Municipality of Northern Bruce Peninsula

Tobermory Water and Wastewater Master Plan

Final Report

September 11, 2026 Confidential



Tobermory Water and Wastewater Master Plan

Final

Municipality of Northern Bruce Peninsula

Confidential

Project No.: 221-09586-00
Client Ref: BRUPNY1000-2161
Date: September 11, 2026

WSP
957 4th Avenue East
Owen Sound
Ontario, N4K 2N9

T: +1 519 376-7612
wsp.com

WSP Canada Inc.

Confidential

Ontario Clean Water Agency (OCWA)
2085 Hurontario Street, 5th Floor
Mississauga, Ontario
L5A 4G1

Attention: Lisa Babel, P. Eng

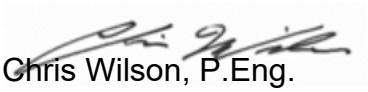
Dear Madam:

Subject: Master Plan Report Submission - Final

WSP is pleased to submit our final version of the Tobermory Water & Wastewater Master Plan. This final master plan report includes updates based on comments received from the Municipality and OCWA, through their review of the final draft. The report has been updated to an AODA format.

Please do not hesitate to contact the undersigned should you have any comments or questions.

Yours sincerely,



Chris Wilson, P.Eng.
Project Manager, Land Development & Municipal Engineering

CW/cw
Encl.
cc: Peggy Van Mierlo-West, Troy Cameron, Leo-Paul Frigault
WSP ref.: 221-09586-00

Revision History

FIRST ISSUE		
April 01, 2026	First Draft	
Prepared by	Reviewed by	Approved by
Jack Ducheck, Designer	Michael Flowers,P.Eng.	Chris Wilson, P.Eng.
REVISION 1		
July 06, 2026	Second Draft	
Prepared by	Reviewed by	Approved by
Jack Ducheck, Designer	Michael Flowers, P.Eng.	Chris Wilson, P.Eng.
REVISION 2		
July 16, 2026	Third Draft	
Prepared by	Reviewed by	Approved by
Jack Ducheck, Designer	Michael Flowers, P.Eng.	Chris Wilson, P.Eng.
REVISION 3		
July 22, 2026	Final Draft	
Prepared by	Reviewed by	Approved by
Jack Ducheck, Designer	Michael Flowers, P.Eng.	Chris Wilson, P.Eng.
FINAL		
September 11, 2026	Final Report	
Prepared by	Reviewed by	Approved by
Jack Ducheck, Designer	Michael Flowers, P.Eng.	Chris Wilson, P.Eng.

Signatures

Prepared by

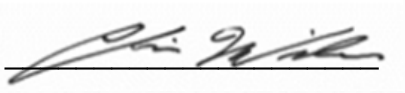


Jack Ducheck, Designer — September 11, 2026 — Date



Michael Flowers, Lead Professional, W/WW Master Planning — September 11, 2026 — Date

Approved[1] by



Chris Wilson, P.Eng., Manager Land Development & Municipal Engineering — September 11, 2026 — Date

WSP Canada Inc. prepared this report solely for the use of the intended recipient, Municipality of Northern Bruce Peninsula, in accordance with the professional services agreement. The intended recipient is solely responsible for the disclosure of any information contained in this report. The content and opinions contained in the present report are based on the observations and/or information available to WSP Canada Inc. at the time of preparation. If a third party makes use of, relies on, or makes decisions in accordance with this report, said third party is solely responsible for such use, reliance or decisions. WSP Canada Inc. does not accept responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken by said third party based on this report. This limitations statement is considered an integral part of this report.

The original of this digital file will be conserved by WSP Canada Inc. for a period of not less than 10 years. As the digital file transmitted to the intended recipient is no longer under the control of WSP Canada Inc., its integrity cannot be assured. As such, WSP Canada Inc. does not guarantee any modifications made to this digital file subsequent to its transmission to the intended recipient.

[1] Approval of this document is an administrative function indicating readiness for release and does not impart legal liability on to the Approver for any technical content contained herein. Technical accuracy and fit-for-purpose of this content is obtained through the review process. The Approver shall ensure the applicable review process has occurred prior to signing the document.

Contributors

Municipality of Northern Bruce Peninsula

CAO	Peggy Van Mierlo-West
Public Works Manager	Troy Cameron

Ontario Clean Water Agency (OCWA)

Municipality Project Manager	Natalie Colantonio
Municipality Project Manager	Lisa Babel
Operations Manager (Operator)	Leo-Paul Frigault

WSP

Consultant Project Manager	Chris Wilson
Consultant Lead Master Plan Engineer	Michael Flowers
Consultant Hydraulics Engineering	Antoine Lahaie
Consultant Project Engineering Support	Jack Ducheck

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 Study Purpose 1

1.2 Scope of the Master Plan 1

1.3 Municipal Class Environmental Assessment Process 2

1.3.1 Environmental Assessment Act 2

1.3.2 Principles of Environmental Planning 2

1.3.3 Municipal Class Environmental Assessment 3

1.3.4 Master Planning 6

1.4 Problem Statement 7

1.5 Public and Stakeholder Consultation 8

1.5.1 Notice of Study Commencement and Public Information Centre 8

1.5.2 Public Information Centre 9

1.5.3 Agency and Public Comments and Responses 9

1.5.4 Notice of Master Plan Completion 9

2 BACKGROUND 10

2.1 Study Area 10

2.2 Land Use 10

2.3 Regulatory Framework 11

2.3.1 Federal Legislation 11

2.3.2 Provincial Regulatory Requirements 12

2.3.3 Relevant Municipality Studies 18

2.4 Data Provided 19

2.4.1 Tobermory Sewage Treatment Facility - Annual Performance Report (2020) 19

2.4.2 Energy Audit Reports (2022) 20

2.4.3 Tobermory “Little Tub” Water Treatment Plant Engineering Report (2006) 20

2.4.4 Tobermory Water And Wastewater Feasibility Study (2012) 20

2.4.5 Tobermory “Little Tub Harbour” Water Treatment Plant Operations Manual (2008) 21
2.4.6 Little Tub WWS WISKI Data 21
2.4.7 Tobermory Community Centre DWS WISKI Data 21
2.4.8 Tobermory WWS Wiski Data 21
2.4.9 Highway No. 6 Plan And Profile (2020) 21
2.4.10 Expansion And Upgrading Of Sewage Treatment Facilities (1995) 21
2.4.11 Upgrading Of Existing Sewage Pumping Station And Forcemain (1994) 22
2.4.12 Asset Management Plan (2020) 22
2.4.13 Certificate of Approval - Municipal Sewage (1991) 22
2.4.14 Certificate of Approval - Municipal Sewage (1993) 22
2.4.15 Amendment to Certificate of Approval – Municipal Sewage (1994) 22
2.5 Municipal Drinking Water System Overview 22
2.5.1 Historical Flows 23
2.5.2 Water Treatment Plant 24
2.6 Municipal Wastewater System Overview 25
2.6.1 Historical Flows 26
2.6.2 Pump Stations 27
2.6.3 Wastewater Treatment Plant 27
2.6.4 Wastewater Generation And Quality Data 28
3 GROWTH AND SERVICING PROJECTIONS 29
3.1 Growth Scenarios 31
3.2 Water: Level of Service Criteria 32
3.2.1 Water Treatment 32
3.2.2 Water Storage 33
3.2.3 Distribution 34
3.3 Wastewater: Level Of Service Criteria 35
3.3.1 Gravity Sewers 35
3.3.2 Pumping Stations and Forcemains 36

3.3.3 Wastewater Treatment 37

4 GAP ANALYSIS 39

4.1.1 Gap Analysis 39

4.1.2 Modelling Methodology 39

5 ALTERNATIVE SOLUTIONS 42

5.1 Proposed Servicing Alternatives 42

5.1.1 Alternative DWS1 – Maintain Existing Level of Service 42

5.1.2 Alternative DWS2 – Expand Water Servicing to Downtown Core and Community Area 42

5.1.3 Alternative DWS3 – Expand Water Servicing to Existing Residential, Municipal, And Commercial Properties and New Developments (Including Expanding Water to Downtown Core and Community Area) 46

5.2 Proposed Wastewater Collection Alternatives 48

5.2.1 Alternative WWS1 – Maintain Existing Level of Service 49

5.2.2 Alternative WWS2 – Expand Wastewater Servicing Within Downtown Core and Community Area 49

5.2.3 Alternative WWS3 – Expand Wastewater Servicing to Existing Residential, Municipal, And Commercial Properties and New Developments (Including Expanding Water to Downtown Core and Community Area) 50

6 EVALUATION OF ALTERNATIVE SOLUTIONS 52

6.1 Evaluation Approach and Criteria 52

6.1.1 Infrastructure Evaluation Approach 52

6.1.2 Infrastructure Evaluation Criteria 52

6.1.3 Evaluation Matrix 54

6.1.4 Water system Alternative Solutions Evaluation 54

6.1.5 Wastewater System Alternative Solutions Evaluation ... 58

7 RECOMMENDED SOLUTIONS 62

7.1 Water Infrastructure Servicing Options 62

7.1.1 Water Option 1: Retrofit Existing Little Tub Water Treatment to Low Lift Pumping Station and New Centralized Water Treatment Plant with Water Storage 62
7.1.2 Water Option 2: New Low Lift Pumping Station, Water Intake and Centralized Water Treatment Plant with Water Storage 63
7.2 Wastewater Infrastructure Alternatives 65
7.2.1 Wastewater Option 1: Expanded Wastewater Collection System and Upgraded Existing Wastewater Treatment Plant....65
7.2.2 Wastewater Option 2: Expanded Wastewater Collection System and New Wastewater Treatment Plant 66
8 MASTER PLAN IMPLEMENTATION AND PHASING....68
8.1 Implementation: Projects and Phasing....68
8.1.1 Water Projects 68
8.1.2 Wastewater Projects....69
8.2 Cost Estimation Summary 69
9 CLOSURE....71
9.1 Additional Studies....71
9.2 Master Plan Approval and Completion....71
9.3 Recommendations....72

Tables

Table 2-1: Tobermory Historical Water Flow Data 24
Table 2-2: Tobermory WTP Process Component Details 24
Table 2-3: Tobermory Historical Wastewater Flow Data 26
Table 3-1: Population Growth 30
Table 3-2: Employment Growth 30
Table 3-3: Required Area for New Growth 30
Table 3-4: Existing Water Storage Summary 34
Table 3-5: Peaking Factors 34
Table 3-6: Design Pressures 34
Table 3-7: Existing Water Servicing Requirements 34
Table 3-8: Gravity Sewers Hydraulic Condition 35
Table 3-9: Gravity Sewers Level of Service 36
Table 3-10: Sanitary Pump Station Hydraulic Condition 36
Table 3-11: Sanitary Pump Station Recommended Level of Service 37
Table 3-12: WWTP Design Basis Requirements (MECP Design Guidelines for Sewage Works, 2008) 37
Table 5-1: Alternative DWS2 Water Servicing 43
Table 5-2: Alternative DWS2 Water Servicing Growth 45
Table 5-3: Alternative DWS3 Water Servicing 46
Table 5-4: Alternative DWS3 Water Servicing Growth 48
Table 5-5: Alternative WWS2 Wastewater Servicing Growth 50
Table 5-6: Alternative WWS3 Wastewater Servicing Growth 51
Table 6-1: Evaluation Criteria Description 53
Table 6-2: Comparative Evaluation of Water Servicing Alternatives 54
Table 6-3: Comparative Evaluation of Wastewater Servicing Alternatives 58
Table 8-1: Phased Water and Wastewater Projects 68
Table 8-2: Water System Projects Capital Costs 70
Table 8-3: Wastewater System Projects Capital Costs 70

Figures

Figure 1-1: Municipal Class EA Process 5
Figure 2-1: Tobermory Study Area 10
Figure 2-2: Existing Land Use and Contour Data for Tobermory 11
Figure 2-3: Tobermory Existing Drinking Water System 23
Figure 2-4: Tobermory Wastewater Collection System . 26
Figure 2-5: Tobermory WWTP Aerial View 28
Figure 3-1: Potential New Growth in Tobermory 31
Figure 4-1: Combined Modelling Approach 39
Figure 5-1: Alternative DWS2 - Expand Water Servicing to Downtown Core and Community Area ... 44
Figure 5-2: Alternative DWS3 – Expand Water Servicing to Existing Residential, Municipal, and Commercial Properties 47
Figure 7-1: Retrofitted Existing Little Tub WTP to Low Lift Pumping Station and Centralized WTP with Water Storage 63
Figure 7-2: New Low Lift Pumping Station and New Centralized WTP with Water Storage 64
Figure 7-3: Expanded Wastewater Collection System and Upgraded Existing Wastewater Treatment Plant 66
Figure 7-4: Expanded Wastewater Collection System and New Wastewater Treatment Plant 67

Appendices

A Public Consultation

B Calculations

C Evaluation Matrix

D Climate Change Memo

E Capital Costs

1 INTRODUCTION

1.1 Study Purpose

The Municipality of Northern Bruce Peninsula has partnered with the Ontario Clean Water Agency (OCWA) and retained WSP Canada Inc. (WSP) to undertake the development of a Water and Wastewater Master Plan for Tobermory.

The objective of the Master Plan is to develop a preferred strategy to provide accessible and reliable drinking water and wastewater services in Tobermory to meet current and future needs, to 2046 and beyond. The Master Plan takes into consideration climate change and social and economic impacts, as well as current limitations to Tobermory's growth, given the existing infrastructure.

The Master Plan is being conducted in accordance with the Class Environmental Assessment (Class EA) process. The requirements for undertaking a Class EA are described in the document Municipal Class Environmental Assessment (MCEA) prepared by the Municipal Engineers Association (MEA) (October 2000, as amended in 2007, 2011, 2015, 2023 & 2024). **Approach # 1** was adopted for the completion of this Master Plan (refer to Section 1.3.4 for more details).

It should be noted that the scope of the project did not include an assessment of repair, rehabilitation or replacement needs related to infrastructure assets reaching the end of their expected service lives.

1.2 Scope of the Master Plan

Master Plans are 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 (MEA).

The following are distinguishing features of Master Plans (MEA):

1. The scope of Master Plans is broad and usually includes an analysis of the system in order to outline a framework for future works and developments. Master Plans are not typically undertaken to address a site-specific problem.
2. Master Plans typically recommend a set of works which are distributed geographically throughout the study area and which are to be implemented over an extended period of time. Master Plans provide the context for the implementation of

the specific projects, which make up the plan and satisfy, as a minimum, Phases 1 and 2 of the Class EA process. Notwithstanding that these works may be implemented as separate projects, collectively these works are part of a larger management system. Master Plan studies in essence conclude with a set of preferred alternatives and, therefore, by their nature, Master Plans will limit the scope of alternatives, which can be considered at the implementation stage.

This Water and Wastewater Servicing Master Plan documents existing conditions, forecasts infrastructure needs to service growth and evaluates alternative servicing strategies to define the preferred solution.

1.3 Municipal Class Environmental Assessment Process

1.3.1 Environmental Assessment Act

The Ontario Environmental Assessment Act (EAA) and the associated Codes of Practice require proponents to examine and document the environmental effects that might result from major projects or activities.

The Act defines the environment broadly as:

1. Air, land or water
2. Plant and animal life, including human
3. Social, economic and cultural conditions that influence the life of human or a community
4. Any building, structure, machine or other device or thing made by human
5. Any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities
6. Any part or combination of the foregoing and the interrelationships between any two or more of them.

The purpose of the Act is the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management of the environment in the Province (RSO1990, c. 18, s.2).

1.3.2 Principles of Environmental Planning

The EAA sets a framework for a systematic, rational, and replicable environmental planning process that is based on five (5) key principles, as follows:

— Consultation with affected parties - Consultation with the public and government review agencies is an integral part of the planning process and allows the proponent to identify and address concerns cooperatively before final decisions are made. Consultation should begin as early as possible in the planning process.
— Consideration of a reasonable range of alternatives - Alternatives to include functionally different solutions to the proposed undertaking as well as alternative methods of implementing the preferred solution. The “do nothing” alternative must also be considered.
— Identification and consideration of the effects of each alternative on all aspects of the environment - This includes the natural, social, cultural, technical, and economic environments.
— Systematic evaluation of alternatives in terms of their advantages and disadvantages, to determine their net environmental effects - The evaluation shall increase in the level of detail as the study moves from the evaluation of alternatives to the proposed undertaking to the evaluation of alternative methods.
— Provision of clean and complete documentation of the planning process followed – This will allow traceability of decision-making with respect to the project. The planning process must be documented in such a way that it may be repeated with similar results.

1.3.3 Municipal Class Environmental Assessment

The Class EA planning process requires the integration of sound engineering judgement, prudent long-term planning, and protection of all aspects of the environment (natural, social, economic, and cultural). This includes consultation with the public and affected agencies, to obtain comments and input, to ensure regulatory compliance and ultimately achieve acceptance for the preferred alternative. The overall result of the Class EA process is the identification of a preferred solution which results in minimal impact on the environment.

Class Environmental Assessments were approved by the Minister of the Environment in 1987 for municipal projects having predictable and preventable impacts. The Class EA streamlines the planning and approvals process for municipal infrastructure projects (including water and wastewater projects) which display the following important characteristics in common:

— Recurring
— Similar in nature
— Usually limited in scale

— Predictable range of environmental effects
— Responsive to mitigation measures

The Class EA document applies to a group of projects which are approved under the EAA, provided they are planned for according to the requirements of the Class EA. The specific requirements of the Class EA document depend on the type of project, its complexity, and the significance of potential environmental impacts.

The MCEA document outlines the procedures to be followed to satisfy Class EA requirements for water, wastewater, and road projects. The process includes five (5) phases:

— Phase 1: Problem Definition
— Phase 2: Identification and Evaluation of Alternative Solutions to Determine a Preferred Solution
— Phase 3: Examination of Alternative Methods of Implementation of the Preferred Solution
— Phase 4: Documentation of the Planning, Design and Consultation Process
— Phase 5: Implementation and Monitoring

Public and agency consultation are integral to the Class EA planning process. Projects subject to the Class EA process are classified into four possible “Schedules” depending on the degree of expected impacts. It is important to note that the Schedule assigned to a particular project is proponent driven. For example, if a project has been designated as ‘Exempt’, the proponent can decide to comply with the requirements of a Schedule B or C of the Class EA process based on the magnitude of anticipated impacts or the special public and agency consultation requirements specific to that particular project.

Agreements made or commitments given by the proponent to affected agencies or the public during the screening process must be followed through and implemented, otherwise the Class EA approval will not be granted. If an affected agency or the public has a concern that cannot be resolved by discussion and negotiation with the proponent, then they can request a proponent to comply with Part II of the EAA. Through issuance of a Part II Order, Schedule “B” and Schedule “C” projects may be elevated to an individual Class EA, requiring the proponent to comply with Part II of the EA Act. Schedule “B” projects could also be elevated to a Schedule “C”.

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

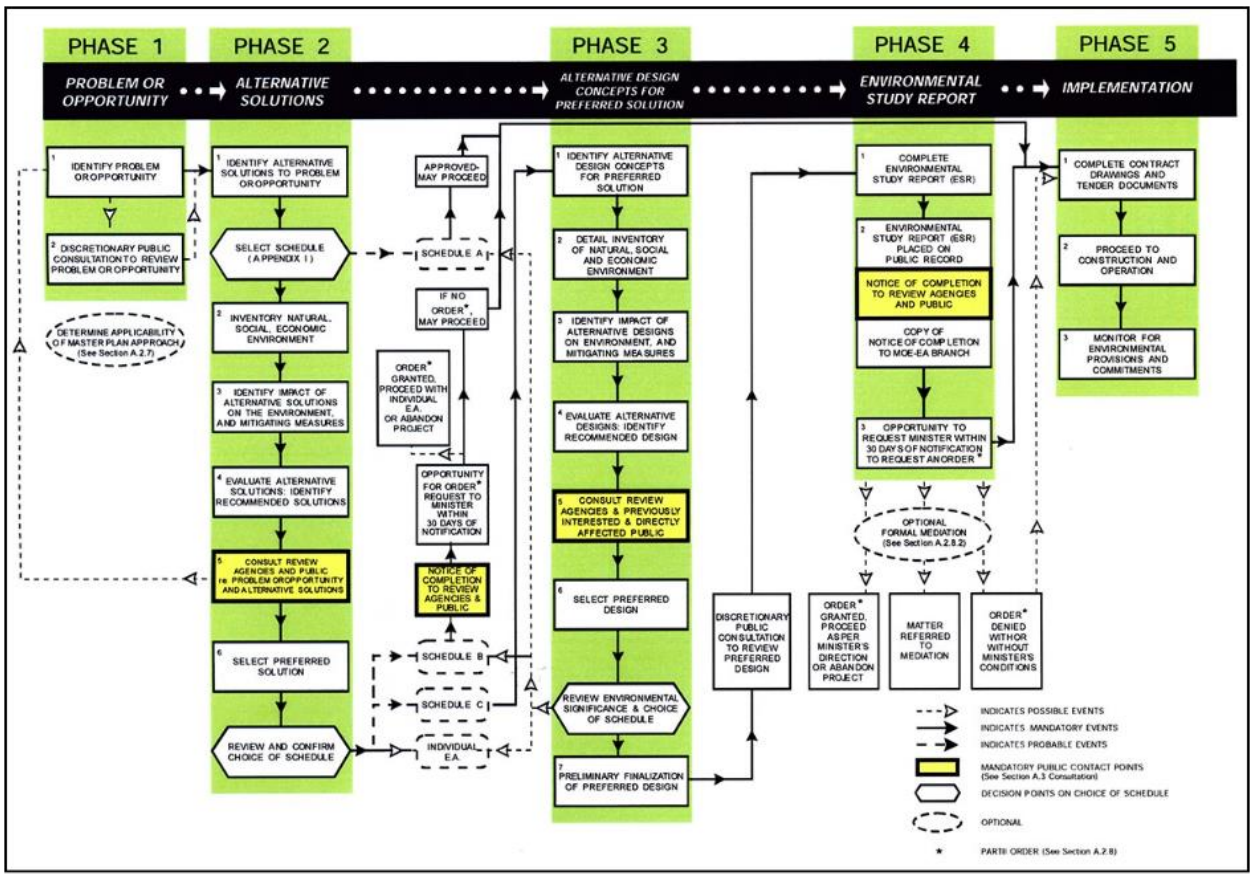


Figure 1-1: Municipal Class EA Process

Exempt Projects

Formally known as Schedule A or A+ Projects, exempt projects are minor, operational and maintenance activities and are pre-approved without the need for further assessment. Projects with this designation are typically limited in scale and have minimal adverse environmental impacts. Examples of Exempt projects include expansion of waterworks to connect to an existing system. This type of project is pre-approved, and the proponent may proceed without following the procedures set out in any other part of the Class EA process.

Schedule B Projects

Schedule B projects generally include improvements and minor expansions to existing facilities where there is potential for some adverse environmental impacts. These projects require screening of alternatives for their environmental impacts and completion of Phases 1 and 2 of the Class EA planning process. If outstanding issues remain after the public review period, any party may request that the Minister of the Environment consider a Part II Order (also known as elevating the project to a Schedule C or an Individual EA).

Provided that no significant impacts are identified and no requests for a Part II order to a Schedule C or Individual Environmental Assessment are received, Schedule B projects are approved and may proceed directly to implementation. Examples include construction of new water storage facilities and water/wastewater conveyance facilities (pumping stations), among others.

Schedule C Projects

Schedule C projects generally include the construction of new facilities and major expansions to existing facilities. These projects are typically more complex and have the potential for significant environmental effects. As a result, they proceed under full planning and documentation procedures and satisfy all five phases of the Class EA planning process. Phase 3 involves the assessment of alternative methods of carrying out the project, as well as public consultation on the preferred conceptual design. Phase 4 normally includes the preparation of an Environmental Study Report (ESR) which is filed for public review. Provided no significant impacts are identified and no requests for Part II Order or elevating to an Individual Environmental Assessment are received, Schedule C projects are then approved and may proceed to Phase 5: implementation. Some examples of a Schedule C projects are construction of a new water system including water supply and distribution system and expansion of a wastewater treatment facility.

1.3.4 Master Planning

While the planning and design process described herein is a process by which municipalities may plan municipal works on a project-by-project basis, the MCEA process allows for cases when it is beneficial to begin the planning process by considering a group of related projects, or an overall system (e.g. water, wastewater and/or roads network) or a number of integrated systems (e.g. infrastructure master plan) prior to dealing with project specific issues. By planning in this way, the need and justification for individual projects and the associated broader context are better defined.

Master Plans are long range plans which examine infrastructure systems or groups of related projects to outline a framework for planning of subsequent projects and/or developments.

The following are distinguishing features of Master Plans:

1 Their scope is broad and usually includes a system-level analysis to outline a framework for future works. Master Plans are typically not focused on a site-specific problem.

2 Master Plans typically recommend a set of works which are distributed geographically throughout the study area and which are to be implemented over an extended period of time.

3 Master Plans provide the context for the implementation of specific projects which make up the plan and satisfy, as a minimum, Phases 1 and 2 of the Class EA process. Notwithstanding that these works may be implemented as separate projects, collectively these works are part of a larger management system. Master Plan studies in essence conclude with a set of preferred alternatives and, therefore, by their nature, Master Plans limit the scope of alternatives which can be considered at the implementation stage.

Appendix 4 of the MCEA document outlines several approaches to conducting Master Plans.

Approach # 1 was adopted for the completion of this Master Plan, which involves the analysis on a regional or systems scale, which enables the Municipality to identify needs and establish broader infrastructure alternatives and solutions. This process involves the preparation of a Master Plan document at the end of Phases 1 and 2 of the MCEA process and is completed at a level of detail which would require more investigation at the project-specific level to fulfill the requirements for the specific Schedule B and C projects identified within the Master Plan. The Master Plan document is made available for public comment prior to being approved by the Municipality.

The Master Plan will become the basis for future investigations for specific Schedule B and C projects identified within it. Schedule B projects would require the filing of a Project File for review while Schedule C projects would have to fulfill Phases 3 and 4 prior to filing an ESR for public review.

1.4 Problem Statement

To service the existing and future needs of the community of Tobermory's Water and Wastewater Systems, the following Problem Statement was adopted to guide the master planning study analysis, in accordance with the MCEA process:

"To develop an infrastructure plan for the community of Tobermory which meets servicing needs for today and future development to 2046 and beyond, considering climate change and social and economic impacts, as well as current limitations to Tobermory's growth due to the extents of the existing municipal drinking water service and lack of municipal water and wastewater service."

Future service requirements were identified for the study, and the Problem Statement objectives were used to guide the analysis and evaluation of infrastructure and develop alternative solutions for infrastructure improvement projects for the community.

1.5 Public and Stakeholder Consultation

The Tobermory Water and Wastewater Master Plan falls under the requirement of a Schedule B project requiring Phase 1 and Phase 2. One requirement of Phase 2 is the need to consult with review agencies, and the public once alternative solutions have been identified. Typically, consultation involves presenting the problem or opportunity that will be addressed, the environmental considerations and potential impacts of each alternative, and the approach used for evaluating the alternatives. The comments and the input from the public and other stakeholders are taken into consideration in the identification of the preferred alternative solution.

Consultation early and throughout the process is a key feature of environmental assessment planning. The purpose of the consultation process is to notify stakeholders of the project details and provide an opportunity for interested parties to review and submit comments related to the study.

The following public and stakeholder consultation activities were completed throughout the Master Planning process.

- Indigenous Consultations – Email notifications
- Stakeholder Engagement – Email notifications
- Public Information Centre (August 27, 2025) – Municipal Website notifications
- Municipal Website (https://letstalknbp.ca) – Content uploads including all Notices, Frequently Asked Questions, Presentation to Council, etc.

Refer to **Appendix A** for copies of all Notices, stakeholder contact list and Public Information Centre material. This information is provided in accordance with the standards prescribed by the Class EA document, which outlines the guidelines for establishing contact with appropriate review agencies in relation to the nature of the project.

1.5.1 Notice of Study Commencement and Public Information Centre

The Notice of Study Commencement was developed to target the ministries, organizations, agencies and other stakeholders that may be affected and/or interested in the Master Plan. The Notice of Study Commencement was published on the

Municipality's website on January 29, 2025. The notice briefly outlined the purpose and justification for the Study and also indicated that a Public Information Centre would be held later in 2025.

The Notice of Study Commencement can be found in **Appendix A**.

A Notice of Public Information Centre (PIC) was developed and published on the Municipal website on August 6, 2025 with the objective of informing the public and other stakeholders of the Study. The notice briefly outlined the purpose and justification for the Study. It also indicated that a PIC would be held on August 27, 2025 to present the alternative water and wastewater servicing solutions, evaluation criteria and methodology used, evaluation of the alternatives and the preferred solution.

1.5.2 Public Information Centre

The Tobermory Water and Wastewater Master Plan PIC was held on August 27, 2025 at the Tobermory Community Centre, in Tobermory, to present an overview of the Study, the alternative water and wastewater servicing solutions, evaluation criteria and methodology used, evaluation of the alternatives and the preferred solution. The purpose of this Public Information Centre was to communicate the process used to carry out the Study and provide an opportunity to receive comments on both the approach followed and on the preferred solution. A copy of the material presented at the PIC is included in **Appendix A**, including the attendance sign-in sheets.

1.5.3 Agency and Public Comments and Responses

Table 1-1, located in **Appendix A**, is a summary of comments received through consultation with regulatory agencies and members of the public during the Master Plan process. A copy of all notices and comments received by agencies during the study are provided in **Appendix A**. Comment sheets received during the PIC are attached as well, with personal information redacted. Email comments received from the Public, are generally summarized in Table 1-1. Copies of these emails and the responses provided are not included in **Appendix A** due to personal information and content.

1.5.4 Notice of Master Plan Completion

A Notice of Master Plan completion will be published on the Municipality's website and sent to key stakeholders upon filing of this Master Plan Report. This Notice is relevant for two reasons: it provides the public and relevant agencies with a final 30-day period to review the final conclusions of the Study, and it informs the public of the outcome of the Study and the nature of the resulting projects.

2 BACKGROUND

2.1 Study Area

The study area for the Master Plan is within the geographical boundaries of Tobermory as shown in Figure 2-1. The Tobermory Study Area is bounded by Lake Huron and Georgian Bay to the north. The study area includes areas with municipal water and wastewater servicing, as well as private water and septic services, and potential growth areas.

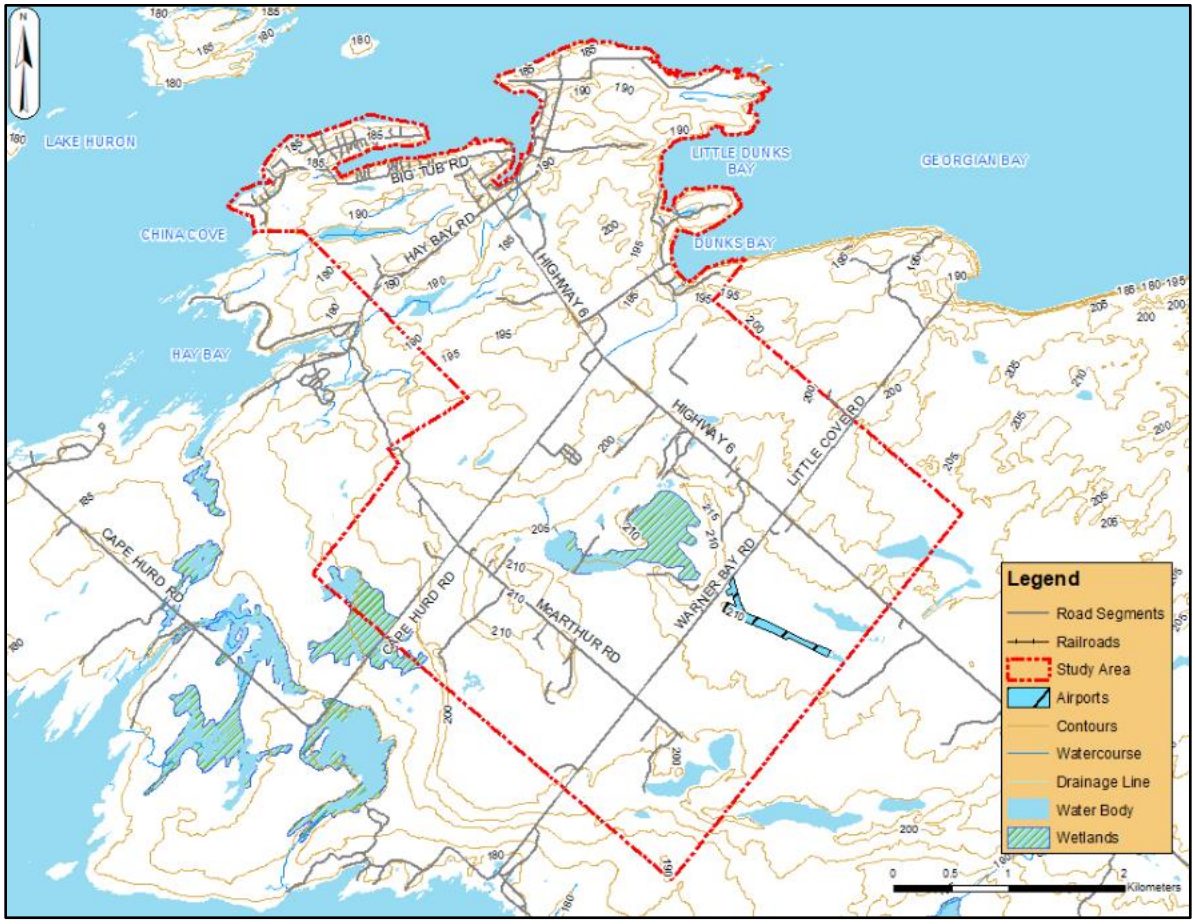


Figure 2-1: Tobermory Study Area

2.2 Land Use

The existing land use and contour data can be found in Figure 2-2. Tobermory is primarily composed of rural area, with a concentration of commercial and residential to the north.

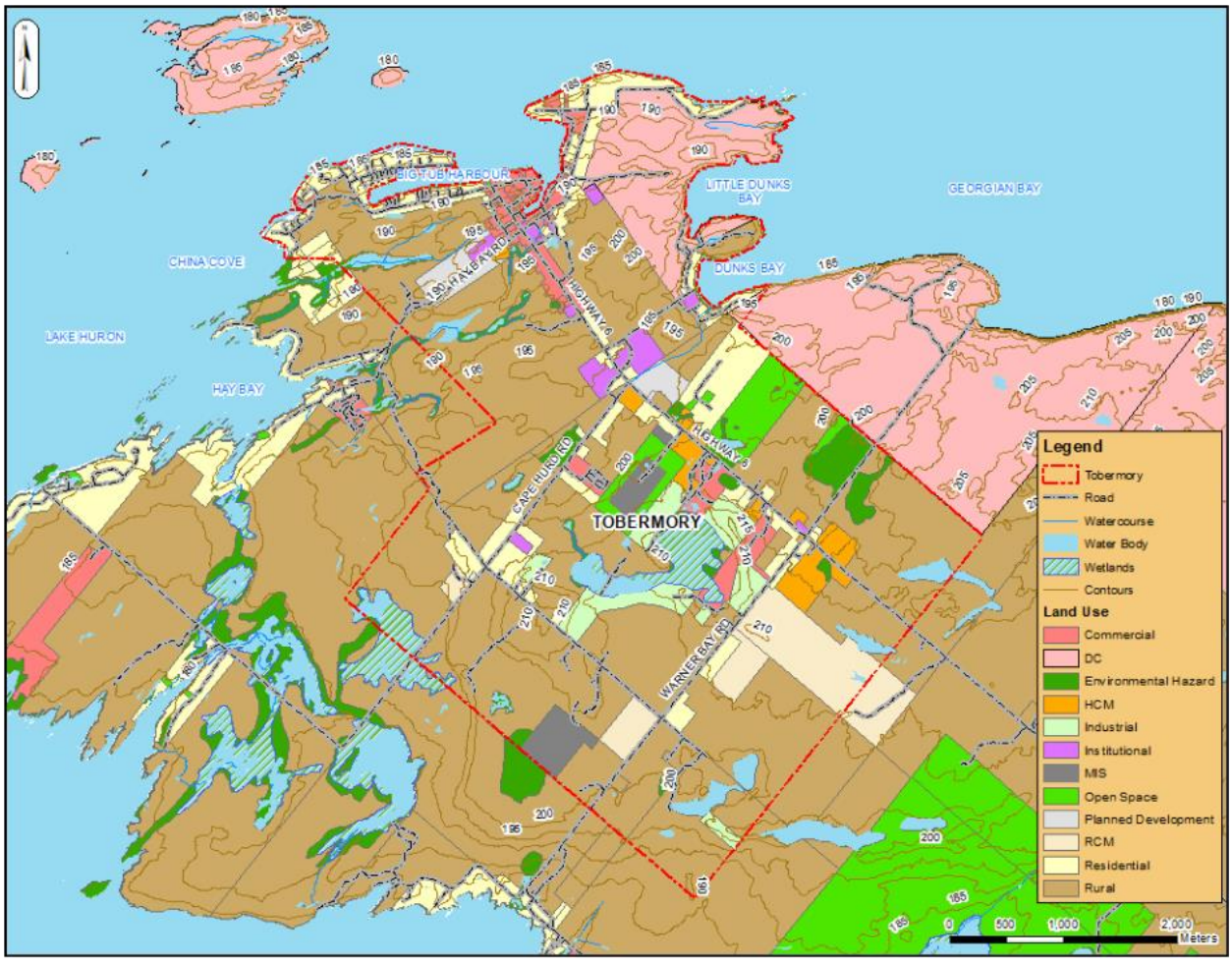


Figure 2-2: Existing Land Use and Contour Data for Tobermory

2.3 Regulatory Framework

The development of the Tobermory Water and Wastewater Masterplan involves a clear understanding of the regulatory framework that governs the planning, design, operation, and long-term management of its municipal water and wastewater system. The following section outlines key legislation, policies, and guidelines that inform the Master Plan.

2.3.1 Federal Legislation

Canada Water Act (1985)

The Canada Water Act, passed in 1970 and revised in 1985, provides management of water resources in Canada. The purpose of the Act is to provide a framework for cooperation with the provinces and territories regarding research, planning, and implementation of programs linked to water use, conservation, and development. The

federal government has outlined regulations under the Canada Water Act including policies for fisheries, navigation, and the conduct of external affairs.

Fisheries Act (1985)

The Fisheries Act contains habitat and pollution protection provisions which are necessary for all levels of government and the public. Subsection 35(1) of this Act states “no person shall carry out any work or undertaking that results in the harmful alteration, disruption or destruction (HADD) of fish habitat” unless authorized by the Minister of Fisheries and Oceans Canada. A subsection 35(2) Fisheries Act authorization may be issued when adverse effects cannot be avoided.

Canadian Environmental Protection Act (1999)

The Canadian Environmental Protection Act is intended to provide for the protection and conservation of the natural environment, by controlling discharges to air, land, and water. Regulations made under the Act propose limits on what can be discharged to the environment and allow for fines and other penalties when unauthorized discharges occur. This Act affects how a community can dispose of materials and approach its construction activities to ensure that there are no harmful effects on the environment.

Wastewater Systems Effluent Regulations (2012)

The Wastewater Systems Effluent Regulations address the largest point source of pollution in Canadian waters. The purpose of the regulations is to reduce the threats to fish, fish habitat and human health by decreasing the amount of harmful substances deposited into waters from wastewater effluent. The regulations set national effluent quality standards that are achievable through secondary wastewater treatment. Wastewater systems that do not meet the effluent quality standards must upgrade to secondary treatment. The effluent quality standards are as follows:

- Average carbonaceous biochemical oxygen demand (cBOD5) concentration must not exceed 25 mg/L;
- Average total suspended solids (TSS) concentration must not exceed 25 mg/L;
- Average total residual chlorine (TRC) concentration must not exceed 0.02 mg/L; and
- Average unionized ammonia concentration must not exceed 1.25 mg N/L.

2.3.2 Provincial Regulatory Requirements

The Planning Act (1990)

The Planning Act establishes the mechanisms and rules for land use planning in Ontario, outlining how land uses may be controlled, and who may control them. The Act

sets the basis for the preparation of Official Plans and planning policies for future development, and it provides municipalities with local autonomy to make decisions and streamline the planning process. The Act empowers local citizens to provide their input to their municipal council and, where permitted, to appeal decisions to the Ontario Municipal Board. Through the Act, the Province issues Provincial Policy Statements and plans.

Ontario Water Resources Act (1990)

The Ontario Water Resources Act was passed for the purpose of conservation, protection, and management of Ontario waters. The act identifies requirements for water works, including wells, and sewage works in relation to planning, design, siting, public notification and consultation, establishment, insurance, facilities, staffing, operation, maintenance, monitoring, and record-keeping. The Act is a general water management statute which applies to both groundwater and surface water. This Act specifies the requirements that the community must satisfy in order for the provincial government to grant approval for establishing, altering, extending, or replacing water and wastewater system components.

Ontario Planning and Development Act (1994)

The Ontario Planning and Development Act establishes the general approach by which the Minister of Municipal Affairs and Housing may cause for Development Plans to be undertaken for development planning areas. The Development Plans may include policies for economic, social and physical development with respect to the following:

- The distribution and density of population within the development area;
- The location of employment areas;
- The identification of land use areas;
- The management of land and water resources;
- The control of all forms of pollution of the natural environment;
- The location and development of servicing communication and transportation systems; and
- The development and maintenance of educational, cultural, recreational, health and other social facilities.

There can also be policies relating to the financing and programming of public development projects as well as capital works and policies to coordinate planning and development among municipalities or planning boards within an area or within separate areas, among other considerations.

In many respects, a Development Plan under the Ontario Planning and Development Act is similar to an Official Plan under the Planning Act. The primary differences are:

1. The Province is the authority for both undertaking and approving the Development Plan; and
2. The legislative requirements for the preparation and approval of a Development Plan are unique to the Ontario Planning and Development Act.

MOE GUIDELINE F-5 (1994)

The Ontario Ministry of the Environment (MOE) (now Ministry of Environment, Conservation and Parks (MECP)) requires that municipal and private sewage treatment works, outfall structures and emergency overflow facilities be located designed, constructed, and operated so as to minimize pollution of receiving waters and interference with water uses.

The primary purpose of Guideline F-5 is to describe the levels of treatment required for municipal and private sewage treatment works discharging to surface waters. This Guideline is supported by the following Procedures:

1. Procedure F-5-1: Determination of Treatment Requirements for Municipal and Private Sewage Treatment Works Discharging to Surface Waters
2. Procedure F-5-2: Relaxation of Normal Level of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters
3. Procedure F-5-3: Derivation of Sewage Treatment Works Effluent Requirements for the Incorporation of Effluent Requirements into Certificates of Approval for New or Expanded Sewage Treatment Works
4. Procedure F-5-4: Effluent Disinfection Requirements for Sewage Works Discharging to Surface Waters
5. Procedure F-5-5: Determination of Treatment Requirements for Municipal and Private Combined and Partially Separated Sewer Systems

Guideline F-5 states that the level of treatment for new or expanded sewage treatment works must be in accordance with Procedures F-5-1 and F-5-2. Effluent requirements, including both waste loadings and concentrations, must be derived in accordance with Procedure F-5-3 or those established in the Wastewater System Effluent Regulations (See Section 2.1.4), whichever are stricter.

MOE Procedure D-5 (1996)

The primary purpose of D-5 is to guide municipal planning for sewage and water servicing. It describes an approach for municipal planning for sewage and water

services to ensure an acceptable quantity and quality of water supply and the proper collection, treatment and disposal of sewage wastewater for development. It is consistent with the Provincial goal to manage growth and change to foster communities that are socially, economically, environmentally, and culturally healthy, and that make efficient use of land, new and existing infrastructure and public service facilities.

1. Procedure D-5-1: Calculating and reporting uncommitted reserve capacity at sewage and water treatment plants
2. Procedure D-5-2: Application of Municipal responsibility for communal sewage and water services
3. Procedure D-5-3: Servicing options statement
4. Procedure D-5-4: Technical guidelines for individual on-site sewage systems: Water Quality impact risk
5. Procedure D-5-5: Technical Guidelines for Private Wells; Water supply assessment

Procedure D-5-1 is used to ensure that sanitary flow generation from approved development applications will not exceed the design capacity of the sewage treatment plant(s). To ensure that capacity is not exceeded it is necessary to determine what uncommitted reserve capacity is available based on historic flows and existing development.

Safe Drinking Water Act, 2002

The Safe Drinking Water Act is in place to provide protection for human health and prevent drinking water health hazards. The Act controls and regulates drinking water systems and drinking water testing. Regulations made under the Act, such as Regulation 268/03 – Ontario Drinking Water Quality Standards, stipulate detailed requirements regarding drinking water systems, testing services, drinking water quality standards, certification of drinking water system operators and drinking water quality analysts and compliance and enforcement. This Act specifies the quality of the drinking water that any community is responsible for producing and delivering as well as how the area's drinking water treatment systems must be operated and managed.

Places to Grow Act (2005)

The Places to Grow Act provides a framework for the Provincial government to coordinate planning and decision-making for long-term growth and infrastructure renewal in Ontario. It gives the Province the authority to designate geographical growth areas, and to develop growth plans in collaboration with local officials and stakeholders to meet specific needs across the Province. Growth plans developed under the Places to Grow Act integrate and build upon other initiatives such as the Greenbelt Plan, the Niagara Escarpment Plan, the Provincial Policy Statement, the Planning Act, municipal

infrastructure planning, and source water protection planning. Growth plans may include population projections and allocations, policies, goals, and criteria relating to issues such as intensification and density, land supply, expansions and amendments to urban boundaries, location of industry and commerce, protection of sensitive and significant lands (including agricultural lands and water resources), infrastructure development, affordable housing and community design.

Municipalities are required to bring their official plans into conformity with the growth plan for their area. Decisions made under the Planning Act and Condominium Act are also required to conform to applicable growth plans.

Clean Water Act (2006)

Ontario's Clean Water Act is intended to ensure that communities are able to protect their municipal drinking water supplies through the development of collaborative, locally driven, science-based protection plans (source water protection plans). The Act requires that local communities evaluate existing and potential threats to their water source(s) and subsequently implement the required actions to reduce or eliminate these threats. The community can use this information to make choices about the size and locations of water and wastewater servicing elements (e.g. treatment plants, pumping stations, transmission mains, and collection mains).

Safeguarding and Sustaining Ontario's Water Act (2007)

The Province of Ontario passed the Safeguarding and Sustaining Ontario's Water Act to enable implementation of the Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement and other amendments to the Permit to Take Water program.

The principles of the Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement include the Premiers of Ontario and Quebec and the Governors of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin. This agreement recognizes the following:

- The water of the Basin are a shared public treasure and the parties to the Agreement have a shared duty to protect, conserve and manage the waters;
- Conserving and restoring the waters and water dependent natural resources of the Basin will improve them; and
- Continued sustainable, accessible, and adequate water supplies for the people and economy of the Basin are important.

Environmental Assessment Act (2010)

The Ontario Environmental Assessment Act and the associated Codes of Practice require proponents to examine and document the environmental effects that might result from major projects or activities. The purpose of the Act is the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management of the environment in the Province (RSO1990, c. 18, s.2).

Municipal Class Environmental Assessment (2015)

The Municipal Class Environmental Assessment document (October 2000, as amended in 2007, 2011, 2015, 2023 & 2024) prepared by the Municipal Engineers Association (MEA) outlines the requirements for undertaking a Class Environmental Assessment (Class EA). The purpose of the document is to provide a process by which to account for preventable and predictable impacts of infrastructure projects.

The Class EA planning process requires the integration of sound engineering judgment, sensible long-term planning, and protection of all aspects of the environment (natural, social, economic, and cultural). This includes consultation with the public and affected agencies to obtain comments and input, to ensure regulatory compliance and ultimately achieve acceptance for the preferred alternative.

Provincial Planning Statement (2024)

The Provincial Planning Statement (PPS), 2024 replaces the Provincial Planning Statement, 2020 and the Growth Plan for the Greater Golden Horseshow in a single framework. It is a key component of Ontario's policy-led planning system as it sets policy direction on matters of provincial interest concerning land use planning and development. In particular, the PPS provides guidance to municipalities regarding building strong healthy communities, wise use and management of resources, and protecting public health and safety. In addition, the PPS policies address growth management, environmental protection, climate change, and conservation of important resources such as cultural heritage and archaeology. The PPS supports an integrated long-term approach to planning by aligning development with infrastructure to build strong communities.

The PPS establishes the role of upper-tier municipalities in planning for growth, development, intensification, and redevelopment (s. 2.3). Planning for infrastructure, including sewage and water systems, must be coordinated and integrated with land use planning and growth management (s.3.1).

Municipalities are required to provide infrastructure in an efficient manner to meet current and projected needs of the community (s.3.6).

In order to protect the environment and minimize potential risks to human health and safety, the PPS indicates that municipal sewage services and municipal water services are the preferred form of servicing for settlement areas (s. 3.6). However, where municipal sewage and water services are not available, planned, or feasible, private communal or individual on-site sewage and water services may be preferred (s. 3.6).

The policies in the PPS may be complemented by provincial plans, including the Niagara Escarpment Plan, or by locally-generated policies. In particular, municipal official plans are crucial for the implementation of the PPS policies and must be kept up to date with the PPS. All decisions related to planning matters must be consistent with the Provincial Policy Statement.

2.3.3 Relevant Municipality Studies

The Official Plan for The Tobermory and Lion's Head Secondary Urban Areas, and the Hamlet of Ferndale (2016)

The Official Plan for the Tobermory and Lion's Head Urban Areas, and the Hamlet of Ferndale summarized the intentions for the communities for the subsequent 25 years. Included was background on the communities, instructions for how to interpret the plan, policies for land uses, general development, and implementation.

As of 2010, the population of Northern Bruce Peninsula was 3744, with an estimate that 50% of that population resided in Tobermory and Lion's Head, and that more than 50% of that population is seasonal.

Northern Bruce Peninsula Climate Action Plan (2022)

The Climate Action Plan presented the components of the plan for Northern Bruce Peninsula to mitigate climate change. They plan to reduce consumption of energy and fossil fuels, protect the environment to promote natural sequestration of carbon, and reduce solid waste generation.

By-Law Growth Management Amendment To The County Of Bruce Official Plan (2022)

The amendment to the County of Bruce official plan provided population projections for Bruce County, including Northern Bruce Peninsula, until 2046. The estimated existing population in 2021 was 4600 persons.

Bruce County Official Plan (2024)

The Bruce County Official Plan regulates areas within the Municipality of Northern Bruce Peninsula excluding Tobermory and Lion's Head Secondary Urban Areas and the Hamlet of Ferndale, which are regulated by the Local Official Plan.

2.4 Data Provided

The following is a list of data, reports, studies, and plans were provided for use in the master plan study, supporting the design basis and evaluation of future servicing options. The Master Plan analysis and recommendations henceforth in this study are limited based on the use of the following provided data sets for the study and supporting documentation for mapping and GIS.

1. Tobermory Sewage Treatment Facility – Annual Performance Report (2020)
2. Energy Audit Reports (2022)
3. Tobermory "Little Tub" Water Treatment Plan Engineering Report (2006)
4. Tobermory Water and Wastewater Feasibility Study (2012)
5. Tobermory "Little Tub Harbour" Water Treatment Plant Operations Manual (2008)
6. Wastewater Treatment Plant and Little Tub Harbour Sewage Pumping Station Operations and Maintenance Manual (2008)
7. Little Tub DWS WISKI Data (2020 – 2024)
8. Tobermory Community Centre DWS WISKI (2015-2020)
9. Tobermory WWS WISKI data (2015 – 2022)
10. Highway 6 plan and Profile (2020)
11. Expansion and Upgrading of Sewage Treatment facilities (1995)
12. Upgrading of Existing Sewage Pumping Station and Forcemain (1994)
13. Asset Management Plan (2020)
14. Certificate of Approval - Municipal Sewage (1991)
15. Certificate of Approval - Municipal Sewage (1993)
16. Amendment to Certificate of Approval – Municipal Sewage (1994)

2.4.1 Tobermory Sewage Treatment Facility - Annual Performance Report (2020)

The Annual Performance Report provided a summary of the performance of the Tobermory Sewage Treatment System for the year of 2020. Included was a description of the system, a summary of monitoring and compliance reports, monitoring and analytical data, maintenance activities, operating challenges, proposed alterations, extensions, or replacements, sludge generation, sludge handling, septage receiving

works, calibration and maintenance procedures, and modifications for performance and reliability.

2.4.2 Energy Audit Reports (2022)

A series of energy audit reports were completed in 2022 for St. Edmund's Museum, the Meeting Place, Tobermory Airport, Tobermory Community Centre, Tobermory Firehall, Tobermory Harbour, and Tobermory Library. The reports summarized the results of the ASHRAE Level 2 and greenhouse gas emissions audits.

2.4.3 Tobermory "Little Tub" Water Treatment Plant Engineering Report (2006)

The Engineering Report summarized the performance and recommendations for the Tobermory "Little Tub" Water Treatment Plant in 2006. Included was a general description of the system, an assessment of physical works, life expectancy of the plant, evaluation of operating authority, options and alternatives, conclusions, and recommendations and plan of action.

2.4.4 Tobermory Water And Wastewater Feasibility Study (2012)

The Feasibility Study for Tobermory's water and wastewater systems summarized proposed water and sewer infrastructure. Included was the proposed servicing area for water and sewer infrastructure, analysis of preliminary water and sewage demands, capacity review of existing treatment facilities, proposed works, cost estimates for proposed works, cost recovery scenarios, and recommendations.

The study proposed three servicing options:

1. Water servicing in the Downtown Core and the Tobermory Community Area
2. Water servicing for areas presently serviced by sewers
3. The ultimate or long-term option for water and wastewater servicing

The analysis of preliminary water and sewage demands included historical flows, as well as estimated flows for 2011 and 2031 for each option.

Based on these flow estimates, the current water treatment plant, Little Tub, does not have sufficient capacity for any of these three proposed options. Therefore, it was recommended that it be retrofitted into a raw water intake/booster pumping station and that a new water treatment facility be constructed off-site. In addition, all three (3) options would require the construction of additional watermains. Option 3 would most likely require a booster station.

The current wastewater treatment facility has sufficient capacity for Options 1 and 2, however, not for the flows that are anticipated by 2031 from Option 3. An additional exfiltration cell would need to be constructed as part of the existing sewage lagoon. All three options would require extensions to existing sanitary sewers, though these would be minor for Options 1 and 2. For Option 3, new pumping stations would be required as the system will need to rely on both gravity and pressure systems.

2.4.5 Tobermory "Little Tub Harbour" Water Treatment Plant Operations Manual (2008)

The Operations Manual for Tobermory's "Little Tub Harbour" Water Treatment Plant detailed the processes within the treatment plant. Included was a plant overview, water source, raw water handling, particulate removal, disinfection, other processes, storage and transmission, common utilities, emergency provisions, and certificates.

2.4.6 Little Tub WWS WISKI Data

The WISKI spreadsheets provided flow data for the Little Tub water treatment plant from 2020 to 2024.

2.4.7 Tobermory Community Centre DWS WISKI Data

The WISKI spreadsheets provided flow data for the Tobermory Community Centre from 2015 to 2020.

2.4.8 Tobermory WWS Wiski Data

The WISKI spreadsheets provided flow data for the wastewater treatment plant from 2015 to 2022.

2.4.9 Highway No. 6 Plan And Profile (2020)

The drawings of Highway No. 6 provided a plan and profile of the sanitary sewer along Highway 6 from Big Tub Road to Maple Golf Crescent.

2.4.10 Expansion And Upgrading Of Sewage Treatment Facilities (1995)

The drawings provided a plan and profile of upgrades to the wastewater treatment plant.

2.4.11 Upgrading Of Existing Sewage Pumping Station And Forcemain (1994)

The drawings provided a plan and profile of upgrades to the sewage pumping station and connected forcemains.

2.4.12 Asset Management Plan (2020)

The asset management plan summarized the existing assets within Northern Bruce Peninsula.

2.4.13 Certificate of Approval - Municipal Sewage (1991)

The certificate of approval for modifications to the existing infiltration lagoon at St Edmunds Wastewater Treatment Plant.

2.4.14 Certificate of Approval - Municipal Sewage (1993)

The certificate of approval for upgrades and expansions the existing Tobermory Sewage Treatment Facility.

2.4.15 Amendment to Certificate of Approval – Municipal Sewage (1994)

The amendment to the 1993 certificate of approval with additional upgrades, including the construction of a wet well, the retrofit of the existing generator/control building by installation of a new motor control centre, construction of a new odour control building, construction of a new metering chamber including a magnetic flowmeter, and the replacement of the existing 150 mm diameter forcemain with a 200 mm diameter forcemain from the Sewage Pumping Station to Highway 6 and Bay Street to approximately 775 meters south of Bay Street.

2.5 Municipal Drinking Water System Overview

The majority of drinking water in the Tobermory Study Area is supplied by private wells, including the Downtown Core and Community Area. The remainder of downtown is supplied drinking water by the Tobermory drinking water system (surface water source) and municipal groundwater wells under the direct influence of surface water (GUDI). Figure 2-3 shows the extents of the existing drinking water system.

The Tobermory drinking water system is supplied from Georgian Bay and treated at the Little Tub Water Treatment Plant (WTP). The WTP is located at 44 Front Street and is a direct filtration plant with a capacity of 187 m^3/day. It services the ferry terminal building,

Harbour Master's Office & public washroom, municipal marina, and the showers & public washrooms in downtown Tobermory.

The Tobermory Community Centre Drinking Water System is supplied by a drilled GUDI well and services the Tobermory Community Centre, Fire Station, and Emergency Services Building. The Tobermory Airport, Public Library, Museum, Public Washroom and the Tobermory Meeting Place (social services organization) are all serviced by GUDI wells.

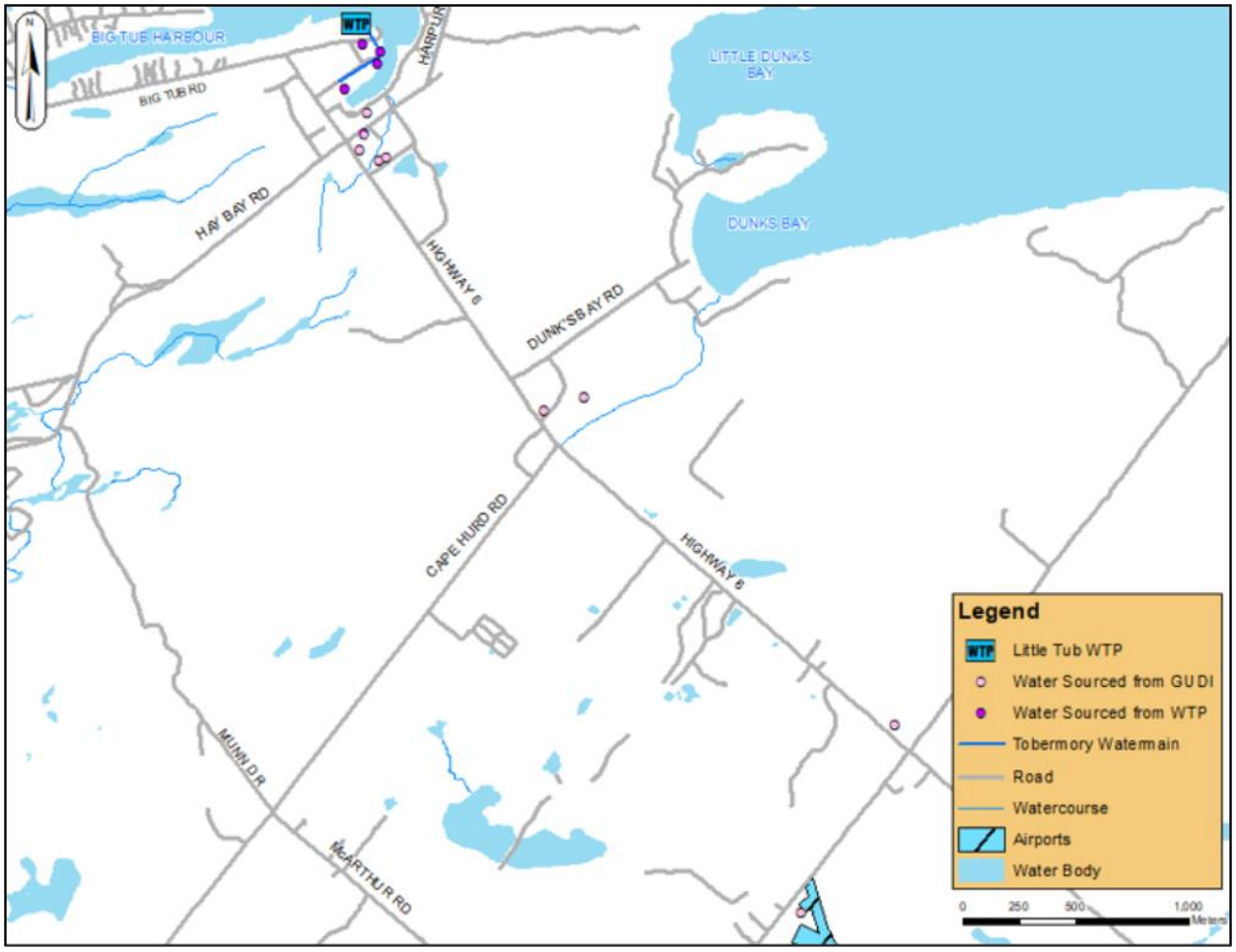


Figure 2-3: Tobermory Existing Drinking Water System

2.5.1 Historical Flows

The historical flows produced by the Little Tub water treatment plant are summarized in Table 2-1. These historical flows are based on servicing four municipal buildings with an equivalent population of 95 persons. Given the estimated equivalent population of 95 persons, and the worst-case scenario average day flow (ADF) for 2021, this gives an equivalent of 250 L/cap/day. The treatment plant has a capacity of 187 m^3/day.

Table 2-1: Tobermory Historical Water Flow Data

	Average Day Flow (m3/day)	Maximum Day Flow (m3/day)
2024	11.48	26.00
2023	11.76	50.00
2022	16.40	84.50
2021	23.80	52.00
2020	13.71	64.00

2.5.2 Water Treatment Plant

The Tobermory "Little Tub" WTP is located at 44 Front Street, Tobermory and operates under Ontario Drinking Water License #185-102. The WTP is a direct filtration plant with a rated capacity of 187 m3/d. Source water is retrieved from Georgian Bay via a low lift pumping system and coagulant (Poly Aluminum Chloride) is then added before raw water passes through an in-line mixer prior to being conveyed to two (2) sand pressure filters. There are two stages of disinfection. First, ultraviolet disinfection rated at 196 m3/day, then secondary disinfection through the injection of sodium hypochlorite. WTP Treatment process design details are provided in Table 2-2.

Table 2-2: Tobermory WTP Process Component Details

Process Component	Parameter	Design Value
Raw Water Intake	Diameter Length	250 mm 67 m from low-lift well, 40 m into Georgian Bay
Low-Lift Pumps	Wet Well Dimensions Quantity of Pumps Capacity of Pump (each)	1.5 m length x 1.5 m wide x 4.0 m depth 2 (1 duty, 1 standby) 11.52 L/s at 31.6 m TDH
Poly-aluminum Chloride Injection and Metering Pumps	Type Quantity of Metering Pumps Type of Metering Pumps Capacity of Metering Pumps	Aluminum Sulphate (Pas-8) 2 (1 duty, 1 standby) Diaphragm 3.8 L/hr and 18.9 L/hr
In-Line Mixer	Type Dimensions	In-line, static mixer 50 mm diameter x 400mm length
Sodium Hypochlorite Injection and Metering Pumps	Pump Quantity	2 (1 duty, 1 standby)
Pressure Filters	Type Quantity Dimensions (each)	Sand 2 0.43 m2
Sump Pump	Horsepower RPM	1.5 hp 1725 RPM

Table 2 2: Tobermory WTP Process Component Details - Continued

Process Component	Parameter	Design Value
Backwash Treatment Tank/Valve	Dimensions Total Capacity	10,000 L
Filtered Water Meter	Dimensions of Tank	2,300 L
UV System, Reactor Units	Quantity of Reactors UVT Minimum UV Dose Delivery Maximum Flow Rate/UV Unit	4 90% 40 mJ/cm2 196 m3/day
Chlorine Retention Tank, Pumps, and Float Controls	Dimensions of Tank Quantity of Chemical Feed Pumps Capacity	9,100 L 2 (1 duty, 1 standby) 0.038 L/min
High-Lift Pumps	Quantity of Pumps Capacity of Pump (each)	2 (1 duty, 1 standby) 4.73 L/s @ TDH 64 m

2.6 Municipal Wastewater System Overview

The majority of wastewater produced in the Tobermory Study Area is treated through private septic systems. The remainder of wastewater is collected by the Tobermory wastewater collection system (gravity and pump station / forcemain), which is treated at the Tobermory Wastewater Treatment Plant (WWTP).

The WWTP is located on Highway 6, southwest of Maple Golf Crescent, and is a sewage lagoon treatment system, with the capacity to treat a summer day design flow of 625 m3/day (Certificate of Approval – Municipal Sewage, 1993). The collection system consists of gravity sewers and forcemains. The current wastewater system is shown in Figure 2-4.

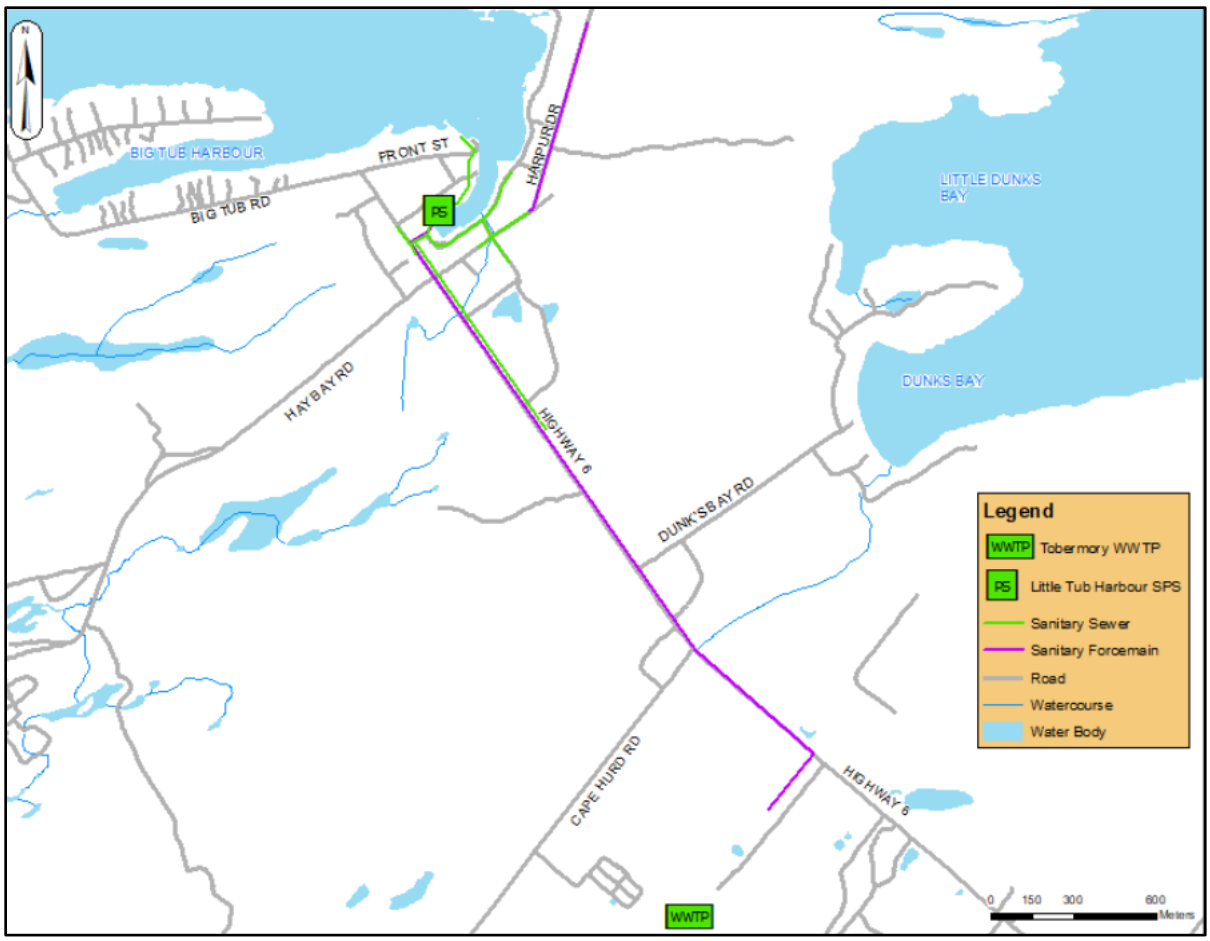


Figure 2-4: Tobermory Wastewater Collection System

2.6.1 Historical Flows

The historical flows treated by the WWTP are summarized in Table 2-3. The WWTP has a capacity of 625 m3/day. Records below show no exceedances of the average day design capacity from 2016 to 2019.

Table 2-3: Tobermory Historical Wastewater Flow Data

	Average Day Flow (m3/day)	Maximum Day Flow (m3/day)
2022	113.60	272.75
2021	135.00	421.75
2020	193.66	458.50
2019	358.63	2,641.00
2018	272.92	1,355.00
2017	228.28	1,144.00
2016	376.75	752.00
2015	304.09	559.74

2.6.2 Pump Stations

There is one (1) pump station in Tobermory (Little Tub Harbour PS), which pumps the collected wastewater through a 200 mm dia. forcemain to the WWTP.

The Little Tub Harbour PS consists of an underground wet well with two (2) submersible pumps, each with a rated capacity of 17.0 L/sec at a TDH of 50.5 m. The wet well has a normal operating volume of 5.7 m^3 and is provided with an odour control activated carbon adsorption unit. The pumping station is also equipped with a 150-kW diesel generator set for providing emergency power.

2.6.3 Wastewater Treatment Plant

The WWTP consists of two aerated lagoon cells, one storage cell, two exfiltration ponds and one overflow cell. The two aerated lagoons cells each have a capacity of 10,800 m^3. The aeration provided is tapered coarse bubble, diffused aeration. Aeration Cell #2 has a quiescent settling zone to permit effluent clarification. The effluent from the aeration Cell #2 can be recycled to aeration Cell #1, transferred to storage Cell #1 for winter storage, or transferred to the exfiltration Cells #2 or 3 during summer operations. The exfiltration cells have a combined minimum rated capacity of 317 m^3/day, and each cell has approximately 13,750 m^2 of surface area. There is one (1) back-up exfiltration cell with a minimum rated capacity of 625 m3/d and approximately 21,875 m2 surface area. To provide coarse bubble diffused aeration for the two aerated cells, the WWTP is provided with one duty and two standby blowers. The lagoon treatment facility also receives septage and sewage from some private systems, such as campgrounds. An aerial view of the treatment plant can be seen in Figure 2-5.



Figure 2-5: Tobermory WWTP Aerial View

2.6.4 Wastewater Generation And Quality Data

The Tobermory Sewage Treatment Facility Annual Performance Report for the operational period of 2020 was reviewed. The Annual Report summarizes effluent water quality, analytical test results, maintenance operations, and relevant activities of the WWTP.

According to the 2020 Tobermory Sewage Treatment Facility Annual Report, the WWTP operated at 31% of its rated ADF capacity of 625 m3/day.

3 GROWTH AND SERVICING PROJECTIONS

In preparation for anticipated future population growth in Tobermory, this study considered several growth scenarios to allow the Municipality to phase water and wastewater servicing improvements over the 25-year study horizon. The following growth scenarios have been developed for this Master Plan Update Study:

1. Existing Conditions – considers existing servicing
2. Near-Term Growth – considers development anticipated in the next 5-years
3. Mid-Term Growth – considers development anticipated in the next 6- to 10-years
4. Long-Term Growth – considers development anticipated in the next 11- to 20-years
5. Future Long-Term Growth – considers development anticipated in the next 21 - to 25-years

The Official Plan for the Tobermory and Lion's Head Urban Areas, and the Hamlet of Ferndale (2016) estimates that as of 2010, the population of Northern Bruce Peninsula was 3744, with an estimate that 50% of that population resided in Tobermory and Lion's Head. As of 2021, it is estimated that the population of Northern Bruce's Peninsula is 4,600 people (By-Law Growth Management, Amendment to the County of Bruce, 2022), while the population of Lion's Head is approximately 624 people (Census Profile, 2021 Census of Population, Lion's Head, Ontario, 2021). Based on the assumption that half of the total population of the Northern Bruce Peninsula (2,300 people) resides in either Tobermory or Lion's Head, it is estimated that Tobermory has a current population of approximately 1,676 people. Assuming an average family size of 2.4 persons/family and 2 persons/household per the 2021 census for Northern Bruce Peninsula 2.2 persons/unit was selected for the analysis.

Expected growth in the near-term (5-years), mid-term (10-years), long-term (20-years), and future long-term (25 years) is summarized in Table 3-1. This growth was calculated using growth values for Northern Bruce Peninsula, as listed in the By-Law Growth Management Amendment to the County of Bruce Official Plan, and taking the ratio of the population of Tobermory compared to the total population of Northern Bruce Peninsula.

Table 3-1: Population Growth

TIME	NORTHERN BRUCE PENINSULA POPULATION	TOBERMORY GROWTH	TOBERMORY ESTIMATED POPULATION
Existing	4,600	0	1,676
Near-Term (5-Years)	5,000	288	1,964
Mid-Term (10-Years)	5,300	504	2,180
Long-Term (20-Years)	5,900	936	2,612
Future Long-Term (25-Years)	6,100	1,080	2,756

Employment growth in Northern Bruce Peninsula is summarized in Table 3-2, as found in the By-Law Growth Management Amendment to the County of Bruce Official Plan.

Table 3-2: Employment Growth

TIME	NORTHERN BRUCE PENINSULA EMPLOYMENT
Existing	1,570
Near-Term (5-Years)	1,690
Mid-Term (10-Years)	1,780
Long-Term (20-Years)	1,980
Future Long-Term (25-Years)	2,040

Given the expected increase in population and the trend toward single family homes, the area required for that growth can be calculated. The resulting areas are summarized in Table 3-3, assuming an average family size of 2.4 persons/family and 2 persons/household per the 2021 census for Northern Bruce Peninsula 2.2 persons/unit was selected for the analysis and a minimum lot area of 3000 m2 for Residential Zone 1.

Table 3-3: Required Area for New Growth

	POPULATION INCREASE	INCREASE IN RESIDENCES	REQUIRED AREA (HA)
Near-term	288	131	39.3
Mid-term	504	229	68.7
Long-term	936	425	127.6
Future Long-Term	1,080	491	147.3

Within Tobermory, approximately 30.9 ha of land is classified as Planned Development, which is insufficient to house even the near-term growth option of 39.3 ha. However, with the addition of the approximately 202.4 ha of Vacant Residential Land available,

there is sufficient area for the future long-term growth scenario of 147.3 ha. See Figure 3-1 for details.

Its to be noted that population projection estimates are based on data collected from the 2021 Census during the COVID-19 pandemic. Impacts due to changes in migration patterns since the COVID-19 pandemic is unique compared to current trends in migration, however the population estimates and assumptions that are included in the By-Law Growth Management Amendment to the County of Bruce Official Plan provide a conservative estimate suitable for the study.

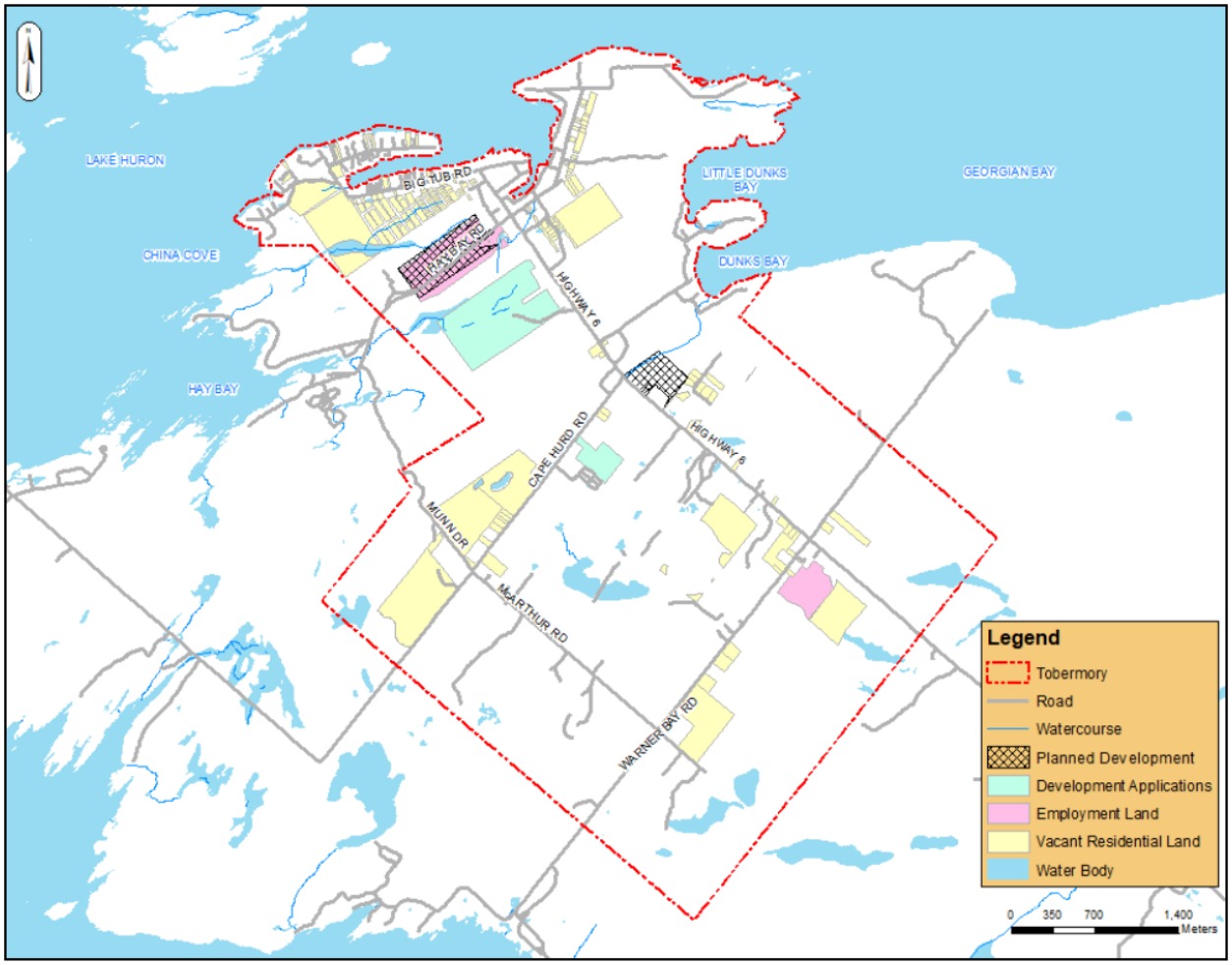


Figure 3-1: Potential New Growth in Tobermory

3.1 Growth Scenarios

In preparation for anticipated future population growth in Tobermory, this study considers several growth scenarios to allow the Municipality to phase water and

wastewater servicing improvements over the 25-Year study horizon. The following growth scenarios have been developed for this Master Plan Study:

1. Do Nothing – maintain existing level of service
2. Expand water servicing to downtown core and Community Center
3. Expand water servicing to municipally owned buildings
4. Expand water and wastewater servicing to new development
5. Expand water and wastewater servicing to existing residents

3.2 Water: Level of Service Criteria

The establishment of Level of Service (LOS) requirements for the water systems is used to evaluate any servicing gaps in existing systems and is used to set the design basis for future proposed systems. The intent of the Level of Service criteria is to address the problem/opportunity statement to develop infrastructure to 2046 and beyond. A summary of the design criteria used for the study is included in **Appendix A**.

3.2.1 Water Treatment

Water treatment plants provide treated water to their respective distribution systems from untreated sources (lakes, wells, streams, etc.) through a variety of treatment processes. Water treatment facilities must be designed in accordance with the Procedure for Disinfection of Drinking Water in Ontario (Ontario, 2006). Drinking water treatment systems that obtain water from a surface water or groundwater under direct influence (GUDI) well must achieve an overall performance supply which provides a minimum level of treatment consisting of chemically assisted filtration and disinfection or other treatment capable of producing water of equal or better quality. This aims to provide as a minimum a 2-log (99%) removal or inactivation of Cryptosporidium oocysts, 3-log (99.9%) removal or inactivation of Giardia cysts, and 4-log (99.99%) removal or inactivation of viruses prior to the water being delivered to the first customer. At a minimum, 0.5-log removal or inactivation of Giardia cysts, and 2-log removal or inactivation of viruses must be provided through disinfection, while the remaining removal may be achieved through filtration or other equivalent treatment processes.

The MECP Design Guidelines for Drinking-Water Systems (MECP, 2008) indicates that plant capacity should be greater or equal to the maximum day demand (MDD) with an allowance for water need for plant use. Additionally, water treatment plants should be designed for a minimum of 10 years (25 years preferred). Accordingly, the MECP Design Guidelines (MECP, 2008) criterion was adopted as the Level of Service (LOS) required for this study. The LOS refers to an acceptable servicing requirement to satisfy

design criteria selected for the study or as prescribed by the MECP which account for acceptable servicing risk and meet industry standards.

3.2.2 Water Storage

The function of water storage in a drinking water system is to provide continuity of supply, maintain system pressure, and meet critical water demands during fire flow and emergency conditions. The MECP Design Guidelines for Drinking-Water Systems (MECP, 2008) outlines the requirements of the required storage. The formula for calculating the required treated water storage in the distribution system is as follows:

Total Treated Water Storage Requirements = A + B + C

Where:

A = Fire Storage

B = Equalization Storage (25% of Maximum Day Demand)

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

Fire storage is the product of the maximum fire flow required in the system and the corresponding fire duration as described herein. When the system can supply more than just the maximum day demand (but less than the peak demand), the fire storage requirements can be determined using the following formula:

$$A = (Peak\ Demand - Pumping\ Station\ Standby\ Capacity) \times Fire\ Duration$$

Where: Peak demand is the greater of the peak hour demand and the maximum day plus fire demand

Floating storage should be designed such that the elevation of the equalization volume (B) is able to maintain a minimum pressure of 275 kPa (40 psi) in the system under peak hour flow conditions. The fire (A) and emergency (C) volumes should be at elevations that sustain 275 kPa (40 psi) during peak hour demand conditions, and 140 kPa (20 psi) under the maximum day plus fire flow condition (MECP, 2008).

The MECP Design Guidelines (MECP, 2008) formula is recommended for the Tobermory area LOS with the fire flows and duration indicated herein. According to the calculations, shown in **Appendix B** the existing system does not have sufficient fire flow capacity and consequently will not have sufficient capacity to provide servicing for any of the growth scenarios under fire flow conditions. The required existing water storage can be seen in Table 3-4.

Table 3-4: Existing Water Storage Summary

SCENARIO	FIRE STORAGE (M^3)	EQUALIZATION (M^3)	EMERGENCY (M^3)	REQUIRED STORAGE (M^3)
Existing	1,485	29	378	1,892

3.2.3 Distribution

Distribution systems convey treated water from the treatment plants and booster stations to the location of the water demand. Watermains are to be sized to carry the greater of the maximum day plus fire flow or peak hour demand. The selected residential water consumption rate is 425 L/cap/day, which is within the accepted MECP range of 240-450 L/cap/day, and tailored towards new growth. The peaking factors for max day and peak hour are based on the MECP Design Guidelines for Waterworks (MECP, 2008) and is summarized in Table 3-5.

Table 3-5: Peaking Factors

Population (Persons)	Maximum Day Factor	Peak Hour Factor
500 – 1,000	2.75	4.13
1,001 – 2,000	2.50	3.75
2,001 – 3,000	2.25	3.38
3,001 – 10,000	2.00	3.00

The applicable design pressures as outlined in the MECP Design Guidelines for Waterworks (MECP, 2008) is presented in Table 3-6 and recommended for use in the development and evaluation of alternative solutions.

Table 3-6: Design Pressures

	PRESSURE (KPA)	PRESSURE (PSI)
Maximum during Average Day	620	90
Minimum during Peak Hour	345	50
Minimum during Max Day + Fire Flow	140	30

Tobermory's current water servicing requirements, based on the existing equivalent population of 95 persons are summarized in Table 3-7.

Table 3-7: Existing Water Servicing Requirements

SCENARIO	EQUIVALENT POPULATION	MDD (M^3/DAY)	PEAK HOUR DEMAND (M^3/DAY)	MDD + FIRE FLOW (M^3/DAY)
Existing	95	117	176	1,601

3.3 Wastewater: Level Of Service Criteria

The level of service provided by the proposed wastewater infrastructure should be evaluated for both dry and wet weather events. There are two considerations when assigning the overall level of service; the hydraulic condition occurring in the infrastructure and the scenario during which this hydraulic condition occurs. Due to varying flow characteristics and event probabilities, the wastewater system components are measured against different benchmarks.

3.3.1 Gravity Sewers

Sanitary sewer systems should be designed with the objective of conveying all the flows to be treated at the sewage treatment plant. Overflows within the sanitary sewer systems should be designed for emergency and unavoidable conditions only (MECP, 2008). The MECP also recommends that gravity sewers be designed to less than 100% full under normal conditions. During large rain events, trunk sewers may become surcharged. Allowing these sewers to surcharge provides storage capacity, thereby reducing by-pass volume. However, this increase in the elevation of the hydraulic grade line in the sewer may have adverse effects depending on site-specific factors. The increase in the elevation of the hydraulic grade line is a result of capacity limitations resulting in bottlenecks and backup of the system. The two (2) primary considerations are the amount of surcharging (elevation of hydraulic grade line) and the elevation of hydraulic grade line relative to adjacent finished ground. The identified level of service below is based on satisfying the MECP Design Guidelines (MECP, 2008) for gravity sewers and maximizing storage capacity while minimizing the risk of basement flooding. Table 3-8 presents the hydraulic condition criteria for gravity sewers and Table 3-9 presents the level of service for gravity sewers used in this study.

Table 3-8: Gravity Sewers Hydraulic Condition

Flow Condition	Hydraulic Condition of Sewers		
	Fair	Moderate	Severe
Dry Weather	Flow < 85% of pipe capacity	Flow > 85% of pipe capacity	Flow > 100% of pipe capacity
Wet Weather (up to and including 100yr return event)	HGL < 0.3m above pipe obvert and > 2 m below finished ground	HGL > 0.3 m above pipe obvert and > 2 m below finished ground	HGL within 2 m of finished ground

Table 3-9: Gravity Sewers Level of Service

Parameter	Level of Service of Sewers		
	GOOD	REVIEW	GAP
Facility Level of Service	Hydraulic grade line (HGL) from the 100yr storm is more than 2 m below the finished ground Dry weather flow is less than the sewer capacity	Hydraulic grade line (HGL) from the 25yr storm flows and larger, is within 2 m of the finished ground HGL from the 10yr storm flows and larger, is between 0.3m of the obvert of the pipe and 2m of the finished ground Dry weather flows > 85% of the sewer capacity but < 99% of the sewer capacity	HGL from the 10yrs storm flows and smaller, is within 2 m of the finished ground Cannot convey the dry weather flows without surcharging.

3.3.2 Pumping Stations and Forcemains

The MECP requires that sanitary sewer systems be able to pump the design peak instantaneous flow. Sewage pumping stations should be designed so that they can be upgraded to handle future peak flows from the ultimate tributary area with minor challenges (MECP, 2008). A design storm of 1:10-year was used.

The recommended sanitary pump station level of service is outlined in Table 3-10 and Table 3-11.

Table 3-10: Sanitary Pump Station Hydraulic Condition

Weather Scenario	Hydraulic Condition of Pump Station		
	Fair	Moderate	Severe
Dry Weather and Wet Weather (up to and including 10yr return event)	Measured flow < 85% of firm capacity	Measured flow > 85% of firm capacity and < 100% of firm capacity	Measured flow > 100% of firm capacity
Wet Weather (above 10yr up to 100yr return event)	Measured flow < peak capacity and no bypass at the station	Measured flow > peak capacity and bypass at the station	Measured flow > peak capacity and local flooding

Table 3-11: Sanitary Pump Station Recommended Level of Service

Parameter	Pump Station Level of Service		
	Good	Review	Gap
Facility Level of Service	Dry weather flows and 10yr storm flows are less than the pumping stations firm capacity	10yr storm flows are greater than the firm but less than the peak capacity	10yr storm flows are greater than the pumping station peak capacity

In addition to the pumping requirements, the MECP also provides design standards for forcemains. At design pumping rates, a cleansing velocity of at least 0.6 m/s should be maintained. At peak flow, the maximum velocity should be limited to 3 m/s. Consideration also needs to be made for air/vacuum relief valves as well as the operating pressure in the forcemain.

3.3.3 Wastewater Treatment

The MECP requires that treatment process units at wastewater treatment plants be sized based on various design parameters. Table 3-12 details the design basis for the process required by the MECP.

Table 3-12: WWTP Design Basis Requirements (MECP Design Guidelines for Sewage Works, 2008)

Treatment Unit	Design Basis
Sewage Pumping Stations	Design Peak Instantaneous Flow
Screening	Design Peak Instantaneous Flow
Grit Removal	Design Peak Hourly Flow, Peak Hourly Grit Loading
Primary Sedimentation	Design Peak Daily Flow
Aeration (without nitrification)	Average Daily BOD_5 Loading (based on Design Average Daily Flow)
Aeration (with nitrification)	Average Daily BOD_5 loading (based on Design Average Daily Flow), Peak Daily TKN Loading (based on Design Peak Daily Flow)
Secondary Sedimentation	Design Peak Hourly Flow, Peak Daily Solids Loading
Sludge Return for Activated Sludge	50% to 200 % of Design Average Daily Flow
Disinfection	Design Peak Hourly Flow
Effluent Filtration	Design Peak Hourly Flow
Outfall Sewer	Design Peak Instantaneous Flow
Sludge Treatment (digestion and dewatering)	Maximum Monthly Mass Loading and Flow Rates

The MECP indicates a wastewater treatment plant should be able to treat the flows of sewage generated within buildings serviced by the sewer system exclusive of any extraneous flows (i.e., the average daily flow). The MECP Design Guidelines (MECP, 2008) also indicates that “during wet weather, the minimum level of treatment required for flows above the dry weather flows from combined sewer system is primary treatment.” Therefore, based on the above MECP criteria, the recommended level of service for wastewater treatment plants is to provide full treatment to all average daily flow.

4 GAP ANALYSIS

4.1 Gap Analysis

For the assessment of the existing and proposed water and wastewater system the evaluation of infrastructure servicing gaps is based on the LOS review of systems using hydraulic models for the distribution networks and potential wastewater collection systems. Treatment facility capacity assessments are based on the MECP design guidelines set out in the Design Criteria.

4.2 Modelling Methodology

Figure 4-1 provides a summary of the modelling methodology applied to assess potential future Tobermory distribution and collection systems. The approach has been tailored in the review for each system to identify gaps in servicing using a combination of traditional spreadsheet hydraulic models and established steady-state hydraulic water models.

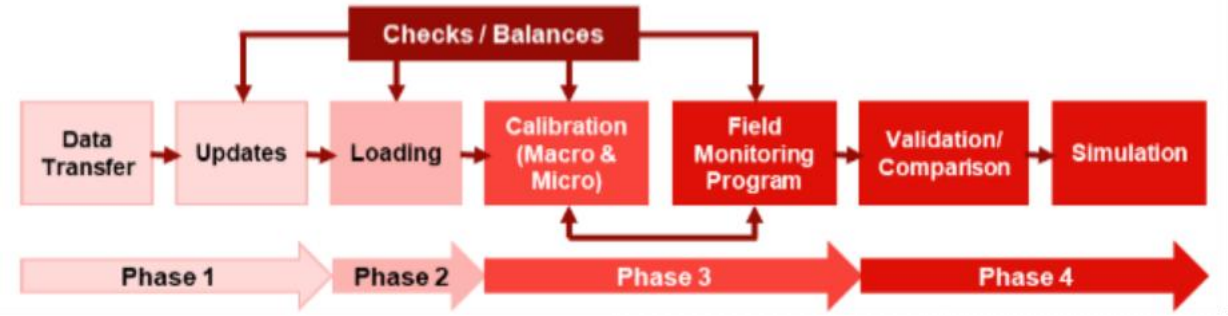


Figure 4-1: Combined Modelling Approach

- Phase 1: Review data sources such as GIS and field data and the specific processes used to transfer information into the models. Using maps and tables, identify new information and update/re-build the model to represent actual infrastructure in the ground (i.e. pipe sizes and materials, elevations, geocoded locations, pump curves and boundary conditions
- Phase 2: Load models with water demand and/or converted water demand for wastewater generation consisting of residential and non-residential loads.
- Phase 3: Existing field monitoring data and/or SCADA records is compared to initial model simulation and key model parameters are adjusted until simulated values match the records. WSP tailored the degree and effort of calibration based on available data provided for the study.

— Phase 4: Without changing any parameters, the calibrated models are used to predict conditions at specific locations the validation data set. If these predictions are within acceptable range, the models are deemed “validated” and ready for use as a decision-support tool of the Master Plan. The alternatives and future conditions are simulated using the calibrated parameters and growth projection scenarios.

This methodology has been tailored to ensure accuracy of the model development to current industry standards and master plan deliverable objectives as follows:

— Development of the water model includes importing in-service components of the distribution system for existing conditions. This included a review of basic data for pumps, valves, and pipes with a view to improving the 24/7 simulation of the water system.
— Review of existing operation controls (in discussion with operators) and key SCADA histories going back at least one year to develop statistics and check true average / maximum / peak times.
— Translation / conversion of all existing water data to develop a tailored calibration program with suitable calibration targets around the use of available flow monitoring and water meter consumption data. An all-pipe model loaded at every node is the basis for a sound hydraulic calibration, without which it is not meaningful to perform pump optimisation and water quality and transient analyses.
— Gaps in data were identified as part of the calibration program.
— Analysis included steady-state and fire flow. Proposed scenarios included Average Day, Maximum Day, Peak Hour, and Maximum Day + Fire Flow.
— Develop results from modeling that include guidelines for each system including zone servicing elevations, reaffirming land usage demands for residential, commercial, industrial, and institutional classification
— Develop a list of all short and long-range construction projects and improvements for the existing and proposed systems required in the future.
— Document and report all assumptions, methodologies, and quality assurance and control tools used.
— Recommend locations for the future installation of permanent flow monitoring facilities at pumping stations and/or in key collection / distribution system locations for the following master plan update.

Water System

Based on the identified water system design criteria, the following critical gaps in level of service are noted and were used to review alternative solutions:

— The majority of residents in Tobermory are on private wells and there is no centralized treatment of potable water.
— The existing Little Tub Water Treatment Plant has sufficient capacity to maintain service of the MDD and the peak hour demand for the same area for both quantity and quality requirements, however it does not have the capacity to handle the MDD plus fire flow. Therefore, there is a gap in the service.

Waste Water System

The existing wastewater system does not have a gap in current service for both quantity and quality requirements. Based on capacity, it is able to maintain service of the same area. However, the remainder of the population is on private septic tanks, and the current system does not allow for growth. The lack of an existing wastewater municipal collection system is not considered a gap in the level of service but will limit future growth in the area.

5 ALTERNATIVE SOLUTIONS

5.1 Proposed Servicing Alternatives

Three water servicing alternatives have been considered for the servicing of Tobermory per consultations with OCWA and the Municipality of Northern Bruce Peninsula.

1. Maintain existing level of service
2. Expand water servicing to downtown core and community area
3. Expand water servicing to existing residential, municipal, and commercial properties and new developments (Including expanding water to downtown core and community area)

The following sections describe the considered alternatives which are evaluated to address problem/opportunity statement. Calculations completed to determine the average day and max day demand including the incremental increases in population is included in **Appendix B**.

5.1.1 Alternative DWS1 – Maintain Existing Level of Service

The Maintain Existing Level of Service alternative serves as a baseline for the other alternatives. In this alternative, the existing water distribution systems, from both the WTP and the GUDI wells, would remain unchanged. There are four existing connections on the WTP system, totalling 43 Equivalent Residence Units (ERU) and approximately 95 people, as calculated in the Tobermory Water & Wastewater Feasibility Study (2012). The existing flows are summarized in Table 3-7.

Little Tub Water Treatment Plant has a capacity of 187 m3/day. Historical flows are within this limit, however, there is minimal capacity for growth and no capacity for fire flow.

Lots with existing private well systems will continue to be supplied by these systems, as will any new developments.

5.1.2 Alternative DWS2 – Expand Water Servicing to Downtown Core and Community Area

Expanding water servicing to the downtown core and community area (Figure 5-1) would involve servicing the lots bound between the intersection of Big Tub Road & Hwy 6, Hay Bay Road & Legion St, Hwy 6 & Chi sin tib dek Rd, and Elgin St & Harpur Dr. In addition to the existing 4 connections, this alternative proposes another 224 existing developed lot connections. This alternative would involve additionally servicing

approximately 164 residential properties, 53 commercial units and 7 municipal buildings. The resulting flows are summarized in Table 5-1. Calculations are located in **Appendix B.**

Equivalent population was calculated based on the estimated number of equivalent residential units (ERU) within the Alternative DWS2 boundary (586). Firstly, the Bruce County Map GIS was used to find an estimated parcel area of existing commercial and institutional properties. The total area (14.1 Ha) was used to calculate a total daily flow using 28m3/ha/day for commercial and institutional properties per the recommended Design Criteria summarized in **Appendix A**. Total flow was then divided by average flow per residential user, similarly, calculated in the Tobermory Water & Wastewater Feasibility Study (2012), resulting in an ERU of 422. This was added with the estimated number of residential units within this boundary (164) to find the total ERU of 586. To find the equivalent population, this number was then multiplied by the estimated residential density (2.2 persons/unit), resulting in an estimated total equivalent population of 1,289 persons.

Table 5-1: Alternative DWS2 Water Servicing

SCENARIO	EQUIVALENT POPULATION	ADD (M^3/DAY)	MDD (M^3/DAY)	PEAK HOUR DEMAND (M^3/DAY)	MDD + FIRE FLOW (M^3/DAY)	STORAGE (M^3)
DWS2	1,289	531	1,328	1,992	2,813	2,271

The Tobermory Community Centre Drinking Water System provides water to the Community Centre, as well as the Tobermory Fire Hall and Bruce County Ambulance Station. By adding the downtown core and community area to the water servicing from Little Tub WTP, there would be fewer operational concerns and costs associated with operating and maintaining two separate drinking water treatment systems. However, an expansion to the system would require an increase in overall water operations and distribution. A new centralized location for water treatment plant may be considered for this alternative. Additionally, multiple GUDI well locations would have to be taken offline.

In order to install watermain on Highway 6, the Ministry of Transportation (MTO) would need to be involved which may impact scheduling for work and higher costs for installation, however there may be opportunities for cost sharing for roadway reinstatement if tied to existing projects being planned for the roadway. As well, past feasibility studies have indicated there is rock in the area, which would result in extra costs for the watermain installation due to insulation or providing the minimum cover.

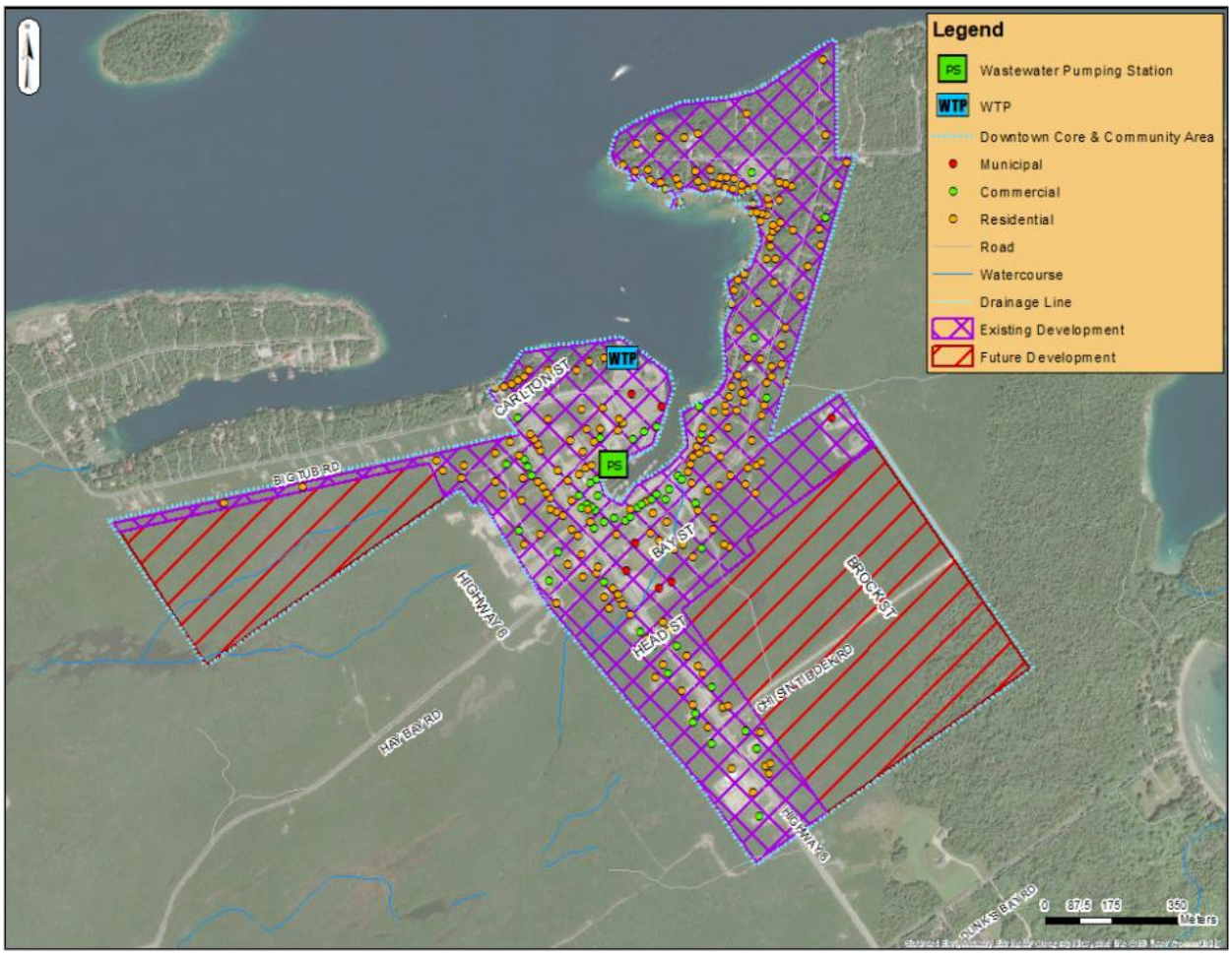


Figure 5-1: Alternative DWS2 - Expand Water Servicing to Downtown Core and Community Area

New growth in Tobermory is expected to occur within the defined Downtown Core and Community Area. Based on the initial population estimate of 1,676 and the growth projections provided by the By-Law Growth Management Amendment to the County of Bruce Official Plan, the population in Tobermory over the near-term, mid-term, long-term and future long-term, is expected to increase by approximately 288, 504, 936 and 1,080 persons, respectively. This additional population, beyond the 1,289 persons outlined in Table 5-1, would increase the MDD by 306 m3/day, 536 m3/day, 895 m3/day, and 1,033 m3/day respectively. This was calculated using a flow of 425 L/cap/day. The Existing, Near-Term, and Mid-Term growth scenarios were calculated using a maximum day factor of 2.50 and a peak rate factor of 3.75. The Long-Term, and Future Long-Term growth scenarios were calculated using a maximum day factor of 2.25 and a peak rate factor of 3.38. Peaking factors are based on the total population serviced and are summarized in Table 3-5.

Required fire flow for the existing population is 183 L/s for 2.25 hours, calculated using FUS, equating to a required fire storage of 1,485 m3. This will not change with development unless a building that requires more fire flow than Grandview Hotel according to FUS standards is constructed. Table 5-2 shows the breakdown into water servicing growth requirements with the incremental increase in equivalent population for near, mid, long and future long-term growth. Calculations are found in **Appendix B** for reference.

Table 5-2: Alternative DWS2 Water Servicing Growth

SCENARIO	EQUIVALENT POPULATION[1]	ADD (M^3/DAY)	MDD (M^3/DAY)	PEAK HOUR DEMAND (M^3/DAY)	MDD + FIRE FLOW (M^3/DAY)	STORAGE (M^3)
Near-Term (5-Years)	1,577	654	1,634	2,451	3,119	2,367
Mid-Term (10-Years)	1,793	746	1,864	2,795	3,348	2,438
Long-Term (20-Years)	2,225	929	2,090	3,140	3,575	2,509
Future Long-Term (25-Years)	2,369	991	2,228	3,347	3,737	2,552

1 – The equivalent population was calculated by adding the estimated equivalent population within Alternative DWS2 of 1,289 persons (Table 5-1) with the incremental growth based on the growth projection summarized in Table 3-1.

It is to be noted that within the boundary of the downtown core and community area for Alternative DWS2, there are 620 available residential lots (including existing undeveloped lots & proposed lots in development). As summarized in Table 3-3, an increase of 131 residences in the near-term, 229 residences in the mid-term, 425 residences in the long-term, and 491 residences in the future long-term is required to meet the expected population growth of Tobermory. Because there are more available lots (620), than the required increase in units in the future long-term (491), there is sufficient land supply to accommodate the expected growth scenario for the next 25 years within the expanded future servicing boundary.

5.1.3 Alternative DWS3 – Expand Water Servicing to Existing Residential, Municipal, And Commercial Properties and New Developments (Including Expanding Water to Downtown Core and Community Area)

Expanding water servicing to existing residents would involve servicing most of Tobermory, with a particularly high density at the northern end, as shown in Figure 5-2 . Due to the expanse of this alternative, it would be possible to also service the municipal buildings not within the community area and downtown core as part of this alternative. This alternative would involve additionally servicing 566 residential properties, 84 commercial and 15 municipal buildings, for a total of 665 existing developed lots. The resulting flows are summarized in Table 5-3 . Calculations are in **Appendix B**.

In order to install watermain on Highway 6, the Ministry of Transportation (MTO) would need to be involved which may impact scheduling for work and higher costs for installation, however there may be opportunities for cost sharing for roadway reinstatement if tied to existing projects being planned for the roadway. As well, past feasibility studies have indicated there is rock in the area, which would result in extra costs for the watermain installation due to insulation or providing the minimum cover.

Equivalent population was calculated based on the estimated number of equivalent residential units (ERU) within the Alternative DWS3 boundary (1,987). Firstly, the Bruce County Map GIS was used to find an estimated parcel area of existing commercial and institutional properties. The total area (47.5 Ha) was used to calculate a total daily flow using 28m3/ha/day for commercial and institutional properties per the recommended Design Criteria summarized in **Appendix A**. Total flow was then divided by average flow per residential user, similarly calculated in the Tobermory Water & Wastewater Feasibility Study (2012), resulting in an ERU of 1,421. This was added with the estimated number of residential units within this boundary (566) to find the total ERU of 1,987. To find the equivalent population, this number was then multiplied by the estimated residential density (2.2 persons/unit), resulting in an estimated total equivalent population of 4,372 persons. Population and flow data can be found in Table 5-3.

Table 5-3: Alternative DWS3 Water Servicing

SCENARIO	EQUIVALENT POPULATION	ADD (M^3/DAY)	MDD (M^3/DAY)	PEAK HOUR DEMAND (M^3/DAY)	MDD + FIRE FLOW (M^3/DAY)	STORAGE (M^3)
DWS3	4,372	1,842	3,683	5,525	5,168	3,007

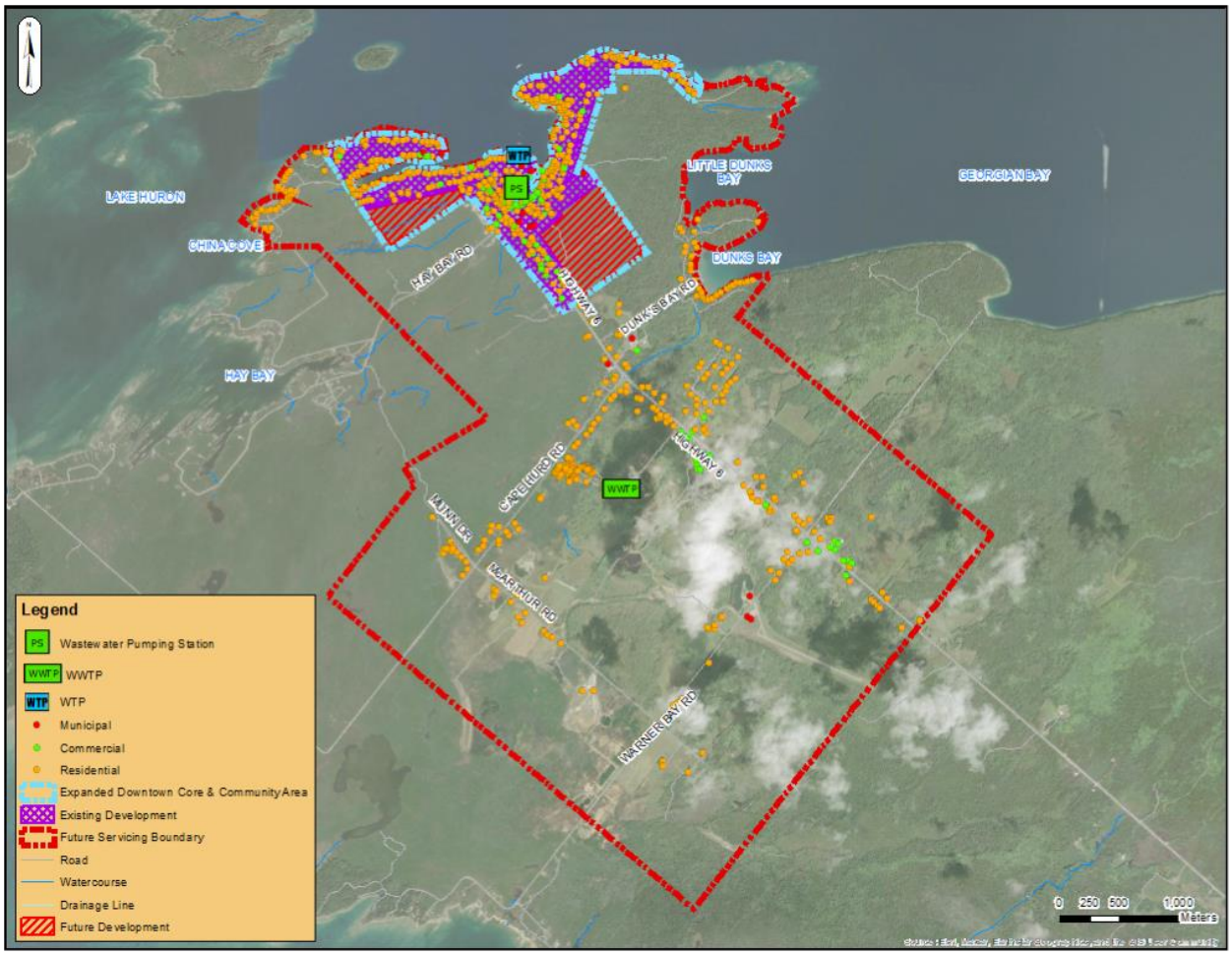


Figure 5-2: Alternative DWS3 – Expand Water Servicing to Existing Residential, Municipal, and Commercial Properties

New growth in Tobermory is expected to occur along Hay Bay Road and Highway 6, east of Cape Hurd Road. Based on the initial population estimate of 1,676 and the growth projections provided by the By-Law Growth Management Amendment to the County of Bruce Official Plan, the population in Tobermory over the near-term, mid-term, long-term, and future long-term is expected to increase by approximately 288, 504, 936, and 1,080 people, respectively. This additional population, beyond the 4,372 persons outlined in Table 5-3, would increase the MDD by 245 m3/day, 428 m3/day, 796 m3/day, and 918 m3/day respectively. This was calculated using a flow of 425 L/cap/day. All growth scenarios were calculated using a maximum day factor of 2.00 and a peak rate factor of 3.00. Peaking factors are based on the total population serviced and are summarized in Table 3-5.

Required fire flow for the existing population is 183 L/s for 2.25 hours, calculated using FUS, equating to a required fire storage of 1,485 m3. This will not change with

development unless a building that requires more fire flow than Grandview Hotel according to FUS standards is constructed. Population and flow data can be found summarized in Table 5-4. Calculations are in **Appendix B**.

Table 5-4: Alternative DWS3 Water Servicing Growth

SCENARIO	EQUIVALENT POPULATION[1]	ADD (M^3/DAY)	MDD (M^3/DAY)	PEAK HOUR DEMAND (M^3/DAY)	MDD + FIRE FLOW (M^3/DAY)	STORAGE (M^3)
Near-Term (5-Years)	4,660	1,964	3,928	5,892	5,413	3,083
Mid-Term (10-Years)	4,876	2,056	4,111	6,167	5,596	3,140
Long-Term (20-Years)	5,308	2,240	4,479	6,718	5,963	3,256
Future Long-Term (25 Years)	5,452	2,301	4,601	6,902	6,068	3,294

1 – The equivalent population was calculated by adding the estimated equivalent population within Alternative DWS3 of 4,372 persons (Table 5-3) with the incremental growth based on the growth projection summarized in Table 3-1.

It is to be noted that within the boundary of the expanded downtown core and community area for Alternative DWS3, there are 659 available residential lots identified (including existing undeveloped lots & proposed lots in development). Its to be noted that this is an increase from Alternative DWS2, due to the expanded downtown core and community area under this alternative. As summarized in Table 3-3, an increase of 131 residences in the near-term, 229 residences in the mid-term, 425 residences in the long-term, and 491 residences in the future long-term is required to meet the expected population growth of Tobermory. Because there are more available lots (659), than the required increase in units in the long-term (491), there is sufficient land supply to accommodate the expected growth scenario for the next 25 years within the expanded future servicing boundary.

5.2 Proposed Wastewater Collection Alternatives

Three wastewater servicing alternatives have been considered for the servicing of Tobermory per consultations with OCWA and the Northern Bruce Peninsula.

1 Maintain existing level of service
2 Expand wastewater servicing within downtown core and community area

3 Expand wastewater servicing to existing residential, municipal, and commercial properties and new developments (including expanding water to unserviced downtown core and community area)

The following sections describe the considered alternatives. Calculations can be found in **Appendix B**.

5.2.1 Alternative WWS1 – Maintain Existing Level of Service

The Maintain Existing Level of Service alternative serves as a baseline for the other alternatives. In this alternative, the existing wastewater collection system will continue to service the future growth for the community of Tobermory. The current CofA does not approve flows in excess of the average daily flow of 625 m3/day for any greater period than one year. This will restrain future growth in the area. The current system has 78 connections and record Average Daily Flow (ADF) of 359 m3/day and Maximum Daily Flow (MDF) of 2,641 m3/day for 2019 as recorded in the WISKI data from OCWA. The 2019 data was chosen as it was the worst-case scenario in recorded data from 2015-2022, with the highest ADF & MDF.

The Tobermory Sewage Lagoon is designed to treat an average summer day flow of 625 m3/day. This is sufficient to treat recent flows, however, according to historical WISKI data from OCWA, the MDF has been regularly greater than this value. Therefore, all servicing alternatives risk exceeding the capacity of the existing WWTP.

5.2.2 Alternative WWS2 – Expand Wastewater Servicing Within Downtown Core and Community Area

Currently, there are 78 existing sewer connections in Tobermory. 150 new connections may be allowed to fully service all lots within the expanded downtown core and community area (228 total existing developed lots). Assuming a wastewater production of 85% of the daily water consumption rate, the ADF for wastewater is 451 m3/day the MDF is 1,129 m3/day for an equivalent population of 1,289 people.

New growth in Tobermory is expected to occur within the defined Downtown Core and Community Area. Based on the initial population estimate of 1,676 and the growth projections provided by the By-Law Growth Management Amendment to the County of Bruce Official Plan, the population in Tobermory over the near-term, mid-term, long-term, and future long-term is expected to increase by approximately 288, 504, 936, and 1,080 persons, respectively. This additional population, beyond the 4,372 persons outlined in Table 5-3, would increase the MDD by 209 m3/day, 363 m3/day, 677 m3/day, and 780 m3/day respectively. This was calculated using a flow of 425 L/cap/day. The Existing, Near-Term, and Mid-Term growth scenarios were calculated

using a maximum day factor of 2.50 and a peak rate factor of 3.75. The Long-Term, and Future Long-Term growth scenarios were calculated using a maximum day factor of 2.25 and a peak rate factor of 3.38. Peaking factors are based on the total population serviced and are summarized in Table 3-5.

Equivalent population and maximum day flow has been calculated and is summarized in Table 5-5.

Table 5-5: Alternative WWS2 Wastewater Servicing Growth

SCENARIO	EQUIVALENT POPULATION[1]	ADF (M^3/DAY)	MDF (M^3/DAY)
WWS2	1,289	452	1,129
Near-Term (5-Years)	1,577	552	1,379
Mid-Term (10-Years)	1,793	625	1,562
Long-Term (20-Years)	2,225	856	1,926
Future Long-Term (25 Years)	2,369	974	2,191

1 – The equivalent population was calculated by adding the estimated equivalent population within Alternative DWS2 of 1,289 persons with the incremental growth based on the growth projection summarized in Table 3-1.

There is bedrock in the area, which would require rock removal for gravity sewers to be installed, otherwise sewage would need to be pumped to a new dedicated wastewater treatment facility or to the updated existing facility.

As indicated, there is sufficient land supply to accommodate the expected growth scenario for the next 25 years within the expanded future servicing boundary.

5.2.3 Alternative WWS3 – Expand Wastewater Servicing to Existing Residential, Municipal, And Commercial Properties and New Developments (Including Expanding Water to Downtown Core and Community Area)

Major sewer extensions would be required to fully service most of Tobermory. 591 new connections may be allowed to service all existing residential, municipal, and commercial lots, including the expanded downtown core and community area. Assuming a wastewater production rate of 85% of daily water consumption rate, the ADF for wastewater is 1,565 m3/day the MDF is 3,130 m3/day for an equivalent population of 4,372 people.

New growth in Tobermory is expected to occur within the defined Downtown Core and Community Area. Based on the initial population estimate of 1,676 and the growth projections provided by the By-Law Growth Management Amendment to the County of

Bruce Official Plan, the population in Tobermory over the near-term, mid-term, long-term, and future long-term is expected to increase by approximately 288, 504, 936, and 1,080 persons, respectively, as shown in Table 3-1. This additional population, beyond the 4,372 persons outlined in Table 5-3, would increase the MDD by 209 m3/day, 363 m3/day, 677 m3/day, and 780 m3/day respectively. This was calculated using a flow of 425 L/cap/day. All growth scenarios were calculated using a maximum day factor of 2.00 and a peak rate factor of 3.00. Peaking factors are based on the total population serviced and are summarized in Table 3-5.

Equivalent population and maximum day flow has been calculated and is summarized in Table 5-6.

Table 5-6: Alternative WWS3 Wastewater Servicing Growth

SCENARIO	EQUIVALENT POPULATION[1]	ADF (M^3/DAY)	MDF (M^3/DAY)
WWS3	4,372	1,865	3,739
Near-Term (5-Years)	4,660	1,870	3,982
Mid-Term (10-Years)	4,876	2,083	4,165
Long-Term (20-Years)	5,308	2,265	4,530
Future Long-Term (25 Years)	5,452	2,490	4,980

1 – The equivalent population was calculated by adding the estimated equivalent population within Alternative DWS2 of 4,372 persons with the incremental growth based on the growth projection summarized in Table 3-1.

There is bedrock in the area, which would require rock removal for gravity sewers to be installed, otherwise sewage would need to be pumped using multiple sewage pumping stations to a to a new dedicated wastewater treatment facility or to the updated existing facility.

As indicated, there is sufficient land supply to accommodate the expected growth scenario for the next 25 years within the expanded future servicing boundary.

6 EVALUATION OF ALTERNATIVE SOLUTIONS

6.1 Evaluation Approach and Criteria

6.1.1 Infrastructure Evaluation Approach

The approach used to determine the preferred alternatives for water and wastewater servicing in the Tobermory area is explained in this section. An evaluation matrix was created to document the advantages and disadvantages of each alternative, and to ultimately identify the preferred solutions.

- **Define Evaluation Criteria**– Criteria were defined for the evaluation of the alternatives. The evaluation criteria for this project included (1) natural environment, (2) social and economic environment, (3) technical suitability, (4) constructability, and (5) cost. The five (5) evaluation criteria were considered to have separate weighting of importance in this evaluation and subdivided into key indicators.
- **Document Advantages, Disadvantages and Potential Impacts** – The impacts associated with each alternative were determined and documented. These impacts were categorized under one (1) of the five (5) evaluation criteria and further subdivided under key indicators.
- **Compare Alternatives** – Each servicing alternative's performance with respect to the evaluation criteria was compared to that of the other alternatives. Scores were assigned to describe an alternative's relative performance on a specific criterion and then weighted to get the overall score.
- **Determine the Preferred Alternative** – The servicing alternative with the least overall impact is preferred and recommended for implementation.

6.1.2 Infrastructure Evaluation Criteria

As noted, prior, the evaluation methodology involves the assessment of the impacts associated with the water and wastewater servicing alternatives under five (5) evaluation criteria. A detailed breakdown of the impacts within the respective criteria and criteria weighting, is provided in Table 6-1.

Table 6-1: Evaluation Criteria Description

CRITERIA	INDICATOR	DESCRIPTION
Natural Environment (20% Criteria Weighting)	Surface and groundwater (30% Of Criteria)	Impacts to the environment from infrastructure development
	Natural heritage features/vegetation (30% Of Criteria)	Potential impacts due to construction on natural habitat and species at risk
	Climate change (40% Of Criteria)	Potential impacts to surrounding natural environment from climate change events
Social and Economic Environment (20% Criteria Weighting)	Existing infrastructure (private and municipal) (25% Of Criteria)	Potential impacts to private or municipal systems, such as roadways, buildings, watermains, wells, sewers, septic tanks, etc.
	Aesthetics (20% Of Criteria)	Potential impacts on the community from the presence of new infrastructure/open space usage
	Redundancy and security of supply (25% Of Criteria)	Ability of system to provide a consistent Level of Service
	Climate change (30% Of Criteria)	Impacts to public during climate change events to provide Level of Service
Technical Suitability (20% Criteria Weighting)	Existing capacity (25% Of Criteria)	Current/proposed infrastructure to service existing demand capacity
	Impacts on further expansion (25% Of Criteria)	Opportunity to service the greater community and ability to connect future areas under expansion
	Full build out (20% Of Criteria)	Opportunity to service full-build out of the community
	Climate Change (30% Of Criteria)	Impacts from climate change events which impact maintaining Level of Service
Constructability (20% Criteria Weighting)	Ease of construction and site access (20% Of Criteria)	When traditional construction approaches are applied, the impacts associated with installation
	Impact on operations during construction (25% Of Criteria)	Impacts associated with maintaining the current Level of Service
	Ease of integration with existing infrastructure (25% Of Criteria)	Impacts associated with tie-in to existing infrastructure or disconnection of old infrastructure
	Climate Change (30% Of Criteria)	Impacts from climate change events on the installation and timing of projects

Table 6 1: Evaluation Criteria Description - Continued

CRITERIA	INDICATOR	DESCRIPTION
Cost (20% Criteria Weighting)	Capital Costs (50% Of Criteria)	Cost to construct new infrastructure to establish the system
	Relative operation and maintenance costs (50% Of Criteria)	Cost to maintain yearly operations, including eq replacement

6.1.3 Evaluation Matrix

As per the evaluation matrix used to compare each alternative for water and wastewater, the indicators under each criterion, were given a number score from 1-5, depending on the alternatives overall impact. A zero (0) was given for no impact, a 1-2 for a minor impact, a 3-4 for a moderate impact and a 5 for a significant impact. The final score was then multiplied by the criteria weighting as summarized in Table 6-1. The evaluation matrix is provided in **Appendix C**. A summarized evaluation of water is provided in Table 6-2, and Table 6-3 for wastewater.

6.1.4 Water system Alternative Solutions Evaluation

Table 6-2: Comparative Evaluation of Water Servicing Alternatives

1. Maintain Existing Level of Service	2. Expand to Downtown Core and Community Area	3. Expand Drinking Water Servicing to Existing and New Developments
Natural Environment		
Surface and Groundwater		
No construction involved, therefore no impacts. **Score: 0**	Establishment of new surface water source/new wellheads and/or expansion of existing surface water source and treatment. **Score: 2**	Establishment of new surface water source /new wellheads and/or expansion of surface water source and treatment with higher capacity. **Score: 3**
Natural Heritage Features/Vegetation		
No construction involved, therefore no impacts. **Score: 0**	Impacts are generally limited to previously impacted lands; however, some impacts are due to new construction. **Score: 1**	Greater impacts to natural environment as new watermain construction increases, potential along more sensitive habitats to service new development. **Score: 3**

Table 6 2: Comparative Evaluation of Water Servicing Alternatives - Continued

1. Maintain Existing Level of Service	2. Expand to Downtown Core and Community Area	3. Expand Drinking Water Servicing to Existing and New Developments
Climate Change		
Does not mitigate climate change or provide resilient infrastructure. Service disruption may occur. **Score: 4**	New infrastructure designed with climate change resiliency to provide the required Level of Service during severe weather and power outages. **Score: 1**	New infrastructure designed with climate change resiliency to provide the required Level of Service during severe weather and power outages. **Score: 1**
Social and Economic Environment		
Existing Infrastructure (Private and Municipal)		
No construction is involved, therefore no impact. **Score: 0**	Conversion from private wells to public system and installation of new watermain in right-of-way. **Score: 2**	Conversion from private wells to public system and installation of new watermain in right-of-way over a larger area. **Score: 3**
Aesthetics		
No construction is involved, therefore no impact to the visual appearance of the community. **Score: 0**	Establishment of new water treatment, pumping and storage infrastructure within the community. **Score: 2**	Establishment of new water treatment, pumping and storage infrastructure within the community. **Score: 2**
Redundancy and Security of Supply		
Development would be limited by ability to establishment new surface water source/new wellheads and/or expansion of existing surface water source. **Score: 5**	Increased security of water supply from a maintained and regulated system. **Score: 2**	Increased security of water supply from a maintained and regulated system. There are more opportunities to provide redundancy in a looped network **Score: 1**
Climate Change		
Does not mitigate climate change or provide resilient infrastructure. Service disruption may occur. **Score: 5**	New infrastructure designed with climate change resiliency to provide the required Level of Service during severe weather and power outages. **Score: 1**	New infrastructure designed with climate change resiliency to provide the required Level of Service during severe weather and power outages. **Score: 1**

Table 6 2: Comparative Evaluation of Water Servicing Alternatives - Continued

1. Maintain Existing Level of Service	2. Expand to Downtown Core and Community Area	3. Expand Drinking Water Servicing to Existing and New Developments
Technical Suitability		
Existing Capacity		
Existing capacity is currently being met but is limited to a few serviced buildings only. **Score: 1**	New systems are designed to service existing and future capacity requirements; however, limited to the downtown core and community area. **Score: 0**	New systems are designed to service existing and future capacity requirements including phased development for connecting the greater community. **Score: 0**
Further Expansion		
Development would be limited due to lack of municipal water servicing. Does not address Class EA Problem Statement **Score: 5**	New systems are designed to service the existing and future capacity requirements; however, limited to the downtown core and community area. **Score: 3**	New systems are designed to service existing and future capacity requirements including phased development for connecting the greater community. **Score: 1**
Full Build Out		
Without municipal water servicing there will be difficulty with implementing a full build out. **Score: 5**	Meets the requirements to establish full-build out of the downtown core and community area; however, limited to expanding out to the surrounding community. **Score: 3**	Provides infrastructure to the largest service area; however, the rate of full expansion is limited by phased development of a larger distribution system. **Score: 2**
Climate Change		
Does not mitigate climate change or provide resilient infrastructure. Service disruption may occur. **Score: 5**	New infrastructure designed with climate change resiliency to provide the required Level of Service during severe weather and power outages. The smaller network of infrastructure is easier to maintain. **Score: 1**	New infrastructure designed with climate change resiliency to provide the required Level of Service during severe weather and power outages. The larger network of infrastructure requires more watermain to maintain. **Score: 2**
Constructability		
Ease of Construction and Site Access		
N/A **Score: 0**	Moderate impacts for construction access within downtown core; however, network of roads provide good access to install new watermain. **Score: 3**	Installation of new watermain over a larger area along defined roadways or newly established easements will result in longer phased construction. **Score: 5**

Table 6 2: Comparative Evaluation of Water Servicing Alternatives - Continued

1. Maintain Existing Level of Service	2. Expand to Downtown Core and Community Area	3. Expand Drinking Water Servicing to Existing and New Developments
Operations during construction		
N/A **Score: 0**	Minor impacts anticipated as private water systems may be maintained during construction. **Score: 1**	Minor impacts anticipated as private water systems may be maintained during construction. **Score: 1**
Ease of Integration with Existing Infrastructure		
N/A **Score: 0**	Minor impacts in the downtown core and community area since there is limited existing infrastructure within the ground. **Score: 1**	More moderate impacts anticipated for establishment of new infrastructure due to phasing of work and longer construction to connect services to properties located outside the downtown core and community area. **Score: 3**
Climate Change		
N/A **Score: 0**	Minor impacts due to climate change events when construction is carried out during warm-weather months. **Score: 2**	Minor impacts due to climate change events when construction is carried out during warm-weather months. **Score: 2**
Cost		
Capital Costs		
System is currently established. No construction involved; therefore, no impacts and no capital costs are anticipated. **Score: 0**	Moderate capital costs to install new water treatment, pumping and storage facilities, and distribution network. **Score: 3**	More significant capital costs to install new larger water treatment, pumping and storage facilities, and distribution network. **Score: 5**
Relative Operation and Maintenance Costs		
No additional operation and maintenance costs; however, current facilities are aging and not localized. Existing infrastructure will need replacement over time. **Score: 3**	Moderate costs for yearly operations of facilities and upkeep of distribution network. **Score: 3**	Greater costs for yearly operations of larger facilities and upkeep of distribution network. **Score: 4**
Overall Rank		
2	**1**	**3**

6.1.5 Wastewater System Alternative Solutions Evaluation

Table 6-3: Comparative Evaluation of Wastewater Servicing Alternatives

1. Maintain Existing Level of Service	2. Expand to Downtown Core and Community Area	3. Expand Drinking Water Servicing to Existing and New Developments
Natural Environment		
Surface and Groundwater		
No construction involved, therefore no impacts; however, degree of private septic bed impacts is unknown. **Score: 2**	Installation of new pumping and pipe infrastructure anticipated to reduce impacts by directing wastewater to municipal treatment. **Score: 1**	Installation of new pumping and pipe infrastructure anticipated to reduce impacts by directing wastewater to municipal treatment. **Score: 1**
Natural Heritage Features/Vegetation		
No construction involved, therefore no impacts. **Score: 0**	Impacts are limited to previously impacted lands; however, some impacts due to new construction. **Score: 1**	Greater impacts to natural environment as new sanitary construction increases, potential along more sensitive habitats to service new development. **Score: 3**
Climate Change		
Does not mitigate climate change or provide resilient infrastructure. Service disruption may occur. **Score: 4**	New infrastructure designed with climate change resiliency to provide the required Level of Service during severe weather and power outages. **Score: 1**	New infrastructure designed with climate change resiliency to provide the required Level of Service during severe weather and power outages. **Score: 1**
Social and Economic Environment		
Existing Infrastructure (Private and Municipal)		
No construction involved, therefore no impacts. **Score: 0**	Conversion from private septic to public system and installation of new sanitary main and potential forcemain in right-of-way. **Score: 2**	Conversion from private septic to public system and installation of new sanitary main and potential forcemain in right-of-way over a larger area. **Score: 3**
Aesthetics		
No construction involved, therefore no impact to the visual appearance of the community. **Score: 0**	Establishment of new wastewater treatment and pumping infrastructure within the community - including odour control. **Score: 2**	Establishment of new wastewater treatment and pumping infrastructure within the community - including odour control. **Score: 2**

Table 6 3: Comparative Evaluation of Wastewater Servicing Alternatives - Continued

1. Maintain Existing Level of Service	2. Expand to Downtown Core and Community Area	3. Expand Drinking Water Servicing to Existing and New Developments
Redundancy and Security of Supply		
Development would be limited by ability to install new septic systems in proximity to existing surface water source and wells. **Score: 5**	Increased security to wastewater collection from a maintained and regulated system. **Score: 2**	Increased security to wastewater collection from a maintained and regulated system. More opportunities to provide collection services to reduce higher concentration discharge from septic systems. **Score: 1**
Climate Change		
Does not mitigate climate change or provide resilient infrastructure. Service disruption may occur. **Score: 3**	New infrastructure designed with climate change resiliency to provide the required Level of Service during severe weather and power outages. **Score: 1**	New infrastructure designed with climate change resiliency to provide the required Level of Service during severe weather and power outages. **Score: 1**
Technical Suitability		
Existing Capacity		
Existing capacity is currently being met but is limited to a few serviced buildings only. **Score: 3**	New systems are designed to service existing and future capacity requirements, however limited to downtown core and community area. **Score: 0**	New systems are designed to service existing and future capacity requirements including phased development for connecting the greater community. **Score: 0**
Further Expansion		
Development would be limited due to lack of municipal water servicing. Does not address Class EA Problem Statement. **Score: 5**	New systems are designed to service the existing and future capacity requirements, however limited to downtown core and community area. **Score: 3**	New systems are designed to service the greater community with connections for further expansion throughout the community. **Score: 1**
Full Build Out		
Without municipal water servicing there will be difficulty with implementing a full build out. **Score: 5**	Meets the requirements to establish full-build out of the downtown core and community area; however, limited to expanding out to the surrounding community. **Score: 3**	Provides infrastructure to the largest service area; however, the rate of full expansion is limited by phased development of a larger distribution system. **Score: 2**

Table 6 3: Comparative Evaluation of Wastewater Servicing Alternatives - Continued

1. Maintain Existing Level of Service	2. Expand to Downtown Core and Community Area	3. Expand Drinking Water Servicing to Existing and New Developments
Climate Change		
Does not mitigate climate change or provide resilient infrastructure. Service disruption may occur. **Score: 4**	New infrastructure designed with climate change resiliency to provide the required Level of Service during severe weather and power outages. The smaller network of infrastructure is easier to maintain. **Score: 1**	New infrastructure designed with climate change resiliency to provide the required Level of Service during severe weather and power outages. The larger network of infrastructure requires more sanitary piping to maintain. **Score: 2**
Constructability		
Ease of Construction and Site Access		
N/A **Score: 0**	Moderate impacts for construction access within downtown core; however, network of roads provide good access to install new sanitary main and potential forcemain. **Score: 3**	Installation of new sanitary main and potential forcemain over a larger area along defined roadways or newly established easements will result in longer phased construction. **Score: 5**
Operations during construction		
N/A **Score: 0**	Minor impacts anticipated as private septic systems may be maintained during construction. **Score: 1**	Minor impacts anticipated as private septic systems may be maintained during construction. **Score: 1**
Ease of Integration with Existing Infrastructure		
N/A **Score: 0**	Minor impacts in the downtown core and community area since there is limited existing infrastructure within the ground. **Score: 1**	More moderate impacts anticipated for establishment of new infrastructure due to phasing of work and longer construction to connect services to properties located outside the community area. **Score: 3**
Climate Change		
N/A	Minor impacts due to climate change events when construction is carried out during warm-weather months. **Score: 2**	Minor impacts due to climate change events when construction is carried out during warm-weather months. **Score: 2**

Table 6 3: Comparative Evaluation of Wastewater Servicing Alternatives - Continued

1. Maintain Existing Level of Service	2. Expand to Downtown Core and Community Area	3. Expand Drinking Water Servicing to Existing and New Developments
Cost		
Capital Costs		
System is currently established. No construction involved; therefore, no impacts and no capital costs are anticipated. **Score: 0**	Moderate capital costs to install new wastewater treatment, pumping facilities and forcemain, and collection network. **Score: 3**	More significant capital costs to install new larger wastewater treatment, pumping facilities and forcemain, and collection network. **Score: 5**
Relative Operation and Maintenance Costs		
No additional operation and maintenance costs; however, current facilities are aging and not localized. Existing infrastructure will need replacement over time. **Score: 3**	Moderate costs for yearly operations of facilities and upkeep of collection network. **Score: 3**	Greater costs for yearly operations of larger facilities and upkeep of collection network. **Score: 4**
Overall Rank		
2	**1**	**3**

7 RECOMMENDED SOLUTIONS

7.1 Water Infrastructure Servicing Options

The preferred alternative is DWS2 - Expand Water Servicing to Downtown Core and Community Area. Under this alternative, municipal water servicing is required that meets current and future growth within the considered service area to the year 2051. New infrastructure should be constructed in a phased approach to reduce impacts to current water services, and the overall community in general. The recommended infrastructure solutions for municipal water servicing include development of a new centralized water treatment plant, with adequate water storage to provide for fire flow capacity. The main new infrastructure requirements for municipal water servicing for DWS2 include the following:

- New water treatment plant with 991 m^3/day Average Day Demand (ADD), 2,228 m^3/day Maximum Day Demand (MDD) and 3,737 m^3/day MDD+Fire Flow (FF) capacity
- Approximately 7 km of new distribution watermain
- Approximately 70 new fire hydrants
- New water service connections
- New water storage for MDD+FF of approximately 2,552 m^3

7.1.1 Water Option 1: Retrofit Existing Little Tub Water Treatment to Low Lift Pumping Station and New Centralized Water Treatment Plant with Water Storage

This option involves retrofitting the existing Little Tub Water Treatment Plant to convert it to a low lift pumping station, including a potentially larger diameter, extended, and deeper raw water intake. The low lift pumping station would supply raw water to a new centralized water treatment plant and water storge (in-ground or elevated) on a property which has suitable space to meet MDD+FF storage requirements, and for future expansion as required. The construction of new distribution watermain would be required to service the existing and new serviced properties within the considered service area. High lift pumping at the new water treatment plant will pressurize the water system to meet service requirements for ADD, and MDD + FF. Existing wells currently utilized within the considered service area, would be decommissioned after new service connections are connected to the operational water system. The new water treatment

plant would be optimized for the desired level of treatment for improved operational efficiency.

Refer to Figure 7-1 for a general layout of the water system under this option. Final options for review and selection to proceed to design and construction would be subject to the completion of required Municipal Class Environmental Assessments. Preliminary estimated construction costs for this option and phasing is summarized in Section 8.

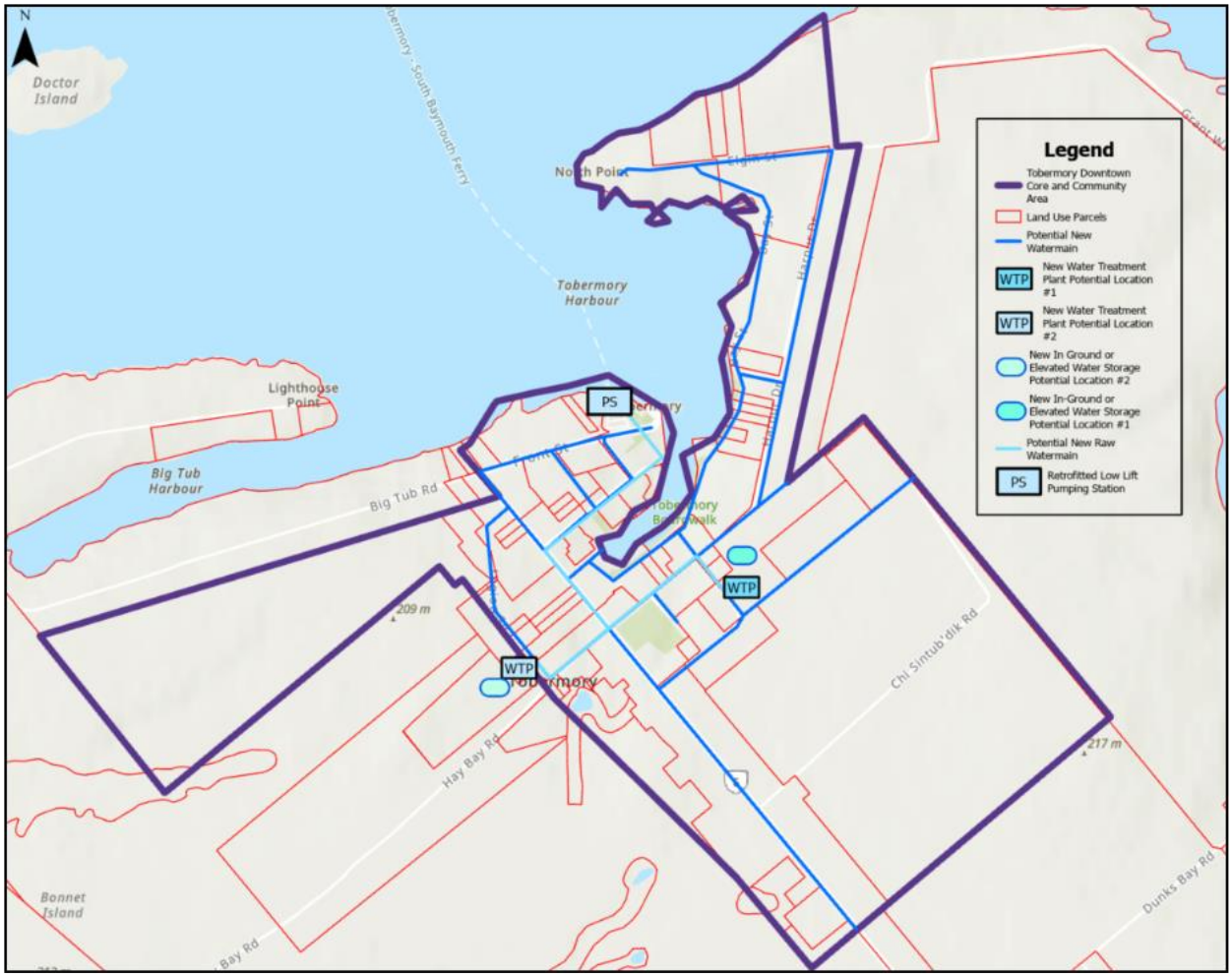


Figure 7-1: Retrofitted Existing Little Tub WTP to Low Lift Pumping Station and Centralized WTP with Water Storage

7.1.2 Water Option 2: New Low Lift Pumping Station, Water Intake and Centralized Water Treatment Plant with Water Storage

This option involves decommissioning of the existing Little Tub Water Treatment Plant, and construction of a new low lift pumping station on a new property with a new raw water intake. The low lift pumping station would supply raw water to a new centralized water treatment plant and water storge (in-ground or elevated) on a property which has

suitable space to meet MDD+FF storage requirements, and for future expansion as required. The construction of new distribution watermain would be required to service the existing and new serviced properties within the considered service area. High lift pumping at the new water treatment plant will pressurize the water system to meet service requirements for ADD, and MDD + FF. Existing wells currently utilized within the considered service area, would be decommissioned after new service connections are connected to the operational water system. The new water treatment plant would be optimized for the desired level of treatment for improved operational efficiency.

Refer to Figure 7-2 for a general layout of the water system under this option. The location of the new low lift pumping station provided in the figure is an example for reference. Final options for review and selection to proceed to design and construction would be subject to the completion of required Municipal Class Environmental Assessments. Preliminary estimated construction costs for this option and phasing is summarized in Section 8.

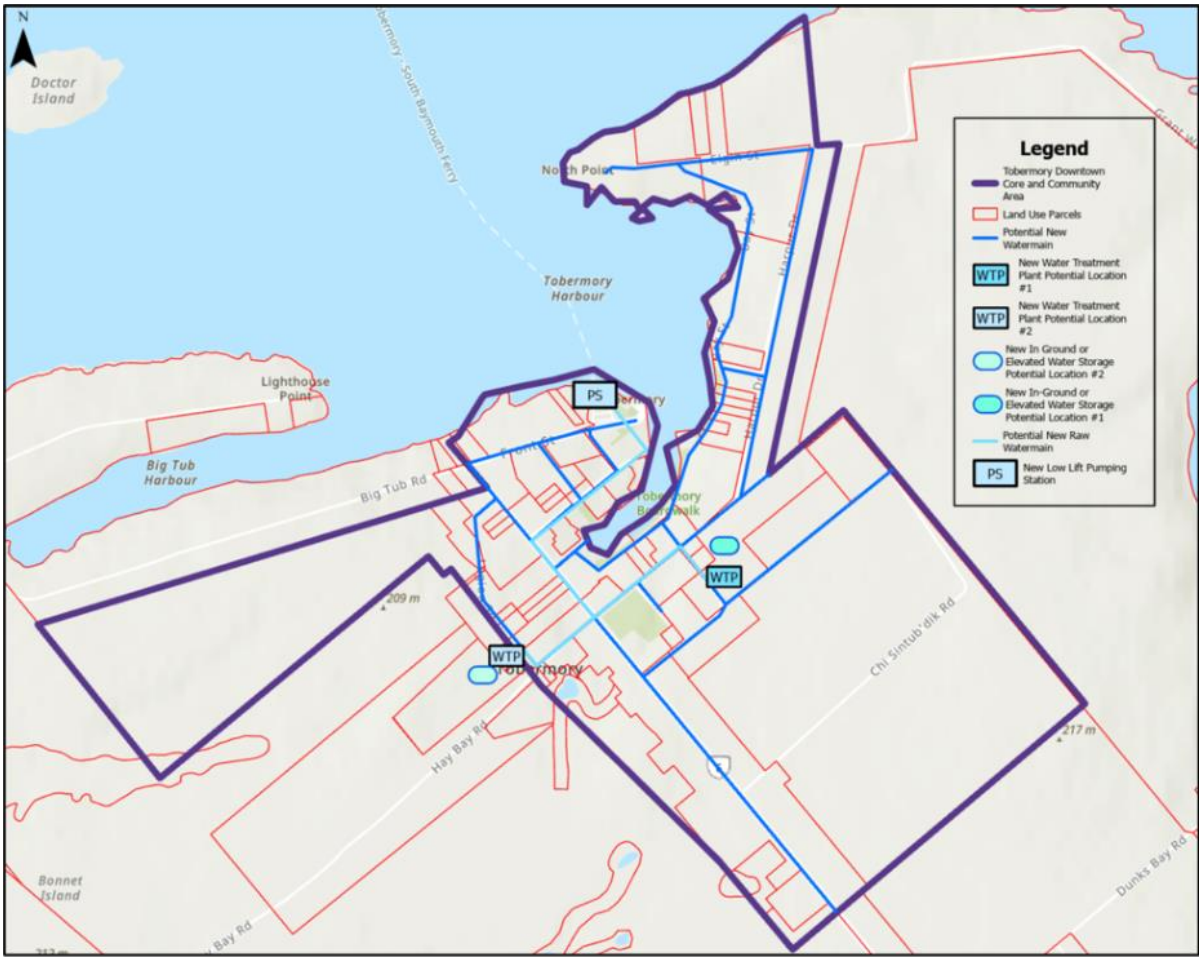


Figure 7-2: New Low Lift Pumping Station and New Centralized WTP with Water Storage

7.2 Wastewater Infrastructure Alternatives

The preferred alternative is WWS2 - Expand Wastewater Servicing within Downtown Core and Community Area. Under this alternative, municipal sanitary collection is required that meets current and future growth within the considered service area to the year 2051. New infrastructure should be constructed in a phased approach to reduce impacts to current sanitary services, properties with existing septic systems, and the overall community in general. The recommended infrastructure solutions for municipal wastewater servicing include development of a new wastewater treatment plant or upgrades to the existing wastewater treatment plant, potential new sanitary pumping station(s) and forcemain(s), and upgrades to the existing pumping station and forcemain. The main new infrastructure requirements for municipal wastewater servicing for WWS2 include the following:

- Expansion of the existing wastewater treatment plant or new wastewater treatment plant with 974 m3/day Average Day Flow (ADF) and Maximum Day Flow (MDF) of 2,191 m3/day capacity
- New and/or updated existing sewage pumping station(s)
- Approximately 4 km of new gravity sewers
- Approximately 60 new manholes
- New sanitary service connections

7.2.1 Wastewater Option 1: Expanded Wastewater Collection System and Upgraded Existing Wastewater Treatment Plant

This option involves the expansion of the existing wastewater collection, pumping systems and existing wastewater treatment plant, to meet the increased sanitary servicing requirements.

The construction of new gravity mains, and upgrades to the existing sewage pumping station and forcemain including potential new sewage pumping station(s) and forcemains(s), would be required to service the existing and new serviced properties within the considered service area. Upgrades to the current wastewater treatment plant would include expansion of the existing primary treatment lagoon system with new lagoons.

Refer to Figure 7-3 for general layout of the wastewater system under this option. The location of the new sewage pumping station provided in the figure is an example for reference. Final options for review and selection to proceed to design and construction would be subject to the completion of required Municipal Class Environmental

Assessments. Preliminary estimated construction costs for this option and phasing is summarized in Section 8.

Map of a proposed water supply system for Tobermory showing a new low lift pumping station, centralized water treatment plant, water storage facilities, and connecting watermains within the community service area.

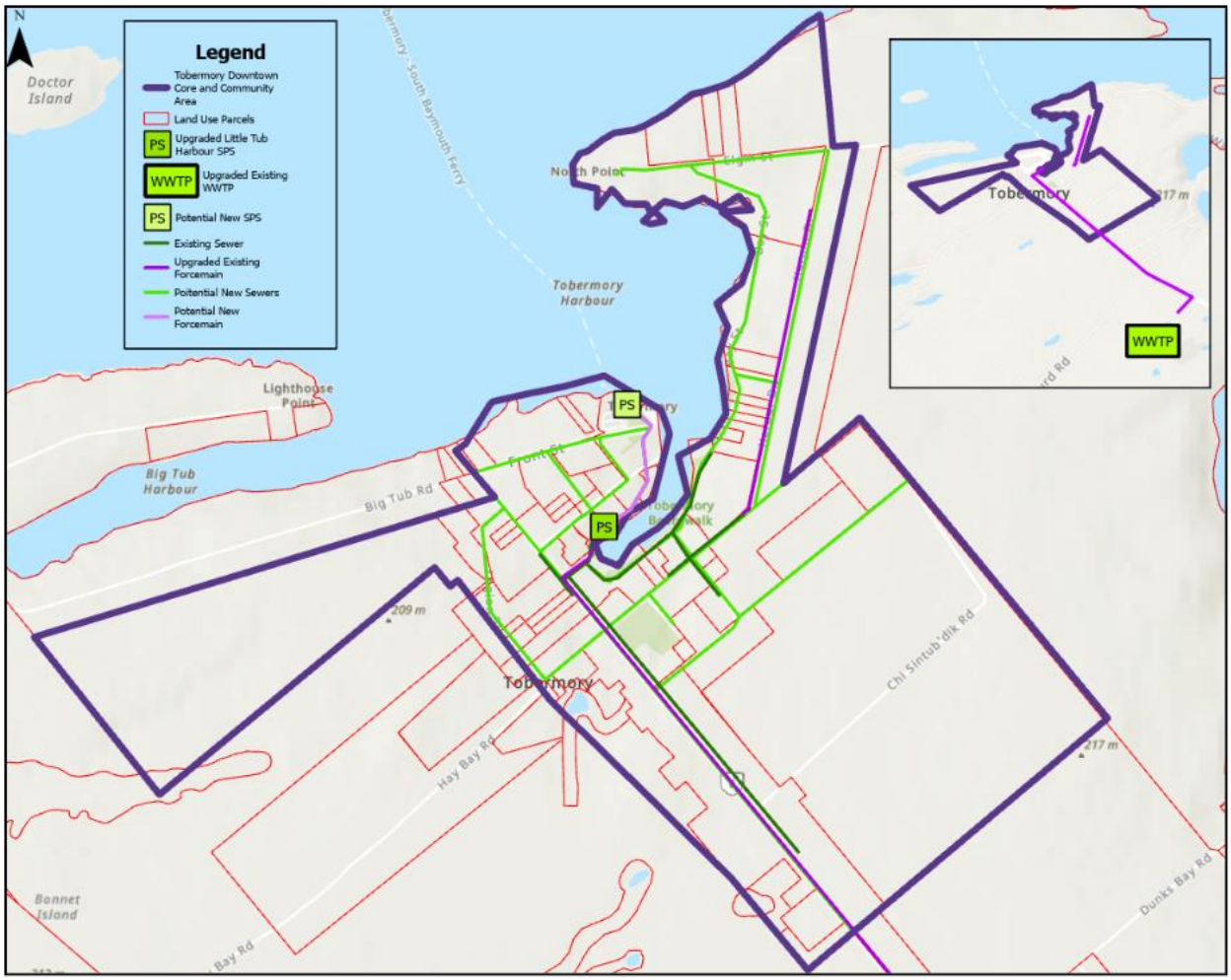


Figure 7-3: Expanded Wastewater Collection System and Upgraded Existing Wastewater Treatment Plant

7.2.2 Wastewater Option 2: Expanded Wastewater Collection System and New Wastewater Treatment Plant

This option involves the expansion of the existing wastewater collection, pumping systems and new wastewater treatment plant, to meet the increased sanitary servicing requirements.

The construction of new gravity mains, and upgrades to the existing sewage pumping station and forcemain including potential new sewage pumping station(s) and forcemains(s), would be required to service the existing and new serviced properties within the considered service area. The new wastewater treatment plant would be constructed at a new location, preferably in the same vicinity as the existing wastewater treatment plant, or as dictated by further investigation under a future Municipal Class Environmental Assessment. The current wastewater treatment system would remain in operation until the new treatment facility is functioning. The new wastewater treatment plant would be optimized for the desired level of treatment for improved operational efficiency.

Refer to Figure 7-4 for general layout of the wastewater system under this option. The locations of the new sewage pumping station and new wastewater treatment provided in the figure are examples for reference. Final options for review and selection to proceed to design and construction would be subject to the completion of required Municipal Class Environmental Assessments. Preliminary estimated construction costs for this option and phasing is summarized in Section 8.

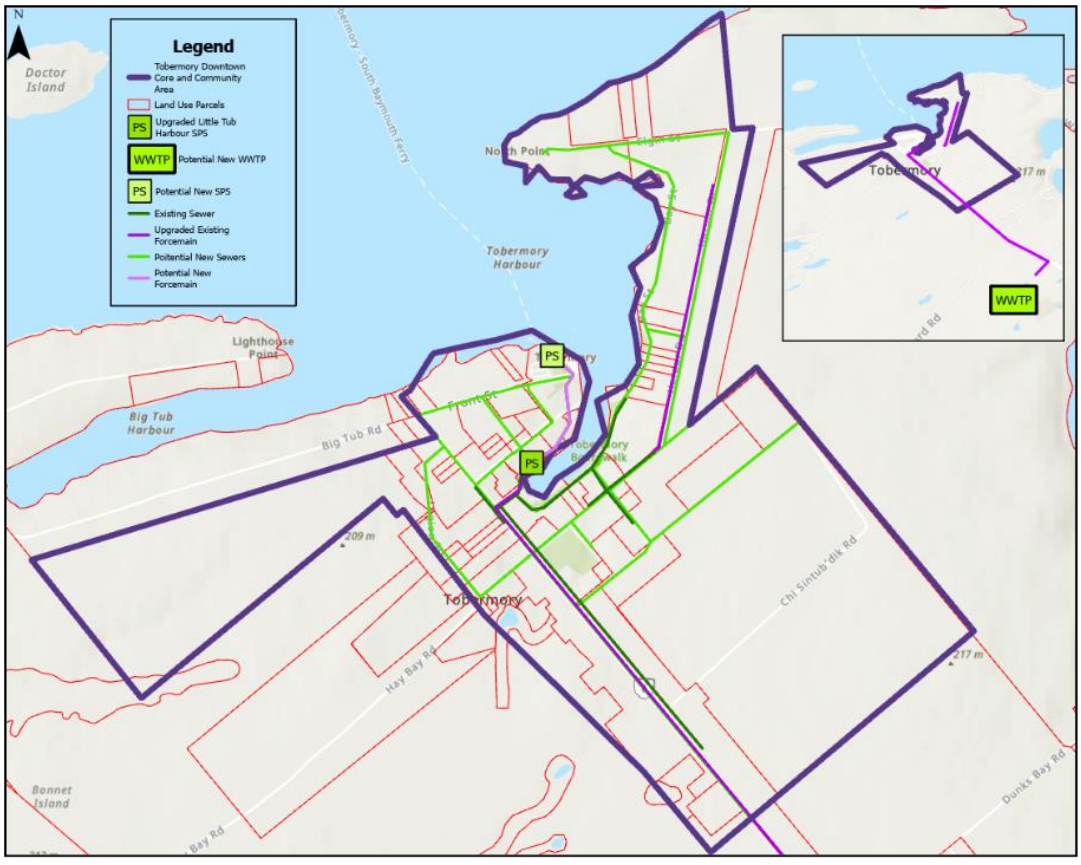


Figure 7-4: Expanded Wastewater Collection System and New Wastewater Treatment Plant

8 MASTER PLAN IMPLEMENTATION AND PHASING

8.1 Implementation: Projects and Phasing

To implement the preferred servicing alternatives for both water and wastewater servicing, a phased approach to implementation is recommended within the growth horizon, given that further studies and construction would need to be completed concurrently while the system is established. A summary of the high-level project phasing is detailed in Table 8-1.

Table 8-1: Phased Water and Wastewater Projects

GROWTH YEAR	PROJECTS/STUDIES AND PHASING
Near-Term (5-Years) 2026-2031	Complete Environmental Schedule C Studies for Treatment Facilities Identify Preferred Infrastructure Servicing Options Property Acquisition (as required) Start to Facility Construction (water and wastewater) Initial build-out of watermains and sewers (500m – 1km of piping) Potential Upgrade/Expansion to SPS Forcemain (3km of piping)
Mid-Term (10-Years) 2031-2036	Construction/Expansion of New Facilities Completion Phased Build-out of watermains and sewers prioritizing short-term growth and connection to existing residents and businesses. (2 additional linear kilometers of piping) Update to Master Servicing Plan (Update to growth projections and refined service area.)
Long-Term (20-Years) 2036-2046	Continue Construction Phased Build-Out of Water Distribution Network and Wastewater Collection System. (2 additional linear kilometers of piping)) Phased planned expansion of facilities (as applicable)
Future Long-Term (25-Years) 2046-2051	Construction and phased build-out of remaining water distribution network and wastewater collection system. (2 additional linear kilometers of piping)) Update to Master Servicing Plan (Update to growth projections and refined service area.)

8.1.1 Water Projects

The new water treatment plant would need to be constructed first prior to distribution and servicing within 10 years. This is inclusive of water intake and low lift station

construction. Additionally, there will be approximately 7 km of new watermain pipe to be installed to service a fully established water distribution network with an introduction of approximately 70 fire hydrants and new water service connections. It's anticipated that construction of watermain would be phased over the full growth horizon of 25 years in order to service the projected population.

8.1.2 Wastewater Projects

The wastewater infrastructure servicing options include either expansion of the existing Wastewater Treatment Plant or a new wastewater treatment plant which will receive flow from Tobermory via an upgraded Little Tub SPS or new pumping station(s) sized to convey average day and peak flow. The expanded or new treatment plant would need to be operation first prior to the receipt of additional sanitary flow and be within service within the next 10 years to accommodate growth.

Additionally, there will be approximately 4 km of new sanitary gravity sewer to be installed to service the full establish a sanitary collection network with an addition of approximately 60 maintenance holes. It's anticipated that construction of sanitary sewer would be phased over the full growth horizon of 25 years in order to service the projected population.

8.2 Cost Estimation Summary

The following Table 8-2 and Table 8-3 summarize the projected capital project opinion of probable costs in current 2026 dollars which provide insights on the order-of-magnitude costs for comparison purposes only. Refer to **Appendix E** for a detailed breakdown of costs and a summary of assumed project elements. Its to be noted other cost considerations for operations and engineering studies are not included in the summary.

Table 8-2: Water System Projects Capital Costs

	PROJECT	YEAR REQUIRED	OPINION OF PROBABLE COST (2026$)	CLASS EA SCHEDULE
Option 1- New WTP and Reservoir. Little Tub WTP Retrofitted as new intake	Part A – Facilities	2031	$41 million	Schedule C
	Part B – Watermain	2031-2046	$19 million	Exempt
	Part C - Intakes	2031	$8 million	Schedule C
Option 2 – New WTP, Intake and Elevated Water Tower	Part A – Facilities	2031	$41 million	Schedule C
	Part B – Watermain	2031-2046	$19 million	Exempt
	Part C – Intakes	2031	$21.75 million	Schedule C

Table 8-3: Wastewater System Projects Capital Costs

	PROJECT	YEAR REQUIRED	OPINION OF PROBABLE COST (2026$)	CLASS EA SCHEDULE
Option 1- Expanded WWTP	Part A – Facilities	2031	$21.5 Million	Schedule C - WWTP Schedule B – Pumping Station
	Part B – Gravity Sewer	2031-2046	$18.25 Million	Exempt
	Part C - Forcemain	2031	$4.25 Million	Schedule B – Pumping Sation
Option 2 – New WWTP	Part A – Facilities	2031	$34.75 Million	Schedule C - WWTP Schedule B – Pumping Station
	Part B – Gravity Sewer	2031-2046	$18.25 Million	Exempt
	Part C - Forcemain	2031	$4.25 Million	Schedule B

9 CLOSURE

The Master Plan was developed to identify a preferred strategy to provide accessible and reliable drinking water and wastewater services in Tobermory, meeting current and future needs to 2046 and beyond. The Master Plan serves as the basis for, and support of, future infrastructure projects as identified through the study. The Master Plan takes into consideration climate change and social and economic impacts, as well as current limitations to growth in Tobermory, given the existing infrastructure. Background reports and relevant legislation/regulations were reviewed as part of the Master Plan process.

To assess water infrastructure needs, the Master Plan included an examination of existing water demands, potential future water demands, and treatment and storage capacity. To assess wastewater infrastructure needs, the Master Plan an examination of existing sewage flows, potential flows, and pumping and treatment capacity. An analysis of existing population and projected future growth was undertaken for both water and wastewater to understand future infrastructure requirements

An ‘Evaluation Matrix’ was completed to evaluate alternative solutions for resolving identified gaps in existing water and wastewater infrastructure in Tobermory. The evaluation matrix was applied to objectively assess the impacts and identify the preferred solutions.

9.1 Additional Studies

Approach No.1 of the MCEA process for Master Plans recognizes that it does not fulfill the necessary requirements for Schedule B and C projects identified. Future environmental assessments and associated technical investigations through separate studies will be required to be completed to meet the applicable MCEA requirements prior to detailed design and construction. Schedule B projects would require the filing of the Project file for public review while Schedule C projects would have to fulfil Phases 3 and 4 prior to filing an Environmental Study Report (ESR) for public review.

9.2 Master Plan Approval and Completion

The Master Plan will be approved for implementation subject to adoption by the Council of the Municipality.

The following are required to be completed to finalize the Municipal Class Environmental Assessment process:

- Address remaining comments from Municipal staff, Council and OCWA.
- Final Public Notice (Notice of Master Plan) for Master Plan completion would be circulated to local Indigenous communities, stakeholders, and agencies via email, and posted in local newspapers and on the Municipal project website.
- Master Plan posted for Public comment on the municipal project website.
- Finalize the Master Plan.
- Final Council approval of the Master Plan.

9.3 Recommendations

Section 7.0 of the Master Plan provides documentation on the recommended solutions and potential options identified for water and wastewater projects. High level project phasing and projected capital probable costs are discussed in Sections 8.0 and 9.0.

It is recommended that the Master Plan be reviewed on a regular basis to evaluate the accuracy of key assumptions (e.g. the rate of growth), confirm the continued suitability of the preferred solutions, and ensure investing aligns with actual growth in coordination with Municipal and Regional Official Plans. The Master Plan should also be updated as required to address any significant changes in the environmental setting and/or local conditions, taking into account the views of residents, Indigenous communities, municipal council and staff, agencies and others to assist in informing its direction.

In parallel, a growth monitoring process, implemented by the Municipality, could provide a reliable method to track development activity, reassess servicing capacity, and to ensure continued alignment with Municipal and Regional infrastructure planning with local growth strategies.