JLR No.: 28243-000
Revision: FINAL – After 30-day Review

June 14, 2021

Prepared for:

**THE CORPORATION OF THE TOWN OF MIDLAND**
575 Dominion Avenue
Midland ON
L4R 1R2

Prepared by:

**J.L. RICHARDS & ASSOCIATES LIMITED**
107-450 Speedvale Avenue West
Guelph, ON
N1H 7Y6
Tel: 519-763-0713
Fax: 519-763-9261

# Final Project File Report

# Town of Midland Wastewater Master Plan

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

J.L. Richards
& Associates Limited
107-450 Speedvale Ave W
Guelph, ON Canada
N1H 7Y6
Tel: 519 763 0713
Fax: 519 763 9261

June 14, 2021
Our File No.: 28243-000

**VIA: E-MAIL** acampbell@midland.ca

Mr. Andy Campbell
Director of Engineering, Water and Wastewater
Town of Midland
575 Dominion Avenue
Midland, ON L4R 1R2

Dear Mr. Campbell:

**Re: Town of Midland Wastewater Master Plan**
**Class EA Completion Letter**

The Notice of Completion (NOC) for the Town of Midland Wastewater Master Plan was issued on May 3, 2021. The complete Project File report was made available at www.engagingmidland.ca. The period for comment closed June 2, 2021 and five (5) comments were provided by stakeholders.

Stakeholder comments are summarized chronologically in Table 1 below. The original correspondences are appended to this letter.

**Table 1 NOC Public and Agency Comments and Consultation**

| Stakeholder | Comment | Action |
|---|---|---|
| Fisheries and Oceans Canada | May 7, 2021 – Noted that they do not review notifications for administrative processes. They also noted that if the project needs a review that a Request for Review Form needs to be submitted. | Acknowledged comment.<br>No further action required. |
| County of Simcoe | May 14, 2021 – Noted that the County maintains jurisdiction of County Road 93 corridor within which a preferred servicing alternative is proposed. The County also anticipates future improvements in this area with a Class EA planned for 2027/2028. They noted that future improvements in this area should be coordinated. | Acknowledged comment.<br>Town to communicate and coordinate with the County of Simcoe on proposed future improvements in the County Road 93 corridor.<br>**Action: Town (As Required)** |
| Conseil de la Nation Huronne-Wendat (CNHW) | May 26, 2021 – Asked whether any archeological studies or fieldwork will be necessary as part of the project. | Responded to the comment with the following: "The report references studies being completed by Simcoe County, and a screening was conducted. However, no archeological field studies were |

| Stakeholder | Comment | Action |
|---|---|---|
| | | conducted as part of this work. In some instances, field studies may be required prior to project implementation, however, that is beyond the scope of the Master Planning stage."<br><br>No further action required. |
| Ministry of the Environment, Conservation and Parks (MECP) | June 1, 2021 – Noted that the Town needs to ensure that the balance between impacts of aging infrastructure and further growth is appropriately considered and evaluated. They recommended that the Town consider non-structural alternatives when the Master Plan is updated and provided text from Page C-5 of the MEA's Class EA document. | Added some additional wording in Section 12.0 of the Project File report to recommend that the Town explore and consider implementing non-structural stormwater management measures in the future. |
| Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) | June 8, 2021 – Noted that Stage 1 of the Archeological Assessment process and the Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment should have been completed as part of the Master Plan process. They requested a timeline with firm commitments for these two studies on parts of the study affected by components of the preferred alternative be added to the project file. | Added some additional wording in Section 11.4 committing that the Town will undertake these assessments for proposed upgrades on non-developed lands once exact land parcels are confirmed and prior to design/construction.<br><br>**Action: Town** |

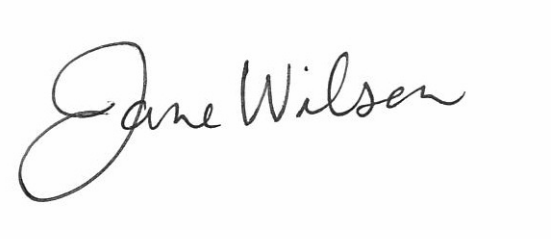
This letter shall form part of the Project File, and the information included shall be relayed on an as needed bases to any individuals (e.g. Town staff, Council or consultants) involved in subsequent stages of project review or implementation.

Mr. Andy Campbell, Town of Midland

Yours very truly,

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:



Jane Wilson, P. Eng.
Environmental Engineer

NB/JW:jh

# Comments Received During Mandatory 30-Day Review Period

**From:** FPP.CA / PPP.CA (DFO/MPO)
**To:** Jane Wilson
**Subject:** RE: Town of Midland - Wastewater Master Plan - Notice of Completion
**Date:** Friday, May 7, 2021 8:24:07 AM
**Attachments:** image001.png

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Hello Jane,

Thank you for the notification of the wastewater master plan. The Department reviews projects (works, undertakings, or activities) being conducted in or near waterbodies that support fish. We also review project proposals for impacts to Species at Risk. We do not review notifications for administrative processes. Please visit our website at: https://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html to determine whether your project requires a review by the Department. If you determine that your project needs a review please complete and submit a Request for Review Form to: FisheriesProtection@dfo-mpo.gc.ca. If you have any questions feel free to contact us at: 1-855-852-8320.

Yours sincerely,

**Triage and Planning**
Fish and Fish Habitat Protection Program
Fisheries and Oceans Canada

---

**From:** Jane Wilson <jwilson@jlrichards.ca>
**Sent:** May 6, 2021 2:36 PM
**Cc:** Andy Campbell <acampbell@midland.ca>
**Subject:** Town of Midland - Wastewater Master Plan - Notice of Completion

Greetings,

Please find attached the Notice of Completion for the Town of Midland's Wastewater Master Plan.

The purpose of the study was to provide guidance on short and long-term wastewater infrastructure improvements within the urban boundary of the Town of Midland. The complete Project File Report and other information are available at https://engagingmidland.ca/wastewater-master-plan for 30-day review.

Interested persons should provide written comment to the Municipality on the proposal within 30 calendar days from the date of this Notice. Comments should be directed to Jane Wilson of J.L. Richards & Associates and Andy Campbell, Director of Engineer, Town of Midland. Please refer to the attached for contact information.

Warm regards,
Jane

*You are receiving this Notice because you have expressed interest in the study or been identified as a potential stakeholder. If you wish to be removed from this list please reply to this email with the comment "unsubscribe".*

**Jane Wilson**, M.Sc., P.Eng.
Associate
Senior Environmental Engineer

J.L. Richards & Associates Limited
107 - 450 Speedvale Ave. West, Guelph, ON N1H 7Y6
Direct: 226-780-7487

J.L. Richards & Associates Limited

*J.L. Richards & Associates Limited is proactively doing our part to protect the wellbeing of our staff and communities while improving our communication technology.* ***We are pleased to announce that we have implemented direct phone lines for all of our staff, allowing you to connect with us regardless of whether we are working remotely or in the office.*** *We are dedicated to delivering quality services to you through value and commitment, as always. Please reach out to us if you have any questions about your project.*

**From:** Jane Wilson
**To:** Lori-Jeanne Bolduc; acampbell@midland.ca
**Cc:** Mario Gros Louis
**Subject:** RE: Midland Notice of Completion
**Date:** Wednesday, May 26, 2021 10:56:00 AM
**Attachments:** image001.jpg

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Greetings Lori-Jeanne,

The report references studies being completed by Simcoe County, and a screening was conducted. However, no archeological field studies were conducted as part of this work. In some instances field studies may be required prior to project implementation, however, that is beyond the scope of the Master Planning stage.

If you have any other questions or concerns, please do not hesitate to let us know.

Jane

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**From:** Lori-Jeanne Bolduc <Lori-Jeanne.Bolduc@wendake.ca>
**Sent:** May 26, 2021 10:46 AM
**To:** Jane Wilson <jwilson@jlrichards.ca>; acampbell@midland.ca
**Cc:** Mario Gros Louis <Mario.GrosLouis@wendake.ca>
**Subject:** Midland Notice of Completion



Good morning,

This acknowledges receipt of attached letter. Could you please let us know if any archaeological studies or fieldwork will be necessary as part of this project?

Thank you,

Lori-Jeanne

| | |
|---|---|
| **From:** | EA Notices to CRegion (MECP) |
| **To:** | Jane Wilson; Andy Campbell |
| **Cc:** | Potter, Katy (MECP); Hood, Cindy (MECP) |
| **Subject:** | RE: Town of Midland, MEA Class EA, Wastewater Master Plan - Notice of Completion |
| **Date:** | Tuesday, June 1, 2021 2:01:36 PM |
| **Attachments:** | image002.png<br>image003.png |



Dear Jane Wilson and Andy Campbell:

We have reviewed the master plan report for the above noted project. It is understood that the Town of Midland Wastewater Master Plan is being conducted to fulfill the requirements for Schedule B projects (Approach 2) under the Municipal Class Environmental Assessment (Class EA). This process will enable the Town to manage existing system deficiencies, plan for increased growth, and create a long-term infrastructure plan, i.e. what infrastructure upgrades are required to accommodate future growth while ensuring CSO volumes are not increased as per F-5-5.

Section 11.0 of the master plan report summarizes its evaluation and selection of the preferred solutions for the Town's wastewater system. It is noted that this is the first Master Plan conducted for the Town's sanitary system and its consideration of alternatives focus on improvements and upgrades of the existing system. We also note that section 11.4 has briefly discussed future studies required which would determine the appropriate near and long-term rehabilitation and/or replacement alternative, the recommended system upgrades, as well as the opportunity to separate combined sewers, reduce I&I and water use.

It is understood that the purpose of the document is to be proactive and clearly define a planning structure to provide direction for future growth and development within the Town to the year 2031. However, most communities in the north are declining in population rather than expanding. Therefore, the Town needs to ensure that the balance between the impacts of aging infrastructure and further growth is appropriately considered and evaluated.

We recommend that the Town should also consider non-structural alternatives (for example, upstream measures such as roof leader disconnection, LIDs etc.) when the Master Plan is updated. As the Municipal Engineers Association's Class EA (*October 2000, as amended 2007 & 2011)* Section C.2 on Page C-5 states:

> *On the premise that structural solutions to infrastructure problems generally may have negative net environmental impacts, proponents should pay particular attention to non-structural solutions in evaluating alternatives.*

*Such alternatives might, for example, include the imposition of controls on private development (e.g. storm water management policies which require rainwater to be discharged onto the ground rather than into a storm sewer) or controls on resource use (e.g. by-law requirements that prevent the discharge of once through cooling water taken from municipal supplies). Land use/zoning controls, flood warning/flood proofing/emergency measures, conservation programs, are further examples of "soft" technology measures which may deserve attention.*

*While these types of alternatives may not be effective in providing adequate solutions to immediate or critical sewage, stormwater management or water problems, they should be given serious consideration.*

*Where possible, they should be implemented in combination with structural measures if it can be demonstrated that they can contribute to the overall solution. For example, improved maintenance activities may allow a reduction in the size of a structural measure resulting in less environmental impact.*

*Consideration of such alternatives would serve to* ***focus a municipality's responsibility for the wise management of the resources under its jurisdiction,*** *in a manner which would avoid the development of infrastructure problems* ***through preventative or non-structural measures.***

Section 13 summarizes consultation of the master plan Class EA study, including a description of the consultation plan, with details of the number of meetings, who was invited, how notification of the meetings was made in Appendices E, H, J and K. It is recommended that section 13 should also provide a summary table of the issues and concerns raised by the public and review agencies and how they were addressed and evaluated throughout the decision making process. In this manner the reader will have a good sense of the consultation result without being buried by the detailed appendices.

Shall you have any questions regarding these comments above please let us know.

Thank you,

**Chunmei Liu** | Regional EA and Planning Coordinator
Environmental Assessment Branch, **Ontario Ministry of the Environment, Conservation and Parks**
Chunmei.Liu@ontario.ca | Website: http://www.ene.gov.on.ca/



---

**From:** Jane Wilson <jwilson@jlrichards.ca>
**Sent:** May-06-21 2:48 PM
**To:** EA Notices to CRegion (MECP) <eanotification.cregion@ontario.ca>

**Cc:** Andy Campbell <acampbell@midland.ca>
**Subject:** Town of Midland, MEA Class EA, Wastewater Master Plan - Notice of Completion



Greetings,

Please find attached the Notice of Completion and Project Information Form for the Town of Midland's Wastewater Master Plan.

The purpose of the study was to provide guidance on short and long-term wastewater infrastructure improvements within the urban boundary of the Town of Midland. The complete Project File Report and other information are available at https://engagingmidland.ca/wastewater-master-plan for 30-day review.

Interested persons should provide written comment to the Municipality on the proposal within 30 calendar days from the date of this Notice. Comments should be directed to Jane Wilson of J.L. Richards & Associates and Andy Campbell, Director of Engineer, Town of Midland. Please refer to the attached for contact information.

Warm regards,
Jane

**Jane Wilson**, M.Sc., P.Eng.
Associate
Senior Environmental Engineer

J.L. Richards & Associates Limited
107 - 450 Speedvale Ave. West, Guelph, ON N1H 7Y6
Direct: 226-780-7487

J.L. Richards & Associates Limited

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---

**From:** Laura Pritchard <lpritchard@jlrichards.ca>
**Sent:** September 4, 2019 9:40 AM
**To:** eanotification.cregion@ontario.ca
**Cc:** Jane Wilson <jwilson@jlrichards.ca>
**Subject:** Town of Midland, MEA Class EA, Wastewater Master Plan

Hello,

Please see attached the project Notice of Commencement and completed project information form

regarding the Town of Midland Wastewater Master Plan.

Thank you,

Laura Pritchard

**Laura Pritchard**, EIT
Environmental Engineering Intern

J.L. Richards & Associates Limited
107 - 450 Speedvale Ave. West, Guelph, ON N1H 7Y6
Tel: 519-763-0713 Fax: 519-763-9261

**From:** Minkin, Dan (MHSTCI)
**To:** Jane Wilson; acampbell@midland.ca
**Subject:** RE: Town of Midland - Wastewater Master Plan - Notice of Completion [MHSTCI File 0011358]
**Date:** Wednesday, June 9, 2021 8:24:06 AM
**Attachments:** image001.png
2021-06-08_MidlandWWTP_MHSTCIcomments.pdf

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Good afternoon,
Please see attached, with apologies for the delay.

**Dan Minkin**
Heritage Planner
Ministry of Heritage, Sport, Tourism and Culture Industries
Heritage, Tourism and Culture Division | Programs and Services Branch | Heritage Planning Unit
401 Bay Street, Suite 1700
Toronto, Ontario M7A 0A7
Tel. 416.786.7553 *NEW*

---

**From:** Jane Wilson <jwilson@jlrichards.ca>
**Sent:** May-06-21 2:36 PM
**Cc:** Andy Campbell <acampbell@midland.ca>
**Subject:** Town of Midland - Wastewater Master Plan - Notice of Completion



Greetings,

Please find attached the Notice of Completion for the Town of Midland's Wastewater Master Plan.

The purpose of the study was to provide guidance on short and long-term wastewater infrastructure improvements within the urban boundary of the Town of Midland. The complete Project File Report and other information are available at https://engagingmidland.ca/wastewater-master-plan for 30-day review.

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Warm regards,
Jane

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**Jane Wilson**, M.Sc., P.Eng.
Associate
Senior Environmental Engineer

J.L. Richards & Associates Limited
107 - 450 Speedvale Ave. West, Guelph, ON N1H 7Y6
Direct: 226-780-7487

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**Ministry of Heritage, Sport, Tourism and Culture Industries**

Programs and Services Branch
401 Bay Street, Suite 1700
Toronto, ON M7A 0A7
Tel: 416.768.7553

**Ministère des Industries du Patrimoine, du Sport, du Tourisme et de la Culture**

Direction des programmes et des services
401, rue Bay, Bureau 1700
Toronto, ON M7A 0A7
Tél: 416.768.7553

Ontario

June 8, 2021 EMAIL ONLY

Andy Campbell
Director of Engineering, Water and Wastewater
Town of Midland
575 Dominion Avenue
Midland, ON L4R 1R2
acampbell@midland.ca

| | | |
|---|---|---|
| **MHSTCI File** | **:** | **0011358** |
| **Proponent** | **:** | **Town of Midland** |
| **Subject** | **:** | **Notice of Completion** |
| **Project** | **:** | **Midland Wastewater Master Plan** |
| **Location** | **:** | **Midland, Ontario** |

---

Dear Mr. Campbell:

Thank you for providing the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) with the Notice of completion for the above-referenced project. MHSTCI's interest in this Environmental Assessment (EA) project relates to its mandate of conserving Ontario's cultural heritage, which includes:

- Archaeological resources, including land and marine;
- Built heritage resources, including bridges and monuments; and,
- Cultural heritage landscapes.

**Project Summary**
The stated purpose of the study is to understand the current wastewater system deficiencies and create a long-term infrastructure plan. We understand that this study will follow Master Plan Approach #2 under the Municipal Class EA.

**Project File Review**
We have reviewed the Project File Report (PFR) for this project and offer the following comments.

As noted in Section 4.6 of the PFR, the screening checklists attached in Appendices F and G, as well as the review of the Simcoe County Archaeological Management Plan noted in the PFR, identified the potential for impacts to cultural heritage resources and the need for associated technical studies. It is unclear why no studies were carried out as part of the Master Plan process, and cultural heritage resources are not further discussed in the PFR. Our letter of October 8, 2019 recommended that Stage 1 of the archaeological assessment process be carried out during the Master Plan study, along with a Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment. These studies not having been completed, the PFR provides neither a rationale for their deferral nor a commitment and timeline for their completion.

A Master Plan study under Approach #2 in the Municipal Class EA is intended to satisfy all EA requirements for Schedule B undertakings that are components of the master plan. This includes cultural heritage technical studies where necessary.

Accordingly, we would request that a timeline with firm commitments for archaeological assessment and cultural heritage evaluation on parts of the study area affected by components of the preferred alternative be added to the project file.

Thank you for consulting MHSTCI on this project and please continue to do so throughout the EA process. If you have any questions or require clarification, do not hesitate to contact me.

Sincerely,

Dan Minkin
Heritage Planner
dan.minkin@ontario.ca

Copied to: Jane Wilson, P. Eng., J.L. Richards & Associates Ltd

**From:** Meile, Christian
**To:** acampbell@midland.ca
**Cc:** Jane Wilson
**Subject:** Wastewater Master Plan- comments
**Date:** Friday, May 14, 2021 10:24:33 AM
**Attachments:** Midland WW MP Study comments May 2021.pdf

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Hi Andy,

Following up from phone conversation the other day, please find attached comments.

Thanks

Christian

**County of Simcoe**
**Transportation and Engineering**
1110 Highway 26,
Midhurst, Ontario L9X 1N6

Main Line (705) 726 9300
Toll Free 1 866 893 9300
Fax (705) 727 7984
Web: simcoe.ca

TRANSPORTATION AND ENGINEERING

May 14th, 2021

**File No.:** E01

Andy Campbell
Executive Director, Environment and Infrastructure
Town of Midland
575 Dominion Avenue
Midland, Ontario
L4R 1R2

Dear Andy:

**RE: Town of Midland**
**Wastewater Master Plan Class Environmental Assessment**

This is in response to your recent notice of study completion dated May 6th, 2021, concerning the above noted project.

The County of Simcoe maintains jurisdiction of County Road 93, which is a two lane arterial road running north-south from Highway 12 north through Midland to the Town of Penetanguishene.

It is understood that one preferred servicing alternative includes a new truck sanitary line, and associated pumping station, potentially located in the County Road 93 corridor, from Highway 12 north to Yonge Street. It should be noted, the County also has plans for future improvements to this corridor beginning with an Environmental Assessment of potential requirements scheduled in the 2027/2028 time frame. It would be beneficial to coordinate Midland's potential servicing requirements in order to properly locate any services within the County corridor, minimise any potential construction and maintenance conflicts and ensure adequate corridor widths for all services to be located outside the travelled portion of the roadway.

Should you have any further questions please contact the undersigned.

Regards,

Christian Meile, P. Eng.
Director, Transportation & Engineering
Engineering, Planning and Environment Division
County of Simcoe

cc: Jane Wilson, P. Eng., J.L. Richards & Associates Ltd.

# Notice of Completion

## Town of Midland Wastewater Master Plan

*The Town of Midland completed a Municipal Class Environmental Assessment (Class EA) for a Wastewater Master Servicing Plan. The purpose of the EA study was to provide guidance on short and long-term wastewater infrastructure improvements within the urban boundary of Midland.*

To address infrastructure needs associated lifecycle replacement needs and continued development within the Town of Midland, the following projects have been identified as part of the long-term servicing strategy:

- Provide additional wet-weather treatment or storage at the Wastewater Treatment Center (Schedule B).
- Lifecycle upgrades and process expansions at the Wastewater Treatment Center including: headworks replacement, aeration system upgrades and expansion, new primary clarifier (10 – 15 year horizon), disinfection system upgrade, septage receiving station upgrades/odour control, upgrades or replacement of nutrient management facility (existing egg shaped digester). (Schedule A+ or B – no increase in annual average day rated capacity)
- Sewer main upgrades along Bayshore, Young, and Pillsbury Trunk sewer mains along with new Bayshore North SPS (Sunnyside Area) and force main, new Pillsbury Trunk SPS (County Road 93 and Highway 12) to accommodate new development.

The study was conducted according to the requirements of Phases 1 and 2 of the Municipal Class Environmental Assessment which is an approved process under the Environmental Assessment Act. The Master Plan demonstrates a sufficient level of investigation, consultation and documentation to fulfil the requirements of the identified Schedule B projects for the proposed infrastructure projects. Interested persons should provide written comment to the Municipality on the proposal within 30 calendar days from the date of this Notice. Comments should be directed to Jane Wilson of J.L. Richards & Associates and Andy Campbell, Director of Engineer, Town of Midland.

The complete Project File Report and other information are available at www.engagingmidland.ca

| **Jane Wilson, P.Eng.** | **Andy Campbell** |
|---|---|
| Environmental Engineer<br>J.L. Richards & Associates Limited<br>107-450 Speedvale Avenue West<br>Guelph, ON N1H 7Y6<br>Phone: 226-780-7487<br>E-mail: jwilson@jlrichards.ca | Director of Engineering, Water and Wastewater<br>Town of Midland<br>575 Dominion Avenue<br>Midland, ON L4R 1R2<br>Phone: 705-526-4275 ext. 2267<br>E-mail: acampbell@midland.ca |

In addition, a request may be made to the Ministry of the Environment, Conservation and Parks for an order requiring a higher level of study (i.e. requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g. require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name.

Requests should specify what kind of order is being requested (request for additional conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate or remedy those potential adverse impacts, and any information in support of the statements in the request. This will ensure that the Ministry is able to efficiently begin reviewing the request. The request should be sent in writing or by e-mail to:

| **Minister of the Environment, Conservation and Parks** | **Director, Environmental Assessment Branch** |
|---|---|
| Ministry of Environment, Conservation and Parks<br>777 Bay Street, 5th Floor<br>Toronto ON M7A 2J3<br>minister.mecp@ontario.ca | Ministry of Environment, Conservation and Parks<br>135 St. Clair Ave. W, 1st Floor<br>Toronto, ON M4V 1P5<br>EABDirector@ontario.ca |

Requests to the Ministry should also be sent to Jane Wilson, J.L. Richards & Associates and Andy Campbell, Director of Engineer by mail or by e-mail.

This Notice issued May 3, 2021.

Information will be collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.

## Revision History

| Rev. | Date | Description | Distribution |
|---|---|---|---|
| 00 | May 28, 2020 | 60% Submission | Andy Campbell – Town of Midland |
| 01 | October 13, 2020 | 90% Submission | Andy Campbell – Town of Midland |
| 02 | Dec. 18, 2020 | Final Submission | Andy Campbell – Town of Midland |
| 03 | March 3, 2020 | Rev. Final Submission | Chuck Fiddy – Town of Midland |
| 04 | April 27, 2021 | For 30-Day Review | Andy Campbell – Town of Midland |
| **05** | **June 14, 2021** | **Final After 30-Day Review Period** | **Andy Campbell – Town of Midland** |

## Table of Contents

## List of Tables

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# 1.0 INTRODUCTION

## 1.1 Background

J.L. Richards & Associates Limited (JLR) has been retained by the Town of Midland (the Town) to complete a Wastewater Master Plan (2020 Master Plan) for the Town's treatment and conveyance system. The Wastewater Master Plan will provide guidance on short and long-term wastewater infrastructure improvements within the urban boundary of Midland.

The Master Plan is being conducted in accordance with Phases 1 and 2 of the Municipal Engineers Association (MEA) Municipal Class Environmental Assessment (Class EA) (updated November 2015) to fulfill the requirements for Schedule B projects (Approach 2). Following this process will enable the Town to manage existing system deficiencies, plan for increased growth, and create a long-term infrastructure plan

Overall, this system is understood to generally be performing in compliance with the Town's Environmental Compliance Approvals (ECAs). However, the main issues to be considered by the 2020 Master Plan include:

- concerns about the impact of combined sewage overflows on the water quality and recreational uses of Georgian Bay;
- an increasing amount infrastructure that is nearing the end of its service life; and
- planning for growth in the Town over the next 20-years and beyond.

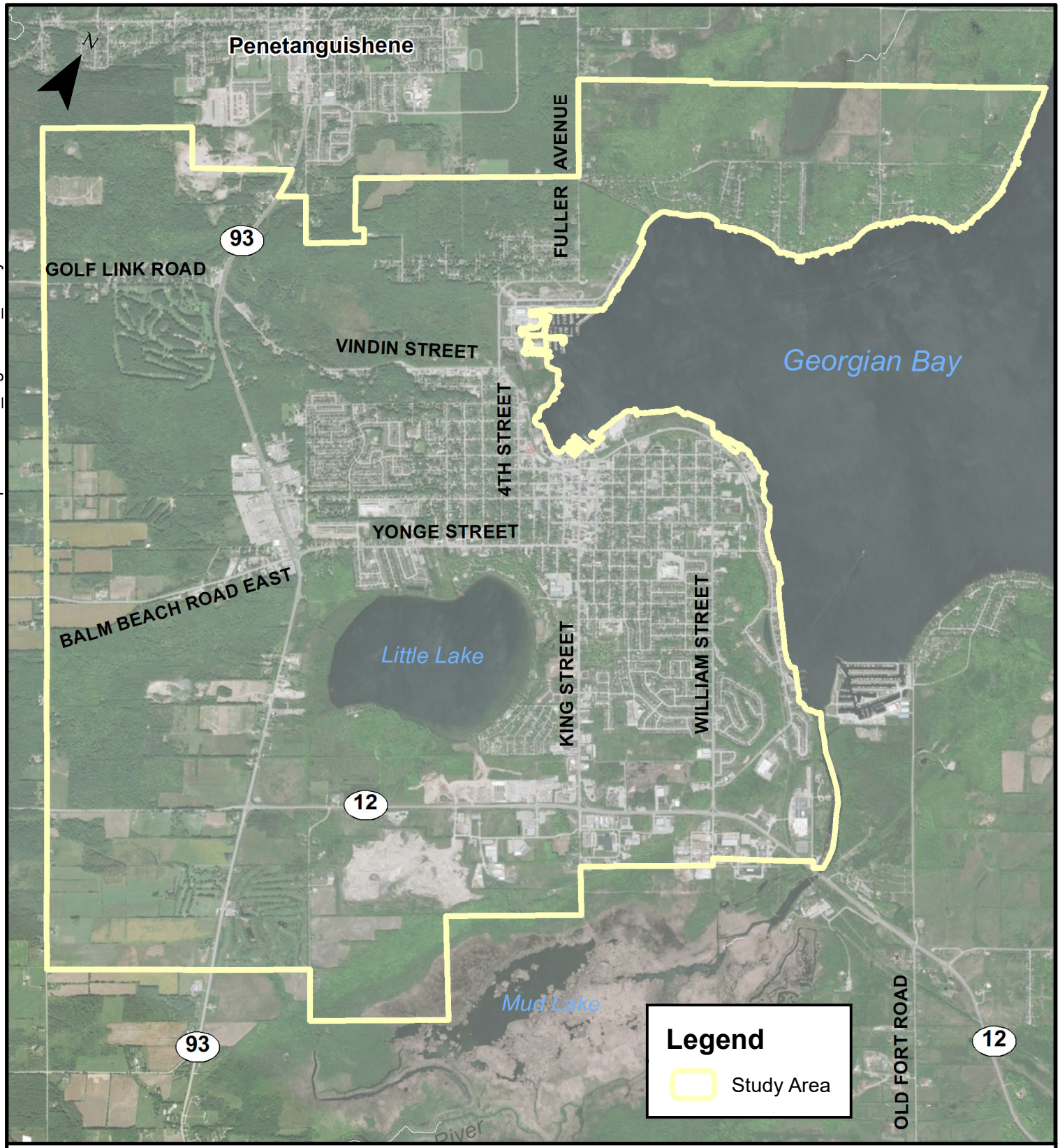
This is the first Master Plan conducted for the Town of Midland sanitary system.

## 1.2 Study Area Overview

Located on Georgian Bay in Simcoe County, the Town of Midland has a permanent population of approximately 20,000 people. That number rises significantly; however, when seasonal visitors are considered. The study area for the Master Plan encompasses the urban boundary of Midland. Figure 1-1 illustrates the study area boundary.

The current wastewater system consists of the Midland Wastewater Treatment Centre (WWTC), a storm equalization tank, seven sewage pumping stations (SPS), and over 100 km of dedicated or combined storm/sanitary sewermain. An overview of key wastewater infrastructure is shown in Figure 1-2.

The WWTC is operated under Environmental Compliance Approval (ECA) No. 5708-A72SPG and has an average rated capacity of 15,665 $m^3$/day and a peak rated capacity of 37,000 $m^3$/day. The plant is a conventional activated sludge plant and provides secondary treatment for industrial and domestic wastewater. The plant also includes a storm equalization tank that can be used to provide temporary storage, or preliminary treatment and disinfection in the event of a plant bypass.




File Location: P:\28000\28243-000 - Midland Wastewater Master Plan\3-Production\1-Civil\GIS\1 - Phase 1 Report\28243_Figure1-1_StudyArea.mxd

Plot Date: Monday, May 11, 2020 8:43:11 AM

PROJECT:

# MIDLAND WASTEWATER MASTER PLAN

TOWN OF MIDLAND

DRAWING:

## STUDY AREA BOUNDARY

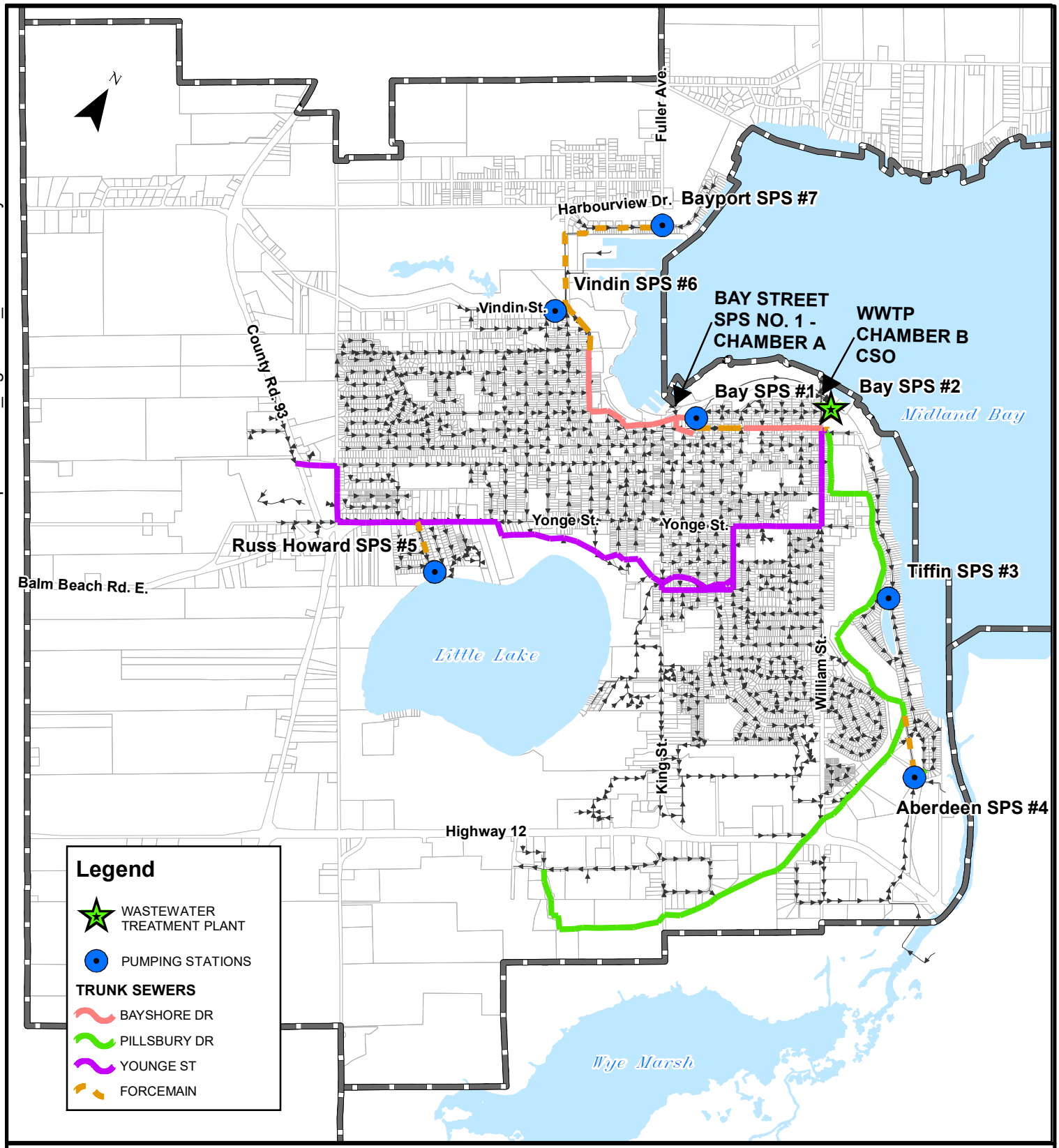
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca



| | |
|---|---|
| DESIGN: | JW |
| DRAWN: | KTK |
| CHECKED: | JW |
| JLR #: | 28243 |

DRAWING #:

FIGURE 1-1




PROJECT:

# TOWN OF MIDLAND WASTEWATER MASTER PLAN

MIDLAND, ONTARIO

DRAWING:

## OVERVIEW OF KEY WASTEWATER INFRASTRUCTURE

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FIGURE 1-2

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## 1.3 Phase 1 and 2 Report Objectives

The Project File Report summarizes the findings from the initial Phase 1 stages of the Master Plan process and provides a basis for the identification of alternatives during Phase 2. Phase 2, also documented in the Project File Report, is the evaluation of alternative solutions to determine recommended alternatives to address the problem or opportunity.

The objectives of the Project File Report are to:

- Review planning forecasts to 2041 and beyond to identify servicing requirements.
- Summarize relevant information related to land use, planning, and the natural environment within the study area.
- Establish the Problem/Opportunity Statement.
- Evaluate the alternative solutions and determine a preferred solution.
- Identify impacts and potential mitigation measures.
- Document public consultation undertakings and outcomes.

## 1.4 Technical Memoranda

The following Technical Memoranda (TMs) were completed as part of Phase 1 of the Master Plan process:

- TM 1 WWTC Capacity and Potential Upgrades, dated July 2, 2019 (revised May 8, 2020), was prepared to summarize a preliminary process assessment of the WWTC and seven pumping stations (SPS). TM 1 is provided in Appendix A.
- TM 2 Growth Forecast, dated May 8, 2020, was prepared to summarize population and development projections for the Master Plan planning horizon. TM 2 is provided in Appendix B.
- TM 3 Condition Assessment of the WWTC and 7 SPS, dated June 3, 2019 (revised May 8, 2020), was prepared to summarize a condition assessment of the WWTC buildings and process infrastructure in addition to the seven SPS. TM 3 is provided in Appendix C.
- TM 4 Wastewater Conveyance System Model Assessment, dated May 8, 2020, was prepared to summarize the basis of development of a sanitary trunk system hydraulic computer model, and present the results of a hydraulic capacity evaluation of the system under various scenarios. TM 4 is provided in Appendix D

It should be noted that the above-noted TMs form much of the technical basis for Project File Report and should be referenced as needed.

## 1.5 Class Environmental Assessment and Master Planning Process

The Ontario Environmental Assessment Act (Act) sets out a planning and decision-making process to consider potential environmental effects before a project begins. The purpose of the Act is to provide for the protection and conservation of the natural environment (R.S.O. 1990, c.E.18, s.2).

The Municipal Class EA process is followed for common types of projects to streamline the review process while ensuring that the project meets the requirements of the Act. In 1987, the first Class EA document prepared by the Municipal Engineers Association (MEA) on behalf of Ontario Municipalities was approved under the Act. Updates and amendments were subsequently made in 1993, 2000, 2007, 2011, and 2015.

The Class EA process includes the following stages:

- Phase 1: Problem and/or opportunity identification.
- Phase 2: Identification and evaluation of alternative solutions.
- Phase 3: Identification and evaluation of design concepts.
- Phase 4: Complete and place Environmental Study Report on Public Record.
- Phase 5: Implementation and monitoring.

Since projects may vary in their environmental impact, they are classified in terms of the following schedules:

- Schedule ‘A’ projects usually have minimal environmental effects and generally include normal or emergency operational and maintenance activities. These projects are preapproved under the Class EA planning process. Projects within this category are subject to Phases 1 and 5.
- Schedule ‘A+’ projects are pre-approved projects similar to Schedule ‘A’, however, the public is to be advised prior to project implementation.
- Schedule ‘B’ projects have the potential for some adverse environmental impacts and therefore, the proponent is required to proceed through a screening process, including consultation with affected parties. Generally, these projects include improvements and minor expansions to existing facilities. Projects within this category are subject to Phases 1, 2, and 5.
- Schedule ‘C’ projects have the potential for greater environmental impacts and are subject to all five Class EA Phases. Generally, these projects include the construction of new facilities and major expansions to existing facilities.

A Master Plan is conducted under the framework of the MEA Class EA Process. It is a planning tool that identifies infrastructure requirements for existing and future land use, through the application of environmental assessment principles, and is intended to satisfy Phases 1 and 2 of the Class EA process. The Municipal Class EA identifies four approaches to the Master Planning process.

This Master Plan is being completed with sufficient detail to fulfill the requirements for Schedule 'B' projects (Approach 2). Projects categorized as Schedule B or Schedule C undertakings have the potential for significant environmental impacts and are required to follow specific phases under the Municipal Class EA. This includes consultation with all parties that may potentially be affected by the project and the preparation of a Class EA Project File or Environmental Study Report that documents the Class EA process.

For this Master Plan, a Project File or Environmental Study Report will be made available for public and agency review at the completion of the Class EA process for a mandatory 30-day period. If there are no requests to the Minister of the Environment, Conservation and Parks (MECP) for a 'Part II Order' within the review period, then the project can proceed to implementation (Phase 5).

# 2.0 PLANNING CONSIDERATIONS AND GROWTH PROJECTIONS

## 2.1 Planning and Policy Considerations

### 2.1.1 Provincial Policy Statement

The 2020 Provincial Policy Statement (PPS) provides general policy guidance on matters of provincial interest related to land use planning and development. The 2020 PPS also provides policy direction for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural environment.

All local planning matters must be consistent with the 2020 PPS, which is issued under Section 3 of the Planning Act. Policies related to infrastructure, servicing (sewer and water), climate change, natural heritage wetlands and water, and aboriginal interests may have implications at the Master Plan level. In subsequent phases of this Master Plan, alternatives will be assessed on the basis of conformance with the 2020 PPS.

Within the study area there are existing partially or un-serviced developments. As part of the Master Plan it has been assumed that all new growth areas would be serviced and that existing un-serviced or partially serviced areas adjacent to service extensions would also be serviced. Full servicing is the preferred form of servicing for settlement areas in the 2020 PPS to support protection of the environment and minimize potential risks to human health and safety.

### 2.1.2 Golden Horseshoe

The study area is not subject to the Oak Ridges Moraine Conservation Plan, Niagara Escarpment Plan, Greenbelt Plan, and Lake Simcoe Protection Plan. The study area is subject to the Growth Plan for the Greater Golden Horseshoe. It is identified as a Primary Urban Settlement Area in the Growth Plan for the Greater Golden Horseshoe (2017) and is anticipating continued growth and development in the community. The Plan was released on May 18, 2017 and came into effect on July 1, replacing the Growth Plan for the Greater Golden Horseshoe, 2006.

### 2.1.3 County Official Plan

In accordance with the 2017 Growth Plan for the Greater Golden Horseshoe, the County of Simcoe is undertaking a Municipal Comprehensive Review which will provide the basis for an update to the Simcoe County Official Plan (SCOP). The SCOP sets out a broad County policy framework regarding development and land use within the County. The SCOP incorporates the basic planning policies of the Provincial Policy Statement, the Growth Plan for the Greater Golden Horseshoe, and other Provincial policies, which the County administers on behalf of the Province of Ontario.

### 2.1.4 Town Official Plan

The Town released a Draft for Public Comment version of the Official Plan in May 2017, a Second Draft was released in February 2019 as a second public draft for public review. The Town's Official Plan was completed in November 2019. As outlined in the Official Plan, the purpose of the document is to clearly define a planning structure to provide direction for future growth and development within the Town to the year 2031.

## 2.2 Population and Employment Growth Forecast

As a lower tier municipality, growth projections for the Town are typically derived from Provincial and/or Simcoe County estimates. In 2017 the Ontario Ministry of Municipal Affairs released the Growth Plan for the Greater Golden Horseshoe which provided distribution of residential population and employment for Simcoe County to 2031. Provincial distribution of population and employment provided from the report aligns with the Simcoe County Growth Plan Amendment No. 1.

Simcoe County is currently completing a Municipal Comprehensive Review (MCR) of their Official Plan and formal growth allocations for Midland have not yet been made available. In the interim, population and employment projections were estimated by the Town using growth allocations from the Province for Simcoe County for 2031, 2036, and 2041 and distributed to Midland based on previous percent allocations used by the County. This allocation is summarized in Table 2-1 below.

**Table 2-1: Estimated Population and Employment Projections**

| | 2006* | 2031 | 2036 | 2041 |
|---|---|---|---|---|
| **Population** | 16,900 | 22,500 | 24,663 | 26,881 |
| **Employment** | 12,000 | 13,800 | 15,127 | 16,487 |

** 2006 Census Data - Statistics Canada*

Technical Memorandum No. 2 – Growth Forecast (Appendix B), provides detailed information on population and development projections on growth allocations. Based on the Town's projections, the anticipated residential population for the 20-year horizon in 2041 is 26,881, an increase of 6,621 persons from 2021. Using the Town's current population density of 2.2 people per unit for residential areas this equates to 3,010 new units between 2021 and 2041. Table 2-2 summarizes the allocation of residential growth to 2041 and beyond 2041. Figure 2-1 shows the distribution of future residential development.

Based on the Town's projections, the anticipated employment for the 20-year horizon in 2041 is 16,487, an increase of 3,407 persons from 2021. As documented in Technical Memorandum No. 2 assumptions were made to estimate the number of hectares of employment land required to 2041, and 33 ha are required between 2021 and 2041. Table 2-3 summarizes the allocation of employment growth. Figure 2-1 shows the distribution of future employment related development.

**Table 2-2: Allocation of Residential Growth**

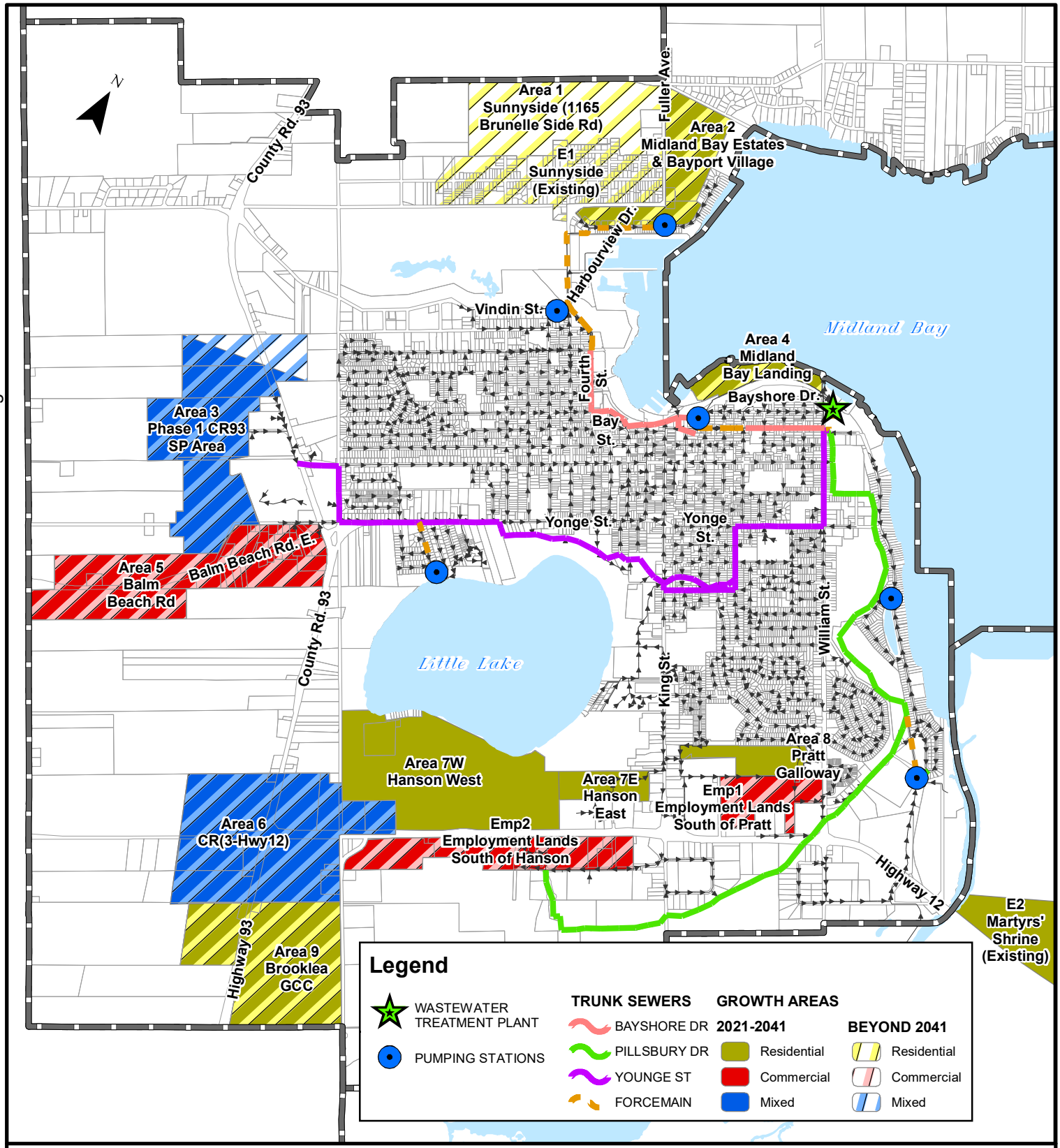
| Area No. | Name | Draft Approved | Vacant | Total | Developed 2021-2041 | Developed > 2041 |
|---|---|---|---|---|---|---|
| 1 | Sunnyside (1165 Brunelle Side Road) | 0 | 916 | 916 | 0 | 916 |
| 2 | Midland Bay Estates (Phase 1) | 92 | 0 | 92 | 92 | 0 |
| | Bayport Village (Phase 2) | 467 | 0 | 467 | 233 | 234 |
| 3 | Phase 1 CR93 SP Area | 0 | 1,764 | 1,764 | 115 | 1,649 |
| 4 | Midland Bay Landing | 0 | 1,089 | 1,089 | 545 | 544 |
| 5 | CR (3-Hwy12) | 0 | 1,029 | 1,029 | 0 | 1,029 |
| 6 | Hanson | 1,702 | 0 | 1,702 | 1,702 | 0 |
| 7 | Pratt Galloway | 202 | 0 | 202 | 202 | 0 |
| 8 | Brooklea GCC | 0 | 1,606 | 1,606 | 114 | 1,492 |
| 9 | Sunnyside (Existing) | 0 | 0 | 0 | 0 | 200 |
| 10 | Martyr's Shrine (Existing) | 0 | 0 | 0 | 7 | 0 |
| | | | **Total Allocated** | | **3,010** | **6,064** |

**Table 2-3: Allocation of Employment Growth**

| Area No. | Name | EA / Commercial (ha) | Developed 2021-2041 (ha) | Developed > 2041 (ha) |
|---|---|---|---|---|
| 11 | Phase 1 CR93 SP Area | 19.7 | 6.6 | 13.1 |
| 12 | Balm Beach Road (Phase 1) | 20.6 | 20.6 | 0.0 |
| | Balm Beach Road (Phase 2) | 36.1 | 0.0 | 36.1 |
| 13 | CR (3-Hwy12) | 32.9 | 9.4 | 23.6 |
| 14 | Employment Land's South of Pratt | 16.7 | 5.6 | 11.1 |
| 15 | Employment Lands South of Hanson | 21.2 | 7.1 | 14.1 |
| | | **Total Allocated** | **33(1)** | **98** |

Table Notes:

(1) Growth for Balm Beach Road Phase 1 includes 30 existing units (16.3 ha) that has been excluded from the total allocated.




PROJECT:

# TOWN OF MIDLAND WASTEWATER MASTER PLAN

MIDLAND, ONTARIO

DRAWING:

## PROJECTED RESIDENTIAL AND EMPLOYMENT GROWTH AREAS

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| JLR #: | 28243 |

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FIGURE 2-1

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# 3.0 OVERVIEW OF EXISTING INFRASTRUCTURE

## 3.1 System Overview

The current wastewater system consists of the Midland WWTC, seven sewage pumping stations (SPS) and associated forcemain, and over 100 km of dedicated or combined storm/sanitary sewermain.

## 3.2 Previous Studies and System History

A chronological summary of the history of the Midland WWTC is provided in Table 3-1.

**Table 3-1: Midland WWTC System History**

| Year | Activity Description |
|---|---|
| 1966 | The Town of Midland primary sewage treatment plant is constructed with a capacity of 5,678 $m^3$/day. |
| 1980 | The Midland WWTC was expanded in 1980 from the existing 5,664 $m^3$/day(236 $m^3$/h) (average day flow) primary sewage treatment plant to a new 13,680 $m^3$/day (570 $m^3$/h) (average day flow) activated sludge sewage treatment plant with an effluent discharge into Midland Bay.<br>The expansion included the following:<br>• Influent works<br>• Primary Effluent Collection Chamber and Piping to Aeration Tanks<br>• Aeration Tank<br>• Final Clarifiers<br>• Chlorination Tank and Building<br>• Outfall<br>• Sludge Dewatering Building<br>• Chemical Feed System<br>• Standby Power |
| 1994 | R.V. Anderson (RVA) completed an Environmental Study Report (ESR) for the Wastewater Treatment System Improvements Class EA. The study examined alternatives to meet the required improvements for the Plant which were to:<br>• Provide additional treatment capacity for existing loadings;<br>• Provide additional treatment capacity for future growth and;<br>• Minimize/eliminate sewage bypassing of the existing WWTC.<br>In addition to the ESR, RVA also completed a Process Optimization and Capacity Study for the WWTC. The potential treatment capability of the existing facility and actual capacity were established. This optimization study was used as a basis for the ESR. |

| Year | Activity Description |
|---|---|
| 1995 | In 1995, the Midland WWTC underwent an expansion and upgrades to various plant facilities. One additional primary clarifier was installed to increase the primary clarification capacity. Other expansions included a 1400 $m^3$ storm bypass detention facility and additional biosolids handling facilities, including the installation of one new 1000 $m^3$ primary digester and the conversion of the existing primary digester to a secondary digester. There was with no increase in capacity of the secondary biological treatment capacity of the plant. The existing gas chlorination system was replaced with a sodium hypochlorite system. The existing Pumping Station No. 2 was relocated within the WWTC site. |
| 2005 | R.J. Burnside completed a study to investigate sewage pumping station options to provide sufficient capacity to accommodate the projected growth in the service area for SPS No. 4 – Aberdeen (formally Pillsbury). |
| 2009 | In 2009, the Midland WWTC had a new effluent dechlorination system, a new stormwater chlorination system and one new standby diesel generator installed. |
| 2014 | In 2014, the Town completed a development charges background study based on the growth from 2014 to 2031 (17 years). A 0.628 $m^3$/capita/day factor was used to determine the cost of the WWTC related to growth between these years.<br>The study identified:<br>• Septage receiving station - $810,000 (79% cost allocated to existing)<br>• Aerators – $1,545,000 (100% development)<br>• Secondary Clarifier Expansion - $1,100,000 (100% development) |
| 2015 | The XCG Nutrient Management Plan identified options for end-uses of the sewage and recommended the Town consider providing partial or complete dewatering at the WWTC. |
| 2017 | The Town submitted a Staff Report to the Council to consider the opportunity to improve the environmental impact that the King Street Rejuvenation project would have on the raw sanitary sewage by-passes into Midland Harbour.<br>The options that were proposed for consideration includes:<br>(1) Eliminate sewage by-passes at Combined Sewer Outlet (Chamber A)<br>(2) No change to Chamber A and undertake an inflow and infiltration study,<br>(3) Undertake an economic analysis of the environmental impacts of the sewage by-passes |
| 2019 | Tatham Engineering completed a flow monitoring study to provide ways that wastewater overflows into Midland Harbour during wet weather events can be eliminated. This study was done in conjunction with the King Street rejuvenation project.<br>A preliminary assessment of the design basis for the sanitary sewer between the Chamber A and Sewage Pumping Station No. 1 was conducted. |

## 3.3 Midland Wastewater Treatment Center

### 3.3.1 Treatment Plant Overview

The Midland WWTC is a conventional activated sludge plant and provides secondary treatment for combined industrial and domestic wastewater. The plant also has a storm equalization tank that can be used to provide temporary storage, or preliminary treatment and disinfection in the event of a plant bypass.

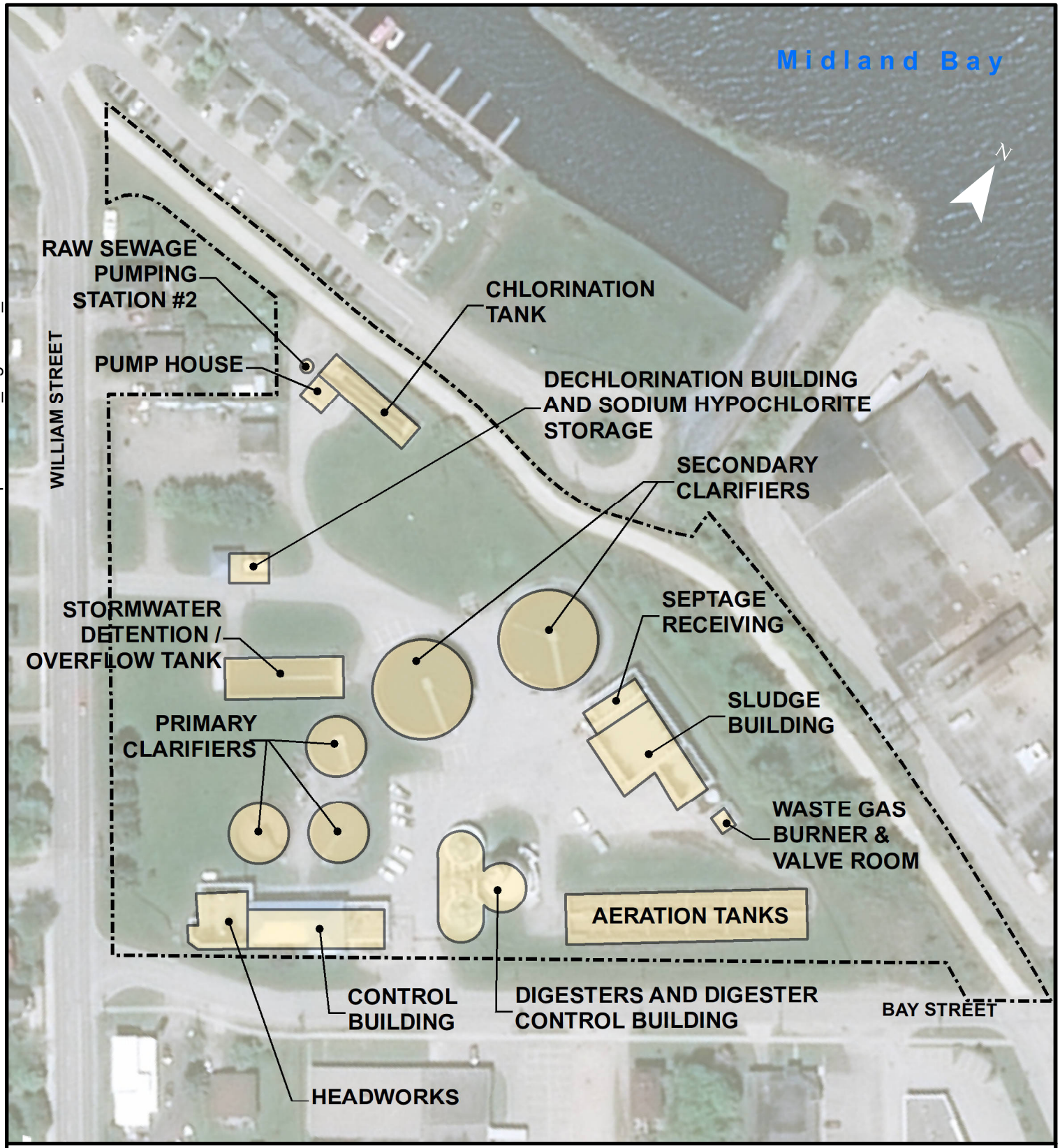
The Midland WWTC generally consists of the following treatment units:

- Fine screening and grit removal in the headwork's building;
- Primary clarification in three circular clarifiers;
- Aeration in six aeration tanks equipped with mechanical aerators;
- Secondary clarification using liquid chlorine (sodium hypochlorite);
- Dechlorination using calcium thiosulphate;
- Sludge digestion using anaerobic digestion with one primary and two secondary digesters;
- Storm equalization with 1,400 $m^3$ rectangular tank and overflow chlorination; and
- Septage Receiving with two receiving tanks each with a volume of 136 $m^3$.

The influent flow is measured using a Parshall flume in the Headworks Building. Effluent flow is measured based at the chlorine contact overflow weir. Phosphorus precipitation is achieved through alum addition (600 L/day dosage) split between the primary clarifiers and the mixed liquor flow from the final aeration basin to the secondary clarifiers.

Solids generated at the plant are anaerobically digested. The primary underflow is pumped to a two-stage egg-shaped anaerobic digester. Two secondary digesters are for thickening and temporary biosolids storage. Digested sludge is hauled off-site for land utilization. The Town of Midland has an agreement with the Region of Huronia Environmental Services to provide required transportation and disposal services for all biosolids to be used for land utilization.

Refer to Figure 3-1 for an overview of the existing WWTC site plan and key infrastructure.




PROJECT:

# MIDLAND WASTEWATER MASTER PLAN

TOWN OF MIDLAND

DRAWING:

## WASTEWATER TREATMENT CENTER SITE PLAN

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FIGURE 3-1

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### 3.3.2 Certificate of Approval Requirements

The Midland WWTC is operated in accordance with the Environmental Compliance Approval (ECA) Number 5708-A72SPG, dated July 20, 2016. The WWTC is rated for an average day flow of 15,665 $m^3$/day and a peak flow rate of 37,000 $m^3$/day. The key objective and compliance requirements for the treatment system are outlined in Table 3-2 and Table 3-3 below.

**Table 3-2: Effluent Objectives (ECA No. 5708-A72SPG)**

| Parameter | Concentration in Effluent | Waste Loading in Effluent |
|---|---|---|
| Carbonaceous Biochemical Oxygen Demand (CBOD5) | 7.0 mg/L | 4,856 kg/month |
| Total Suspended Solids | 7.0 mg/L | 4,856 kg/month |
| Total Ammonia Nitrogen (June 1 to August 31) | 5.0 mg/L | - |
| Total Phosphorus | 0.3 mg/L | 146 kg/month |
| Total Residual Chlorine | <0.02 mg/L | - |
| *E. coli* | 200 organisms/100 mL | - |

**Table 3-3: Effluent Limits (ECA No. 5708-A72SPG)**

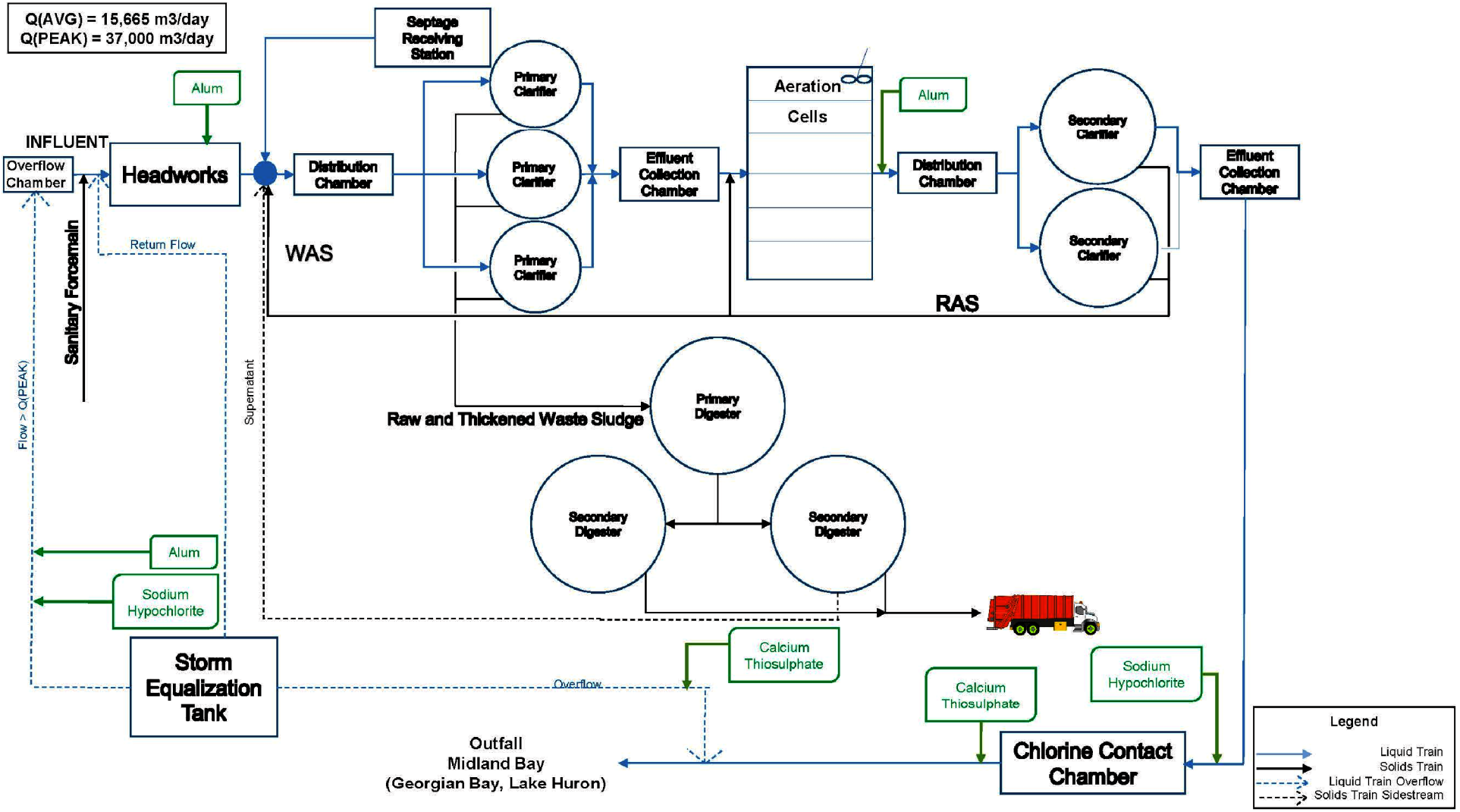
| Parameter | Conc. Effluent | Non-compliance |
|---|---|---|
| CBOD5 | 10.0 mg/L | Annual average concentration means the arithmetic mean of the monthly average concentrations of a contaminant in the effluent calculated for any particular calendar year |
| Total Suspended Solids | 10.0 mg/L | Annual average concentration means the arithmetic mean of the monthly average concentrations of a contaminant in the effluent calculated for any particular calendar year |
| Total Ammonia Nitrogen | 10.0 mg/L (June 1 to August 31) | Monthly average concentration means the arithmetic mean of all daily concentrations of a contaminant in the effluent samples or measured, or both, during a calendar month |
| | 15.0 mg/L (September 1 to May 31) | Monthly average concentration means the arithmetic mean of all daily concentrations of a contaminant in the effluent samples or measured, or both, during a calendar month |
| Total Phosphorus (Monthly Limit) | 0.4 mg/L | Monthly average concentration means the arithmetic mean of all daily concentrations of a contaminant in the effluent samples or measured, or both, during a calendar month |
| Total Phosphorus (Annual Limit) | 0.3 mg/L<br><br>Waste Loading: 1,716 kg/year (1) | Annual average concentration means the arithmetic mean of the monthly average concentrations of a contaminant in the effluent calculated for any particular calendar year<br>Annual average loading means the value obtained by multiplying the annual average concentration of a contaminant by the annual average daily flow over the same calendar year |
| Total Residual Chlorine | 0.02 mg/L | Monthly average concentration means the arithmetic mean of all daily concentrations of a contaminant in the effluent samples or measured, or both, during a calendar month |
| E. coli | 200 organisms/ 100 mL | Maintained always |
| pH | Maintained between 6.0 – 9.5 | Maintained always |

Table Notes:

(1) The Total annual phosphorous loading is based on an annual average daily flow rate of 15,665 $m^3$/day and effluent total phosphorous concentration of 0.3 milligram per litre.

### 3.3.3 Wastewater Treatment Unit Processes

The following is a description of each process treatment system at the Midland WWTC. A high level process flow diagram is provided in Figure 3-2 and is to be read in conjunction with the following sub-sections.




PROJECT:

# MIDLAND WASTEWATER MASTER PLAN

TOWN OF MIDLAND

DRAWING:

## COLLECTION SYSTEM SCHEMATIC

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# FIGURE 3-2

#### *11.1.2.1. Headworks*

Raw sewage enters the headworks in a single channel which is separated by a cut-water gate into two separate channels that have a combined capacity of 683 L/s (2,460 $m^3$/hour). The cut-water gate automatically opens to direct excess flow down the second channel as required for high flow events exceeding 185 L/s. The primary train has a barminutor screening system with a detritor grit removal system, while the bypass train has a Pista® grit removal system and a comminutor. For phosphorous precipitation, aluminum sulphate is added to the flows before entering the primary clarifier influent distribution chamber.

In spite of adequate theoretical hydraulic capacity, operators have reported that under current peak flows of 37,000 $m^3$/day the headworks appears to operate at or near capacity. Lack of detailed hydraulic information for specific equipment, possible hydraulic constraints to the grinder and/or barminutor, and/or increased binding of screens by debris during high wet weather flows may be contributing to these issues.

In a storm event, where flow exceeds 290 L/s an overflow gate automatically opens directing excess flow to the storm equalization tank. An overflow chamber (Man Hole No. 28) with a motorized sluice gate and 750 mm diameter bypass sewer line discharges to the storm detention/overflow tank.

#### *11.1.2.2. Primary Treatment*

Screened sewage is directed to the three parallel circular primary clarifiers for settlement, with a total rated peak flow clarification capacity of 32,580 $m^3$/day. Waste activated sludge is added to the flow to co-thicken the sludge. The three primary clarifiers are equipped with scum collection and scraper system. Underflow sludge from each of the primary clarifiers is continuously pumped via dedicated piston pumps to the primary digester. Refer to Table 3-4 for a summary of key design parameters for the primary treatment system.

**Table 3-4: Primary Treatment Infrastructure – Primary Clarifiers**

| Description | Design Parameter |
|---|---|
| Type | Circular |
| Number | 3 |
| Diameter | Each: 15.2m |
| Design Side Water Depth (SWD) | Each: 3.4m |
| Surface Area | Each (Total): 181$m^2$, 544$m^2$ |
| Volume (1) | Each (Total): 617 $m^3$, 1851$m^3$ |
| Capacity – Peak Flow (2) | Each (Total): 10,860$m^3$, 32,580$m^3$ |
| Weir Length | 47.75 |

Table Notes:
(1) Value based on the design side water depth
(2) Based on a surface overflow rate of 60 $m^3/m^2$.

### *11.1.2.3. Secondary Treatment*

Primary effluent is aerated along with return activated sludge from the secondary clarifiers (the mixed liquor) in six aeration cells which can be operated in series or parallel, each with a volume of 478 $m^3$ and equipped with a 15 kW mechanical aerator. Refer to Table 3-5 for a summary of key design parameters for the aeration tanks. Aluminum sulphate is added to the flow in the mixed liquor channel before entering the secondary clarifiers. Flow proceeds to the two circular secondary clarifiers for settlement, equipped with two return activated sludge pumps with a rated capacity of 126 L/s. Sludge is pumped to aeration as return activated sludge and the remaining sludge is pumped to the primary clarifiers as wasted activated sludge for cothickening with the primary sludge. Refer to Table 3-6 for a summary of key design parameters for the secondary clarifiers.

**Table 3-5: Secondary Treatment – Aeration Tank Infrastructure**

| Description | Design Parameter |
|---|---|
| Type | Rectangular |
| Number | 6 |
| Dimensions | Each: 10.1m x 10.1m x 5.2m SWD |
| Volume(1) | Each (Total): 478 $m^3$, 1434 $m^3$ |
| Theoretical ADF Capacity | 21,000 $m^3$/day |
| Theoretical PHF Capacity | 37,000 $m^3$/day |

Table Notes:
(1) Volume from ECA.

**Table 3-6: Secondary Treatment – Secondary Clarifiers Infrastructure**

| Description | Design Parameter |
|---|---|
| Type | Circular |
| Number | 2 |
| Diameter | Each: 25.3m |
| Design Side Water Depth (SWD) | 3.6m |
| Surface Area | Each (Total): 500$m^3$, 1000$m^3$ |
| Volume(1) | Each (Total): 1810$m^3$, 3620$m^3$ |
| Theoretical ADF Capacity | 16,200 $m^3$/day |
| Theoretical PHF Capacity | 32,400 $m^3$/day |
| Weir Length | 79.5 |

Table Notes:
(1) Value based on design side water depth.

### *11.1.2.4. Disinfection*

Secondary effluent is disinfected year-round with sodium hypochlorite (approximately 12%) in the chlorine contact chamber. Subsequently flow is directed to the de-chlorination chamber and calcium thiosulphate is added for dechlorination. Refer to Table 3-7 for a summary of key design parameters for disinfection.

**Table 3-7: Disinfection Infrastructure**

| Description | Design Parameter |
|---|---|
| Type | Chlorination: Sodium Hypochlorite<br>Dechlorination: Calcium thiosulphate |
| Chlorine Contact Chamber Number | 3 Passes |
| Dimensions | 30 m by 10 m |
| Volume | 475 $m^3$ |

### *11.1.2.5. Digestion*

Sludge is processed in a two-stage anaerobic digestion process, one primary digester and two secondary digesters. The primary digester is a 1000 $m^3$ egg shaped digester that provides a hydraulic retention time of 15 days based on a daily sludge production of 55 $m^3$/day. One of the two secondary digesters is equipped with a floating fibreglass cover to store the produced gas, the other has a fixed roof. A waste gas flare stack is in place to burn off excess gas. Refer to Table 3-8 for a summary of key design parameters for digestion infrastructure.

**Table 3-8: Digestion Infrastructure**

| Description | Design Parameter |
|---|---|
| Type | Two-Stage Anaerobic |
| Number | 1 Primary, 2 Secondary |
| Volume (Primary) | 1000 $m^3$ |
| Volume (Secondary) | Each (Total): 454 $m^3$, 908 $m^3$ |

XCG prepared a Nutrient Management Plan for the WWTC in 2008. The plan outlined the current situation at the WWTC, and options for consideration in the future. A long-list of alternatives were provided for end-uses of utilization on land, thermal processes or landfilling. Based on the existing situation in Midland, utilization on land was derived as the most viable option. After reviewing different options, the most cost-effective alternative was to implement the current method of conventional mesophilic anaerobic digestion. This alternative requires that the Town consider a strategy to provide multi end-use options for the future. The analysis conducted by XCG excluded the condition reviews of the existing assets, and maintenance and upgrade needs for the digesters.

#### *11.1.2.6. Hauled Sewage Receiving*

Hauled sewage receiving has two hauled waste receiving tanks for sewage haulers to discharge into. During times of low flow the tank can be pumped to various areas of the plant to be treated. Refer to Table 3-9 for a summary of key design parameters for hauled sewage receiving infrastructure.

**Table 3-9: Hauled Sewage Receiving Tank Infrastructure**

| Description | Design Parameter |
|---|---|
| Type | Holding Tank and Septic Tank Waste |
| Number | 2 |
| Volume | Each (Total): 136$m^3$ (272$m^3$) |

This building retrofit was originally designed with an odour control system; however, it is no longer operational and operators have identified potential concerns with odour impacts on adjacent properties.

#### *11.1.2.7. Storm Equalization*

In the event that influent flow to the plant exceeds the primary treatment rated capacity, there is a storm detention/overflow tank with an approximate volume of 1400 $m^3$ for combined sewage flow detention. The headworks has an overflow chamber with a motorized sluice gate and bypass sewer line which discharges to the tank in a storm event where flows exceed 290 L/s.

The tank is equipped with two dewatering pumps to drain the tank to headworks, a sediment flushing system, and provisions for alum treatment and chlorination. A stormwater chlorination system is located inside the Chemical Building with a metering pump to feed sodium hypochlorite to the storm detention/overflow tank. Should the detention tank overflow the flow is dechlorinated prior to outfall into Georgian Bay. Refer to Table 3-10 for a summary of key design parameters for storm equalization infrastructure.

**Table 3-10: Storm Equalization Infrastructure**

| Description | Design Parameter |
|---|---|
| Surface Area | 320m$^2$ |
| Volume | 1400m$^3$ |

#### *11.1.2.8. Outfall*

A new plant outfall and overflow outfall were constructed as part of the 1980 plant upgrades. Both outfalls have a dimeter of 900 mm. The capacity of the limiting section of one outfall pipe is approximately 100,000 m$^3$/day (1,160 L/s).

#### *11.1.2.9. Emergency Power*

In 2009, a new standby diesel generator was installed at the WWTC to provide emergency power that meets the necessary requirements.

### 3.4 Pumping Station Overview

There are currently seven sewage pumping stations in the Town. All wastewater generated within the system is ultimately conveyed to the Midland WWTC via three main sewershed areas as follows:

**Bayshore Drive Trunk:**

- From the north end, the Bayport SPS No. 7 pumps to Vindin SPS No. 6 via forcemain. The route starts on Bayport Blvd. flowing west, then south to Harbourview Drive.
- From Vindin SPS No. 6, sewage is conveyed via forcemain which discharges to the trunk sewer on Fourth Street and Victoria Street. The sewage then flows to the Bay SPS No. 1 via gravity.
- From Bay SPS No. 1, sewage is pumped to the WWTC via twinned forcemains which discharge to a trunk sewer on Bay Street and Russell Street, which flows to the WWTC via gravity.

**Young Street Trunk:**

- Russ Howard SPS No. 5 discharges to the trunk sewer at the intersection of Russ Howard Drive and Yonge Street via forcemain. The sewage flows via gravity to the WWTC.

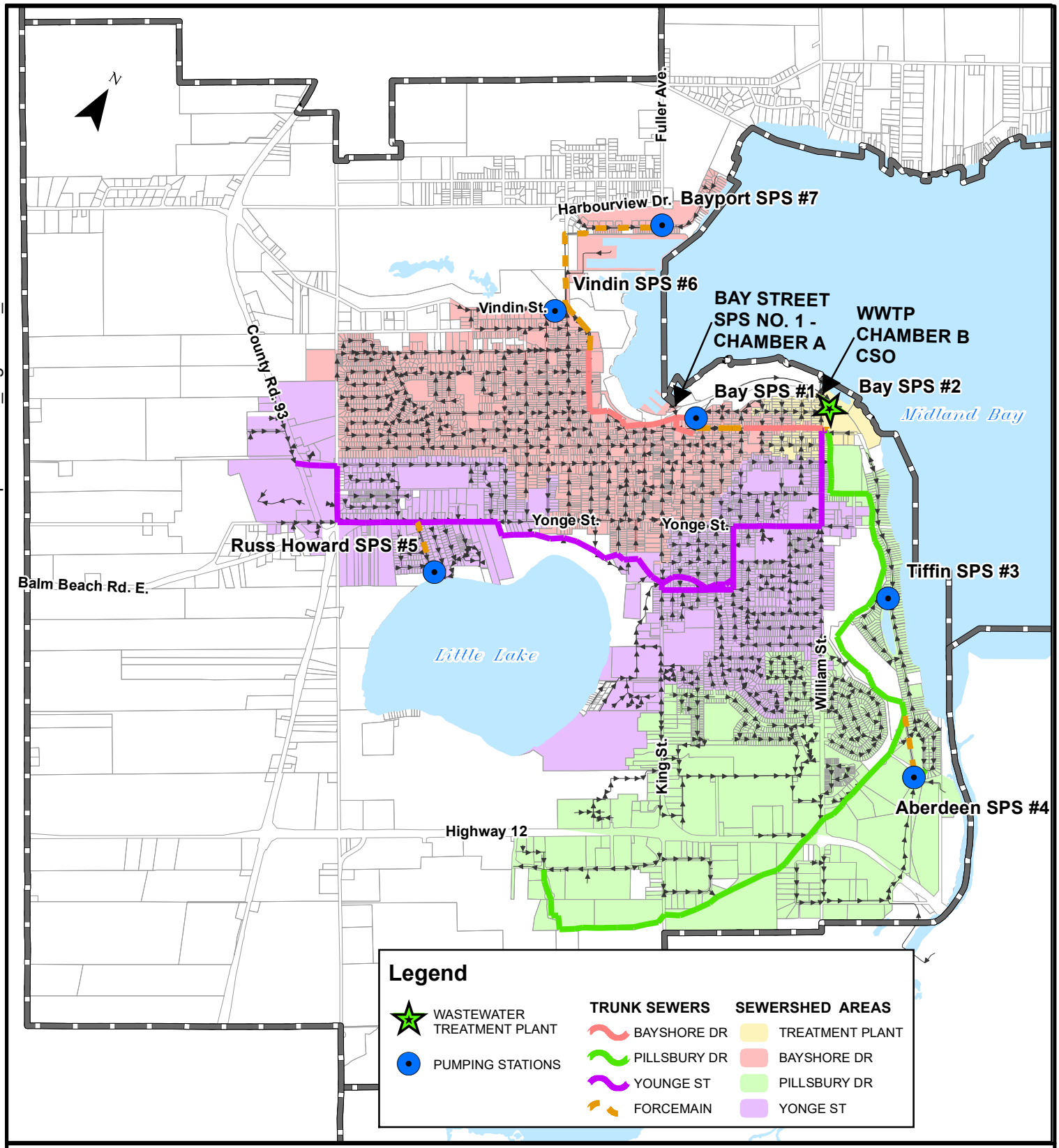
**Pillsbury Drive Trunk:**

- Pillsbury SPS No. 4 discharges via forcemain to a trunk sewer just north of the Pillsbury Drive and Aberdeen Blvd intersection along the trail path. The trunk sewer then discharges to the WWTC via gravity.
- The Aberdeen SPS No. 3 discharges via forcemain to the trunk sewer flowing from Pillsbury SPS No. 4 just west of the Aberdeen Drive and Taylor Drive intersection in the forested area. The trunk sewer then discharges to the WWTC via gravity.

Table 3-11 provides a summary of each sewage pumping stations capacity and location. Refer to Figure 3-3 for an overview of the existing collection system and sewershed areas.

**Table 3-11: Sewage Pumping Station Inventory and Operational Characteristics**

| Station No. | Pumping Station | Year of Construction (Major Upgrade) | Pumping Infrastructure / Rated Capacity | Address / Description |
|---|---|---|---|---|
| 1 | Main Sewage | 1966 (1993) | 3 sewage pumps each rated at 125 L/s.<br>Firm Capacity: 250 L/s | 444 Bay Street. Single pump room and a below grade pump well |
| 2 | Bay SPS | 1966 | 2 submersible sewage pumps each rated for 50L/s at 11.5 m TDH.<br>Firm Capacity: 50 L/s | 200 Bay Street, main WWTC site. |
| 3 | Tiffin | 2007 | 2 self priming pumps each rated for 41.3 L/s.<br>Firm Capacity: 41.3 L/s | 518 Aberdeen Blvd. single storey pump house and separate below grade manhole well |
| 4 | Aberdeen | 1966 (2007) | 2 submersible pumps with each pump rated for 62 L/s.<br>Firm Capacity: 62 L/s | 101 Pillsbury Drive. Single storey above grade and a below grade wet well |
| 5 | Russ Howard | 2002 | 3 self priming pumps each rated at 11.3 L/s at 1.32 m TDH.<br>Firm Capacity: 11.3 L/s | 415 Russ Howard Drive. Single storey pump house and a separate below grade manhole well |
| 6 | Vindin | 2009 | 2 submersible pumps each rated at 60L/s at 14.2m TDH.<br>Firm Capacity: 60 L/s | 691 Vindin Street. Separate below grade manhole well |
| 7 | Bayport | 2008 | 2 self-priming pumps each rated at 42.7 L/s at 27 m TDH.<br>Firm Capacity: 42.7 L/s | 498 Bayport Blvd. Single storey pump house and separate below grade manhole well. |




PROJECT:

# TOWN OF MIDLAND WASTEWATER MASTER PLAN

MIDLAND, ONTARIO

DRAWING:

## EXISTING SEWERSHED AREAS

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FIGURE 3-3

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## 3.5 Main Sewage Pumping Station

### 3.5.1 Physical Description of Existing Infrastructure

Sewage Pump Station (SPS) No. 1 (Main Sewage Pumping Station) is located on Bay Street and operates under ECA Number 3-0622-93-006, issued by the Ontario MECP September 20, 1993. The station is downstream of Chamber A (refer to following section) and receives flow from the north and north-west portions of the Town. The station has three dry pit, centrifugal, non-clog, vertical sewage pumps each with a rated capacity of 125 L/s. The pumps are operated with one constant speed jockey pump rated at 100 L/s and two variable speed/frequency controlled pumps in order to provide the SPS design capacity not to exceed 250 L/s. The facility has one standby diesel generator and a motor control centre with all associated electrical and instrumentation works. From the Main Sewage PS, twin 450mm diameter forcemains are used to pump sewage to a 525 mm diameter gravity sewer, which discharges to the Midland WWTC. There is also an older forcemain that is not currently in service that runs north of Bayshore Drive to SPS No. 2.

### 3.5.2 Review of Pumping Station and Forcemain Capacity Study

C.C. Tatham & Associates Ltd. conducted a Flow Monitoring Study for the sanitary sewer along Bayshore Drive in support of the King Street Rejuvenation project (C.C. Tatham & Associates, 2019). The study provided a preliminary assessment of the design basis for the sanitary sewer in order to eliminate wastewater overflows into Midland Harbour during wet weather events. Flow monitoring was conducted for a continuous 12 month period from October 2017 to October 2018 to convey peak wastewater flows to the Midland WWTC and eliminate overflows at Chamber A. The study suggests the replacement of the sewer between Chamber A and SPS 1 with a 600 mm diameter sewer or larger. The findings from the study indicate no upgrades are required to SPS No. 1 and the discharge forcemains. However, from the study, SPS No. 1 did not appear to have excess capacity and once overflows are eliminated SPS 1 may need to be expanded. A Class EA study (Schedule B) would be required prior to design and implementation.

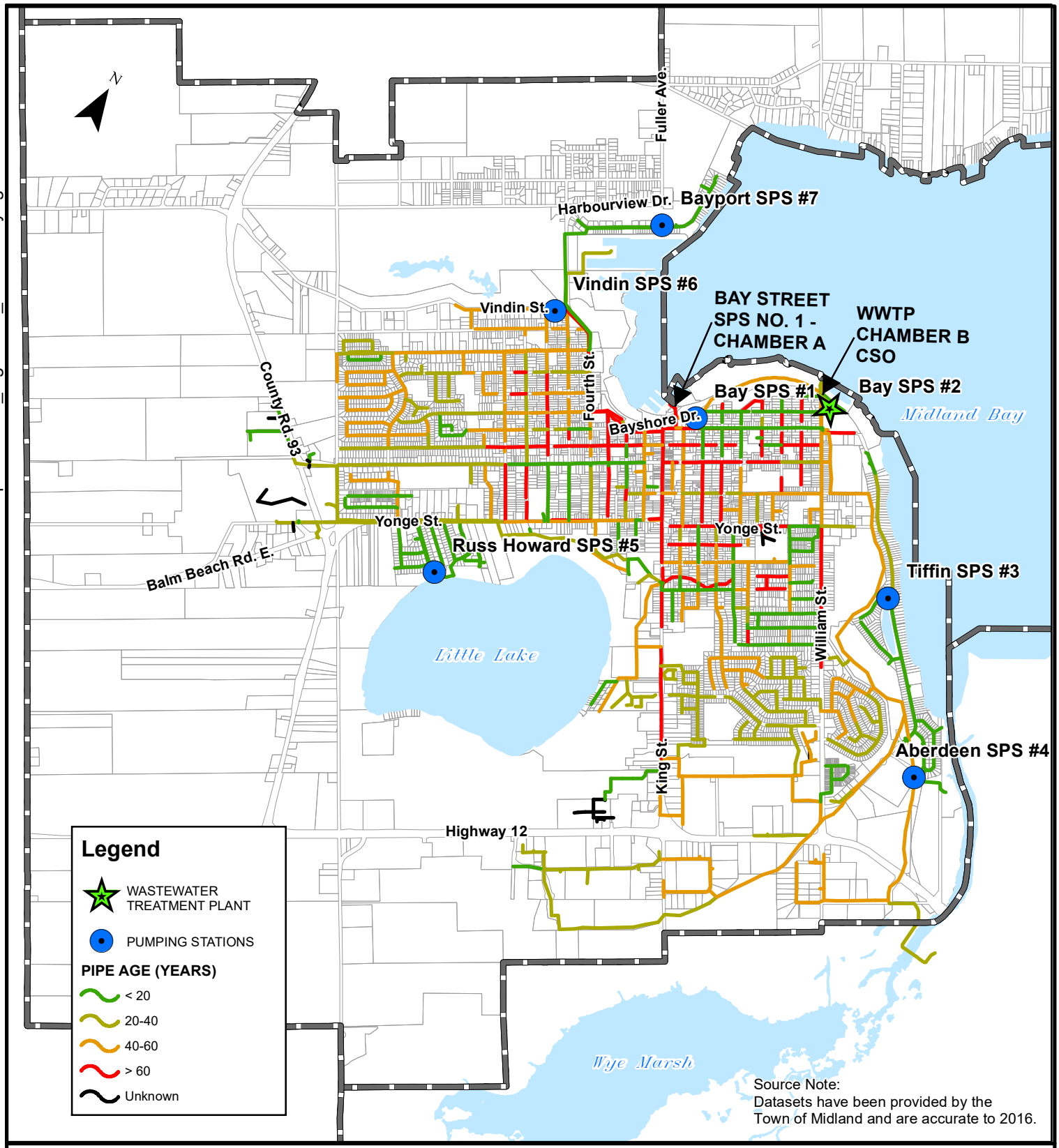
### 3.5.3 Chamber A

‘Chamber A’ is the Storm Overflow Chamber. It is located upstream of SPS No. 1 and collects flow from the storm conveyance system on Bay Street and combined sewer conveyance system on King Street. Flows that enter the sanitary side of Chamber A outlet to Pumping Station No. 1. Flows that enter the storm side of Chamber A outet to Midland Bay. When the sanitary (combined) sewer flows exceed the capacity of Pumping Station No.1 they overflow into the storm conveyance side of the Chamber, which outlets to Midland Bay.

Prior to the summer of 2020, the overflow elevation at Chamber A had been lowered in order to facilitate monitoring of the overflows at the SPS #1 Main SPS via a triangular weir. In 2020 the overflow elevation was raised back to its design level and the modelling results and analysis in the modelling conducted for the master plan are reflective of this higher elevation of the overflow weir.

## 3.6 Collection System

Figure 3-4 provided by information from the Town shows the approximate age of the pipes in the existing collection system. The age of the pipes range from less than 20 years to greater than 60 years, and the majority of the pipes are between 40 to 60 years and greater than 60 years. The Town is currently undergoing a pipe rehabilitation program to determine and address rehabilitation needs in the existing system. We also note that there are a few areas within the Town combined sewers, these are generally being separated when lifecycle replacements or upgrades occur in these areas.




PROJECT:

# TOWN OF MIDLAND WASTEWATER MASTER PLAN

MIDLAND, ONTARIO

DRAWING:

## AGE OF EXISTING WASTEWATER COLLECTION SYSTEM

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FIGURE 3-4

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## 3.7 Condition Assessment Findings

The JLR team participated in a multi-disciplinary on-site inspection on March 14, 2019. With the guidance of Town staff, the JLR team was visited all eight facilities (WWTC and the seven pumping stations). At each facility, the JLR team completed an assessment of the condition of the major building components based solely on visual observations and discussions with staff.

Technical Memorandum 3 (Appendix C) was prepared by reviewing the findings of each discipline, including Architectural and Structural, Building Electrical, Building Mechanical, Process Piping and Equipment, and Process Electrical. JLR prepared the Condition Assessment of the Egg Shaped Digester and Roof of Secondary Digester Final Report, dated March 29, 2019. Findings from the final report were also included in the Technical Memorandum 3. A project meeting was held with the Town's Staff on July 10, 2019. The Town's Staff identified existing issues, and preferences in the replacement/repair of specific components of the WWTC.

Table 3-12 summarizes the approximate near-term repair and replacement costs identified through this condition assessment. Overall, approximately $1.5M in lifecycle upgrades required at the WWTC and the sewage pumping stations were identified. In addition, further investigations were recommended to asses replacement needs and costs associated with minor architectural and structural damage or cracking in various locations, lighting and fire alarm systems, minor process equipment issues, etc. (refer to Appendix C). It is anticipated that once additional investigations are conducted, the cost of lifecycle upgrades will exceed $1.5M to address near term rehabilitation and replacement of existing assets, without consideration for expansion of the existing plant.

**Table 3-12: Summary of Condition Assessment Recommendations**

| Process Area | Opinion of Probable Cost | Description |
|---|---|---|
| **Wastewater Treatment Center** | | |
| Administration/Control Building Headworks | $12,000 | Seal penetrations, replace sealants, and re-rate equipment. Cover spray foam insulation, remediate leaking pipes, and repaint equipment. |
| Administration/Control Building | $29,000 | Replace original equipment, remove wiring/conduit, provide disconnects, and remove corroded parts. |
| Headworks | $316,000 | Replace/remove conduits, gates, further investigation for muffin monster control panel. Replace comminutor in the bypass train and replace guards on screenings. |
| Primary Clarification | $124,000 | Repaint metal platform above clarifier, reattach segments of guardrails, replace conduits, stem on sluice gate, and pumps. |
| Aeration System | $362,000 | Repair cracks and metal grating, replace conduit, junction boxes, inlet gate, effluent tipping gates and pipe and support brackets. |
| Secondary Clarifiers | $30,000 | Repair concrete slab and concrete stairs leading to the metal platform. Replace conduits and junction boxes, and scum collector plate. Remove corroded components of the weir plate and apply protective coating. |
| Chlorine Contact Tank | $12,000 | Replace plywood platform and ultrasonic level sensor, cladding and insulation, and seal pump disconnect conduit. |
| Chlorination and Effluent Water Building | $43,000 | Re-rate lifting hooks, re-paint peeled interior finishes, and grade away exterior asphalt surface, seal penetrations. Replace basement receptacles, effluent water piping, and remove abandoned wiring, conduits, and corrosion. |
| Dechlorination Building | $3,000 | Install cement protection board and splash pad/rainwater leader, repair foundation wall and replace and seal leaks. |
| Storm Tanks | $1,000 | Re-attach and weld segment of the guardrail. |
| Sludge Building (1) | $192,000 | Re-rate lifting hook, re-paint interior finishes and overhead door frames. Remove plywood wall coverings. Replace sealant in the joints, hot water circulation pumps, corroded sections of pipe, and damaged ducts. Install pipe extensions, and grinders. |

| Process Area | Opinion of Probable Cost | Description |
|---|---|---|
| Digesters and Digester Control Building | $202,000 | Re-paint interior finishes, replace metal door frame, corroded conduits, corroded pumps and pipes, and exterior metal siding panels, and install rainwater leader extensions. |
| **Sub-Total WWTC** | **$1,326,000** | |
| **Sewage Pumping Stations** | | |
| Bay SPS No. 1 – 444 Bay Street | $156,000 | Re-rate lifting hook, paint corroded structural steel framing members, lintels, exterior vent hood, and exposed soffit. Replace dented exterior metal siding panels, exhaust fan, outdoor lighting, corroded control panel, and generator. |
| Bay SPS No. 2 – 200 Bay Street | $6,000 | Replace corroded discharge pipe. |
| Aberdeen (Tiffin) SPS No. 3 – 518 Aberdeen Blvd. | $10,000 | Replace overhead door sweep, unit heater and faucet. Repair exterior stucco, install rainwater leader extensions. |
| Pillsbury SPS No. 4 - 101 Pillsbury Drive | $18,000 | Replace corroded vent, re-grade to mitigate pooling of stormwater within the building. |
| Russ Howard SPS No. 5 – 415 Russ Howard Drive | $1,000 | Reparge foundation walls. |
| Vindin SPS No. 6 – 691 Vindin Street | -- | |
| Bayport SPS No. 7 – 498 Bayport Blvd | $1,000 | Seal gap between overhead door frame and masonry, reinstate disconnected rainwater leader extension. |
| **Sub-Total SPSs** | **$192,000** | |
| **Grand Total** [(2)(3)(4)] | **$1,518,000** | |

Table Notes:
(1) Where immediate action is required, this should be addressed by the Town as this could lead to safety issues in the absence of intervention.
(2) Due to the results of further investigations required for components of the condition assessment, changes to the OPC should be anticipated.
(3) Costs associated with chlorination and dechlorination are specifically for the repair/upgrade of the current process. If a UV system is implemented, increase in costs should be expected.
(4) It is recommended that additional inspections to ensure full compliance with existing ESA and OESC requirements be conducted.

# 4.0 ENVIRONMENTAL AND LAND USE CONSIDERATIONS

## 4.1 Procedure F-5-5 Wet Weather Management

Regulatory considerations were reviewed as they pertain to requirements for treating wet weather flows, particularly the five procedures that form part of Guideline F-5 – Levels of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters. Procedure F-5-5 of Guideline F-5, which applies to combined sewer systems (CSS) with combined sewer overflows (CSOs), outlines the following requirements for managing and reducing CSOs:

1. Eliminate CSOs during dry-weather periods except under emergency conditions;
2. Establish and implement Pollution Prevention programs that address mitigating measures at the pollution source;
3. Establish and implement proper operation and regular inspection/ maintenance for combined sewer systems;
4. Establish and implement a floatables control program;
5. Maximize the use of an existing collection system for storage of wet weather flows;
6. Maximize the flow of wet weather flows to a wastewater treatment plant;
7. During a seven-month period commencing within 15 days of April 1 (i.e., April 1-15 to November 1-15) 90% of flow volume due to wet weather is to be captured and treated;
8. The flow captured must be given a minimum of primary treatment; removal of 30% carbonaceous biochemical oxygen demand and 50% total suspended solids for an average year within the stipulated seven-month period;
9. In addition to Item 8, dry weather flow is subject to the process effluent concentration criteria of the WWTP; and
10. During wet weather, for secondary treatment plants, the flows through the secondary treatment capacity will be subject to the process effluent concentration criteria of the WWTP. The flows in the WWTP which bypass the secondary treatment will be subject to a minimum level of primary treatment.

Procedure F-5-5 of Guideline F-5, will need to be considered in the development and selection of preferred treatment and conveyance options in this study.

## 4.2 Adjacent Property Uses

The Midland Wastewater Treatment Centre is operated by the Town and is located at 200 Bay Street, Midland, ON. Based on Schedule ‘A’ of the Town’s Official Plan, the land use surrounding the WWTC is categorized as mostly residential areas, with waterfront mixed use, employment, and open space areas as minority. Figure 4-1 shows the adjacent land use surrounding the WWTC.

The Midland WWTC has received no documented odour complaints. However, the existing and planned development (Mundy's Harbour Condominiums) along the waterfront near the WWTC may lead to odour concerns. Therefore, odour control may need to be considered at the septage receiving station or other processes at the plant.

## 4.3 Source Water Protection

Ontario's Clean Water Act provides the mandate for a provincial drinking water source protection program in Ontario. Its focus is on the protection of water sources for municipal drinking water systems, with additional attention to surface water and groundwater sources on the broader landscape.

The Severn Sound Source Protection Authority (SSSPA) released a Source Protection Plan in 2015, which was amended in 2018. The Town of Midland operates one groundwater based water supply system and has no surface water intakes. There are a number of well head protection areas (WHPAs) within the Town. No WHPAs from other municipalities cross into the Town of Midland. The location of vulnerable areas, to protect the source water for municipal residential drinking water systems, will need to be considered in subsequent stages of this study and during project implementation.

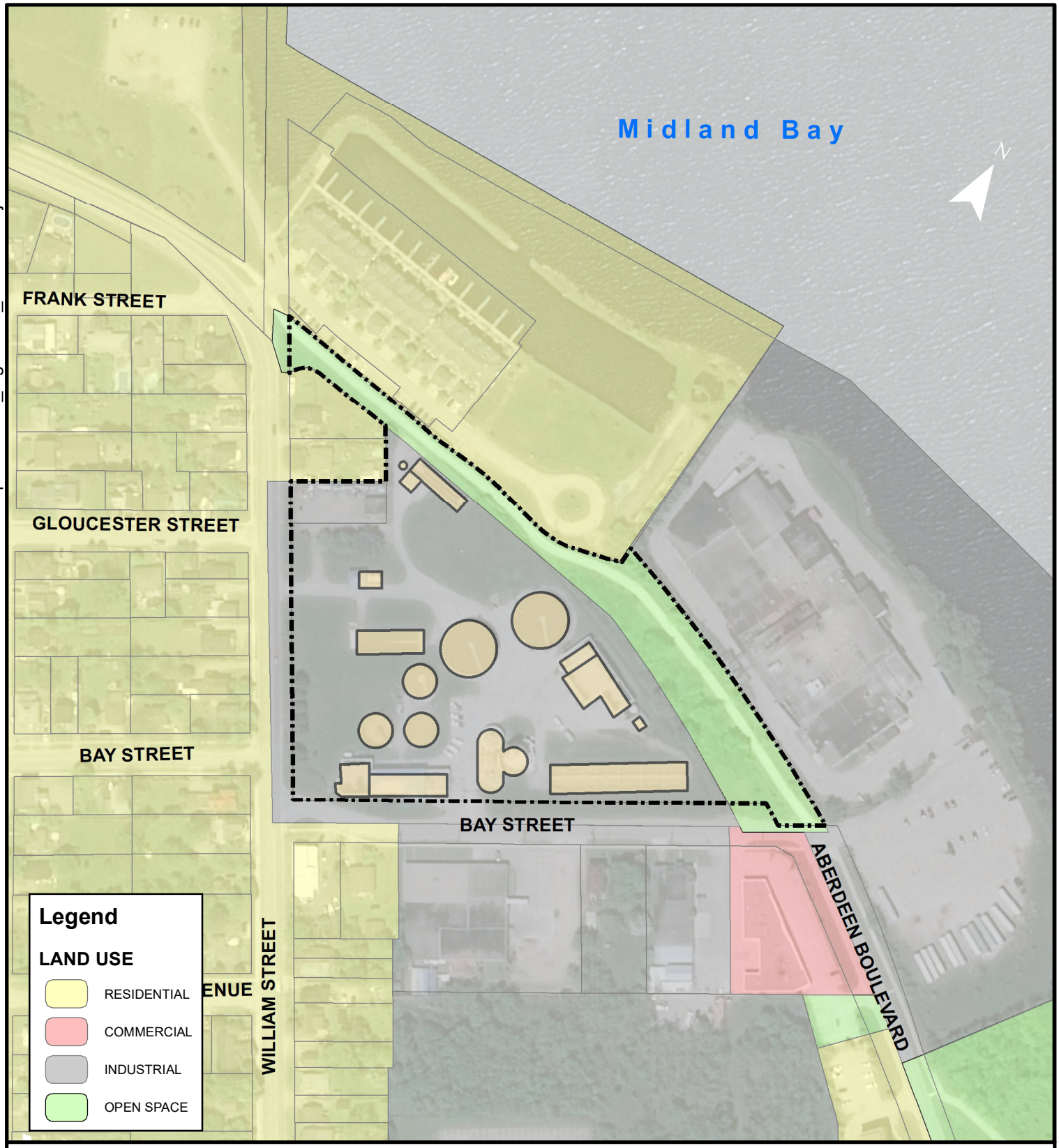
## 4.4 Natural Heritage

The Severn Sound Remedial Action Plan Report (RAP) identifies 65 species of fish (MECP, 1993). The majority of these fish species inhabit Severn Sound year-round. Between 1975 and 1993 the large diverse fish community structure underwent changes due to degradation in water quality and fish habitat. In some isolated years fish diversity in the community improved.

Studies conducted of the benthic community in Midland Bay in support of the RAP Report indicated good water quality with the exception of the inner harbour which has moderate water quality due to a moderate amount of dissolved nutrients present. Nuisance algae growth was attributed to phosphorous concentration and fish community balance. It is important to keep algae concentrations low because use of Midland Bay for swimming is of high importance.

There are some woodlots in Midland Area, including reforested, pastured woodlots and agricultural lands with corn, mixed grain, and hay systems. Wildlife habitat exists in Midland in the shoreline of Severn Sound and within forested areas of Town. Landscaping and design management practices implemented so WWTC lands continue to be compatible with surrounding vegetation and wildlife. Figure 4-2 shows natural features in close proximity to the study area.

Based on the findings from these previous studies, the potential for disruption to the natural environment is relatively low. However, that should be confirmed prior to implementation of the preferred alternative, particularly if work in or near a watercourse is proposed.




PROJECT:

# MIDLAND WASTEWATER MASTER PLAN

TOWN OF MIDLAND

DRAWING:

## ADJACENT LANDUSE SURROUNDING WASTEWATER TREATMENT CENTER

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FIGURE 4-1

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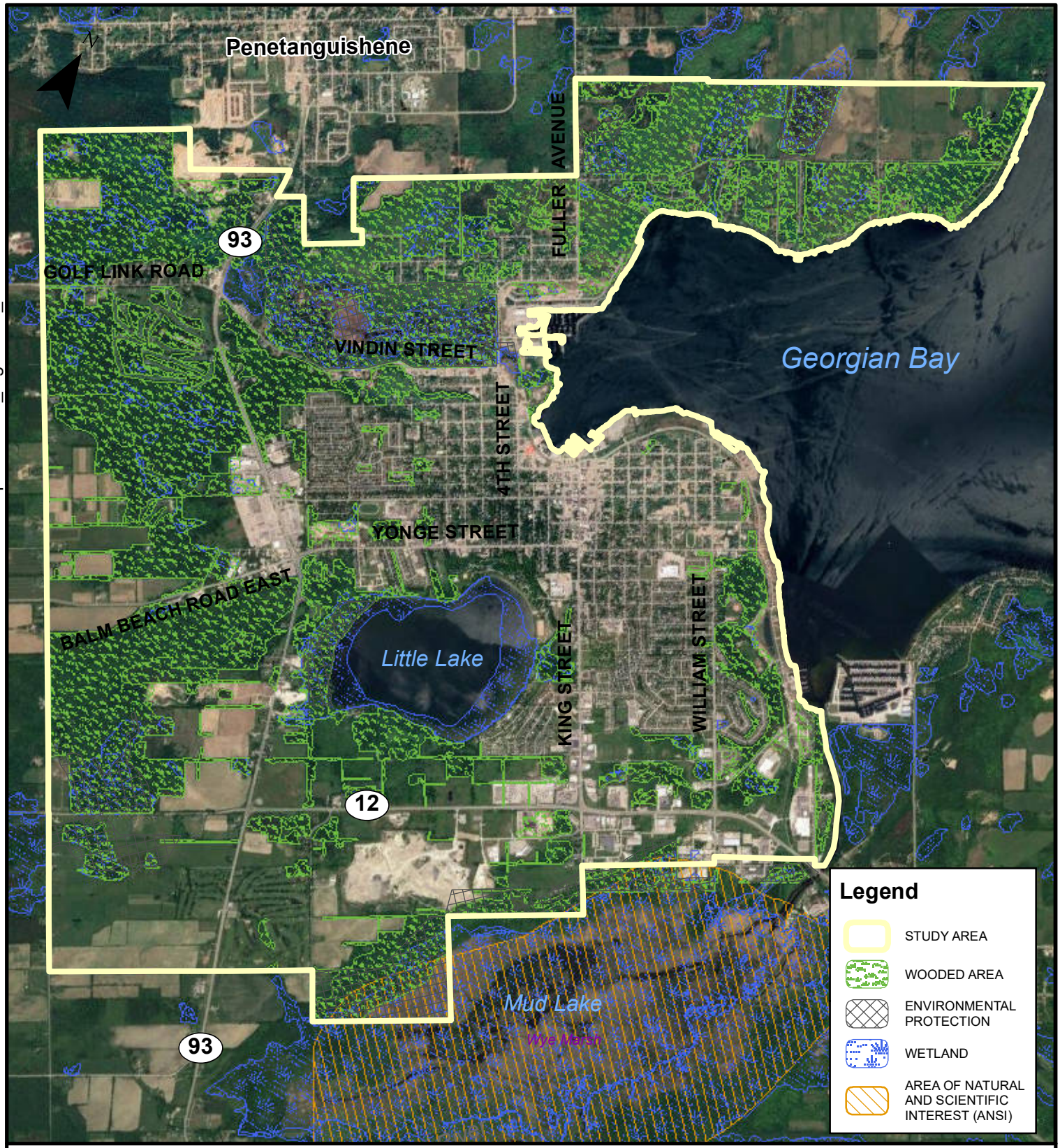


PROJECT:

# MIDLAND WASTEWATER MASTER PLAN

TOWN OF MIDLAND

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## NATURAL FEATURES AND HISTORICAL WASTE DISPOSAL SITES

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FIGURE 4-2

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## 4.5 Cultural Environment

The Ministry of Culture, Tourism and Sport (MCTS) screening built heritage resources and cultural heritage landscapes was conducted. The screening for cultural heritage is presented in Appendix F. The screening suggests that a Cultural Heritage Evaluation will be required prior to project implementation. This is because parts of the project area have been identified/designated under the Ontario Heritage Act as being of cultural heritage value and St. Marie Among the Hurons, a National Historic Site, is located near the study area boundary.

## 4.6 Archaeological Resources

The County of Simcoe completed an Archaeological Management Plan (AMP) on December 4, 2019, in order to conserve and protect rich cultural heritage and archaeological features and sites, and to address legislative requirements and policies of the Province and the County's Official Plan. Based on the conclusions from the AMP, the Town of Midland's WWTC falls within the historical archaeological site potential layer.

The MCTS screening for archaeological potential is presented in Appendix G. There are known archaeological sites within 300 m of the study area, and there are Aboriginal knowledge or historically documented evidence of past Aboriginal use within 300 m of the study area. There is also a known burial site/cemetery adjacent to the study area, the study area has been recognized for its cultural heritage value. Comprehensive mapping and inventories of built heritage resources were not considered in the AMP and may be required in the future, prior to project implementation.

## 4.7 Geology and Hydrogeology

Results of a geotechnical investigation of the Midland WWTC site completed in 1980, indicate the site is located on the Simcoe Lowlands Physiographic Region. Subsurface conditions generally consist of sandy gravelly and sometimes boulder till with some fluvio-glacial (outwash) materials overlying some areas.

No geotechnical or hydrological investigations are to be completed as part of the scope of this Master Plan; however, it is generally understood sub-surface conditions are consistent with the findings from previous geotechnical investigations. Investigations should be completed prior to any construction to verify site specific conditions.

## 4.8 Microplastics Entering Severn Sound Watershed

In partnership with Severn Sound Environmental Association and Georgian College, a report on microplastics entering Severn Sound Watershed via wastewater effluent was prepared identifying issues with microplastic particles entering freshwater ecosystems via wastewater discharge. Microplastics are degraded residues from non-recycled plastics. They are detrimental to all life forms that depend on water bodies due to entanglement and ingestion that results in blockage of digestive tracts, internal bleeding, death from starvation, etc.

Analysis was conducted to determine the presence of microplastics in the Midland WWTC, in addition to WWTPs in Penetanguishene, Victoria Harbour, and Port McNicoll. Three samples were obtained from the last point of access after the chlorination contact system, before the final weir. The analysis showed small amounts of fragments, film, and foam. It was determined that plastic microfibers made up 90% of the plastic pieces found in the collected samples. Various technologies have been developed to mitigate the risks associated with the presence of microplastics in freshwater ecosystems and could be considered in subsequent stages of this Master Plan.

## 4.9 Climate Change

It is anticipated that potential upgrades to the WWTC may lead to the production of greenhouse gas emissions and possibly impact carbon sinks. In the context of the Midland WWCP, increasing production of biogas reduces GHG emissions if it is beneficially used. The greater the beneficial use the less GHG emissions. Additionally, plants in general emit VOCs. Use of chlorine has a greater environmental impact than UV for example (due to use, production, transportation etc.). Additionally, during the construction phase of the potential upgrades to the WWTC, greenhouse gas emissions could be emitted from heavy vehicles. During evaluation (Section 11), methods to reduce greenhouse gas emissions and negative impacts on carbon sinks will be considered. Existing features of the project that may reduce greenhouse gas emissions will also be identified.

# 5.0 EXISTING WASTEWATER TREATMENT PLANT PERFORMANCE

## 5.1 Historical WWTC Flow Data

Annual reports and daily flow data for the WWTC were reviewed for 2013 to 2017. As summarized in Table 5-1, the WWTC is currently operating at approximately half of its rated average day flow (ADF) capacity of 15,665 $m^3$/d.

**Table 5-1: WWTC Annual Flow Summary Table (2013-2017)**

| Year | Annual Average Day Flow ($m^3$/day) | Annual Maximum Day Flow ($m^3$/day) | Annual Peak Hour Flow ($m^3$/day) |
|---|---|---|---|
| 2013 | 8,906 | 24,525 | 35,738 |
| 2014 | 9,273 | 22,949 | 38,888 |
| 2015 | 8,631 | 14,364 | 27,199 |
| 2016 | 8,964 | 26,080 | 26,080 |
| 2017 | 9,576 | 22,010 | 30,902 |
| Average ($m^3$/day) | 9,070 | 21,986 | 31,761 |
| Average (L/s) | 105 | 228 | 368 |
| Peaking Factor | - | 2.2 | 3.5 |
| Rated Capacity | 15,665 $m^3$/day | | 37,000 $m^3$/day |

The average day flow (ADF) to the WWTC is 9,070 $m^3$/day approximately 58% of the plants rated capacity of 15,665 $m^3$/day. The average maximum day flow and average max peak flow are 19,727 $m^3$/day and 31,761 $m^3$/day respectively. The maximum day and peak hour peaking factors are 2.2 and 3.5 respectively. Maximum day and peak hour flows do not include the volume stored in the storm equalization tank or bypassed. The volume stored in the tank during a storm event is not currently recorded.

## 5.2 Existing Per Capita Wastewater Flows

In 2013, Aecom completed an update for the Town of Midland Waterworks Master Plan. The study estimated the percent of residential and employment demand consumption in the Town of Midland based on GIS spatial analysis. From the study, approximately 64 percent of the water was assigned for residential use and 36 percent for employment use (AECOM, 2013).

The Town of Midland Waterworks Master Plan is currently undergoing an update; however, it is expected these ratios have not changed significantly in the last five years. For the purposes of developing per capita flows wastewater flows for the Wastewater Master Plan, the ratio of average day flow for residential and employment use from the 2013 Waterworks Master Plan was applied.

**Table 5-2: Per Capita Wastewater Flow**

| Criteria | Units | Value |
|---|---|---|
| Total Average Day Flow (ADF) 2013-2017 | $m^3$/day | 9,070 |
| % Flow Residential (1) | % | 64 |
| Residential ADF | $m^3$/day | 5805 |
| 2017 Residential Population (2) | capita | 19,364 |
| **Average Residential Per Capita Flow** | **L/capita/day** | **300** |
| | | |
| Average Day Flow (ADF) 2013-2017 | $m^3$/day | 9,070 |
| % Flow Employment (1) | % | 36 |
| Residential ADF | $m^3$/day | 3265 |
| 2017 Residential Population (2) | capita | 12,792 |
| **Average Employment Per Employee Flow** | **L/employee/day** | **255** |

Table Notes:
(1) From Town of Midland's Waterworks Master Plan (Aecom, 2013).
(2) Refer to Technical Memo No. 2 – Growth Forecast (JLR, 2020).

Based on flow data from the past five years the average residential and employment flows are 300 L/capita/day and 255 L/employee/day. This is in alignment with the MECP Design Guidelines for Sewage Works (2008) and typical for average domestic sewage flows.

## 5.3 Summary of Bypass Events

A bypass is defined as any discharge from a pump station or chamber that does not undergo any treatment before it discharges to the environment. Bypass locations are Chamber A located at Pump Station No. 1, and Chamber B and the Storm Tank located on the WWTC Property. Bypass event data is from Midland Wastewater Annual Reports. Presented in Table 5-3 is a summary of the reported bypass events from 2013-2017.

**Table 5-3: Summary of Primary Bypass Events 2013-2017**

| Year | Location | Number of Events | Total Duration (Minutes) | Volume of Bypass ($m^3$) |
|---|---|---|---|---|
| 2013 | Chamber A | 1 | 18 | 54 |
| 2014 | Chamber A | 4 | 55.8 | 119.6 |
| 2015 | Chamber A | 1 | 24.6 | 203.76 |
| 2016 | Chamber A | 6 | 61.43 | 237.4 |
| | Storm Tank | 11 | 1,687.8 | 9,457.9 |
| 2017 | Chamber A | 3 | 98.4 | 863.6 |

Plant bypasses occur due to rainfall events and the combined stormwater and sanitary sewer system. Bypass events commonly occur at Pump Station No. 1 Chamber A. The MECP 2012/2013 inspection report outlines required actions to mitigate the number of bypass events occurring at Pump Station No. 1. A plant overflow event as defined by the WWTC ECA is a discharge to the environment at a location other than the plant outfall or into the plant outfall downstream of the final effluent sampling location. No overflow events have been reported for 2013-2017.

## 5.4 Impact of Bypass Events on Flow Monitoring

Influent flow to Midland WWTC is measured by two flow meters located in the headworks. One flow meter measures flow in the primary flow channel and another measures flow in the secondary channel. During a wet weather event, any bypass flow sent to the storm equalization tank is not metered when it is sent to the storm equalization tank as it does not have an influent flow meter. Flow sent to and stored in the storm tank during storm events is measured when it is pumped back to the headworks for treatment during periods of low flow. There is a flow meter on the outlet of the storm equalization tank to measure the volume of bypass events.

The maximum day and peak hour influent flow measured at the plant underestimates the actual flows to the plant because the flow meter does not capture the flow stored in the storm equalization tank at the time it actually enters the plant. The actual maximum day flow would be higher due to contributions of bypass flow from Chamber A, bypass flow from the storm equalization tank, and the volume of wastewater stored in the storm tank.

The greatest volume bypass in the last five years occurred on March 31, 2016 and Table 5-4 summarizes the estimated maximum day flow during that event.

**Table 5-4: Estimated Maximum Day Flow Including Bypass**

| Year | Total Bypass Volume ($m^3$) | Storm Tank Volume ($m^3$) | Maximum Day Flow ($m^3$) | Maximum Day Flow including Bypass Volume ($m^3$) | Peaking Factor |
|---|---|---|---|---|---|
| 2016 | 4,754.4 (1) | 1,400 | 26,080 (2) | 32,234 | 3.6 (3) |

Table Notes:
(1) Includes the volume bypassed at Chamber A and the Storm Tank on March 31, 2016.
(2) Assumed the maximum day flow for March 2016 occurred on March 31, 2016.
(3) Peaking factor calculated using the average annual average day flow of 9,070 $m^3$/day.

Using this estimation, the maximum day flow including the largest bypass volume is 32,234 $m^3$/day. The maximum day peaking factor is 3.6 accounting for the total bypass volume and the storm tank volume. This flow estimate is a representation of a wet year. As indicated in Table 5-4, 2016 had the greatest volume of bypass flow over the last five years.

## 5.5 Historical Influent Quality

Composite samples are analyzed weekly for biochemical oxygen demand (BOD5), total phosphorous, total suspended solids, total Kjeldahl nitrogen, total ammonia nitrogen, and pH. The influent quality from these sampling events are summarized in Table 5-5.

**Table 5-5: Summary of Wastewater Influent Quality Parameters (1)**

| | BOD5 (mg/L) | Total Phosphorous (mg/L) | Total Suspended Solids (mg/L) | Total Kjeldahl Nitrogen (mg/L) | Un-Ionized Ammonia (mg/L) | pH |
|---|---|---|---|---|---|---|
| 2013 | 115.4 | 3.25 | 157.69 | 23.64 | 0.85 | 7.77 |
| 2014 | 154.4 | 3.20 | 188.2 | 24.91 | 0.94 | 7.8 |
| 2015 | 154.2 | 3.40 | 200.2 | 25.65 | 0.87 | 7.7 |
| 2016 | 136.0 | 3.54 | 187.67 | 25.84 | 1.67 | 7.9 |
| 2017 | 133.0 | 3.00 | 190.0 | 25.00 | 1.00 | 8.0 |
| **Average** | 138.6 | 3.28 | 184.8 | 25.0 | 1.07 | 7.8 |
| Typical Wastewater Strength (2) | 110 (Low)<br>190 (Med)<br>350 (High) | 4 (Low)<br>7 (Med)<br>12 (High) | 120 (Low)<br>210 (Med)<br>400 (High) | 20 (Low)<br>40 (Med)<br>70 (High) | - | - |

Table Notes:
(1) Data from Midland Wastewater Annual Reports (Town of Midland, multiple years).
(2) Typical Wastewater Strength - Metcalf and Eddy (2003).

The results indicate that the average concentration of BOD5, total suspended solids, and total Kjeldahl nitrogen in the influent wastewater are in the low to medium range of literature values for typical raw municipal wastewater strength. Total phosphorous average concentration is in the low range for literature values for typical raw municipal wastewater strength.

## 5.6 Historical Treated Effluent Quality

Samples of the final effluent are taken at the end of the final effluent contact chamber before entering the outfall to Midland Bay. Composite samples are analyzed weekly for CBOD5, total suspended solids, total phosphorous and total ammonia nitrogen. Grab samples are collected daily and tested on-site for pH and total chlorine residual. A separate grab sample is collected and analyzed weekly for E. coli. The effluent quality is summarized in Table 5-6 on the following page. A summary of the percent removal of BOD5, total phosphorous and total suspended solids for final effluent is included in Table 5-7.

**Table 5-6: Summary of Effluent Water Quality Parameters**

| | CBOD5 (mg/L) | Total Phosphorous (mg/L) | Total Suspended Solids. (mg/L) | Total Ammonia Nitrogen (mg/L) | pH | E. coli (org/100mL) (4)(5) | Conductivity (mg/L) |
|---|---|---|---|---|---|---|---|
| Objective | 7 | 0.3 | 7 | 5 (2) | - | 200 | - |
| Limit | 10 | 0.3 (1) | 10 | 10 (3) | 6 to 9.5 | 200 | - |
| 2013 | 5.62 | 0.13 | 3.51 | 0.35 | 7.48 | ***1099*** | 933.38 |
| 2014 | 5.34 | 0.12 | 3.32 | 3.94 | 7.5 | ***754*** | 965.52 |
| 2015 | 5.68 | 0.12 | 3.05 | 1.69 | 7.38 | ***299*** | 960.18 |
| 2016 | 4 | 0.13 | 3 | 1.59 | 7.4 | 75 | 962.35 |
| 2017 | 3.2 | 0.11 | 3.1 | 4.1 | 7.5 | 81 | 1054.3 |
| Average | 4.77 | 0.12 | 3.2 | 2.33 | 7.45 | ***272*** | 975.15 |

Table Notes:

(1) Only annual limit for total phosphorous is noted in table since the monthly limit is higher and the concentration does not exceed the annual limit which is more stringent.
(2) Total ammonia nitrogen objective is for only June 1 to August 31.
(3) Only the more stringent limit of 10 mg/L for June 1 to August 31 for total ammonia nitrogen is noted in table for it is the more stringent limit comparatively to the limit of 15mg/L for September 1 to May 31.
(4) E. coli uses a geometric mean to calculate the annual average and 2013-2017 average. Prior to 2016, the requirement for less then 200 E. coli was only during the seasonal chlorination period May 15 to October 15.
(5) A separate analyzer before the discharge weir ensure that the chlorine residual is >0.02 mg/L. The analyzer was installed in 2016 to replace a less acute ORP probe.

**Table 5-7: Summary of Effluent Water Quality Percent Removal**

| | CBOD5 (%l) | Total Phosphorous (%) | Total Suspended Solids (%) |
|---|---|---|---|
| 2013 | 95 | 96 | 98 |
| 2014 | 97 | 96 | 98 |
| 2015 | 96 | 96 | 98 |
| 2016 | 97 | 96 | 98 |
| 2017 | 98 | 96 | 98 |
| Average | 97 | 96 | 98 |

The effluent water quality has generally met ECA compliance requirements over the last five years. Total residual chlorine concentrations consistently do not meet current ECA objective or limit requirements in 2013-2017, because seasonal E. coli limits were in place from an earlier ECA (2009) E. coli counts progressively decreased to meet ECA current requirements in 2016 and 2017. In December 2016, due to equipment failure of the oxidation reduction potential (ORP) probe the chlorination and dechlorination system was shut down as per MECP direction (Town of Midland, multiple years).

The inadequate ORP probe was replaced with a new ultra low range analyzer to accurately measure chlorine residual. This equipment failure resulted in elevated E. coli counts in January 2017. Due to poor control and mixing of chemicals within the chlorinating and dechlorinating stages of treatment December 2017 exhibited higher than usual counts of E. coli. The elevated counts of E. coli in January and December 2017 did not affect the overall annual 2017 E. coli ECA compliance.

The WTTC had elevated concentrations of total ammonia nitrogen in 2017. The Town reports active adjustments are being made to the activated sludge process and solids retention time in order to reduce total ammonia levels.

## 5.7 Impact of King St. Rejuvenation Project on Flows

The King Street Rejuvenation project included the complete reconstruction of King Street in the Town. Construction associated with the King Street Rejuvenation Project began in the Fall of 2020 with Phase 1. Subsequently Phase 2 was completed between March 2020 to November 2020. Operations staff reported a decrease in extraneous flows as the project was completed. Limited data is available to compare before and after the construction, but a preliminary review of the flow meter record from the WPCP (refer to Table 5-8: ) suggests that flows may be declining. Flows should continue to be monitored to confirm longer term trends.

**Table 5-8: Comparison of Wastewater Flows Before and After King St Rejuvenation**

| AVERAGE DAILY FLOW ($m^3$/day) | Average 2013-17 | 2019 | 2020 | % Diff from Average | Volume Diff from Average | Comments |
|---|---|---|---|---|---|---|
| **JANUARY** | 9169.74 | | 8326.22 | -9% | -843.52 | |
| **FEBRUARY** | 8762.94 | | 6783.65 | -23% | -1979.29 | |
| **MARCH** | 10025.63 | | 9424.54 | -6% | -601.09 | Phase 2 Starts March 30, 2020 |
| **APRIL** | 12200.12 | | 8334.12 | -32% | -3866.00 | |
| **MAY** | 9267.36 | | 6946.49 | -25% | -2320.87 | |
| **JUNE** | 8179.23 | | 7166.40 | -12% | -1012.83 | |
| **JULY** | 7950.09 | | 7439.66 | -6% | -510.43 | |
| **AUGUST** | 8443.66 | | 7469.34 | -12% | -974.32 | |
| **SEPTEMBER** | 8118.32 | | 7634.56 | -6% | -483.76 | |
| **OCTOBER** | 8555.80 | | 7970.89 | -7% | -584.91 | |
| **NOVEMBER** | 9408.42 | 7738.28 | | -18% | -1670.14 | Phase 2 Complete Nov. 2020 |
| **DECEMBER** | 8757.17 | 7451.35 | | -15% | -1305.83 | Phase 1 Complete Dec. 2019 |

## 5.8 Preliminary Treatment Plant Assessment

In support of development of the Town's capital budget and Development Charges By-Law, Technical Memorandum No. 1 – WWTC Capacity Assessment (Appendix A), was prepared in July 2019 to provide a high-level overview of existing and future capacity constraints at the WWTC. The Technical Memorandum also consists of a high-level flow estimations of the capacity of each unit process. The findings of Technical Memorandum No. 1 are superseded by the updated assessment in subsequent sections of this report.

## 6.0 PROPOSED LEVEL OF SERVICE STANDARD

The proposed level of service required from the wastewater system is summarized for each different component of the system in Table 6-1 below.

**Table 6-1: Level of Service Criteria Summary**

| Component | Dry Weather Criteria | Wet Weather Criteria |
|---|---|---|
| Wastewater Treatment Plant | Average day flow (ADF) to be less than 80% of rated capacity | Provide primary treatment (min) up to and including the 5yr storm and meet Procedure F-5-5 requirements. |
| Pumping Stations | Flow to be less than pump station firm capacity | 1:10 year storm flow to be less than firm capacity and 1:100 year storm flow to be less than peak capacity |
| Gravity Sewers | Flow to be less than sewer capacity | HGL to be within 300 mm above pipe obvert or greater than 2 m below finished ground during the specified Infiltration and Inflow (RDII) event where basements are present. |
| Pressurized Sewers | Velocity to be greater than 0.9 m/s | |

No specific Infiltration and Inflow (RDII) event has been defined for the gravity system Level of Service. A range of storm events will be assessed and information provided on the level of basement and surface flood risk associated with each event. This will allow the Town to make an informed judgement on the level of service it wishes to provide residents.

In addition, F-5-5 states that “there shall be no increases in CSO volumes above existing levels at each outfall allowed except where the increase is due to the elimination of upstream CSO outfalls.” F-5-5 references and average year, and it is assumed that a design event with a 1:2 year return period storm, which has an annual probability of 50%, could be considered an average year for the purposes of assessing impacts on adherence to F-5-5.

# 7.0 MODELLING OF EXISTING AND FUTURE CONDITIONS

## 7.1 Model Set-up and Overview

The wastewater conveyance system within Midland was modelled using PCSWMM based on GIS data held by the Town and survey of specific sections of the infrastructure. The model was calibrated to the results of a flow monitoring program undertaken for three months in spring 2019 as well as previous flow monitoring results. The model was then simulated under a series of design events with Rainfall Dependent Inflow and Infiltration (RDII) and existing and future population growth scenarios. Technical Memorandum No. 4 (Appendix D) summarizes the basis of development of the sanitary trunk sewer system hydraulic computer model.

Figure 7-1 shows the preliminary future sewershed boundaries modelled based on the growth allocation presented in Section 2.2. The results of the modelling work have been used to prepare a hydraulic capacity evaluation of the system under various scenarios including existing development up to 2041 and development beyond 2041. These results are summarized in the following section.

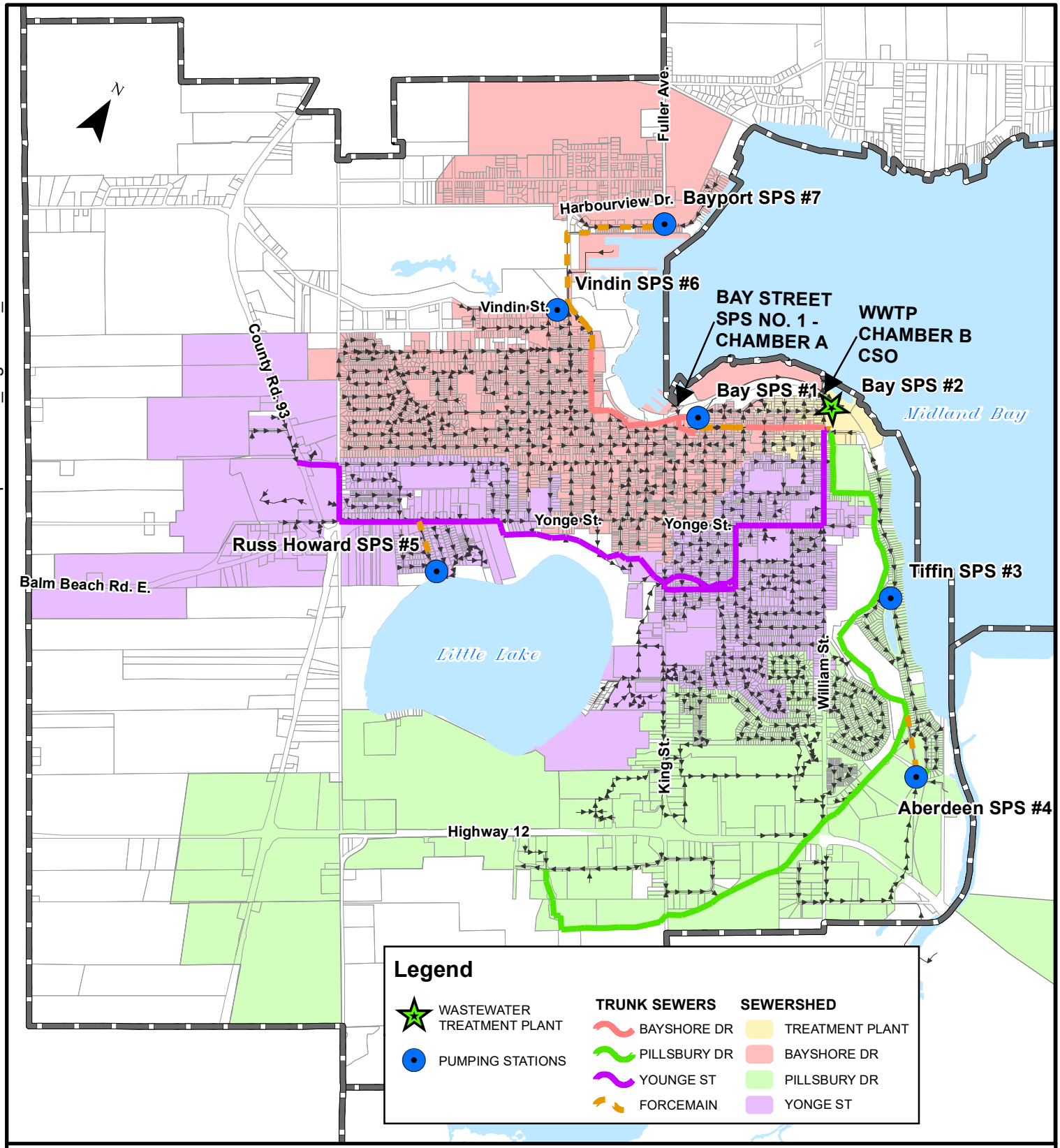
We note that, the assessment made in the 2019 Flow Monitoring Study, and on the first issue of this 2020 Technical Memorandum (see Appendix D Technical Memorandum No. 4) was based on an overflow elevation at Chamber A artificially lowered in order to facilitate monitoring of the overflows at the SPS #1 Main SPS via a triangular weir. In 2020 the overflow elevation was raised back to its design level and the modelling results and analysis below are reflective of this higher elevation of the overflow weir.

## 7.2 Hydraulic Capacity of WWTC and Equalization Storage

Volumes at the CSOs under the existing population are shown in Table 7-1. The CSO volume at the plant assumes that the plant is capable of processing up to 1,550 m³/hour (equivalent to rated peak hour flow of 37,000 $m^3$/day) and storing 1,400 m³ in the equalization tank during the STORM event. The peak flow rates in the CSOs under the existing population are shown in Table 7-2 . This information is presented to provide a baseline to measure future growth related CSO increases against, so that they can be addressed per Guideline F-5-5. The tables also show the volume and rate of flooding from the conveyance system in the model where it occurs in the storm event.

**Table 7-1: CSO Volumes (24 hours, Existing Population)**

| STORM Event | System Flooding Volume ($m^3$) | CSO Volume at SPS1 Chamber A ($m^3$) | CSO Volume at WWTC Chamber B ($m^3$) | Average Total System Inflow Including Flooding ($m^3$) | CSO as % of Total System Inflow |
|---|---|---|---|---|---|
| DWF | 0 | 0 | 0 | 10,000 | 0% |
| 1:2 year | 0 | 0 | 700 | 25,800 | 3% |
| 1:5 year | 0 | 0 | 4,200 | 32,800 | 13% |
| 1:10 year | 0 | 0 | 7,100 | 37,400 | 19% |
| 1:100 year | 800 | 0 | 17,200 | 51,900 | 33% |

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# TOWN OF MIDLAND WASTEWATER MASTER PLAN

MIDLAND, ONTARIO

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FIGURE 7-1

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**Table 7-2: CSO Peak Flow Rates (Existing Population)**

| Storm Event | System Flooding Peak Flow ($m^3$/hour) | CSO Peak Flow at SPS1 Chamber A ($m^3$/hour) | CSO Peak Flow at WWTC Chamber B ($m^3$/hour) | Peak Total System Inflow Including Flooding ($m^3$/hour) |
|---|---|---|---|---|
| DWF | 0 | 0 | 0 | 840 |
| 1:2 year | 0 | 0 | 550 | 2,100 |
| 1:5 year | 0 | 0 | 1,450 | 3,000 |
| 1:10 year | 0 | 0 | 1,880 | 3,430 |
| 1:100 year | 470 | 0 | 2,840 | 4,860 |

CSO volumes under the existing condition are small compared to the total flow entering the system under he 1:2 year storm. It is assumed that a design event with a 1:2 year return period storm, which has an annual probability of 50%, could be considered an average year for the purposes of assessing impacts on adherence to F-5-5. Since the plant treats up to 97% in a 1:2 year storm event, the system could be considered as being able to treat up to 90% of inflow in an average 7-month period and is therefore operating within F-5-5. If the CSOs were to be completely removed under the existing population additional volume and/or capacity in the system of around 17,100 $m^3$ would be required.

The CSOs under the future 2021-2041 population are shown in terms of volumes in Table 7-3 and in terms of peak flow rates in Table 7-4. The required increase in capacity shown in the tables are the volume increase in storage tank *or* flow capacity increase in the WWTC required to maintain existing CSOs under each respective event. The required increases are approximate and conservative as they are based on numerical analysis of the modelling results.

**Table 7-3: CSO Volumes (24 hours, 2021-2041 Population)**

| Storm Event | System Flooding Volume ($m^3$) | CSO Volume at SPS1 Chamber A ($m^3$) | CSO Volume at WWTC Chamber B ($m^3$) | Average Total System Inflow Including Flooding ($m^3$) | Required Increase in Capacity ($m^3$) |
|---|---|---|---|---|---|
| DWF | 0 | 0 | 0 | 13,000 | 0 |
| 1:2 year | 0 | 0 | 2,500 | 32,400 | 1,800 |
| 1:5 year | 0 | 0 | 7,100 | 39,500 | 2,900 |
| 1:10 year | 0 | 0 | 10,600 | 44,100 | 3,500 |
| 1:100 year | 1,000 | 0 | 21,800 | 58,600 | 4,800 |

**Table 7-4: CSO Peak Flow Rates (2021-2041 Population)**

| Storm Event | System Flooding Peak Flow ($m^3$/hour) | CSO Peak Flow at SPS1 Chamber A ($m^3$/hour) | CSO Peak Flow at WWTC Chamber B ($m^3$/hour) | Peak Total System Inflow Including Flooding ($m^3$/hour) | Required Increase in Capacity ($m^3$/hour) |
|---|---|---|---|---|---|
| DWF | 0 | 0 | 0 | 1,000 | 0 |
| 1:2 year | 0 | 0 | 1,020 | 2,570 | 470 |
| 1:5 year | 0 | 0 | 1,730 | 3,280 | 280 |
| 1:10 year | 0 | 0 | 2,230 | 3,770 | 350 |
| 1:100 year | 530 | 0 | 3,020 | 5,100 | 240 |

CSO volumes increase due to the increase in population and F-5-5 prohibit increases in CSO as a result of growth. Under F-5-5, there can only be increases in volume if it is offset by removal of other CSO flows, not due to increases in population. The CSO volumes will have to be reduced to allow for population growth. The CSO volumes will have to be reduced to allow for population growth. From the results, an additional storage of 1,800 $m^3$ would be required to maintain CSO volumes in the 1:2 year storm event. Alternatively, the peak capacity of the plant would need to be increased by 460 $m^3$/hour to address the worst case increase in peak flow, which occurs under the 1:2 year storm event.

To meet the 1:100 year storm LOS, additional volume and/or capacity of 22,800 m³ would be required in the system assuming that there is no flood loss (i.e. collection system is expanded to convey all flows to the plant), alternatively the capacity of the WWTC would have to increase by 3,550 m³/hour. There would have to be corresponding increases in capacity in the conveyance system and pump stations to ensure that all sanitary flows arrive at the WWTC. Increasing storage and capacity in the system may reduce the size of increase in capacity at the plant.

Overall, from this assessment, in order to meet the requirements of F-5-5 for 2021 – 2041 anticipated treatment plant flows, an additional 1,800 $m^3$ of storage is required or a 460 $m^3$/hour increase in rated peak hourly flow capacity at the plant. This equates to a peak rated capacity of 48,040 $m^3$/day compared to the existing rated capacity of 37,000 $m^3$/day. For a discussion of CSO and treatment capacity requirements beyond 2041, refer to Technical Memorandum No. 4 (Appendix D).

### Capacity Analysis of Pumping Stations

Table 7-6 and Table 7-6, and Table 7-7 show flows to the pump stations under various model scenarios. As noted in Technical Memorandum No. 4 (Appendix D), flows reported at the pump station are based on calibration to downstream flow monitoring and therefore the peak flows to the pump stations may be underestimated due to the effect of pump discharges on the flows at the flow monitoring location. Prior to any SPS upgrades, peak flows should be further assessed.

**Table 7-5: Pump Station Level of Service: Existing Service Population**

| Pump Station | Firm Capacity (l/s) | Peak Capacity (l/s) | DWF (l/s) | 1:10 year Storm (l/s) | 1:100 year Storm (l/s) |
|---|---|---|---|---|---|
| 1 – Main SPS | 250 | 375 (1) | 74 | 219 | 280 |
| 2 – Bay Street | 50 | 100 | 7 | 26 | 35 |
| 3 – Tiffin | 41.3 | 82.6 | 3 | 19 | 27 |
| 4 – Aberdeen | 62 | 124 | 5 | 32 | 45 |
| 5 – Russ Howard | 23 | 34 | 2 | 23 | 28 |
| 6 – Vindin | 60 | 120 | 22 | 31 | 40 |
| 7 – Bayport | 42.7 | 85.4 | 4 | 17 | 24 |

**Table 7-6: Pump Station Level of Service: 2021 - 2041 Population**

| Pump Station | Firm Capacity (l/s) | Peak Capacity (l/s) | DWF (l/s) | 1:10 year Storm (l/s) | 1:100 year Storm (l/s) |
|---|---|---|---|---|---|
| 1 – Bay Street (Main) | 250 | 375 (1) | 80 | 224 | 287 |
| 2 – Bay Street | 50 | 100 | 13 | 32 | 42 |
| 3 – Tiffin | 41.3 | 82.6 | 3 | 19 | 27 |
| 4 – Aberdeen | 62 | 124 | 5 | 38 | 51 |
| 5 – Russ Howard | 23 | 34 | 2 | 23 | 28 |
| 6 – Vindin | 60 | 120 | 21 | 31 | 41 |
| 7 – Bayport | 42.7 | 85.4 | 12 | 25 | 32 |

**Table 7-7: Pump Station Level of Service: Beyond 2041 Population**

| Pump Station | Firm Capacity (l/s) | Peak Capacity (l/s) | DWF (l/s) | 1:10 year Storm (l/s) | 1:100 year Storm (l/s) |
|---|---|---|---|---|---|
| 1 – Bay Street (Main) | 250 | 375 | 89 | 245 | 336 |
| 2 – Bay Street | 50 | 100 | 18 | 40 | 49 |
| 3 – Tiffin | 41.3 | 82.6 | 3 | 19 | 27 |
| 4 – Aberdeen | 62 | 124 | 5 | 38 | 51 |
| 5 – Russ Howard | 23 | 34 | 2 | 24 | 26 |
| 6 – Vindin | 60 | 120 | 22 | 32 | 35 |
| 7 – Bayport | 42.7 | 85.4 | 22 | 49 | 54 |

This shows that existing pumping stations are able to accommodate growth beyond 2041. Although, it should be noted that there is substantial flooding upstream of SPS No. 7 (Bayport) beyond 2041, and it will operate beyond capacity if this flooded volume is conveyed to the pump station (refer to conveyance Section).

The Flow Monitoring Study completed by Tatham Engineering (2019) reviewed the capacity of key components of the upstream and downstream infrastructure associated with SPS No. 1. This is summarized compared to the modelled 1:100 year storm in Table 7-8.

**Table 7-8: Capacity of SPS No. 1 Related Infrastructure – 1:100 Year Storm**

| System Component | Peak Capacity (l/s) | Existing (l/s) | 2021 to 2041 (l/s) | Beyond 2041 (l/s) |
|---|---|---|---|---|
| 1 – Bay Street (Main) Peak Capacity | 375 | 280 | 287 | 336 |
| Existing Sewer Chamber A to SPS No. 1 | 156 | | | |
| Twin 450 dia. Forcemain – 1 (max. 3 m/s) | 450 | | | |
| Twin 450 dia. Forcemain – 2 Forcemains | 900 | | | |
| Limiting Section of 525 mm Gravity Sewer | 305 | | | |

From this, in order to convey anticipated peak flows from the SPS No. 1 to the WWTC and provide a 1:100 storm LOS, upgrades are required for the existing sewer from Chamber A to SPS No. 1 and the limiting section of 525 mm gravity sewer. However, modelling of the conveyance system only identified the bottleneck between Chamber A and the Main SPS. It is likely that the actual capacity of the downstream gravity sewer is more than the free flow capacity due to upstream pressures. As such, no upgrades to this section have been identified. Due to the potential for underestimation of peak flows at SPS in the model, these peaks should be confirmed.

## 7.3 Conveyance System Model Findings

Figure 7-2 shows the level of service with the existing population. The system is within the required level of service under the existing population scenario. The entire gravity trunk system achieves the dry weather criteria of having a sewer capacity greater than the dry weather flow, except on one sewer section downstream of the Aberdeen Pump Station which is due to this sewer section being on a reverse slope, as indicated by the GIS. There are three locations under wet weather events where there is a basement flood risk in the 1:5 year storm event. The basement flood risk in those three locations are extended in the less frequent storm events, and in the 1:100 year storm event there is a street flooding recorded.

Under the 2021-2041 predicated population growth there are no reductions in level of service in the frequent storm events. There is an increase in basement flood risk on the Pilsbury Trunk in the 1:10 year storm, but no changes to surface flood risk in the 1:100 storm event. Figure 7-3 depicts the level of service under the 2021-2041 growth scenario.

There are severe constraints in the existing infrastructure under the population growth predicted beyond 2041 including along the Pilsbury trunk. Under the 1:2 and 1:5 year storm events the Pillsbury trunk has severe capacity constraints with surface flooding and extensive basement flooding risk present upstream of the trunk crossing of Highway 12. There is also surface flooding of MH2029 on the Yonge Trunk at Len Self Boulevard in the 1:5 year storm event. The same capacity constraints are present under the 1:10 year storm. Under a 1:100 year storm event there is surface flooding at MH2044 on Yonge Trunk at Yonge Street and Leitz Road in addition to extensive surface flooding on the upstream end of the Pillsbury trunk. All pump stations are continuing to operate within capacity except SPS No. 7 which is beyond capacity and resulting in flooding upstream in the model. Figure 7-4 depicts the level of service beyond 2041.

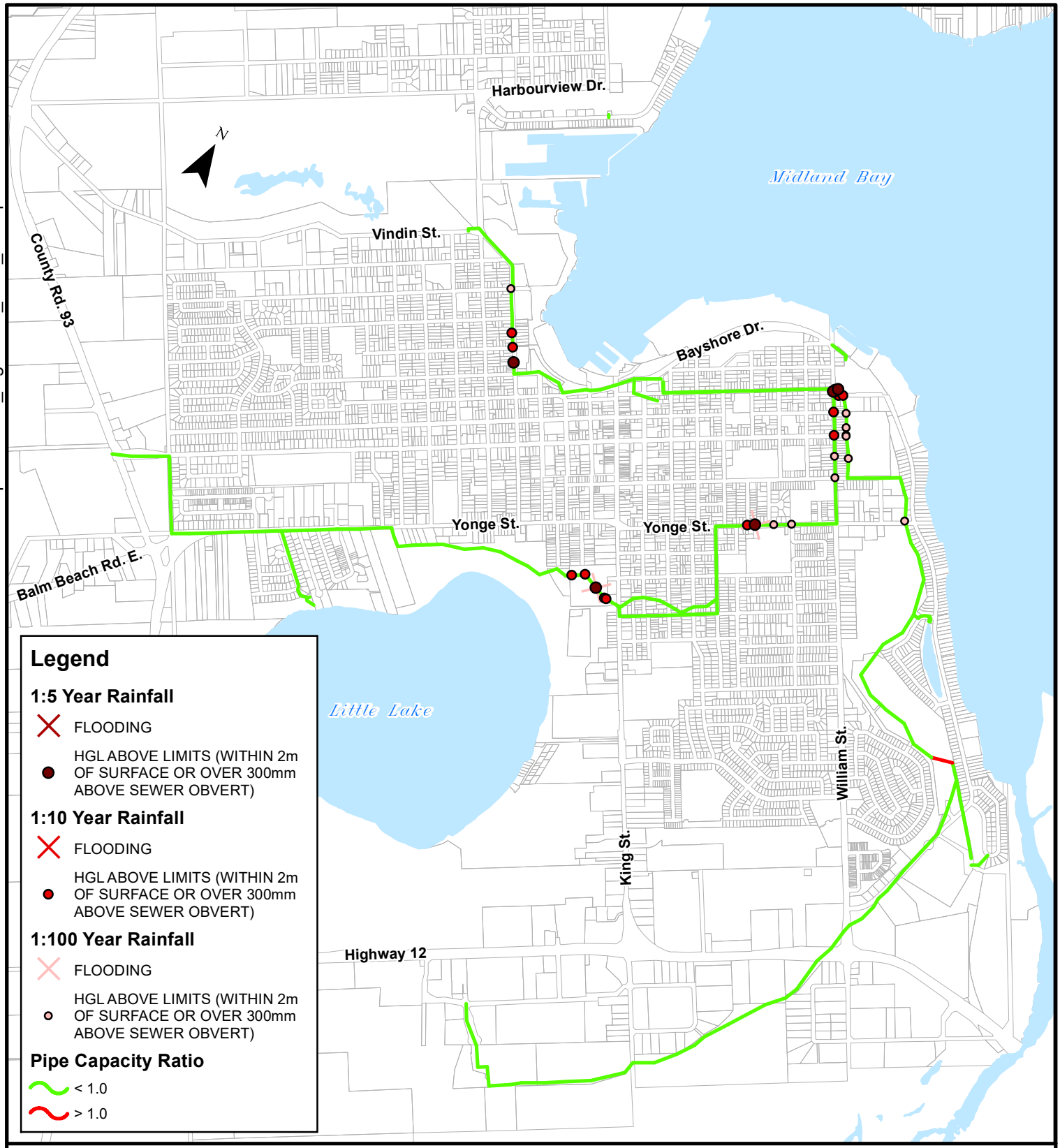


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FIGURE 7-2

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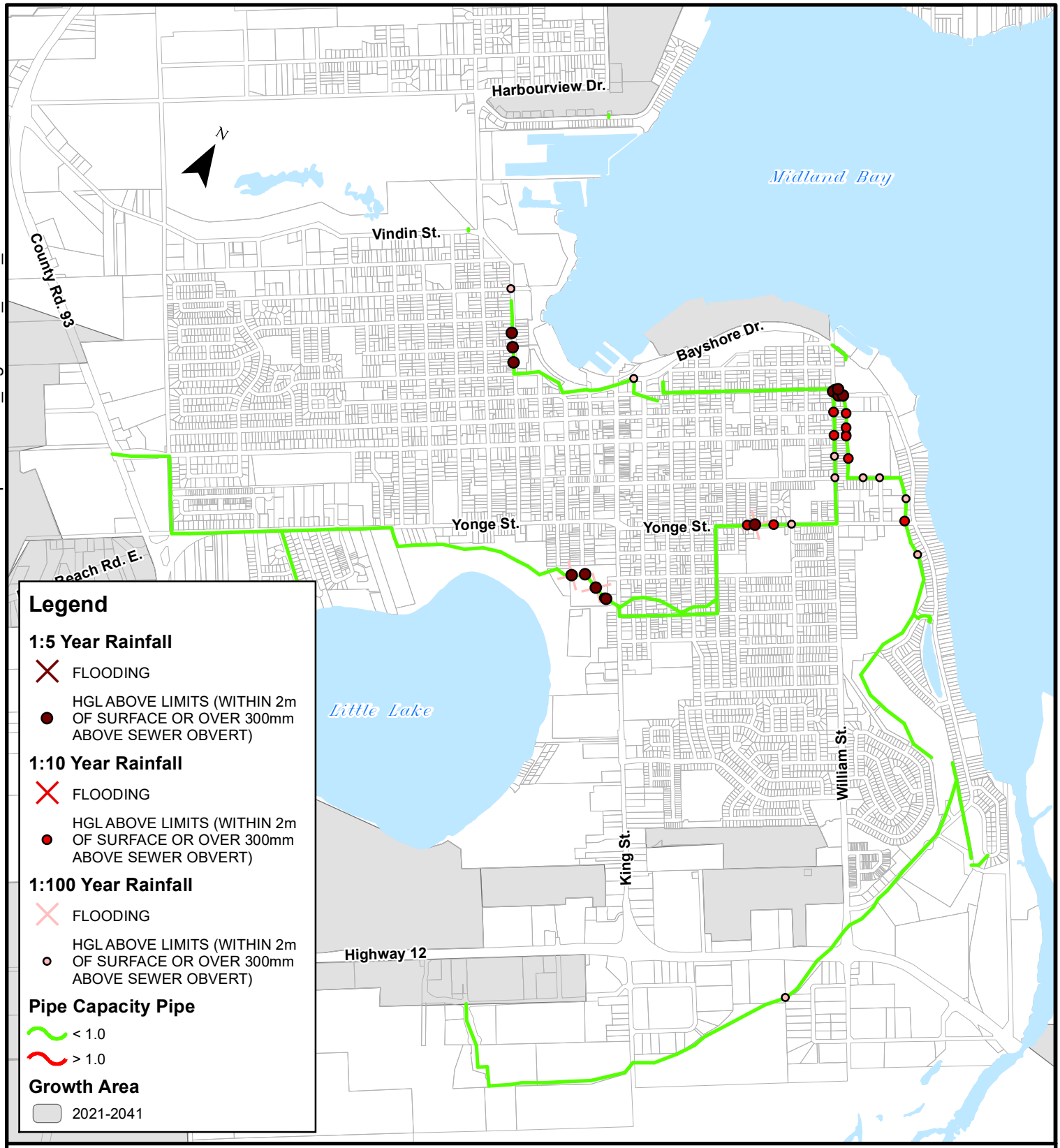


PROJECT:

# TOWN OF MIDLAND WASTEWATER MASTER PLAN

MIDLAND, ONTARIO

DRAWING:

## LEVEL OF SERVICE WITH 2021-2041 POPULATION

J.L.Richards
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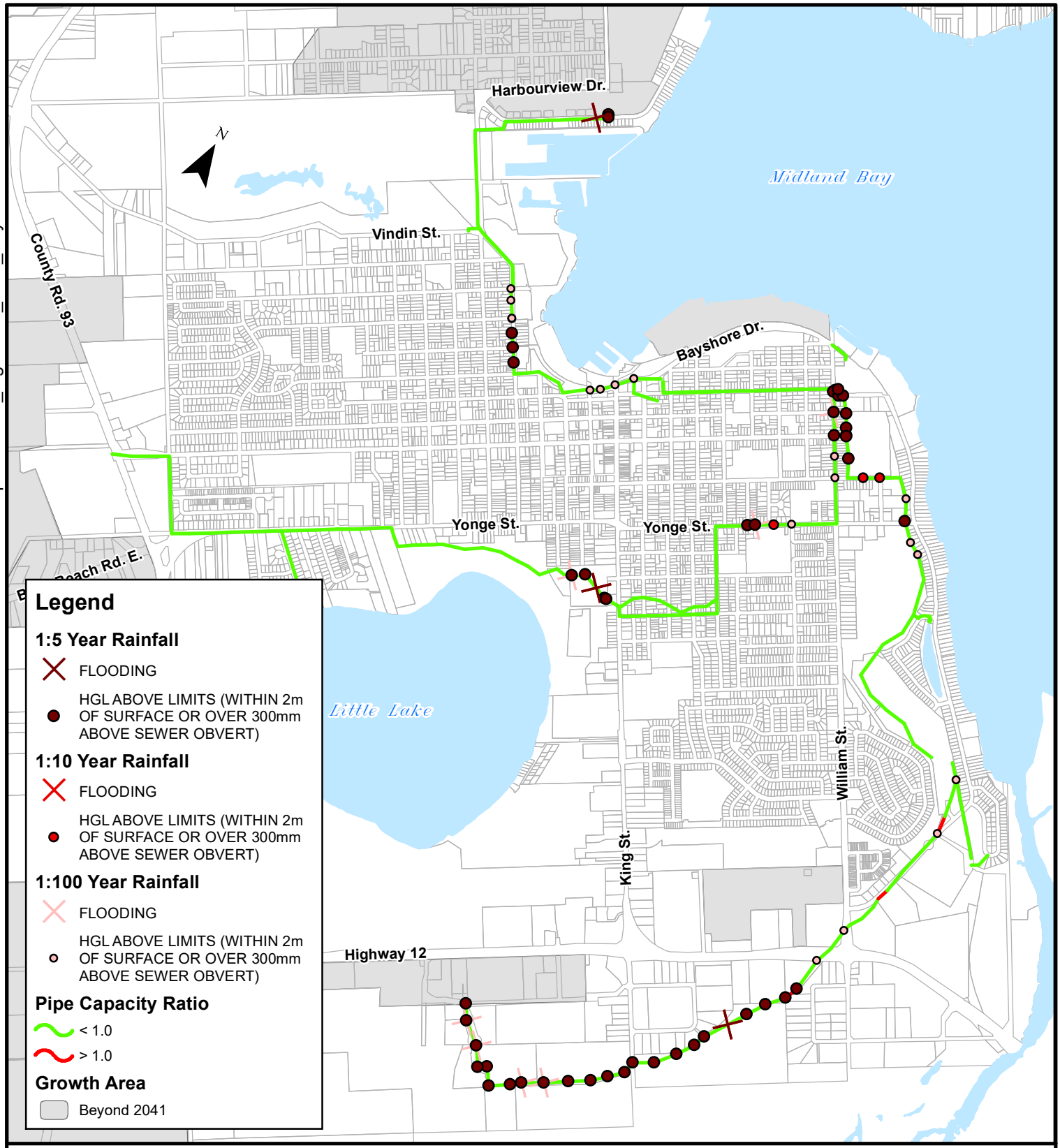
| | |
|---|---|
| DESIGN: | BP |
| DRAWN: | TB |
| CHECKED: | BP/JW |
| JLR #: | 28243 |

DRAWING #:

FIGURE 7-3

File Location: P:\28000\28243-000 - Midland Wastewater Master Plan\3-Production\1-Civil\GIS\1 - Phase 1 Report\28243_Figure7-3_LOS_2021-2041.mxd

Plot Date: Friday, December 11, 2020 12:53:57 PM




PROJECT:

# TOWN OF MIDLAND WASTEWATER MASTER PLAN

MIDLAND, ONTARIO

DRAWING:

## LEVEL OF SERVICE WITH BEYOND 2041 POPULATION

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|---|---|
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| DRAWN: | TB |
| CHECKED: | BP/JW |
| JLR #: | 28243 |

DRAWING #:

FIGURE 7-4

File Location: P:\28000\28243-000 - Midland Wastewater Master Plan\3-Production\1-Civil\GIS\1 - Phase 1 Report\28243_Figure7-4_LOS_Beyond2041.mxd

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# 8.0 WWTC CAPACITY ASSESSMENT

## 8.1 Design Hydraulic Loading

In order to evaluate the wastewater system, certain assumptions need to be developed as the sewer, pumping stations and WWTC work as an integrated system. Based on input from the Town the follow priorities or assumptions have been developed:

- During a seven month period commencing within 15 days of April 1 (i.e., April 1-15 to November 1-15), 90% of flow volume due to wet weather is to be captured and treated per Procedure F-5-5 of Guideline F-5 (MECP, 2016). It is assumed that a design event with a 1:2 year return period storm, which has an annual probability of 50%, could be considered an average year for the purposes of assessing impacts on adherence to F-5-5.
- Overflows at Chamber A under 1:100 year storm are conveyed to the WWTC.
- Chamber B remains in operation (open weir).
- The septage receiving station is not expanded beyond current capacity.

Based on the modelling reviewed in Section 7 and the preliminary findings in Technical Memorandum No 1 (JLR, 2020) the following flows are anticipated at the WWTC:

**Table 8-1: 2017-2041 Future Plant Capacity Assessment**

| Flow Component | Average Day Flow (ADF) ($m^3$/day) | Maximum Day Flow (MDF) ($m^3$/day) | Peak Hour Flow (PHF) ($m^3$/day) |
|---|---|---|---|
| Existing Recorded Annual Flow 2013 – 2017(1) | 9,070 | 19,727 | 31,761 |
| Existing Bypass to Equalization or Overflow | -- | 1,400(2) | 18,264(3) |
| Existing Chamber A Overflow Volume | -- | 456(4) | Included above |
| **Total Existing Collection System Flows** | **9,070** | **21,583** | **50,025** |
| **Peaking Factors** | **--** | **2.38** | **5.52** |
| Residential Growth 2017 - 2041 | 2,255 | Refer to total | Refer to total |
| Employment Growth 2017 - 2041 | 942 | | |
| Martyrs' Shrine and Marina | 4 | | |
| **Total Future Flow to Plant for Treatment** | **12,271** | **39,500(5)** | **48,280(6)** |
| **Rated Capacity from ECA** | **15,665** | **32,580(7)** | **37,000** |
| **% Rated Capacity** | **78%** | **120%** | **130%** |

Table Notes:

(1) Five year average from Town's Annual Wastewater Reports.
(2) Estimated assuming that during a typical bypass event the equalization tank fills in one day.
(3) Based on 90 percent overflow rate from Chamber A and WWTC 2013 –2019 (761 L/s).
(4) Based on maximum day overflow volume at Chamber A, prior to 2020 change in weir height.
(5) Based on average system inflow from 24 hour 1:5 RDII event. Assumes continued use of 1,400 $m^3$ equalization tank.
(6) Based on required increase in peak treatment capacity from 24 hour 1:2 storm event. Assumes continued use of 1,400 $m^3$ equalization tank.
(7) Capacity of primary clarifiers specified in the ECA.

Based on this assessment, in 20-years (2041) the plant will be operating at 78% of its rated average day capacity and the rated peak flow will be exceeded.

## 8.2 Design Influent Concentrations and Loading

Composite samples at the WWTC headworks are analyzed weekly. Based on influent quality from 2013 – 2017, the average concentration of BOD5, total suspended solids, and total kjeldahl nitrogen in the influent wastewater are in the low to medium range of literature values for typical raw municipal wastewater strength. The average influent strength will be used for design purposes.

Septage is also received at the WWTC and pumped to the primary clarifiers. Typical septage strength from the US Environmental Protection Agency, Guide to Septage Treatment and Disposal, 1994, has been used for design purposes. Currently the maximum septage volume received at the plant is 192 $m^3$/day. It is estimated that if a single line of trucks que during operating hours of the plant, the total septage volume that could be received is approximately 200 $m^3$/day.

The existing and future loading to the plant is summarized in Table 8-2, Table 8-3, and Table 8-4.

**Table 8-2: Design Influent Concentration**

| Parameter | Average WW Concentration (mg/L) | Septage Concentration (mg/L) |
|---|---|---|
| 5-Day Biological Oxygen Demand (BOD5) | 138.6 | 6480 |
| Total Phosphorous (TP) | 3.28 | 210 |
| Total Suspended Solids (TSS) | 184.8 | 12862 |
| Total Kjeldahl Nitrogen (TKN) | 25.0 | 588 |

**Table 8-3: Existing Wastewater and Septage Loading Summary**

| Parameter | Wastewater Loading | Septage Loading | Combined Loading |
|---|---|---|---|
| ADF ($m^3$/day) | 9,070 | 192.6 | 9,262 |
| MDF ($m^3$/day) | 19,727 | n/a | 19,727 |
| PHF ($m^3$/day) | 31,761 | n/a | 31,761 |
| BOD5 (kg/day) | 1257 | 1248 | 2505 |
| TP (kg/day) | 29.7 | 40.44 | 70.2 |
| TSS (kg/day) | 1676 | 2477 | 4153 |
| TKN (kg/day) @ PHF | 794 | 113 | 908 |

**Table 8-4: Future (2041) Wastewater and Septage Loading Summary**

| Parameter | Wastewater Loading | Septage Loading | Combined Loading |
|---|---|---|---|
| ADF ($m^3$/day) | 12,271 | 200.0 | 12,471 |
| MDF ($m^3$/day) | 39,500 | n/a | 39,500 |
| PHF ($m^3$/day) | 48,280 | n/a | 48,280 |
| BOD5 (kg/day) | 1701 | 1296 | 2997 |
| TP (kg/day) | 40.2 | 42.00 | 82.2 |
| TSS (kg/day) | 2267 | 2572 | 4839 |
| TKN (kg/day) @ PHF | 1207 | 118 | 1325 |

## 8.3 Design Effluent Criteria

As the average day flow of 15,665 $m^3$/day is not being exceeded, effluent requirements are generally anticipated to stay the same as current ECA limits and objectives. This assumption will need to be reviewed during subsequent stages of the implementation process (i.e. preliminary design or subsequent Class EA).

However, we note that in 1993 the MECP, in conjunction with Environment Canada and various other provincial and federal agencies, released the Severn Sound Remedial Action Plan (RAP) Report to provide a strategy to restore the Severn Sound ecosystem (MECP, 1993). Remedial measures identified by the RAP include the governing of phosphorous input into Severn Sound from wastewater treatment facilities. Midland WWTC is located in the Open Severn Sound Area and as per the Severn Sound RAP Report Midland WWTC effluent total phosphorous concentration must be less than 0.3 mg/L.

## 8.4 Process Capacity Evaluation and Considerations

In order to identify potential growth related upgrades at the WWTC the rated capacity of each major unit process was reviewed and compared to the future loading conditions. The findings of this high-level capacity review are summarized in Table 8-5. Capacity limitations or operational constraints were found related to the headworks, aeration system, primary clarifiers. Issues with odour control at the septage receiving station have also been identified by operations staff and the digestors are approaching end of life. To manage future peak hourly flows either the secondary clarifiers or equalization storage would need to be expanded. The chlorination system would require expansion if future peak flows are treated at the plant (refer to Section 10 for review of treatment and equalization alternatives); however, operational challenges have been experienced related to the chlorination system and there may be benefits to converting the chlorination/dichlorination system to UV, regardless of the future treatment alternative selected.

**Table 8-5: High-Level Process Capacity Evaluation**

| Unit Process | Design Basis | Theoretical Rated Capacity ($m^3$/day) | Existing Loading Conditions ($m^3$/day) | Future Loading Conditions ($m^3$/day) | Expansion Required in 2021 - 2041 |
|---|---|---|---|---|---|
| Headworks | PIF(1) | 59,040 (actual capacity less) | 31,761 | 48,280 | 5+ years |
| Primary Clarifiers | PDF | 32,580(3) | 19,727 | 39,500 | 10 - 15 years |
| Aeration Tanks with Nitrification | ADF | 15,665(4) | 9,070 | 12,271 | No |
| | ADF BOD5 Loading | 889-2065 kg/day(5) | 2,505 kg/day | 2,997 kg/day | Immediate |
| | $O_2$ Requirement | 240 kg $0_2$/hr(6) | 280 kg $O_2$/hr | 384 kg $O_2$/hr | Immediate |
| Secondary Clarifiers | PHF | 37,000(7) | 31,761 | 48,280 | 5+ years (if expand to treat future peak hourly flows) |
| | PDF Solids Loading | 64,335(8) | Not evaluated(9) | Not evaluated(9) | No |
| Chlorination Chamber and Dechlorination | PHF | 45,600(10) | 31,761 | 48,280 | 5+ years (if expand to treat future peak hourly flows) |
| Sludge Treatment | Max Month Mass Loading – Refer to XCG Nutrient Management Report (XCG, 2015) | | | | |

Table Notes:
(1) Assume Peak Instantaneous Flow (PIF) equivalent to Peak Hour Flow (PHF).
(2) Based on theoretical 2460 $m^3$/hr combined capacity for 2 channels, however, bottlenecks reported by operations staff.
(3) Peak flow clarification capacity of 32,580 $m^3$/day per day from ECA.
(4) Existing average day rated capacity of the plant from ECA.
(5) Estimated using MECP Design Guidelines (2008) for Conventional Aeration System with Nitrification.
(6) Using a maximum recommended value for 02 transfer of 4.4 lb 02/Hp*hr.
(7) Based on Surface Overflow Rate of 37 $m^3/m^2$/day from MECP Design Guidelines (2008).
(8) Based on existing PDF, 100% ADF for RAS flow, 3000 mg/L MLSS concentration.
(9) Not evaluated since the hydraulic flow is the bottleneck for secondary clarifier sizing.
(10) Based on ECA volume and providing 15 minute contact time.

## 9.0 EXISTING AND FUTURE SERVICING CONSTRAINTS

Existing and future system deficiencies have been identified in Table 9-1 to assist in a systematic review of the problems/opportunities, potential solutions and actions moving forward.

Overall, through the Phase 1 review it has been found that:

- Various equipment/systems are past their originally intended operational life and are in need of near-term replacement and at least $1.6M in lifecycle upgrades is required at the WWPC and SPSs.
- In order to meet requirements of Procedure F-5-5 and design the system so that there are no increases in CSO volumes above existing due to growth, an increase in equalization volume or peak hourly treatment capacity is required.
- If the requirements of Procedure F-5-5 are met by increasing treatment capacity, future loading conditions for the aeration tanks with nitrification (specifically the BOD5 loading and O2 requirement), secondary clarifiers and chlorination chamber and dechlorination is in excess of the current ECA rated capacity.
- The WWPC aeration system requires near term upgrades to meet current treatment requirements. Additionally, issues with odour control at the septage receiving station have also been identified. The chlorination system will require expansion if future peak flows are treated at the plant; however, operational challenges have been experienced related to the chlorination system and there may be benefits to converting the chlorination/dichlorination system to UV, regardless of the future treatment alternative selected. The digesters are starting to reach the end of their operational life and are in need of upgrades and repairs. Consideration may need to be given to replacement to address issues associated with ageing infrastructure.
- There is a desire by the Town to eliminate CSOs at Chamber A (SPS No. 1). We note that the meter chamber also needs to be replaced based on information from operations staff. The sewer between Chamber A and the SPS would also need to be upgraded.
- Based on the results from modelling the wastewater conveyance system, the system is within the required level of service under the existing population scenario, but there is some basement flood risk in the 1:10 year storm event, as well as surface flooding in the 1:100 year RDII event. These risks increase as development is added on the 2021-2041 and beyond 2041 timeframes.

**Table 9-1: Summary of Servicing Constraints**

| Component | Criteria | | Existing Population | 2021-2041 Population | Beyond 2041 |
|---|---|---|---|---|---|
| Wastewater Treatment Centre | Average day flow (ADF) to be less than 80% of capacity. | Rated ADF of 15,665 $m^3$/day | 58% of rated capacity (9,070 $m^3$/day), meets LOS. | 78% of rated capacity (12,271 $m^3$/day), approaching LOS. | Does not meet LOS. |
| | Provide primary treatment up to and including the 5yr storm. | PDF of 32,580 $m^3$/day for Primary Clarifiers | PDF of 21,583 $m^3$/day, meets LOS | PDF of 39,500 $m^3$/day, exceeds LOS in 10 – 15 years | Does not meet LOS. |
| | Meet requirements of Procedure F-5-5. No increases in CSO volumes above existing. | | Meets LOS | Requires 1,800 $m^3$ storage increase or 460 $m^3$/hr increase in PHF | Does not meet LOS. |
| Main SPS (SPS No. 1) | 1:10 year storm flow less than firm capacity | Firm capacity 250 L/s | 143 L/s, meets LOS (actual peak TBC) | 224 L/s, approaching LOS | 245 L/s, approaching LOS |
| | 1:100 year storm flow less than peak capacity | Peak capacity 375 L/s | 280 L/s, meets LOS | 287 L/s, meets LOS | 336 L/s, approaching LOS |
| Bayport SPS (SPS No. 7) | 1:10 year storm flow less than firm capacity | Firm capacity 25 L/s | 17 L/s, meets LOS | 20 L/s, meets LOS | 49 L/s, does not meet LOS |
| | 1:100 year storm flow less than peak capacity | Peak capacity 52 L/s | 24 L/s, meets LOS | 27 L/s, meets LOS | Does not meet LOS, once upstream flooding addressed |
| Gravity Sewers | Flow to be less than sewer capacity | Varies | Refer to figures | Refer to figures | Refer to figures |
| | HGL above limits during 1:100 (RDII). | 2m of surface or 300mm above obvert | Refer to figures | Refer to figures | Refer to figures |

## 10.0 PROBLEM AND OPPORTUNITY STATEMENT

The Town operates a communal wastewater system that consists of the Midland Wastewater Treatment Centre (WWTC), seven sewage pumping stations and associated forcemain, and over 100 km of dedicated or combined storm/sanitary sewermain. The WWTC provides secondary treatment and disinfection to wastewater prior to the discharging of treated effluent to the Georgian Bay.

Although the WWTC has been able to historically meet its Environmental Compliance Approval treated effluent requirements, there are challenges associated with aging plant equipment and components, maintaining existing CSO volumes as growth occurs, eliminating CSOs at the Main SPS (SPS No.1) and accommodating flows from growth, and eliminating/reducing the risk of surface and basement flooding due to collection system constraints.

There is an opportunity through the Master Planning process to review the wastewater system holistically and develop strategic plan of actions that can be implemented over a logical time period and in a prioritized fashion with the intended goal of addressing the identified problems and ensuring appropriate performance and reliability of the wastewater system in both the short and long term.

## 11.0 EVALUATION AND SELECTION OF PREFERRED ALTERNATIVES

Phase 2 of the Master Plan process involves the identification and evaluation of alternative solutions to determine potential strategies and actions to address the problems and opportunities identified in Phase 1. All reasonable potential solutions to the problem(s), including the 'do nothing' alternative, are considered. To facilitate the evaluation and selection of the preferred solutions during Phase 2, a transparent and logical three (3) part assessment process was established. This process included:

- Initial screening of alternatives.
- Detailed evaluation of screened alternatives.
- Selection of a preferred alternative.

Based on the initial screening, a detailed assessment of the short list of alternatives was conducted. Evaluation criteria were developed based on a review of the background information, experience on similar assessments, and consultation with the Town staff. The evaluation was conducted using criteria in the following four major criteria categories:

- **Natural Environment**: natural features, natural heritage areas, Areas of Natural and Significant Interest, designated natural areas, watercourses and aquatic habitat.
- **Technical Considerations**: constructability, maintaining or enhancing wastewater treatment, reliability and security of conveyance system, ease of connection to existing infrastructure and operating and maintenance requirements, expandability.
- **Social Environment and Archaeology**: proximity of facilities to residential, commercial and institutions, archeological sites, land-use, and planning designations.
- **Financial Impacts**: capital costs, Operation and Maintenance costs.

Each alternative was assigned an evaluation impact level (refer to Table 11-1) for each criteria. This method provides an overall assessment of the positive and negative impacts of each alternative. This method was used as it is recognized that there could be more than one alternative or technology that can address a problem and that additional consideration of these technologies could be undertaken.

**Table 11-1: Evaluation Impact Level**

| Evaluation Impact Level | Indicator |
|---|---|
| High Positive | ↑↑ |
| Low/Moderate Positive Impact | ↑ |
| No Anticipated Impact | ↔ |
| Low/Moderate Negative Impact | ↓ |
| High Negative | ↓↓ |

The relative impact for each criterion to each potential strategy was assessed based on the alternatives anticipated impact with respect to that criterion. The four evaluation criteria were assigned equal weights as they were considered to have equal importance in this evaluation at the Master Plan stage. Once the detailed evaluation was completed, a recommended preferred alternative or alternatives was identified.

We note that the LOS target for the system is for the 2021 - 2041 scenario, however, in some cases the beyond 2041 was developed for the Town to provide future guidance. Additionally, as a lot of infrastructure has a useful life span beyond the 20-year horizon, it was also used to ensure that if an upgrade is required, the increase required to meet the 2041 and beyond scenario was reviewed. (i.e. if 2041 requires a 525mm pipe but the beyond 2041 needs a 600mm, we would recommend the 600).

Note that additional recommendations for further studies to be completed outside the scope of this Master Plan are listed in Section 11.4.

## 11.1 Collection System Improvements

### 11.1.1 2021 – 2041 Service Population

Conveyance system improvements have been selected in order to achieve either prevention of surface flooding in the development scenario or provide a similar level of service to that experienced under the existing population scenario.

To meet 2021 – 2041 servicing requirements, up to 1.4 km of sewer upgrades have been identified across the trunk sewer system as set out Table 11-2. In all cases, pipe sections to be upgraded within the 2021 – 2041 time period have been sized to accommodate beyond 2041 flows.

**Table 11-2: 2021 - 2041 Collection System Upgrades**

| Trunk | Pipe Length to be Upgraded (m) | Old Max Diameter (mm) | Upgraded Max Diameter (mm) | Upgrade Cost (2020$) |
|---|---|---|---|---|
| Bayshore | 132 | 450 | 525 | $350,000 |
| Yonge [(2)] | 732 | 750 | 825 | $1,450,000 |
| Pilsbury | 521 | 600 | 900 | $1,580,000 |

Table Notes:

(1) The Town has noted a watermain upgrade project is anticipated along Young street in the next 5 years. The cost of sewers along Young street have been reduced to account for savings associated with removals and road works etc.

As an alternative to the Yonge Trunk upgrades around King Street identified in Table 11-2 the Town has indicated that the remediation of Yonge Street may allow for cost effective upgrades and re-alignment of the Yonge Trunk along Young Street. Re-routing the trunk flows directly along Yonge Street between Little Lake Park Road and Russel Street would require 1.6 km of new 600mm diameter sewer however some of this may replace the existing 200 mm diameter local sewers already in the corridor. Conceptual and detailed design phases of the work would have to be undertaken to assess design implications and options. It is understood from the GIS data that some of the sewers which would be bypassed have been replaced within the last 30 years and some within the last 10 years. These sewers would still be required to convey local flows but not the trunk flows and would remain to provide resiliency in the system. Upgrades identified along this section of the Yonge Trunk at Little Lake Park Road would not be required. This option to re-align the Young trunk would add $1.42M to the costing presented above. Given the increase in cost, it's recommended that upgrades be made along the current alignment, unless there are operational issues/deficiencies identified along the existing alignment.

### 11.1.2 Beyond 2041 Service Population

Given the potential for development areas in the beyond 2041 horizon to develop sooner then forecast and because buried infrastructure has a lifespan beyond 20 years, conveyance upgrades beyond 2041 have also been reviewed. Conveyance system

improvements for the beyond 2041 scenario have been selected in order to achieve either prevention of surface flooding in the development scenario or provide a similar level of service to that experienced under the existing population scenario.

#### *11.1.2.1. Bayshore Trunk Upgrades*

A short section of Bayshore has a reduction in level of service to the extent that there are potential HGL issues in the dry weather flow condition. This section has reverse slope sewers in the GIS and a survey should be undertaken to confirm the sewer elevations. If the GIS is representative of the sewers then upgrades are recommended to regrade the sewer sections as part of the growth beyond 2041. The cost of this work is estimated at $950,000.

#### *11.1.2.2. Servicing Alternatives for Highway 12 Development*

There are four future development areas located along or near Highway 12, that are anticipated to be developed within 2021-2041 and beyond 2041 (Area 7W – Hanson West, Area 6 – CR93-Hyw 12, Area 9 Brooklea GCC, and Emp2 – Employment Lands). When modelling was conducted, servicing all of the growth in these areas (beyond 2041 scenario) presented capacity constraints along the Pillsbury trunk. Three options were evaluated to service this future growth:

- Alternative 1: Direct future flow to Upstream End of Pillsbury Drive Trunk
    - Convey the increased flows from the new pump stations(s) to the upstream end of Pillsbury Drive Trunk. Increase capacity, by upsizing the trunk, between 400 m west of King Street and William Street (1.7 km) plus upgrade of 230 m along Pilsbury Drive east of William Street; or
- Alternative 2: Direct future flow to Young Street Trunk at County Road 93
    - Redirect the increased 2021-2041 future development flow at the upstream end of the Pilsbury trunk to the Yonge Street Trunk by construction of a pump station and 2.5 km of forcemain along County Road 93 with no upgrades on the Pilsbury Trunk. This would require an additional 430 m of upgrades on the Yonge Trunk on William Street between Yonge Street and Barnett Avenue along with minor reductions in level of service on the Yonge Trunk at two nodes; or
- Alternative 3: Direct future flow to Pilsbury Trunk at William Street
    - Convey the increased flows from the upstream end of the Pilsbury Trunk to connect into the Pilsbury Trunk at William Street via a 3.7 km forcemain from the new pump station(s). Upgrades of 230 m of sewer east of William Street would still be required but would avoid upgrades upstream of William Street and on the Yonge Trunk at William Street.

The capital cost estimate for these alternatives are provided in Table 11-3.

**Table 11-3: Pilsbury Trunk Capacity Options OPCC**

| Option | Upstream Pilsbury Flow Directed to: | Upgrades | Upgrade Cost (2020$) | |
|---|---|---|---|---|
| 1 | Upstream end of Pilsbury Trunk | 66 L/s Sewage Pump Station<br>1.8 km Forcemain<br>1.9km of Pilsbury Trunk | $1,800,000<br>$4,475,000<br>$5,025,000 | $11.3M |
| 2 | Yonge Trunk at County Road 93 | 66 L/s Sewage Pump Station<br>2.5 km Forcemain<br>430m of Yonge Trunk | $1,800,000<br>$6,210,000<br>$1,300,000 | $9.3M |
| 3 | Pilsbury Trunk at William Street | 66 L/s pump station<br>3.7 km Forcemain<br>230m of Pilsbury Trunk | $1,800,000<br>$9,200,000<br>$600,000 | $11.6M |

The forcemain routes were evaluated based on the four screening criteria. Each alternative was assigned an evaluation impact level. See Table 11-4 for a summary.

**Table 11-4: Pillsbury Trunk Capacity Options – Impact Evaluation**

| Alternative | Screening Criteria | | | | Outcome |
|---|---|---|---|---|---|
| | Natural Environment | Technical Considerations | Social Environment and Archaeology | Financial Impacts | |
| Do Nothing | ↔ | ↓↓ | ↓↓ | ↔ | Not Feasible |
| Upstream end of Pilsbury Trunk | ↓ | ↑ | ↑ | ↓↓ ($11.3M) | Least Preferred |
| Yonge Trunk at County Road 93 | ↓ | ↑↑ | ↑ | ↓ ($9.3M) | Preferred |
| Pilsbury Trunk at William Street | ↓ | ↑ | ↑ | ↓↓ ($11.6M) | Less Preferred |

Based on a consideration of all evaluated factors, the recommended option to address the Pillsbury Trunk Capacity constraints is directing flow in the beyond 2041 growth scenario to the Yonge Trunk via a forcemain along County Road 93. The main advantage of this option is that it avoids lengthy construction along the Pillsbury trunk in favor of more modest upgrades along the Young Trunk and were construction of watermain is already anticipated in the longer term (watermain extension along County Road 93). As noted in Section 10.2.1, the upgrades to the Young Trunk (required for 2021-2041 growth) could be done along the existing route ($1.4M) or by realigning the trunk along Young as part of the watermain work already proposed ($2.9M).

#### *11.1.2.3. Yonge Trunk Upgrades*

As indicated above, if additional flow from the Pilsbury Trunk is redirected to the Yonge Trunk then 430 m of sewer will require to be upgraded on the Yonge Trunk at William Street between Yonge Street and Barnett Avenue. There will be reductions in the level of service at two nodes which will now have a basement flood risk in the 1:100 year event. Level of service in the 1:10 year event is maintained and there is no surface flood risk in either event.

If there are no redirected flows from the Pilsbury Trunk to the Yonge Trunk no further upgrades are required on the Yonge Trunk to accommodate increased flows in the beyond 2041 growth scenario.

#### *11.1.2.4. Other Upgrades Beyond 2041*

In addition to the upgrades discussed for HLG level of service improvements above, a number of sewer sections operate beyond free flow capacity during dry weather flow in the beyond 2041 population growth, shown in red in Figure 7-4. These sections should be upgraded when lifecycle renewal of the sewers is being undertaken. An approximate cost of these upgrades is between $ 825,000 and $ 1,950,000.

## 11.2 Sewage Pump Station Improvements

### 11.2.1 2021 – 2041 Service Population

No pump station improvements are required under the 2021-2041 future population growth scenario. All pumps have sufficient capacity when the 20 year upgrades are implemented.

### 11.2.2 Beyond 2041 Service Population

Due to capacity limitations at the Bayport SPS #7, upgrades will be required to facilitate growth of Area 1 and the inclusion of E1 into the service area beyond 2041. These areas were not included in the 2008 design brief for the pump station. Upgrades would have to increase the capacity by nearly double at the pump station and would involve either a new forcemain or a replacement forcemain. The proposed alternative is to construct a new pump station with a new forcemain to connect into the gravity system at the same location as the SPS #7 forcemain at Victoria Street (Figure 7-4). The pump station would have to have a capacity of 33 L/s and the forcemain would be approximately 1.2 km long depending on the final location of the station. If, as part of lifecycle upgrades, SPS #7 requires significant work in timing with growth expansion in the area, upgrades to the existing pump station would be preferential.

## 11.3 Treatment and Equalization Storage Alternatives to Meet F-5-5

Based on the evaluation of treatment plant capacity (refer to Table 9-1) within the 2021 – 2041 growth scenario additional primary treatment capacity will be required along with additional peak hourly treatment or storage capacity will be required to meet the requirements of Procedure F-5-5. Three options to address these constraints to 2041 were reviewed. Under all three options is was assumed that lifecycle upgrades at the plant and sewage pumping stations would be required (refer to Section 3.7 and 8.4).

### WWCP Upgrades Common to All Options

*Plant Wide Lifecycle Repairs and Replacements:* From the Condition Assessment of the WWTP (refer to Section 3.7) approximately $1.3M in lifecycle repairs and replacements were identified at the plant. In addition, further investigations were recommended to asses replacement needs and costs associated with minor architectural and structural damage or cracking in various locations, lighting and fire alarm systems, minor process equipment issues, etc. Based on experiences with rehabilitation work at plants of a similar vintage, it is estimated that that total cost of lifecycle upgrades will approach twice that, $3.04M.

*Headworks:* In spite of adequate theoretical hydraulic capacity operators have reported that under current peak flows of 37,000 $m^3$/day the headworks appears to operate at or near capacity. Lack of detailed hydraulic information for specific equipment, possible hydraulic constraints to the grinder and/or barminutor, and/or increased binding of screens by debris during high wet weather flows may be contributing to these issues.

Additionally, both the comminutor in the bypass train and the grit rake associated with the detritor system in the primary inlet channel experience treatment/operating issues and are due for lifecycle replacement. Given the potential hydraulic constraints, age, and type of the existing infrastructure a like-for-like equipment replacement is not recommended as the technologies are effectively obsolete.

A new headworks or a significant retrofit is required to address lifecycle replacement needs and accommodate future flows. For budgeting purposes, we have assumed a new headworks would be constructed north of the existing headworks building and the existing headworks abandoned. The capacity of the headworks should be based on the ultimate peak design flows. Based on the original design capacity of the headworks this would be approximately 62,300 $m^3$/day, this would need to be confirmed during design.

*Primary Clarifier:* Under both potential expansion alternatives (i.e. capturing or treating future peak flows) the 20-year maximum day flow is anticipated to be approximately 39,500 $m^3$/day. The rated capacity of the clarifiers from the ECA is 32,580 $m^3$/day, this means that a primary treatment expansion will be required prior to 2041. Alternative treatment technologies could be considered during design, for budgeting purposes it has been assumed that a fourth clarifier, the same size as the existing clarifiers would be constructed. With four primary clarifiers in service the total rated maximum day capacity

would be approximately 43,440 $m^3$/day. Costs for this upgrade would be allocated to growth from 2021 - 2041 and to growth beyond 2041.

*Aeration:* The primary effluent discharges into six (6) aeration tanks all equipped with inlet isolation gates, a surface aerator in the centre of each tank, and effluent tipping gates to maintain level in the tanks. Operators have reported challenges maintain adequate DO levels in the existing tanks and so the ADF, ADF BOD5 loading and O2 requirements was reviewed under future loading conditions. This assessment found that the hydraulic capacity of the tanks is adequate under future (2041) flows, however, there is an existing deficiency with respect to the O2 requirement. To address this issue it is recommended that in addition to lifecycle upgrades required on the tanks that the existing surface aerators be replaced with fine bubble diffusers (or other suitable aeration technology). The upgrade would be designed to treat 20-year design flows. Costs would be shared between existing users and 20-year growth.

Disinfection: Further study is required to assess the disinfection improvements (i.e. conversation to UV), however, they have been carried for budgeting purposes.

*Odour Control at the Septage Receiving Station:* As part of the 1995 plant upgrade/expansion the sludge storage building was converted to a septage receiving station. The conversion included installing FRP covers on new steel supporting beams along with an odour control system. Piping was also added or relocated to allow septage to be pumped to the primary clarifiers, primary digesters or aeration tanks. It is understood that most of the odour control system and building HVAC has been decommissioned or abandoned. It's recommended that the tanks be refurbished and a permanent cover be constructed to contain odours. A new odour control system would be required along with upgrades to the buildings HVAC and existing mechanical equipment. An alternative to this upgrade would be constructing a new septage receiving station in the same or new location. The cost of rehabilitation is lower and has been carried forward.

*Digestors:* Prior to undertaking significant rehabilitation work, it is necessary to review the nutrient management processes at the plant. As noted in Report ENG-2018-01 presented to Council in February 2018 there may be value in investing in a new facility that enhances beneficial reuse of the resulting material. An option could be the introduction of Lystek or other technology. It is recommended that in keeping with the original report to Council that an RFP be issued to review nutrient management options as the WPCP and determine if costs savings and reduction in greenhouse gas emissions can be achieved though the use of a technology that can produce Class A Fertilizer. For budgetary purposes the cost of a study and new facility has been carried forward.

### WWCP Upgrades Specific to Wet-Weather Alternative

*In addition to the base upgrades above, options were evaluated with respect to treating or storing future peak flows. These are described as follows:*

- **Do Nothing**
    - Under this alternative, the existing WWTC and equalization storage would remain status quo. This alternative will not address the issues with both systems inadequacy to handle future peak flows.
- **Plant Expansion to Treat Peak**
    - The existing WWTC would be expanded to meet the anticipated increase in Peak Hour Flow attributable to development. Infrastructure required would be constructing a new secondary clarifier, and expanding the disinfection system (and/or replacing with UV). Over the longer term an expansion to the primary clarifiers would also be required to address increase in Peak Day Flow.
- **Expand Equalization Storage**
    - In this alternative, the existing equalization storage will be expanded to store an additional 1,800 $m^3$ during the Peak Hour Flow Over the longer term an expansion to the primary clarifiers would also be required to address increase in Peak Day Flow.

A summary of costs associated with these options is provided in Table 11-5 and detailed capital cost estimates for these alternatives are provided in Appendix H. The screening and evaluation is summarized in Table 11-6

**Table 11-5: Treatment and Storage Alternatives OPCC**

| Option | Treatment and Equalization Options | Upgrade Projects | Upgrade Cost (2020$) | |
|---|---|---|---|---|
| 1 | Expand Plant to Treat Peak | New Secondary Clarifier(2) | $3,070,000 (total)<br>$1,872,000 (2021-2046)<br>$1,198,000 (beyond 2046) | **$2.1M** |
| | | Expand Disinfection (UV) | $200,000(3) | |
| 2 | Expand Equalization Storage | New Equalization Storage Tank | $2,720,000 | **$2.7M** |

Table Notes:

(1) From the Condition Assessment of the WWTP (refer to Section 3.7) approximately $1.3M in lifecycle repairs and replacements were identified at the plant. Based on experiences with rehabilitation work at plants of a similar vintage, it is estimated that that total cost of lifecycle upgrades will approach twice that, $3.04M.

(2) It was assumed that the third secondary clarifier would match the size of the existing clarifiers. The additional clarifier will have capacity to treat 18,500 $m^3$/day at PHF (three clarifiers can treat 55,500 $m^3$/day at PHF). This exceeds the required treatment capacity in 2041 by 7,220 $m^3$/day at PHF which can be used to service growth beyond 2041.

(3) Further study required to confirm disinfection upgrades, cost of expansion assumes that full replacement of existing system with UV occurs.

**Table 11-6: Evaluation of Treatment and Storage Alternatives**

| Alternative | Screening Criteria | | | | Outcome |
|---|---|---|---|---|---|
| | Natural Environment | Technical Considerations | Social Environment and Archaeology | Financial Impacts | |
| Do Nothing | ↓↓ | ↓↓ | ↓↓ | ↔ refer to Table 12-1 | Does not Address Problem |
| Plant Expansion to Treat Peak Flows | ↑ | ↑ | ↑ | ↓ ($2.1M) | Preferred |
| Expand the Equalization Storage | ↑ | ↑ | ↑ | ↓ ($2.7M) | Preferred |

Both the option to expand the plant to treat peak flows and expand the equalization storage tank are positive from a natural environment, social environment and archeological perspective. They will address CSOs related to growth and have limited impact on the environment during construction, since works are limited to the existing wastewater plant site. Both options will need to consider the potential impacts of climate change during design and implementation. Significant differences in the greenhouse gas emission associated with both options are not anticipated. The option to expand the wet weather treatment capacity is anticipated to be a Schedule A project, as the plant is not being expanded beyond its rated average day capacity and no land acquisition is required. The option to expand equalization is a Schedule B activity.

The tank option is relatively straightforward to construct and operate. However, there will continue to be a frequent need to divert flows and manage/ disinfect water stored in the equalization tank. It will also need to be further expanded to meet the anticipated needs beyond 2041. With the plant expansion, construction efforts are more involved in the near term, but there is a capacity benefit that can be realized beyond 2041. It would also reduce the number of times that flows need to be diverted under existing conditions and in the 2021 – 2041 growth scenario. There can, however, be operational challenges associated with oversized clarifiers during normal flows (e.g. sludge bulking) the secondary clarifier option would have more mechanical equipment associated with it. Given these potential concerns equalization storage has been carried forward for budgeting purposes.

Based on a consideration of all evaluated factors, either recommended option would satisfactorily address the F-5-5 requirements with modest environmental impacts. Operators have observed a decline in flows as a result of completion of the King St. Rejuvenation Project in the summer/fall of 2020. As this may have an impact on the size

and timing of the upgrades, it is recommended that flows continue to be monitored and reviewed prior to selection and implementation.

## 11.4 Further Studies Required

### 11.4.1 Cultural Heritage and Archeological Investigations

As noted in Sections 4.5 and 4.6, depending on the location of the proposed upgrades, a Cultural Heritage Evaluation and/or an archeological investigation may be required prior to project implementation. It is noted that most of the proposed work is in existing roadways or existing developed areas and do not require these investigations. For infrastructure on new lands (e.g. new pumping stations), the Town is committed to complete both a Stage 1 Archeological Assessment (and Stage 2 if required) and a Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment once exact locations are confirmed and prior to project design/construction.

### 11.4.2 Assessment of Nutrient Management Alternatives

The digesters are starting to reach the end of their operational life and are in need of upgrades and repairs. Consideration may need to be given to replacement to address issues associated with ageing infrastructure. Further investigation is required to determine the appropriate near and long-term rehabilitation and/or replacement alternative. As mentioned previously, it is recommended that an RFP be issued to review nutrient management options at the WPCP and determine if costs savings and reduction in greenhouse gas emissions can be achieved through the use of a technology that can produce Class A Fertilizer.

### 11.4.3 Assessment of Storm Sewer Capacity Downstream of Chamber A

As noted in Section 6, the weir height was adjusted back to its original design height in the summer of 2020. Monitoring of Chamber A is ongoing, however, there are concerns that during storm events capacity constraints downstream of Chamber A (towards the overflow outlet) are causing storm water to surcharge into Chamber A. In extreme events there is the possibly that storm surges overtop the weir into the sanitary side of Chamber A. Further investigation is required to confirm if surcharging is occurring in Chamber A during storm events and recommend system upgrades.

### 11.4.4 Combined Sewer Separation, I&I, and Water Use Reduction Studies

A reduction in CSO volumes could also be achieved by implementing a thorough inflow and infiltration (I&I) reduction program. The I&I reduction program would involve lining sewers and redirecting weeping tile drainage. A partial I&I reduction program may deliver results which would reduce the required increase in storage size or capacity improvements downstream. The flow monitoring program undertaken for the model calibration was not sufficient to identify areas of the system where I&I is a specific issue.

As part of ongoing work the Town should continue to monitor I&I and review opportunities to reduce I&I in the existing and future components of the collection system. As part of the Town's overall water and wastewater service program, a review of opportunities for water use reduction strategies and/or greywater use could also be conducted.

## 12.0 IMPLEMENTATION PLAN

The timing of anticipated upgrades has been identified within the immediate, 2021-2041, and Beyond 2041 timeframe as a guide. The actual timing of upgrades will be contingent on the rate on development in each of the contributing areas. Refer to Figure 12-1 for locations of the proposed upgrades. All pipe and sewage pumping station sizing are approximate and should be confirmed during design.

Note that in addition to the proposed infrastructure improvements, the Town should explore and consider implementing non-structural stormwater management measures, especially in areas serviced with combined storm and sanitary sewers. Recommended by the MECP, these sustainable measures may be used to avoid or reduce the scope of future combined sewer upgrades by reducing stormwater flow in these areas. Alternative measures may include:

- Implementation of above-grade stormwater management technologies (low impact development technologies) such as swales, bioretention facilities, permeable pavement, etc. to reduce or attenuate wet weather flows;
- Implementation of stormwater management design policies that favour above-ground stormwater discharge instead of below ground discharge (e.g. roof leader disconnections for private development discharge of rainwater);
- Implementation of by-laws to add controls on water resource use (e.g. prevent the discharge of once-through cooling water); or
- Various other alternatives such as the implementation of land use/zoning controls, flood warning/flood proofing/emergency measures, conservations programs, etc.

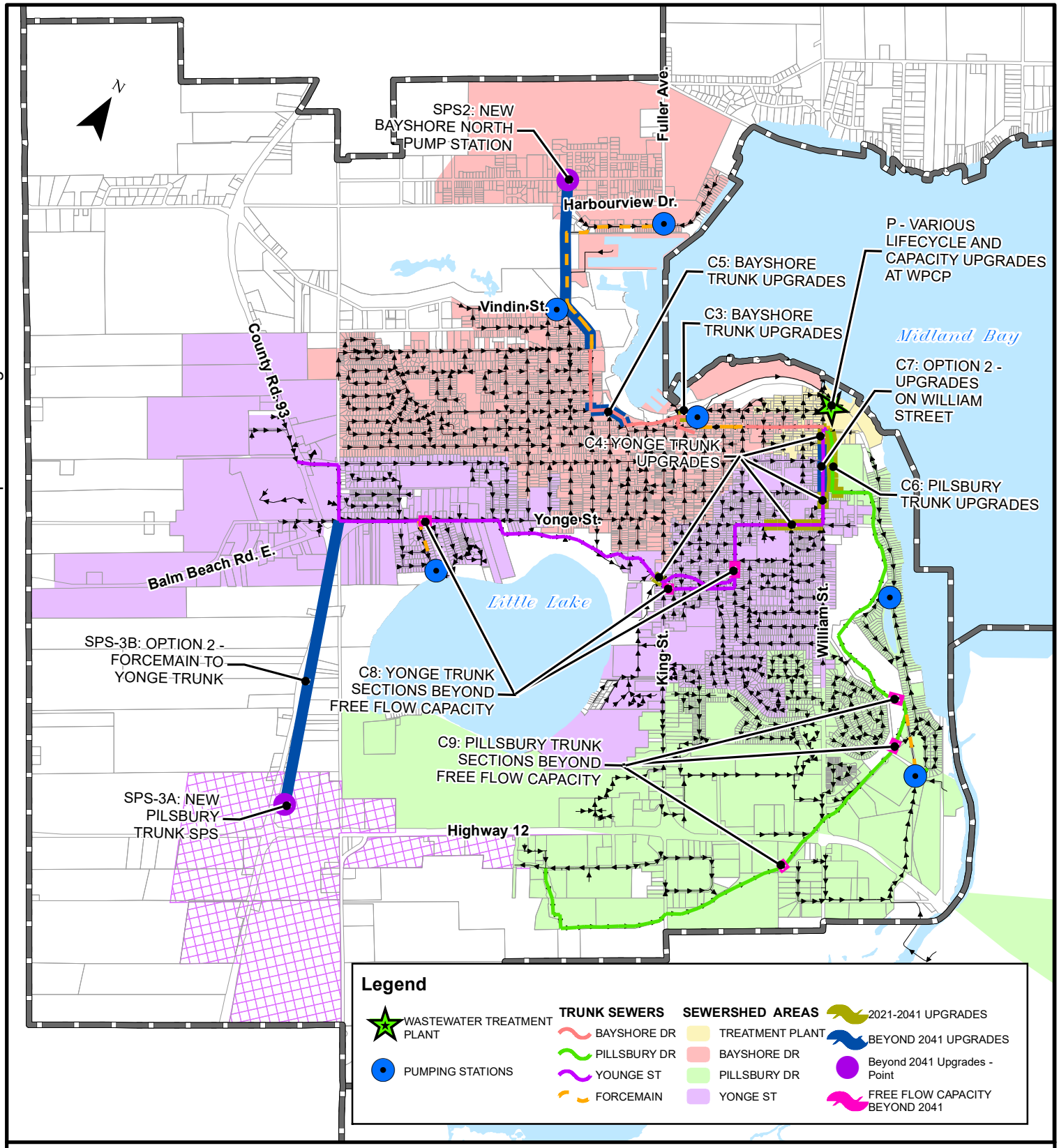
## Table 12-1: Implementation of Preferred Wastewater Servicing Alternatives – Town Wide WPCP Upgrades

| System Component | Description | Cost Estimate (2020$) | Funding % | | | Funding $ | | | Trigger/ Timing |
|---|---|---|---|---|---|---|---|---|---|
| | | | Town | Developer (Growth to 2041) | Developer (Growth beyond 2041) | Town | Developer (Growth to 2041) | Developer (Growth beyond 2041) | |
| **Town-Wide Upgrades – with Option 3 for Treatment/Equalization Storage** | | | | | | | | | |
| P-1 | Wastewater treatment plant and sewage pumping station lifecycle replacements and repairs. | $3,040,000 | 100% | 0% | 0% | $ 3,040,000.00 | $ - | $ - | 0 – 10 years (1) |
| P-2 | New Equalization Storage Tank (only under equalization storage option) | $2,720,000 | 0% | 100% | 0% | $ - | $ 2,720,000.00 | $ - | 5+ years |
| P-3 | Headworks Replacement (required under all alternatives) (2) | $4,100,000 | 60% | 0% | 40% | $ 2,460,000.00 | $ - | $ 1,640,000.00 | 0 – 10 years (1) |
| P-4 | Aeration System Upgrades and Expansion (required under all alternatives) (3) | $2,600,000 | 70% | 30% | 0% | $ 1,820,000.00 | $ 780,000.00 | $ - | Immediate |
| P-5 | New Primary Clarifier (required under all alternatives) (4) | $1,810,000 | 0% | 63% | 37% | $ - | $ 1,140,300.00 | $ 669,700.00 | 10 - 15 years |
| P-6 | Replace/Expand Disinfection (UV), if required (further investigation needed) (5) | $2,443,000 | 100% | 0% | 0% | $ 2,443,000.00 | $ - | $ - | 5 – 10 years |
| P-7 | Septage Receiving Station Upgrades and Odour Control (required under all alternatives) | $1,990,000 | 100% | 0% | 0% | $ 1,990,000.00 | $ - | $ - | 0 – 10 years (1) |
| P-8A | Assessment of Nutrient Management Alternatives to Address Maintenance Needs and Sustainability Objectives | $50,000 (study only) | 100% | 0% | 0% | $ 50,000.00 | $ - | $ - | 0 – 5 years |
| P-8B | New Nutrient Management Facility (TBD based on outcome of study) | $5,000,000 | 75% | 0% | 25% | $ 3,750,000.00 | $ - | $ 1,250,000.00 | TBD |
| **TOTAL** | | $ 23,753,000.00 | | | | $ 15,553,000.00 | $ 4,640,300.00 | $ 3,559,700.00 | |

**Table Notes:**
**(1) actual timing could be phased or planned to coincide with other proposed lifecycle/expansion upgrades.**
**(2) Operators have reported that under current peak flows of 37,000 m3/day the headworks appears to operate at or near capacity. The design capacity of the new headworks should be based on the ultimate peak design flows. Based on the original ultimate design capacity of the headworks this would be approximately 62,300 m3/day. This would need to be confirmed during design, however, if forms a reasonable basis for distribution costs. Existing peak flows are 37,000m3/day. In the equalization tank option, no increase in peak is anticipated to 2041, thus the remainder of the costs would be allocated to growth beyond 2041.**
**(3) Aeration upgrades would be designed to accommodate 2041 design flows. The cost of components to accommodate growth (e.g. additional blower, additional diffuser, increase in pipe size, I&C and electrical upgrades) is approximately 30% of the total cost - refer to detailed OPCC.**
**(4) Flows to 2041 exceed the rated capacity of the existing clarifiers by 5,120m3/day if a new equalization storage tank is constructed. It has been assumed that a fourth clarifier, the same size as the existing clarifiers would be constructed. The new clarifier would have a capacity of 8,145m3/day. The flows to 2041 account for 63% of the new clarifiers capacity. The remainder of the capacity would be allocated to growth beyond 2041.**
**(5) In the equalization tank option, no increase in peak flows is anticipated to 2041. The cost sharing would be contingent on the ultimate design capacity of the system determined during detailed design.**
**(6) An expansion is not required to service growth to 2041. The cost sharing would be contingent on the ultimate design capacity of the system determined during detailed design.**

**Table 12-2: Implementation of Preferred Wastewater Servicing Alternatives – Collection System Upgrades**

| | | | | | |
|---|---|---|---|---|---|
| **Bayshore Trunk Upgrades** | | | | | |
| C2 | Two sections of 450 mm diameter pipe immediately upstream of the Main SPS #1. A total of 132 m of sewer is upgraded. | $350,000 | -- | Development | 2021-2041 |
| C5 | Five sections of 630mm to 675 mm diameter pipe downstream of SPS #7. A total of 335 m of sewer is upgraded. | $950,000 | -- | Development | Beyond 2041 |
| SPS-2 | New Bayshore North SPS (capacity ~33 L/s) with 1.2 km long forcemain (includes service to 200 existing not serviced units). | $3,100,000 | 200 units | Development | Beyond 2041 |
| **Young Trunk Upgrades** | | | | | |
| C3a & C3b | Four sections of the Yonge Trunk have been identified for upgrades. Two of these sections are to prevent surface flooding and the other two are to maintain the existing level of service when there is future population growth. A total of 732 m of upgrades have been identified with new sewer sizes including 150 m of 825 mm diameter pipe close to the WWTC | $1,450,000 | -- | Development | 2021-2041 |
| C8 | Upgrade sewer sections that operate beyond free flow capacity during dry weather flow in the beyond 2041 population growth | $300,000 to $620,000 | -- | Development | Beyond 2041 |
| **Pilsbury Trunk Upgrades – with preferred Option 2 for highway 12 Development Area Servicing** | | | | | |
| C4 | The Pilsbury Trunk has around 520 m of upgrades identified and all are required to maintain the existing level of service under the future population scenario. The upgrades are in the nine sewer sections immediately upstream of the WWTC. | $1,580,000 | -- | Development | 2021-2041 |
| SPS-3a & 3b | New Pilsbury Trunk SPS (capacity 66 L/s) and 2.5 km long forcemain to Young Trunk | $8,010,000 | -- | Development | Beyond 2041 |
| C6 | Upgrades on William Street portion of Young Trunk upstream of WWTC (due to flows from Pilsbury catchment area) | $1,300,000 | -- | Development | Beyond 2041 |
| C7 | Upgrade sewer sections that operate beyond free flow capacity during dry weather flow in the beyond 2041 population growth | $525,000 to $1,352,000 | -- | Development | Beyond 2041 |




PROJECT:

# TOWN OF MIDLAND WASTEWATER MASTER PLAN

MIDLAND, ONTARIO

DRAWING:

## UPGRADES TO SUPPORT 2021-2041 & BEYOND 2041 GROWTH SCENARIOS

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| DESIGN: | BP |
| DRAWN: | TB |
| CHECKED: | BP/JW |
| JLR #: | 28243 |

DRAWING #:

FIGURE 12-1

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# 13.0 PHASE 1 AND 2 CONSULTATION SUMMARY

## 13.1 Project Team Meetings

A project initiation meeting was held on November 8, 2018 with representatives from the Town and JLR to confirm roles and responsibilities, project understanding, proposed work plan and schedule, and to review current and historical issues associated with the Town's system. Additional progress meetings were held June 17, 2019, July 10, 2019, and August 23, 2019.

## 13.2 Public and Agency Consultation Plan

A Stakeholder Mailing List was developed and reviewed with the Town. The mailing list identifies potential developers and review agency stakeholders. A copy of the mailing list is provided in Appendix H. A Notice of Study Commencement was prepared and included a comment form for potential stakeholder to return by mail or email. The Notice was mailed to potential developers and review agencies and emailed to Aboriginal Communities. The Notice was also issued in the Midland Mirror local newspaper on September 26, 2019. Refer to Appendix J for a copy of the Notice and responses received to date.

## 13.3 Public Information Center

A Public Information Center (PIC) was held on November 17, 2020. The PIC Notice is in Appendix J and the presentation, and minutes are provided in Appendix K. The PIC notice was published in the paper, posted on Engaging Midland, and emailed to the project's notification list. Two separate virtual PICs were held. The first was for local developers and was by invitation only. The second was a general session open to all members of the public. Approximately 8 participants attended the developer PIC and 24 attended the general public PIC. Following the PIC, a recording of the meeting was posted on the projects Engaging Midland website and all PIC registrants were notified that it was available for viewing.

## 13.4 Public and Agency Stakeholder Comments

Table 13-1 below provides a summary of the public and agency comments received during the Master Plan and the action taken by the project team. Refer to Appendix J for a record of all received stakeholder comments.

**Table 13-1: Summary of Public and Agency Stakeholder Comments (Chronological)**

| Stakeholder | Comment | Action |
|---|---|---|
| Jones Lang LaSalle (JLL) on behalf their client | April 15, 2019 – Requested that their contact information be added to the project mailing list and that study reports be provided for reference.<br><br>April 23, 2019 – Indicated in a call that their client owns land west of Fuller Ave and South of Brunelle for the purposes of subdividing the land for single-family residential and were told approval would be contingent on servicing. They noted that they are unsure from the Master Plan documents if the site was zoned for services. | **Response #1:** Informed that no studies have been issued to date and that their contact information was added to the project mailing list.<br><br>**Response #2:** The project team reviewed the Official Plan and discussed with Town planners to establish if the land should be considered "serviceable" as part of Master Plan. |
| Conseil de la Nation Huronne-Wendat (CNHW) | September 9, 2019 – Requested confirmation on whether archeological assessments are anticipated as part of this project. | Informed that scope of project includes a review of the County of Simcoe Archeological Management Plan. For areas of archeological potential, the Master Plan will identify if there is a need for additional localized archeological studies. Contact information was added to project mailing list. |
| Georgian Bay Forever | September 9, 2019 – Identified the following issue(s) to be explored/investigated as part of the Master Plan:<br>• Raw and partially treated sewage discharges;<br>• Climate change impacts, including stormwater infiltration/diversion;<br>• Tertiary & quaternary treatment benefits; | Noted by project team; contact information was added to project mailing list. |

| Stakeholder | Comment | Action |
|---|---|---|
| | • Enzymatic digestors of PCPs and pharmaceuticals; and<br>• Microfiber source diversion/capture. | |
| Midland Fire Department | September 16, 2019 – Identified the following issue(s) to be explored/investigated as part of the Master Plan:<br>• Fire hydrants with fire flows available everywhere in the Town. | Noted by project team.<br>It is noted that this comment was considered within the Waterworks Master Plan, completed by a separate firm. No response was provided. Contact information was added to project mailing list. |
| Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) | October 8, 2019 – Letter was sent in response to Notice of Commencement indicating the following requirements for the Master Plan study:<br>• Identification of Cultural Heritage Resources through engagement with Indigenous communities.<br>• Identification of any impacts to archeological resources by completing screening tool.<br>• Completion of Stage 1 archeological assessment for the entire study area during the Master Plan phase.<br>• Identification of built heritage and cultural heritage landscapes through completion of Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment, for entire study area during the Master Plan. | Noted by project team.<br>Refer to Sections 4.4, 4.5 and 4.6 and Appendices F and G for assessments undertaken as part of the Master Plan, as well as requirements prior to project implementation. |

| Stakeholder | Comment | Action |
|---|---|---|
| Ministry of the Environment, Conservation and Parks (MECP) | October 24, 2019 – Letter was sent in response to Notice of Study Commencement indicating the following requirements for the Master Plan Study:<br>• Identification of MECP areas of interest which are applicable to the project and address them within the Master Plan.<br>• Consultation with indigenous communities listed in the letter and follow-up with the MECP under certain circumstances. | Noted by project team.<br>Project mailing list was updated to include all listed indigenous communities. |
| Goodreid Planning Group | November 5, 2019 – Requested confirmation that servicing of the Brooklea golf course was considered in the Master Plan. | Informed that servicing the Brooklea golf course was being considered within the 20-year planning period of the Master Plan. Contact information was added to project mailing list. |
| C.F. Crozier & Associates Consulting Engineers on behalf of their client | December 3, 2019 – Indicated that their client is interested in a development opportunity in the area south of Little Lake along Highway 12 between Highway 93 South and King Street. Requested more information on the planned wastewater infrastructure in this area.<br><br>December 3, 2019 – Followed-up with request for additional information on the extent of the sanitary network extension from the WWTP towards Highway 93. | **Response #1:** Noted by project team; Town indicated that no servicing drawings are available for this area but that the Master Plan has discussed a concept, and it will be up to the Development community to determine timing based on needs and ability to front-end the cost of the works.<br><br>**Response #2:** Town indicated there is an existing sanitary sewer on Beamish that would be the connection point. |

| Stakeholder | Comment | Action |
|---|---|---|
| | December 4, 2019 – Followed-up with request for engineering drawings or GIS mapping of existing sanitary infrastructure.<br><br>December 6, 2019 – Followed-up with request for full overview of sanitary network and additional information on the WWTP.<br><br>December 6, 2019 – Clarified that they are requesting information on WWTP remaining capacity and planned future population. | **Response #3:** Town provided GIS snapshot of area of interest.<br><br>**Response #4**: Town provided PDF of water infrastructure (wastewater infrastructure to be provided at a later time) and requested additional clarification on WWTP information request.<br><br>**Response #5**: Town informed that this information will be obtained through the Master Plan process. Contact information was added to project mailing list. |
| Sabourin Kimble & Associates Ltd. on behalf of North American Development Group | January 2, 2020 – Letter was issued indicating that their client has a development site located at the north-east corner of Highway 93 and Highway 12, and that the Town's recommended water implementation strategy would only service their site in 15-20 years. They noted that this would prevent their client from developing the site for 15-20 years due to lack of external services. They requested that the Town re-visit the water system infrastructure strategy and re-consider and expedite the timeline of external services to the site due to significant tenant interest. | Noted by project team.<br>It is noted that this comment was considered within the Waterworks Master Plan, completed by a separate firm. No response was provided. Contact information was added to project mailing list. |

## 13.5 Committee of the Whole

Findings of the report were presented to the Town's Committee of the Whole on April 21, 2021. At that meeting a motion was passed to adopt the Final Wastewater Servicing Plan and issue the Notice of Completion. Proceeding from that meeting can be found on the Town's website.

## 14.0 LIMITATIONS

This Report has been prepared for the exclusive use of The Town of Midland, for the stated purpose. Its discussions and conclusions are summary in nature and cannot be properly used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report was prepared for the sole benefit and use of the Town of Midland and may not be used or relied on by any other party without the express written consent of J.L. Richards & Associates Limited.

Cost estimates are based on historic construction data and does not include labour, material, equipment, manufacturing, supply, transportation or any other cost impacts in relation to COVID-19. JLR shall not be responsible for any variation in the estimate caused by the foregoing factors, but will notify the Client of any conditions which JLR believes may cause such variation upon delivery of the estimate.



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