROLLER (SEE DWG E5-W).
2. ALL EQUIPMENTS ARE LOCATED IN MCL UNLESS OTHERWISE NOTED.
3. TR3 MUST HAVE A HIGHER TIME SETTING THAN TR2.



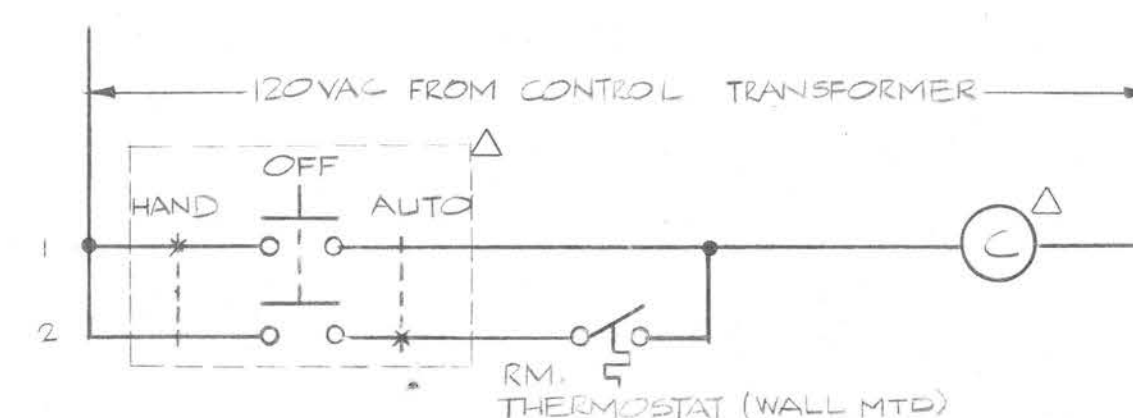
PUMP N2 3 & 5 DUTY SELECTION



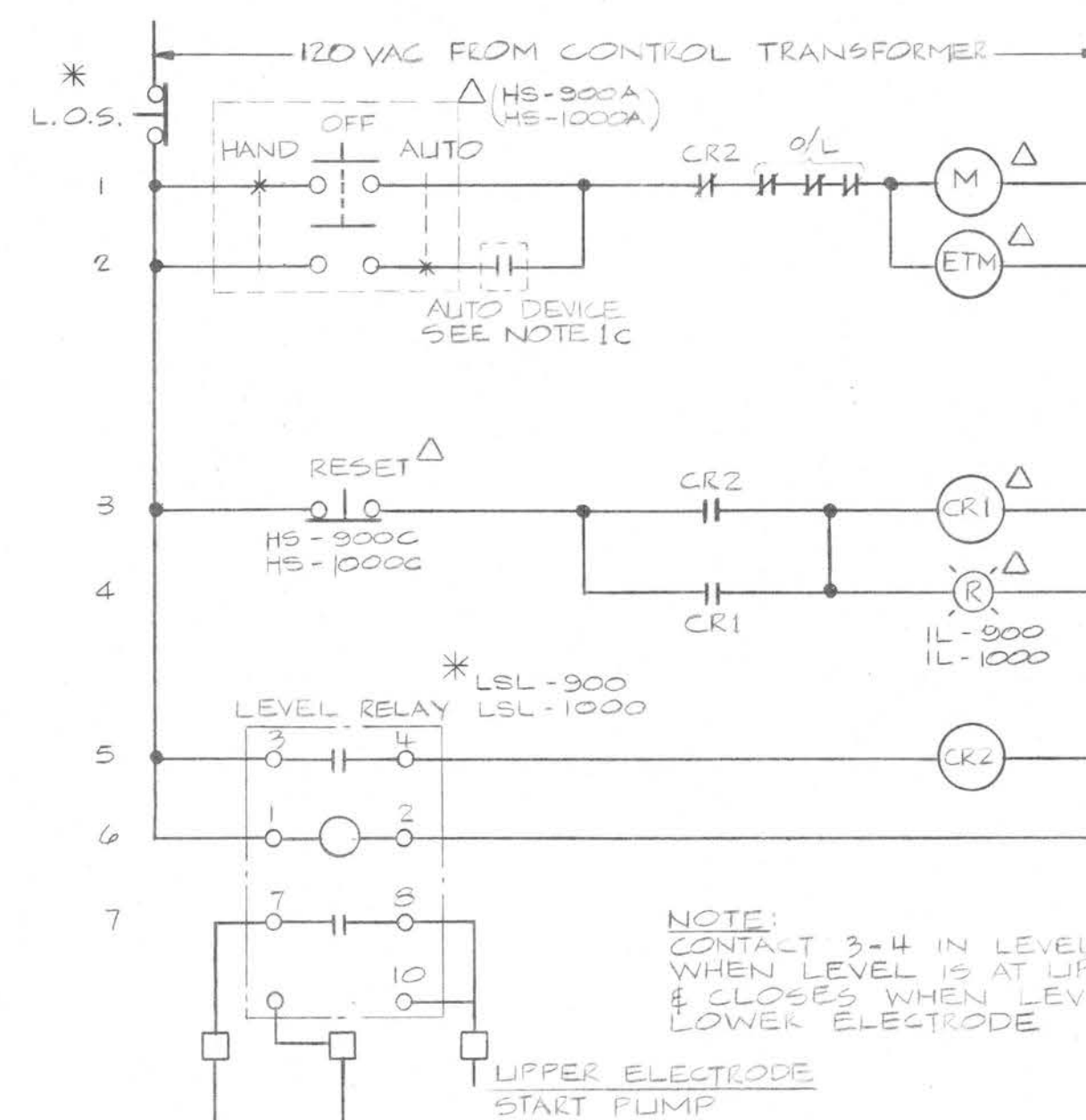
PUMPS CONTROL CIRCUIT
(TYP FOR H.L. PUMPS 1 & 2)



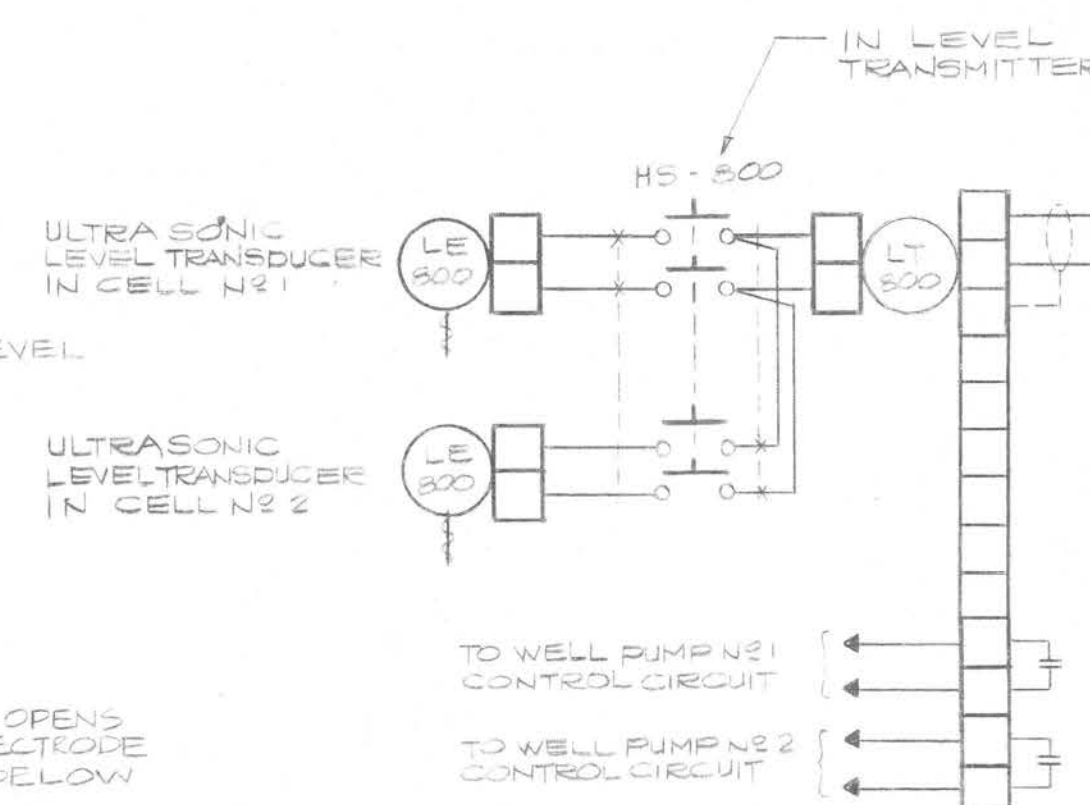
VENTILATOR CONTROL CCT



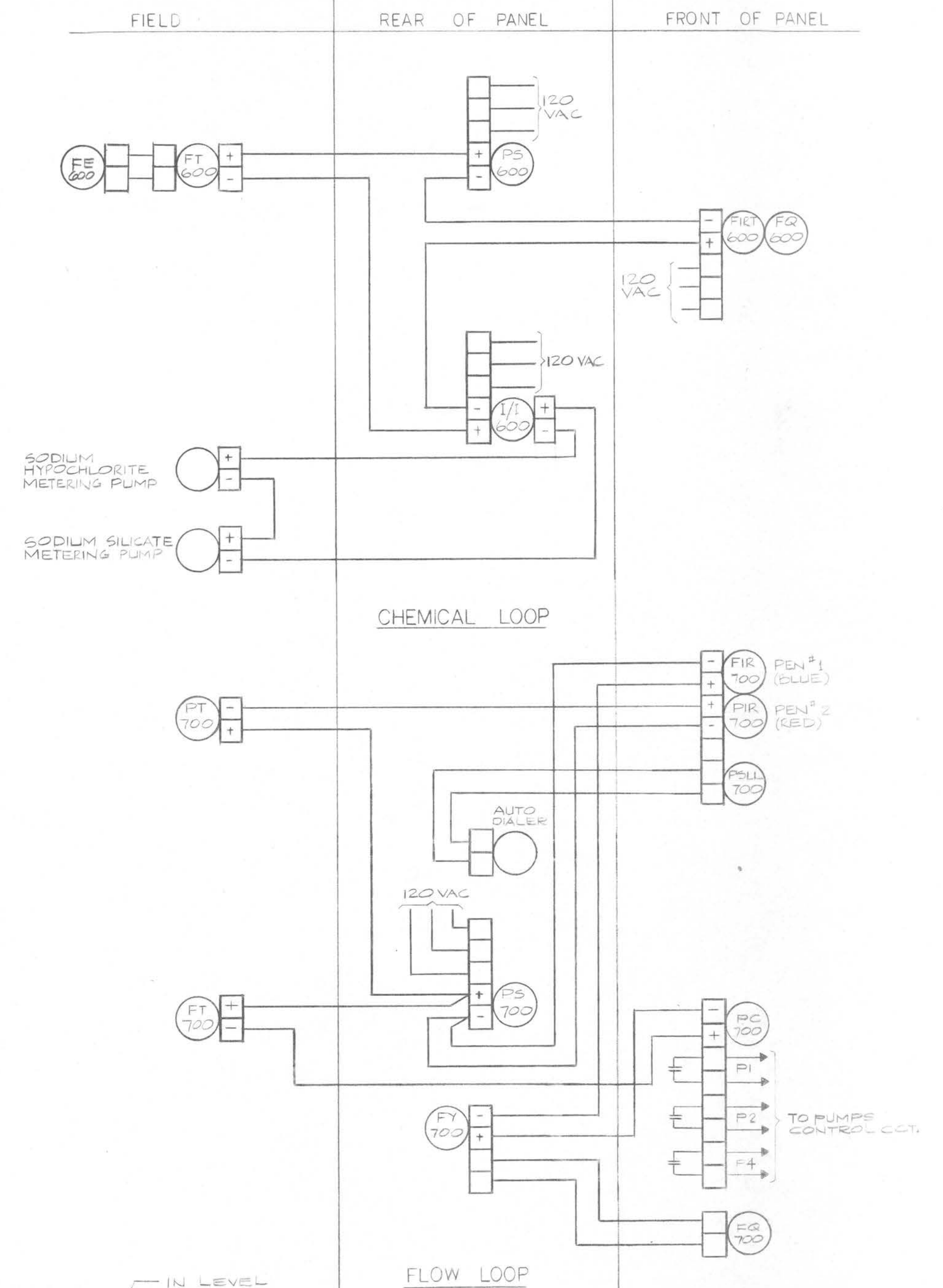
UTILITY HEATERS
(2 REQ'D)



WELL PUMP CONTROL CIRCUIT
(2 REQ'D)

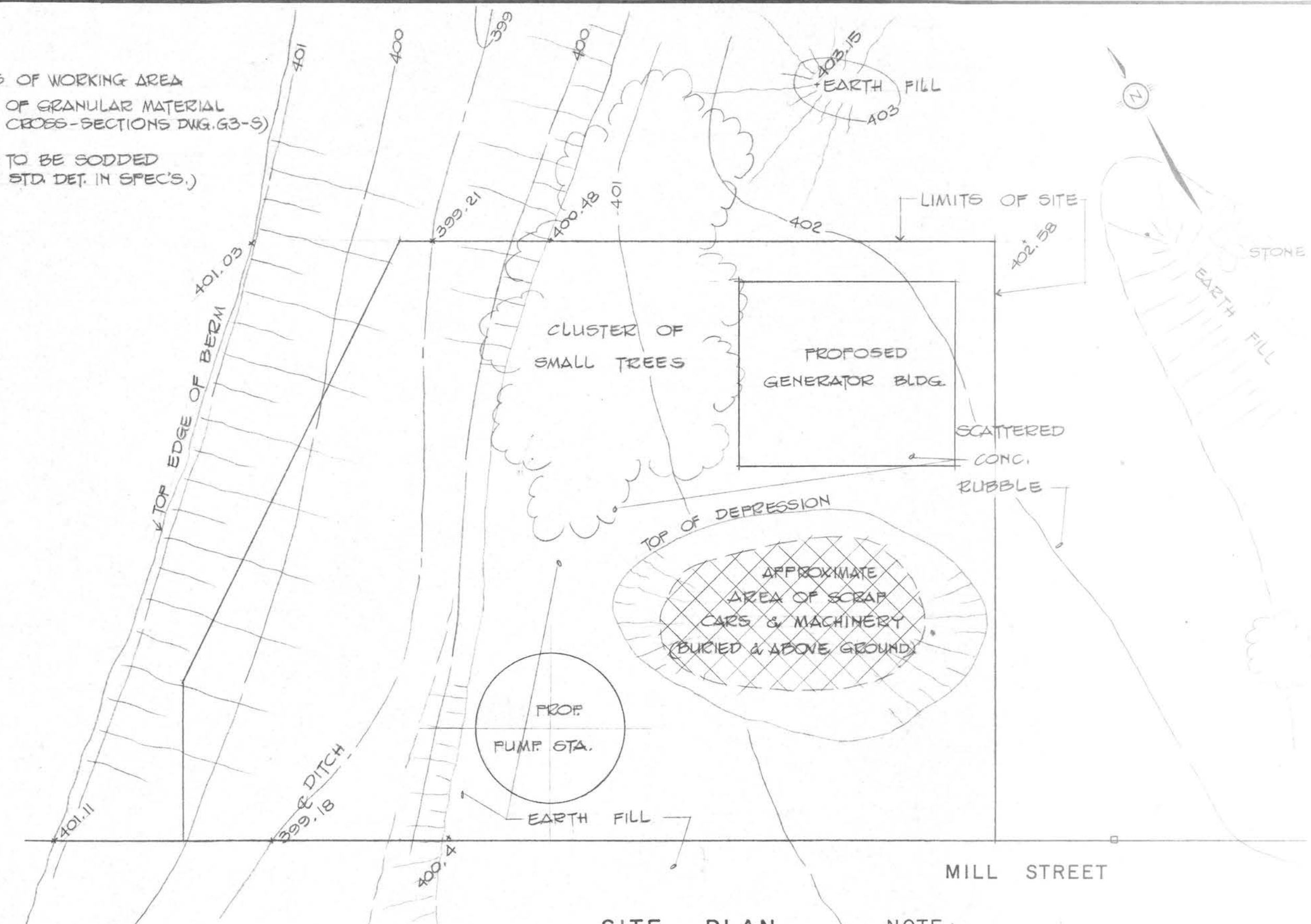
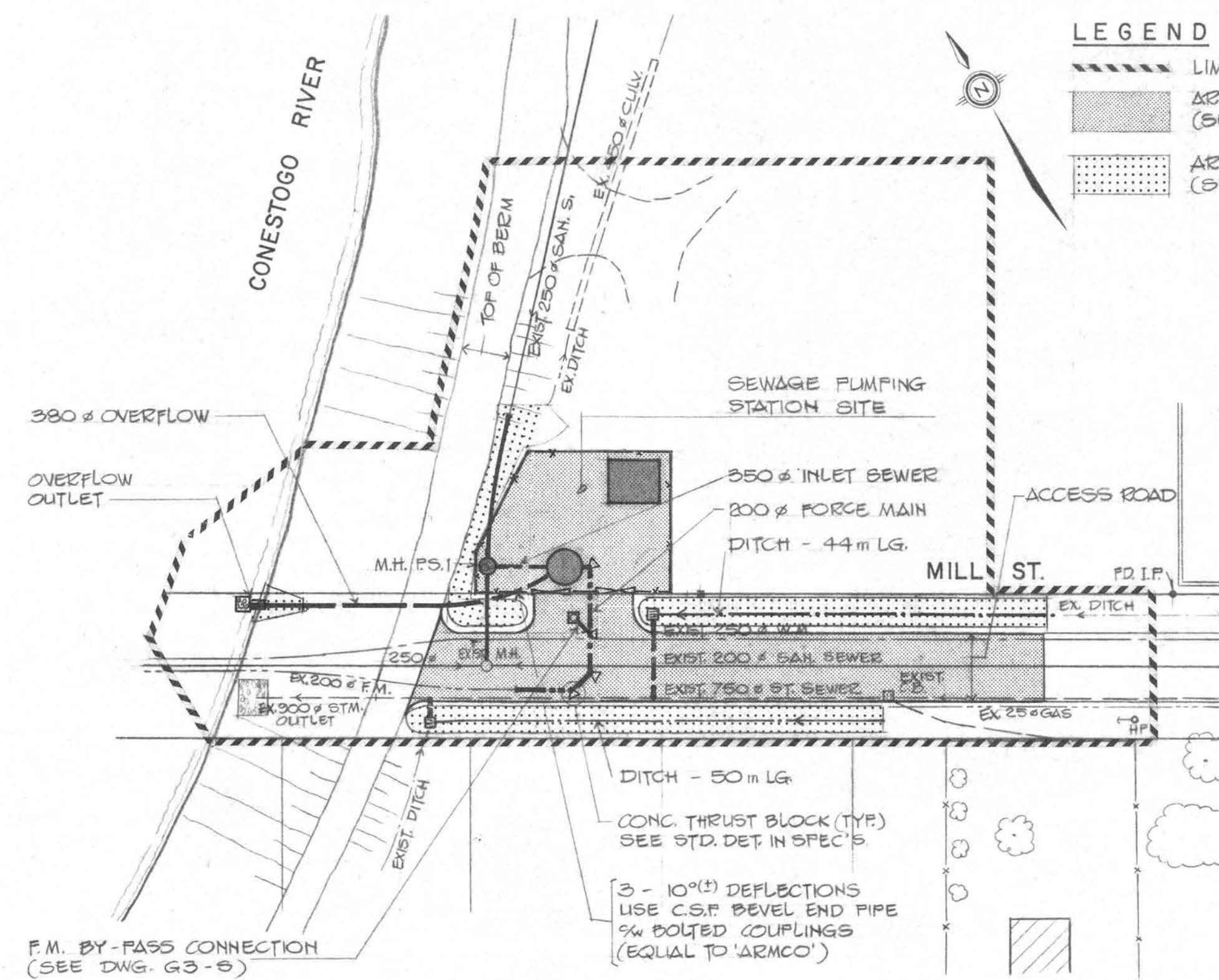
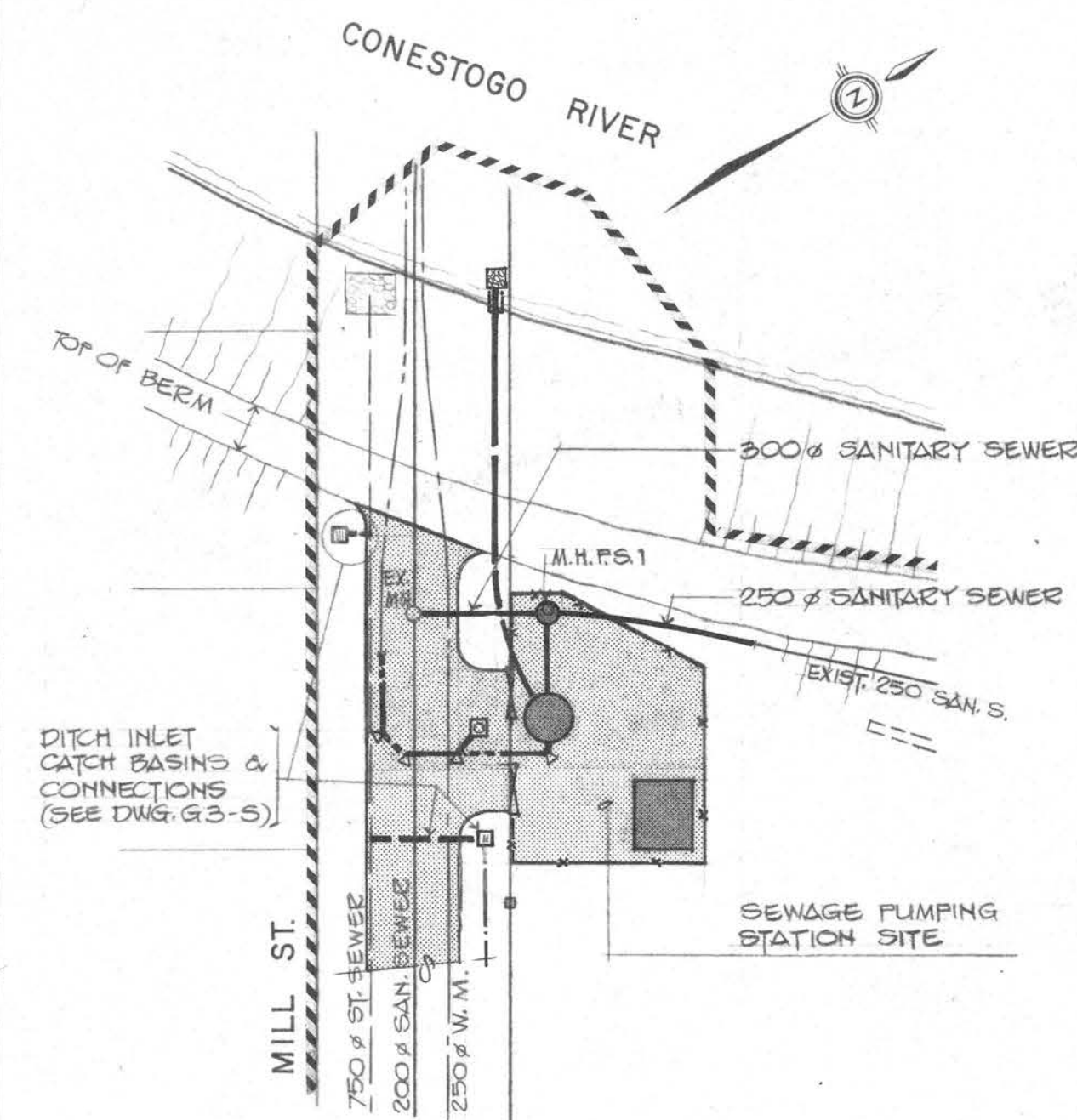


RESERVOIR LEVEL CONTROL LOOP

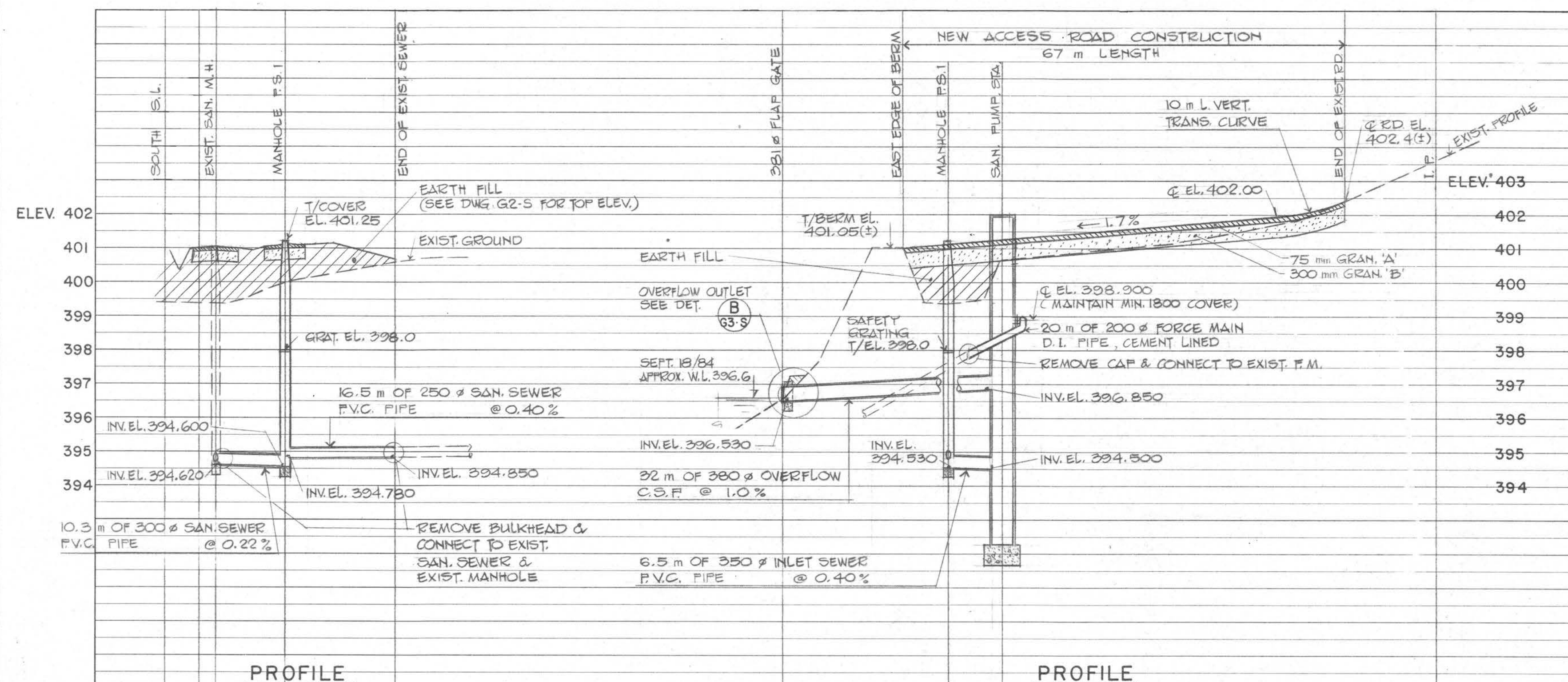


CHEMICAL LOOP

FLOW LOOP



NOTE:
BEFORE COMMENCEMENT OF NEW CONSTRUCTION THE CONTRACTOR IS TO CLEAR TREES, REMOVE CONCRETE RUBBLE, SCRAP METAL & ANY OTHER WASTE MATERIAL FROM SITE AS REQUIRED & DISPOSE OF ALL AT HIS EXPENSE.



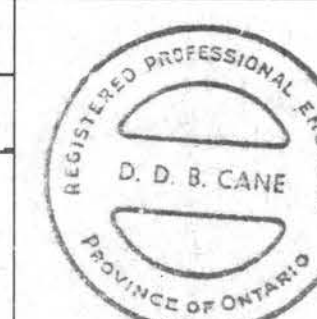
STATION	000.00	007.50	017.80	034.30	036.50	072.00	084.00	000.00	STATION
SEWER									ROAD

Date	Revisions

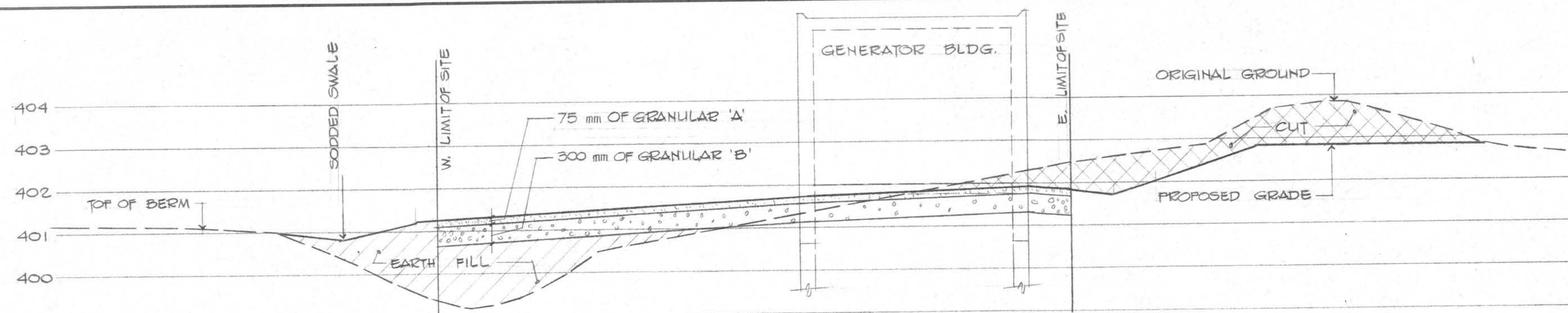
K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
480 FREDERICK STREET
KITCHENER, ONTARIO N2H 2P5



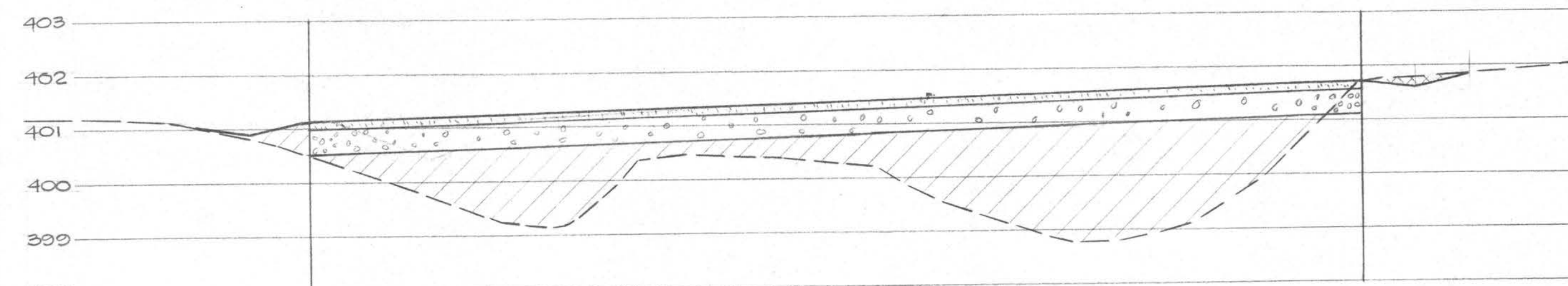
MINISTRY OF THE ENVIRONMENT
VILLAGE OF DRAYTON PROJECT N° SEWAGE 3-0150 CONTRACT N°
MILL STREET
SERVICES, ACCESS ROAD AND SITE



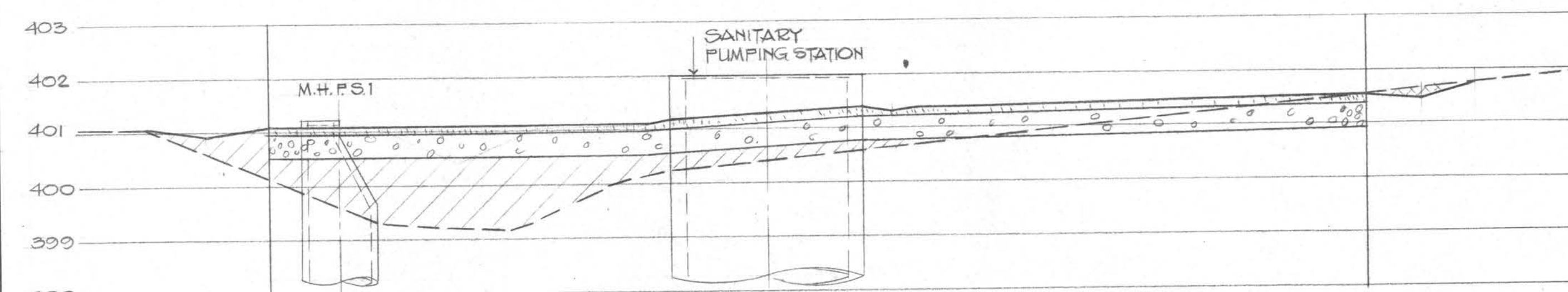
Simcoe			
Simcoe Engineering Group Limited • Consulting Engineers			
Design	D. D. B. C.	Scale	U.N.O.
Drawn	V. T.	Horiz.	1:500
Checked		Vert.	1:100
		Date	NOV. 1984
		Drawing No.	GI-S



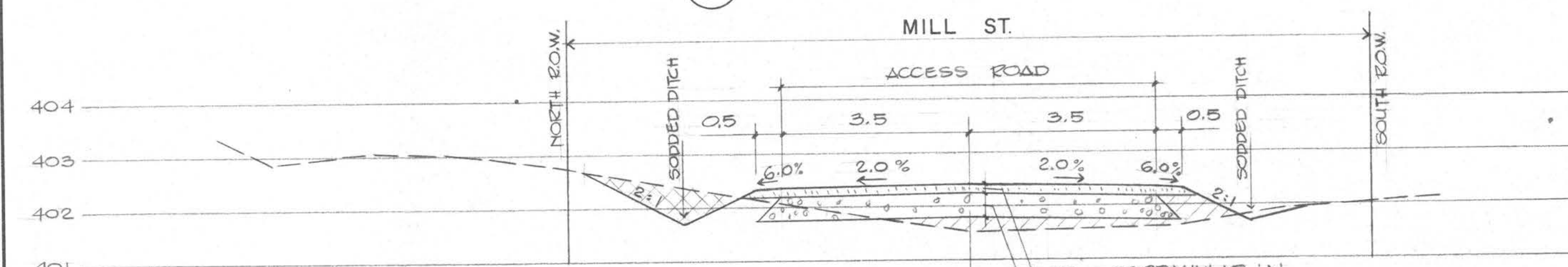
1 SECTION
62-S



2 SECTION
62-S

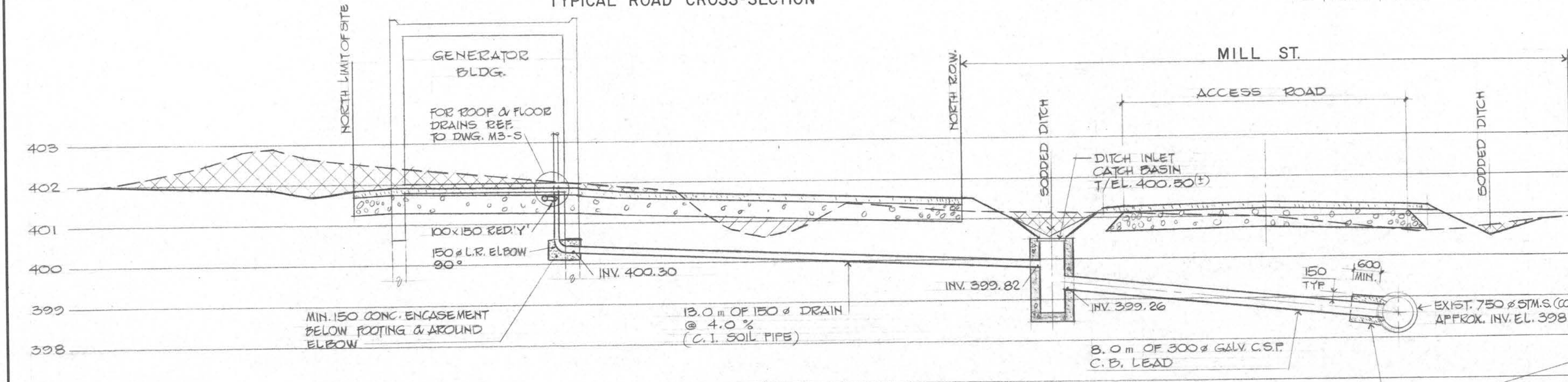


3 SECTION
62-S

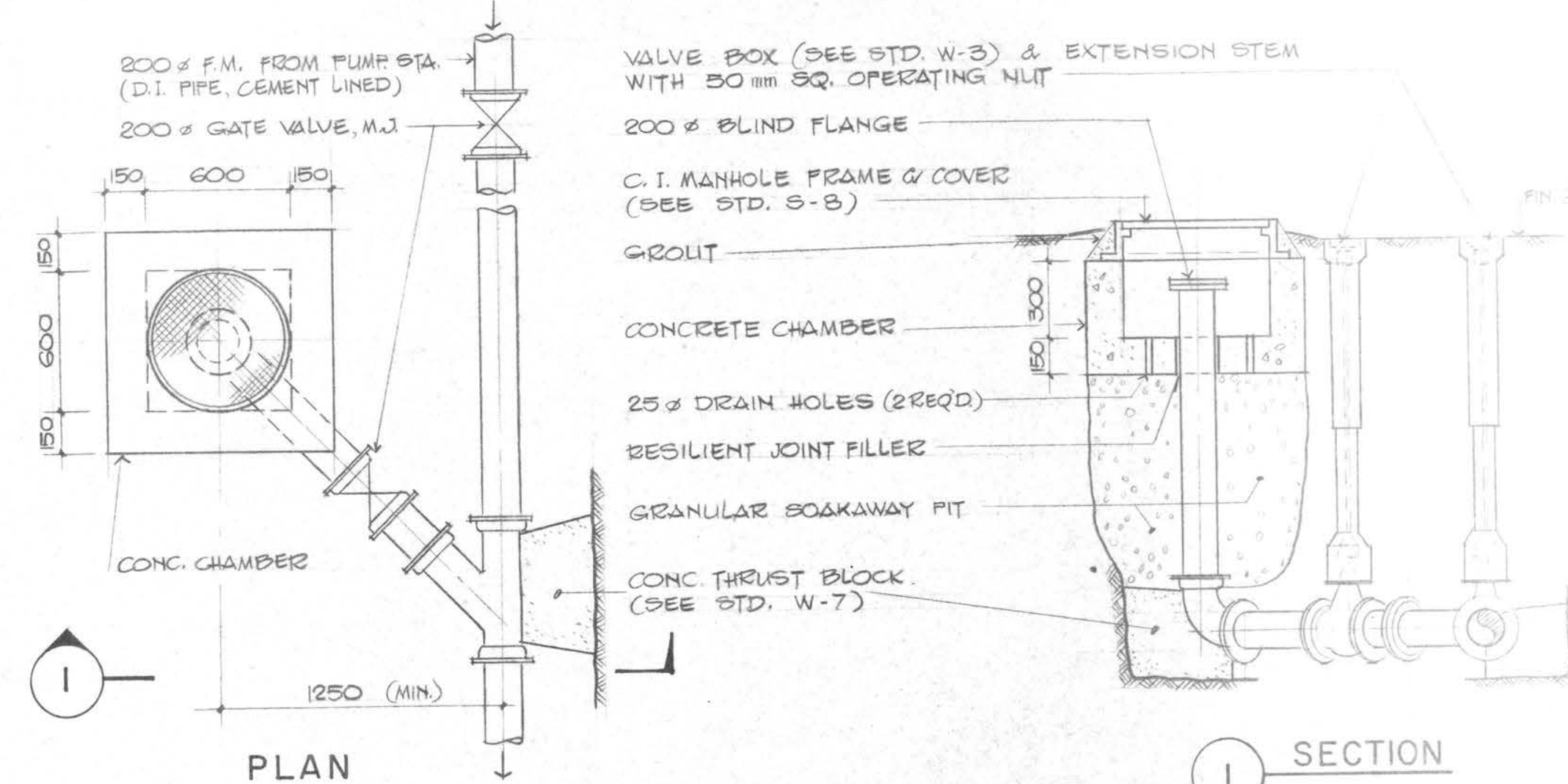


4 SECTION
62-S

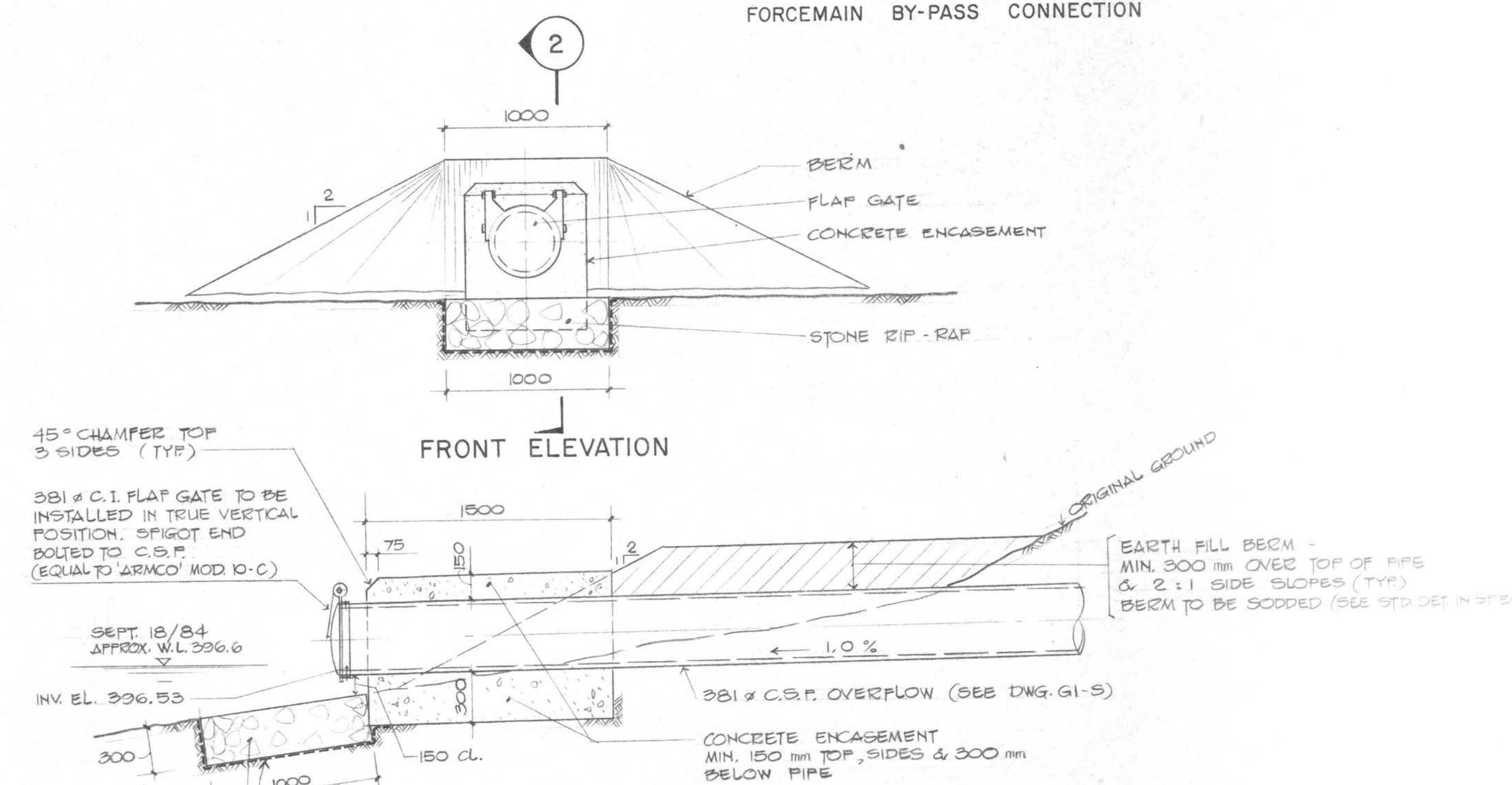
TYPICAL ROAD CROSS-SECTION



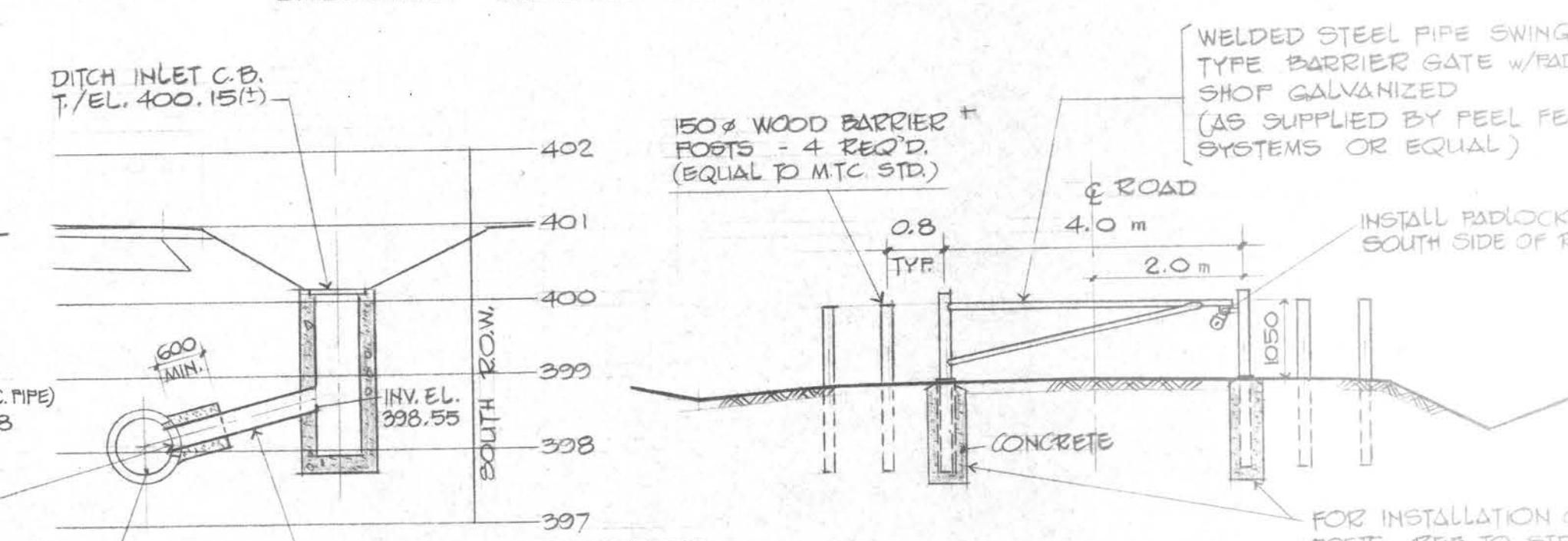
5 SECTION
62-S



A DETAIL
62-S 1:25
FORCEMAIN BY-PASS CONNECTION



2 SECTION
62-S 1:25
EMERGENCY OVERFLOW OUTLET



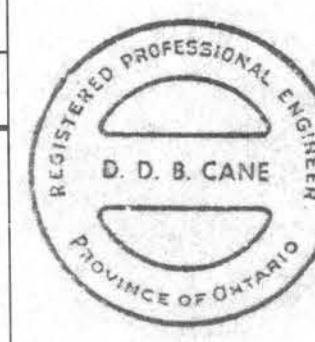
B DETAIL
62-S

Date	Revisions

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
460 FREDERICK STREET
KITCHENER, ONTARIO N2H 2P8

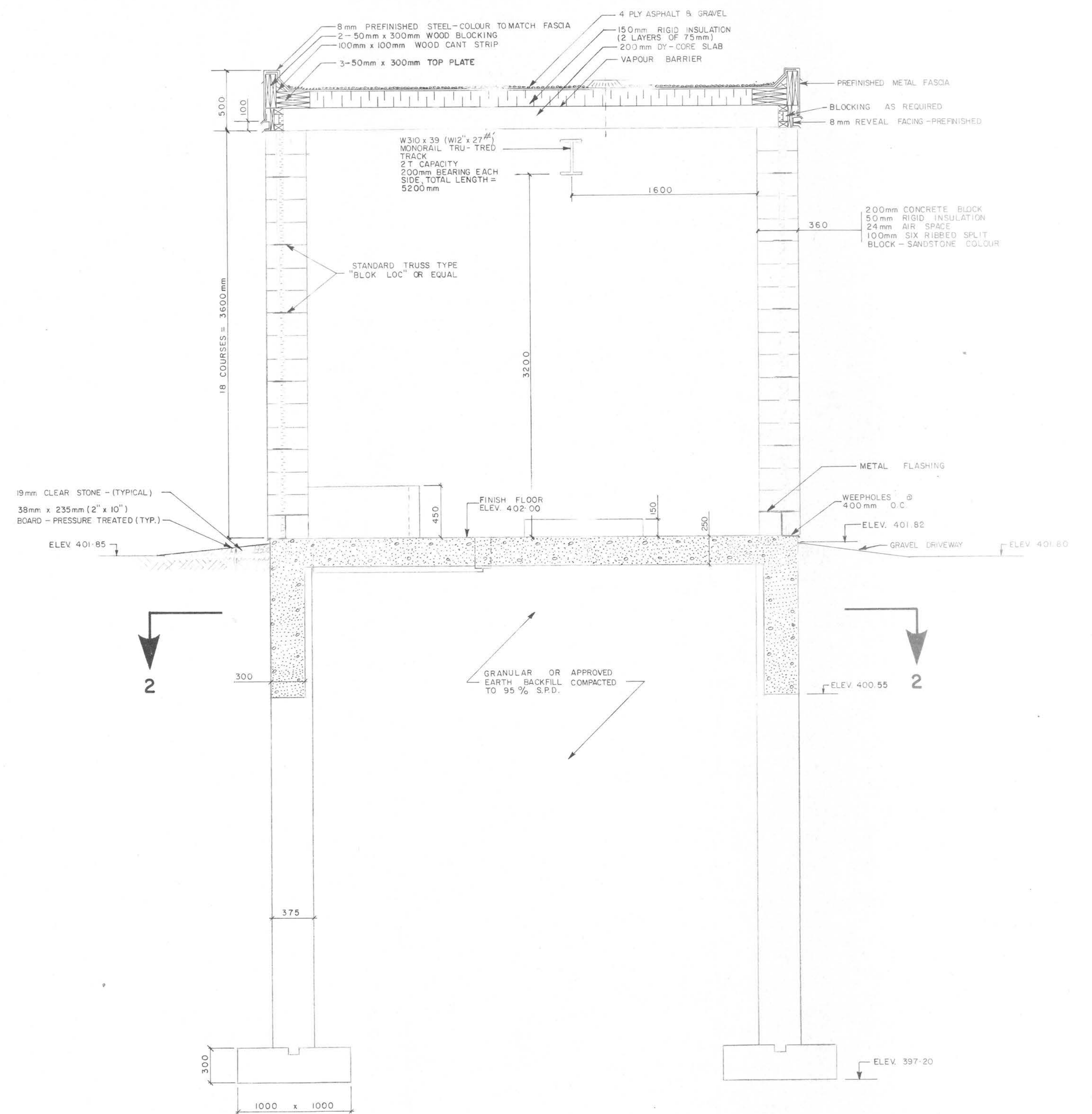
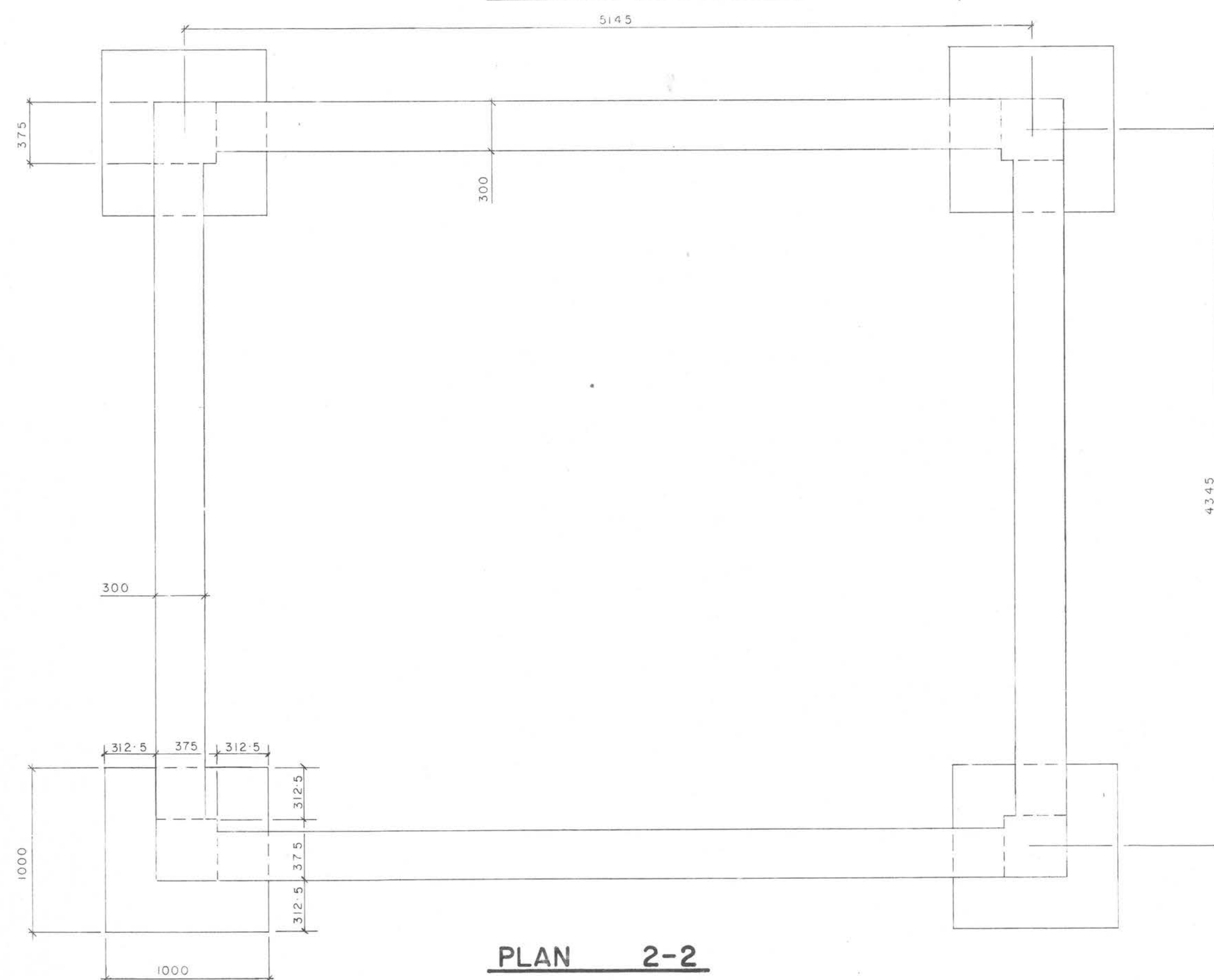


MINISTRY OF THE ENVIRONMENT
VILLAGE OF DRAYTON PROJECT N° SEWAGE 3-0150 CONTRACT N° 84-1
SEWAGE PUMPING STATION
SITE & ACCESS ROAD CROSS-SECTIONS & DETAILS

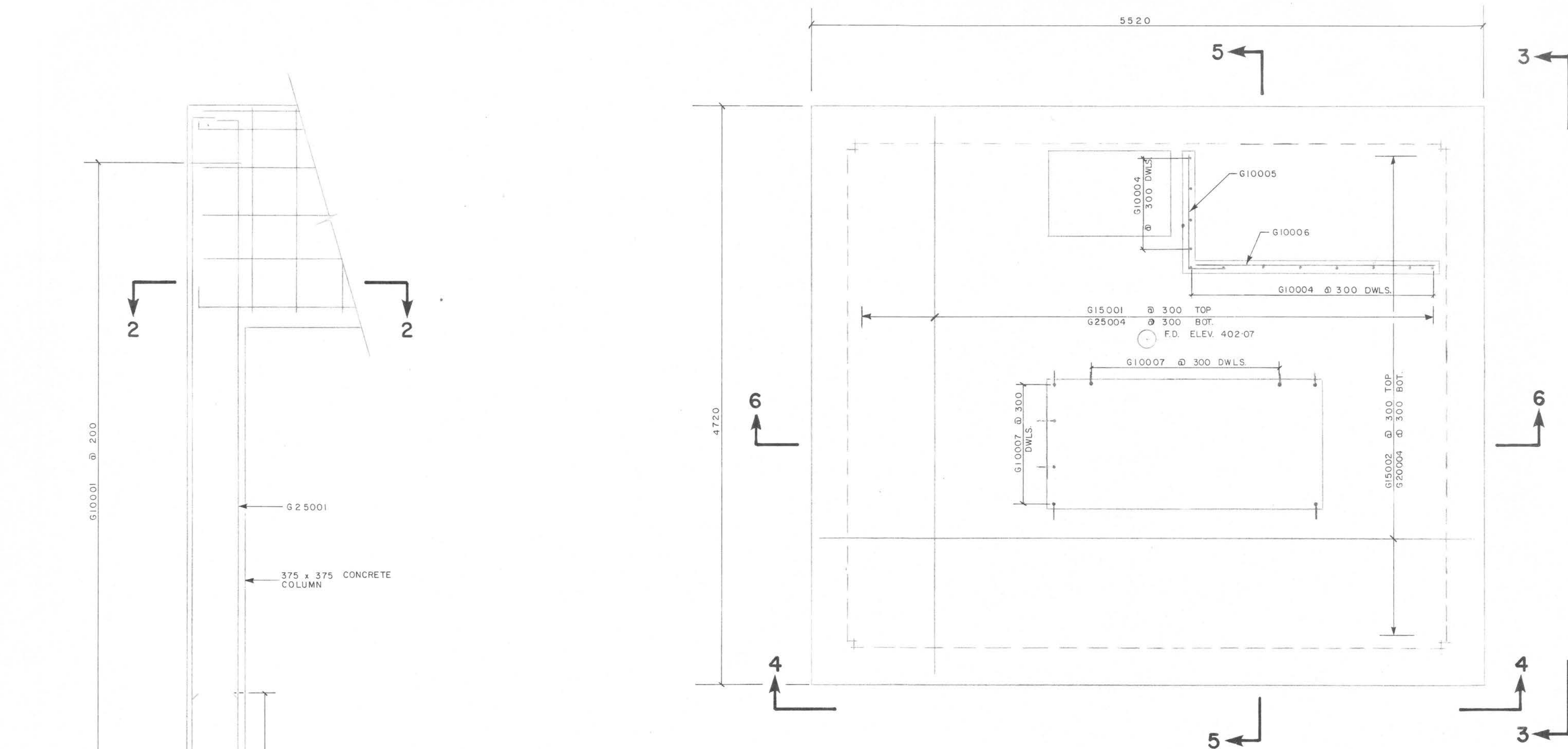


Simcoe		
Simcoe Engineering Group Limited • Consulting Engineers		
Design	D. D. B. C.	Scale 1:80 (APPROX.)
Drawn	V. T.	U. N. O.
Checked		Date NOV 1984

G3-S

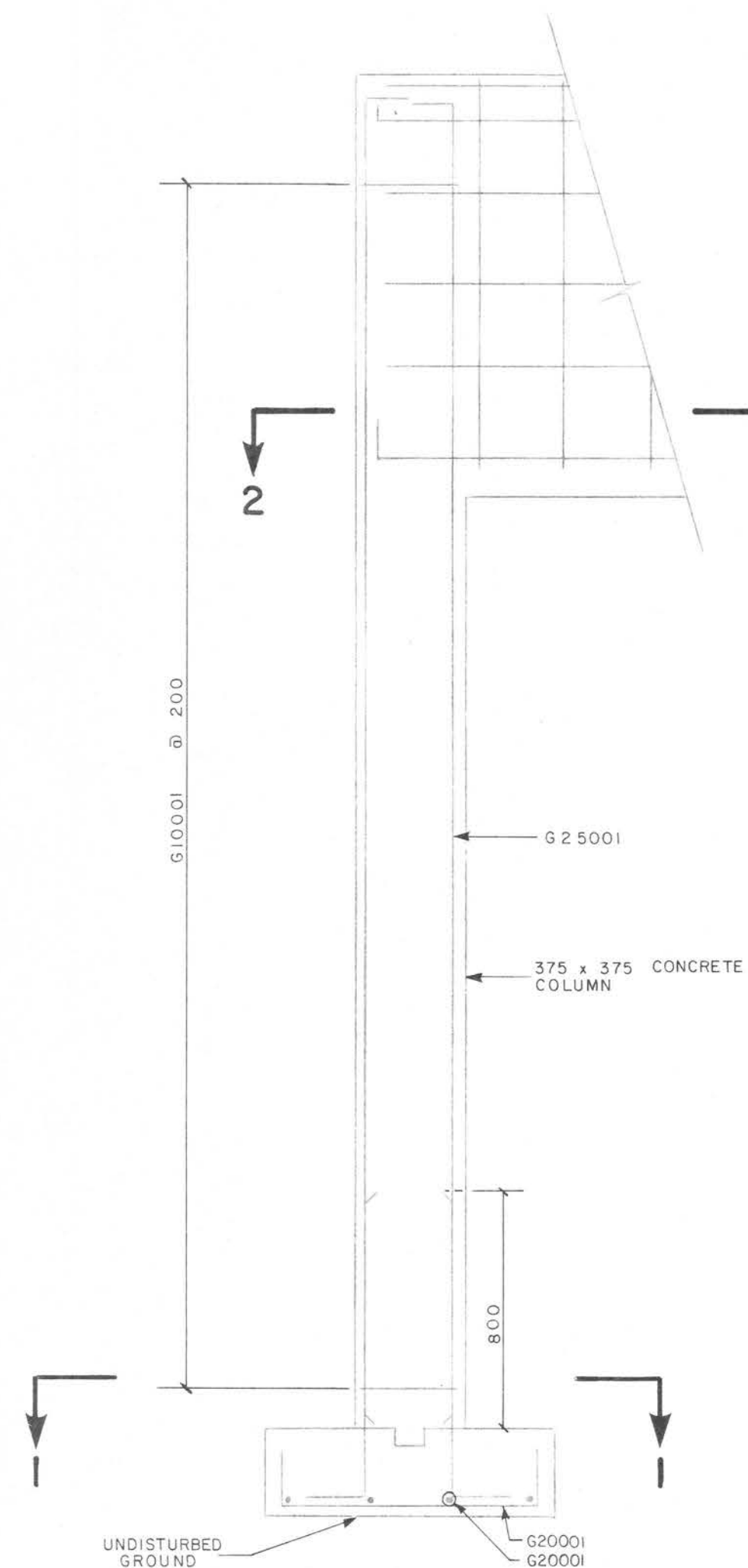


Design	E. A.	Scale Horiz. 1/25 Vert. 1/25	Drawing No. A2-S
Drawn	L. U.		
Checked	E. A.	Date NOV. 1964	



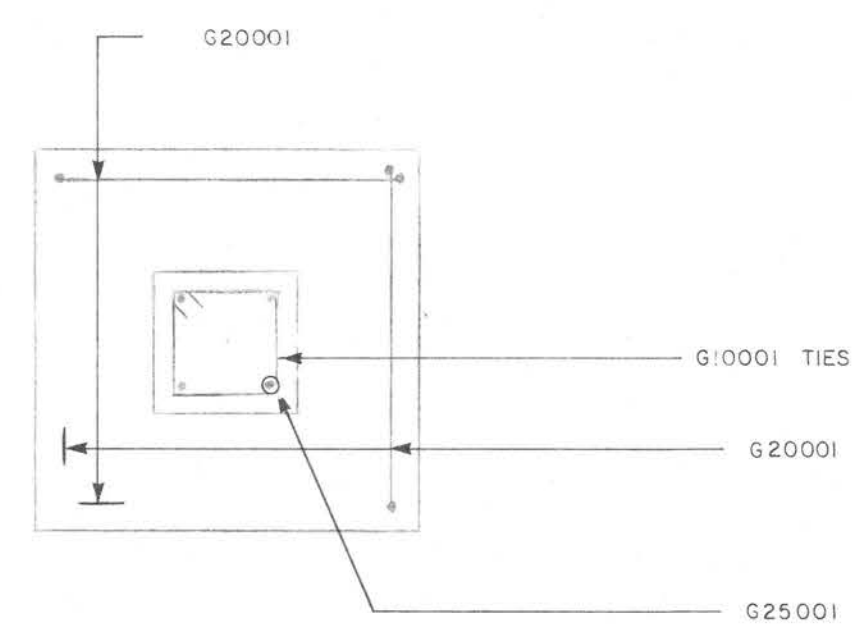
FLOOR PLAN

SCALE 1:25



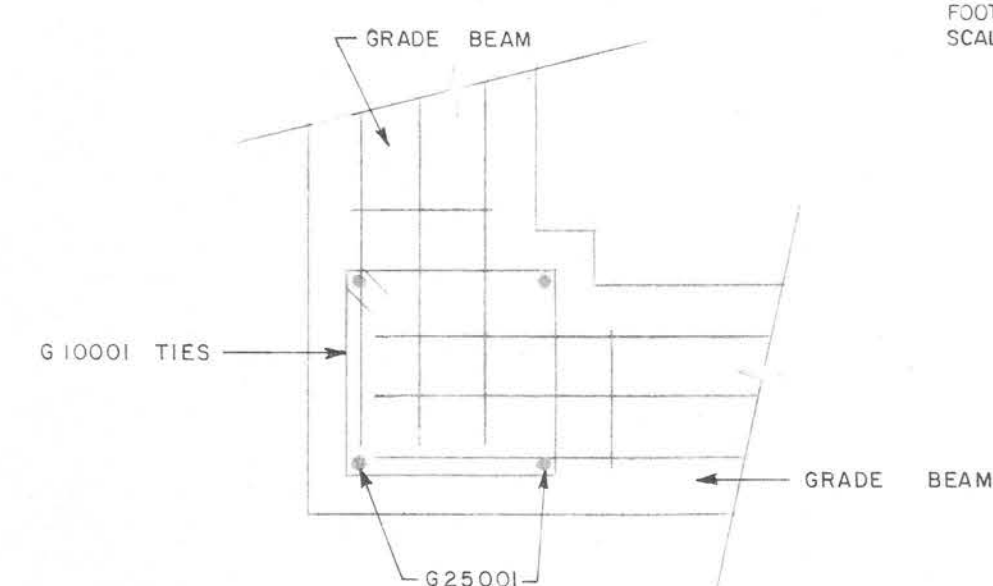
TYPICAL COLUMN DETAIL

SCALE 1:20



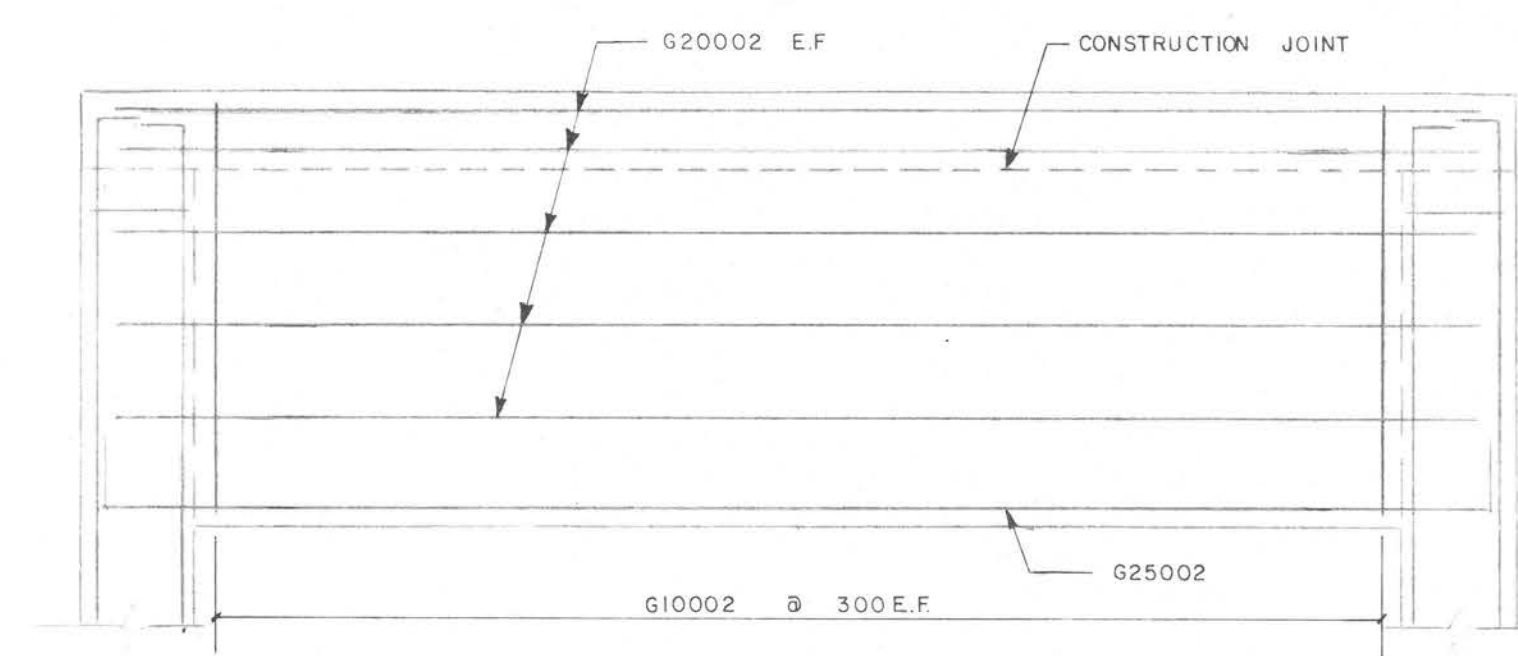
SECTION 1-1

FOOTING REINFORCEMENT (TYR)
SCALE 1:20



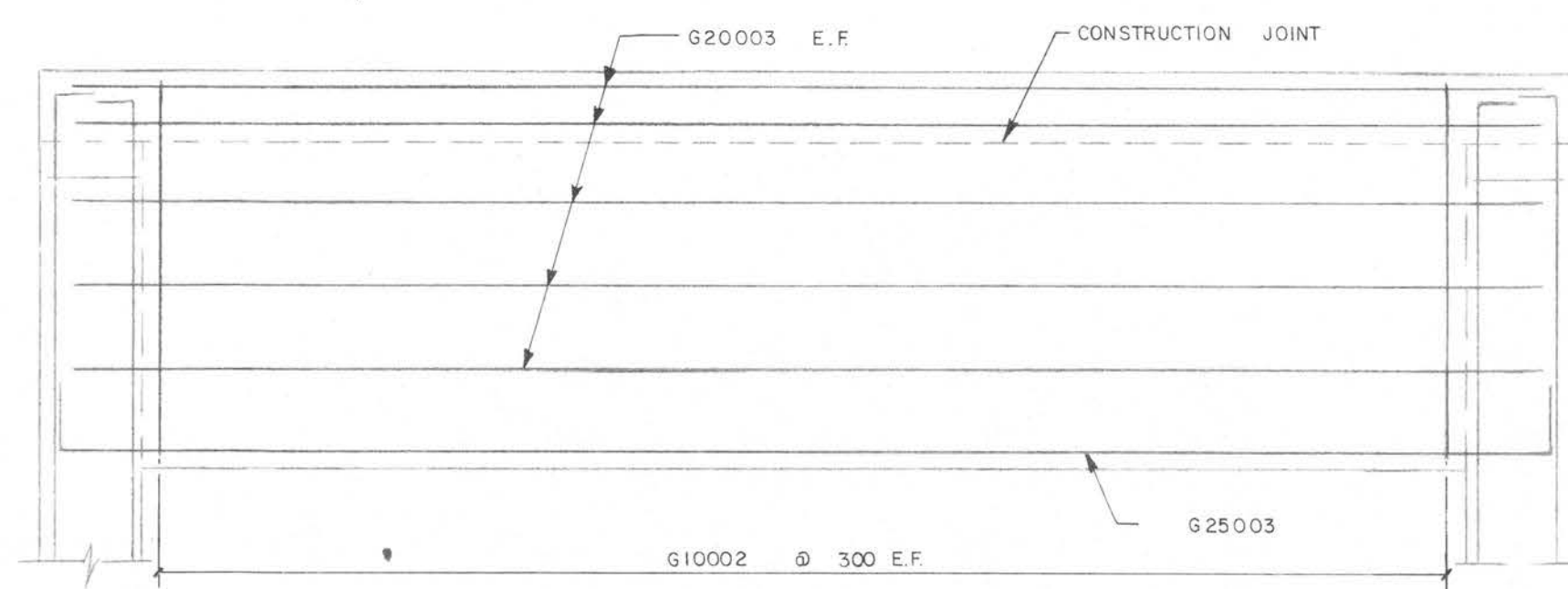
SECTION 2-2

SCALE 1:10



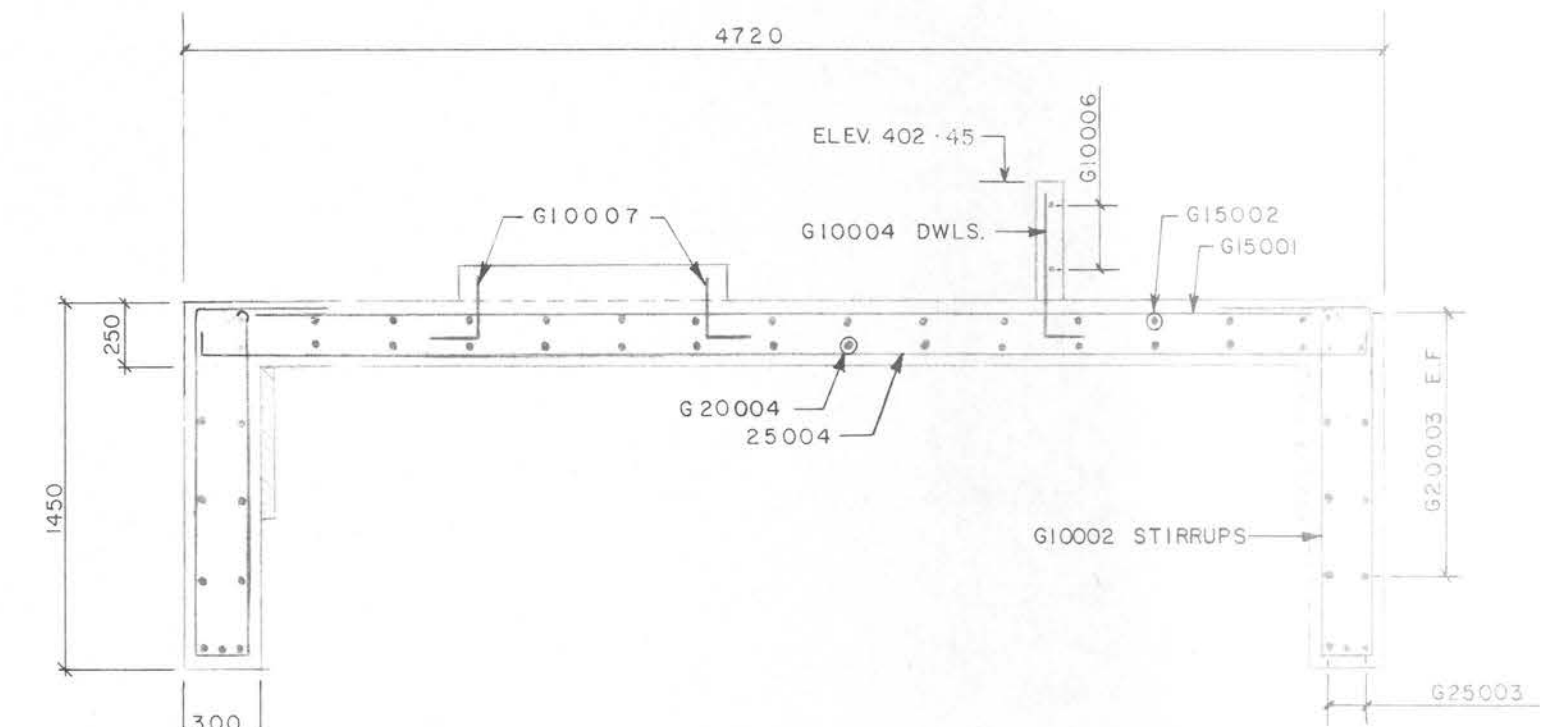
GRADE BEAM 3-3

SCALE 1:25



GRADE BEAM 4-4

SCALE 1:25



SECTION 5-5

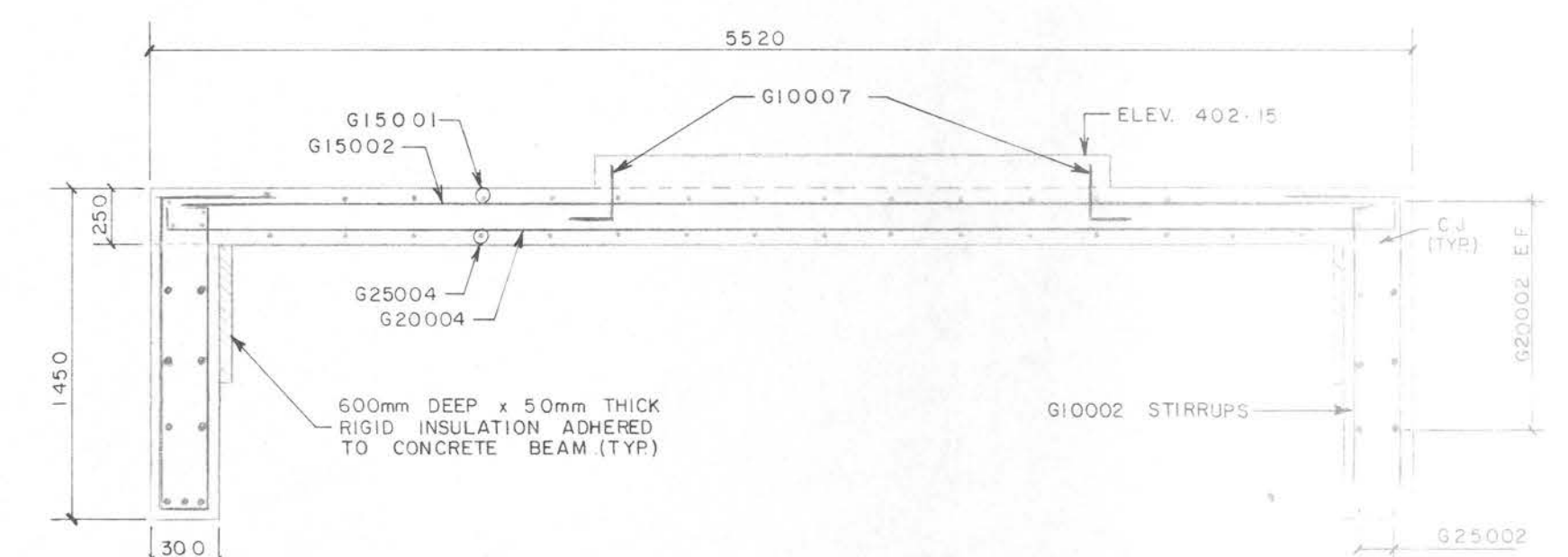
SCALE 1:30

LEGEND

E.F. - EACH FACE
C.J. - CONSTRUCTION JOINT
G10001 - REINFORCEMENT BAR SIZE, SEQUENCE NUMBER

NOTE:





- THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING No. A2-S
- FOR GENERAL NOTES SEE DRAWING No. S4-W



SECTION 6-6

SCALE 1:30

FOR GENERAL NOTES SEE DWG No. S4-W

Date	Revisions	 K. SMART ASSOCIATES LIMITED CONSULTING ENGINEERS AND PLANNERS 480 FREDERICK STREET KITCHENER, ONTARIO N2H 2P5	 F. M. ADRAHIM REGISTERED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO	 Ontario	MINISTRY OF THE ENVIRONMENT			 D. D. B. CANE REGISTERED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO	Simcoe				
					VILLAGE OF DRAYTON PROJECT N° 3-0150 CONTRACT N° 84-1				Simcoe Engineering Group Limited • Consulting Engineers				
					GENERATOR BUILDING				Design	E. A.	Scale	Horiz. AS SHOWN Vert.	Drawing No. SI-S
					STRUCTURAL DETAILS				Drawn	S. H.			
									Checked	E. A.	Date	NOV. 1984	

ALUMINUM CHECKER PLATE
TOP COVER 9/16" HINGED ACCESSSES
AND SUPPORT FRAME
(FOR DET. SEE DWG. M3-S)

PORTABLE LIFTING
GIB SUPPORT (2 REQ'D)
SEE DET. (F) M5-S

GRAVITY VENT PIPE
(2 REQ'D)

GRABRAIL & STEP
SEE DET. (B) M4-S
VALVE OPERATOR COVER
SEE DET. (D) M4-S

PLAN ABOVE EL. 402.0

2 SUBMERSIBLE
SEWAGE PUMPS
FLYGT. MOD. CF 3201 HT

REMOVABLE
BASKET SCREEN
SEE DET. (B) M5-S

350 Ø INLET
(M2-S)

381 Ø OVERFLOW
(GALV. C.S.P. 14 GA.)

BOLT SPIGOT END FRAME
TO C.S.P. (DET. EQUAL TO
'ARMCO')

350 ROUND SLICE GATE
9/16" OPERATOR STAND
EXTENSION PIPE, EQUAL TO
'ARMCO' MOD. 20-10C

FLOAT SWITCH BRACKET
SEE DET. (C) M5-S

GRATING, HANDRAIL &
SUPPORTS, SEE DET. (A) THIS DWG.

200 Ø GATE VALVE, FL.

JUNCTION BOX FOR PUMP &
FLOAT CONNECTIONS 9/16"
WATER PROOF DUPLEX RECEPTACLE
FOR DET. SEE DWG. E1-S

AIR RELEASE VALVE

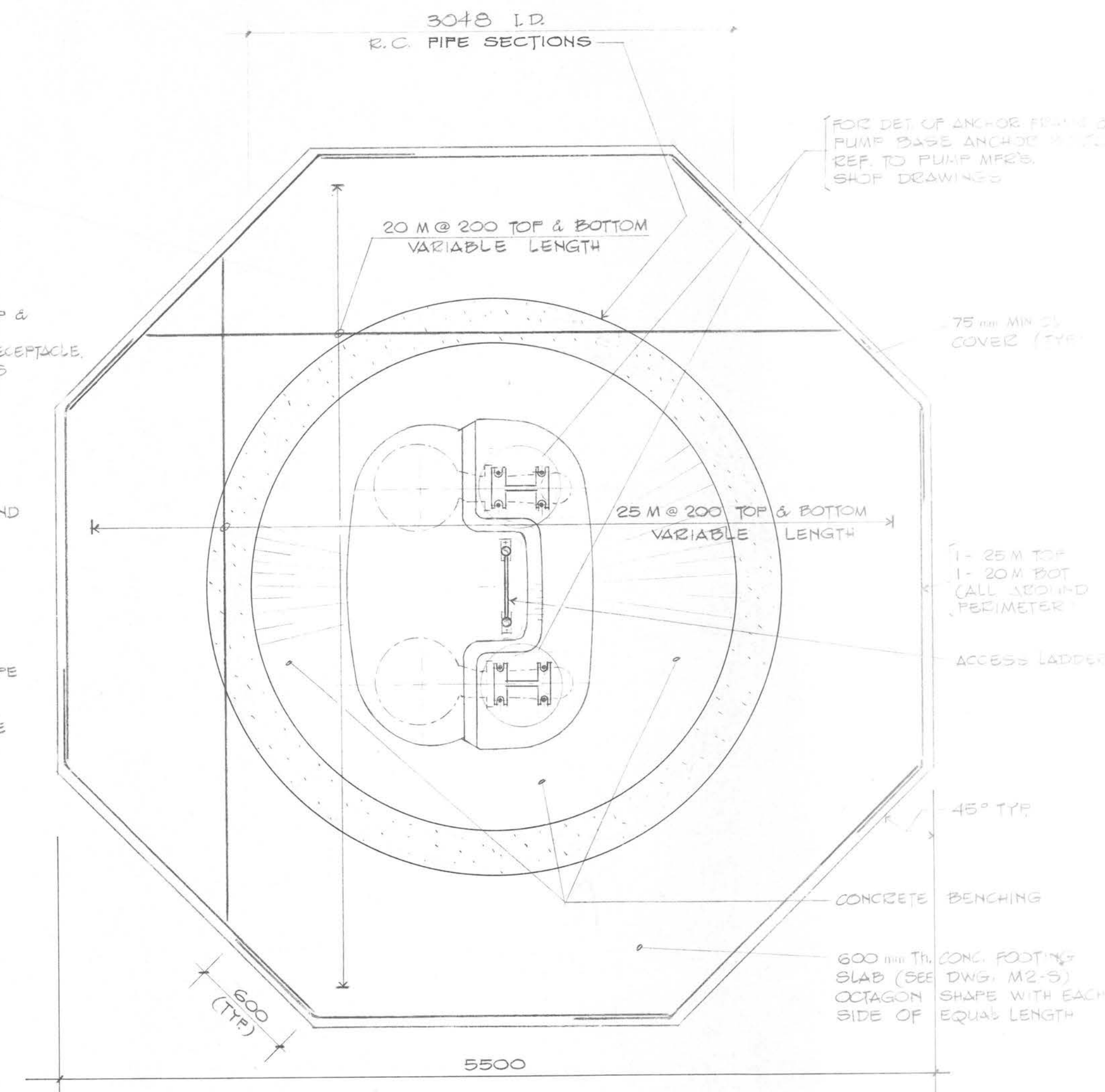
RETAINER GLAND

'PRESSER' TYPE
COUPLING

200 Ø D.I. PIPE
F.M.

150 Ø VENT & SUPPORT
SEE DET. (C) M4-S

PLAN AT EL. 399.2



PLAN AT EL. 394.2

NOTES:

MISCELLANEOUS METAL

- 1) ALL MISCELLANEOUS METAL SHOWN FOR THE SEWAGE PUMPING STATION TO BE ALUMINUM UNLESS NOTED OTHERWISE.
- 2) ALL ALUMINUM SURFACES IN CONTACT WITH CONCRETE TO RECEIVE BITUMINOUS COATING (EQUAL TO MIDCO R.B. 1010)

NOTES:

SOIL, STRUCTURAL CONCRETE, PIPE AND BACKFILL

- 1) FOOTING SLAB DESIGNED FOR A MAXIMUM SOIL BEARING CAPACITY OF 200 KPa.
- 2) MINIMUM STRENGTH OF CONCRETE POURED-IN-PLACE TO BE 20 MPa (3000 psi) AT 28 DAYS.
- 3) NO CONCRETE SHALL BE PLACED IN THE FOOTING BEFORE THE CHARACTER OF THE SOIL AND EXCAVATION FOR THE FOOTING HAVE BEEN APPROVED BY THE ENGINEER.
- 4) ALL CONCRETE SHALL BE PLACED IN THE DRY.
- 5) REINFORCING STEEL TO BE GRADE 400.
- 6) MINIMUM LAP OF REINFORCING STEEL TO BE 30 BAR DIAMETER UNLESS SHOWN OTHERWISE.
- 7) BACKFILL MATERIAL SHALL BE PLACED SIMULTANEOUSLY AROUND THE PIPE. EXCAVATED SAND AND GRAVEL MAY BE RE-USED AS BACKFILL MATERIAL. TOPSOIL, SILT ALLUVIUM AND SURFICIAL FILL SHALL NOT BE USED AS BACKFILL.
- 8) EARTH BACKFILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.
- 9) THE CONTRACTOR SHALL SUBMIT REINFORCING BAR LIST FOR THE ENGINEER'S APPROVAL.
- 10) PRECAST, REINFORCED CONCRETE PIPE :
 - a. DESIGN IN ACCORDANCE WITH CSA STD. SPEC. A257.2 CL. III & ASTM C76.
 - b. MIN. WALL THICKNESS TO BE 273 mm WITH 2 CIRCULAR CAGES OF REINFORCING STEEL OR EQUIVALENT.
 - c. CONCRETE STRENGTH TO BE 34.5 MPa (5000 psi)
 - d. ALL JOINTS (CSA STD. SPEC. A257.3 & ASTM C443) TO BE WATERTIGHT & SUBJECT TO THE ENGINEER'S APPROVAL.



CROSS BAR GRATING (EQUAL TO BORDEN TYPE 'D' SIZE 6).
WELD FLAT BAR AROUND EACH
GRATING PANEL. BAR SIZE TO
EQUAL BEARING PARS OF GRATING.
EACH PANEL TO BE SECURED TO
SUPPORTS WITH FASTENERS.
LAMINATE 3 mm TH. RED RUBBER
GASKET TO TOP OF ALL
GRATING SUPPORTS.

2 PUMP STA.

WELDED FRAME SUPPORT
FASTENED TO CONC. WALLS
w/ CLIP ANGLES & CADM. PL.
STEEL ANCHOR BOLTS

100 x 75 x 6 'L'
ROLLED TO SHAPE
CADM. PL. STEEL ANCHORS @ 350%

200 x 58 'L' @ 6.46 kg/m
(EQUAL TO KEIZER
ALUMINUM No. HC-13)

PUMP STA.

DETAIL
N.T.S.

PLAN OF LANDING

CLIP ANGLE w/ BOLTS
& ANCHORS (2 SETS
REQ'D EACH END OF BEAM)
USE SHIMS WHERE REQ'D.

SECURITY CHAIN
9/16" SNAP HOOK & EYE BOLTS

WELDED BASE FLANGE
w/ 2 - 12 Ø CADM. PL. BOLTS

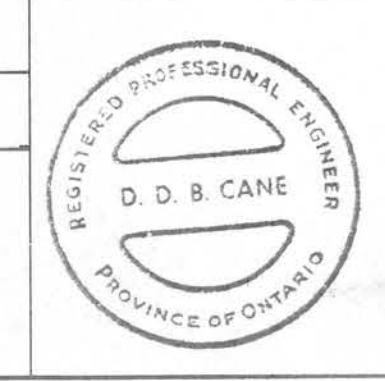
SECTION
N.T.S.

Date	Revisions

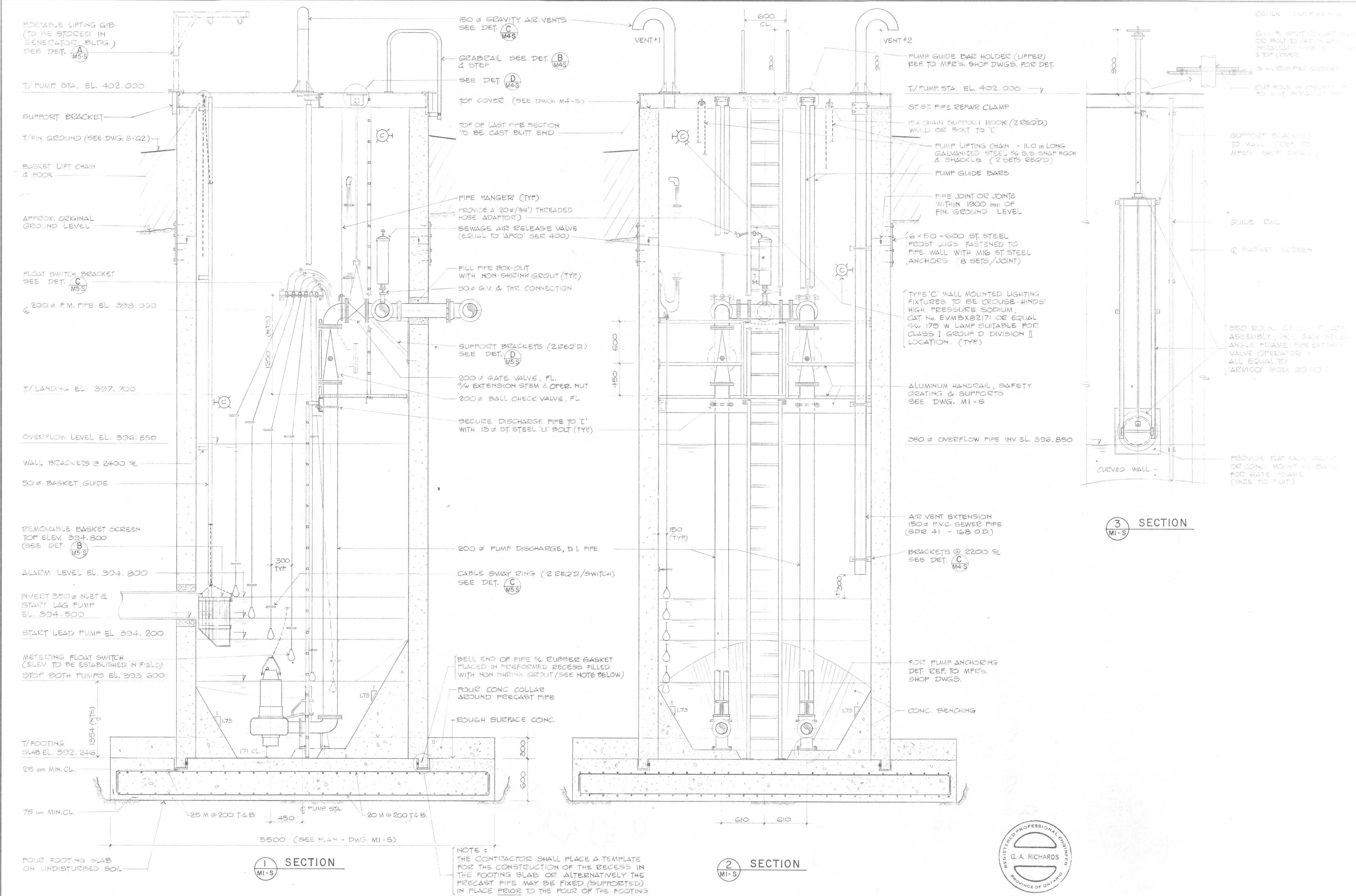
K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
480 FREDERICK STREET
KITCHENER, ONTARIO N2H 2P5







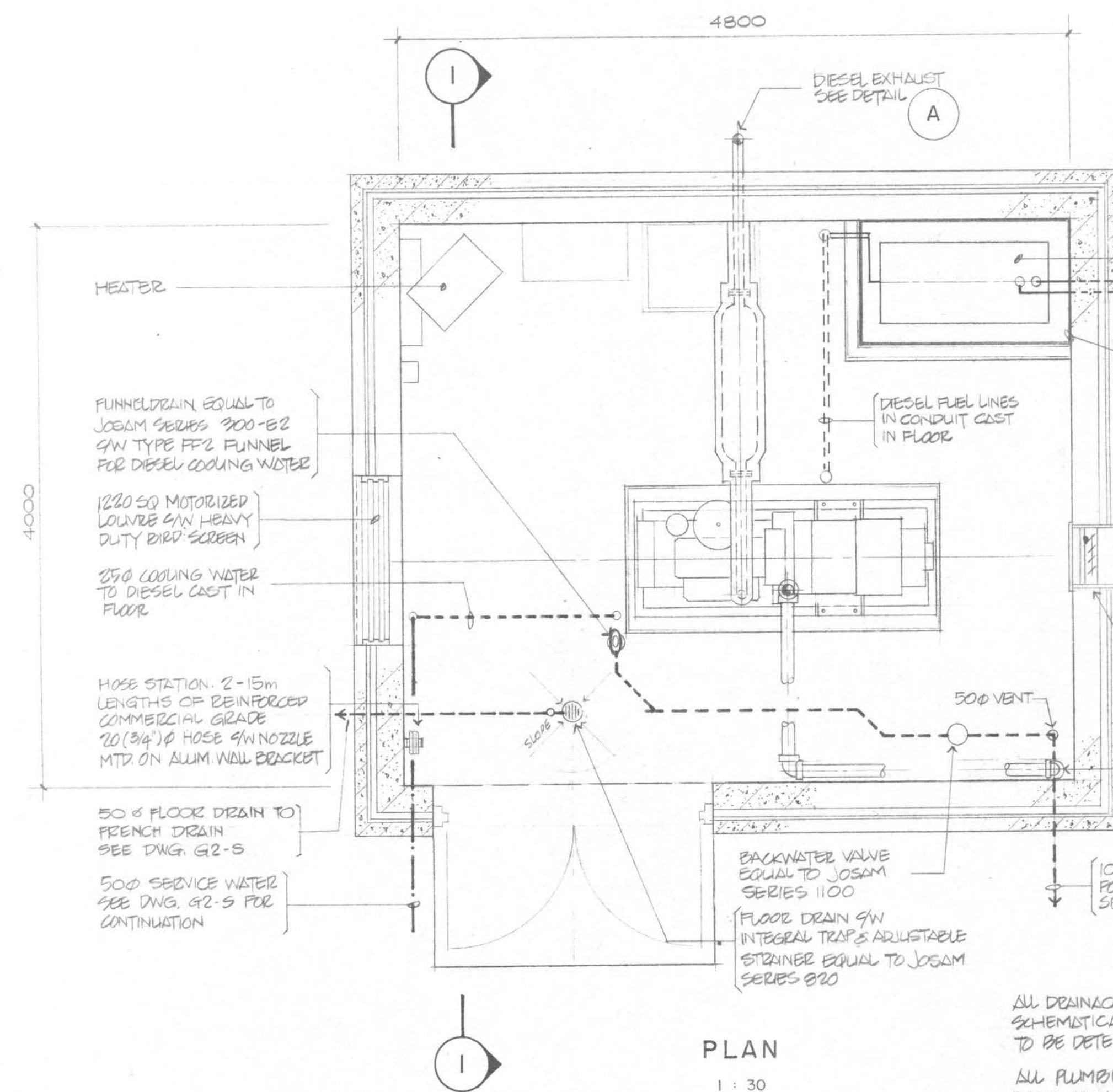
MINISTRY OF THE ENVIRONMENT
VILLAGE OF DRAYTON PROJECT N° SEWAGE 3-0150 CONTRACT N°
SEWAGE PUMPING STATION
PLANS AND DETAILS



Simcoe			
Simcoe Engineering Group Limited • Consulting Engineers			
Design	D. D. B. C.	Scale	1 : 25
Drawn	V. T.		U. N. O.
Checked		Date	NOV. 1984
		Drawing No.	M1-S

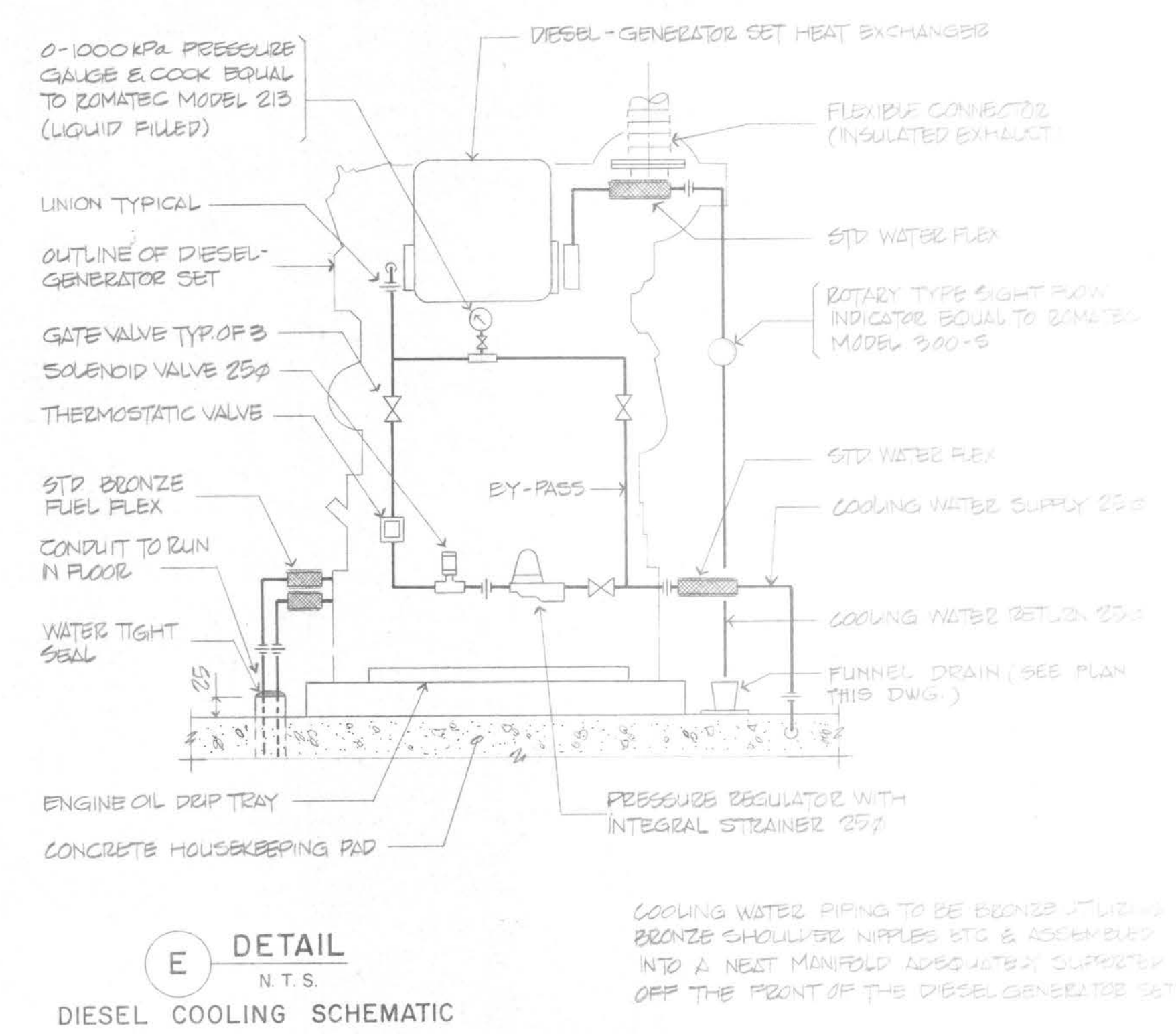
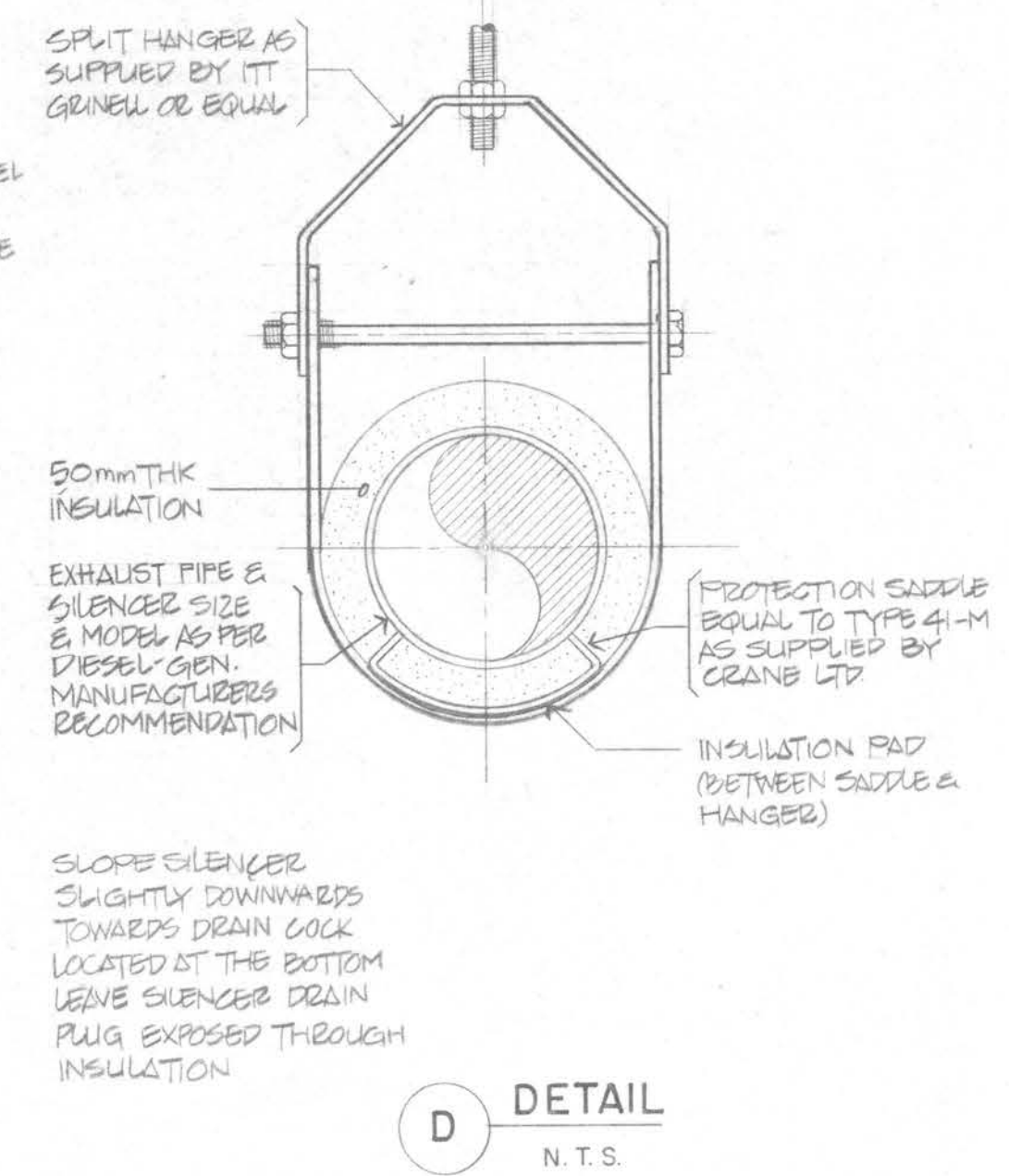
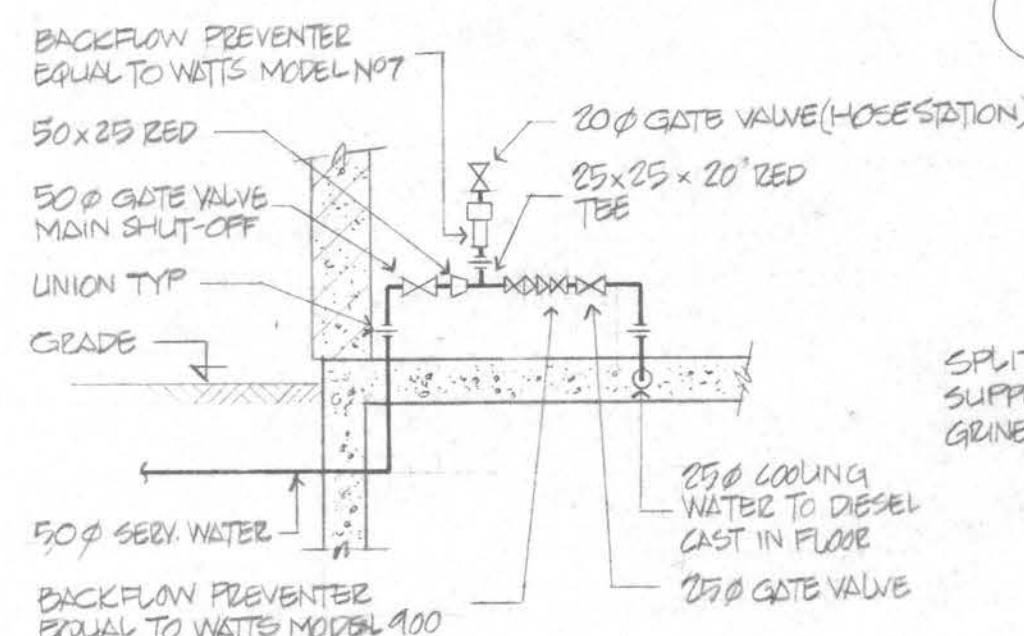
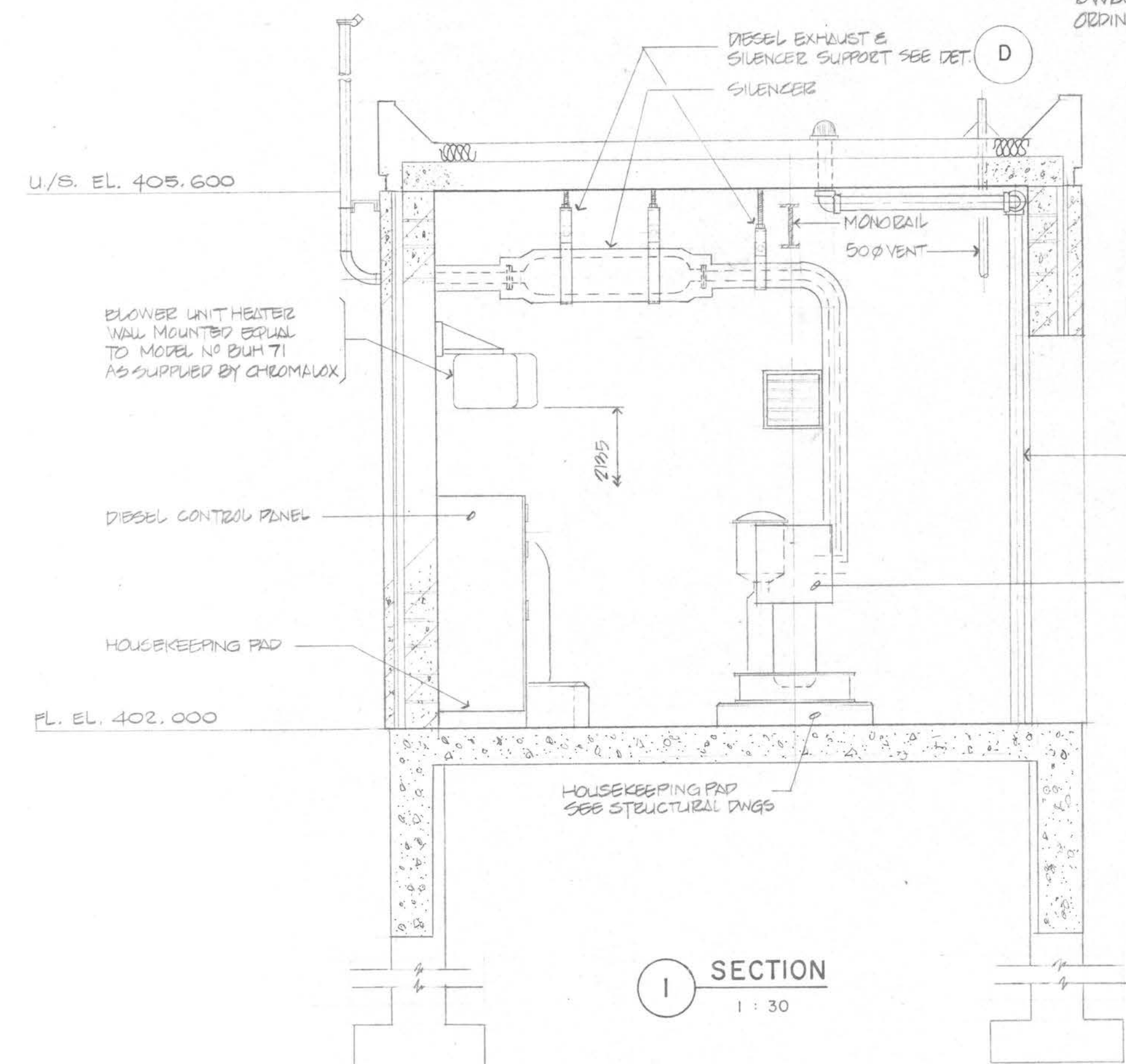
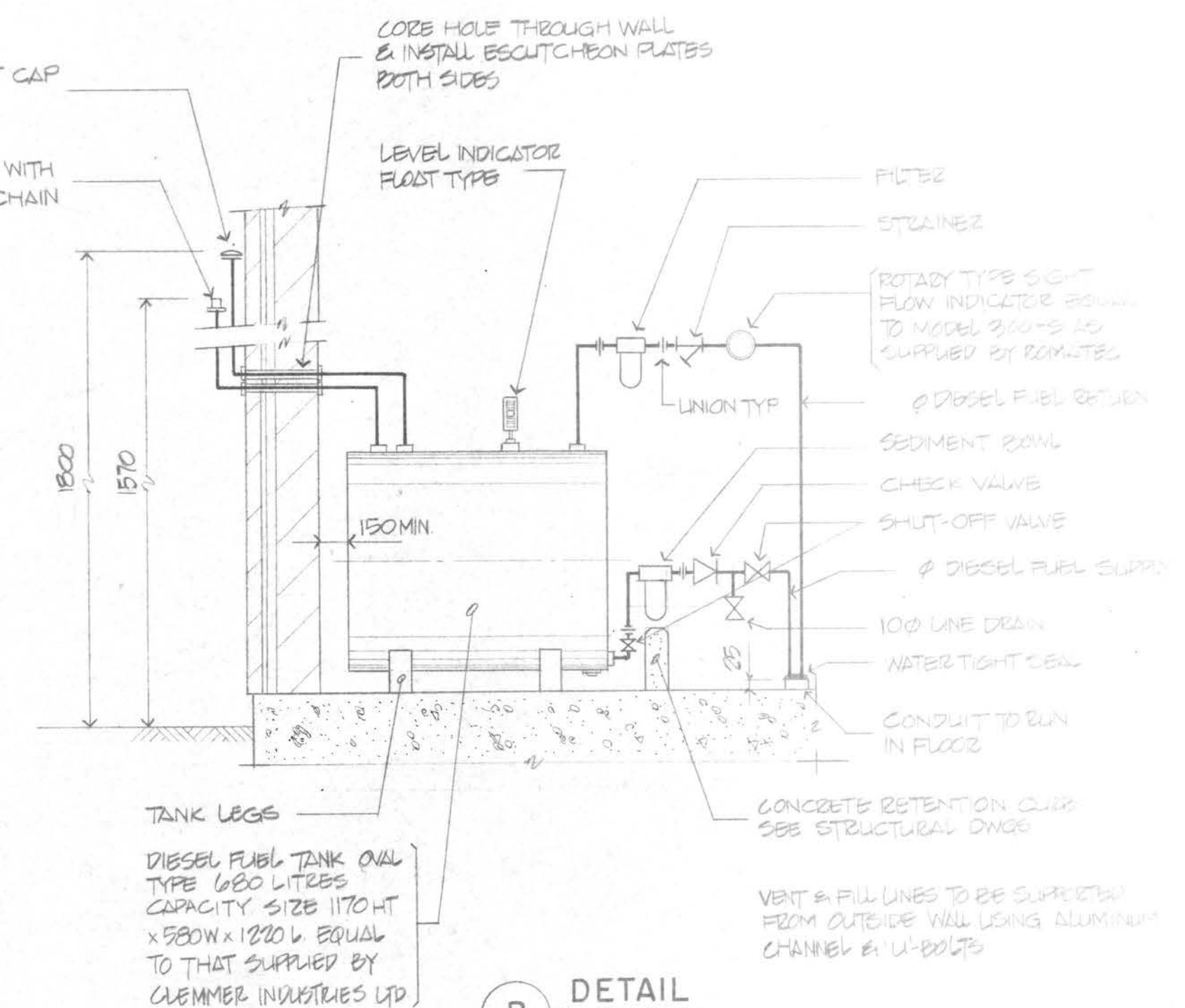
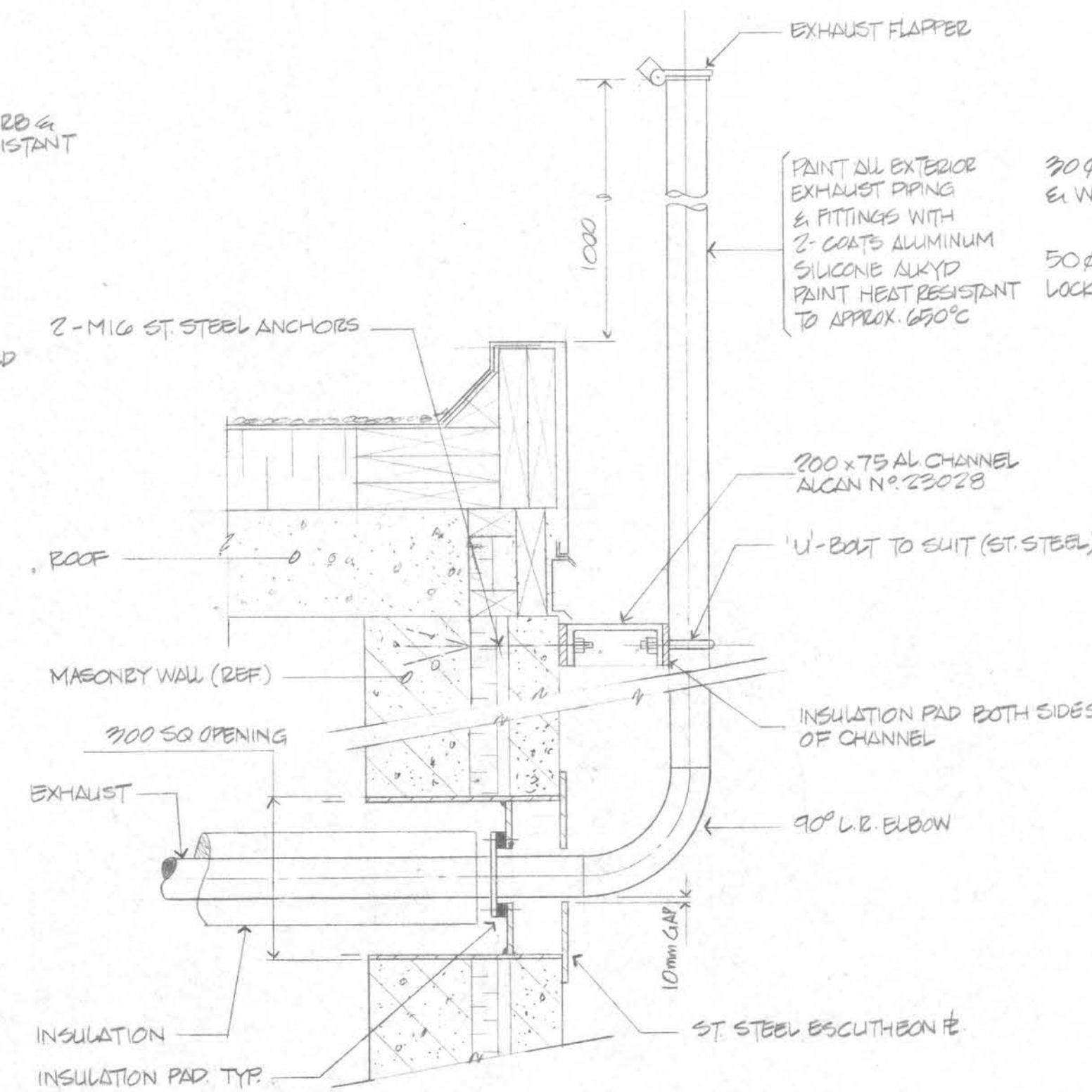


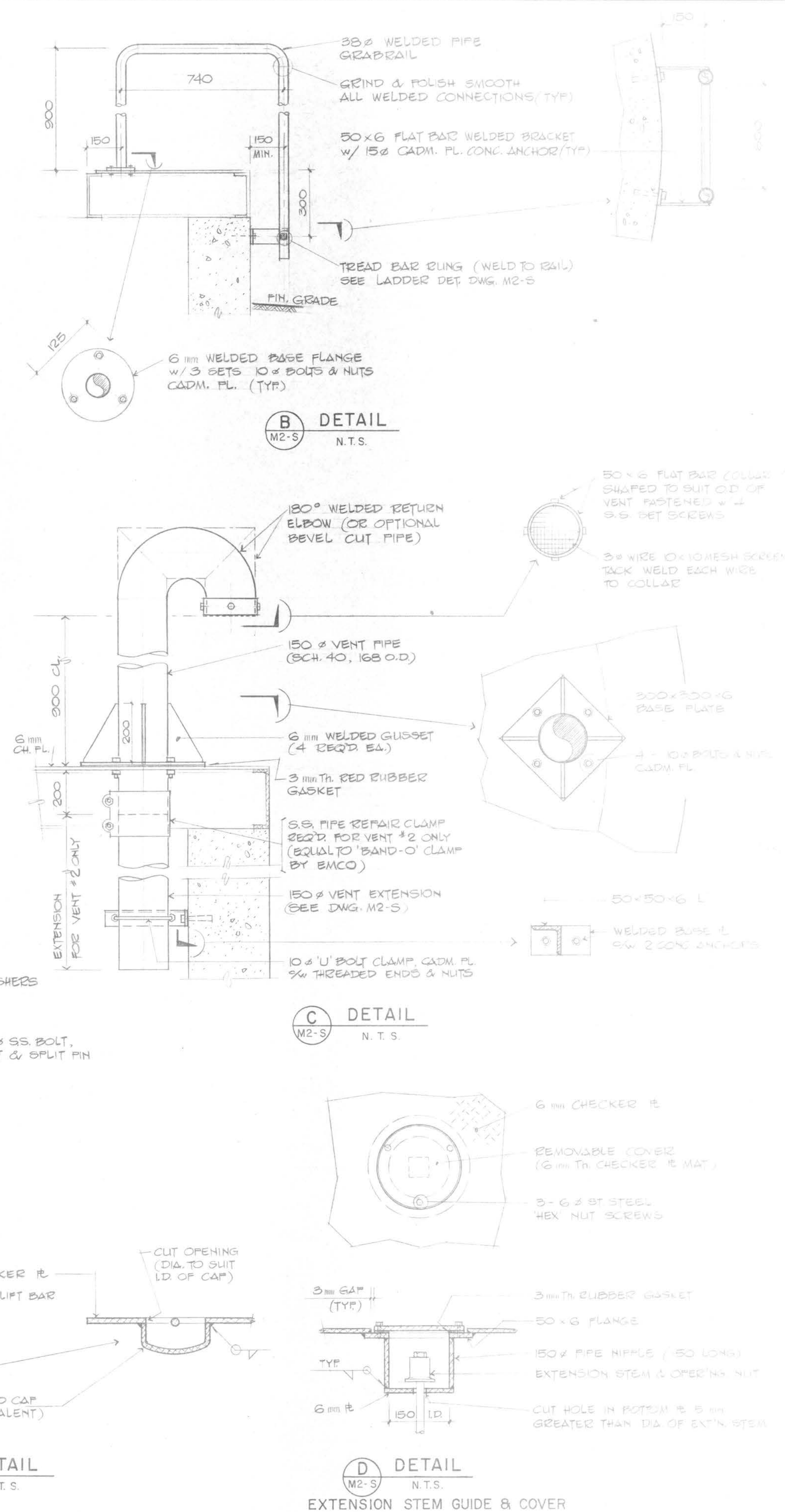
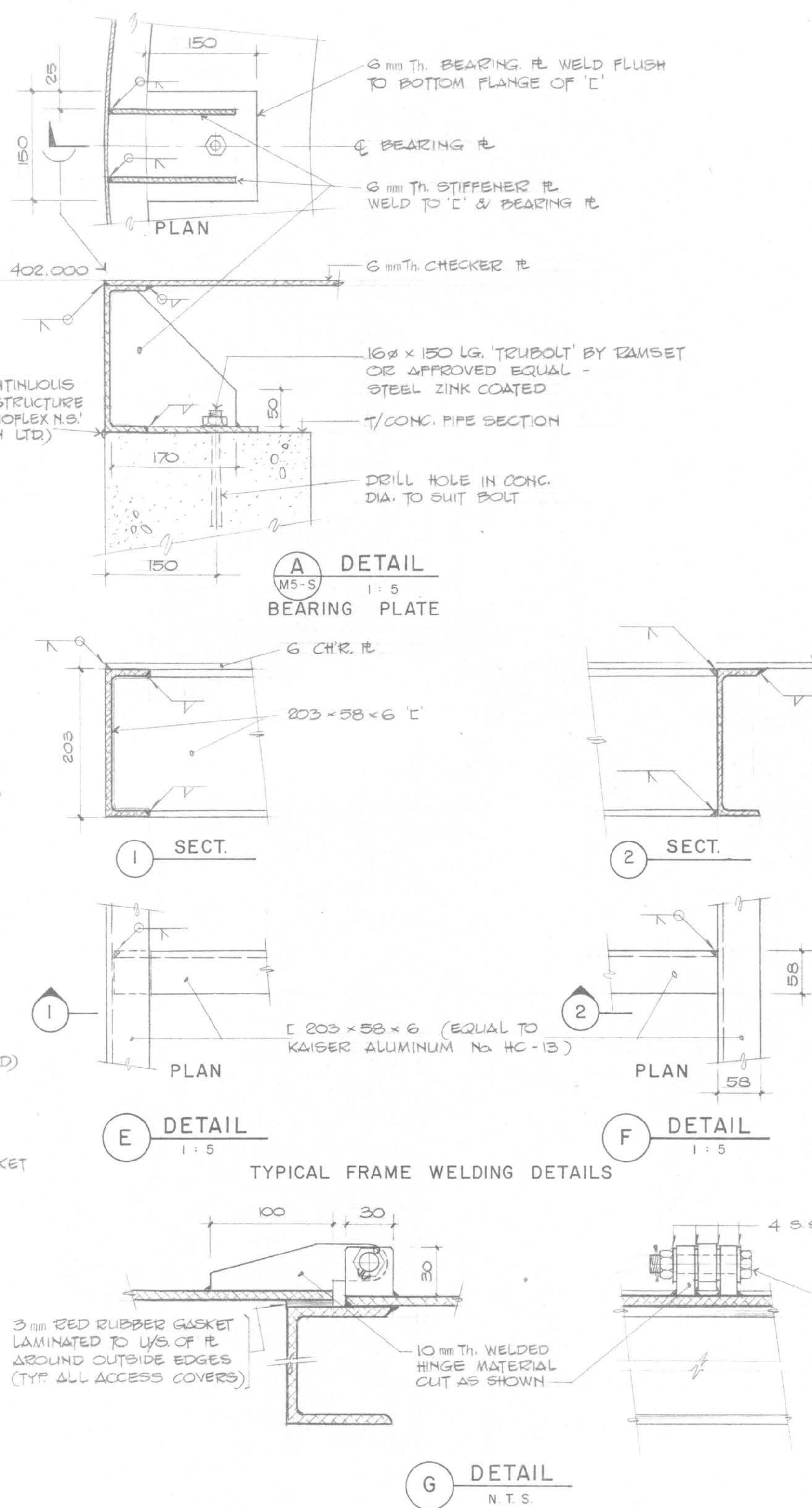
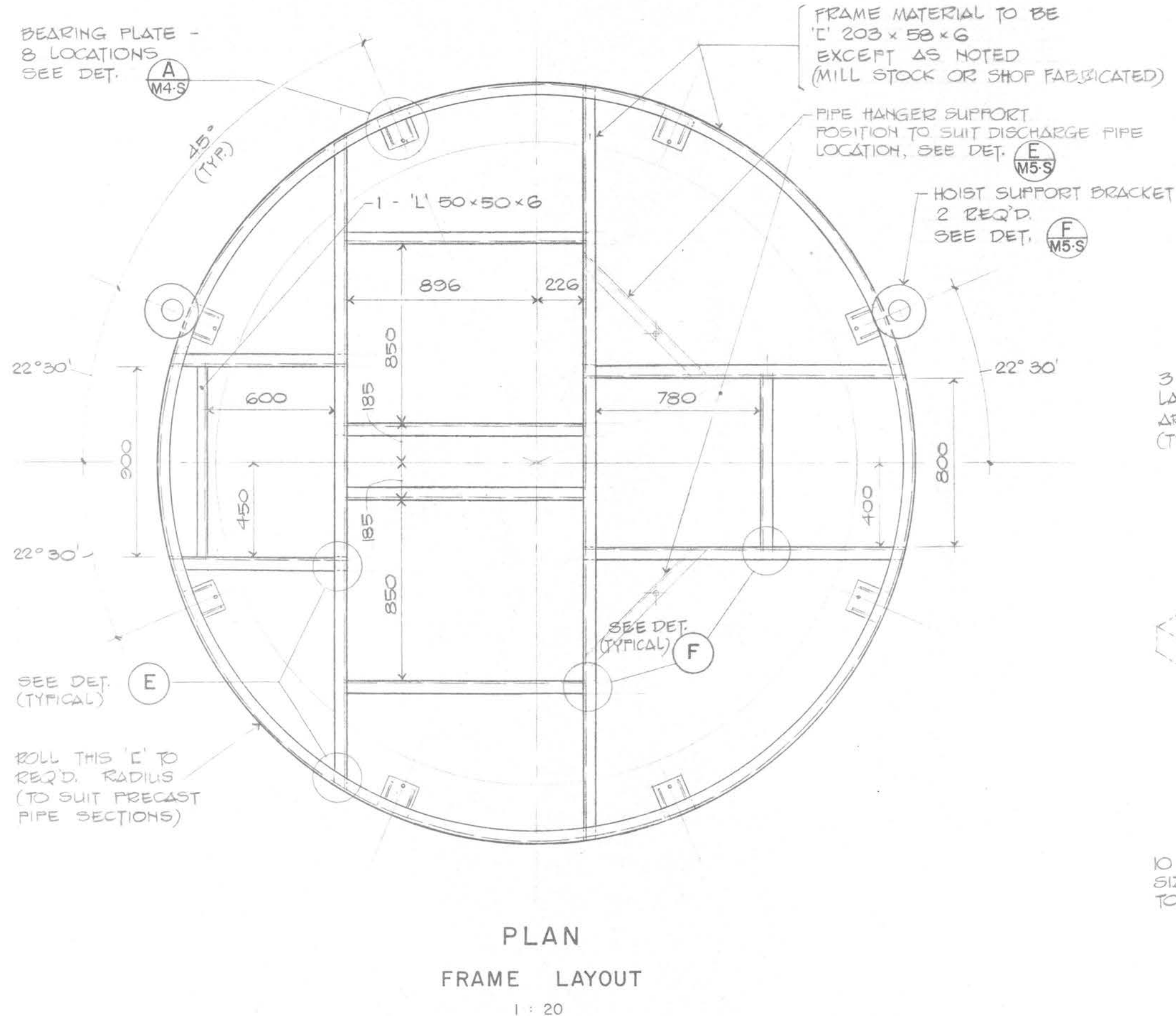
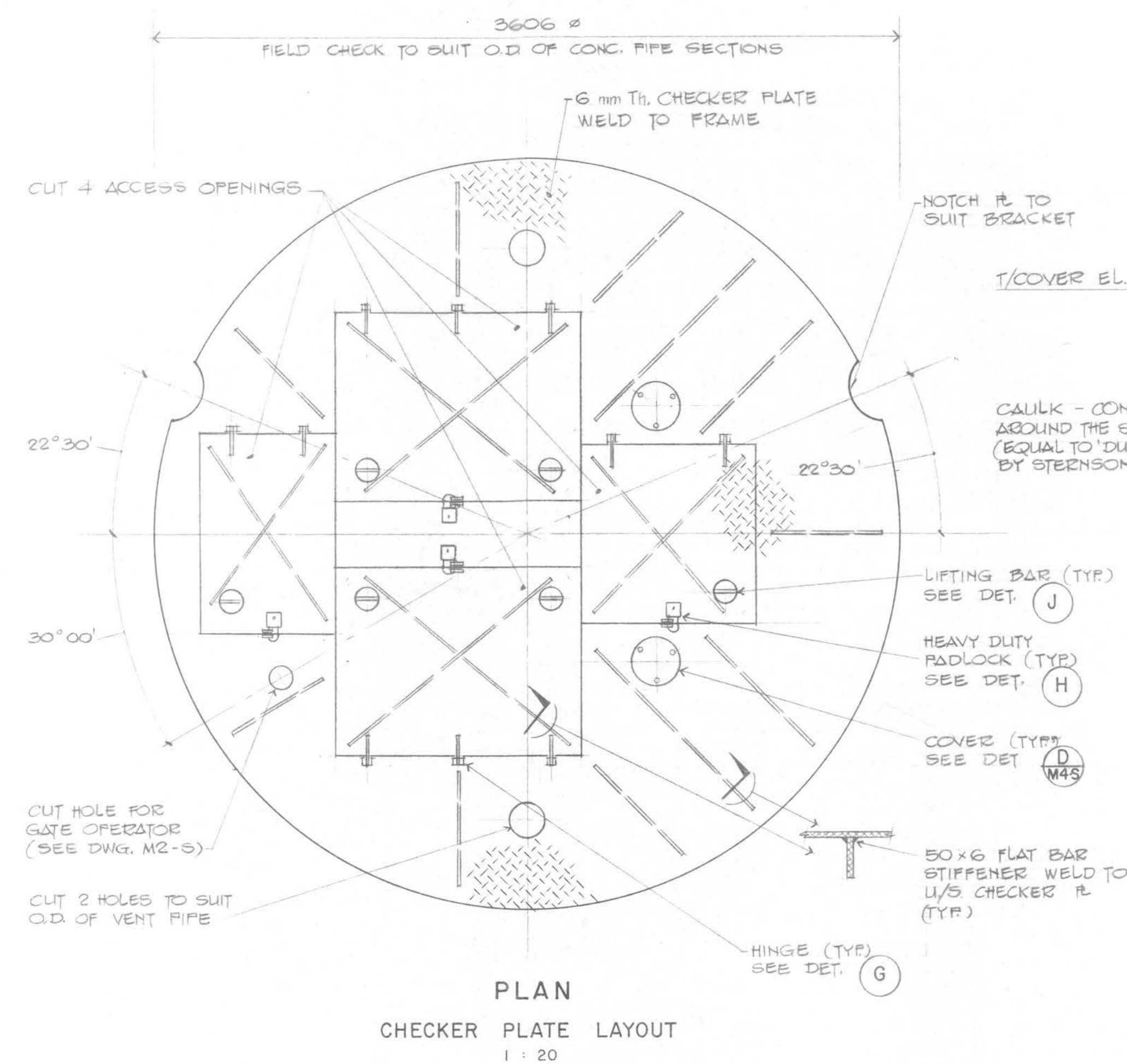
Date	Revisions	 K. SMART ASSOCIATES LIMITED CONSULTING ENGINEERS AND PLANNERS 460 FREDERICK STREET KITCHENER, ONTARIO N2H 2P5		 Ontario	MINISTRY OF THE ENVIRONMENT			Simcoe	
					VILLAGE OF DRAYTON PROJECT N°SEWAGE 3-0150 CONTRACT N°			Simcoe Engineering Group Limited • Consulting Engineers	
					SEWAGE PUMPING STATION SECTIONS			Design D. D. B. C.	Scale 1 : 25
					Drawn V. T.				M2-S
					Checked	Date NOV. 1984			



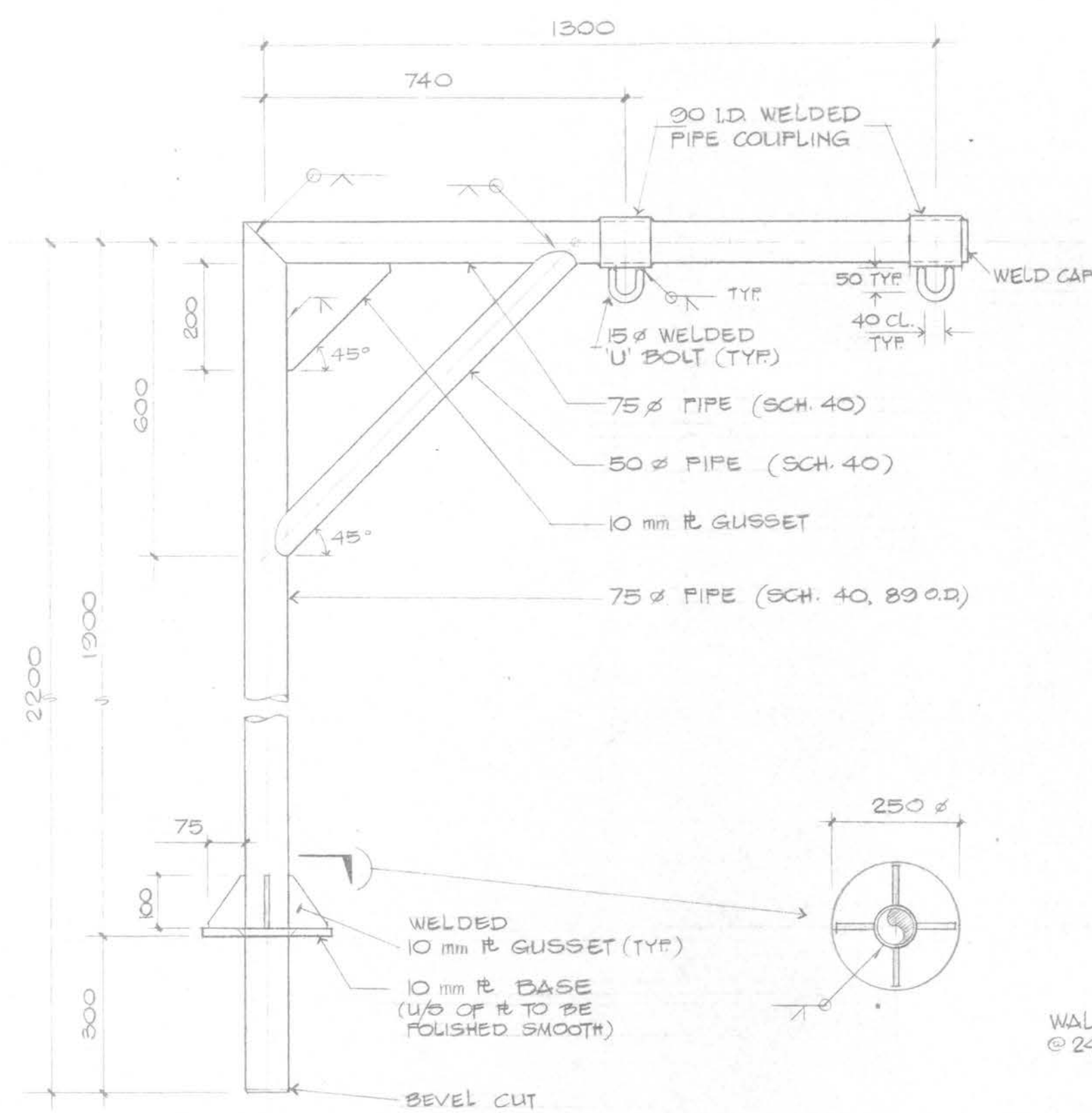
ALL DRAINAGE PIPING SHOWN SCHEMATICALLY EXACT LOCATIONS TO BE DETERMINED IN FIELD

ALL PUMPING TO CONFORM TO REGULATION 647 UNDER THE ONRC AND TO ALL LOCAL ORDINANCES & REGULATIONS

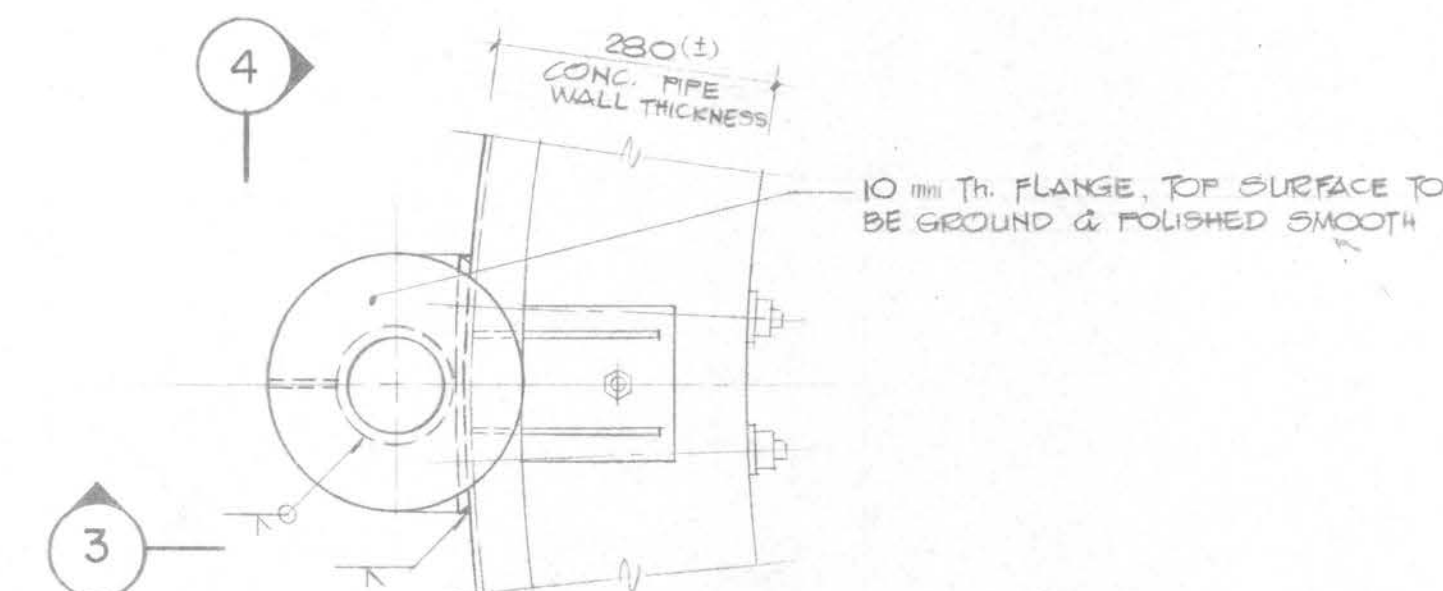




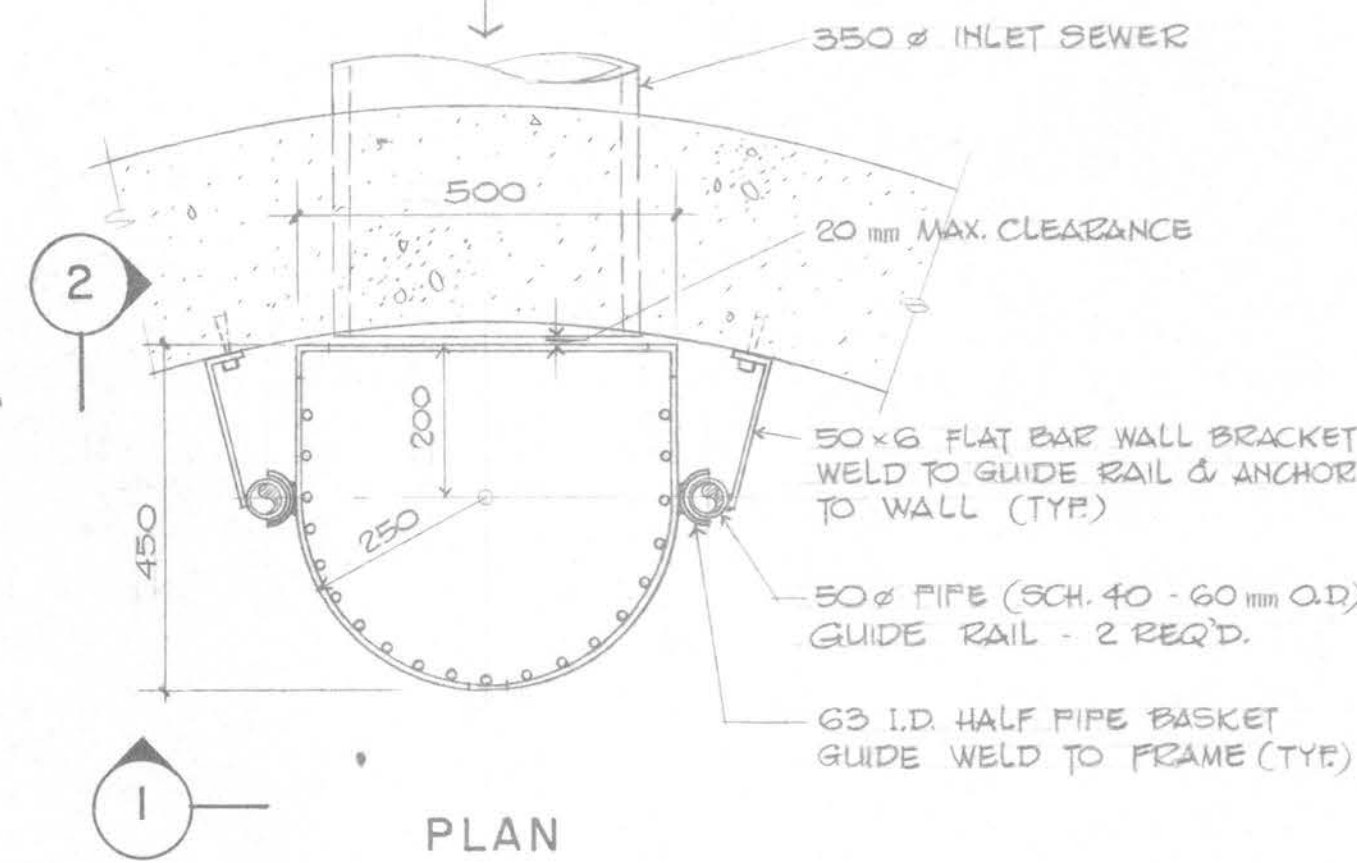
Date	Revisions	 K. SMART ASSOCIATES LIMITED CONSULTING ENGINEERS AND PLANNERS 480 FREDERICK STREET KITCHENER, ONTARIO N2H 2P5	 REGISTERED PROFESSIONAL ENGINEER E. M. ABRAHAM PROVINCE OF ONTARIO	 Ontario	MINISTRY OF THE ENVIRONMENT		 REGISTERED PROFESSIONAL ENGINEER D. B. CANE PROVINCE OF ONTARIO	Simcoe	
					VILLAGE OF DRAYTON	PROJECT N ^o SEWAGE 3-0150 CONTRACT N ^o 84-1		Simcoe Engineering Group Limited • Consulting Engineers	
					SEWAGE PUMPING STATION			Design	Scale
		COVER PLANS AND DETAILS		Drawn	V. T.	AS NOTED	M4-S		
				Checked		Date NOV. 1984			



A DETAIL
M2-S 1:10
PORTABLE HOIST

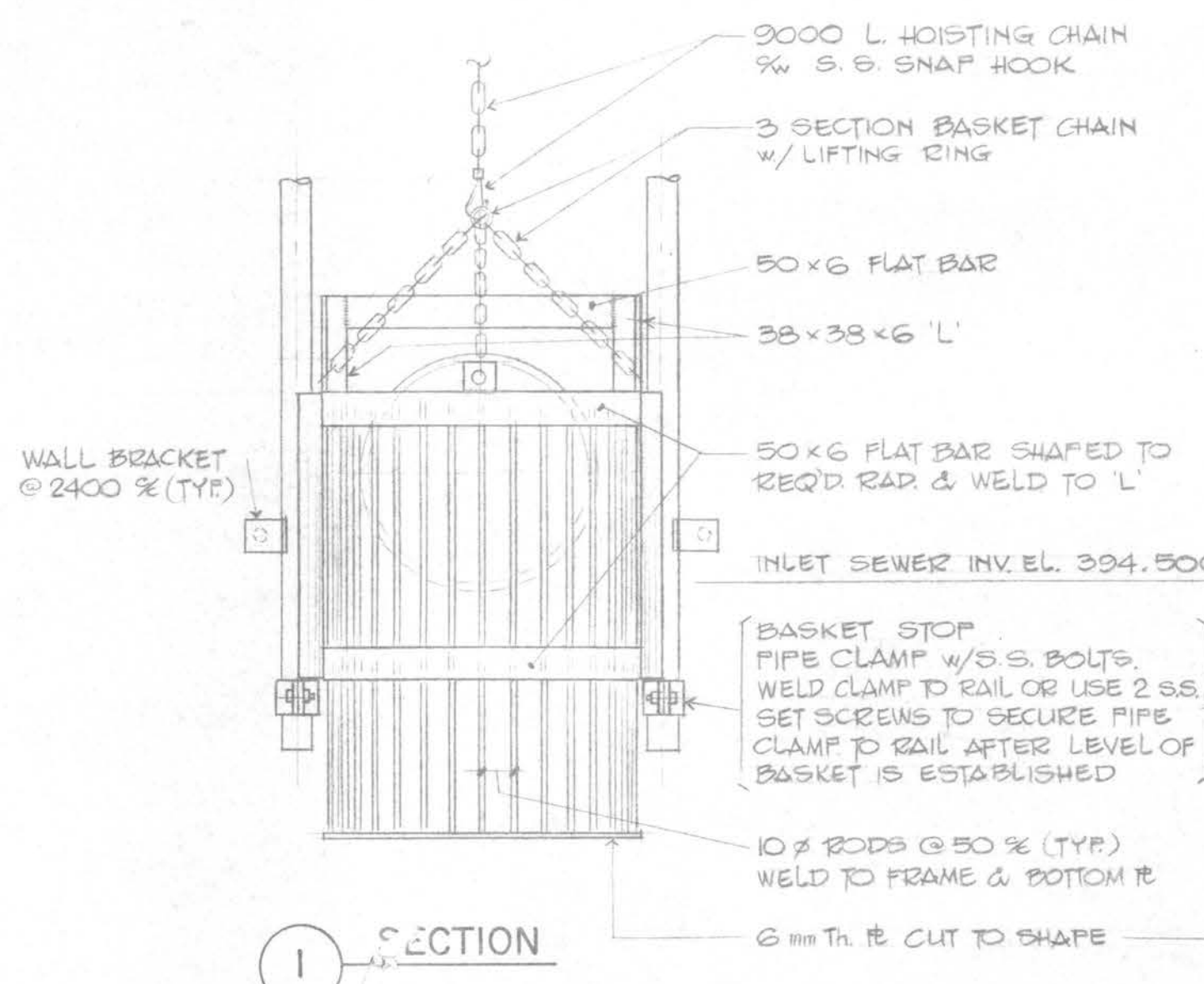


F DETAIL
M4-S N.T.S.
HOIST SUPPORT BRACKET



PLAN

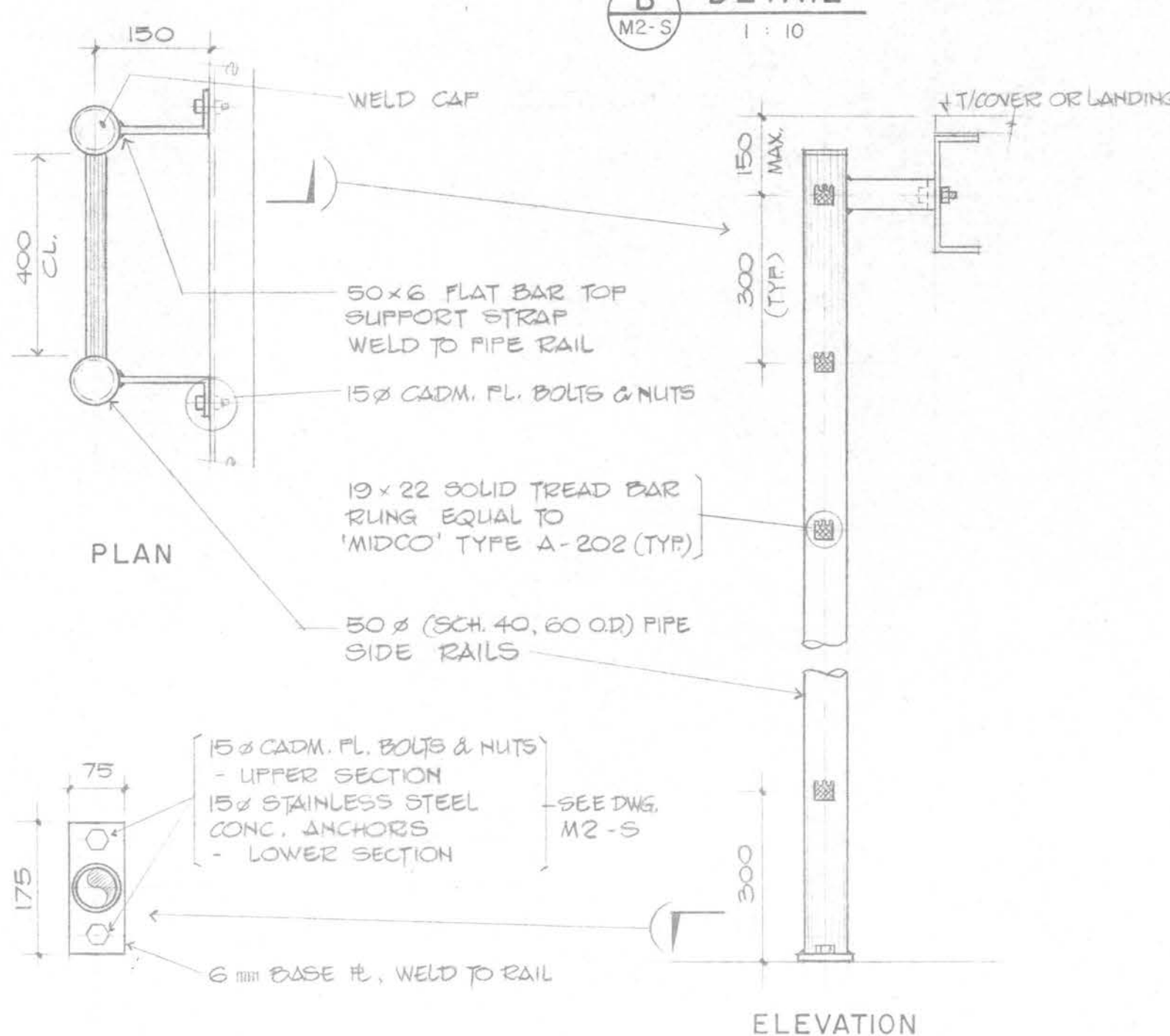
REMOVABLE BASKET SCREEN



1 SECTION

2 SECTION

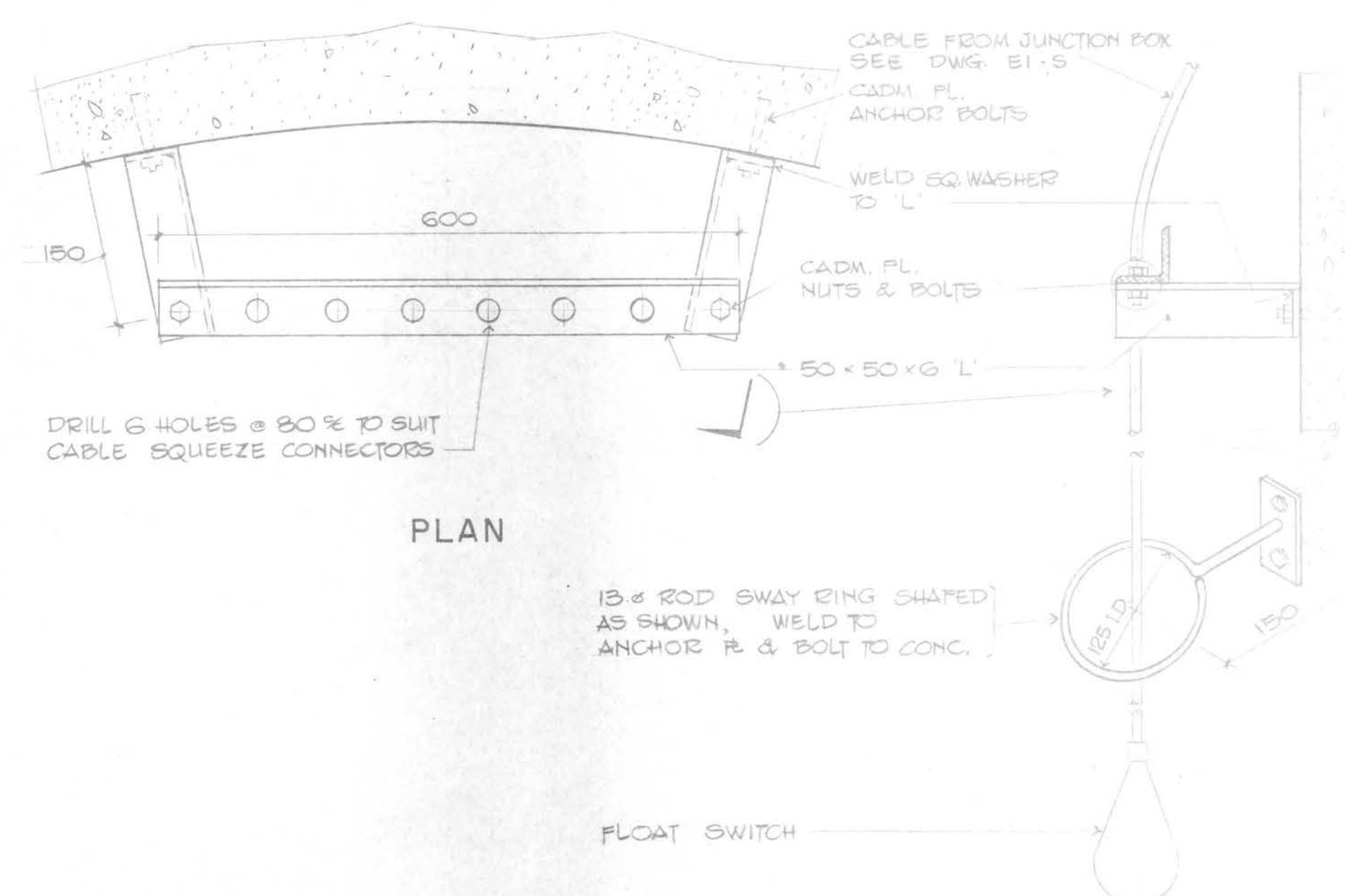
B DETAIL
M2-S 1:10



PLAN

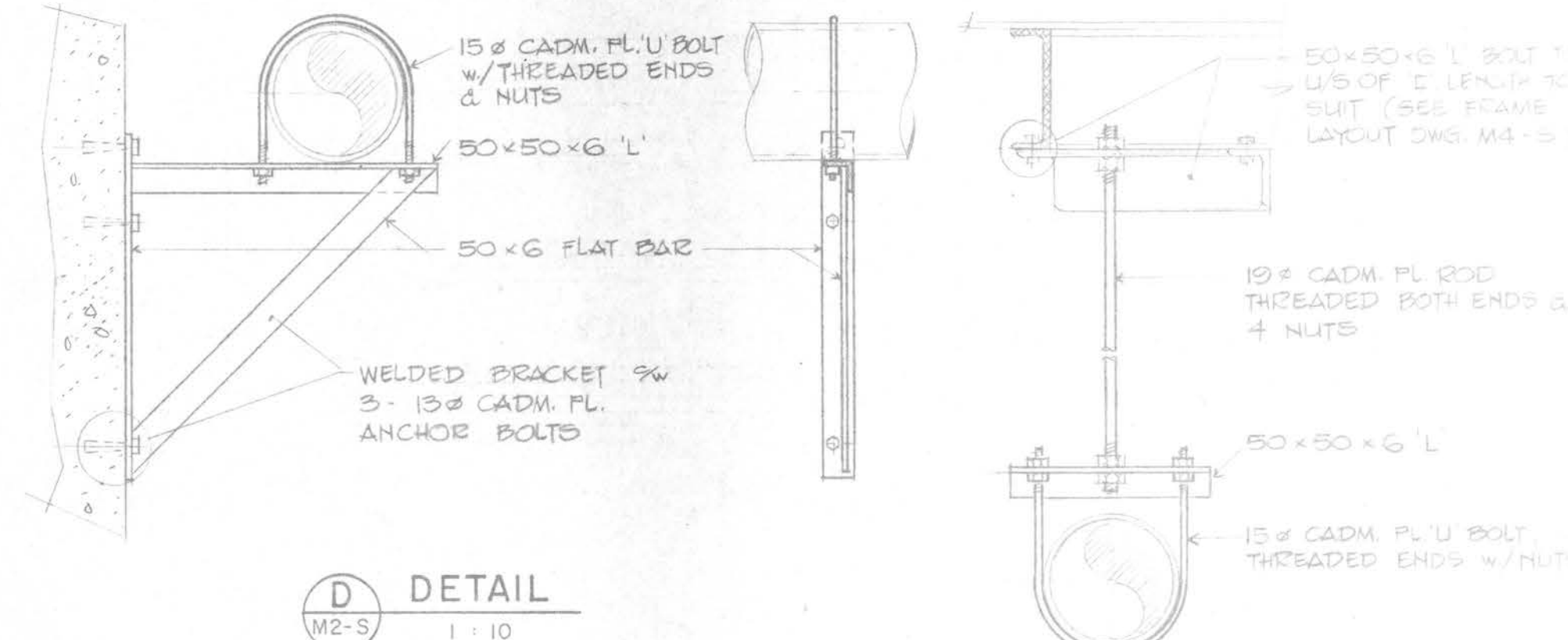
ELEVATION

G DETAIL
M2-S N.T.S.
ACCESS LADDER



PLAN

C DETAIL
M2-S 1:5
FLOAT SWITCH CABLE BRACKET



D DETAIL
M2-S 1:10

E DETAIL
M2-S 1:10

Date	Revisions

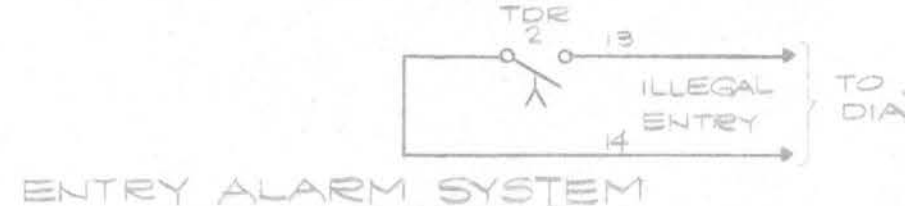
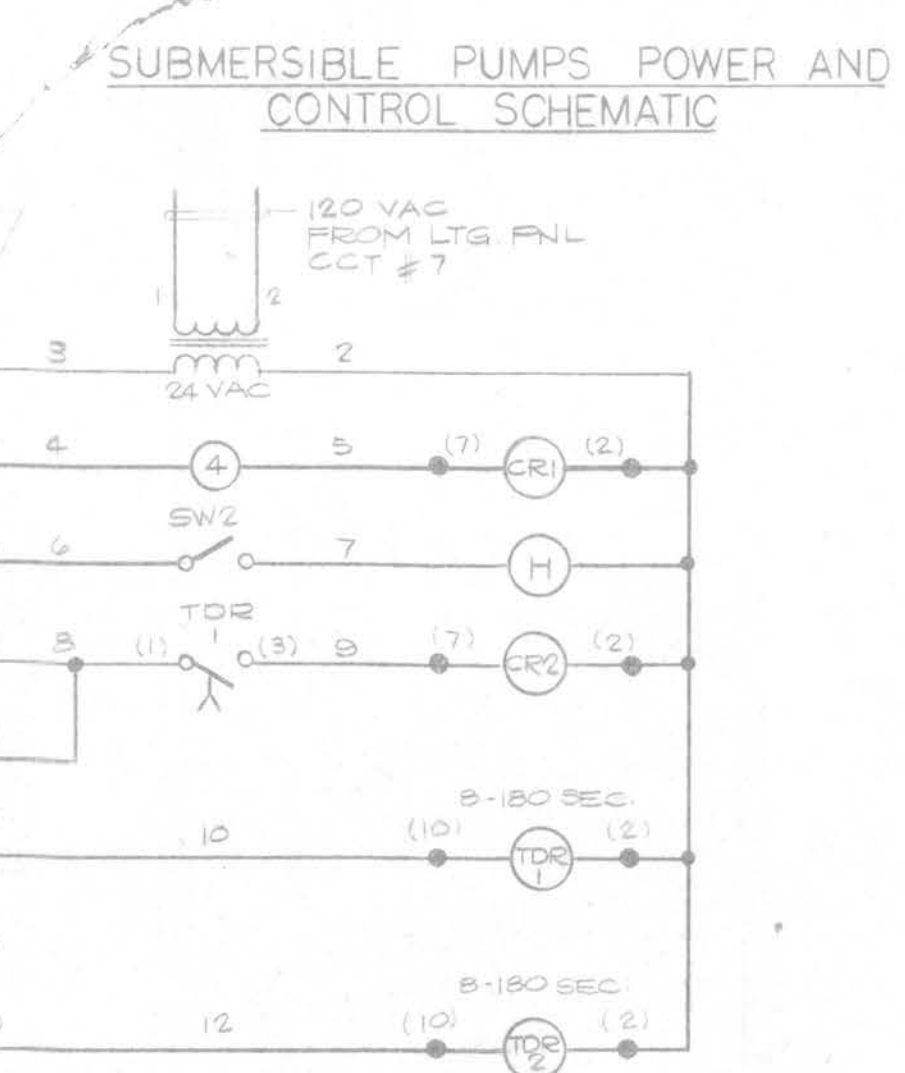
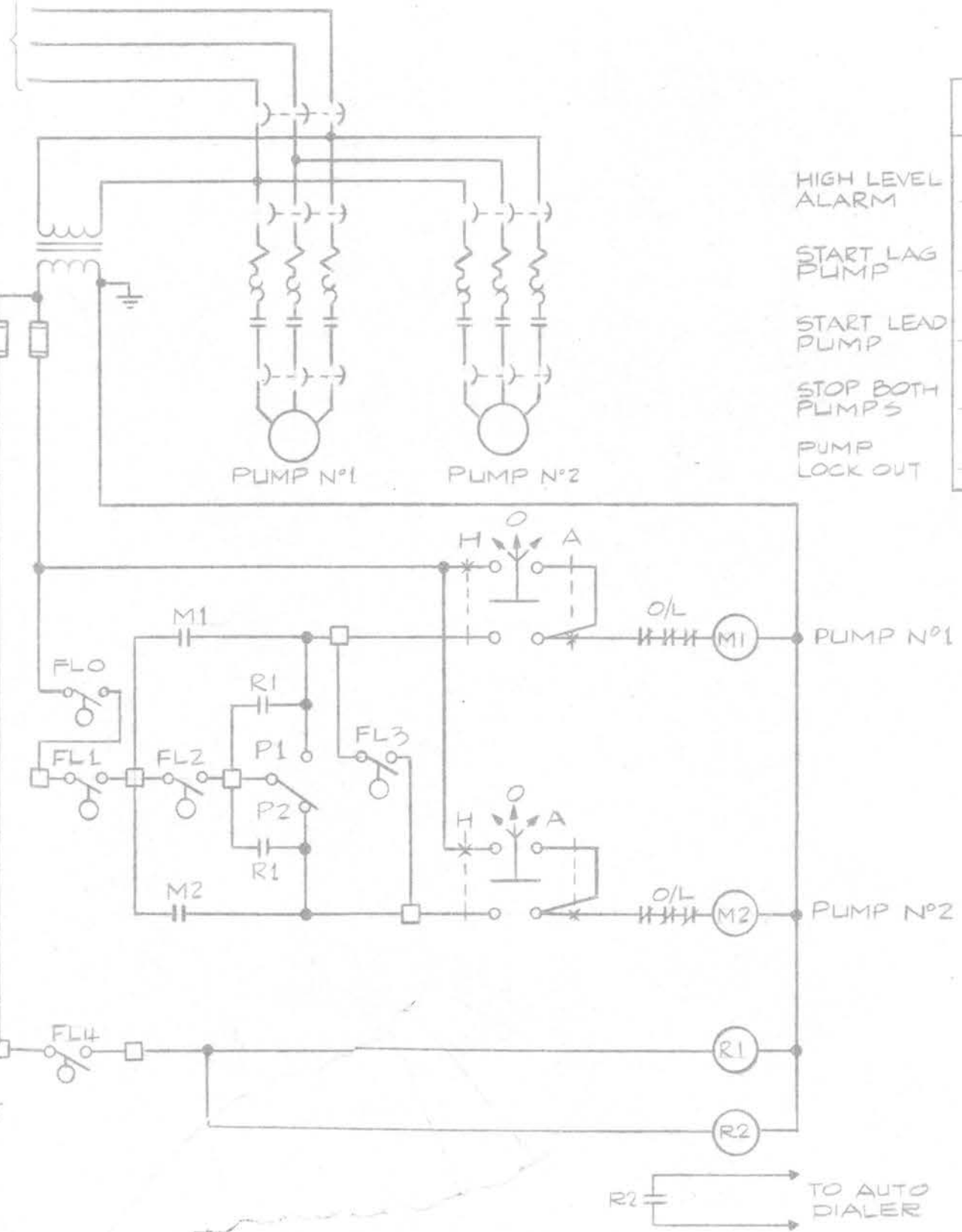
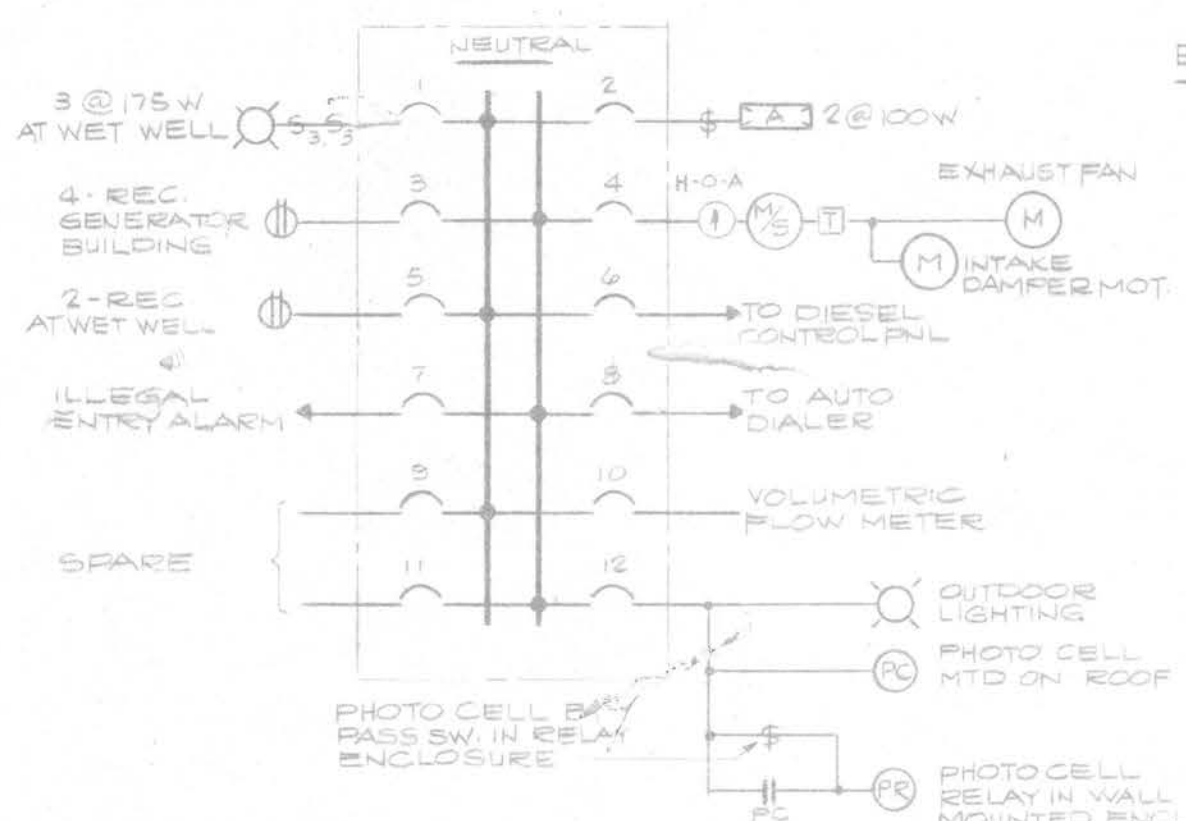
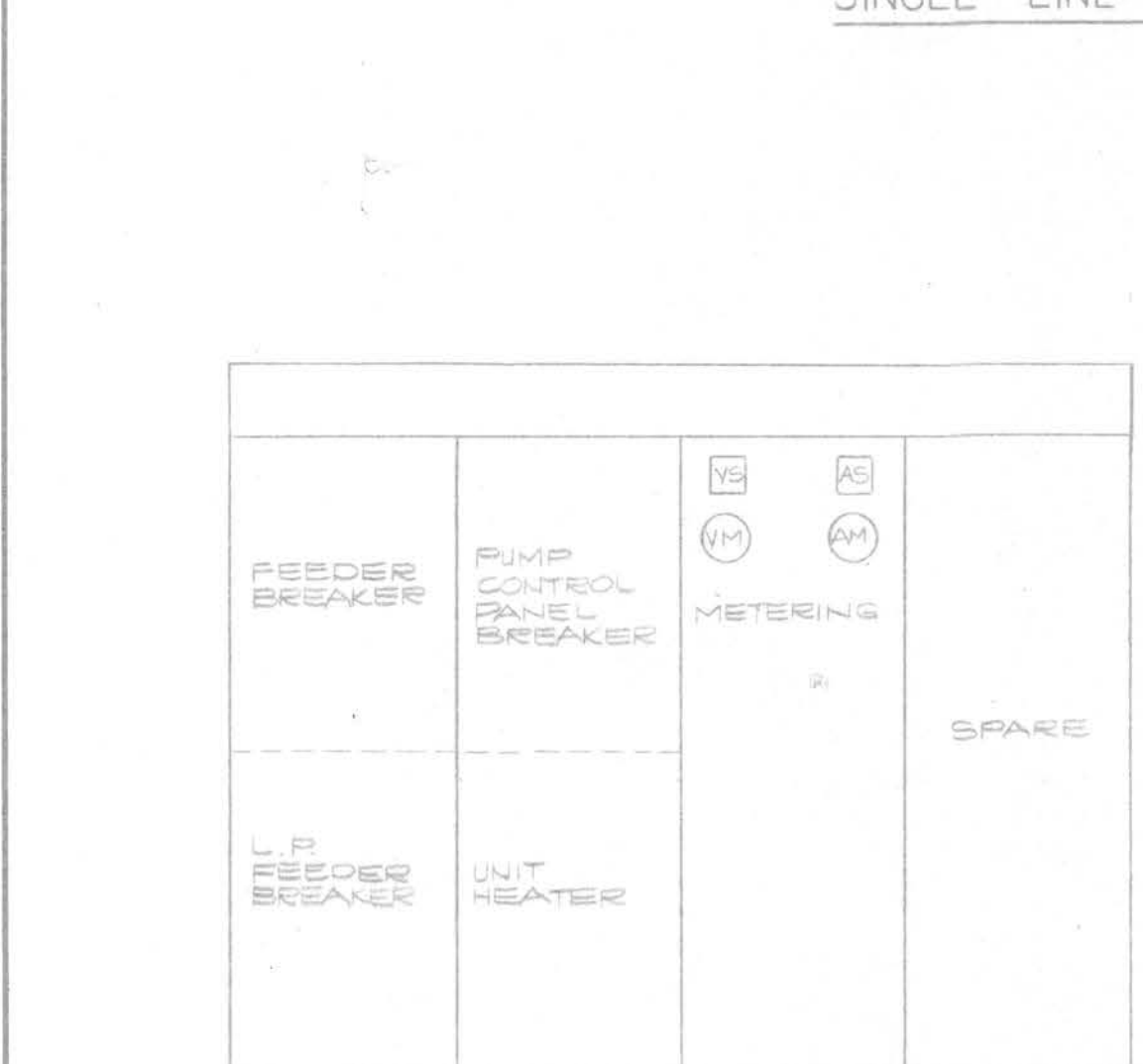
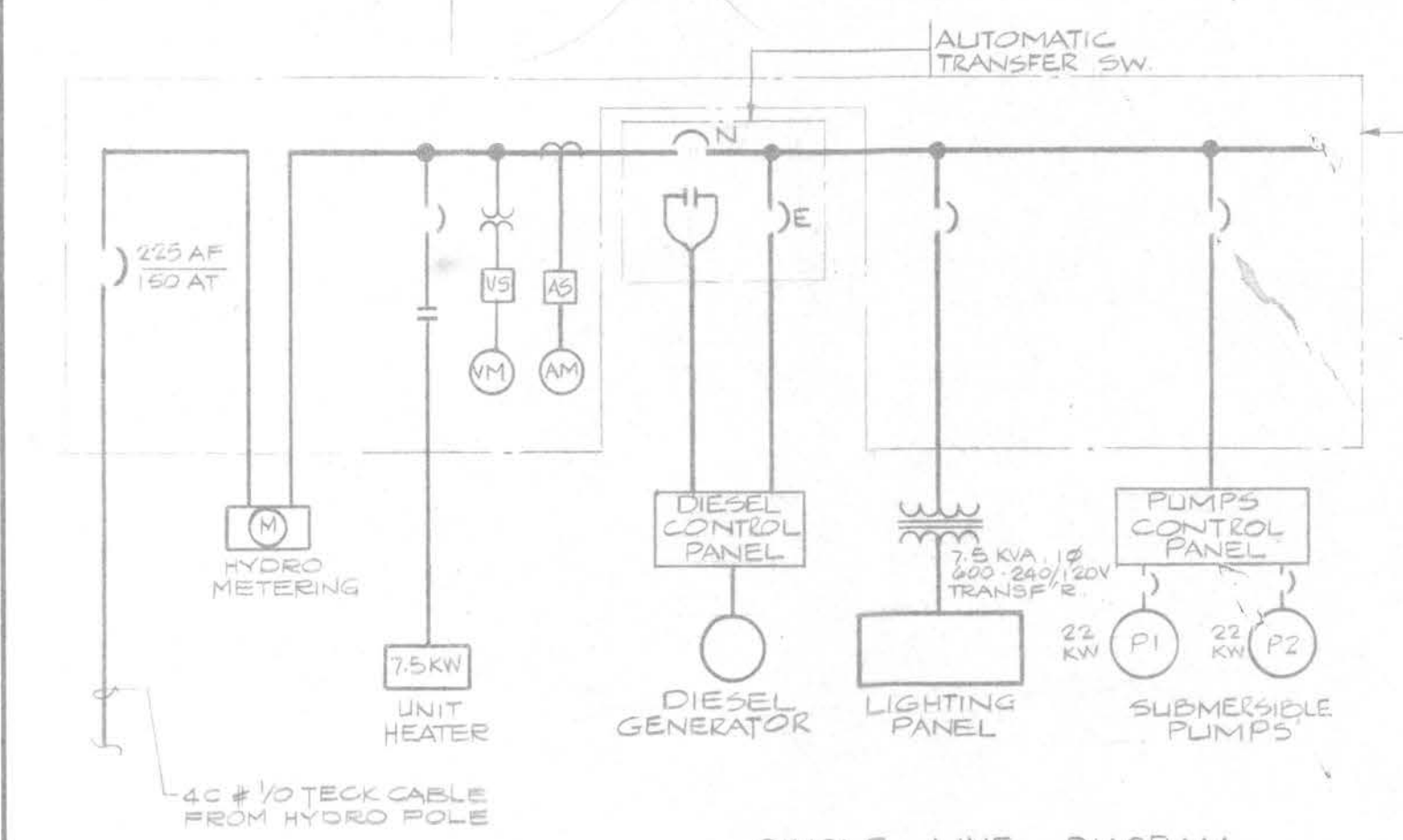
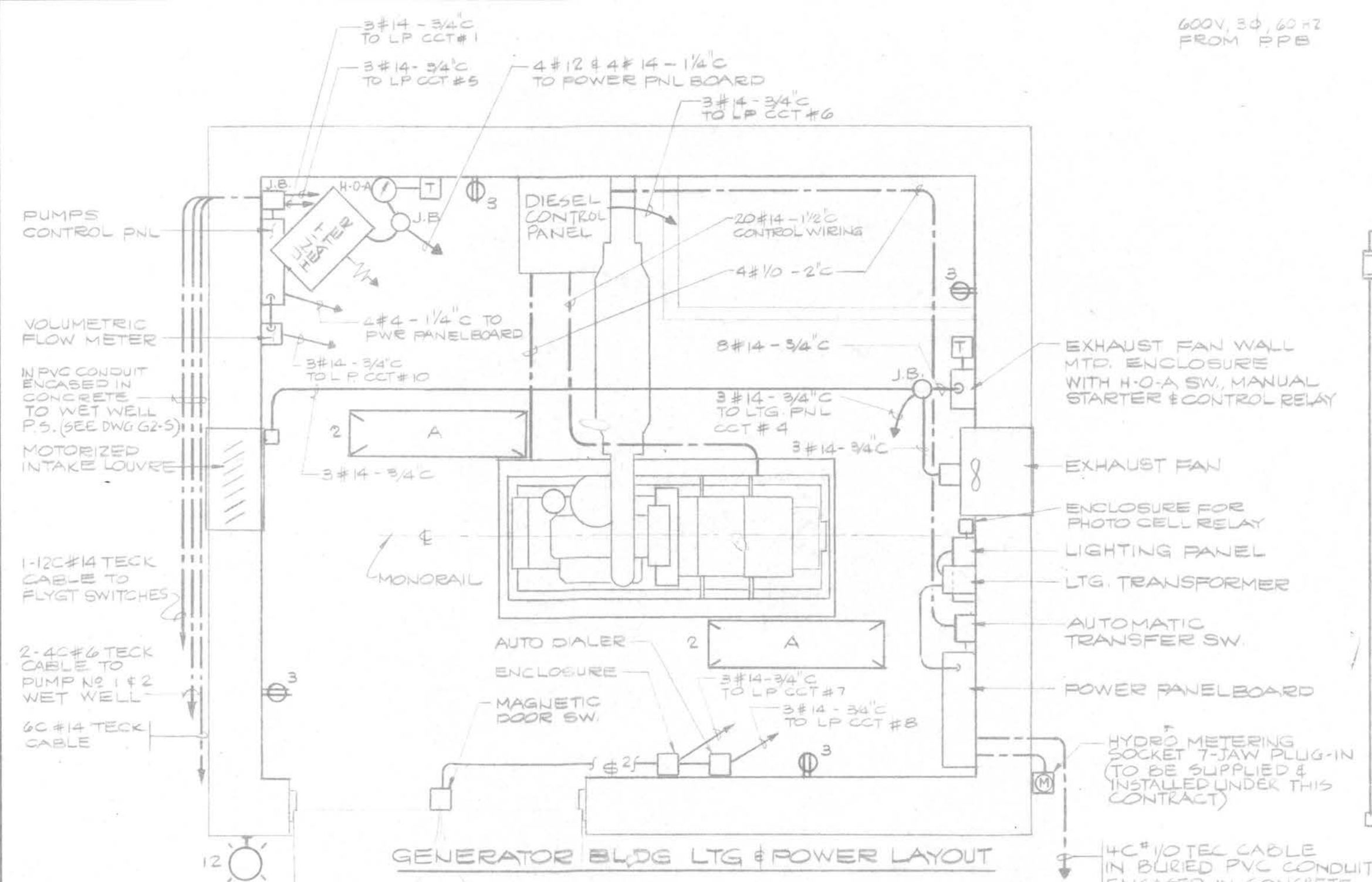
K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
480 FREDERICK STREET
KITCHENER, ONTARIO N2H 2P5



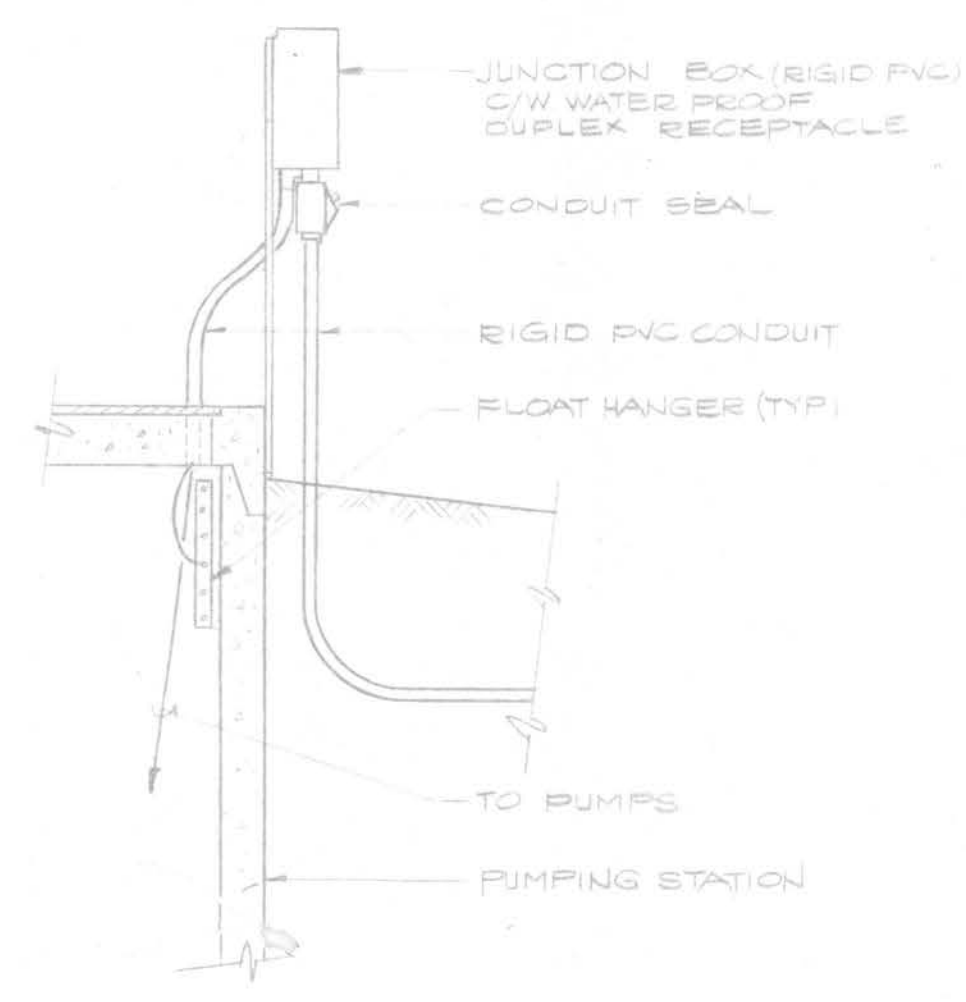
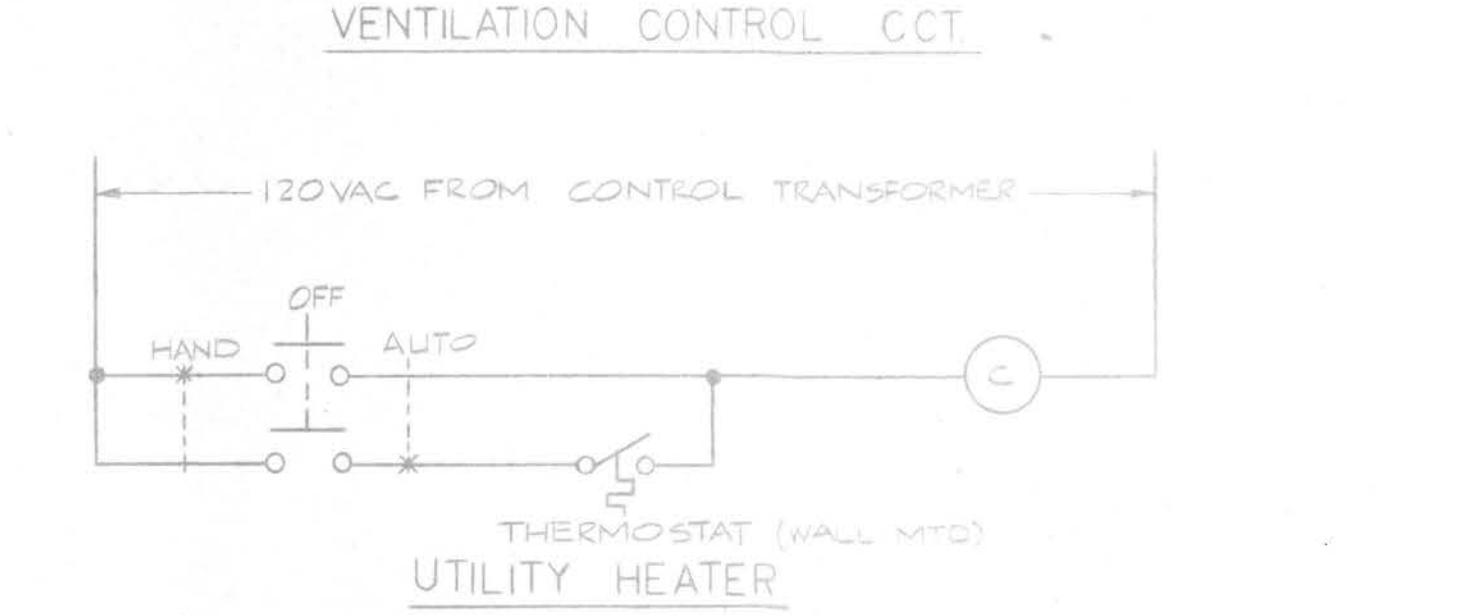
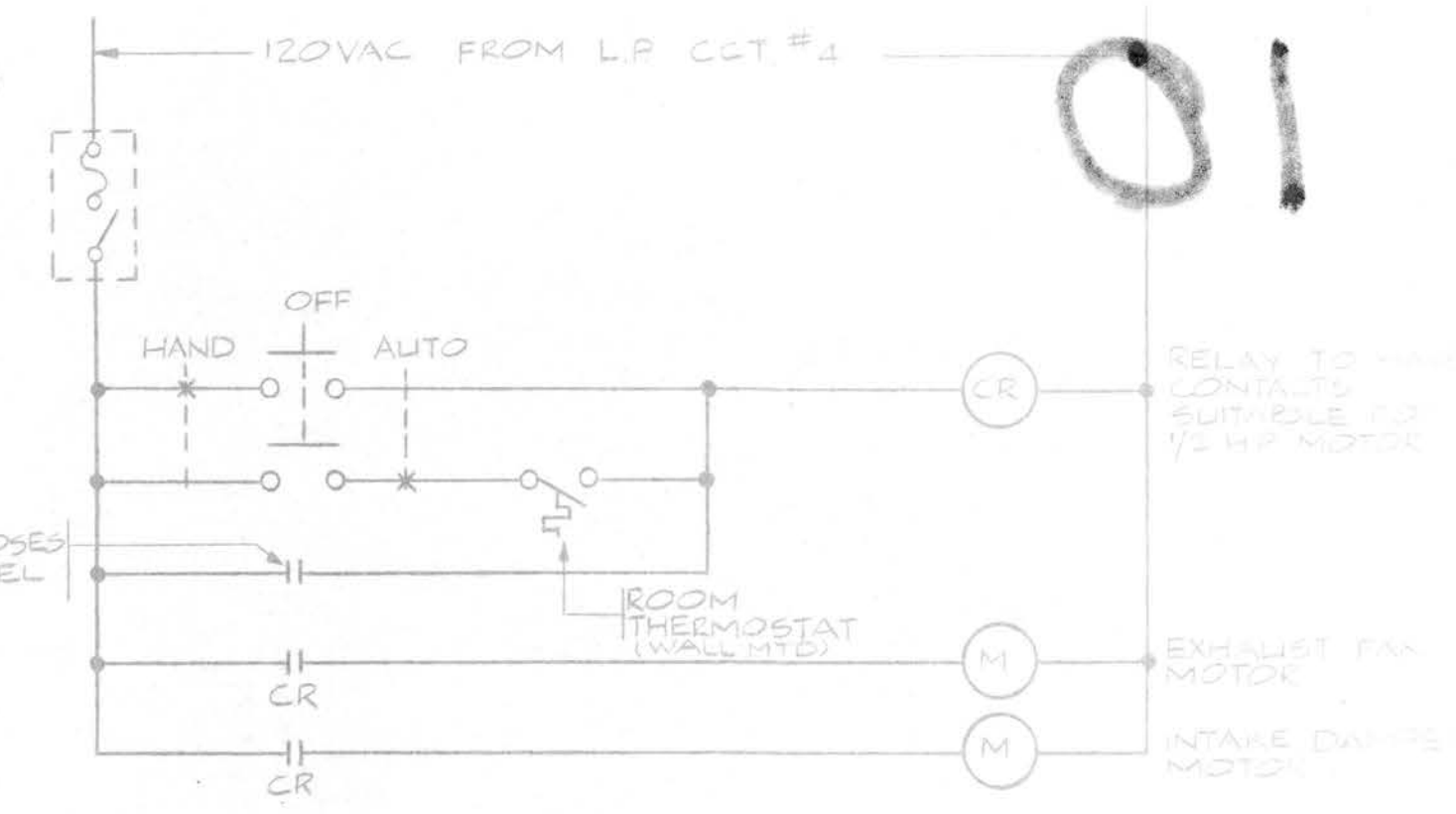
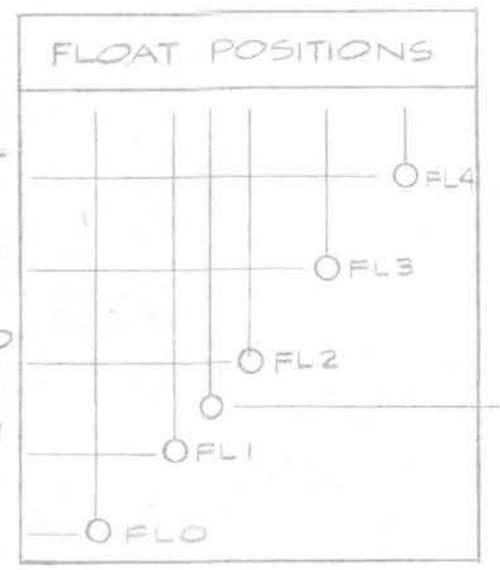
MINISTRY OF THE ENVIRONMENT
VILLAGE OF DRAYTON PROJECT NO SEWAGE 3-0150 CONTRACT NO 84-1
SEWAGE PUMPING STATION
MISCELLANEOUS DETAILS



Simcoe
Simcoe Engineering Group Limited • Consulting Engineers
Design D. D. B. C. Scale AS NOTED Drawing No. M5-S
Drawn V. T.
Checked Date NOV. 1984



TAG	QTY	DESCRIPTION	MANUFACTURER	PART N°
CR1/CR2	2	RELAY	POTTER-BRONFIELD	KUPI4A15 24-VAC COIL
TRD1/TRD2	2	TIMERS	ELECTROMATIC	5A205024-180SEC
T1	1	TRANSFORMER	EDWARDS	S92
H	1	HORN	MALLOEY	SC625A
SW1	2	DOOR SWITCH	EDWARDS	N° 59
SW2	1	SWITCH	ALLEN-BRADLEY	800 H32A
SW3	1	KEY SWITCH	"	"
T.S.	10	TERM. BLOCKS	ELECTROVERT	800T-X25 (OFF-ON)
ENCL	1	ENCLOSURE	HAMMOND	1414 PHMB



NOTE:
FOR LEGEND AND SYMBOLES
SEE DWG. N° E.2-W



Engineering
for **people**