Water and Wastewater Master Plan

Revision: Final

Municipality of Lakeshore

Lakeshore Water and Wastewater Master Plan

Water and Wastewater Master Plan

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Executive Summary

Background

The Municipality of Lakeshore (Lakeshore) is in the northeastern portion of Essex County on the shores of Lake St. Clair. With an area of approximately 530 km^2, it is the largest municipality in the County. Lakeshore is responsible for providing infrastructure services to a population of approximately 40,000, which has grown more than 10 percent over the last 5 years based on the recent census data (Statistics Canada, 2023). In addition to the growth realized over the last 5 years, there is high demand for development within the Municipality. As a result, Lakeshore must manage their water and wastewater infrastructure to service the community's existing and future servicing needs considering high development pressures and anticipated growth.

Drinking water is supplied to residents in Lakeshore by five separate water supply systems:

- Belle River Water Supply System (BRWSS), which is owned and operated by Lakeshore.
- Tecumseh Water Supply System (TWSS), which is supplied by the City of Windsor. Lakeshore owns the watermains within the municipal boundary that are supplied by the TWSS.
- Stoney Point Water Supply System (SPWSS), which is owned and operated by Lakeshore.
- Union Water Supply System (UWSS), which is supplied by Union Water. Lakeshore owns the watermains within the municipal boundary that are supplied by the UWSS.
- Tilbury-Wheatley Water Supply System (TWWSS), which is supplied by the Municipality of Chatham-Kent. Watermains supplied by the TWWSS within the Lakeshore municipal boundary are either owned by Chatham-Kent or privately owned.

Wastewater servicing in Lakeshore is provided through a combination of municipal service and private systems. Lakeshore owns five wastewater collection and treatment systems which includes the Denis St. Pierre Water Pollution Control Plant (WPCP), the Stoney Point Lagoon Wastewater Facility, the Comber Lagoon Wastewater Facility, the North Woodslee Wastewater Treatment Facility, and the South Woodslee Wastewater Treatment Facility. Residents that are not within the municipal servicing boundary treat wastewater using private (septic) systems.

Existing Conditions

The purpose of this section is to described the existing conditions within Lakeshore's Water and Wastewater systems.

Existing Water System Constraints

The Municipality is fully serviced with municipal water from the following five independent and interconnected water supply systems (WSS):

- BRWSS, which is owned and operated by Lakeshore.
- TWSS, which is supplied by the City of Windsor. Lakeshore owns the watermains within the municipal boundary that are supplied by the TWSS.
- SPWSS, which is owned and operated by Lakeshore.
- UWSS, which is supplied by Union Water. Lakeshore owns the watermains within the municipal boundary that are supplied by the UWSS.

- TWWSS, which is supplied by the Municipality of Chatham-Kent. Watermains supplied by the TWWSS within the Lakeshore municipal boundary are either owned by Chatham-Kent or privately owned.

While the UWSS, TWWSS and TWSS service part of Lakeshore, their water supply systems are not owned by the Municipality and are therefore not considered in the analysis of this Master Plan. Only the watermains supplied by the UWSS and TWSS that are located within the municipal boundary are owned by Lakeshore. The remaining systems are described in the following sections.

Existing water treatment system constraints were identified by comparing current water demands against available treatment capacity in each system. Per capita water demands and maximum day factors were identified using the following methodology:

- Historical treated water pumping rates were reviewed to identify the Average Day Demand (ADD) and Maximum Day Demand (MDD) at each Water Treatment Plant (WTP).
- Water billing records were reviewed for each service area to identify the average daily consumption.
- Non-revenue water (i.e., volume of water that was "lost" as a share of the net water produced) was calculated by subtracting the average daily consumption from the historical treated water pumping rates.
- The ADD and MDD less non-revenue water (i.e., the actual water demand of the population) were calculated and used to identify the maximum day factor and per capita water demand of the service population.

Table ES-1presents the water demand analysis for 2022. Of note, the non-revenue water percentage of the total production is relatively high in the SPWSS, which could be caused by poor distribution system condition and resulting leaks. Watermain monitoring and rehabilitation could significantly reduce water demands at the Stoney Point WTP.

Table ES-1. Water Demand Analysis (2022)

Parameter	Lakeshore WTP	Stoney Point WTP
System ADD, m^3/d	10,104	2,044
System MDD, m^3/d	16,367	3,354
Average Water Consumption per Billing Records, m^3/d	7,934	1,300
Average Non-Revenue Water, m^3/d	2,174	744
Non-Revenue Water Percentage of Total Production	22 percent	36 percent
Service Population ADD, m^3/d	7,934	1,300
Service Population MDD, m^3/d	14,193	2,610
Maximum Day Factor	1.79	2.01
Per Capita Water Demand, LPCD	264	209

Notes:
LPCD = litre(s) per capita per day

The MECP guidelines for Drinking Water Systems recommend a maximum day factor of 1.80 and 2.00 for the population ranges of 25,001-50,000 and 3,001-10,000, respectively (MECP, 2008). Therefore, the maximum day factor for Lakeshore WTP is slightly below the MECP design guidelines and the maximum day factor for Stoney Point WTP is nearly equal to the MECP design guidelines.

Existing water demands were then assessed against the Lakeshore WTP and Stoney Point WTP rated capacities to identify any existing water treatment capacity constraints. Table ES-2 presents a capacity assessment for each WTP under existing conditions.

The Lakeshore WTP is currently operating at 45 percent of its rated capacity and does not have any existing capacity constraints.

The Stoney Point WTP is currently operating at 74 percent of its rated capacity and does not have any existing constraints.

Table ES-2. Existing Water Treatment Constraints

Water Treatment Plant	Treatment Capacity (m^3/day)	Current MDD (m^3/day)	% Rated Capacity
Lakeshore WTP	36,000	16,367	45
Stoney Point WTP	4,545	3,354	74

Storage requirements within BRWSS and SPWSS were identified based on the MECP Design Guidelines for Pumping Facilities and Treated Water Storage, where:

$$Storage = A + B + C$$

A = Fire Flow (based on MECP recommendations for equivalent population size; Table 8-1 from the design guidelines)

B = Equalization Storage (25 percent of maximum day demand (MDD))

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

Historical water demand data at each HLPS and BPS was analyzed to identify the MDD component for each pressure zone and is summarized in Table ES-3.

Table ES-3. Existing Water Demands - BRWSS and SPWSS Pressure Zones

Pressure Zone	ADD (m^3/d)	MDD (m^3/d)	Maximum Day Factor
Belle River	10,104	16,367	1.79
Stoney Point	1,370	2,961	1.93
Haycroft	139	286	2.05
Comber	496	734	1.48
Tilbury West	139	286	2.05

The Fire Underwriters Survey methodology was used to determine the fire flow requirements for the Belle River, Stoney Point and Comber pressure zones. The Haycroft and Tilbury West pressure zones service rural areas and were not designed to provide fire flow, as distribution systems were only intended to provide adequate potable water supply. Therefore, a fire flow analysis was not completed for these areas.

The Fire Underwriters Survey methodology is based on building type, type of construction, size of building, building contents, presence of sprinkler protection, and risk of exposure for nearby buildings (Fire Underwriters Survey, 2020). The following assumptions were made to support fire flow requirement estimation:

- Buildings with high fire flow requirements were identified by visually inspecting and estimating their size using a mapping tool.

- No fire walls were considered for any building and the entire area of the building was considered to contribute to the fire flow requirement estimation.
- Ordinary construction type.
- Limited combustible contents.
- All buildings have a sprinkler system.
- 2 m of separation was assumed for residences in Belle River.
- 12 m of separation was assumed for residences in Stoney Point.
- 12 m of separation was assumed for residences in Comber.
- Smaller buildings in size that may have a higher combustible content are not accounted for due to lack of available information.

Fire flow requirements for the Belle River, Stoney Point and Comber pressure zones are presented in Table ES-4. The following facilities formed the basis for fire flow requirements:

- **Belle River:** Industrial Cluster at County Road 22 and Patillo Road
- **Stoney Point:** Assisted Living Southwestern
- **Comber:** Centennial Central School

ICI fire flow requirements were used to support the storage analysis for each pressure zone.

Table ES-4. Estimated Fire Flow Rates

Location	Residential Fire Flow Required (L/s)	ICI Fire Flow Required (L/s)	Duration, hours
Belle River	76	267	3.5
Stoney Point	76	152	2
Comber	50	133	2

Table ES-5 presents the treated water storage constraint assessment for each pressure zone in the BRWSS and SPWSS. The Belle River, Haycroft and Tilbury West pressure zones do not have any storage constraints under existing conditions. The Stoney Point and Comber pressure zones have existing storage deficits of 514 m^3 and 442 m^3, respectively.

Table ES-5. Existing Treated Water Storage Constraint Assessment

Pressure Zone	MDD (m^3/d)	A (Fire Flow)	B (25% of MDD)	C (25% of A+B)	Storage Required (m^3)	C (25% of A+B)	Storage Required (m^3)
Belle River	16,367	3,364	4,092	1,864	9,320	15,722	6,402
Stoney Point	2,961	1,094	598	285	1,978	1,464	-514
Haycroft	286	-	71	18	89	470	381
Comber	734	958	183	285	1,426	985	-442
Tilbury West	286	-	71	18	89	89	0

Distribution system pipe constraints (i.e., pipe capacity and system pressure under minimum day demand (min DD), MDD and fire flow conditions) were not assessed as part of this Master Plan, as a calibrated water distribution system model was not available.

Pumping requirements for each pressure zone were identified based on the following:

- **Systems with floating storage** require sufficient pumping capacity to meet the pressure zone MDD plus the MDD of any downstream pressure zones.
- **Systems without floating storage** require sufficient pumping capacity to meet the pressure zone MDD and fire flow requirements identified in Section 5.6.2, plus the MDD of any downstream pressure zones.

Table ES-6 presents an assessment of the existing water distribution system pumping constraints. The Belle River, Haycroft and Tilbury West pressure zones do not have any existing pumping constraints, while the Stoney Point and Comber pressure zones have pumping capacity deficits of 11,301 m^3/d and 9,599 m^3/d, respectively. While these deficits are significant, they can be addressed by implementing floating storage rather than increasing pumping capacity. The pumping deficits are primarily driven by fire flow requirements, which would not be required if these systems had floating storage. Alternative solutions for addressing these deficits are discussed in further detail in Section 9.

Table ES-6. Existing Water Distribution System Pumping Constraint Assessment

Pressure Zone	Primary Pressure Zone Pumping Requirements (m^3/d)	Other Pressure Zone Pumping Requirements (m^3/d)	Total Pumping Requirements (m^3/d)	Available Pumping Capacity (m^3/d)	Pumping Capacity Surplus/Deficit (m^3/d)
Belle River	16,367 [a]	-	16,367	36,400	20,033
Stoney Point	15,526 [b]	1,305 [c]	16,831	5,530	-11,301
Haycroft	823 [d]	-	823	2,851	2,028
Comber	12,225 [b]	-	12,666	3,067	-9,599
Tilbury West	436 [d]	-	436	1,970	1,534

Notes:

[a] System MDD.

[b] System MDD plus fire flow.

[c] Downstream System MDD.

[d] Peak hourly demand.

Existing Wastewater System Constraints

Lakeshore has realized growth more quickly than projected in the 2018 WWMP and continues to grow rapidly, creating further interest in new developments. Multiple wastewater treatment facilities will need expansions so that they can continue receiving and treating wastewater from existing communities and to accommodate growth. Table ES-7 summarizes the current rated capacity and Annual Average Daily Flow (AADF) for Lakeshore's five wastewater treatment plants based on data from 2018 to 2022.

Dennis St. Pierre WPCP was operating at 94 percent capacity based on data from 2018 to 2022. An expansion to the plant was recently completed and commissioned, the new rated capacity for Dennis St. Pierre WPCP is 25,000 m^3/day and would be adequate to receive more wastewater flows in the short term. The plant is currently operating at 54 percent of its rated capacity.

Comber STF is operating at capacity (94 percent), and Stoney Point STF is operating above the rated capacity (127 percent). In addition, performance issues have been identified in Sections 5.4.3 and 5.4.4 for Stoney Point and Comber STF, respectively. To accept more wastewater flows and accommodate growth, expansion of both Comber and Stoney Point STF is imperative. These facilities are currently in violation of their Certificates of Approval. The Stoney Point STF has discharged raw untreated wastewater into the Stoney Point WTP Intake Protection Zone 2 due to incoming flows beyond the rated capacity of the facility posing a risk to public health and safety and impacts to the local environment. The MECP provided formal written concerns regarding the existing constraints at the Stoney Point STP as part of the Master Plan.

North and South Woodslee STF are operating at 13 percent and 22 percent of the rated capacity and have hydraulic capacity to accept additional wastewater flows.

Table ES-7. Existing Wastewater Treatment Constraints

Treatment Plant	Treatment Capacity (m^3/day)	AADF (Existing) (m^3/day)	% Rated Capacity
Denis St. Pierre WPCP	25,000	13,558	54
Stoney Point STF	949	1,211	127
Comber STF	430	402	94
North Woodslee STF	330	44	13
South Woodslee STF	210	46	22

The sanitary hydraulic model representing the Denis St. Pierre Sanitary Collection System was the main tool used to identify constraints within the Denis St. Pierre sewershed. Operator reports of condition-based needs were also considered. Property flooding reports were particularly useful information in the sewersheds in which hydraulic models have not been developed as they can provide insight into the level of performance of the existing system. A summary of the existing sanitary collection system constraints within Lakeshore is provided in Table ES-8.

Table ES-8. Existing Constraints Summary

Location	Sewershed	Description
Russel Woods Drive Trunk Sewer	Denis St. Pierre	Insufficient pipe capacity causes surcharge to PS07
Maidstone PS06	Denis St. Pierre	Insufficient pumping capacity causes surcharge to PS07
Patillo Road Sewers	Denis St. Pierre	Insufficient pipe capacity from Silver Creek Drive to Advance Boulevard
East Puce Road Sewers	Denis St. Pierre	Insufficient pipe capacity from Monarch Meadows Drive to Country Road 22
Maidstone PS04	Denis St. Pierre	Insufficient pumping capacity
Sewers Downstream of Chelsea PS	Denis St. Pierre	Insufficient pipe capacity along IC Roy Drive, Mancini Drive, and Poplar Drive to Oakwood Avenue
Belle River PS02	Denis St. Pierre	One of two forcemains is in poor condition
Stoney Point	Stoney Point	Conveyance constraints are unknown. Flow monitoring is recommended in this sewershed
Comber	Comber	Conveyance constraints are unknown. Flow monitoring is recommended in this sewershed
North Woodslee	North Woodslee	Conveyance constraints are unknown. Flow monitoring is recommended in this sewershed
South Woodslee	South Woodslee	Conveyance constraints are unknown. Flow monitoring is recommended in this sewershed

Future Conditions

The section describes future conditions of the Water and Wastewater systems within Municipality of Lakeshore.

Community Growth Projections

Table ES-9 and Table ES-10 summarize the growth projections for the water and wastewater servicing areas, respectively. Figure ES-1 compares the anticipated growth scenario (Anticipated Development Residential Population) to the High Growth Scenario for Lakeshore from the County of Essex Final Draft Growth Analysis Report (County of Essex, 2022).

Table ES-9. Future Residential Population by Water Service Area

Water Servicing Area	2032 Population [a]	2042 Population [a]
Belle River	43,211	60,117
Stoney Point	6,429	8,802
Tecumseh	N/A[b]	N/A[b]
Union	N/A[b]	N/A[b]
Tilbury Wheatly	N/A[b]	N/A[b]

[a] Total population

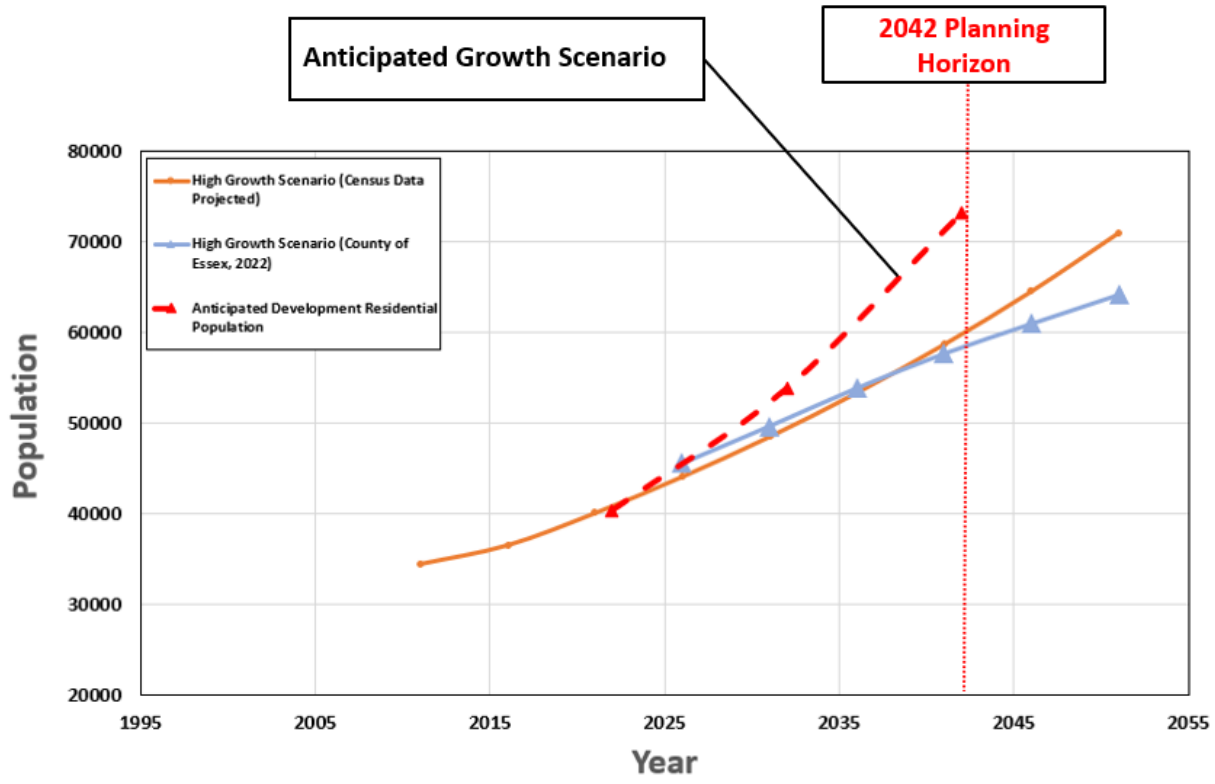
[b] Not applicable: water service area is not within the scope of the WWMP

Table ES-10. Future Residential Population by Wastewater Service Area

Wastewater Servicing Area	2032 Population [a]	2042 Population [a]
Denis St. Pierre	38,974	55,880
Stoney Point	2,280	4,540
Comber	1,272	1,368
North Woodslee	510	510
South Woodslee	400	400

[a] Total population

Figure ES-1. Growth Projections



As shown in Figure ES-1, the high growth scenario projected using census data is relatively consistent with the County of Essex (County of Essex, 2022) projected growth scenario through 2042. The anticipated growth scenario is higher than the census projected growth scenario and the County of Essex projected growth scenario.

ICI equivalent population projections are also important to consider during master planning. If the ratio of ICI to residential populations within each water and wastewater servicing area change substantially during the planning horizon, per capita water demand and per capita wastewater generation rates may no longer be representative. A comparison of the ratio of ICI equivalent populations to residential populations for existing conditions, the 2032 scenario, and the 2042 scenario was completed for each water and wastewater servicing area as presented in Table ES-11 and Table ES-12, respectively. Note that greenhouse developments are not anticipated within Lakeshore and therefore were not considered during this WWMP.

Table ES-11. Percentage of ICI Populations to Residential Populations by Water Servicing Area

Water Servicing Area	Existing	2032	2042
Belle River	44%	39%	31%
Stoney Point	6%	6%	19%

Table ES-12. Percentage of ICI Populations to Residential Populations by Wastewater Servicing Area

Wastewater Servicing Area	Existing	2032	2042
Comber	138%	138%	231%
Denis St. Pierre	48%	41%	32%
Stoney Point	17%	17%	9%

As shown in Table ES-12, the ICI to residential population in Comber wastewater servicing area and Stoney Point water servicing area increases substantially over the planning horizon. Therefore, the future wastewater generation rate in Comber and water demand rate in Stoney Point should be re-evaluated during subsequent design stages of the preferred alternative.

Projected Water Demands

Future water demands were projected based on growth projections presented in Section 6.1 and using the following methodology:

- Future water demands for the existing population were assumed to remain consistent with existing water demands (i.e., no change in per capita water demands and maximum day factors).
- Future water demands for new growth were calculated using the historical maximum day factor (determined in Section 5.5) and MECP design guideline for per capita water demand. This approach is somewhat conservative, as the historical maximum day factor and per capita water demands in the BRWSS and SPWSS are below the MECP design guideline values.

Future water demands are presented for each WTP in Table ES-13 and are broken down by pressure zone in

Table ES-14.

Table ES-13. Water Demand Projections by WTP

Treatment Plant	Year	ADD (m^3/d)	MDD (m^3/d)
Lakeshore WTP	Existing	10,104	16,367
	2032	14,734	24,650
	2042	20,651	35,235
Stoney Point WTP	Existing	2,044	3,354
	2032	2,122	3,510
	2042	2,952	5,177

Table ES-14. Water Demand Projections by Pressure Zone

Pressure Zone	Year	Population	ADD (m^3/d)	MDD (m^3/d)
Belle River Pressure Zone	Existing	29,981	10,104	16,367
	2031	43,211	14,734	24,650
	2041	60,117	20,651	35,235
Stoney Point Pressure Zone	Existing	4,349	1,237	2,393
	2031	4,482	1,284	2,483
	2041	5,447	1,622	3,136
Haycroft Pressure Zone	Existing	328	139	286
	2031	328	139	286
	2041	328	139	286
Comber Pressure Zone	Existing	1,378	496	734
	2031	1,378	527	780
	2041	2,875	1,020	1,509
Tilbury West Pressure Zone	Existing	480	140	286
	2031	480	140	286
	2041	480	140	286

Projected Wastewater Flows

Table ES-15 summarizes the projected AADF for the five wastewater treatment plants over the Master Plan planning horizon. The projection is based on the population projections presented in Section 6.1. Planning for the development of the treatment plant starts as soon as the facility reaches 80 percent of the rated capacity.

Table ES-15. Lakeshore's Projected Wastewater Generation (2022-2042)

Treatment Plant	Date	Treatment Capacity (m^3/day)	AADF per capita (L/day/cap)	Population	AADF (Projected) (m^3/day)	% Rated Capacity
Denis St. Pierre WPCP	Existing (2023)	25,000	527	25,744	13,558	54
Denis St. Pierre WPCP	2032	25,000	527	38,974	20,525	82
Denis St. Pierre WPCP	2042	25,000	527	55,880	29,429	118
Stoney Point STF	Existing (2023)	949	531	2,280	1,211	127
Stoney Point STF	2032	949	531	2,280	1,211	127
Stoney Point STF	2042	949	531	4,540	2,412	254
Comber STF	Existing (2023)	430	383	1,050	402	94
Comber STF	2032	430	383	1,272	487	113
Comber STF	2042	430	383	1,386	531	123
North Woodslee STF	Existing (2023)	330	85	510	44	13
North Woodslee STF	2032	330	85	510	44	13
North Woodslee STF	2042	330	85	510	44	13
South Woodslee STF	Existing (2023)	210	116	400	46	22
South Woodslee STF	2032	210	116	400	46	22
South Woodslee STF	2042	210	116	400	46	22

Comparing the projected versus the available plant treatment capacity, the following observations are noted:

- **The Denis St. Pierre WPCP** is operating at 54 percent of its rated capacity. It is predicted that wastewater flows will reach 80 percent of the new rated capacity in 2032, triggering the planning process to expand the treatment capacity of the plant. The design for the ongoing expansion includes the provision for an expansion to 30,000 m^3/day. If growth is realized more quickly than projected, the Municipality could proceed with expansion without undertaking a subsequent Schedule C Class EA, with MECP approval, as the current Schedule C Class EA is valid for 10 years. If growth is realized as projected or more slowly than projected, the Municipality will need to initiate a Schedule C Class EA to

expand the plant when 80 percent capacity is reached (anticipated to occur in 2032). However, from 2032 to 2042, the population in Belle River/Maidstone wastewater service area is anticipated to increase by approximately 46 percent and capacity for the plant will not be sufficient to treat the projected wastewater flows. As the population projections put forward in this Master Plan predict that 80 percent of the 30,000 m^3/day could be reached before 2042 it is recommended that the need to expand beyond 30,000 m^3/day be considered at that time. Subsequent Master Plan updates will assist the Municipality in refining the timing of these future needs. It is recommended that the Municipality monitor how flows are realized relative to the Master Plan projections to adjust the need for subsequent Master Plan updates and the need to trigger a plant expansion.

- **The Stoney Point STF** is operating at 127 percent of the rated capacity. The existing capacity at the STF is not adequate to meet the present and future treatment requirements and expansion of the plant is needed before any further growth can be accommodated. In addition, performance issues (i.e., Stoney Point STF exceeded effluent TAN, TSS and E.coli for several months from 2018 to 2022) have been identified under existing conditions (Section 5.4.3). During engagement activities on the project the MECP has emphasized the need for a long-term plan to address both existing and future capacity needs to protect the environment and public health.
- **The Comber STF** is operating near its rated capacity. The population in the Comber servicing area is expected to grow by 30 percent over the planning horizon and the plant capacity is not adequate to meet future treatment requirements and expansion of the facility is needed before any additional growth can be accommodated. In addition, performance issues (i.e., effluent objectives for TAN were exceeded numerous times) have been identified under existing conditions (Section 5.4.4). During engagement activities on the project the MECP has emphasized the need for a long-term plan to address both existing and future capacity needs to protect the environment and public health. All reserved capacity at this STF has been allocated.
- **The North and South Woodslee STFs** are operating at 13 percent and 22 percent of the rated capacity, respectively. Minimal increase in AADF is anticipated for the North and South Woodslee STF between 2022-2042 and the capacity at North and South Woodslee is adequate to meet treatment requirements over the planning horizon.

  The wastewater conveyance system flows for the 2032 and 2042 future scenarios were based on the projected residential and equivalent ICI populations. The design flow rate for the future residential and ICI equivalent population is 450 LPCD in accordance with the Municipality of Lakeshore's Development Manual (Town of Lakeshore, 2017). The peaking factor for each proposed development corresponds to the calibrated diurnal profiles from the sanitary hydraulic model calibrated by Jacobs in 2021. The peaking factor was assigned based on the location of the developments and the diurnal profile used for the nearby existing catchments. This approach is assumed more realistic to evaluate the capacity at the pumping stations compared to a constant Harmon peak factor value. Similarly, calibrated real-time kinematic values that represent inflow and infiltration (l/l) during wet weather events have been specified for the future projected parcels instead of using a constant design rate that may overestimate the total volumes arriving to the pumping stations. However, a sensitivity analysis can be performed on the recommended alternative to determine the impact of the I/I estimation methodology on the sizing of proposed infrastructure.

Summary of Future Water Treatment Needs

The future water demands developed in Section 6.2 were compared against the rated capacities of the Lakeshore WTP and Stoney Point WTP to identify future water treatment needs. This comparison is presented in Table ES-16. Future demand increases are partially dependent on ICI growth timing, so overall demands should be monitored and expansion timing should be adjusted as required.

- **The Lakeshore WTP** is currently operating at 45 percent of its current rated capacity and is not expected to exceed its rated capacity within the planning horizon of 2042. However, it will be operating at 98 percent capacity by 2042, meaning that the planning process for expansion should be initiated within the planning period.
- **The Stoney Point WTP** is projected to reach its rated capacity by 2035 and will exceed its rated capacity by 632 m^3/d in 2042.

Table ES-16. Water Treatment Plant Percent Capacity Projections

WTP	Year	Treatment Capacity (m^3/day)	MDD (m^3/day)	Percent of Rated Capacity
Lakeshore WTP	2022	36,400	16,367	45
	2032	36,400	24,650	68
	2042	36,400	35,235	98
Stoney Point WTP	2022	4,545	3,354	74
	2032	4,545	3,510	77
	2042	4,545	5,177	114

Summary of Future Water Storage and Distribution Needs

A future storage needs assessment for each pressure zone is presented in Table ES-17.

Table ES-17. Future Water Storage Needs

Pressure Zone	Year	MDD (m^3/d)	Required Storage Capacity (m^3)	Available Storage Capacity (m^3)	Storage Surplus/Deficit (m^3)
Belle River Pressure Zone	2022	16,367	9,320	15,722	6,402
	2032	24,650	11,908	15,722	3,814
	2042	35,235	15,216	15,722	506
Stoney Point Pressure Zone	2022	2,393	1,978	1,464	-514
	2032	2,483	2,144	1,464	-680
	2042	3,136	2,348	1,464	-884
Haycroft Pressure Zone	2022	286	89	470	381
	2032	286	89	470	381
	2042	286	89	470	381
Comber Pressure Zone	2022	734	1,426	985	-442
	2032	780	1,441	985	-456
	2042	1,509	1,669	985	-684
Tilbury West Pressure Zone	2022	286	89	89	0
	2032	286	89	89	0
	2042	286	89	89	0

No storage deficits are projected in the Belle River, Haycroft and Tilbury West pressure zones within the planning horizon. The Stoney Point and Comber pressure zones have storage deficits under current conditions, which are expected to increase to 884 m^3 and 684 m^3 by 2042, respectively.

Future treated water pumping needs were identified based on the methodology described in Section 5.6.3, considering future water demands in each pressure zone. Future needs are presented in Table ES-18Table 6-11.

Table ES-18. Future Water Pumping Needs

Pressure Zone	Year	Required Pumping Capacity (m^3/day)	Available Pumping Capacity (m^3/day)	Pumping Surplus/Deficit (m^3/day)
Belle River Pressure Zone	2022	16,367	36,400	20,033
	2032	24,650	36,400	11,750
	2042	35,235	36,400	1,165
Stoney Point Pressure Zone	2022	16,831	5,530	-11,301
	2032	16,967	5,530	-11,437
	2042	18,350	5,530	-12,820
Haycroft Pressure Zone	2022	823	2,851	2,028
	2032	823	2,851	2,028
	2042	823	2,851	2,028
Comber Pressure Zone	2022	12,224	3,067	-9,157
	2032	12,271	3,067	-9,204
	2042	13,000	3,067	-9,933
Tilbury West Pressure Zone	2022	436	1,970	1,534
	2032	436	1,970	1,534
	2042	436	1,970	1,534

No pumping deficits are projected in the Belle River, Haycroft, and Tilbury West pressure zones within the planning horizon. The Stoney Point and Comber pressure zones have storage deficits under current conditions, which are expected to increase to 12,820 m^3 and 9,933 m^3 by 2042, respectively.

Summary of Future Wastewater Treatment Needs

Table ES-19 summarizes what is required for Lakeshore to accept additional wastewater flows and accommodate growth.

- **The Denis St. Pierre WPCP** was operating at 94 percent of the rated capacity and the plant capacity was not adequate to meet the existing treatment requirements. However, a recent expansion to the Denis St. Pierre WPCP has been completed and is currently operational. The new rated capacity of Denis St. Pierre WPCP is 25,000 m^3/day and is expected to be able to meet the treatment requirements to 2032 based on the population projections presented in Section 6.1. The plant is currently operating at 54 percent of its rated capacity.
  - In 2032 it is predicted that wastewater flows will reach 80 percent of the new rated capacity, triggering the planning process to expand the treatment capacity of the plant. The design for the

ongoing expansion includes the provision for an expansion to 30,000 m^3/day. If growth is realized more quickly than projected, the Municipality could proceed with expansion without undertaking a subsequent Schedule C Class EA, with MECP approval, as the current Schedule C Class EA is valid for 10 years.

- If growth is realized as projected or more slowly than projected, the Municipality will need to initiate a Schedule C Class EA to expand the plant when 80 percent capacity is reached (anticipated to occur in 2032). It is recommended that the Municipality monitor how flows are realized relative to the Master Plan projections to adjust the need for subsequent Master Plan updates and the need to trigger a plant expansion.

- **Stoney Point STF** is operating at 127 percent of the rated capacity. The existing capacity at the STF is not adequate to meet the present and future treatment requirements and expansion of the plant is needed before any further growth can be accommodated. In addition, performance issues (i.e., Stoney Point STF exceeded effluent TAN, TSS and E.coli for several months from 2018 to 2022) have been identified under existing conditions (Section 5.4.3). During engagement activities on the project the MECP has emphasized the need for a long-term plan to address both existing and future capacity needs to protect the environment and public health.
- **Comber STF** is operating near its the rated capacity. The population in the Comber servicing area is expected to grow by 30 percent over the planning horizon and the plant capacity is not adequate to meet future treatment requirements and expansion of the facility is needed before any growth beyond that already approved can be accommodated. All reserve capacity has been allocated. The development anticipated to bring the Comber STF over its rated capacity are under construction at the time of this Master Plan. In addition, performance issues (i.e., effluent objectives for TAN were exceeded numerous times) have been identified under existing conditions (Section 5.4.4). During engagement activities on the project the MECP has emphasized the need for a long-term plan to address both existing and future capacity needs to protect the environment and public health.
- **North and South Woodslee STF** have sufficient hydraulic capacity and no increase in the average daily flows to the plants is projected till 2042. Hence, expansion of the North and South Woodslee STF is not required.

Table ES-19. Lakeshore's Future Wastewater Treatment Needs

Treatment Plant	Current Rated Capacity (m^3/day)	Existing Average Daily Flows 2023 (m^3/day)	Projected Average Daily Flows 2032 (m^3/day)	Projected Average Daily Flows 2042 (m^3/day)	Remarks
Denis St. Pierre Water Pollution Control Plant	25,000	13,558	20,525	29,429	The Denis St. Pierre WPCP was commissioned in spring 2024 and increased the capacity to 25,000 m^3/day. Based on the population projections, the Denis St. Pierre WPCP will reach 80 percent of its rated capacity by 2032, triggering the Phase 2 expansion to 30,000 m^3/d.
Stoney Point Lagoon Facility	949	1,211	1,211 [a]	2,412 [a]	The Stoney Point Lagoon Facility is currently over the rated hydraulic capacity.
Comber Lagoon Facility	430	402	487 [a]	531 [a]	The Comber Lagoon Facility is near capacity, triggering the need for expansion. Existing reserve capacity has already been allocated.
North Woodslee Treatment Facility	330	44	44	44	The North Woodslee facility has remaining hydraulic capacity.
South Woodslee Treatment Facility	210	46	46	46	The South Woodslee facility has remaining hydraulic capacity.

Notes:

[a] Project growth and flows are impacted due to capacity constraints

Summary of Future Sanitary System Needs

The conveyance constraints at Stoney Point, Comber, North Woodslee, and South Woodslee remain unknown and flow monitoring is recommended to better understand the constraints (in Section 5.4).

The sanitary hydraulic model was used to identify the future conveyance constraints within the Denis St. Pierre sewershed. Model scenarios were developed for 2032 and 2042 using the population projections described in Section 6.1 and the sanitary flow projection methodology described in Section 6.3.2. The constraints identified under the projected 2032 and 2042 scenarios, as well as the existing conditions scenario, are described in Table ES-20 and shown in Figure ES-2.

Table ES-20. Future Sanitary System Needs -Denis St. Pierre Sewershed

Constraints	Constrained under Existing Conditions	Constrained under Future (2032) Conditions	Constrained under Future (2042) Conditions	Description
Amy Croft Drive Trunk Sewer	No	Yes	Yes	Insufficient sewer capacity along Amy Croft Drive
St. Clair Shores PS	No	Yes	Yes	Insufficient pumping capacity
Russel Woods Drive Trunk Sewer	Yes	Yes	Yes	Insufficient pipe capacity causes surcharge to PS07
Maidstone PS06	Yes	Yes	Yes	Insufficient pumping capacity causes surcharge to PS07
Wintermute Avenue Sewers	No	Yes	Yes	Insufficient pipe capacity along Wintermute Avenue downstream of Maidstone PS09
Patillo Road Sewers	Yes	Yes	Yes	Sections of pipe downstream of Maidstone PS10
East Puce Road Sewers	Yes	Yes	Yes	Insufficient pipe capacity from Monarch Meadsown Drive to Country Road 22
Maidstone PS04	Yes	Yes	Yes	Insufficient pump capacity
Sewers Downstream of Chelsea Park PS	Yes	Yes	Yes	Insufficient pipe capacity along IC Roy Drive, Mancini Drive, and Poplar Drive to Oakwood Avenue

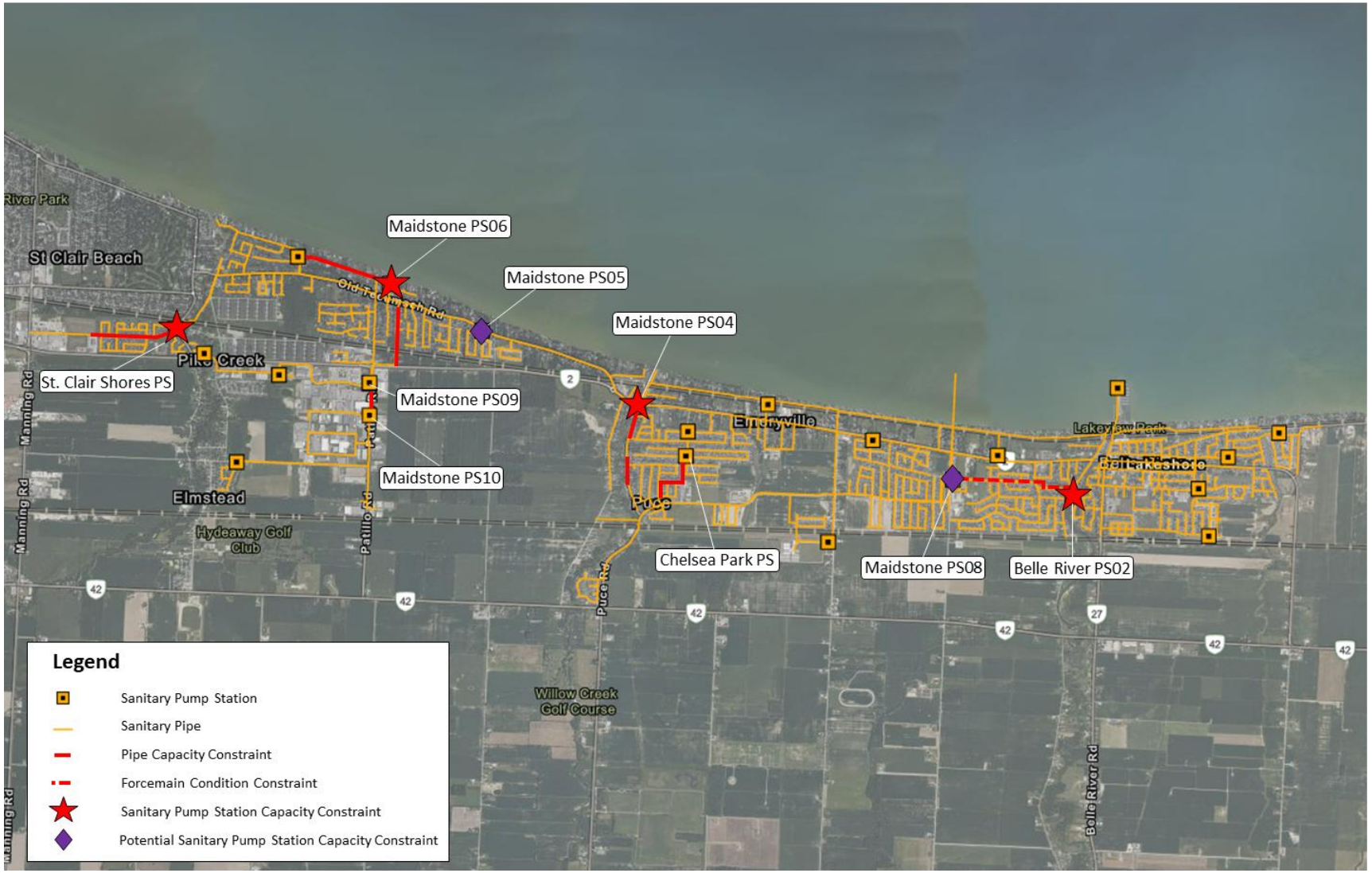
Constraints	Constrained under Existing Conditions	Constrained under Future (2032) Conditions	Constrained under Future (2042) Conditions	Description
Maidstone PS05 [a]	No	No	No	PS05 capacity becomes insufficient if flows along Old Tecumseh Drive increase due to upstream conveyance system upgrades
Maidstone PS08 and Oakwood Trunk Sewer [a]	No	No	No	PS08 capacity becomes insufficient if flows to PS08 increase due to upstream conveyance system upgrades. This results in constraints due to backwater within the Oakwood Trunk Sewer
Belle River PS02	Condition-based	Yes	Yes	One of two forcemains is in poor condition. The pumping capacity at Belle River PS02 is also insufficient

Notes:
[a] Becomes a constraint if recommended alternatives result in increased flows to infrastructure location

Existing constraints along Russel Woods Drive Trunk Sewer, Patillo Road Sewers, East Puce Road Sewers, Sewers Downstream of Chelsea Park PS, and at Maidstone PS06 and Maidstone PS04 are identified and described in Section 5.4.2.3. Belle River PS02 forcemain was identified as an existing condition-based need in Section 5.4.2.3, and under future conditions the Belle River PS02 capacity is also identified as a constraint. Additional future constraints include insufficient capacity along Amy Croft Drive Trunk Sewer and at St. Clair Shores PS, as well as insufficient pipe capacity downstream of Maidstone PS09 along Wintermute Avenue.

The capacity of Maidstone PS05 and Maidstone PS08 will no longer be sufficient if infrastructure alternatives recommended to resolve the constraints presented in Table ES-20 increase the flows to these pump stations. Insufficient pumping capacity at Maidstone PS08 causes water to backup into the Oakwood Trunk Sewer, resulting in the Oakwood Trunk Sewer surcharging to a level higher than existing conditions.

Figure ES-2. Future Conveyance System Constraints in Denis St. Pierre Sewershed



Problem and Opportunity Statement

The goal of the WWMP Class EA is to plan for the future of water and wastewater servicing for the Municipality of Lakeshore to provide capacity for growth in a manner that is sustainable, financially responsible, and protects the environment.

This Class EA provides a long-term plan to guide how Lakeshore will continue to meet the demands of a growing community to 2042. The decisions are driven by goals for:

- Infrastructure reliability and the ability to provide an appropriate level of service
- Ability to accept and accommodate growth
- Regulatory compliance
- Public health and safety
- Legislation
- Sustainability
- Climate Change adaptation and mitigation
- Meeting priorities put forward through Municipal and County Official Plans

Lakeshore has realized growth more quickly than projected in the 2018 WWMP Update. Lakeshore continues to experience rapid growth and increased interest in new development. This presents challenges and opportunities for Lakeshore as follows:

- Multiple wastewater treatment facilities (specifically Stoney Point STP and Comber STP) have previously triggered the requirement to expand to continue to receive and treat wastewater from the existing communities and accommodate growth. The Denis St. Pierre WPCP is expected to trigger the need to expand within the planning horizon.
- Lagoon systems at Stoney Point STP and Comber STF have drawn attention from regulatory authorities and provincial agencies due to long-term hydraulic capacity constraints (identified in 2008 and 2018 Master Plans) and recent effluent quality non-compliance.
- There are numerous sanitary conveyance capacity constraints in the Denis St Pierre sewershed limiting Lakeshore's ability to service planned growth areas and accept new development.
- Conveyance and treatment system capacities are significantly impacted by high levels of inflow and infiltration within the collection systems.
- Provincial policy and direction emphasize redevelopment to provide additional housing opportunities, including intensification, and allowing for the approval of additional residential units (ARUs).
- Intensification of residential areas result in increased wastewater flow and drinking water demands greater than the designed capacity of the infrastructure.
- Growth realized since the 2018 WWMP Update has exceeded projections impacting Lakeshore's ability to proactively implement the recommendations.

When addressing these challenges, there are opportunities to implement solutions that provide adaptation to a changing climate, decrease energy usage, protect the environment, and protect human health and safety. Unimplemented Master Plan recommendations are likely to limit growth and economic development within Lakeshore.

Environmental Assessment Process

Overview of Study Approach

This Master Plan will be completed as an Approach 1 Class EA, including Phases 1 and 2 of the Municipal Engineer's Class EA process. The Class EA process is a decision-making framework that effectively meets the requirements of the *EA Act* and is comprised of the following five phases.

1. Identify the problem or opportunity
2. Identify alternative solutions and establish a preferred solution
3. Examine alternative methods of implementing the preferred solution that will minimize negative effects and maximize positive effects
4. Prepare the project file
5. Implement the preferred solution

Decision Making Process

A fundamental goal of this study is to document the transparent, defensible, and reproducible decision-making process such that the selected preferred solutions are technically sound and understood by the community. The decision-making framework incorporated feedback received during engagement activities conducted for this study. A multi-step evaluation approach was used to identify the preferred alternatives. The decision-making process was tailored for each of the problems identified through the problem definition phase of the project. A general overview of the decision-making process is as follows:

1. Identification of Alternatives.
2. Detailed evaluation using detailed criteria within four broad categories representing the Natural Environment, Social and Cultural Environment, Technical Environment, and Economic Environment.

Alternatives were scored using the tailored criterion. The alternative receiving the highest score is identified as the preferred alternative representing the solution with appropriate balance of cost to community benefit.

Alternatives Identification and Evaluation

Table ES-21 summarizes the preferred solutions for this Master Plan. The implementation requirements of each project and their sequencing plan are discussed in subsequent sections.

Table ES-21. Master Plan Recommended Solutions

System	Recommended Solution	Year Required	Drivers	Capital Cost (CAD) [a], [b]	Implementation Requirements
Water Treatment	Upgrade Stoney Point WTP capacity	Near to Medium-term	Growth	$11,950,000	Schedule C Class EA
Water Treatment	Planning for Lakeshore WTP	Medium to Long-term	Growth	$550,000	Optimization Study, Schedule C Class EA
Water Distribution and Storage	Stoney Point Pressure Zone Alternative 3: Floating Storage	Near-term	Growth	$10,900,000	Schedule B Class EA
Water Distribution and Storage	Comber Pressure Zone Alternative 3: Floating Storage [c]	Near-term	Growth Level of Service	$10,900,000	Schedule B Class EA
Watermain Upgrades	Upgrade various watermain	Various	Condition	$46,257,000 [d]	None
Wastewater Treatment	Stoney Point and Comber STF Alternative 3: Common Mechanical STP	Immediate	Regulatory Compliance	$74,450,000	Schedule C Class EA
Wastewater Treatment	Denis St. Pierre WPCP Alternative 2: Expand Plant on Existing Site	Immediate to Long-term	Growth	$6,400,000 [e]	Schedule C Class EA
Sanitary Collection and Conveyance	Constraint Group 1 Alternative 4: Add new trunk sewer along County Road 22 from West Pike Creek Road to Puce Road. Includes pump station upgrades and local sewer upgrades.	Near-term	Level of Service Growth	$47,295,000	Schedule B Class EA Stage 1 Archaeological Assessment Cultural Heritage Assessment Report EIA
	Group 1 components: New trunk sewer along County Road 22				Exempt from further Class EAs Archeological work previously completed, PIF# P053-057 (D.R. Poulton & Associates Inc. , 2004)

System	Recommended Solution	Year Required	Drivers	Capital Cost (CAD) [a], [b]	Implementation Requirements
	Group 1 component: St. Clair Shores Pump Station Expansion and Forcemain				Schedule B Class EA Archaeological Assessment Cultural Heritage Report
Sanitary Collection and Conveyance	Constraint Group 2 Alternative 2: Increase capacity of County Road 22 Trunk Sewer from Puce Road to Denis St. Pierre WPCP. Includes pump station upgrades and local sewer upgrades. [f]	Near-term	Level of Service Growth	$44,740,000	Schedule B Class EA Stage 1 Archaeological Assessment Cultural Heritage Assessment Report EIA
	Group 2 components: New trunk sewer along County Road 22				Exempt from further Class EAs Archeological work previously completed, PIF# P053-057 (D.R. Poulton & Associates Inc. , 2004)
	Group 2 components: Maidstone PS02 expansion				Schedule B Class EA Archaeological Assessment Cultural Heritage Report
	Group 2 components: Maidstone PS08 expansion				To be completed as part of future Denis St Pierre WPCP expansion Refer to Table 10-10
Sanitary Collection and Conveyance	Constraint Group 3 (Belle River) Alternative 3: Belle River PS02 Upgrades	Immediate	Condition Growth	$7,954,000	Schedule B Class EA Stage 1 Archaeological Assessment Cultural Heritage Assessment Report EIA

Notes:

[a] Capital costs are presented at a 2024 dollar value and are at a planning level of detail with a confidence of +50% / -30%

[b] Excluding cost of property acquisition

[c] Comber sideroad watermain must be replaced before this recommendation can be implemented

[d] Cost basis is from previous Master Plan (water distribution model calibration and hydraulic modelling is required to confirm constraints within the water distribution system)

[e] Excluding cost of expansion beyond 30 MLD

[f] Constraint Group 2 recommendations must be completed prior to Conveyance Group 1 implementation

Engagement

This section summarizes the engagement conducted through this Master Plan.

Engagement Plan and Approach

As an integral part of the MCEA process, active and ongoing consultation and engagement with the public and stakeholders including First Nations and Indigenous communities, community members and government entities is maintained. A project mailing list was established where interested members of the public could sign up to receive updates on the progress of the projects and be notified of key communication points and sessions open to the public. This essential procedure fosters a transparent and responsible planning process.

A project contact list was developed at the onset of the project which includes stakeholders from relevant government agencies, First Nations community representatives and interested members of the public who signed up to the project mailing list. The contact list was maintained and updated throughout the master planning process. Key opportunities for the public to receive information about the project and express their input were communicated through project notices distributed to the mailing list, posted on the Municipality's project website (lakeshore.ca/WWMP), and printed in the local newspaper. A dedicated project mailbox was set up to allow for interested members of the community to ask questions and provide feedback at any phase of the project A copy of the project contact list is provided in Appendix A.

Engagement Activities

Engagement is a key component of the Municipal Class EA Process. The following provides a summary of the engagement activities completed for this Class EA:

- Project Notices
  - Notice of Commencement
  - Notices of Public Information Centres
  - Notice of Study Completion
- Public and Stakeholder Engagement Activities
  - Public Information Center 1 was held on June 28, 2023, from 5:30-8:30pm at the Atlas Tube Recreation Centre in Belle River, Ontario. This PIC presented attendees with background information related to the project, including Lakeshore's water and wastewater system, current conditions and future servicing needs, and next steps for the project through a series of display boards. Attendees had the opportunity to ask questions during the session and voice potential concerns at the end of the session through a project survey. A total of 17 members of the public were in attendance. The PIC presentation material was published on the project webpage for the public to access and provide feedback with an online form that could be filled out for a period of 30 days.
  - Public Information Center 2 was held on November 22, 2023, from 5:30-8:30pm at Lakeshore's Town Hall in Council Chambers. This PIC presented attendees with a summary of identified constraints and opportunities, the criteria for identifying the long list of alternatives and a preliminary list of project alternatives for the wastewater treatment and conveyance system through a series of display boards. Attendees had the opportunity to ask questions during the session and voice potential concerns at the end of the session through a project survey. A total of 19 members of the public were in attendance.
  - Public Information Center 3 was held on June 10, 2024 from 5:30 to 8:30pm at Lakeshore's Town Hall in Council Chambers. This PIC presented attendees with the evaluation criteria and results of

the shortlisted alternatives for the water and wastewater system, the resulting preliminary recommendations, and the implementation plan for the proposed projects. Attendees had the opportunity to ask questions during the session and voice potential concerns at the end of the session through a project survey. A total of 29 members of the public signed in on the sign in sheet.

- Ahead of PIC 1, landowners were invited to request engagement meetings with Municipal Staff. Several landowner meetings were held between Municipality staff and landowners in the Municipality to discuss the project and concerns that the landowners may have. A total of 12 meetings were held in June and July of 2023 between various landowners and the Municipality.
- Agency Engagement. Two meetings were conducted with the MECP throughout the project. Records of engagement with these agencies can be found in Appendix C.

How the Preferred Solutions Incorporates Engagement Feedback

Consultation and engagement conducted throughout this Master Plan resulted in the team receiving valuable feedback at key stages in the study. The following common themes were identified through feedback received during engagement activities:

1. **Sanitary system capacity is a high priority.** Many landowners indicated that they cannot develop their lands in accordance with the Municipality's applicable OP and secondary plans because of insufficient sanitary sewer capacity. The team heard from Council that enabling development is a high priority for the economic development of the Municipality and implementing the 2020 PPS.
2. **Insufficient wastewater treatment capacity at Stoney Point and Comber is a significant concern.** Engagement with provincial agencies (MECP) indicated that the Municipality is at risk of receiving a Control Order under the Ontario Water Resources Act and Ontario Clean Water Act. Untreated wastewater has been discharged within the Municipality's Intake Protection Zone 2 for the Stoney Point WTP which poses an environmental risk and threat to source water protection. The MECP is waiting for the conclusion of this Master Plan to determine if issuing a Control Order is appropriate.
3. **The cost of the recommendations is a concern.** Councillors and Municipal staff indicated that the recommendations will be financially challenging for the Municipality to implement.
4. **The ability to provide fire flow in emergencies is a concern.** The Municipal fire department expressed concerns with the ability of the treatment and distribution system to provide fire flows in the case of a significant fire without resulting in a boil water advisory in Comber, Stoney Point, and Maidstone. Fire flow deficiencies and preferred solutions to address the deficiencies were identified in this Master Plan.

The feedback received through the engagement process impacted the decision-making process as follows:

1. **Alternative Development:**
    a. **Sanitary Conveyance Alternatives.** The feedback received through engagement activities informed the identification of alternatives. The team heard from the community early in the process that alleviating sanitary sewer capacity constraints to enable development was a high priority. Alternatives were developed to provide sufficient sanitary system capacity to facilitate the planned future growth in Lakeshore.
    b. **Stoney Point and Comber STF Alternatives:** Feedback received through Agency consultation and engagement informed the identification and screening of alternatives for the Stoney Point and Comber STFs. The alternatives identified prioritized an approach that will bring the facilities into regulatory compliance and able to meet anticipated regulatory requirements that will be imposed when changes to the facility approvals are required., It is anticipated that effluent limits and

objectives for nitrogen and phosphorous will be much more stringent than currently approved at these facilities. The team heard that the cost of implementing new infrastructure at these facilities will be fiscally challenging for the Municipality. The alternatives identified included a wide range of options to identify cost-effective solutions. Recommendations also include considerations that can be included in subsequent work to implement the recommendations to manage the cost of implementing the recommended solution. There are also development pressures within these communities that cannot be considered without treatment and conveyance capacity.

2. **Evaluation Framework:**
    a. **Sanitary Conveyance Alternatives:** The feedback received from the community and Council informed the development of the evaluation criteria and scoring of alternatives to consider priorities related to enabling development and growth in the Municipality.
    b. **Stoney Point and Comber STF Alternatives:** Feedback received through Agency engagement activities informed the evaluation of alternatives for the Stoney Point and Comber STFs. The evaluation included criteria which captured the environmental and public safety concerned related to the baseline (do nothing) alternative. The team heard that the cost of implementing new infrastructure at these facilities will be fiscally challenging for the Municipality. A detailed sensitivity assessment of the evaluation category weightings was performed to identify if the scoring of alternatives would change if one category was given a higher weighting relative to the other categories. The recommended solution was the highest ranked alternative for all scenarios conducted during the sensitivity analysis, indicating that the recommended alternative represents the greatest benefit and lowest overall cost to the Municipality.
3. **Project Prioritization in the Implementation Plan:** The project team heard through engagement activities that enabling growth is a high priority for the community. This was an important consideration when identifying the timing of recommended projects in the Implementation Plan. With respect to the Sanitary Conveyance recommendations, those that could be implemented more quickly because they can be implemented in parallel with other planned projects (such as road reconstruction projects) were prioritized. The project team also considered which recommendations could facilitate more growth relative to the others to help determine the recommended timing to implement the recommendations.
4. **Financial Strategy.** The project team heard concerns related to the costs of the recommendations through the engagement activities. This Master Plan includes a section providing guidance to Municipal staff on funding and financing considerations and alternative project delivery models that maybe enable the Municipality to manage the capital costs of the recommendations put forward in this Master Plan.

Implementation Plan

This section presents a summary of the implementation plan developed for this Master Plan.

General Recommendations

The following general recommendations have been identified throughout the Master Plan through engagement activities:

- Complete Master Plan updates every 5 to 8 years. While Master Plans are typically undated every 8 to 10 years, more frequent updates appropriate when recommendations when there are changes within the Municipality that change the identified problem and opportunity statement sooner than planned. Lakeshore is experiencing rapid growth and has a high demand for development it is recommended

that an update to the Master Plan is conducted in 2030 and again in 2035 to help the Municipality proactively respond to the rapid growth.

- Future Master Plan updates should continue to review if it is appropriate to expand sanitary servicing to Lighthouse Cove and Rochester Place.
- The next Master Plan Update is recommended to address the performance of the South Woodslee Sewage Treatment Plan. The agency engagement related to this Master Plan have been spills to residential properties associated with the South Woodslee treatment facility.
- Follow the Municipality's Secondary Plans to avoid servicing impacts.
- The Municipality should monitor the level of interest in the community to add accessory dwelling units to identify how that may impact sanitary conveyance system capacity.
- Future Master Plan updates should consider the effects of potential drought on water demand and supply.
- **General recommendations related to the Municipality's water treatment systems:**
  - The relevant policies and procedures required for significant threats to drinking water prescribed in the Source Protection Plan are recommended to be put in place at the Stoney Point WTP for IPZ-2 to mitigate the threat to the drinking water supply posed by untreated discharged wastewater from the Stoney Point STF until the recommended preferred solution is implemented and commissioned.
  - A quantitative microbial risk assessment is recommended to identify the need for enhancing multi-barrier disinfection in Stoney WTP. This assessment should capture Stoney Point STF Lagoon discharges to adequately assess the risk.
  - Monitor growth and update projections in the BRWSS throughout the planning period, as supplying the Stoney Point WTP from the Lakeshore WTP may become a viable solution if a Lakeshore WTP expansion is no longer required.
  - The Municipality should complete a process optimization study at the Stoney Point WTP to identify opportunities to maximize the treatment capacity of the existing processes.
- **General recommendations related to the Municipality's water distribution systems:**
  - Complete monitoring of Lakeshore water distribution systems and calibrate water distribution models with monitoring results. Update distribution system constraints and recommendations based on distribution modelling results.
- **General recommendations related to the Municipality's wastewater treatment facilities:**
  - The Municipality should proactively acquire the land required for future expansion and the associated buffer zone required by the MECP. Land acquisition costs have not been included in this Master Plan.
  - The Municipality should secure the funding and implement the expansion of the Denis St Pierre WPCP to 30,000 m^3/day before 2032 to avoid the costs associated with needing to complete a subsequent Schedule C Class EA. If growth is realized more slowly than anticipated, the Municipality should complete a Schedule C Class EA to expand beyond the current rated capacity.
  - The Municipality should move toward completing the design and construction of the recommended solution for Stoney Point and Comber STFs immediately after completing and filing the Schedule C ESR.
  - In accordance with the 2020 PPS and communications from the MECP received through engagement on this Master Plan, development within the Stoney Point and Comber servicing areas cannot be approved until "suitable Class EA process is completed, the requisite tenders are let, and

the contracts for the required municipal sanitary sewage works expansion/upgrades are awarded" (Appendix C).

- Refer to Section 8 for recommendations for the Stoney Point WTP to mitigate the risk to drinking water supply posed from the seasonal discharges from the existing Stoney Point STF. As identified in Section 8, the Municipality should complete a process optimization study to identify opportunities to maximize the treatment capacity of the existing processes and reduce risk.
- The Municipality should proactively seek funding sources to support the implementation of the recommended solution for the Stoney Point and Comber STFs. The Municipality should engage with the MECP for support when seeking funding to implement these recommendations.
- The Municipality should consider suitable opportunities for alternative delivery methods to accelerate the implementation of this solution. Information on alternative delivery methods are provided in Section 14.
- It is also recommended that the Municipality review the 5-year rolling average for average daily flows received at the Denis St Pierre WPCP to identify how growth is being realized relative to the Master Plan projections to determine the timing of the next WPCP expansion and Master Plan update.

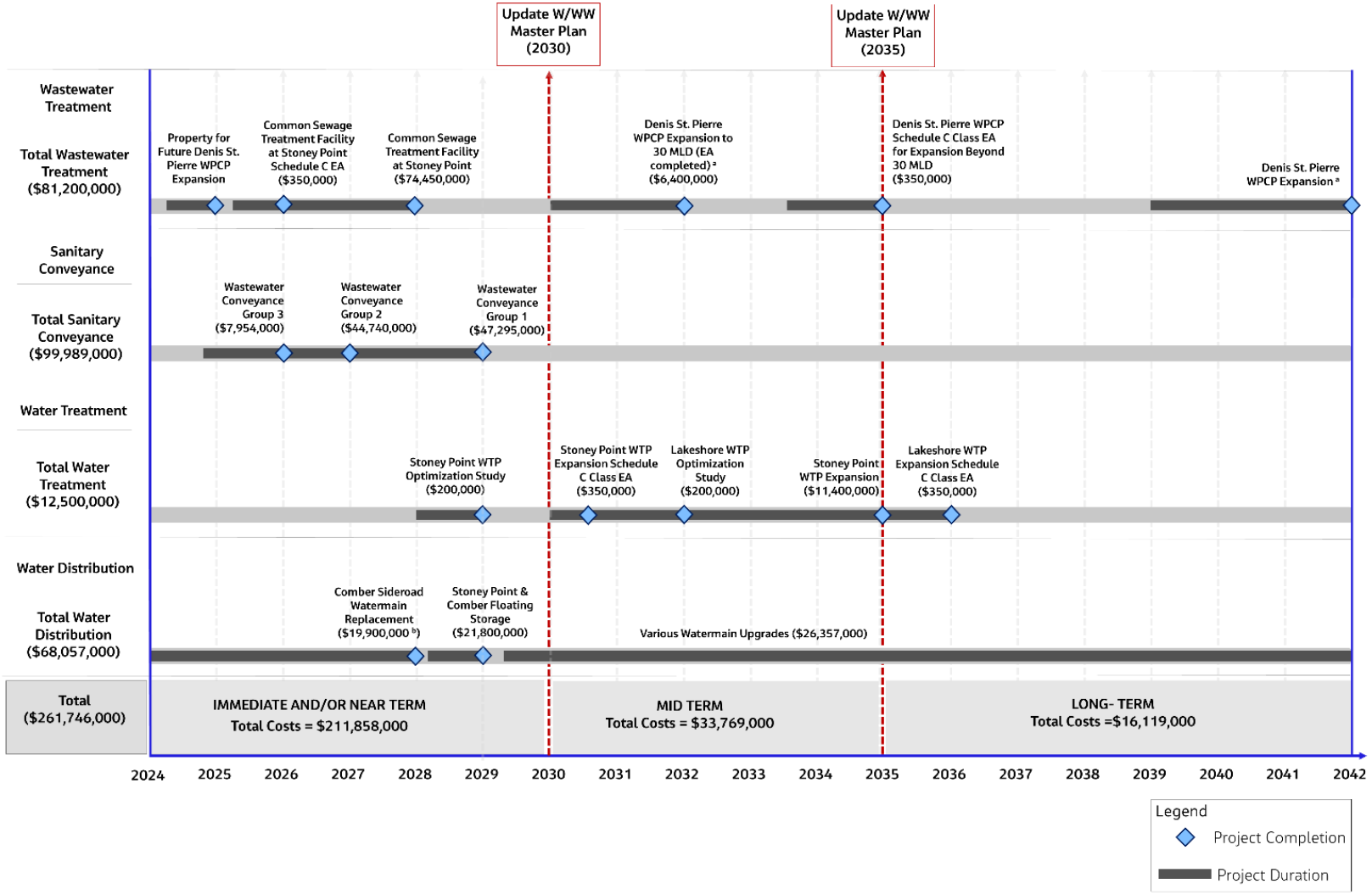
- **General recommendations related to the Municipality's sanitary conveyance systems:**
  - Complete flow monitoring within the Stoney Point, Comber, and North and South Woodslee wastewater collection systems to monitor and identify sources of inflow and infiltration as well as to understand current capacities. Stoney Point and Comber investigations should be prioritized.
  - Continue to actively investigate and mitigate inflow and infiltration within Lakeshore's wastewater collection systems. It is recommended that Municipal Staff develop an approach to define the necessary support and resourcing to implement this recommendation.
  - The Municipality should implement a Sanitary Allocation Policy. Refer to Section 13.3.1 for more information.
  - The Municipality should develop a full buildout scenario in the hydraulic model representing servicing the entire Denis St Pierre WPCP servicing boundary identified in the Official Plan to support the preliminary design and sizing of the identified conveyance alternatives. The potential for intensification in accordance with the 2020 PPS should also be considered. The full buildout modelling scenario can also be used as a tool to implement the Municipality's sanitary sewer allocation policy.
  - It is recommended that the Municipality formally define a sanitary conveyance system level of service which accounts for climate change. This is important for sizing infrastructure to provide resiliency for the future.
  - The Municipality should confirm tie-in locations for future developments. This will inform infrastructure sizing and confirm the need for Maidstone PS02 upgrades.
  - Pump station draw down tests are recommended to confirm capacities.
  - The downstream constraint group 2 preferred alternative needs to be implemented prior to the constraint group 1 preferred alternative.
  - Supportive studies, including Archaeological and Cultural Heritage Assessments, as well as an EIA, are required prior to implementation.
  - The Municipality should continue to proactively implement source control measures and enforce the Municipal Sewer Use By-Law to protect reserve capacity. Effective source control can delay the need for costly capital projects.

- It is recommended that the Municipality carefully consider development applications that do not comply with the approved secondary plans. The Sanitary Allocation Policy will aid the Municipality in evaluating proposed changes in density in secondary planning areas.

Implementation Plan

Figure ES-3 presents the recommended implementation plan presenting the recommended timeframe for each recommended solution necessary to address the Master Plan problem and opportunity statement.

Figure ES-3. Implementation Plan



Statement of Limitations

This Report was not prepared in anticipation of any legal proceedings, nor is this Report intended for use or reliance in any way in any legal proceedings related to the project, or otherwise. No liability is accepted for any use or reliance on the information provided herein by third parties. Jacobs accepts no responsibility for damages, if any, suffered by any party as a result of decisions made or actions based on this Report. No other warranty, expressed or implied, is made.

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This Report is to be read in full. No excerpts shall be taken to be representative of the findings. Jacobs takes no responsibility for misrepresentation or misuse of portions of this Report.

Contents

Appendices

(To be provided upon request.)

Tables

Figures

Acronyms and Abbreviations

Acronym	Definition
µg	microgram(s) per litre
AADF	Annual Average Daily Flow
ADD	Average Daily Demand
ANSI	Areas of Natural and Scientific Interest
BRWSS	Belle River Water Supply System
CCME	Canadian Council of Ministers of the Environment
COTTFN	Chippewas of the Thames First Nations
CPR	Canadian Pacific Rail
CofA	Certificate of Approval
DFO	Fisheries and Oceans
EA	Environmental Assessment
EAAS	Extended Aeration Activated Sludge
ERCA	Essex Region Conservation Authority
ECA	Environmental Compliance Approval
EIA	Environmental Impact Assessment
EPA	U.S. Environmental Protection Agency
ESOC	Emerging Substances of Concern
ESR	Environmental Study Report
FMPF	Flood Mitigation and Protection Framework
GLWQA	Great Lakes Water Quality Agreement
ha	hectare(s)
I/I	inflow and infiltration
ICI	Industrial, Commercial and Institutional
IDF_CC	Intensity Duration Frequency Climate Change

Acronym	Definition
IPZ	Intake Protection Zone
Lakeshore (or Municipality)	Municipality of Lakeshore
LIO	Land Information Ontario
LTVCA	Lower Thames Valley Conservation Authority
m	metre(s)
MCEA	Municipal Class Environmental Assessment
MDD	maximum daily demand
MECP	Ontario Ministry of the Environment, Conservation and Parks
MNRF	Ontario Ministry of Natural Resources and Forestry Mapping
MODA	Multi-Objective Decision Analysis
NHIC	Natural Heritage Information Centre
O&M	operations and maintenance
OP	Official Plan
OBBA	Ontario Breeding Bird Atlas
PFAS	per- and polyfluoroalkyl substances
PIC	public information centre
POI	Point of Impingement
PPS	Provincial Policy Statement
PS	pump station
RBC	rotating biological contractor
SAR	species at risk
SARB	Species at Risk Branches
SMP	Stormwater Master Plan
SPWSS	Stoney Point Water Supply System
SRP	soluble reactive phosphorus

Acronym	Definition
STF	sewage treatment facility
STP	sewage treatment plant
TDH	total dynamic head
TN	total nitrogen
TP	total phosphorus
TWSS	Tecumseh Water Supply System
TWWSS	Tilbury-Wheatley Water Supply System
UWSS	Union Water Supply System
WPCP	water pollution control plant
WSS	Water Supply System
WTP	water treatment plant
WW	Wastewater
WWMP	Water and Wastewater Master Plan
WWSS	Windsor Water Supply System

1. Introduction and Background

This section provides an overview of the project and a summary of the Master Plan report structure.

1.1 Background

The Municipality of Lakeshore (Lakeshore) is in the northeastern portion of Essex County on the shores of Lake St. Clair. With an area of approximately 530 km^2, it is the largest municipality in the County. Lakeshore is responsible for providing infrastructure services to a population of approximately 40,000, which has grown more than 10 percent over the last 5 years based on the recent census data (Statistics Canada, 2023). In addition to the growth realized over the last 5 years, there is high demand for development within the Municipality. As a result, Lakeshore must manage their water and wastewater infrastructure to service the community's existing and future servicing needs considering high development pressures and anticipated growth.

Drinking water is supplied to residents in Lakeshore by five separate water supply systems:

- Belle River Water Supply System (BRWSS), which is owned and operated by Lakeshore.
- Tecumseh Water Supply System (TWSS), which is supplied by the City of Windsor. Lakeshore owns the watermains within the municipal boundary that are supplied by the TWSS.
- Stoney Point Water Supply System (SPWSS), which is owned and operated by Lakeshore.
- Union Water Supply System (UWSS), which is supplied by Union Water. Lakeshore owns the watermains within the municipal boundary that are supplied by the UWSS.
- Tilbury-Wheatley Water Supply System (TWWSS), which is supplied by the Municipality of Chatham-Kent. Watermains supplied by the TWWSS within the Lakeshore municipal boundary are either owned by Chatham-Kent or privately owned.

These systems are illustrated in Figure 1-1.

Wastewater servicing in Lakeshore is provided through a combination of municipal service and private systems. Lakeshore owns five wastewater collection and treatment systems which includes the Denis St. Pierre Water Pollution Control Plant (WPCP), the Stoney Point Lagoon Wastewater Facility, the Comber Lagoon Wastewater Facility, the North Woodslee Wastewater Treatment Facility, and the South Woodslee Wastewater Treatment Facility. Residents that are not within the municipal servicing boundary treat wastewater using private (septic) systems. The communities located within the servicing boundary are illustrated in Figure 1-2.

Figure 1-1. Lakeshore Water Supply Systems

Lakeshore Water and Wastewater Master Plan - Figures - All Documents (sharepoint.com)

To be replaced in the PDF.

Figure 1-2. Lakeshore Wastewater Servicing Areas

Lakeshore Water and Wastewater Master Plan - Figures - All Documents (sharepoint.com)

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1.2 Master Plan Purpose and Approach

Lakeshore's first Water and Wastewater Master Plan (WWMP) was completed in 2008 and a subsequent update was completed in 2018. The 2018 WWMP focused on servicing constraints in the eastern region of Lakeshore (Stoney Point, Lighthouse Cove, Rochester Place, Comber) as the western area did not recognize the same constraints at that time.

Growth in Lakeshore has resulted in the projected population being realized sooner than projected in the 2018 Master Plan. To support the community and to enable growth, the Municipality requires an updated Master Plan to provide a roadmap for planning and implementation of water and wastewater infrastructure improvements to the planning horizon of 2042.

This Lakeshore WWMP Update will update the Master Plan completed in 2018 and will be conducted in accordance with the Municipal Class Environmental Assessment (EA) Process for Approach 1 Master Plans (Municipal Class Environmental Assessment (MCEA), 2023). The purpose of a Master Plan is to identify current and future needs, put forward a realistic and achievable plan to address the identified needs, and identify the risks of not addressing the identified needs.

The objective of this Master Plan is to provide Lakeshore with updated recommendations to guiding the implementation of water and wastewater infrastructure improvements over the next 20-year planning horizon (to 2042) using a transparent decision-making process. Lakeshore's WWMP is intended to provide timely, fiscally responsible, and achievable solutions to better manage the infrastructure required to service growth while managing risks within the Municipality using sound municipal and environmental planning principles.

1.3 Report Structure

This Master Plan report (Master Plan) is structured as follows:

- **Section 1: Introduction and Background** provides an overview of the Master Plan development process.
- **Section 2: Ontario Environmental Assessment Process** describes how the environmental assessment process has informed the development of this Class EA.
- **Section 3: Project Context** describes the project purposes, history of water and wastewater treatment, and distribution and collection within Lakeshore, and presents the regulations and policies that inform and shape the Master Plan development.
- **Section 4: Methods and Approach** details the approach to engagement and decision-making process.
- **Section 5: Study Area Existing Conditions** details the existing conditions establishing foundation for understanding Lakeshores existing and future water and wastewater needs.
- **Section 6: Study Area Future Conditions** projects the anticipated future water and wastewater needs within the planning horizon, forming the basis for the Class EA problem and opportunity statement.
- **Section 7: Problem and Opportunity Statement** defines the problems and opportunities identified through the documentation of the existing conditions and future needs in accordance with the Class EA process.
- **Section 8: Water Treatment Alternatives Identification and Evaluation** identifies the water treatment alternatives to address the current and future needs identified in Sections 5 and 6, the results from the detailed evaluation approach, and the preferred solutions.

- **Section 9: Water Storage and Pumping Alternatives Identification and Evaluation** identifies the water distribution and storage alternatives to address the current and future needs identified in Sections 5 and 6, the results from the detailed evaluation approach, and the preferred solutions.
- **Section 10: Wastewater Treatment Alternatives Identification and Evaluation** identifies the wastewater treatment alternatives to address the current and future needs identified in Sections 5 and 6, the results from the detailed evaluation approach, and the preferred solutions.
- **Section 11: Sanitary Collections and Conveyance Alternatives Identification and Evaluation** identifies the sanitary collections and conveyance alternatives to address the current and future needs identified in Sections 5 and 6, the results from the detailed evaluation approach, and the preferred solutions.
- **Section 12: Public, Agency, and First Nations Consultation and Engagement** details the engagement activities conducted throughout the Master Plan development and how the feedback received through engagement activities informed the Class EA.
- **Section 13: Implementation Plan** presents the recommended projects, the implementation schedule, triggers, and capital cost forecast for implementing the Class EA recommended projects.
- **Section 14: Funding and Financing Considerations** This section provides guidance on the funding and financing mechanisms available to the Municipality to fund the recommendations put forward in the implementation plan.

2. Ontario Environmental Assessment Process

This section describes the Environmental Assessment Act, the Class EA Process, and provides contact information for the primary contacts for the project.

2.1 Environmental Assessment Act

The objective of the Ontario *Environmental Assessment Act* R.S.O. 1990, c. E. 18 is to consider the possible effects of projects early in the planning process, when concerns may be most easily resolved, and to select a preferred alternative with the fewest identified impacts.

The *EA Act* requires the study, documentation, and examination of the environmental effects that could result from projects or activities.

The *EA Act* defines "environment" very broadly as follows:

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

In applying the requirements of the EA Act to projects, two types of EA planning and approval processes are identified:

- Individual EAs (Part II of the EA Act): Projects have terms of reference and individual EAs, which are carried out and submitted to the Ministry of the Environment, Conservation and Parks (MECP) for review and approval.
- Class EAs: Projects are approved subject to compliance with an approved Class EA process; provided that the appropriate Class EA approval process is followed, a proponent will comply with the requirements of the *EA Act*.

2.2 Class Environmental Assessment Process

The Class EA process is a decision-making framework that effectively meets the requirements of the *EA Act* and is comprised of the following five phases. These phases are illustrated in Figure 2-1.

1. Identify the problem or opportunity
2. Identify alternative solutions and establish a preferred solution
3. Examine alternative methods of implementing the preferred solution that will minimize negative effects and maximize positive effects

4. Prepare the project file
5. Implement the preferred solution

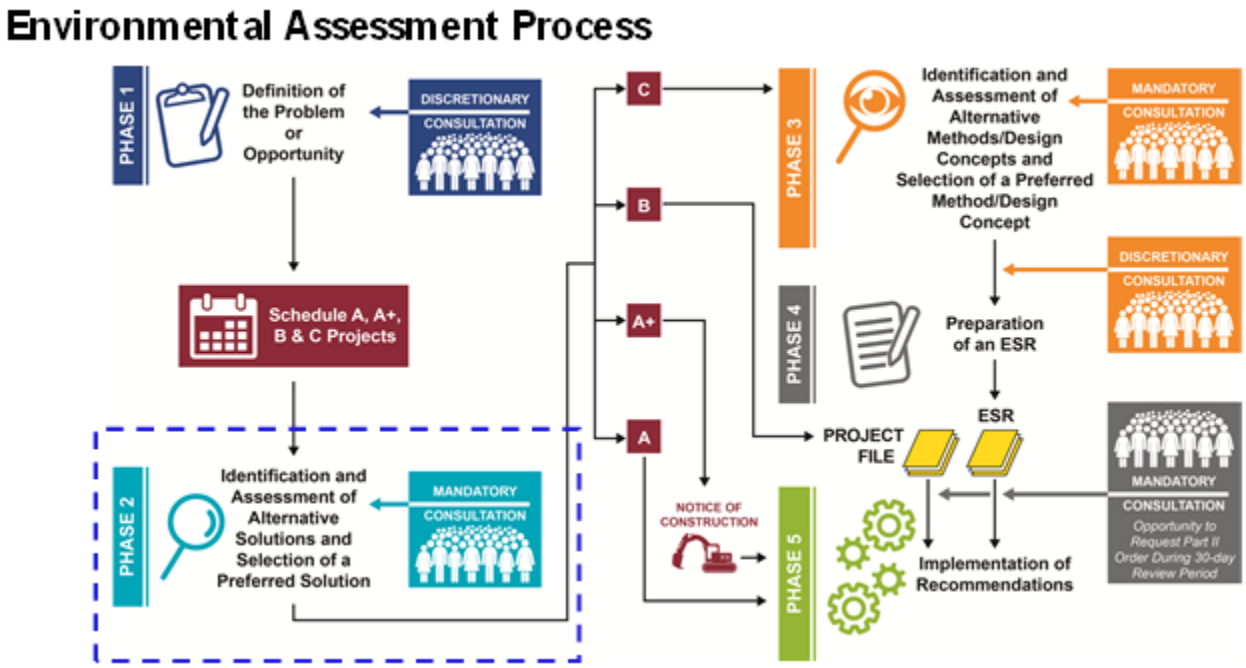
This Master Plan will be completed as an Approach 1 Class EA, including Phases 1 and 2 of the Municipal Engineer's Class EA process, as shown on Figure 2-1 (Municipal Class Environmental Assessment (MCEA), 2023). These include:

- Schedule A projects are minor operational and upgrade activities and may go ahead without further assessment once Phase 1 of the Class EA process is complete (that is, the problem is reviewed, and a solution is confirmed).
- Schedule "A+" projects are pre-approved but still require public notification prior to implementation of the project. Projects categorized as Schedule A+ include activities such as municipal infrastructure plans previously approved by a municipal council (Phase 1).
- Schedule B projects must proceed through the first two phases of the process. Proponents must identify and assess alternative solutions to the problem, inventory impacts, and select a preferred solution. They must also contact relevant agencies and affected members of the public. Provided that no significant impacts are identified and no requests are received to elevate the project to Schedule C or undertake the project as an Individual EA (Section 16 Order), the project may proceed to the next phase.
- Schedule C projects require more detailed study, public consultation, and documentation, as they may have more significant impacts. Projects categorized as Schedule C must proceed through all five phases of an assessment. An Environmental Study Report (ESR) must be completed and available for a 30-day public review period prior to proceeding to implementation.

A Section 16 Order is the legal mechanism in which the status of an undertaking can be elevated before the project can progress. The study's planning and design process allows for concerns to be identified and resolved throughout the course of the project; however, a Part 16 Order request can be submitted to MECP on the grounds that the order may prevent, mitigate or remedy adverse impacts on the existing Aboriginal and treaty rights of the Aboriginal peoples of Canada as recognized and affirmed in section 35 of the Constitution Act, 1982.

The EA Act as amended through the COVID-19 Economic Recovery Act, 2020, also provides the Minister with the authority to make two types of orders with respect to an undertaking proceeding in accordance with a Class EA. The Minister may, on their own initiative, within a time limited period, require a proponent to undertake an individual EA, referred to as a section 16(1) order, in which case the proponent cannot proceed with the project without first seeking and obtaining approval under Part II of the Act (conduct an individual EA). The Minister may also impose conditions on an undertaking, referred to as a section 16(3) order, where the proponent must meet the conditions outlined in the order.

Figure 2-1. Municipal Engineers Association Process



2.3 Project Contact

Primary contacts for the project are as follows:

Municipality of Lakeshore

Krystal Kalbol, P.Eng.
Corporate Leader – Operations
Municipality of Lakeshore
419 Notre Dame Street
Belle River, ON N0R 1A0
519-728-1975 x 655
kkalbol@lakeshore.ca

Jacobs Engineering Group

Jillian Schmitter, P.Eng., Project Manager
165 King Street West
Kitchener, ON N2G1A7
519-514-1622
jillian.schmitter@jacobs.com

Kylee Moffatt, P.Eng., Associate Project Manager
165 King Street West
Kitchener, ON N2G1A7
Kylee.Moffatt@jacobs.com

Project engagement is intended to address all comments received during the consultation period and resolve any outstanding concerns with the project team. In the event there are outstanding concerns that relate to the potential adverse impacts to constitutionally protected Indigenous and treaty rights, a Part II Order request on those matters (only) should be addressed in writing to:

Minister Andrea Khanjin
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto, ON M7A 2J3
minister.mecp@ontario.ca

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Avenue, 1st Floor
Toronto, ON M4V 1P5
ClassEAnotices@ontario.ca

If other concerns with the Master Plan report and/or EA process are made known to the Minister, or determined following a review of the document, the Minister reserves the right to issue an order on his or her own initiative within a specified time period.

3. Project Context

This section provides an overview of the Study Area and the legislative framework in which the Master Plan was developed as well as a description of potential future regulatory changes. Section 3 also summarizes studies and Master Plans that are relevant to this Master Plan.

3.1 Study Area

The Study Area is defined as the area within the spatial boundaries of the environment relevant to the Master Plan. These spatial boundaries vary based on the distribution, movement patterns or potential zones of interaction between the proposed activities (e.g., construction and operation of the preferred solution) and the natural or social environment.

The Study Area boundaries for the purposes of this Master Plan include the Lakeshore municipal boundary and are illustrated in Figure 3-1. The service areas for water service and wastewater service are different and are described in detail in Section 3.1.1 and Section 3.1.2.

Figure 3-1. Lakeshore Study Area Boundaries

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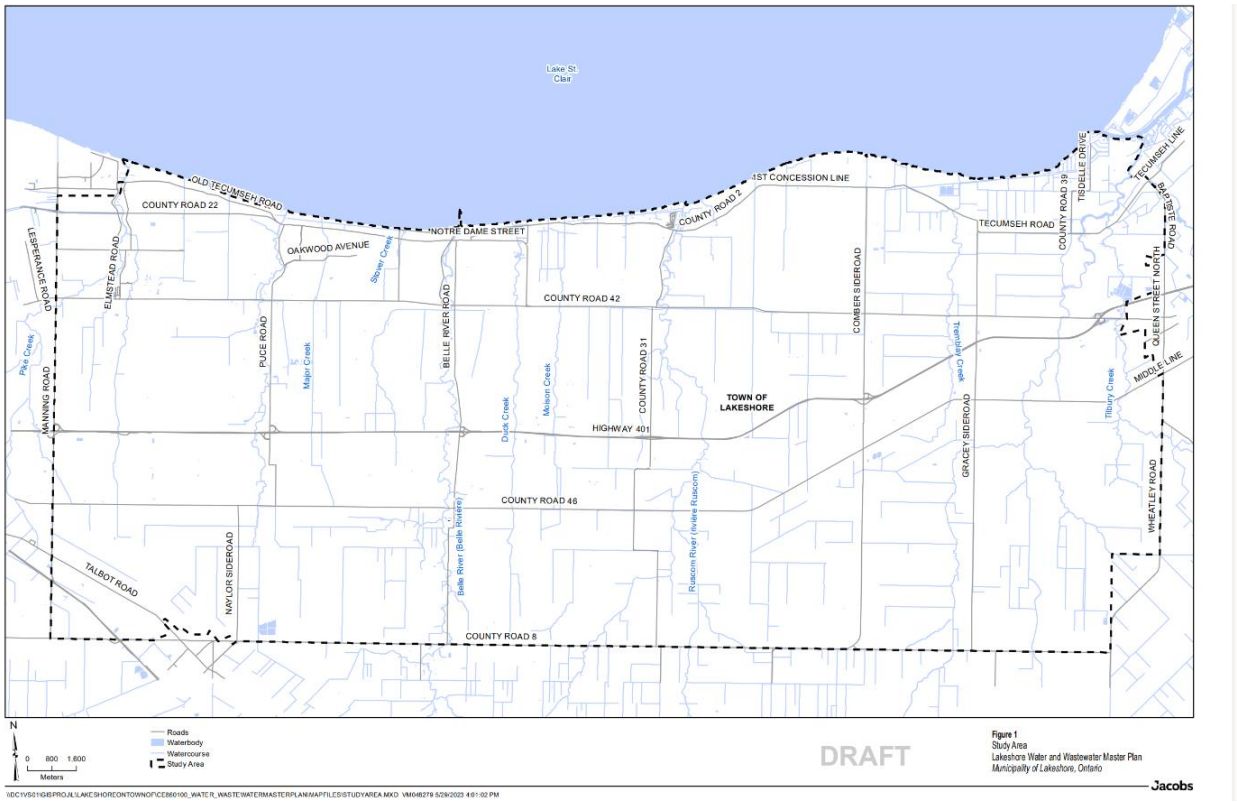
[Lakeshore Water and Wastewater Master Plan - Figures - All Documents (sharepoint.com)]



3.1.1 Water Service Areas

Lakeshore is currently serviced by five separate water supply systems. These systems are described in this section and illustrated in Figure 1-1.

1. The **BRWSS** services the northwestern portion of Lakeshore. The service area extends generally from Lake St. Clair to the north, Highway 401 to the south, Manning Road to the west, and Rochester Townline Road to the east. The BRWSS's water supply source is Lake St. Clair. The Lakeshore Water Treatment Plant (WTP) is on Lakeview Drive in the community of Belle River.

2. The **SPWSS** services the communities of Stoney Point, Surf Club, and Comber, as well as the rural areas between Lake St. Clair and County Road 8, generally east of Rochester Townline and west of Big Creek. The SPWSS's water supply source is Lake St. Clair. The Stoney Point WTP is on St. Clair Road, in the community of Stoney Point.

3. The **TWSS** is supplied by the Windsor Water Supply System (WWSS), and services the western boundary of the BRWSS service area, due to a lack of watermain infrastructure from the BRWSS. According to an agreement between the Municipality and the Town of Tecumseh, the TWSS currently supplies water to two small areas off Manning Road (County Road 19): (1) Little Baseline Road (for approximately 700 metres [m] east from Manning Road); (2) the rural area between County Road 42 and Highway 401, immediately west of Manning Road, along the Scott Sideroad and Walls Road. The TWSS's water supply source is the Detroit River. The Windsor WTP is on Wyandotte Street, in the City of Windsor.

4. The **UWSS** services the southwest portion of the Municipality, south of Highway 401, between Manning Road and Rochester Townline Road, including Ruscom and Woodslee (commonly referred to as the Lakeshore–Union water service area). System pressures in this area are generally governed by a combination of both the pressure head developed by the high-lift pumps at the Cottam Reservoir & Booster Pumping Station, in the community of Cottam within the Town of Kingsville, and the water level in the Essex elevated water tower, in the Town of Essex. The UWSS's water supply source is Lake Erie; the Union WTP is located on Union Ave., within the community of Ruthven in the Town of Kingsville.

5. The **TWWSS** services portions of the rural area located along the Municipality's eastern boundary, generally east of Big Creek, according to an agreement between the Municipality and the Chatham-Kent Public Utilities Commission. The TWWSS's water supply source is Lake Erie. The Wheatley WTP is on Detroit Ave., within the community of Wheatley, within the Municipality of Chatham-Kent.

The population is projected to grow in Belle River and Stoney Point water supply areas over the 20-year planning horizon. The focus of the water component of this Master Plan is to evaluate the ability of water treatment, storage and distribution systems within Belle River and Stoney Point water supply systems to service the area and identify constraints and recommended solutions to identified needs.

Tecumseh, Union, and Tilbury-Wheatley Water Supply Systems service certain areas of Lakeshore as per the agreement between Lakeshore and the respective Town/Municipality. However, these water supply systems are not owned by Lakeshore and were not assessed in this Master Plan.

3.1.2 Wastewater Service Areas

The 2018 WWMP (CH2M Hill & Stantec, 2018) described the wastewater service areas in detail; these service areas are largely unchanged since 2018. The following descriptions are from the 2018 Master Plan and updated to reflect current conditions. Figure 1-2 shows the boundaries of these wastewater service areas.

1. **The Denis St. Pierre Sewage Works (formerly Belle River/Maidstone Sewage Works)** services the urban areas between Manning Road and Charron Line Road north of the Canada Pacific Rail (CPR) tracks by the sanitary sewage works system. This system consists of sanitary sewers, pumping stations, and the Denis St. Pierre WPCP (formerly the Belle River/ Maidstone WPCP), which is located on Rourke Line (Figure 1-2). The system was developed by the now MECP (formerly the Ministry of the Environment) as a provincial Sewage Works Project that was constructed and built between 1974 and 1981 under 10 construction contracts.

2. The **Stoney Point Sewage Works** services the Stoney Point urban area and adjacent lakefront areas through a wastewater collection and lagoon-based treatment system. The first phase of the system was constructed in 1978 and included a gravity collection system, two pumping stations, and two 14-acre oxidation ponds. The Stoney Point Sewage Treatment Facility (STF) is located on Tecumseh Road west of Little Creek; Figure 1-2 shows the Stoney Point service area and STF. The collection system was extended in the late 1980s westerly along St. Clair Road, toward Rochester Townline Road to service lakefront properties.

3. The **Comber Sewage Works** services the Comber urban area through a wastewater collection and lagoon-based treatment system. The system was constructed in 1974 and includes a gravity collection system, pumping station and two 6-acre oxidation ponds. The Comber STF is in the southeast corner of Comber and is accessible from Windsor Avenue. The Comber service area and STF is shown on Figure 1-2.

4. The **North Woodslee Sewage Works** services the western portion of the North Woodslee hamlet. This system was constructed in 2007 and consists of a wastewater collection and treatment system intended to service the existing residences and a proposed subdivision development. The sewers convey wastewater to a treatment facility located on West Belle River Road. This facility is sized to treat sewage from residences and future growth within the hamlet on the east side of Belle River. Planning and final design for local collection sewers to service the eastern portion of the hamlet area has not been initiated. The North Woodslee service area and STF is shown on Figure 1-2.

5. The **South Woodslee Sewage Works** services the South Woodslee hamlet area through a wastewater collection and treatment system. The system was constructed in 2005 and consists of a low-pressure sewage collection system and a mechanical sewage treatment plant west of County Road 27 (Belle River Road) in the southwestern corner of Woodslee Memorial Park adjacent to the Belle River; it is accessible from King Street. The South Woodslee service area and STF is shown on Figure 1-2.

3.1.3 Existing Unserviced Areas

As part of the study, settlement areas that are not currently serviced with municipal sewer collection and treatment were identified (Figure 1-2). These areas, listed here, are serviced by individual onsite private septic systems (typically a septic tank with leaching bed):

- Lighthouse Cove Area (Including shoreline area West of Lighthouse Cove, i.e. Laforet Beach, Crystal Beach and Couture Beach Roads).
- Rochester Place Area (Including Deerbrook, Street Joachim and Shoreline area generally between Charron Line Road and Rochester Town Line Road including along the Ruscom River).
- Belle River Road Area (North of North Woodslee Hamlet and south of Belle River urban area).
- Essex Fringe Area (Southwest corner of the Municipality along County Road 35 including adjacent side streets).

The Municipal Official Plan identifies Lighthouse Cove and Rochester Place as areas to be serviced by the municipal collection system in the future beyond the planning horizon of this Master Plan.

3.2 Legislative Framework

The Municipality must operate within the administrative, legislative, and financial framework established by various levels of government including federal, provincial, county, and municipal governments. Key provincial, federal, and municipal initiatives and regulations provide directives and guidance for the planning process. These regulations and initiatives are described in the following sections and will guide the development of this Class EA.

3.2.1 Wastewater Treatment and Collections

Wastewater treatment processes must meet the requirements of the following environmental protection legislation and regulations:

- Ontario Water Resources Act, as amended by the Safeguarding and Sustaining Ontario's Water Act, 2007 is the legal foundation of Ontario's water policy and an important law governing water quality and quantity in Ontario. This Act prohibits the discharge of polluting material in or near water, prohibits or regulates the discharge of sewage, facilitate orders requiring measures to prevent, reduce or alleviate impairment of water quality, enables the designation and protection of sources of public water supply, and regulates water taking more than 50,000 litres per day.
- Ontario Safe Drinking Water Act, S.O. 2002, c. 32: is intended to protect human health through the control and regulation of drinking water systems and drinking water testing. Wastewater systems need to be located, designed, constructed, maintained, and operated in accordance with applicable standards so that drinking water is protected, safe, clean, and reliable.
- Ontario Clean Water Act requires that communities, through local Source Protection Committees, protect municipal drinking water supplies (and non-municipal supplies if added by the Municipality of Minister) from overuse and contamination, now and into the future. This Act aims to prevent contaminants from entering sources of drinking water, including lakes, rivers, and aquifers.
- Essex Region Conservation Authority Source Water Protection: includes plans and policies that apply to activities that are identified as drinking water source threats. The Source Protection Plan builds on the findings of the Assessment Report by establishing policies to address significant threats to drinking water quality, identifying who is responsible to take action, and sets timelines for policy implementation and monitoring (Essex Region Conservation Authority, 2015).

- Thames-Sydenham and Region Source Protection Plan: has been developed as a three-volume document and includes plans and policies that apply to activities that are identified as drinking water source threats (Thames-Sydenham and Region, 2023).
- O. Reg. 435/93: Water Works and Sewage Works applies to wastewater collection and treatment facilities, licensing of facility operators and operating standards.
- Canada Fisheries Act: manages and protects Canada's fisheries resources prohibiting the deposit of all deleterious substances that may degrade or alter water quality in a manner that directly or indirectly harms fish, fish habitat or the use of fish by humans. The Wastewater Systems Effluent Regulations (include mandatory minimum effluent quality standards) apply in respect of a wastewater system that deposits effluent as part of a wastewater system. Effluent containing deleterious substances will follow the requirements and standards outlined in this regulation.

3.2.2 Water Treatment and Distribution

Water treatment processes must meet the requirements of the following environmental protection legislation and regulations:

- Guidelines for Canadian Drinking Water Quality, which are established by Health Canada and define water quality goals for water treatment operations to aim to achieve.
- O. Reg. 169/03: Ontario Drinking Water Quality Standards (ODWQS), which defines treated water quality standards that must be met by drinking water systems in Ontario.
- O. Reg. 170/03: Drinking Water Systems, which defines general obligations, monitoring requirements, sampling requirements and reporting requirements for drinking water system owners.
- Essex Region Conservation Authority Source Water Protection: includes plans and policies that apply to activities that are identified as drinking water source threats and delineates IPZ Examples of these threats can be chemical spills (i.e., diesel) or the release of untreated sewage, and require mitigation measures to promote source water protection. The Source Protection Plan builds on the findings of the Assessment Report by establishing policies to address significant threats to drinking water quality, identifying who is responsible to take action, and sets timelines for policy implementation and monitoring (Essex Region Conservation Authority, 2015).
- Thames-Sydenham and Region Source Protection Plan: has been developed as a three-volume document and includes plans and policies that apply to activities that are identified as drinking water source threats (Thames-Sydenham and Region, 2023).

U.S. Environmental Protection Agency (EPA) standards are also commonly considered in Ontario, as they can be more stringent than guidelines in Canada and serve as a guideline for Canadian drinking water quality standard updates. For example, the ODWQS for total trihalomethanes (TTHMs) and haloacetic acids (HAAs) are 100 micrograms per litre (µg/L) and 80 µg/L, respectively, while the EPA maximum contaminant level for Stage 1 Disinfectants and Disinfection Byproducts Rule standards are 80 µg/L for TTHMs and 60 µg/L for HAAs. It is anticipated that these more stringent guidelines will be adopted in Canada in the future. Considering EPA standards is a conservative method that provides "future-proofing" and is recommended during master planning.

3.2.3 Provincial Policy Statement

The Provincial Policy Statement (PPS) came into effect May 1, 2020 under section 3 of the Planning Act. The purpose of the PPS is to provide direction on matters of provincial interest related to land use planning and development and to set the foundation for policy regarding the regulation of development and use of land (Province of Ontario, 2020). The PPS supports a comprehensive, integrated, and

long-term approach to planning, and recognizes linkages among policy areas. Municipal official plans (described in the subsection that follows) are considered the most important "vehicle" for implementation of the PPS. Policies applicable to the project are described.

Section 1.1.1: Healthy, livable, and safe communities are sustained by promoting development and land use patterns that conserve biodiversity and prepare for regional and local impacts of climate change.

Section 1.2.1: A coordinated, integrated, and comprehensive approach should be used when dealing with planning matters within municipalities, including managing natural heritage, water, agricultural, mineral, cultural heritage, and archaeological resources.

Section 1.2.2: Planning authorities shall engage with Indigenous communities and coordinate on land use planning matters.

Section 1.6.6.1: Planning for sewage and water services shall:

- accommodate forecasted growth in a manner that promotes the efficient use and optimization of existing municipal sewage services;
- ensure that these systems can be sustained by water resources and prepare for the impacts of climate change; and,
- promote water conservation and water use efficiency.

Section 1.6.6.2: Municipal sewage services and municipal water services are the preferred form of servicing for settlement areas to support protection of the environment and minimize potential risks to human health and safety. Within settlement areas with existing municipal sewage services and municipal water services, intensification and redevelopment shall be promoted wherever feasible to optimize the use of the services.

Section 1.6.6.6: States that planning authorities may only allow lot creation when there is confirmed sufficient reserve sanitary system capacity within the municipal sewage services. This section of the PPS is consistent with MECP Guideline D-5.

Section 1.6.6.7: Planning for stormwater management will:

- be integrated with planning for sewage and water services;
- minimize or prevent increases in contaminant loads;
- minimize erosion or changes in water balance;
- prepare for climate change impacts; and,
- promote stormwater management best practices.

3.2.4 First Nations, Indigenous, and Métis Communities

Meaningful engagement with Indigenous groups, including First Nations and Métis communities, are important to the success of municipal projects. Under the Municipal Class EA process there is a duty to consult with Treaty Rights Holders.

The 2020 PPS encourages meaningful engagement and coordination with Indigenous communities on planning activities (Province of Ontario, 2020). The MECP has confirmed its delegation of the procedural aspects of rights-based consultation for the project.

First Nations and Métis groups in the local area may have an interest in the Lakeshore WWMP. These groups include:

- Aamjiwnaag First Nation
- Walpole Island First Nation (Bkejwanong Territory)
- Caldwell First Nation
- Chippewas of Kettle and Stoney Point
- Chippewas of the Thames First Nation
- Oneida Nation of the Thames
- Munsee-Delaware Nation
- Delaware Nation
- Métis Nation of Ontario

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

3.2.5 Canada-US Great Lakes Water Quality Agreement and the Lake Erie Action Plan

The Canada-US Great Lakes Water Quality Agreement (GLWQA) is a bi-lateral agreement between the United States and Canada first signed in 1972 (Government of Canada, 2022). This agreement was amended in 2012. The Governments of Canada and the United States have committed to a shared vision of a healthy Great Lakes region, through the responsible management of use and enjoyment of the Lakes will be protected for generations (Government of Canada, 2022). The 2012 agreement puts forward long-term and short-term actions. This agreement is relevant to this Master Plan as Lake St. Clair is the primary water source for the Municipality and is the receiving water body for wastewater generated in the Municipality.

Actions in the 2012 amendment relevant to this Master Plan include:

- Development of achievable phosphorous reductions targets for Lake Erie to combat algae blooms
- Develop binational phosphorus-reduction strategies for Lake Erie including detailed domestic action plans to meet the agreed upon objectives

In response to the 2012 amendment to the GLWQA, Canada and Ontario developed the Lake Erie Action Plan. In February 2018, Canada and Ontario released the final Lake Erie Action Plan which puts forward more than 120 actions to reduce phosphorous loadings entering Lake Erie (Government of Canada, 2018). The intent of these actions is to combat harmful algal bloom and improve the health of Lake Erie. Algal blooms can result in zone of low oxygen causing harm to aquatic life. Phosphorous loadings are the root cause of algal blooms. Algal blooms of cyanobacteria (blue-green algae) can produce toxins that are harmful to human health and cannot be effectively treated using conventional drinking water treatment systems. Algal blooms can impact aquatic life, beach quality, recreational use, and the overall ecology of lakes.

Section A2 of the Action Plan puts forward actions to optimize point sources of phosphorous from Municipal sources (like wastewater treatment facilities). There are actions identified to further achieve reductions in phosphorous loadings from municipal wastewater treatment facilities. Action 2 identifies a legal effluent discharge limit of 0.5 milligrams per litre of total phosphorous for all municipal wastewater

treatment plans within the Lake Erie basin (which includes municipalities discharging to Lake St. Clair). (Government of Canada, 2018)

3.2.6 Lakeshore Official Plan

The Municipality of Lakeshore Official Plan (OP) is a long-term policy document that establishes the basic framework for how the Municipality will evolve over time. Following the amalgamation of the Townships of Lakeshore (Maidstone Township and Town of Belle River), Rochester, Tilbury North and Tilbury West, the Municipality consolidated the five OPs of the former municipalities, resulting in the 2006 OP.

The OP was updated to reflect new planning policies introduced by Essex County and the Province of Ontario since the adoption in 2006 and came into effect in November 2010. Since then, there have been several changes to the planning framework at the provincial and County levels to which the Lakeshore's OP must conform. The Planning Act requires lower-tier municipalities to amend their OPs to conform to the upper-tier OP. Therefore, the Lakeshore is required to conform to Essex County's OP, approved on April 28th, 2014.

As a result of various provincial and County level legislation revisions and amendments, Lakeshore initiated a detailed and comprehensive 5-year review of the OP in 2015, undertaking several studies to facilitate the review including the following:

- Residential Intensification Strategy (WSP & MMM Group, Lakeshore 5-Year Official Plan Review - Residential Intensification Strategy, 2016): to support the Municipality in implementing provincial intensification policies and achieve its residential intensification targets as outlined in the County of Essex Official Plan.
- Affordable Housing Strategy (SHS Consulting, 2016): to help the Municipality of Lakeshore address housing needs and provide opportunities for more affordable housing.
- Growth Analysis Study Update (Watson & Associates, 2015): to guide decision-making specifically related to land-use planning and growth management, infrastructure planning/phasing and municipal finance to the year 2031.
- Natural Heritage Review (Essex Region Conservation Authority, 2016).

In 2021, a revised OP (WSP, 2021) was drafted to provide a blueprint for growth in the Municipality to the year 2031. The OP was prepared in accordance with the Planning Act and implements the policies of the PPS, 2020. The OP also conforms to the County of Essex Official Plan Policy Framework while providing more detailed land use planning policies to address local planning issues in Lakeshore.

In accordance with the Planning Act, a review of the OP is required at a minimum of 5-year intervals to ensure the OP achieves the goals and objectives of the Municipality and determine if amendments are required. Lakeshore is currently still undergoing a review and update to their OP.

The 2021 Lakeshore Draft OP will provide a basis for the development and growth management policies by forecasting residential and employment growth and identifying the required land needs over the planning period. Key policies from the approved Lakeshore OP were considered in the development and evaluation of water and wastewater servicing alternatives.

3.2.7 County of Essex OP

The County of Essex OP, adopted in 2014, is a comprehensive planning document that sets out long-term goals and objectives to guide the development of the County. The OP sets a framework for coordination and co-operation among local municipalities, which includes the Municipality of Lakeshore, and the County on planning and development issues that transcend municipal boundaries. It contains various

policies and frameworks that support the protection of the natural environment, while providing direction for growth and resource management across municipalities. The County promotes efficient and environmentally responsible development across municipalities that is consistent with the PPS.

The County encourages new development to proceed on the basis of full municipal sewage services and municipal water services and local municipalities are encouraged to coordinate their approach to, and timing of, the provision of municipal water and municipal sewage through the preparation of an overall servicing strategy. The following servicing policies apply to the development of this Master Plan:

- Full municipal sewage services and municipal water services are the preferred form of servicing for all settlement areas.
- The use of private communal sewage services and private communal water services or individual onsite sewage services and individual onsite water services must be consistent with the PPS and shall only be used when municipal sewage and municipal water services are not within municipal servicing area boundaries.
- The use of partial services shall only be used where necessary to address failed individual onsite sewage services and individual onsite water services in existing development, within settlement areas, to allow for infilling and rounding out of existing development on partial services provided the following is met:
  - the development is within the reserve sewage and water system capacity
  - site conditions are suitable for the long-term provision of such services.
- Public or private investment in upgrading or expanding municipal sewage services or municipal water services should be focused within the Primary Settlement Areas identified on Schedule "A2" of this Plan. The County recognizes that circumstances may warrant infrastructure investment in Secondary Settlement Areas.
- Local municipalities will encourage monitoring and proper maintenance of private sewage treatment systems in the County to protect water resources and the natural heritage system.
- The local municipality must confirm the availability of the required servicing capacity prior to the County approval of development.

The OP is currently undergoing a comprehensive review by the County that commenced in 2021.

3.2.8 Ontario Bill 23

On November 28, 2022, Government of Ontario passed the More Homes Built Faster Act, 2022 (Bill 23), a bill that significantly amends and creates new legislation affecting planning and land development across the Province of Ontario. Bill 23 is "part of a long-term strategy to increase housing supply and provide attainable housing options for hardworking Ontarians and their families," with a goal of building 1.5 million homes in 10 years.

Bill 23 In Ontario introduces changes to the *Planning Act* and *Development Charges Act* to create expanded "as of right" development rights for small scale residential development, regulate the use of inclusionary zoning, require municipalities to be more flexible with parkland dedications, limit the application of site plan control, and change how planning authority is exercised in upper-tier and lower-tier municipalities, giving communities more influence over decisions that impact them directly. Changes to the Planning Act will also require municipalities to adopt zoning by-law amendments that ensure that development meetings minimum density targets near major transit station areas within one year of identifying such major transit station areas in an OP. Amendments to the Development Charges Act include several new discounts and exemptions to the rates that municipalities can charge for new

development, including affordable and inclusionary zoning units, select attainable housing units, non-profit housing developments, as well as rental construction and development.

The Municipal Act, 2001 is also amended to permit the Minister to make regulations to ensure greater standardization of Municipal By-laws under the act that prohibit and regulate the demolition and conversion of residential rental properties.

Amendments to the *Ontario Land Tribunal Act* (OLT), 2021 are intended to help to speed up proceedings, resolve cases more efficiently and streamline process. The legislative changes will clarify the Tribunal's powers to dismiss appeals and award costs to the successful parties. The OLT may be required, through regulation, to prioritize the resolution of certain classes of proceedings and be subject to timelines during such proceedings.

Amendments to the *Ontario Heritage Act* and related regulations will renew and update Ontario's heritage policies and strengthen the criteria for heritage designation and update guidelines. This will promote sustainable development that conserves and commemorates key places with heritage significance and provide municipalities with the clarity and flexibility needed to move forward with priority projects, including housing.

Amendments to the Conservation Authorities Act have the potential to permit development in areas that were previously prohibited through regulation, freeze certain fees payable to the conservation authority and impose new limits on a conservation authority's programs or services, if related to reviewing development applications.

3.2.9 Climate Change

As part of the Flood Mitigation & Protection Framework, Lakeshore has put forward plans to improve the resiliency of Municipal assets and services in the face of fluctuating water levels and weather patterns (Municipality of Lakeshore, 2021). This entails prioritizing stormwater infrastructure upgrades, identifying and repairing inflow and infiltration (I/I) sources and eliminating cross-connections in the sanitary conveyance systems, among other measures.

As part of the Master Plan Class EA process, alternative solutions related to water and wastewater infrastructure (both improvements/upgrades to existing infrastructure as well as any required new infrastructure) will be identified and evaluated, while considering the benefits and impacts to the natural, social, cultural, technical, and economic environment to identify preferred solutions.

Impacts related to climate change are considered in the evaluation of solutions as part of the natural environment criteria. Design storms were used and compared to identify existing and future constraints to similar events projected under climate change stresses to determine how the existing infrastructure performs with more frequent and intense rainfall events.

3.2.10 Sewer Use By-law

A Sewer Use By-Law is a major regulatory by-law that aims to protect public safety, the environment and municipal infrastructure by setting strict limits on what can be discharged into the sewer system and natural watercourses.

Lakeshore's Sewer Use By-law 80-2011 was adopted in December 2011. The sewer use by-law sets standards for allowable discharges into the sanitary and storm sewer systems. Maximum concentrations are set for various contaminants identified in Schedule A and Schedule B of the by-law. If exceeded, the discharger may be subject to surcharge fees. These fees cover additional operations and maintenance that may be required due to high-strength wastewater entering the sanitary system.

All allowable water discharges into the sanitary and storm sewer systems must originate from the municipal water supply. The By-law prohibits any water originating from a source other that the municipal water supply, including storm water or groundwater, from being discharged directly or indirectly to a sanitary sewer. Every person and corporation contravening any provision of the By-law is liable to fine(s) set out by the By-law.

The Sewer Use By-Law update will continue to allow the Municipality to maintain relatively consistent influent quality throughout the planning period for this Master Plan which is an important consideration in assessing capacity and developing alternative solutions for the Municipality.

3.2.11 Secondary Plans

There are several Special Planning Areas identified in the Municipality's 2021 OP Draft (WSP, 2021) that require Secondary Plans or Special Planning Area studies to be completed to coordinate development within existing settlement areas and/or promote redevelopment or intensification within an area. The following policies related to the Secondary Plan areas were identified in the 2021 OP Draft:

3.2.11.1 Emeryville Secondary Plan

The following specific policies related to the preparation of the Secondary Plan for the Emeryville Special Planning Area were reviewed under the OP (5-year Final Draft, March 2021) as part of this MP update.

- Section 9.2(b)/(c): A Transportation Study Update and Impact Study will be undertaken to support the preparation of secondary plans and associated development application submissions. These studies will consider the need and justification for any additional north-south and/or east-west Urban Residential Collector Roads to accommodate existing and planned development, particularly for lands located east of the Fourth Concession Drain and north of Oakwood Avenue.
- Section 9.2(e): The Municipality will work to ensure that residential parcels are provided with road access from two directions to facilitate continuity, pedestrian and cyclist mobility, and emergency vehicle access, where possible.

3.2.11.2 Patillo/Advance Secondary Plan

The following specific policies related to the preparation of the Secondary Plan for the Patillo/Advance Special Planning Area were reviewed under the OP (5-year Final Draft, March 2021) as part of this MP update.

- Section 9.3(c): A Planning Rationale Report will be prepared to address consideration of future land use compatibility issues between the existing Urban Area and Employment Area and the compatible integration of new land uses.
- Section 9.3(d): The Secondary Plan will identify an appropriate Urban Buffer within the Urban Reserve Designation, located along the western and northern portion of the Urban Reserve Designation. The Secondary Plan will provide appropriate policies to ensure land use compatibility through appropriate land use transitions and buffer areas between the Urban Area and the future development of lands within the Urban Reserve Area.
- Section 9.3.1(a): An Urban Arterial Road will be constructed to connect County Road 22 and Little Baseline Road and will be accommodated within a 30-metre right-of-way with a right-in-right-out only at County Road 22. This road will be constructed in phases as "build out" or future development in the area warrants the construction of the road. Once this road is constructed the Croft Drive and Advance Boulevard access points to County Road 22 will be terminated.

- Section 9.3.1(b): An Urban Commercial/Employment Collector Road will be constructed which connects Advance Boulevard and Croft Drive to provide area-wide access to the intersection of County Road 22. An Urban Commercial/Employment Collector Road (Extension of Silver Creek Industrial Road) will be constructed to connect with the proposed Urban Arterial Road which connects County Road 22 and Little Baseline Road. The Urban Commercial/Employment Collector Roads will be accommodated within a 22 metre right-of-way.
- Section 9.3.1(c): Future development will be "phased" to provide for orderly development and shall be coordinated with the road improvements (County Road 22, Patillo Road and County Road 42), construction of the internal roads and the extension of municipal services to this area. Development will be permitted only when the applicable road improvements and internal roadway connections are made that provide the roadway capacity to support additional traffic.
- Section 9.3.1(e): The area will continue to develop on municipal water and municipal sewage in accordance with Table 7.1 Hierarchy of Sewage and Water Services and Section 7.3.1.1 Municipal Water and Sewage Services in the OP.

3.2.11.3 County Road 22 Corridor Secondary Plan

A Secondary Plan and Corridor Transformation Strategy for the County Road 22 Corridor was prepared in 2012 (MMM Group, 2012) to provide more detailed land use and design guidance for the development of the corridor.

The Corridor Transformation Strategy provides principles and guidelines for the transformation of County Road 22 and a conceptual urban design framework to direct development within the corridor that is in keeping with the Municipality's vision for County Road 22. The guidelines identify the Municipality's intent with respect to land use, built form, streetscape, parking, landscaping, and other urban design matters which should be addressed through the preparation and review of development applications. The guidelines provide the Municipality with the necessary tools for the review and evaluation of development applications within the corridor.

3.2.11.4 Wallace Woods Secondary Plan

The Draft Wallace Woods Secondary Plan Report was completed in 2022 by WSP for a proposed mixed-use development, the Wallace Woods Special Planning Area, in the Municipality of Lakeshore as required under the Municipality's OP. The Report is to be used as a guide for future development of the area by reviewing the existing conditions and identifying supporting studies to facilitate the recommendations of the Secondary Plan. As per Section 9.5 (f) of the OP, the Secondary Plan established an appropriate residential phasing plan and policies to ensure the orderly, efficient, and timely progression of residential development, in accordance with the anticipated growth projections as identified in Table 3.1 of the OP.

As part of the Secondary Plan, a Transportation Study was undertaken to identify and recommend improvements to the road network, including the provision of additional transportation capacity between County Road 22 and County Road 42. An Urban Design Study was also undertaken to support the creation of an innovative, mixed-use, and pedestrian-oriented main street environment.

3.2.11.5 Lakeshore West/Manning Road Special Planning Area

The following specific policies related to the preparation of the Secondary Plan for the Lakeshore West/ Manning Road Special Planning Area were reviewed under the OP (5-year Final Draft, March 2021) as part of this MP update.

- Through a review of this Plan or the Lakeshore West/Manning Road Special Planning Area Secondary Plan, the Municipality may consider an amendment to this Plan to transfer existing, vacant commercial/employment designated lands from one location, to another location outside of a Settlement Area, provided that the lands to be transferred from the existing, vacant commercial/ employment designated lands will be removed from the Settlement Area, included within the Agricultural Area and designated an appropriate Land Use Designation.
- Section 9.6(e): A Planning Rationale Report will be prepared to address the requirements of the OP as well as land use compatibility issues between the existing and proposed lands uses within the Special Planning Area and the Town of Tecumseh.
- Section 9.6(f): A Transportation Study will be undertaken to make recommendations on required improvements to the road network including access to the Special Planning Area. Access to Manning Road and the associated development will be undertaken in accordance with the recommendations of the Manning Road EA.
- Section 9.6(h): For the lands fronting County Road 22, located on the south side of County Road 22, west of West Pike Creek Road, the Lakeshore West/Manning Road Special Planning Area Secondary Plan will have consideration for the policies of Section 3.3.9 and Section 9.4, and the built form and urban design guidelines of the Corridor Transformation Strategy – County Road 22 Special Planning Area Design Guidelines to ensure the development of a consistent streetscape and built form along this section of the County Road 22 Mixed-Use corridor.
- Section 9.6(i): The lands on the north side of Amy Croft Drive, within the Lakeshore West/Manning Road Special Planning Area, may be considered independently from the lands on the south side of County Road 22, through the preparation of a separate Secondary Plan.

3.2.11.6 Lighthouse Cove Special Planning Area

The following specific policies related to the preparation of the Secondary Plan for the Lighthouse Cove Special Planning Area were reviewed under the OP (5-year Final Draft, March 2021) as part of this MP update.

- Section 9.7(a): Preparation of a Flood Risk Assessment to determine if there are risks associated with the development of lands.
- Section 9.7(d): A Transportation Study will be undertaken to investigate opportunities for a secondary access to ensure safe ingress and egress within flood-prone areas.
- Section 9.7(e): Long-term municipal servicing for Lighthouse Cove must be established prior to considering any further development, other than development of a single detached residence as infill or minor rounding out on existing lots of record, within the Urban Area, if site conditions are suitable for the long-term provision of such services with no negative impacts.
- Section 9.7(g): Environmental studies may be undertaken to address issues relating to water quality, shoreline management, and environmental protection.
- Section 9.7(h): A Municipality Emergency Management and Response Plan will be prepared to address notification and evacuation requirements in the case of an emergency.

- Section 9.7(i): The Municipality may consider, as a priority, community improvement initiatives to address general improvement and revitalization of Lighthouse Cove, in accordance with Section 4.2.2 of the OP.

3.2.11.7 Amy Croft Secondary Plan Area

The Amy Croft Secondary Plan was drafted in 2016 by WSP. The planning report establishes a basis and planning framework for Amy Croft Special Planning Area that will introduce an improved road network, including implementation, phasing and cost-sharing policies, through the Secondary Plan process.

The following relevant policies from the OP provide guidance with respect to transportation, access, and servicing requirements in the Amy Croft Secondary Plan area and were reviewed as part of this MP update:

- Section 9.8(a)(i): An Urban Commercial/Employment Collector Road (Lanoue Street extension) will be constructed to connect Manning Road to the Commercial Boulevard extension. Commercial Boulevard, an Urban Commercial/Employment Collector Road, will be extended to connect to the Lanoue Street extension. The roads and road improvements will be constructed in phases as "buildout" or future development in the area warrants the construction of the roads and road improvements. An Environmental Site Assessment shall be required to determine the location of the Lanoue Street extension.
- Section 9.8(a)(ii): Future development will be phased to provide for orderly development and shall be coordinated with road and infrastructure improvements and the extension of municipal services. Development will only be permitted when applicable road improvements and internal roadway connections are made that provide the roadway capacity and road improvements to support additional traffic, to the satisfaction of the Municipality. A Traffic Impact Study will be required for a new development proposal.
- Section 9.8(a)(iii): The need for a Traffic lmpact Study to support a proposed development may be required at the discretion of the Municipality as outlined in the Municipality's Development Manual and will be in accordance with the Municipality of Lakeshore Corridor Management and Access Control Policy.
- v) The Secondary Plan area will continue to develop on municipal water and municipal sewage services in accordance with Table 7.1 Hierarchy of Sewage and Water Services and Section 7.3.1.1 Municipal Water and Sewage Services in the OP.
- Section 9.8(a)(vi): A stormwater management study for the Secondary Plan area is required to determine the stormwater management requirements to serve the Secondary Plan area.
- Section 9.8(a)(vii): An Environmental Impact Assessment shall be required to assess the significance of any natural heritage features, prior to development or site alterations occurring within or adjacent to natural heritage features, in accordance with the policies of this plan.

3.3 Potential Future Regulatory Changes

3.3.1 Emerging Substances of Concern

As analytical technologies advance, a growing list of compounds that can have physiological effects on humans and aquatic organisms are being detected in surface waters and in biosolids. These compounds are referred to as Emerging Substances of Concern (ESOCs) and include endocrine disruptors and hormones, pharmaceuticals, personal care products (soaps, shampoos, perfumes, and antimicrobials), pesticides, herbicides, nanoparticles, and PFAS.

ESOCs enter the wastewater system and the natural environment in various ways. Many ESOCs enter municipal wastewater through bathing, cleaning, laundry, disposal of human waste and unused pharmaceuticals, and agricultural application of pesticides. Removal of some ESOCs in wastewater and drinking water plants does occur, however, removal rates vary with the specific ESOC and type of treatment (EPA, 2010).

While most municipal wastewater treatment plants are not specifically designed to remove ESOCs from wastewater, a number of research projects have reported that removal of some ESOCs occurs in facilities with secondary treatment, as well as those with some form of advanced treatment. In 2010, the MECP conducted a study to determine the world-wide state of research on the removal of ESOCs at municipal wastewater treatment plants (CH2M, 2010). The study indicated that nitrifying wastewater treatment plants appear to eliminate more ESOCs than non-nitrifying plants, and that wastewater treatment plants that nitrify and denitrify further reduce ESOC concentrations. Thus, nitrifying secondary treatment is considered a surrogate for ESOC removal; however, guidelines for the extent to which ESOC removal can be achieved through nitrifying secondary treatment have not been defined.

ESOCs and their fate across wastewater treatment plants is an area of ongoing research. At this level of planning, potential future limits on ESOCs are speculative and are therefore not accounted for in the future expansion plans for treatment facilities that will be developed in this Master Plan.

3.3.2 Nitrogen Species

Nitrate in water is linked to various health issues in humans, and also has a fertilizing effect in bodies of water where too much nitrate could trigger algae blooms in surface waters where nitrate is the limiting nutrient. Nitrate is typically not the limiting nutrient in Ontario surface waters; phosphorus is typically limiting and is therefore subject to regulatory control. In Ontario, there is no specific regulation for nitrate or Total Nitrogen (TN) (a measurement of all nitrogen species including ammonia, organic and reduced nitrogen, nitrite, and nitrate) in wastewater treatment plant effluents; however, TN limits have been implemented in treatment plants elsewhere in Canada that discharge to sensitive receiving waters. The Canadian Council of Ministers of the Environment (CCME) published the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2019), which notes a limit of 3 milligrams per litre (mg/L) for nitrate (as nitrogen) for chronic exposure in freshwater lakes, rivers and streams that support aquatic life.

There is a general trend in North America toward application of TN limits due to anoxia in surface waters. For example, Florida has eliminated wastewater effluent discharges to the ocean, and areas that discharge to the Long Island Sound and the Chesapeake Bay need to meet exceedingly strict TN limits (as low as 3 mg/L as nitrogen on an annual basis). In Europe, many plants that discharge to sensitive streams are required to meet a TN limit of 10 mg/L (as nitrogen) on a monthly average basis.

The trend toward the application of TN limits in the remainder of Canada and around the industrialized world may lead to the application of TN limits in plants discharging to Ontario streams and lakes at some point in the future. As a first step in that direction, relatively relaxed limits might be applied (20 to 25 mg/L as nitrogen); however, more stringent TN limits could be expected within the foreseeable future to levels in line with those currently applied in Europe. It is recommended that in the future, Lakeshore continues to monitor the regulatory environment surrounding TN limits.

Point source phosphorus discharges to the Great Lakes have garnered significant attention because of recent algal blooms across Lake Erie and in localized areas of the Lake Ontario, Lake Huron, and Like Michigan nearshores. Algae blooms in Lake St. Clair have occurred but have received less public attention. In February 2018, the Ontario MECP and Environment and Climate Change Canada published the Canada-Ontario Lake Erie Action Plan to reduce algal blooms caused by phosphorus discharges to the

lake. One of the actions within the plan is to establish, by 2020, a legal effluent total phosphorus (TP) concentration limit of 0.5 mg/L for all wastewater treatment plants in the Lake Erie basin that have an average daily flow capacity above 3.78 mL/d (Government of Canada, 2018). The Lake Erie basin includes Lake St. Clair. This TP limit is consistent with the binational recommendation for wastewater treatment plant discharges under the Canada-U.S. GLWQA. The Lake Erie Action Plan also recognizes soluble reactive phosphorus (SRP) as a parameter of interest for nuisance algal blooms due to SRP being readily bioavailable for algae, however, no recommendations or actions were advanced to make SRP a regulated parameter for wastewater facility effluents.

Lakeshore should anticipate additional scrutiny from regulatory authorities related to the phosphorous and nitrogen species discharges as Lake St. Clair is subject to the requirements of the Canada-Ontario Lake Erie Action Plan as the municipal wastewater treatment facilities discharge to Lake St. Clair.

3.3.3 Potential Future Regulations for Biosolids Quality and Disposal

Currently, land application of biosolids requires pathogen reduction, limited metal concentrations, and odour reduction as outlined in O. Reg. 267/03 (Province of Ontario, 2017). Potential future changes in regulations based on increased scrutiny of ESOCs in biosolids could drive biosolids management away from land application. The prevalence and environmental impacts of ESOCs in biosolids is an area of ongoing research in the wastewater industry. It is recommended that in the future, Lakeshore continues to monitor the regulatory environment surrounding ESOCs and biosolids. Potential future ESOC limitations in biosolids would have municipal impacts and should be considered in future biosolids Master Plans.

3.3.4 Potential Future Regulations for Wastewater Treatment

In addition to the anticipated changes to nitrogen species effluent objectives and targets related to the GLWQA and Canada-Ontario Lake Erie Action Plan, modernization of Environmental Compliance Approvals (or Certificates of Approval) will be undertaken by the MECP within the planning horizon for this Master Plan. The MECP recently introduced consolidated linear infrastructure (CLI) Environmental Compliance Approvals (ECAs) for stormwater and wastewater collection systems across the province. The CLI ECA process created uniformity in the monitoring, operating, and reporting requirements for owners of collection systems across the province.

3.3.5 Potential Future Regulations for Air, Noise, and Odour

The Ontario Environmental Protection Act Local Air Quality Regulation (O. Reg. 419/05) regulates the maximum allowable concentration of specific air contaminants “at the point of impingement (POI)”, which is typically the property line and other receptors such as building air intakes or windows (Province of Ontario, 2019). Currently, the regulation includes half-hour POI concentration standards and assumes the use of a model that is approved by O. Reg. 346. By February 1, 2020, the MECP will phase in new concentration standards, referred to as Schedule 3 Standards, based on averaging times ranging from ten minutes to 24 hours depending on the contaminant. The new standards also require the use of AERMOD or another approved model, as the existing O. Reg. 346 models do not reflect the latest scientific advancements in air dispersion modelling.

The Schedule 3 Standards have 24-hour and 10-minute odour-based standards for some offensive odorous contaminants, including total reduced sulphur, hydrogen sulphide, and mercaptans. ECA amendment applications after February 1, 2020 must include facility-wide Emission Summary and Dispersion Modelling (ESDM) demonstrating compliance with the new Schedule 3 Standards using an AERMOD model. In ECA applications for wastewater treatment plants, an Emission Summary and Dispersion Modelling report must demonstrate compliance with the 10-minute POI Limit for total reduced sulphur.

3.4 Related Studies and Master Plans

3.4.1 2008 Water and Wastewater Master Plan

The Municipality of Lakeshore adopted its first comprehensive WWMP in 2008 (Stantec, 2008). The Master Plan (2008) identified capacity problems within the Stoney Point and Comber sewage systems as well as environmental problems in the unserviced areas of Rochester Place and Lighthouse Cove. The 2008 Master Plan outlined the preferred solution which involves the construction of a new mechanical STF in the Stoney Point area and decommissioning of existing sewage lagoons in Stoney Point and Comber. The preferred solution also includes new sanitary sewage collection systems in Lighthouse Cove and Rochester Place together with sewage PS and forcemains to transmit sewage from Stoney Point, Comber, Lighthouse Cove and Rochester Place to the proposed new treatment facility in the Stoney Point area.

3.4.2 Eastern Communities Environmental Study Report

Servicing of the Eastern Communities has been explored since the 2008 WWMP, leading to the development of the Eastern Communities EA in 2012 (Stantec, 2012), which was carried out as a Schedule C Class EA in accordance with Phase 3 and Phase 4 of Municipal Class EA process. Constraints identified in the 2008 Master Plan were evaluated in detail in the 2012 Eastern Communities EA ESR, and design concepts for the wastewater collection systems were identified and evaluated. Similarly, alternative treatment processes for a new treatment facility and strategies for biosolids management were identified and evaluated. Environmental impacts, mitigation measures, property requirements and probable costs were also identified for the recommended design approach.

Environmental assessments completed through the Municipal Engineers Association (MEA) process are considered valid for 10 years. As the Eastern Communities Class EA was completed in 2012, the findings of the ESR are no longer considered valid.

3.4.3 2018 Water and Wastewater Master Plan

In 2018, the Lakeshore prepared an update to the original 2008 WWMP Study in accordance with Phases 1 and 2 of the MEA Class EA Process (MEA, 2000 amended in 2023) (CH2M HILL & Stantec, 2018). The goal of the 2018 Master Plan was to provide an updated, consolidated framework to continue guiding the planning and implementation of strategic water and wastewater infrastructure improvements over a 20-year planning horizon (2015 to 2035), and to integrate the natural, social, and economic environment considerations. Community growth projections were established for the planning horizon along with corresponding projected water demands and wastewater flows.

Several constraints were identified within the water system related to water treatment, storage and distribution systems within the Belle River and Stoney Point water supply systems. Wastewater constraints were identified for the existing and potential wastewater service areas throughout the Municipality to satisfy the needs of existing development and provide sufficient capacity to accommodate future growth based on projected demands. As a result, several conceptual alternative solutions were identified to address the problems and needs of the water and wastewater systems.

Alternative servicing solutions were identified and evaluated to address the specific problems and needs of the water and wastewater systems and the unserviced settlement areas, and a detailed evaluation of the various alternative solutions was conducted. A list of water and wastewater infrastructure projects were identified as a conclusion to the Master Plan project that would be required to service the Municipality to 2035 and beyond.

After the completion of the Master Plan update, a review of the 2016 flows at the Denis St. Pierre WPCP indicated an average treated flow greater than anticipated from the projected population forecast, resulting in the potential for the WPCP to reach capacity sooner than previously identified. The review resulted in the need for the Municipality to initiate a study to upgrade and expand capacity at the Denis St. Pierre WPCP. The study is further described in Section 3.4.4.

3.4.4 Denis St. Pierre WPCP Expansion Environmental Assessment

The Dennis St. Pierre Expansion Schedule C Class Environmental Assessment was completed in 2020 in accordance with Phases 3 and 4 of the MEA Class EA process (Stantec, 2020). In 2018, the Dennis St. Pierre WPCP was operating at 98 percent of its existing rated capacity of 14,500 m^3/day. The existing capacity was not adequate to accommodate projected future flows from the Belle River and Maidstone wastewater service areas. As a result, there have been overflow incidents, especially in 2019, that caused average effluent TP (0.55 mg/L) to exceed the limit (0.5 mg/L) as set out by MECP, with a particular incidence of 0.82 mg/L, according to the ESR prepared by Stantec in 2020.

In the 2020 ESR, wastewater treatment design and technology alternatives for the plant expansion were identified and evaluated. Wastewater treatment facilities expansion was proposed on the east side of the existing Denis St. Pierre WPCP site, originally purchased, and reserved to accommodate an expansion of the plant. Extended Aeration Activated Sludge (EAAS) was identified as the preferred technology for the expansion of the plant. Similarly, design alternatives for the management of biosolids and biosolids treatment technologies were identified and evaluated. Aerobic Digestion was the recommended technology for treatment of biosolids and disposal of biosolids by application on farmland was recommended as it is a proven process successfully used for biosolids disposal from the plant for many years.

Recommendations from the 2020 ESR were adopted, and expansion of the plant to a new rated capacity of 25,000 m^3/day was completed in early 2024. The ESR and design include the provision to expand the plant to 30,000 m^3/day.

3.4.5 Lakeshore Flood Mitigation and Protection Framework

The Lakeshore Flood Mitigation and Protection Framework (FMPF) puts forward a comprehensive framework to address both surface flooding and basement flooding resulting from flows in the sanitary and storm conveyance systems. This Master Plan is primarily concerned with flooding related to the sanitary conveyance system and extraneous flows entering the conveyance system which contribute to flooding and require treatment capacity. Extraneous flows are also referred to as inflow and infiltration (I/I) and are clear water flows such as rainwater or groundwater that enter the sanitary conveyance system. Clear water flows entering the sanitary system are prohibited by the Municipality's sewer use By-law (as summarized in Section 3.2.10).

The FMPF includes provisions for investigations to identify sources of mitigations measures to remove extraneous flows from the sanitary system. These measures include:

- Operationalize a rotating Smoke Testing Program
- Operationalize monitoring, tracking and enforcement of results including required repairs and elimination of private infrastructure cross-connections to the sanitary system, when detected
- Expanded Building and Occupancy Inspections
- Review drainage areas and recommend Drainage Act initiation to achieve an increase level of service
- Review of the OP and Zoning By-law and preparation of implementation guidelines

- Review and changes to Development Standards
- Development of a Flood Rapid Response Plan
- Staffing Plan to execute and support the FMPF.

3.4.6 2022-2026 Strategic Objectives

The 2022-2026 Strategic Objectives for the Municipality of Lakeshore is intended to provide high-level direction for the Municipality. The strategic objectives outline priorities and actions that reflect the Municipality's ambitions and is intended to prepare Lakeshore for the future.

The objective of the document is to provide clarity on direction to allow for all levels of plans, actions, and activities of the Municipality to align with Council's strategy, and with one another. Building on the vital day-to-day services that Lakeshore provides to the community, this strategic outlook document indicates where the organization should focus its efforts to meet the challenges of the current environment as effectively as possible.

Five strategic objectives are identified as part of the Strategic Plan that will provide direction for Municipal staff in the development of yearly business plans and division budgets. Each priority is comprised of several strategic directions: high-level focus areas, measures and policy directions to which Municipal staffwill develop yearly business plans to support. These priorities include:

1. **Building and Stewarding Municipal Infrastructure:** The Municipality of Lakeshore will continue to maintain and repair older infrastructure and constructure new infrastructure by updating the Municipality's Asset Management Plan, developing Phase 2 Stormwater Master Plan, and identifying gravel roads for conversion to tar and chip.

2. **Developing Our Future Community:** The Municipality of Lakeshore is committed to develop Lakeshore to build the Municipality's future and safeguard the unique identities present by developing a 25-year Municipal Master Plan, developing Wallace Woods Secondary Plan, creating a stakeholder engagement and management plan, and designing and building one park per term.

3. **Modernizing and Enhancing Municipal Function:** The Municipality of Lakeshore will modernize and strengthen the Municipality's organizational framework by organizing municipal data to further evidence-based decision-making, implementing a future-focused business operating model, and right-sizing municipal responsibilities.

4. **Becoming an Economic Leader in Essex County:** The Municipality of Lakeshore will aim to foster economic development and implement strategic economic initiatives by designing a regional industrial park, developing a Business Attraction and Retention Plan, planning the Greenhouse Business Park, and creating a corporate branding and communication initiative.

5. **Modernizing Resident-Centred Service:** The Municipality of Lakeshore will modernize technology and establish forward-looking service standards that place residents at the forefront by undertaking a calendar of By-law modernization, implementing a plan for resident-service standards, and setting standards and operating procedures for resident communication regarding Council.

3.4.7 Stormwater Master Plan

In an effort to adapt to the changing climate, Lakeshore is completing a Stormwater Master Plan (SMP) (Municipality of Lakeshore, 2021). The purpose of the SMP is to ensure stormwater is managed effectively and responsibly to help protect local water sources, municipal infrastructure, protect properties and the environment from flooding impacts. The SMP is being completed in two phases: Phase 1, completed in April 2022, addressed stormwater issues in the mostly urban areas of the northwest portion of Lakeshore, and Phase 2 which is ongoing and will address the remaining areas of Lakeshore not included in Phase 1.

Phase 1 of the SMP defines guidelines and policies that dictate how Lakeshore will manage stormwater over the next years. The plan prioritizes the projects and provides a means for Lakeshore to estimate future stormwater requirements and costs. The main objective was to identify the causes of existing flooding and drainage issues within Lakeshore, develop a strategy to implement stormwater management measures that protect public and private property from flooding, preserve receiving water systems, and minimize stormwater servicing costs. Recommendations were made for improvements to both private and public drainage works to reduce the risk of flood damage caused by severe storm events including pump station and storm sewer improvements and replacements, expansion of the sanitary sewer I/I reduction program to identify and mitigate significant wet weather flows, and the installation of rain guards at all sanitary manholes where there is a risk of inflow caused by roadway ponding.

The SMP will develop a plan to effectively manage existing stormwater infrastructure within these communities and provide recommendations for areas of improvement required to accommodate future growth. The Municipality's stormwater conveyance and management infrastructure is separate from the Municipality's sanitary collection system and therefore, for the purposes of the WWMP, both studies prioritize the continued protection of local water courses.

3.4.8 Shoreline Management Plan

In 2022, the Municipality of Lakeshore completed the Shoreline Management Plan, a long-term management plan to address existing and future risks to public health and property and to conform with applicable Provincial Policy direction (Stantec Consulting Ltd et al., 2022). The plan investigates how similar shorelines manage the risks associated with coastal hazards and provides high-level recommendations for proactive land use planning with the Municipality.

The Shoreline Management Plan summarizes relevant provincial and municipal policies in Ontario that prioritize the location of new development away from hazardous lands adjacent to the Great Lakes. The Shoreline Management Plan included an analysis of flood risk and road inundation using historical 100-year lake levels compared to 100-year climate change lake level for the Pike Creek, Puce River, and Belle River areas.

The result of the analysis, in combination with a review of land use management approaches, recommends that municipal and conservation authority mapping be updated to clearly identify the extent of land susceptible to flooding hazards, particularly within the Lake St. Clair flood-prone area. The analysis identified additional areas with a higher risk of flood hazard events that may cause challenges for first responders to access private and commercial properties. When flood risk is coupled with the 100-year climate change lake level, the risk to infrastructure, buildings, and threats to human safety increases significantly along the Lake St. Clair shoreline.

Recommendations from the Shoreline Management Plan were reviewed and integrated into the development of alternative solutions for water and wastewater infrastructure within Lakeshore by identifying opportunities to increase climate resiliency where possible.

3.4.9 Transportation Master Plan

Lakeshore completed a Transportation Master Plan in 2008 to provide a comprehensive long-range plan to integrate transportation infrastructure requirements of existing and future land use, with the community planning principles of the Municipality for growth management, public safety, affordability, economic vitality, and quality of life developed through the Municipality's OP (IBI Group, 2008).

The objectives of the Transportation Master Plan, in addition to identifying short- and long-term needs of the Municipality's transportation system resulting from proposed, planned, and approved growth over the next 20 years to 2025, included integrating the transportation planning process with other planning initiatives in the Municipality such. As part of the development of this Master Plan, ongoing transportation initiatives in the Municipality were reviewed and considered when developing and evaluating alternative water and wastewater servicing solutions across the Municipality.

4. Methods and Approach

Section 4 describes the approach to completing the Mater Plan, the objectives of the public consultation component of the Master Plan, and provides a summary of the Community Communication and Engagement Plan and the Engagement with First Nations and Indigenous Communities.

4.1 Overview of Study Approach

This study was completed as an Approach 1 Schedule B Master Plan Class EA, following Phases 1 and 2 of the Class EA process. Community Engagement is an important component of the Class EA process. The approach to community engagement is presented in Section 4.2.

The activities completed in Phases 1 and 2 include:

- **Phase 1 -** Existing Conditions and Future Needs: This phase included development of capacity and performance requirements, assessing existing facilities and practices for water treatment and distribution and sanitary collection and wastewater treatment, identifying gaps in meeting future needs, and development of a Problem and Opportunities Statement.
- **Phase 2 -** Identification and Evaluation of Alternative Solutions: This phase included identification of alternative water distribution, sanitary collection, and wastewater treatment solutions to meet future requirement or provide benefit with respect to future opportunities. Alternative solutions were subject to comparative evaluation to identify preferred solutions. An implementation plan documents the schedule for the recommended solutions, identifying capital costs over the planning horizon.

The following sections provide additional details on the approach to each phase.

4.2 Engagement Plan and Approach

Effective public engagement programs build and maintain community trust and credibility to improve decision-making and identify community issues far enough in advance that they can be effectively addressed before final decisions are made.

The Municipality is committed to undertaking public consultation that provides a variety of opportunities for learning and sharing. As such, the Municipality has committed to a program that exceeds requirements of the Schedule B Class EA. Through the public consultation program, the proponent will conduct a consultation process that meets the following requirements:

- Is meaningful to those involved
- Facilitates open and transparent dialogue resulting in defensible and traceable decision-making
- Provides opportunities for early public and stakeholder involvement
- Helps promote public learning regarding wastewater treatment and the environment

The objective of the public consultation component was to provide information in support of the Lakeshore WWMP Update and to provide the public and agencies (stakeholders) the opportunity to be involved in the project in a meaningful way.

The Consultation Plan has the following objectives:

- Inform interested and potentially affected parties
- Solicit input
- Consider input in the selection and development of the preferred recommended solutions
- Consider input in the development of environmental mitigation strategies
- Earn support for the project

4.2.1 Community Communication and Engagement Plan

As part of this Master Plan update, a Community Communication and Engagement plan was developed. The Communication and Engagement Plan establishes a strategy for the Municipality to provide meaningful information about the project to the identified audiences, as well as provide engagement opportunities over the course of the Master Plan development.

Project communications and engagement with members of the public, review agencies, and other stakeholders (i.e., organizations, businesses) is an important part of the Master Plan MCEA process. The objective of the Community Engagement and Communications Plan is to present the activities and methods that will be used throughout the Master Plan update.

Specifically, the Communications Plan presents the following information:

- The MCEA study project team
- The principles guiding the Communications Plan for this project
- Consultation and communication opportunities, methods, roles, and responsibilities
- An approach to responding to comments and feedback
- An approach to documenting communications and engagement activities, which will be included in the Master Plan record (project file)

The goal for communications and engagement was to effectively inform the public, agencies, and other stakeholders about the Class Environmental Assessment process for Master Planning, as well as the study background and goals, and provide sufficient opportunities for two-way communication opportunities. Specific goals of the Communication and Engagement Plan include:

- Providing accessible methods and opportunities for consultation and engagement
- Addressing comments, questions, and concerns so they can be considered within the study process
- Garnering support from members of the public, agencies, and other stakeholders that the process is fair, transparent, and honest

To achieve these goals, the following specific objectives were defined for the communications and consultation program:

- Provide adequate notice at the start of the Master Plan study to actively encourage inclusive and equitable participation.
- Clearly and effectively communicate information on each alternative solution the Master Plan study considers, including:
  - Benefits, negative effects, and costs of each alternative
  - Rationale for the recommendations
  - Opportunities for sustainable solutions, particularly relating to water
  - Recommendations to minimize adverse effects and maximize benefits
- Foster public trust and confidence by:
  - Demonstrating the Municipality is following a comprehensive process, with a team of specialists who have the experience and qualifications to complete a fair, transparent, and educated evaluation of alternatives
  - Providing consistent messaging to all interested members of the public and stakeholders and other potential influencers, such as elected officials and other opinion leaders

- Engage stakeholders and the public in consultation that provides balanced information and elicits meaningful input.

Managing and incorporating input from the community was used to appropriately influence the Master Plan decision-making process and support in the identification and development of informed water and wastewater infrastructure solutions.

Engagement activities conducted throughout the project are described in Section 12. The full Community Communication and Consultation plan is presented in Appendix A. In addition, outreach meetings with landowners and stakeholders were conducted.

4.2.2 Engagement with First Nations and Indigenous Communities

A separate Indigenous Community Communication and Engagement plan was developed as part of this Master Plan. Throughout the MCEA process, it is important to engage with Indigenous communities, including First Nations, Métis, and Inuit peoples to understand traditional knowledge of the lands throughout the past, in the present, and into the future.

The MECP establishes guidelines for engagement with Indigenous communities throughout the EA process. Communities were encouraged to identify interests in the WWMP Update to support the planning process, including, but not limited to: interest in archaeological or natural environment surveys, and to understand how the potential adverse effects of a proposed alternative can be prevented or mitigated.

Using the Aboriginal and Treaty Rights Information System as a preliminary step in identifying communities that are anticipated to have a potential interest in this study, the following list of communities was identified. This list was confirmed through a letter from the MECP dated June 28, 2023.

- Aamjiwnaag First Nation
- Walpole Island First Nation (Bkejwanong Territory)
- Caldwell First Nation
- Chippewas of Kettle and Stoney Point
- Chippewas of the Thames First Nation
- Oneida Nation of the Thames
- Munsee-Delaware Nation
- Delaware Nation
- Métis Nation of Ontario

The full Indigenous Community Communication and Engagement plan is presented in Appendix B.

5. Study Area Existing Conditions

This section describes the existing conditions within the Study Area, including the natural environment, the social and cultural environment, and the existing technical environment.

5.1 Natural Environment

5.1.1 Natural Heritage

The Study Area boundary is consistent with the Lakeshore's municipal boundary. Lakeshore is within the northeastern portion of Essex County on the shores of Lake St. Clair. In review of imagery, the Study Area is dominated by agricultural lands, rural roads, residential areas (primarily along Lake St. Clair) with inclusions of woodlands, minor wetlands, and numerous watercourses as illustrated in Figure 5-1. The majority of the Study Area occurs within the Essex Region Conservation Authority (ERCA) Regulated Area and a portion of the eastern limits of the Study Area occurs within the Lower Thames Valley Conservation Authority (LTVCA) (ERCA, 2023) (Lower Thames Conservation Authority, 2023), (Ontario Conservation, 2023).

5.1.2 Terrestrial Habitat

Based on a desktop review, the Study Area consists mainly of anthropogenically disturbed agricultural and residential zones. Riparian areas and wetlands associated with the numerous watercourses and fragmented woodlands also occur (Figure 5-1).

5.1.3 Aquatic Habitat and Fisheries

According to Land Information Ontario (LIO) and the Ministry of Natural Resources and Forestry mapping (MNRF, 2023), numerous watercourses occur within the Study Area as well as the shoreline of Lake St. Clair (Figure 5-1). These features provide for fish bearing habitat.

5.1.4 Wetlands

According to LIO and MNRF mapping (MNRF, 2023), the Study Area contains some minor wetland habitat. However, numerous Provincially Significant Wetlands occur within the Study Area (Figure 5-1).

5.1.5 Areas of Natural and Scientific Interest (ANSI)

Based on LIO and MNRF mapping (MNRF, 2023) the Emeryville Clay Plain Woods Life Science ANSI occurs within the Study Area, north of Highway 401 at Lakeshore Road 111 (Figure 5-1).

5.1.6 Wildlife and Wildlife Habitat

The Study Area provides various habitat for avifauna through watercourses, agricultural, wetlands (including Provincially Significant Wetlands), woodlands and riparian zones.

Background data obtained for wildlife included a review of the Ontario Breeding Bird Atlas (OBBA), which provides information on avifauna occurrences based on a 10 km^2 area. The 2nd Atlas of the OBBA includes data collected from 2001 to 2005 (Birds Ontario, 2023).

LIO and MNDMNRF SAR mapping was also accessed (MNDMNRF, 2022a). A Species at Risk (SAR) screening email was sent to the MECP SAR Branch (SARB) as per the Endangered Species Act on

June 15, 2023. MECP replied on June 16, 2023 (Appendix D). Per MECP's response, it is the proponent's responsibility to ensure the Endangered Species Act is not contravened. Due to the Natural Features within the Study Area and potential for SAR occurrences and habitat, the proponent should retain a qualified environmental consultant (such as a biologist/ecologist) to review any future proposed works such as at a detailed design stage.

5.1.7 Species at Risk

According to the Natural Heritage Information Centre area mapping (NHIC, 2023), (MNRF, 2023), Fisheries and Oceans Canada (DFO) (Fisheries and Oceans Canada, 2023), (Government of Ontario, 2023), OBBA (Birds Ontario, 2023) and iNaturalist (iNaturalist, 2023)), SAR which may occur within the vicinity of the Study Area and/or 120 m adjacent lands is listed in Table 5-1. The presence of SAR or SAR habitat within the Study Area has not been field verified to date.

While some of the species from Table 5-1 have the potential to occur within the Study Area or 120 m adjacent lands, field verification and SAR specific surveys are recommended to confirm presence or absence of SAR and associated habitat.

Table 5-1. Potential SAR Within or Proximal to the Study Area and 120-m Adjacent Lands

Common Name	Scientific Name	S Rank[a]	SARO[b]	COSEWIC[c]	SARA[d]
Northern Bobwhite	*Colinus virginianus*	S1?B	END	END	END
Least Bittern	*Botaurus lentiginosus*	S5B	-	-	-
Bald Eagle	*Haliaeetus leucocephalus*	S4	SC	NAR	-
Peregrine Falcon	*Falco peregrinus*	S4	SC	NAR	-
Black Tern	*Chlidonias niger*	S3B,S4M	SC	NAR	-
Barn Owl	*Tyto alba*	S1	END	END	-
Short-eared Owl	*Asio flammeus*	S4?B,S2S3N	SC	SC	SC
Common Nighthawk	*Chordeiles minor*	S4B	SC	SC	THR
Eastern Whip-poor-will	*Antrostomus vociferus*	S4B	THR	THR	THR
Chimney Swift	*Chaetura pelagica*	S3B	THR	THR	THR
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S3	SC	END	THR
Eastern Wood-Pewee	*Contopus virens*	S4B	SC	SC	SC
Acadian Flycatcher	*Empidonax virescens*	S1B	END	END	END
Olive-sided Flycatcher	*Contopus cooperi*	S4B	SC	SC	THR
Bank Swallow	*Riparia riparia*	S4	THR	THR	THR
Barn Swallow	*Hirundo rustica*	S4B	THR	THR	THR
Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR	THR
Golden-winged Warbler	*Vermivora chrysoptera*	S3B	SC	THR	THR
Cerulean Warbler	*Setophaga cerulea*	S2B	THR	END	END
Prothonotary Warbler	*Protonotaria citrea*	S1B	END	END	END
Canada Warbler	*Cardellina canadensis*	S5B	SC	SC	THR
Louisiana Waterthrush	*Parkesia motacilla*	S2B	THR	THR	THR
Yellow-breasted Chat	*Icteria virens*	S1B	END	END	-

Common Name	Scientific Name	S Rank[a]	SARO[b]	COSEWIC[c]	SARA[d]
Grasshopper Sparrow	*Ammodramus savannarum*	S4B	SC	SC	-
Henslow's Sparrow	*Centronyx henslowii*	S1B	END	END	END
Bobolink	*Dolichonyx oryzivorus*	S4B	THR	THR	THR
Eastern Meadowlark	*Sturnella magna*	S4B, S3N	THR	THR	THR
King Rail	*Rallus elegans*	S1B	END	END	END
American White Pelican	*Pelecanus erythrorhynchos*	S3B,S4M	THR	NAR	-
Horned Grebe	*Podiceps auritus*	S1B,S3N,S4M	SC	SC	-
Piping Plover	*Charadrius melodus*	S1B	END	END	-
Red-necked Phalarope	*Phalaropus lobatus*	S3B,S4M	SC	SC	SC
Rusty Blackbird	*Euphagus carolinus*	S4B,S3N	NAR	SC	SC
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	SC
Snapping Turtle	*Chelydra serpentina*	S4	SC	SC	SC
Spiny Softshell	*Apalone spinifera*	S2	END	END	END
Blanding's Turtle	*Emydoidea blandingii*	S3	THR	END	-
Midland Painted Turtle	*Chrysemys picta marginata*	S4		SC	SC
Butler's Gartersnake	*Thamnophis butleri*	S2	END	END	END
Massasauga (Carolinian population)	*Sistrurus catenatus pop. 2*	S1	END	END	END
Eastern Foxsnake (Georgian Bay population)	*Pantherophis gloydi pop. 1*	S3	THR	THR	END
Common Five-lined Skink (Carolinian population)	*Plestiodon fasciatus pop. 1*	S2	END	END	END
Spotted Gar	*Lepisosteus oculatus*	S1	END	END	END
Silver Chub	*Macrhybopsis storeriana*	S2	THR	END	SC
Eastern Sand Darter	*Ammocrypta pellucida*	S2	END	THR	THR
Grass Pickerel	*Esox americanus*	S3	SC	SC	
Channel Darter (Lake Erie populations)	*Percina copelandi pop. 1*	S1	SC	END	END
Northern Madtom	*Noturus stigmosus*	S1	END	END	END
Pugnose Shiner	*Notropis anogenus*	S2	THR	THR	THR
Pugnose Minnow	*Opsopoeodus emiliae*	S2	THR	THR	THR
Spotted Sucker	*Minytrema melanops*	S2	SC	SC	SC
Lake Sturgeon (Great Lakes - Upper St. Lawrence River population)	*Acipenser fulvescens pop. 3*	S2	THR	THR	-

Common Name	Scientific Name	S Rank[a]	SARO[b]	COSEWIC[c]	SARA[d]
Black Redhorse	*Moxostoma duquesnei*	S2	THR	THR	THR
Silver Lamprey (Great Lakes - Upper St. Lawrence populations)	*Ichthyomyzon unicuspis pop. 1*	S3	SC	SC	SC
Mapleleaf Mussel	*Quadrula quadrula*	S2	THR	SC	-
Round Pigtoe	*Pleurobema sintoxia*	S1	END	END	END
Wavy-rayed Lampmussel	*Lampsilis fasciola*	S2	THR	SC	SC
Fawnsfoot	*Truncilla donaciformis*	S1	END	END	END
Kidneyshell	*Ptychobranchus fasciolaris*	S1	END	END	END
Lilliput	*Toxolasma parvum*	S1	THR	END	END
Snuffbox	*Epioblasma triquetra*	S1	END	END	END
Round Hickorynut	*Obovaria subrotunda*	S1	END	END	END
Swamp Rose-mallow	*Hibiscus moscheutos*	S3	SC	SC	SC
Climbing Prairie Rose	*Rosa setigera*	S2S3	SC	SC	SC
Green Dragon	*Arisaema dracontium*	S3	SC	SC	-
Shumard Oak	*Quercus shumardii*	S3	SC	SC	-
Butternut	*Juglans cinerea*	S2?	END	END	END
Black Ash	*Fraxinus nigra*	S4	END	THR	
Kentucky Coffee-tree	*Gymnocladus dioicus*	S2	THR	THR	THR
Transverse Lady Beetle	*Coccinella transversoguttata*	S1	END	SC	SC
American Chestnut	*Castanea dentata*	S1S2	END	END	END
Climbing Prairie Rose	*Rosa setigera*	S2S3	SC	SC	SC
Common Hop-tree	*Ptelea trifoliata*	S3	SC	SC	SC
Monarch	*Danaus plexippus*	S2N,S4B	SC	END	SC

[a] NHIC Subnational Rank
[b] Species at Risk Ontario (SARO)
[c] Committee on the Status of Endangered Wildlife in Canada (COSEWIC)
[d] Species at Risk Act (SARA)
? = more data required
S1 = Critically Imperilled (often 5 or fewer occurrences)
S2 = Imperilled (often 20 or fewer occurrences)
S3 = Vulnerable (restricted range with relatively few populations - often 80 or fewer)
S4 = Uncommon but not rare; some cause for long-term concern due to declines or other factors
S5 = Secure species, common, widespread, and abundant
S#S# = Range given due to uncertainty
B = Status qualifier; breeding
N = Status qualifier; non-breeding
M = Status qualifier; migrant species
H = Status qualifier; possibly extirpated
- = Not at Risk
SC = Special Concern
THR = Threatened
END = Endangered

Figure 5-1. Desktop Natural Environment Background Data

Lakeshore Water and Wastewater Master Plan - Figures - All Documents (sharepoint.com)

5.1.8 Surface Water Quality

Lake St. Clair is a freshwater lake in the Lake Huron to Erie corridor in the Great Lakes Basin. The lake is relatively shallow, with an average depth of about 10 feet. As a result, the lake's water is completely exchanged every five to seven days. Millions of people in Canada including people in Municipality of Lakeshore rely on that water source for drinking, fishing, and recreational purposes. Lake St. Clair's watershed is heavily impacted by human activity, which has resulted in contamination of its water by fecal human/animal matter containing waterborne pathogens, and thus posing a direct risk to human health. Common sources of such pollution include combined sewer overflows, wastewater treatment plant bypasses, and agricultural application of manure derived from animal fecal waste.

A study conducted in the Lighthouse Cove area, serviced by private onsite septic system, noted the presence of algae bloom in the Lighthouse Canal System. Increased levels of cyanobacteria and TP was found throughout the canal system. The report, based on the genotyping data, determined that majority of fecal contamination (except the E.coli hotspots) at Lighthouse Cove is predominantly of animal origin. The specific sources(s) of this contamination (i.e., wild, domestic or farm animal) was unclear and not identified (Stantec, 2022).

E. coli level was found to be between 0-99 CFU/100 mL in most of the Lighthouse Cove canal system. However, few hotspots were determined having E. coli levels higher than recreational water guidance level (200 CFU/100 mL) set by (Health Canada, 2012).These hotspots were also corelated with higher level of human DNA marker and F+ coliphage levels with no clear source(s) of contamination identified. Maintaining an ongoing understanding of the water quality in the Lighthouse Cove and Rochester Place area can inform servicing needs and provide relevant information to determine the need to expand servicing to these areas in the future (beyond the planning horizon for this Master Plan).

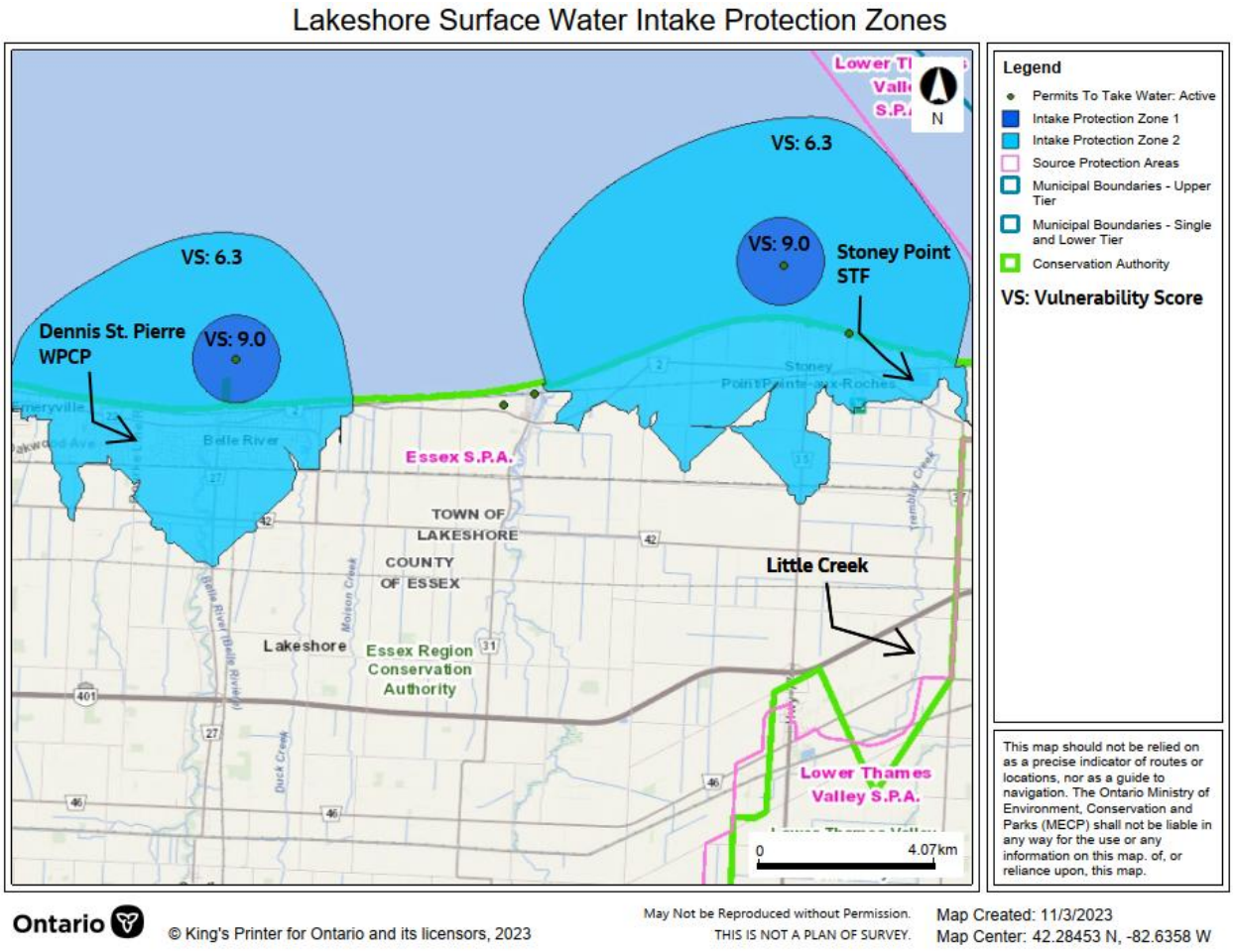
5.1.9 Source Water Protection

The *Clean Water Act*, 2006 (CWA) aims to protect existing and future sources of drinking water. To achieve this, several types of vulnerable areas have been delineated around surface water intakes and wellheads for every municipal residential drinking water system that is in a source protection area. These vulnerable areas are known as Wellhead Protection Areas and surface water IPZs. IPZs are areas of land and water where run-off from streams or drainage systems could carry contaminants that could impact the source water at the municipal drinking water intakes. IPZs are subcategorized into IPZ-1, 2 and 3, each representing the approximate travel time of a contaminant to the intake. There are no Wellhead Protection Areas in the Study Area, as per MECP's Source Protection Information Atlas (MECP, 2023).

As per MOE Technical Rules, Vulnerability scores are assigned for IPZ-1, IPZ-2 and IPZ for all types on intake in the Essex Region Source Protection Area (ERSPA), and for the IPZ-3s of the intakes in Lake St. Clair in the ERSPA. Vulnerability scores range from 1 to 10, with 10 being the most vulnerable.

Lakeshore has two intakes located in Belle River and Stoney Point Area. These intakes and the identified IPZ are shown Figure 5-2. As depicted in Figure 5-2, Dennis. St Pierre WPCP and Stoney Point Sewage Treatment Plant (STP) both are in IPZ-2 identified for Lakeshores drinking WTP intakes with a moderate vulnerability score. IPZ-2 are areas where water (and contaminant) could reach the intake within 2 hours of a spill/extreme weather event and contaminate the intake (Essex Region Conservation Authority, 2015). Plant effluent from Dennis St. Pierre WPCP is discharged approximately 600 metres off the shore of Lake St. Clair located in IPZ-2 of the Belle River WTP. In case of Stoney Point STP, effluent is discharged to Little Creek approximately 820 m upstream of where the creek discharges into Lake St. Clair within the IPZ-2 for the Stoney Point WTP.

Figure 5-2. Lakeshore Surface Water Intake Protection Zones



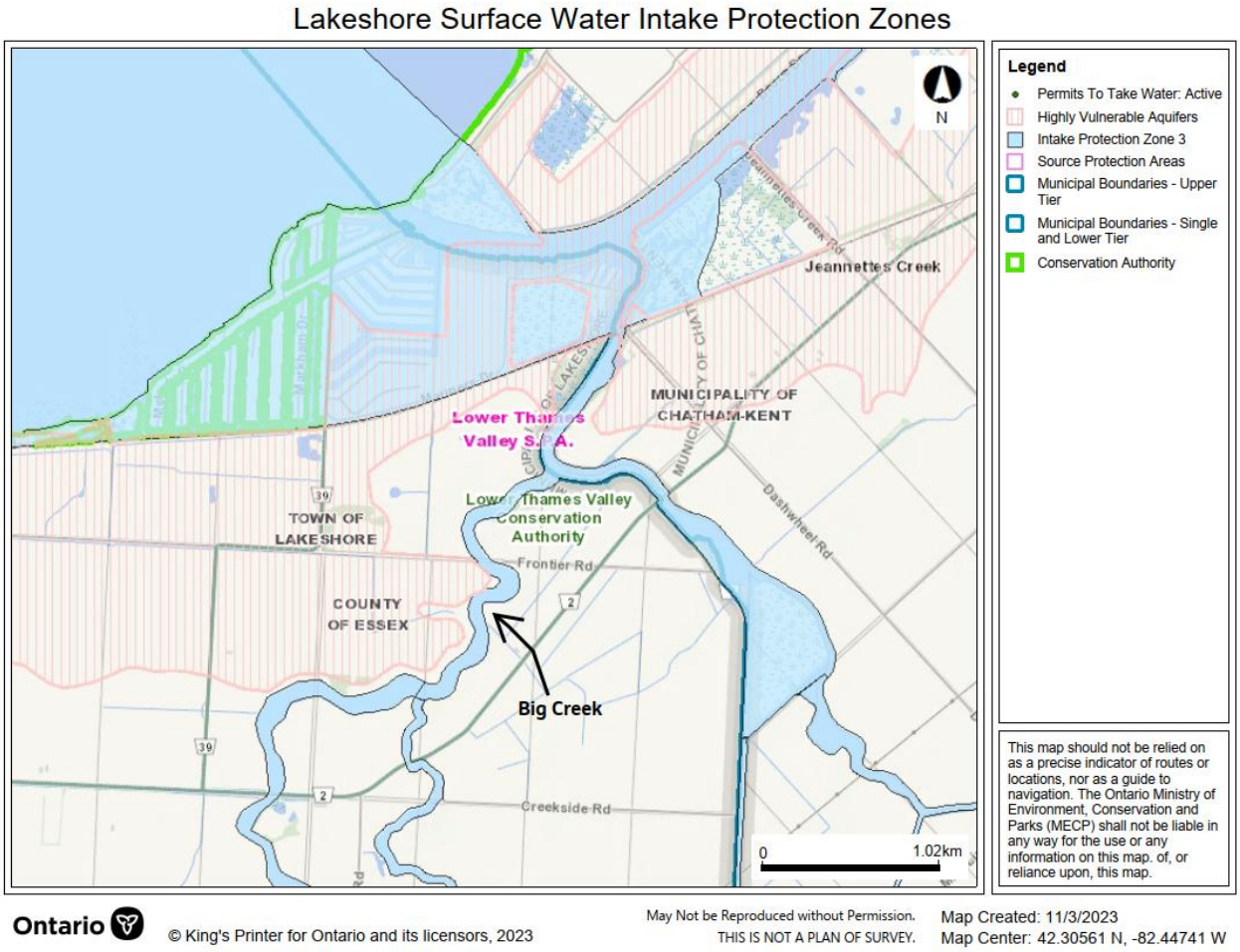
The *Clean Water Act* requires that policies be developed to address existing or future significant threats and specifies that policies are optional for moderate or low threats. Since, both Dennis St. Pierre and Stoney Point release effluent in IPZ-2 area with a moderate vulnerability score, conforming to the Source Water Protection Policies, as described in Table 5.1 of the Essex Region Source Water Protection Plan, is optional for these plants (Essex Region Conservation Authority, 2015). However, in fall 2023 there was a documented release of from the lagoons at Stoney Point STF where the 180 days of stabilization required in the Certificate of Approval (CofA) was not met. This release from the lagoons is considered a spill of untreated wastewater to the environment and poses a real risk of contaminating the drinking water source in Stoney Point area. A quantitative microbial risk assessment is recommended to identify the need for enhancing multi-barrier disinfection in Stoney WTP. This type of event has a high likelihood of reoccurring again due to climate change and the current operating condition of Stoney Point STF (refer to Section 5.4.3 for information on the existing capacity constraints and performance of this facility). Therefore, relevant policies and procedures prescribed in the Source Protection Plan required for significant threats are recommended to be in place at the Stoney Point WTP for IPZ-2 to mitigate this threat to the drinking water supply.

There are also Highly Vulnerable Aquifers (HVA) within the Study Area according to the MECP's Source Protection Information Atlas. An HVA is an aquifer that is susceptible to contamination, either because it is located close to ground surface or the ground material around the aquifer are highly permeable. While the HVAs have been identified by Lakeshore, there are no mandatory policies that apply to these areas

because groundwater is not used to supply Lakeshore's water treatment plants (Essex Region Conservation Authority, 2015).

Comber STP discharges effluent to Big Creek identified as IPZ-3. As shown in Figure 5-3, Big Creek passes through a HVA and discharges into IPZ-3 of Lake. St Clair. IPZ-3 areas extend outward from the IPZ-2 and include setbacks from all streams or drainage systems where modelling demonstrates that contaminant spills may reach the intake during an extreme rainfall or windstorm event (Essex Region Conservation Authority, 2015).

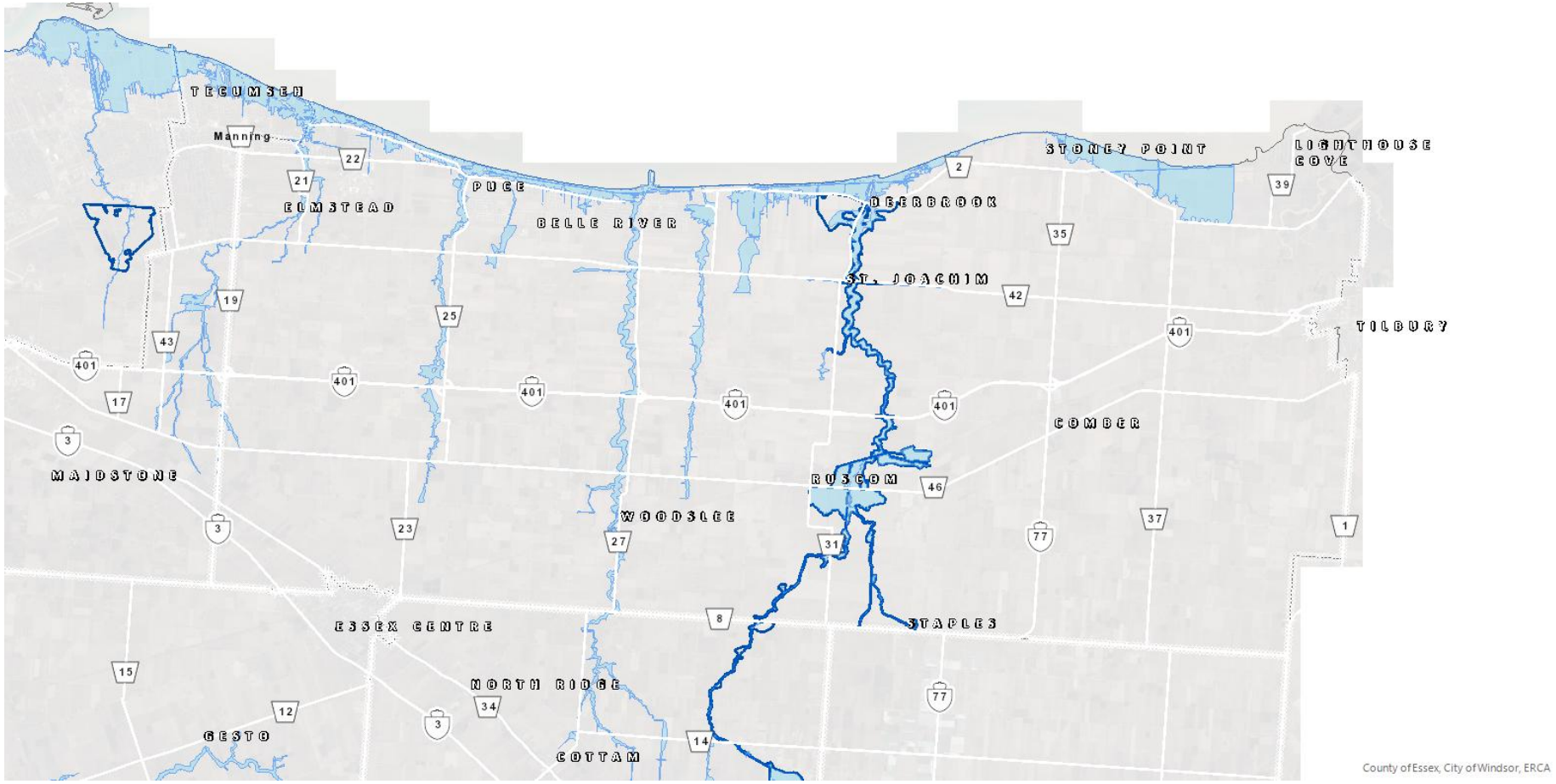
Figure 5-3. Lakeshore Surface Water Intake Protection Zone and Highly Vulnerable Aquifer



5.1.10 Floodplain

The Study Area overlaps the ERCA Regulated Area and the LTVCA Regulated Area. Figure 5-4 (Essex Region Conservation Authority, 2023) shows the 1 in 100-year flood lines within ERCA Regulated Area. Controlling development in flood-prone areas reduces the potential for effects of infrastructure damage and infrastructure within the flood lines may require additional protection measures. A permit from ERCA or LTVCA may be required for construction or development within the regulated area to verify activities and the proposed infrastructure does not impair the hydrological function of waterways.

Figure 5-4. Essex Region Conservation Authority 1 in 100 Year Flood Line Map



5.1.11 Land Use

The Study Area (Figure 3-1) consists largely of agricultural lands with distinct urban areas that include Maistone, Stoney Point, Comber, North Woodslee, South Woodslee, Lighthouse Cove, and several smaller settlement areas. The urban areas consist primarily of residential land use with scattered ICI and mixed-use land uses. The largest concentration of ICI employment lands is in the vicinity of Patillo Road in Maidstone.

Several recreational Marina's exist along the shorelines of Lake St. Clair. Beaches, campgrounds, golf courses, parks, and community pools and splash pads are also scattered throughout the Study Area. The following six conservation areas exist within the Study Area:

- Ruscom Shores Conservation Area (Located in southwest of Surf Club Drive and west of Stoney Point)
- Tremblay Beach Conservation Area (Located in Stoney Point alongside Lake St. Clair and immediately north of the Stoney Point Lagoon Facility)
- Lighthouse Cove Conservation Area (located in Lighthouse Cove)
- Rowsom's Tilbury West Conservation Area (located west of Comber and south of Middle Line near Big Creek)
- Big 'O' Conservation Area (located along Highway 77 and west of the Comber Lagoon Facility)
- Maidstone Conservation Area (located west of North Woodslee and southeast of Middle Line and Naylor Sideroad)

The Study Area is bisected by Highway 401 running east-west. Via Rail and Canadian Pacific Rail lines run through Maidstone and Stoney Point. Several rivers, creeks, and streams flow north through the Study Area to drain to Lake St. Clair.

5.2 Social and Cultural Environment

On January 1, 2000, the Town of Belle River and Townships of Maidstone, Rochester, Tilbury North, and Tilbury West amalgamated to form the Town of Lakeshore. Located in the northeastern portion of the County, the Municipality is geographically the largest municipality in the County, with an area of approximately 530 km^2 (Figure 3-1). The Municipality extends southward from the shores of Lake St. Clair generally between County Road 19 (Manning Road) on the west and Kent County Road 1 on the east and County Road No. 8 on the south. The Municipality is adjacent to the Towns of Tecumseh to the west, Kingsville and Essex to the south, and the Municipality of Chatham-Kent to the east. The Municipality is comprised of a large geographic community with multiple urban centres and hamlets resulting from municipal restructuring, historical growth, and settlement trends. There are many separate settlement areas within the Municipality, including:

- Maidstone
- Belle River
- Comber
- Stoney Point
- Lighthouse Cove
- Essex Fringe
- Rochester Place/Deerbrook
- St. Joachim
- North Woodslee
- South Woodslee
- Ruscom
- Staples

The Municipality is predominantly rural-agricultural. Most residents in the Study Area are employed in the City of Windsor and commute daily from those urban centres. Some residents are employed in local industrial and commercial centres in the Patillo/Advance and Belle River areas, as well as in the local agricultural industry. Air quality in the area is good, with few industrial discharges that would impact local

air quality. Noise level is acceptable, with some intrusion from the flight path from Windsor Airport and the operation of the CN Railway and CPR, which run through the Municipality from east to west. Lakeshore has a road system with a full range of utilities including hydro, power, water, natural gas, and telephone/communications.

5.2.1 Current Population

The 2018 Master Plan included existing (2015) population numbers of settlement areas within the Municipality. The existing population numbers presented in the 2018 Master Plan were derived from Watson & Associates (2015) (Watson & Associates, 2015). The difference in census population values from 2016 to 2021 was used as an estimate to represent the additional existing population since the 2018 Master Plan was prepared. Growth is assumed to occur primarily in the Maidstone settlement area. Table 5-2 shows the estimated 2021 populations per settlement area, and identifies which water and wastewater servicing area each settlement area is in.

Table 5-2. Lakeshore's Existing Population

Settlement Area	2021 Population [a]	Wastewater Servicing Area	Water Servicing Area
Maidstone	26,299	Denis St. Pierre	Belle River
Shoreline Development	860	Stoney Point	Stoney Point
Comber	1,050	Comber	Stoney Point
Belle River Strip	920	Not Serviced	Belle River
Lighthouse Cove	600	Not Serviced	Stoney Point
Stoney Point	1,420	Stoney Point	Stoney Point
North Woodslee	510	North Woodslee STF	Union
South Woodslee	400	South Woodslee STF	Union
Rochester Place/Deerbrook [b]	278	Not Serviced	Belle River
St. Joachim [b]	376	Not Serviced	Belle River
Ruscom [b]	30	Not Serviced	Union
Staples [b]	96	Not Serviced	Stoney Point
Essex Fringe	260	Not Serviced	Union
Rural	6,880	Not Serviced [c]	All [d]
Total Population	39,979 [e]		

Notes:

[a] Assumed all growth from 2016 to 2021 occurred in Maidestone

[b] Hamlet Communities

[c] Assumed the rural population will remain on septic/private wastewater systems

[d] Population split proportionally (based on area) for water systems

[e] Population is slightly less than the actual population based on 2021 Census Data, which is 40,410 (Statistics Canada, 2023)

The total population presented in Table 5-2 is slightly less than the actual population of 40,410 based on 2021 Census Data (Statistics Canada, 2023). However, the population is within a reasonable range and provides a marginally conservative estimate for per capita wastewater generation rates and per capita drinking water demand.

Table 5-3 shows the estimated (2021) existing population for each water service area.

Table 5-3. Population by Water Service Area

Water Servicing Area	Population
Belle River	29,981
Stoney Point	6,207
Tecumseh	27
Union	3,178
Tilbury Wheatly	587
Total	**39,979**

Lakeshore provides the entire population with drinking water services. However, as described in Section 3.1.1, the Belle River and Stoney Point water systems are supplied by Lakeshore while the Tecumseh, Union, and Tilbury Wheatly water systems are supplied by others.

Table 5-4 shows the estimated existing (2021) population per wastewater service area.

Table 5-4. Population by Wastewater Service Area

Wastewater Servicing Area	Population
Denis St. Pierre	25,744
Stoney Point	2,280
Comber	1,050
North Woodslee	510
South Woodslee	400
Total	**29,984**

Approximately 75 percent of the total population has wastewater servicing provided by Lakeshore, while the remaining population has onsite private systems.

5.2.2 Community Health and Safety

Municipal water and wastewater servicing provides significant benefits to community health and safety by providing:

- Reliable, clean, and safe drinking water
- Water for fire suppression
- Reliable wastewater collection and conveyance of wastewater to treatment facilities
- Reliable wastewater treatment
- Protection from property damage and human health impacts caused by basement flooding (due to sanitary sewer system capacity constraints)

The operation of these municipal services contributes to community health and safety and contributes to environmental protection by providing reliable treatment. This also provides benefits to the community through improved surface water quality enhancing the community's ability to participate in recreational activities in nearby Lake St. Clair.

Construction, equipment, and infrastructure have the potential to increase human exposure to potential community health and safety risks. Development and construction activities may increase the type and volume of traffic on surrounding roadways (e.g., construction vehicles and equipment) or introduce additional hazards to the environment (e.g., material spill). Since the projects recommended through this Class EA are located throughout the Municipality, and may occur on existing facility sites, in existing rights of way (including public corridors) and may require new easements or the acquisition of land, it can be expected that the community will be impacted by the construction activities required to implement recommended projects.

5.2.3 Odour

Odour in the Study Area is primarily influenced by the existing wastewater treatment facility operations and, to a lesser extent, vehicle exhaust from surrounding roadways, gas stations and mechanical repair shops. Alternative solutions will include consideration for odour control at treatment facilities to mitigate potential odours emitted from existing and new processes.

5.2.4 Noise

Noise in the local Study Area is influenced by traffic and human activity on surrounding roadways, ongoing operation of municipal water and wastewater treatment and conveyance facilities. Sensitive receptors identified in the area will be considered when identifying and evaluating alternatives.

5.2.5 Infrastructure and Services

Recommended projects can be expected to cause disruptions to transportation on existing local and regional roadways. Transportation infrastructure surrounding the recommendations may experience disruption in the form of long- and short-term road closers, detours, and additional traffic from construction vehicles. No increase in traffic is expected once construction is completed. Road closures that could impact emergency services or evaluation routes will be an important consideration during construction.

There are several utility lines surrounding the potential project sites. Accounting for underground and overhead utilities within the vicinity of the recommended capital projects will be an important consideration. During construction, an interruption of services may occur because of an accident; however, Ontario One-Call locates will be done prior to construction.

The project is not anticipated to increased demand on local or regional services (e.g., emergency, health care, waste management). Therefore, additional detailed information regarding local or regional services is not warranted.

5.2.6 Cultural Heritage Environment

Cultural heritage resources include archeological resources, built heritage resources, and culture heritage landscapes. There are cultural and built heritage resources within the study area. Recommended projects with the potential for cultural heritage will require further investigation prior to implementation. Requirements for subsequent investigations will be identified in the implementation plan put forward in Section 13 of this Master Plan. The MCM's screening checklist for evaluating potential for built heritage and cultural heritage landscapes is used to identify where technical cultural heritage studies are necessary.

5.2.7 Archaeological Resources

Areas of archeological potential have been identified within the study area. Under the Ontario Heritage Act (R.S.O. 1990, c 0.18) it is an offence for a party other than a licensed archaeologist to make alterations to a known archaeological site or to remove an artifact or other physical evidence of past human use or activity until a licensed archaeologist has completed field work and reported to the Minister that the site no further archaeological potential. Recommended projects with the potential for archaeological resources will require further investigation prior to implementation. The MCM's screening checklist for evaluating the potential for archaeological resources is used to identify where archaeological investigations are necessary.

5.3 Existing Water Systems

The Municipality is fully serviced with municipal water from the following five independent and interconnected water supply systems (WSS):

- BRWSS, which is owned and operated by Lakeshore.
- TWSS, which is supplied by the City of Windsor. Lakeshore owns the watermains within the municipal boundary that are supplied by the TWSS.
- SPWSS, which is owned and operated by Lakeshore.
- UWSS, which is supplied by Union Water. Lakeshore owns the watermains within the municipal boundary that are supplied by the UWSS.
- TWWSS, which is supplied by the Municipality of Chatham-Kent. Watermains supplied by the TWWSS within the Lakeshore municipal boundary are either owned by Chatham-Kent or privately owned.

While the UWSS, TWWSS and TWSS service part of Lakeshore, their water supply systems are not owned by the Municipality and are therefore not considered in the analysis of this Master Plan. Only the watermains supplied by the UWSS and TWSS that are located within the municipal boundary are owned by Lakeshore. The remaining systems are described in the following sections. The service area boundaries are presented in Figure 1-1.

5.3.1 Belle River Water Supply System

5.3.1.1 Service Area

The BRWSS services the northwestern area of the Municipality and generally extends from Lake St. Clair to the north, Highway 401 to the south, Manning Road to the west, and Rochester Townline Road to the east. The extent of this service area is shown in Figure 1-1. The BRWSS service area includes a mixture of urban residential, rural residential, industrial, commercial, and institutional development with a total serviced population of approximately 27,903 people. The residential, industrial, commercial, and institutional consumers are mainly located north of the CPR between Pike Creek and Duck Creek. The remainder of the BRWSS service area primarily consists of rural residential consumers. The BRWSS is considered a "large municipal residential system" under Ontario Regulation (O. Reg.) 170/03 and is operated under Lakeshore's MECP Municipal Drinking Water Licence (MDWL) Number (No.) 031-101 and MECP Drinking Water Works Permit (DWWP) No. 031-201.

5.3.1.2 Treatment

The BRWSS is supplied by the Lakeshore WTP, which is located at 492 Lakeview Drive in a residential area along Lake St. Clair within the community of Belle River. The Lakeshore WTP was originally constructed in 1926 and underwent an extensive upgrade including gravity filters in 1945.

From 1974 to 2006, a series of major renovations and process improvements were completed that established a rated treatment capacity of 18,200 cubic metres per day (m^3/day).

In 2008, the original WTP was demolished and replaced with a new modern treatment facility (including a new intake into Lake St. Clair) to satisfy the projected future water supply requirements of the service area, as well as to fulfill a number of recommendations of the 2009 Lakeshore WWMP (Stantec, 2009) related to system treatment and storage. The WTP includes the following unit processes:

- Low-lift pumping
- Clarification
- Intermediate pumping
- Filtration
- Disinfection via ultraviolet (UV) and chlorination
- Treated water storage
- High-lift pumping

The new WTP is located on the south side of Lakeview Drive, across from the original WTP site. The new WTP reuses the original low-lift pumping station, which was upgraded to service the new plant. The Lakeshore WTP is a conventional filtration plant with UV and chlorine disinfection and has a rated capacity of 36,400 m^3/d. Raw water is drawn from Lake St. Clair. Onsite storage is provided by a two-cell treated water storage reservoir with a total storage volume of 9,922 m^3.

Details about the Lakeshore WTP include the following:

- Rated treatment capacity of 36,400 m^3/day
- Intake conveys raw water from Lake St. Clair to low-lift pump station with the following features:
  - 1,200 millimetre (mm) diameter high-density polyethylene (HDPE) pipe
  - Extends approximately 1,050m into Lake St. Clair
  - Situated parallel to original intake
  - Terminates offshore into a 4.1 m diameter concrete and steel circular crib offshore at an approximate depth of 2.1 to 2.4 m
  - Includes 400mm diameter HDPE carrier pipe for zebra mussel and frazil ice control
  - Includes onshore intake well located adjacent to the low-lift pump station for emergency situations
  - Mean lake level hydraulic capacity of 50,000 m^3/day
- Low-lift pump station conveying raw water to the clarifier treatment system with the following features:
  - Two separate screening wells containing one automatic travelling raw water screen and one manual bypass screen each with 10 mm openings
  - Two pump suction chambers complete with four new low-lift vertical turbine pumps (three duty and one standby), each with rated capacity of 151.6 litres per second (L/s) at 15.9 m total dynamic head (TDH)
  - Common 600-mm-diameter discharge header complete with associated valves, controls, and appurtenances

  - Chlorine solution booster pump system for zebra mussel control
  - Raw water sampling pump system for analysis and process control
  - Low-pressure aeration blower system for frazil ice control
  - High-pressure air compressor system for frazil ice control
- Clarification treatment system with the following features:
  - Four upflow solids contact clarifiers, each 10.67 m diameter, with 5.5 m side water depth (SWD)
  - Each rated for treatment rise rate of 4.4 metres per hour (m/hr)
  - Equipped with inclined tube settlers, sludge rake drive and sludge blowdown systems discharging directly into municipal sanitary sewer system
- Filtration system with the following features:
  - Four gravity-flow dual-media open bed filters containing 3 m thick granulated activated carbon top layer on 0.3 m thick silica sand layer on underdrain system with air scouring capabilities
  - Each 8 m-long-by-4 m-wide-by-6.8-m-SWD with 626-cubic metre (m^3) capacity
  - Each rated for filtration rate of 12 m/hr with 15 minutes empty bed contact time (EBCT)
  - Air scour system with air scour rate of 60 m/hr using two 1,920 m^3/hr at 75 kilopascal (kPa) centrifugal air blowers
  - Filter backwash system with two 200 L/s at 15m TDH centrifugal backwash pumps, one 400 m^3 backwash supply tank, and two 500 m^3 residuals holding tank with 15 minute backwash capacity
  - Filter-to-waste piping system complete with all associated valves, controls, and appurtenances
- Onsite treated water storage system conveying treated water to a high-lift pump station with the following features:
  - Two-cell in-ground treated water reservoir with combined storage volume of 9,922 m^3
  - Each cell is 51.8 m long by 21.1 m wide by 5.2m SWD
  - Complete with concrete baffle walls and all associated piping valves, controls, and appurtenances
- High-lift pump station conveying treated water to distribution system with the following features:
  - 8.1 m-long-by-1.7 m-wide-by-6.3 m SWD chamber with four separate suction compartments
  - Fitted with three high-lift vertical turbine pumps (two duty and one standby) each rated 211 L/s at 41.5 m TDH
  - Common discharge header complete with associated valves, meters, controls, and appurtenances
  - Treated water sampling pump system for analysis and process control
- Alum chemical storage and feed system with the following features:
  - Two alum bulk storage tanks each having capacity of 21 m^3
  - Two diaphragm metering feed pumps (one duty – one standby) each rated 0–408 litres per hour (L/hr)
  - Complete with all associated piping valves, controls and appurtenances
- Polymer chemical storage and feed system with the following features:
  - Liquid polymer Type 1 storage tank having capacity of 2,082 litres

  - Two diaphragm metering liquid polymer Type 1 feed pumps (one duty – one standby) each rated 0-26.5 L/hr
  - Two liquid polymer Type 2 storage drums each having capacity of 20 litres
  - Two diaphragm metering liquid polymer Type 2 feed pumps (one duty and one standby) each rated 0–9.5 L/hr
  - Mixing chamber with integral mixer and associated controls for polymer dilution
  - Complete with all associated piping valves, controls, and appurtenances
- Powdered activated carbon storage and feed system with the following features:
  - Powdered activated carbon (PAC) hopper with 2.3m^3 capacity
  - Variable-frequency drive (VFD) PAC feed system paced to flow
  - PAC/water mixing eductor
  - Two booster feed pumps (one duty and one standby) each rated at 0–182 L/hr
  - Complete with all associated piping, valves, controls, and appurtenances
- Disinfection system with the following features:
  - Ultraviolet (UV) primary disinfection system using two UV reactors (one duty and one standby) each rated 0–36,400 m^3/day
  - Chlorine gas secondary and emergency disinfection system consisting of two chlorine gas vacuum-based feed systems (one duty and one standby) using 150-pound cylinders with automatic switchover, weigh scales, emergency chlorine gas scrubber, and all associated piping, valves, controls, and appurtenances, which feed a common distribution manifold that supplies chlorine to the following systems:
    - Zebra mussel control with chlorine feed capacity of 0-140.3 kilograms per day (kg/day)
    - Pre-chlorination with chlorine feed capacity of 0-175 kg/day
    - Post-chlorination with chlorine feed capacity of 0-127.6 kg/day
- Residuals management system with the following features:
  - Two 567m^3 dissolved air flotation (DAF) holding tanks equipped with DAF equipment for thickening residuals prior to being pumped into clarifiers
  - Two residual transfer pumps each rated at 17 L/s at 8.7 m TDH
  - DAF equipment having a rated capacity of 1,400 m^3/day with initial rapid mixing followed by two-stage flocculation and final clarification with 5.7 surface loading rate, 8 second retention time during rapid mixing and 8 minutes' retention time during flocculation stage at peak flow
  - Two air saturation tanks each having capacity of 650 litres with 65m/hr surface loading rate at 550=kPa working pressure
  - Two recycle pumps each rated at 5 L/s at 63 m TDH
  - Two air receivers each having capacity of 6 litres
  - Two air compressors rated at 58.4 Litres per minute @ 620-kPa maximum
- Standby power system with the following features:
  - 900-kilowatt (kW) diesel generator with automatic transfer system
  - Diesel fuel storage tank having capacity of 2,270 litres

- Process control and supervisory control and data acquisition system with the following features:
  - Magnetic flow meters for clarifier influent, filter effluent, filter backwash water supply, UV reactor influent, high-lift pump discharge, clarifier blowdown, PAC pump discharge, zebra mussel booster pump discharge, DAF influent
  - Ultrasonic level sensors for level control
  - Pressure transmitters for high-lift discharge and filter differential head loss
  - Chlorine residual analyzers for raw water, filtered water, and treated water
  - Turbidity analyzers for intake influent, low-lift pump discharge, clarifier effluent, filter inlet, filter effluent, DAF influent and effluent, and high-lift pump discharge
  - pH analyzers for intake influent, low-lift pump discharge, reservoir and high-lift pump discharge
  - Temperature analyzers for intake influent, low-lift pump discharge and high-lift pump discharge
  - GE-based Fanuc programmable logic control (PLC) hardware and Wonderware In-Touch software complete with universal power supply

5.3.1.3 Storage and Distribution

The BRWSS treated water storage and distribution system consists of a single pressure zone. The BRWSS is supplied by the Lakeshore WTP, with treated water storage provided by the reservoir storage at the WTP and the Belle River Water Tower. The Belle River Water Tower was first constructed in 1954 and upgraded in 2015. It is located near the intersection of Rourke Line Road and Oakwood Avenue and provides 5,800 m^3 in storage volume. The Maidstone Water Tower previously serviced the BRWSS but was decommissioned. The Table 5-5 presents a summary of the active water storage facilities in the BRWSS and their volumes.

Table 5-5. BRWSS Storage Facilities

Storage Facility	Storage Volume (m^3)
Belle River Water Tower	5,800
Lakeshore WTP Reservoir	9,922
BRWSS Total Storage Volume	**15,722**

The distribution system consists of approximately 275 km of watermains, with pipe diameters up to 600 mm. There are emergency interconnection points with neighbouring water supply systems at the following locations:

- TWSS
  - County Road 42 east of County Road 19 (Manning Road) – 200-mm-diameter interconnection
  - Amy Croft Drive east of County Road 19 - 300 mm-diameter interconnection
- UWSS
  - Belle River Road south of Highway 401 - 200 mm-diameter interconnection
- SPWSS
  - Surf Club Drive north of County Road 2 - 150 mm-diameter interconnection

5.3.2 Stoney Point Water Supply System

5.3.2.1 Service Area

The SPWSS services the communities of Stoney Point, Surf Club, Comber, and the rural areas between Lake St. Clair and County Road 8 generally east of Rochester Townline and west of Big Creek. The extent of this service area is shown in Figure 1-1. The Stoney Point water service area consists of a mixture of urban residential, rural residential, industrial, commercial, and institutional development with a total equivalent service population of approximately 6,100. The SPWSS is considered a "large municipal residential system" under O. Reg. 170/03 and operates under Lakeshore's MECP MDWL No. 031-101 and MECP DWWP No. 031-201.

5.3.2.2 Treatment

The SPWSS is supplied by the Stoney Point WTP, which is located at 6011 St. Clair Avenue along the shore of Lake St. Clair in the residential community of Stoney Point. The WTP was originally constructed in the early 1950s. In 1991, the plant underwent an extensive upgrade and expansion from a pressure filter treatment facility to a gravity filter treatment facility. The Stoney Point WTP is a conventional filtration plant with chlorine disinfection and has a rated capacity of 4,545 m^3/d. Raw water is drawn from Lake St. Clair. Onsite storage is provided by a two-cell treated water storage reservoir with a total storage volume of 1,727 m^3.

As part of the 1991 expansion, the existing structures were expanded and retrofitted with washrooms, a lunchroom, an office, a workshop, a laboratory, storage areas, and the like, as well as chlorine gas disinfection and fluoridation facilities. The expanded treatment facility was also fitted with two new dual-media gravity filters, a new high-lift pump well, and a new underground reservoir complete with new high-lift pumps, backwash pumps, and a standby emergency generator. The expansion also featured new clarifier sludge and filter backwash treatment and disposal systems, complete with a two-celled settling pond as well as modern PLC-based process control and a supervisory control and data acquisition (SCADA) system.

Together with the treatment facility, the low-life pump station was retrofitted with new low-lift pumps and metering systems, new chemical storage and feed systems for coagulation (alum), taste and odour control (PAC), and chlorine-solution-based zebra mussel control.

From 2004 to 2006, the WTP underwent further upgrades to meet new treatment requirements set by the MECP including clarifier bypass facilities, filter-to-waste facilities, flow-metering upgrades, and associated monitoring systems for fluoride and disinfection contact time control. The fluoridation system was later decommissioned in November 2011 following public consultation and Council resolution. The WTP currently includes the following unit processes:

- Low-lift pumping
- Clarification
- Intermediate pumping
- Filtration
- Disinfection system via chlorination
- Treated water storage
- High-lift pumping

As there are no water towers in the Stoney Point water service area, pressure is maintained in the distribution system by continuous high-lift pump operation.

Details about the Stoney Point WTP include:

- Rated treatment capacity of 4,545 m^3/day
- Intake conveying raw water from Lake St. Clair to low-lift pump station with the following features:
  - 600mm-diameter Asphalt-coated corrugated steel pipe
  - Extends approximately 1,270 m into Lake St. Clair
  - Mouth of intake located in approximately 1.8 m of water
  - Includes HDPE carrier pipe for zebra mussel control
  - Mean lake level hydraulic capacity of 18,160 m^3/day
- Low-lift pump station conveying raw water to clarifier treatment system with the following features:
  - Screening well containing a coarse manual screen and a fine manual screen with 10 mm openings
  - Pump suction chamber complete with two low-lift vertical turbine pumps (one duty and one standby) each rated at 56.8 L/s at 9.1 m TDH
  - Common 300 mm-diameter discharge header complete with associated valves, controls, and appurtenances
  - Chlorine solution discharge pipe for zebra mussel control
  - Alum solution discharge pipe for particulate removal
  - Polymer solution discharge pipe for particulate removal
  - Carbon solution discharge pipe for taste and odour control
  - Raw water sampling pump system for analysis and process control
- Clarification treatment system with the following features:
  - Solids contact upflow clarifier, 9.1 m in diameter with 3.8 m SWD
  - Rated for treatment rise rate of 4.4 m/hr
  - Equipped with sludge scraper arms and drive including sludge blowdown system discharging directly into the sludge settling ponds
- Intermediate pump station with the following features:
  - Two intermediate pump suction chambers
  - Three vertical turbine pumps (two duty and one standby) each rated at 26.5 L/s at 7.6 m TDH
  - Common 300-mm-diameter discharge header complete with associated valves, controls, and appurtenances
  - Clarified water sampling pump system for analysis and process control
  - Chlorine solution discharge pipe for pre-chorine residual control
- Filtration system with the following features:
  - Two gravity-flow dual-media open bed filters containing 0.45 m-thick anthracite top layer on 0.30 m-thick silica sand layer on Ecodyne underdrain system with air scouring capabilities
  - Each 3.66 m-long-by-4.2-m-wide-by-4.66-m-SWD with 73 m^3 capacity
  - Each rated for filtration rate of 14.33 m/hr
  - Air scour system with air scour rate of 60 m/hr using 943 m^3/hr at 100 kPa centrifugal air blower
  - Filter backwash system with 190.8 L/s at 11.37 m TDH vertical turbine backwash pump located in high-lift pump station Clearwell No.1 discharging into wastewater chamber discharging to onsite settling ponds

  - Filter-to-waste piping system complete with all associated valves, controls, and appurtenances
  - Chlorine solution discharge pipe for pre-chorine residual control
- Onsite treated water storage system with the following features:
  - Two-cell in-ground treated water reservoir with total storage volume of 1,547 m^3
  - Cell 1 is approximately 30 m long by 7 m wide by 3.96 m SWD with storage volume of 807 m^3
  - Cell 2 is approximately 26 m long by 7 m wide by 3.96 m SWD with storage volume of 740 m^3
  - Complete with associated piping valves, controls, and appurtenances
- High-lift pump station conveying treated water to distribution system with the following features:
  - Two separate Clearwell suction compartments:
    - Clearwell No.1 (3 m long by 3.7 m wide by 5.5 m SWD with storage volume of 59 m^3)
    - Clearwell No.2 (6.25 m long by 3.7 m wide by 5.5 m SWD with storage volume of 121 m^3)
  - Three high-lift vertical turbine pumps (two duty and one standby) each rated at 32 L/s at 68.3 m TDH
  - Common discharge header complete with associated valves, meters, controls, and appurtenances
  - Discharge pressure of approximately 68 to 75 pounds per square inch (psi)
  - Treated water sampling pump system for analysis and process control
  - Chlorine solution discharge pipe for post chorine residual control
- Alum chemical storage and feed system with the following features:
  - Alum bulk storage tank with a capacity of 22.73 m^3
  - Diaphragm metering feed pump rated at 0–77 L/hr with max dosage rate of 0–100 mg/L
  - Complete with all associated piping valves, controls and appurtenances
- Polymer chemical storage and feed system with the following features:
  - Two liquid polymer storage tanks each with 680-litre volume plus integral mixer and associated controls
  - Diaphragm metering liquid polymer feed pump rated at 0–6.8 L/hr
  - Complete with all associated piping valves, controls and appurtenances
- PAC storage and feed system with the following features:
  - PAC bag loading hopper with 0.12 m^3 capacity and dust collector
  - VFD PAC volumetric feed system paced to flow with 160-litre solution tank and mixer
  - Diaphragm metering carbon solution feed pump rated at 0–77 L/hr with dosing ranging of 0-100 mg/L
  - Complete with all associated piping, valves, controls, and appurtenances
- Disinfection system with the following features:
  - Chlorine gas primary disinfection system consisting of two chlorine gas vacuum-based feed systems using 150-pound cylinders with automatic switchover, weigh scales, and associated piping, valves, controls, and appurtenances, which feed a common distribution manifold that supplies chlorine to the following systems:
    - Zebra mussel control with chlorine feed capacity of 0-23 kg/day
    - Pre-chlorination with chlorine feed capacity of 0-11 kg/day
    - Post-chlorination with chlorine feed capacity of 0-1.5 kg/day

- Residuals management system with the following features:
  - In-ground wastewater chamber 6.1 m long by 3.05 m wide by 4.66 m SWD with storage volume of 86.7 m^3
  - Wastewater centrifugal pump rated at 75.7 L/s at 8.23 m TDH complete with associated piping, valves, controls, and appurtenances for discharging into in-ground residual holding ponds
  - Two in-ground residual holding ponds each 97m long by 26.2 m wide by 1.52 m SWD and storage volume of 5,000 m^3, complete with associated piping, valves, controls, and appurtenances for discharge to Lake St. Clair
- Standby power system with the following features:
  - 175-kilowatt diesel generator with automatic transfer system
  - Diesel fuel storage tank with capacity of 1,135 litres
- Process control and SCADA system with the following features:
  - Magnetic flow meters for low-lift pump discharge, intermediate pump discharge, filter effluent, filter backwash, high-lift pump discharge
  - Ultrasonic level sensors for level control
  - Pressure transmitters for high-lift discharge and filter differential head loss
  - Chlorine residual analyzers for raw water, filtered water, and treated water
  - Turbidity analyzers for intake influent (raw), clarifier effluent (clarified), filter effluent (filtered) and high-lift discharge (treated) water
  - pH analyzers for intake influent (raw), clarifier effluent (clarified), filter effluent (filtered) and high-lift discharge (treated) water
  - Temperature analyzers for intake influent (raw), clarifier effluent (clarified), filter effluent (filtered) and high-lift discharge (treated) water
  - GE-based Fanuc PLC hardware and Wonderware In-Touch software complete with UPS

5.3.2.3 Storage and Distribution

The SPWSS consists of four pressure zones, as follows:

- Stoney Point Pressure Zone – Stoney Point urban area and adjacent lakefront areas
- Haycroft Pressure Zone – rural areas south of lakefront and north of Highway 401
- Comber Pressure Zone – Comber urban area
- Tilbury West Pressure Zone – Staples and rural areas south of Highway 401

The Stoney Point pressure zone is supplied by the Stoney Point WTP High-lift Pump Station (HLPS), which consists of three vertical turbine pumps. The HLPS also conveys water to the Haycroft Reservoir and Booster Pump Station (BPS), which is located at Comber Sideroad and Lakeshore Road 303. The Haycroft BPS consists of four vertical turbine pumps supplies water to the Haycroft pressure zone and also boosts water pressure for delivery to the Comber Reservoir and BPS. The Haycroft Reservoir is an in-ground storage reservoir with a total volume of 470 m^3. Of note, this reservoir was not designed to provide fire flow to its service area.

The Comber Reservoir and BPS is located in the community of Comber and supplies the Comber and Tilbury West pressure zones. Each pressure zone is supplied by a dedicated set of pumps: 3 vertical turbine pumps for the Comber Pressure Zone and 4 vertical turbine pumps for the Tilbury West Pressure Zone. There is an interconnection between the discharge headers that allows the Comber Pressure Zone pumps

to supply the Tilbury Pressure Zone when required. This is the current operating strategy, with the Tilbury Pressure Zone pumps only used when required (i.e., high demand periods). The Comber Reservoir is a two-cell in-ground storage reservoir with a total volume of 1,074 m^3. Table 5-6 and Table 5-7 present a summary of the pumping and storage facilities in SPWSS, respectively.

Table 5-6. SPWSS Pumping Facilities

Pump	No. of Pumps	Pumping Capacity	Firm Capacity (L/s)
Stoney Point HLPS	3 (2 duty, 1 standby)	32 L/s at 68.3 m TDH	64.0
Haycroft BPS	4 (3 duty, 1 standby)	11 L/s at 73 m TDH	33.0
Comber BPS (for Comber)	3 (2 duty, 1 standby)	One pump – 11.37 L/s at 44.2 m TDH Two pumps – 20.82 L/s at 44.2 m TDH	32.19
Comber BPS (for Tilbury West)	4 (3 duty, 1 standby)	7.57 L/s at 68.8 m TDH	22.71

Table 5-7. SPWSS Storage Facilities

Storage Facility	Storage Volume (m^3)
Stoney Point WTP Reservoir	1,727
Haycroft Reservoir	470
Comber Reservoir	1,074
SPWSS Total Storage Volume	**3,271**

The distribution system consists of approximately 210 km of watermains with diameters up to 300 mm. There are emergency interconnection points with neighbouring water supply systems at the following locations:

- BRWSS
  - Surf Club Drive north of County Road 2 - 150 mm-diameter interconnection
- UWSS
  - County Road 8 west of the community of Staples - 100 mm-diameter interconnection
  - County Road 8 and Highway 77 east of the community of Staples - 200 mm-diameter interconnection
- TWSS
  - East side of the community of Lighthouse Cove at Admiral Drive & Fourth Street - 300mm diameter interconnection

5.4 Existing Wastewater Systems

There are five existing wastewater treatment and collection systems servicing hamlets within the Municipality of Lakeshore. These include the flowing:

1. Denis St. Pierre Sewage System (formerly known as the Belle River/Maidstone Sewage System)
2. Stoney Point Sewage System
3. Comber Sewage System
4. South Woodslee

5. North Woodslee

The 2018 WWMP suggested that additional treatment capacity at the Denis St. Pierre WPCP, Stoney Point STF, and Comber STF is necessary to support the existing and anticipated growth through 2035. The 2018 WWMP indicated sufficient capacity at the North and South Woodslee STFs. The Denis St. Pierre WPCP was recently expanded to 25,000 m^3/day. The other wastewater treatment facilities have not undergone upgrades or expansion since the completion of the 2018 Master Plan.

5.4.1 Wastewater Conveyance Level of Service

Constraints within the Denis St. Pierre conveyance system were identified using Lakeshore's sanitary hydraulic model that was updated and calibrated by Jacobs in 2021. A constraint was identified if the theoretical water level modelled within a pipe exceeded the top of the pipe (this means the pipe is surcharged) to a level that could result in basement flooding during a 5-year design storm. The risk of basement flooding is identified if the water level within a surcharged pipe was 1.8 m or less below the ground surface.

Sizing for the identified preferred alternatives will be such that the proposed sewers should be free-flowing and will not increase the hydraulic grade line (HGL) on existing surcharged sewers during the 5-year design storm.

5.4.2 Denis St. Pierre Sanitary System

Formerly referred to as Belle River/Maidstone, the Denis St. Pierre sewage system consists of sewers, pumping stations, and a wastewater treatment plant with an outfall discharging to Lake St. Clair.

5.4.2.1 Background

The Belle River wastewater collection and treatment systems were commissioned in 1976, while the Maidstone collection system was completed in 1981. Major upgrades to this system include the construction of a sewer trunk connecting the wastewater treatment plant to the Puce River area, rehabilitation of the Denis St. Pierre WPCP in 2010, and capacity upgrades at the Denis St. Pierre WPCP completed in 2024.

The Belle River/Maidstone wastewater treatment plant, currently known as Denis St. Pierre WPCP, was commissioned in 1976 as an extended aeration plant and was later upgraded and expanded in 1999 using sequence batch reactors. The treatment plant was restored to an EAAS process in 2010 to address operational issues that limited the plant's ability to operate at its design capacity. The 2010 rehabilitation also included the addition of a holding tank (to store wet weather flows), new final settling tanks, and the construction of a new effluent pumping station. The WPCP's treatment capacity was upgraded in 2024.

5.4.2.2 Treatment System

The Denis St. Pierre WPCP, located on Rourke Line Road, south of County Road 22, was recently expanded to a rated capacity of 25,000 m^3/day. The facility operates under an Amended Environmental Compliance Approval (ECA) for Sewage Works (No. 6438-C2XQM5) issued by the MECP on July 12, 2020. The treatment plant consists of fine screening, grit removal, four extended aeration tanks, two final settling tanks, UV disinfection, and chemical phosphorus removal. The waste activated sludge is stabilized using aerobic digestion and dewatered using gravity thickeners and centrifuges for land application. The treated water discharges to Lake St. Clair via a 900-mm-diameter outfall equipped with nozzles at the end of the outfall to disperse the treated effluent.

The Denis St. Pierre WPCP recently underwent an expansion and upgrade based on ESR recommendations (Stantec, 2020). Figure 5-5 shows the plan view of the facility prior to the 2023 expansion.

The characteristics of raw wastewater that the facility receives normally fall within a typical range for untreated municipal wastewater. Despite operating close to its rated capacity prior to the expansion, the Denis St Pierre WPCP appears to be reliably meeting the required effluent water quality put forward in its ECA. Further details on the facility's historical data on raw wastewater characteristics and effluent compliance is included Appendix D.1.

Figure 5-5. Denis St. Pierre WPCP

5.4.2.3 Sanitary Collection System

The sanitary collection system within the Denis St. Pierre sewershed covers the western portion of the lakefront of the Municipality of Lakeshore. It services the most populated area of the Municipality and consists of 22 pump stations (PS) in total. Two pump stations, Maidstone PS08 and Belle River PS02, are directly upstream of the Denis St. Pierre WPCP, making two separate sub-sewersheds. Four pump stations are upstream of Belle River PS02 pump station and 16 pump stations are upstream of Maidstone PS08 pump station. Upgrades at Maidstone PS08 are underway to increase its capacity.

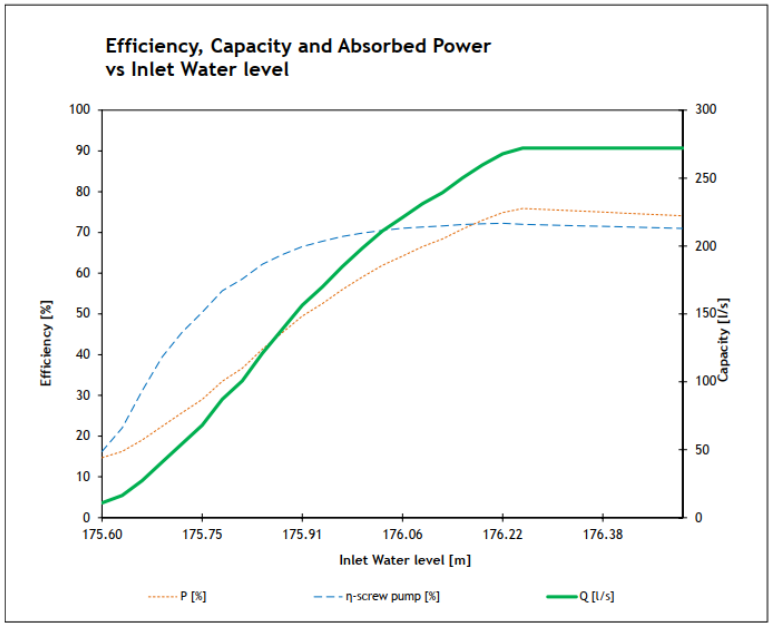
There were over 300 property flooding reports from Denis St. Pierre servicing area in the available data from 2021 to 2023, the majority of which appear to be related to sanitary flow backup based on the report descriptions. Several of these reports note that sanitary services become unavailable during both light and heavy rainfall events due to sanitary back ups, with customers experiencing raw sewage entering their homes through floor drains and bathtubs. In most cases, flooding issues are reoccurring in various neighbourhoods, resulting in customers installing drainage technologies such as valves and backflow preventers to limit the extent of flooding and damage. In some cases, sanitary laterals are suspected to be surcharged, resulting in residents being unable to flush toilets.

The Denis St. Pierre sanitary collection system constraints were identified largely using sanitary hydraulic modelling and operator observations, with basement flooding reports supplementing these findings. Since the Maidstone PS08 updates have been completed, the hydraulic model was updated to incorporate the additional pump capacity based on pump curves provided by the Municipality.

The updated hydraulic model accounts for three pumps (with the two stages lumped into one), and each pump train represented with a maximum capacity of 272 L/s using the curve shown in Figure 5-6 and the following considerations:

- The provided pump curve applies to all three pump trains and there is no capacity loss when all pumps are operating.
- The pump curve provided was for the second stage pumps. The pump curve elevations were inferred to represent the first stage pump elevations and it was assumed the first stage pumps had the same performance as the second stage pumps.
- It was assumed that for all simulations all pumps will be running and pumping as per the pump curve.

Figure 5-6. Denis St. Pierre WPCP pump curve applied to each of the 3 pumps in the model



The modelled results indicate that this additional pump capacity will substantially reduce surcharging due to backwater within the immediate PS08 catchment area. The remaining capacity constraints under existing conditions within the Denis St. Pierre sanitary collection system have been identified under the following areas:

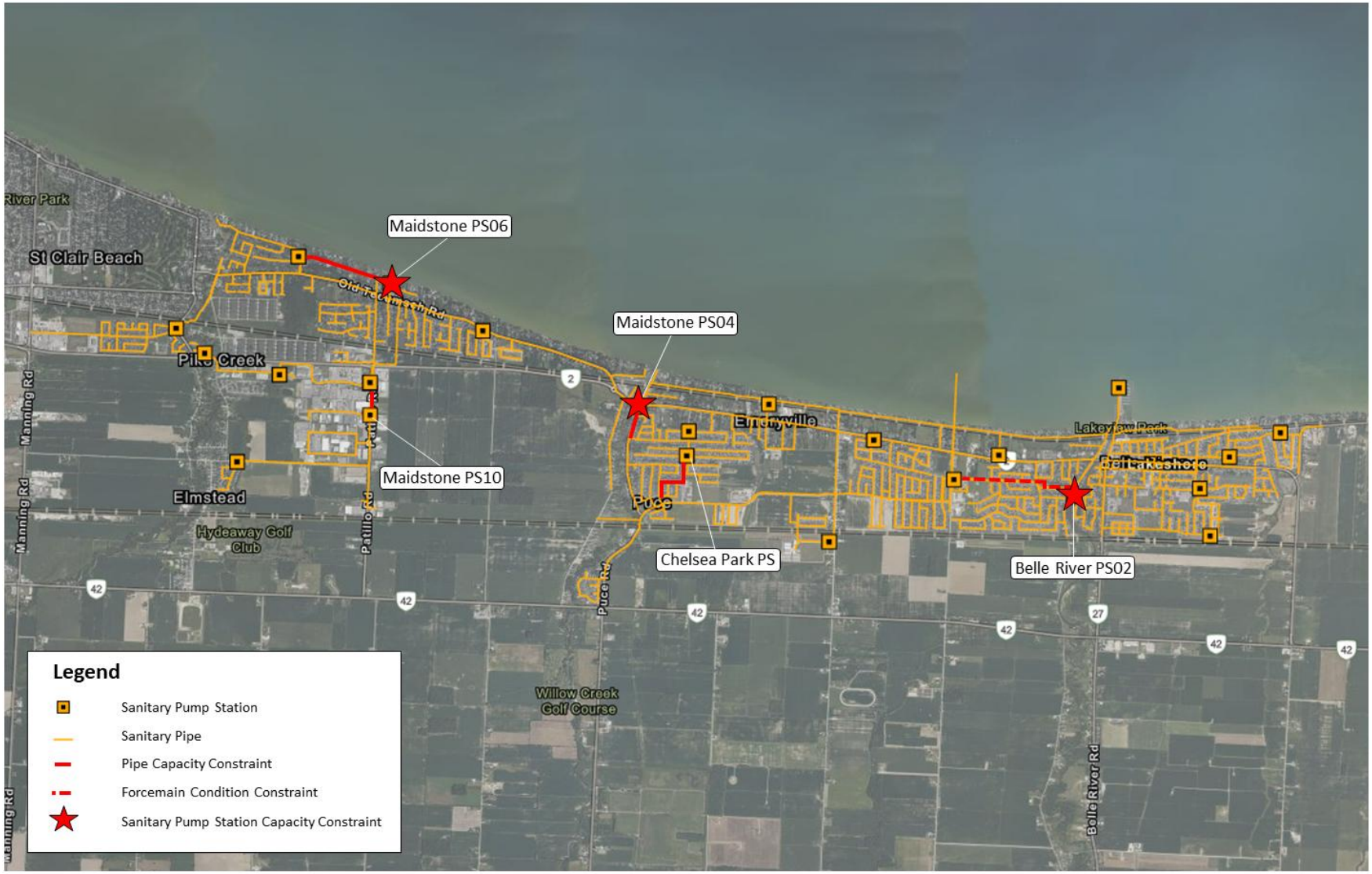
- Russel Woods Drive Trunk Sewer
- Maidstone PS06
- Patillo Road Sewers downstream of Maidstone PS10
- East Puce Road Sewers
- Maidstone PS04
- Sewers Downstream of Chelsea Park PS
- Belle River PS02 Forcemain

The sewers downstream of Maidstone PS10 along Patillo Road from Silver Creek Drive to Advance Boulevard are constrained as the pipe capacity is lower compared to pumping rate from the pumping station, resulting in a risk of basement flooding. The sewers along East Puce Road are constrained due to lack of conveyance capacity from Monarch Meadows Drive to County Road 22, causing surcharging in the system with a resulting HGL within basement flooding levels south of Monarch Meadows Drive. The sewers downstream of Chelsea Park PS along IC Roy Drive, Mancini Drive, and Popular Drive to Oakwood Avenue are also constrained due to the pipe capacity being lower than the pumped flow from Chelsea Park PS, resulting in a risk of basement flooding along IC Roy Drive.

Pumping capacity at Maidstone PS04 is currently under-sized, resulting in backwater and surcharging to basement flooding levels in the upstream conveyance system. Capacity constraints along Russel Woods Drive Trunk Sewer and at Maidstone PS06 causes an overflow into Maidstone PS07. Additionally, municipal staff have informed that contractors are unwilling to undertake the inspection work on one of the two Belle River PS02 forcemains that conveys flow from the Belle River area to the Dennis St. Pierre WPCP, due to the condition of the infrastructure.

Many of the constraints within the Denis St. Pierre sewershed are hydraulically connected and therefore require solutions that address them simultaneously to avoid creating an additional constraints downstream. The existing constraints are identified in Figure 5-7.

Figure 5-7. Existing Constraints in Denis St. Pierre Sanitary Collection System



5.4.3 Stoney Point Sanitary System

5.4.3.1 Background

The Stoney Point sewage system serves the Stoney Point community and the adjacent lakefront areas. The first phase of the system was constructed in 1978 and included a gravity collection system, two pumping stations, and two lagoons located on Tecumseh Road west of Little Creek. The collection system was extended in the late 1980s westerly along St. Clair Ave. toward Rochester Townline Road to service the lakefront properties. Raw sewage from Pumping Station No.1 is pumped into two 5.6-hectare (ha) (14.02 acres) lagoons.

5.4.3.2 Treatment System

The Stoney Point STP is located on Lot 16, Broken Front Concession, Township of Tilbury. It is a lagoon-based wastewater treatment system designed to treat an average daily flow of 949 m^3/day that is currently operating under CofA No. 1-482-77-006 (issued on May 31, 1977). The lagoons are routinely drained in a controlled manner with discharge to Little Creek, approximately 820 m upstream of where the creek discharges into Lake St. Clair. The ECA states that 180 days of stabilization is required prior to releases from the lagoons. Prior to being drained, the lagoons are treated with aluminum sulphate for phosphorus removal. The sludge that had accumulated in cell 2 was removed in August 2005. Cell 1 has never had sludge removal. Figure 5-8 shows the lagoon layout at Stoney Point STP.

Figure 5-8. Stoney Point STP Lagoons

Based on the Eastern Communities Sewage Works ESR completed in 2012, a combined sewage treatment plant, referred to as the Lakeshore Eastern Communities WPCP, was preferred to accommodate both incoming flows to the Stoney Point and Comber STPs (Stantec, 2012). The 2012 ESR identified an EAAS or Sequencing Batch Reactor as the preferred treatment technologies for the proposed WPCP. The existing Stoney Point and Comber lagoons were planned to be demolished.

The raw wastewater flowing to the Stoney Point STP is very dilute based on a review of the performance reports (2018 to 2022) as shown in Table 5-8. The contaminant mass loadings are below the normal range for domestic wastewater, which could be linked to infiltration in the sewage system.

Table 5-8. Stoney Point STP Raw Wastewater Average Concentrations and Loads (2018 to 2022)

Contaminant	Average Concentration [a] (mg/L)	Average Load [b] (kg/day)	Maximum Month Load Peak Factor	Per Capita Load (g/cap/day)	Typical Per Capita Load [c] (g/cap/day)
BOD_5	63	70	1.7	31	50 – 120
TSS	67	73	1.6	32	60 – 150
TKN	No data	-	-	-	9 – 18
TP	1.6	1.8	1.6	0.7	1.5 – 4.5

[a] Average of monthly influent concentration data from the Annual Operations Report,

[b] Loading at the plant's current average daily flow

[c] Adapted from Metcalf and Eddy (2003)

Notes:

g/cap/day = grams per capita per day

TKN = total kjeldahl nitrogen

TSS = total suspended solids

Moreover, it is apparent that the facility is not meeting effluent requirements put forward in the CofA based on the Performance Assessment Reports data from 2018 to 2022. The Figure 5-9 and Figure 5-10 illustrate the lagoons' effluent nitrogen and TSS concentrations. Additional details on the historical loading and effluent quality data are presented in Appendix D.1.

In addition, in 2023 the lagoons reached capacity earlier than anticipated and required an early release from the lagoons without the required 180 days of stabilization, resulting in the release of untreated wastewater with high concentrations of unionized ammonia.

As stated in the report issued by the Municipality of Lakeshore to the County of Essex dated September 8, 2022 (Lakeshore, 2022), the works relating to the proposed new Lakeshore Eastern Communities WPCP were not undertaken. Consultation activities with the MECP as part of this Master Plan indicated that the Ministry is looking for the Master Plan to put forward a long-term plan and commitment from Lakeshore to implement a solution that will address performance concerns at the Stoney Point STP (Appendix C).

Figure 5-9. Stoney Point STP Effluent cBOD$_5$ & TSS Concentration

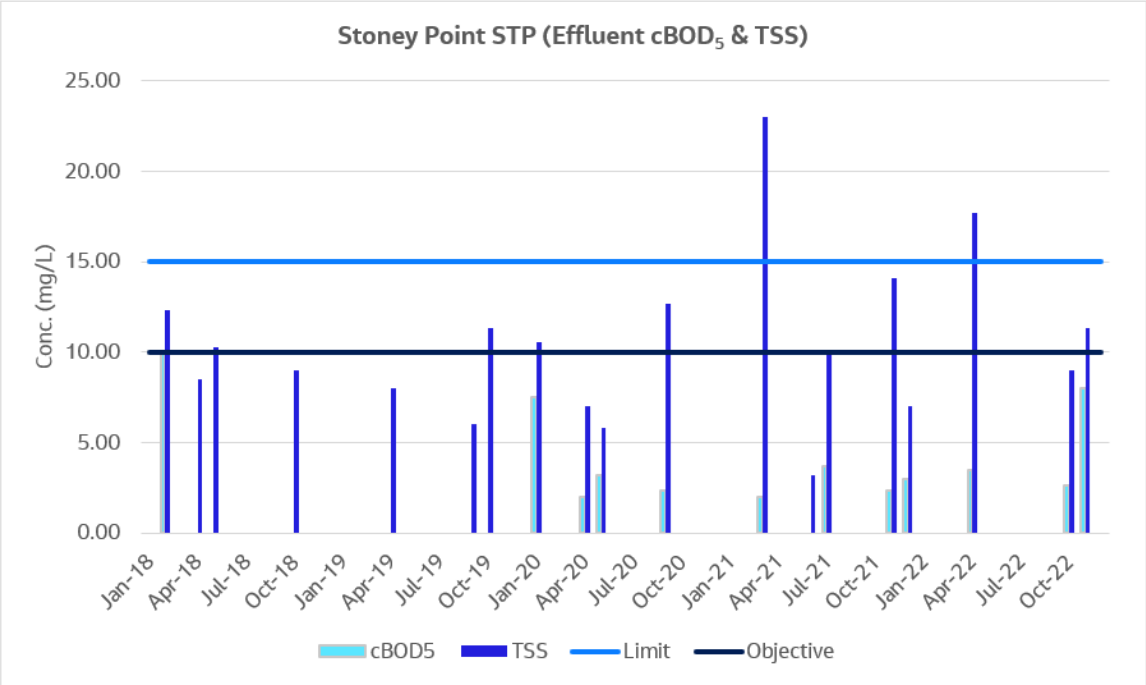
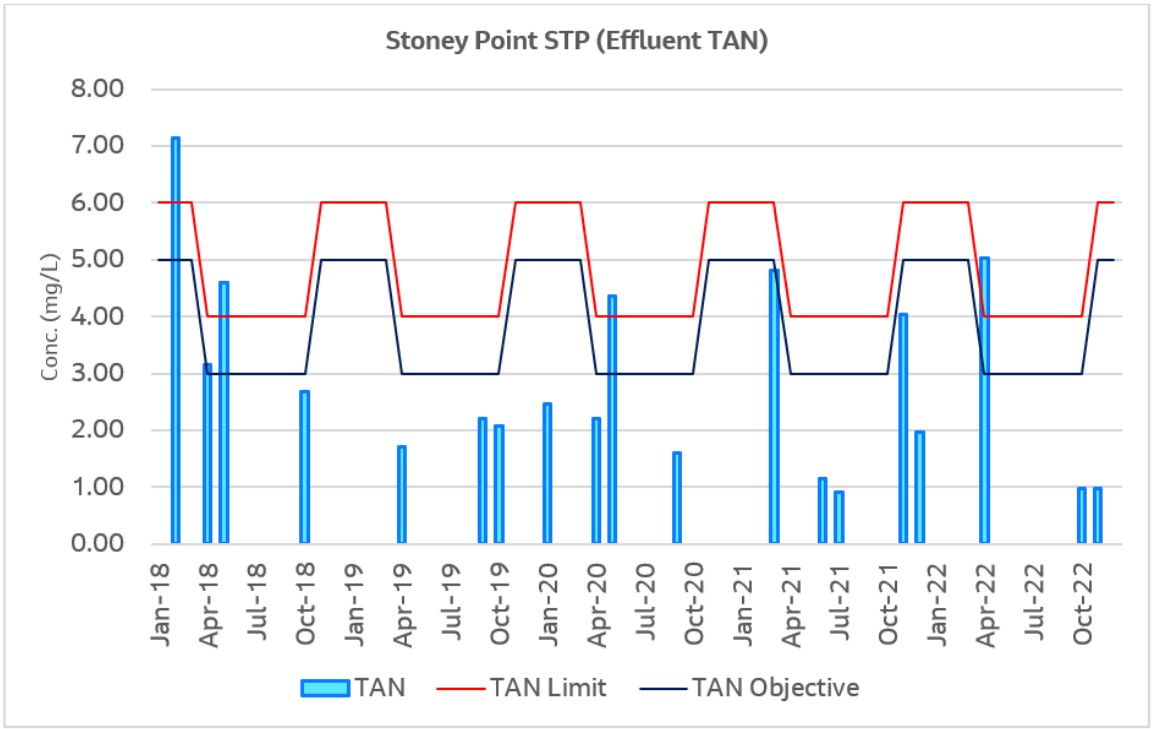


Figure 5-10. Stoney Point STP Effluent Total Ammonia Nitrogen & Total Phosporus Concentration



5.4.3.3 Sanitary Collection System

The Stoney Point sanitary collection system services the community of Stoney Point, situated on the west side of the lakefront of the Municipality of Lakeshore. Stoney Point experiences high average annual daily flows and dilute wastewater loadings, which points to high inflow and infiltration in the area. It has been reported that these high flows appear to coincide with high lake levels, which suggests that they could be due to high levels of groundwater intrusion as opposed to rainfall derived inflows.

Conveyance constraints within Stoney Point are unknown since recent flow monitoring and modelling has not been completed. There are 19 recorded property flooding reports from Stoney Point servicing area in the available data from 2010-2017 and 2020 -2023, several of which appear to be related to sanitary flow backup based on the report descriptions. As well, it is suspected that the Stoney Point collection system is exceeding capacity since the Stoney Point STF is exceeding capacity. Therefore, it is strongly recommended that flow monitoring and hydraulic modelling be completed in the Stoney Point sanitary collection system to identify specific areas of constraint.

5.4.4 Comber Sanitary System

5.4.4.1 Background

The Comber sewage system services the Comber settlement area through a wastewater collection and lagoon-based treatment facility. The system was built in 1974 and comprises a gravity collection system, pumping station, and two 2.43 ha (6 acre) lagoons. The Comber STP is located in the south-east corner of Comber and accessible from Windsor Avenue.

5.4.4.2 Treatment System

The Comber STP was constructed in 1974 and was designed based on an average flow of 430 m^3/day. The two 6-acre lagoons are routinely drained in a controlled manner, with discharge to an open drain leading to No.1 Government Drain, which discharges to Big Creek with ultimate discharge into Lake St. Clair. Prior to being drained, the wastewater is treated with aluminum sulphate for phosphorus removal. Sludge that had accumulated in both cells was removed in 2004. Figure 5-11 shows the current Comber STP lagoon configuration.

Based on the Eastern Communities Sewage Works ESR completed in 2012, a combined sewage treatment plant, referred to as the Lakeshore Eastern Communities WPCP, was preferred divert flows from the Comber STP to a new treatment facility located at Stoney Point STP (Stantec, 2012). The 2012 ESR identified an EAAS or Sequencing Batch Reactor as the preferred treatment technologies for the proposed WPCP. The existing Stoney Point and Comber lagoons were planned to be demolished. Comber STF receives fairly dilute wastewater loads based on the 2018 to 2022 performance assessment reports summarized in Table 5-9. The influent TKN and TP are on the low end of the typical range for municipal wastewater.

Table 5-9. Comber STP Raw Wastewater Average Concentration and Loads (2018 – 2022)

Contaminant	Average Concentration [a] (mg/L)	Average Load [b] (kg/day)	Maximum Month Load Peak Factor	Per Capita Load (g/cap/day)	Typical Per Capita Load [c] (g/cap/day)
BOD_5	187	73	1.7	70	50 – 120
TSS	236	93	2.4	89	60 – 150
TKN	32	10.8	1.3	10	9 – 18
TP	4.5	1.7	1.5	1.6	1.5 – 4.5

[a] Average of monthly influent concentration data from the Annual Performance Assessment Reports (PARs)

[b] Loading at the plant's current average daily flow

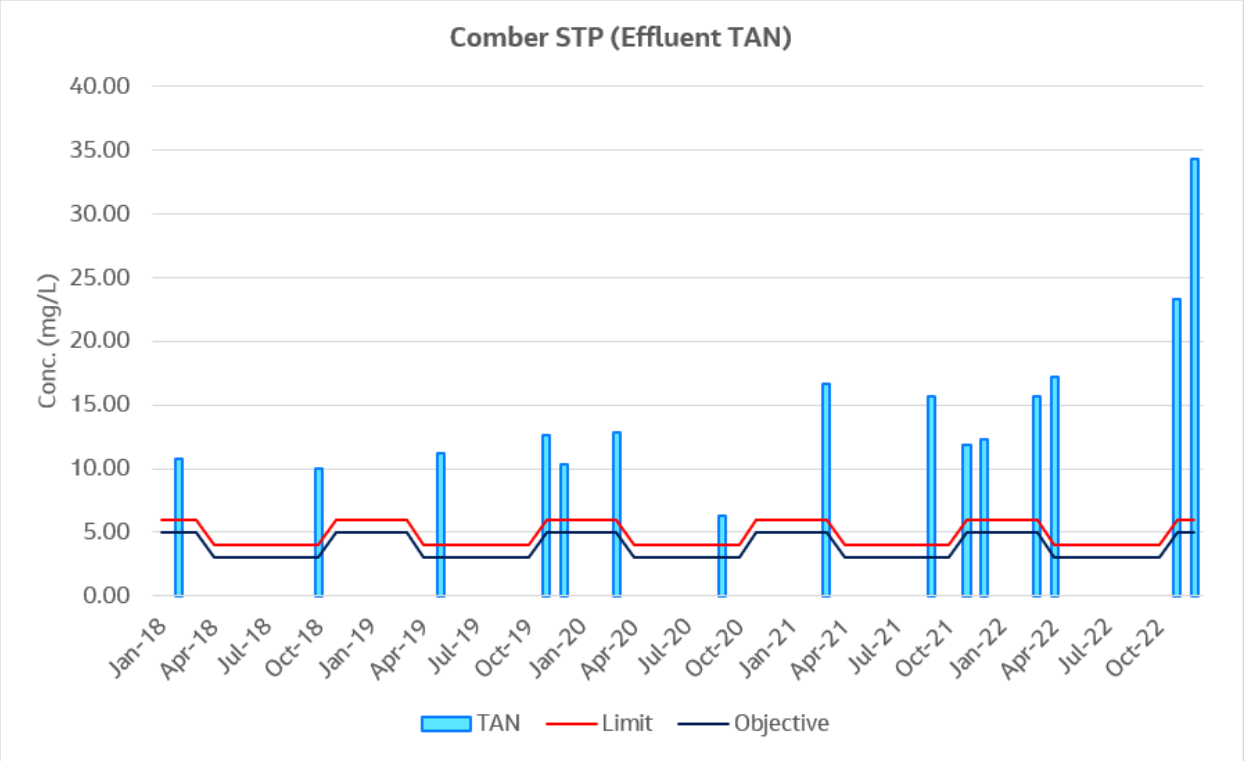
[c] Adapted from Metcalf and Eddy (2003)

Albeit the limited effluent data for Comber STP, the reduced nitrification of ammonia is apparent during the assessment period (2018–2022) as illustrated in Figure 5-12. Further details on Comber STP historical loading data and effluent quality are included in Appendix D.1 of this Master Plan.

A document issued by Municipal staff on October 24, 2023 identifies a spill that occurred in August-September 2023 (Lakeshore, 2023). Following a large rainfall event in August 2023, where 30 cm of rain fell over the course of two days, the Comber lagoons filled, overflowed, and spilled to the outlet channel for 290 hours (12 days) (Lakeshore, 2023). This incident was reported to the Spills Action Centre on September 6, 2023 and resulted in the unplanned release from the lagoons outside of the spring and fall discharge periods, constituting the release of untreated sewage. This event is indicative of the lagoons operating at or near their hydraulic capacity, it is recommended that any unallocated reserve capacity be maintained to mitigate impacts from future similar events.

Figure 5-11. Comber STP Lagoons

Figure 5-12. Comber STP Effluent Total Ammonia Nitrogen Concentration



Note: The Comber STP has no limits or objectives in the facility CofA, the Municipality of Lakeshore uses those in the Stoney Point STF's CofA to monitor performance for operations and monitoring purposes. The Limits and Objectives shown for Comber in 5-12 are those in place for the Stoney Point STF.

5.4.4.3 Sanitary Collection System

The Comber sanitary collection system services the community of Comber in the Municipality of Lakeshore, situated to the south of the interchange between Highway 401 and Highway 77. Conveyance constraints within Comber are unknown since recent flow monitoring and modelling has not been completed. There are no recorded property flooding reports from Comber in the available data from 2010-2017 and 2020 -2023. However, assuming the Comber collection system and Comber STF would have been originally designed to the accommodate the same wastewater flows, it is suspected that the collection system is reaching or exceeding capacity since the Comber STF is nearly at capacity. Therefore, it is strongly recommended that flow monitoring and hydraulic modelling be completed in the Comber sanitary collection system to identify specific areas of constraint.

5.4.5 North Woodslee Sanitary System

5.4.5.1 Background

The wastewater collection and treatment system were constructed in 2007 in the western portion of the North Woodslee hamlet area to service existing residences and proposed subdivision developments. The sewers convey wastewater to the North Woodslee treatment facility located on the West Belle River Rd. The STP capacity was established to also service lands in the North Woodslee area east of the Belle River.

5.4.5.2 Treatment System

The North Woodslee STP was constructed in 2007 and has a rated capacity of 330 m^3/day (and peak flow rate of 990 m^3/day) and uses the rotating biological contactor (RBC) process based on CofA No. 9979-6N5KSK. It consists of an inlet pumping station, a primary settling tank, one RBC package plant, a secondary settling tank, a filtration system, a UV disinfection, and a chemical phosphorus removal system. The settled sludge from the primary and secondary settling tank is assumed to be treated offsite. The treated effluent discharges to the Belle River via a 200 mm-diameter outfall.

Figure 5-13 shows the location and building of North Woodslee STP. The North Woodslee plant receives extremely diluted wastewater (between 2018 and 2022) and very high effluent total ammonia nitrogen (TAN) concentrations were recorded from May to July of 2019. Additional details on the historical influent loading and effluent quality data are presented in Appendix D.1.

Figure 5-13. North Woodslee STP

5.4.5.3 Sanitary Collection System

The North Woodslee sanitary collection system services the community of North Woodslee in the southern part of the Municipality of Lakeshore, spanning from Oriole Park Drive in the north to South Middle Road in the south. Conveyance constraints within North Woodslee are unknown since recent flow monitoring and modelling has not been completed. There is one recorded property flooding report in the available data from 2010-2017 and 2020 -2023 and the flooding incident does not appear to be related to the North Woodslee sanitary collection system based on the available description. It is recommended that flow monitoring within North Woodslee may be beneficial to inform conveyance needs and identify and project constraints.

5.4.6 South Woodslee Sanitary System

5.4.6.1 Background

The South Woodslee hamlet area is service by wastewater collection and treatment system, which were constructed in 2005. The system consists of a low-pressure sewage collection system and a mechanical STP located west of Belle River Road in the southwestern portion corner of Woodslee Memorial Park adjacent to the Belle River and is accessible from King St.

5.4.6.2 Treatment System

The South Woodslee WPCP, located in Lot 24, Concession 1 in the Hamlet of South Woodslee, was constructed in 2000 and utilizes the RBC treatment process with a rated capacity of 210 m^3/day. The operation of this plant is governed by ECA No. 5649-6V4SUW (dated November 20, 2006).

The South Woodslee WPCP is a nitrifying plant and consists of a primary clarifier, one RBC train, a final clarifier, a filtration unit, a UV disinfection system, and a chemical addition for phosphorus removal. Like North Woodslee STP, the sludge from the clarifiers is also treated offsite. The treated effluent is discharged to the Belle River. The plant was rehabilitated in 2007 to address some operational issues that limited the plant's treatment capacity.

Figure 5-14 shows the current South Woodslee STP building.

South Woodslee STP appears to receive extremely weak municipal wastewater, similar to North Woodslee. The treatment facility seems to have issues meeting the required effluent quality, particularly in terms of TSS and TAN. Refer to Appendix D.1 for additional details on South Woodslee historical influent loading data and effluent compliance information.

Figure 5-14. South Woodslee STP

5.4.6.3 Sanitary Collection System

The South Woodslee sanitary collection system services the community of South Woodslee, in the southern part of the Municipality of Lakeshore, directly south of South Middle Road. Conveyance constraints within South Woodslee are unknown since recent flow monitoring and modelling has not been completed. There are four recorded property flooding reports in the available data from 2010-2017 and 2020 -2023 and the cause of flooding incidents do not appear to be related to the South Woodslee sanitary collection system based on the available description or the cause is unknown. It is recommended that flow monitoring within South Woodslee is completed.

5.4.7 Areas Serviced by Private Onsite Systems

Residences that are outside the municipal wastewater servicing boundary are serviced by private onsite sewage disposal systems typically consisting of septic tanks and leaching beds.

Historically, onsite septic private sewage disposal systems provided a means to achieve a minimal level of wastewater treatment in remote, sparsely populated areas where municipal services did not exist. These types of systems are heavily dependent on ground conditions and adequate land availability to be effective. Prior to 1974, these systems were constructed with overflow pipes directed to local watercourses to prevent systems from overloading during wet conditions.

A study conducted in the Lighthouse Cove area identified hotspots having E. coli levels higher than recreational water guidance level (200 CFU/100 mL) set by Health Canada (Health Canada, 2012). These hotspots were also corelated with higher level of human DNA marker and F+ coliphage levels with no clear source(s) of contamination identified. With only a few hotspots identified having human E.coli, the report concluded that the water quality discharge from the community septic systems appeared to be good. No stations were identified in the report where septic system performance could be clearly identified as solely contributing to reduced water quality conditions (Stantec, 2022).

5.5 Economic Environment

The municipality is conducting a rate study and development charges study as a result of the Master Plan recommendations to establish the existing economic environment and future needs.

5.6 Summary of Existing Constraints

This section summarizes the existing needs identified for drinking water, sanitary collection and conveyance, and wastewater treatment.

5.6.1 Existing Water Treatment System Constraints

Existing water treatment system constraints were identified by comparing current water demands against available treatment capacity in each system. Per capita water demands and maximum day factors were identified using the following methodology:

- Historical treated water pumping rates were reviewed to identify the ADD and MDD at each WTP.
- Water billing records were reviewed for each service area to identify the average daily consumption.
- Non-revenue water (i.e., volume of water that was “lost” as a share of the net water produced) was calculated by subtracting the average daily consumption from the historical treated water pumping rates.

- The ADD and MDD less non-revenue water (i.e., the actual water demand of the population) were calculated and used to identify the maximum day factor and per capita water demand of the service population.

Table 5-10 presents the water demand analysis for 2022. Of note, the non-revenue water percentage of the total production is relatively high in the SPWSS, which could be caused by poor distribution system condition and resulting leaks. Watermain monitoring and rehabilitation could significantly reduce water demands at the Stoney Point WTP.

Table 5-10. Water Demand Analysis (2022)

Parameter	Lakeshore WTP	Stoney Point WTP
System ADD, m^3/d	10,104	2,044
System MDD, m^3/d	16,367	3,354
Average Water Consumption per Billing Records, m^3/d	7,934	1,300
Average Non-Revenue Water, m^3/d	2,174	744
Non-Revenue Water Percentage of Total Production	22 percent	36 percent
Service Population ADD, m^3/d	7,934	1,300
Service Population MDD, m^3/d	14,193	2,610
Maximum Day Factor	1.79	2.01
Per Capita Water Demand, LPCD	264	209

Notes:
LPCD = litre(s) per capita per day

The MECP guidelines for Drinking Water Systems recommend a maximum day factor of 1.80 and 2.00 for the population ranges of 25,001-50,000 and 3,001-10,000, respectively (MECP, 2008). Therefore, the maximum day factor for Lakeshore WTP is slightly below the MECP design guidelines and the maximum day factor for Stoney Point WTP is nearly equal to the MECP design guideline.

Existing water demands were then assessed against the Lakeshore WTP and Stoney Point WTP rated capacities to identify any existing water treatment capacity constraints. Table 5-11 presents a capacity assessment for each WTP under existing conditions.

The Lakeshore WTP is currently operating at 45 percent of its rated capacity and does not have any existing capacity constraints.

The Stoney Point WTP is currently operating at 74 percent of its rated capacity and does not have any existing constraints.

Table 5-11. Existing Water Treatment Constraints

Water Treatment Plant	Treatment Capacity (m^3/day)	Current MDD (m^3/day)	% Rated Capacity
Lakeshore WTP	36,000	16,367	45
Stoney Point WTP	4,545	3,354	74

5.6.2 Existing Water Storage Constraints

This section presents an assessment of existing treated water storage constraints for the BRWSS and SPWSS. Storage requirements were identified based on the MECP Design Guidelines for Pumping Facilities and Treated Water Storage, where:

$$Storage = A + B + C$$

A = Fire Flow (based on MECP recommendations for equivalent population size; Table 8-1 from the design guidelines)

B = Equalization Storage (25 percent of maximum day demand (MDD))

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

Historical water demand data at each HLPS and BPS was analyzed to identify the MDD component for each pressure zone and is summarized in Table 5-12.

Table 5-12. Existing Water Demands - BRWSS and SPWSS Pressure Zones

Pressure Zone	ADD (m^3/d)	MDD (m^3/d)	Maximum Day Factor
Belle River	10,104	16,367	1.79
Stoney Point	1,370	2,961	1.93
Haycroft	139	286	2.05
Comber	496	734	1.48
Tilbury West	139	286	2.05

The Fire Underwriters Survey methodology was used to determine the fire flow requirements for the Belle River, Stoney Point and Comber pressure zones. The Haycroft and Tilbury West pressure zones service rural areas and were not designed to provide fire flow, as distribution systems were only intended to provide adequate potable water supply. Therefore, a fire flow analysis was not completed for these areas.

The Fire Underwriters Survey methodology is based on building type, type of construction, size of building, building contents, presence of sprinkler protection, and risk of exposure for nearby buildings (Fire Underwriters Survey, 2020). The following assumptions were made to support fire flow requirement estimation:

- Buildings with high fire flow requirements were identified by visually inspecting and estimating their size using a mapping tool.
- No fire walls were considered for any building and the entire area of the building was considered to contribute to the fire flow requirement estimation.
- Ordinary construction type.
- Limited combustible contents.
- All buildings have a sprinkler system.
- 2 m of separation was assumed for residences in Belle River.
- 12 m of separation was assumed for residences in Stoney Point.
- 12 m of separation was assumed for residences in Comber.
- Smaller buildings in size that may have a higher combustible content are not accounted for due to lack of available information.

Fire flow requirements for the Belle River, Stoney Point and Comber pressure zones are presented in Table 5-13. The following facilities formed the basis for fire flow requirements:

- **Belle River:** Industrial Cluster at County Road 22 and Patillo Road
- **Stoney Point:** Assisted Living Southwestern
- **Comber:** Centennial Central School

ICI fire flow requirements were used to support the storage analysis for each pressure zone.

Table 5-13. Estimated Fire Flow Rates

Location	Residential Fire Flow Required (L/s)	ICI Fire Flow Required (L/s)	Duration, hours
Belle River	76	267	3.5
Stoney Point	76	152	2
Comber	50	133	2

Table 5-14 presents the treated water storage constraint assessment for each pressure zone in the BRWSS and SPWSS. The Belle River, Haycroft and Tilbury West pressure zones do not have any storage constraints under existing conditions. The Stoney Point and Comber pressure zones have existing storage deficits of 514 m^3 and 442 m^3, respectively.

Table 5-14. Existing Treated Water Storage Constraint Assessment

Pressure Zone	MDD (m^3/d)	A (Fire Flow)	B (25% of MDD)	C (25% of A+B)	Storage Required (m^3)	C (25% of A+B)	Storage Required (m^3)
Belle River	16,367	3,364	4,092	1,864	9,320	15,722	6,402
Stoney Point	2,961	1,094	598	285	1,978	1,464	-514
Haycroft	286	-	71	18	89	470	381
Comber	734	958	183	285	1,426	985	-442
Tilbury West	286	-	71	18	89	89	0

5.6.3 Existing Water Distribution System Pumping Constraints

This section presents an assessment of water distribution system pumping constraints. Distribution system pipe constraints (i.e., pipe capacity and system pressure under minimum day demand (min DD), MDD and fire flow conditions) were not assessed as part of this Master Plan, as a calibrated water distribution system model was not available.

Pumping requirements for each pressure zone were identified based on the following:

- **Systems with floating storage** require sufficient pumping capacity to meet the pressure zone MDD plus the MDD of any downstream pressure zones.
- **Systems without floating storage** require sufficient pumping capacity to meet the pressure zone MDD and fire flow requirements identified in Section 5.6.2, plus the MDD of any downstream pressure zones.

Table 5-15 presents an assessment of the existing water distribution system pumping constraints. The Belle River, Haycroft and Tilbury West pressure zones do not have any existing pumping constraints, while the Stoney Point and Comber pressure zones have pumping capacity deficits of 11,301 m^3/d and 9,599 m^3/d, respectively. While these deficits are significant, they can be addressed by implementing floating storage rather than increasing pumping capacity. The pumping deficits are primarily driven by fire flow requirements, which would not be required if these systems had floating storage. Alternative solutions for addressing these deficits are discussed in further detail in Section 9.

Table 5-15. Existing Water Distribution System Pumping Constraint Assessment

Pressure Zone	Primary Pressure Zone Pumping Requirements (m^3/d)	Other Pressure Zone Pumping Requirements (m^3/d)	Total Pumping Requirements (m^3/d)	Available Pumping Capacity (m^3/d)	Pumping Capacity Surplus/Deficit (m^3/d)
Belle River	16,367 [a]	-	16,367	36,400	20,033
Stoney Point	15,526 [b]	1,305 [c]	16,831	5,530	-11,301
Haycroft	823 [d]	-	823	2,851	2,028
Comber	12,225 [b]	-	12,666	3,067	-9,599
Tilbury West	436 [d]	-	436	1,970	1,534

Notes:
[a] System MDD.
[b] System MDD plus fire flow.
[c] Downstream System MDD.
[d] Peak hourly demand.

5.6.4 Existing Wastewater Treatment Constraints

Lakeshore has realized growth more quickly than projected in the 2018 WWMP and continues to grow rapidly, creating further interest in new developments. Multiple wastewater treatment facilities are or have triggered the requirement to expand so that they can continue receiving and treating wastewater from existing communities and to accommodate growth. Table 5-16 summarizes the current rated capacity and Annual Average Daily Flow (AADF) for Lakeshore's five wastewater treatment plants based on data from 2018 to 2022.

Dennis St. Pierre WPCP was operating at 94 percent capacity based on data from 2018 to 2022. An expansion to the plant was recently completed and commissioned, the new rated capacity for Dennis St. Pierre WPCP is 25,000 m^3/day and would be adequate to receive more wastewater flows in the short term. The plant is currently operating at 54 percent of its rated capacity.

Comber STF is operating at capacity (94 percent), and Stoney Point STF is operating above the rated capacity (127 percent). In addition, performance issues have been identified in Sections 5.4.3 and 5.4.4 for Stoney Point and Comber STF, respectively. To accept more wastewater flows and accommodate growth, expansion of both Comber and Stoney Point STF is imperative.

North and South Woodslee STF are operating at 13 percent and 22 percent of the rated capacity and have hydraulic capacity to accept additional wastewater flows.

Table 5-16. Existing Wastewater Treatment Constraints

Treatment Plant	Treatment Capacity (m^3/day)	AADF (Existing) (m^3/day)	% Rated Capacity
Denis St. Pierre WPCP	25,000	13,558	54
Stoney Point STF	949	1,211	127
Comber STF	430	402	94
North Woodslee STF	330	44	13
South Woodslee STF	210	46	22

5.6.5 Existing Sanitary Collection System Constraints

The sanitary hydraulic model representing the Denis St. Pierre Sanitary Collection System was the main tool used to identify constraints within the Denis St. Pierre sewershed. Operator reports of condition-based needs were also considered. Property flooding reports were particularly useful information in the sewersheds in which hydraulic models have not been developed as they can provide insight into the level of performance of the existing system. A summary of the existing sanitary collection system constraints within Lakeshore is provided in Table 5-17.

Table 5-17. Existing Constraints Summary

Location	Sewershed	Description
Russel Woods Drive Trunk Sewer	Denis St. Pierre	Insufficient pipe capacity causes surcharge to PS07
Maidstone PS06	Denis St. Pierre	Insufficient pumping capacity causes surcharge to PS07
Patillo Road Sewers	Denis St. Pierre	Insufficient pipe capacity from Silver Creek Drive to Advance Boulevard

Location	Sewershed	Description
East Puce Road Sewers	Denis St. Pierre	Insufficient pipe capacity from Monarch Meadows Drive to Country Road 22
Maidstone PS04	Denis St. Pierre	Insufficient pumping capacity
Sewers Downstream of Chelsea PS	Denis St. Pierre	Insufficient pipe capacity along IC Roy Drive, Mancini Drive, and Poplar Drive to Oakwood Avenue
Belle River PS02	Denis St. Pierre	One of two forcemains is in poor condition
Stoney Point	Stoney Point	Conveyance constraints are unknown. Flow monitoring is recommended in this sewershed
Comber	Comber	Conveyance constraints are unknown. Flow monitoring is recommended in this sewershed
North Woodslee	North Woodslee	Conveyance constraints are unknown. Flow monitoring is recommended in this sewershed
South Woodslee	South Woodslee	Conveyance constraints are unknown. Flow monitoring is recommended in this sewershed

6. Study Area Future Conditions

Section 6 describes the growth projections within the Study Area and the resulting projected water demand and wastewater flows. A summary of the future water and wastewater needs is also provided.

6.1 Community Growth Projections

The population projections were used to estimate future wastewater flows and water demand to determine the future constraints on Lakeshore's water and wastewater infrastructure and to identify when the recommendations should be implemented to service anticipated growth.

Population projections for Lakeshore are based on anticipated developments and municipal planning areas. In total, there were more than 80 development proposals identified and considered for population projections within the 2042 planning horizon of this Master Plan. Based on available information such as lot size, land use type, and site plans (where available), residential and ICI future populations were established. To predict the expected timing of the population growth, priorities were developed with input from municipal staff. Anticipated developments and planning areas were prioritized based on the priorities identified in Table 6-1.

Table 6-1. Criteria used for Development Prioritization

Priority 1 Assumed to be built within the next 10 years (up to 2032)	Priority 2 Assumed to be built within the next 20 years (up to 2042)	Priority 3 Assumed to be built within the next 40 years (up to 2062)
1. Condition-based needs (based on remaining useful life, understanding of current condition, and critical nature of the infrastructure) 2. Alignment with other planned infrastructure projects (leveraging opportunities to include conveyance infrastructure projects with other prioritized capital projects such as road reconstruction) 3. Within Secondary Plan or Municipal Planning Area within the servicing boundary. 4. Legal commitments	1. Within wastewater servicing boundary 2. Development plan but no adopted Secondary Plan	1. Currently not within wastewater servicing boundary 2. No legal commitments and not within Secondary Plan area

Priority 1 developments are predicted to be serviced within 10 years (2032); Priority 2 developments are predicted to be serviced within 20 years (2042), and Priority 3 developments are predicted to be serviced beyond 2042. Based on this analysis, it is projected that the residential population of Lakeshore will be approximately 73,000 by 2042, representing a population increase of 80 percent.

Table 6-2 and Table 6-3 summarize the growth projections for the water and wastewater servicing areas, respectively. Figure 6-1 compares the anticipated growth scenario (Anticipated Development Residential Population) to the High Growth Scenario for Lakeshore from the County of Essex Final Draft Growth Analysis Report (County of Essex, 2022).

Table 6-2. Future Residential Population by Water Service Area

Water Servicing Area	2032 Population [a]	2042 Population [a]
Belle River	43,211	60,117
Stoney Point	6,429	8,802
Tecumseh	N/A[b]	N/A[b]
Union	N/A[b]	N/A[b]
Tilbury Wheatly	N/A[b]	N/A[b]

[a] Total population

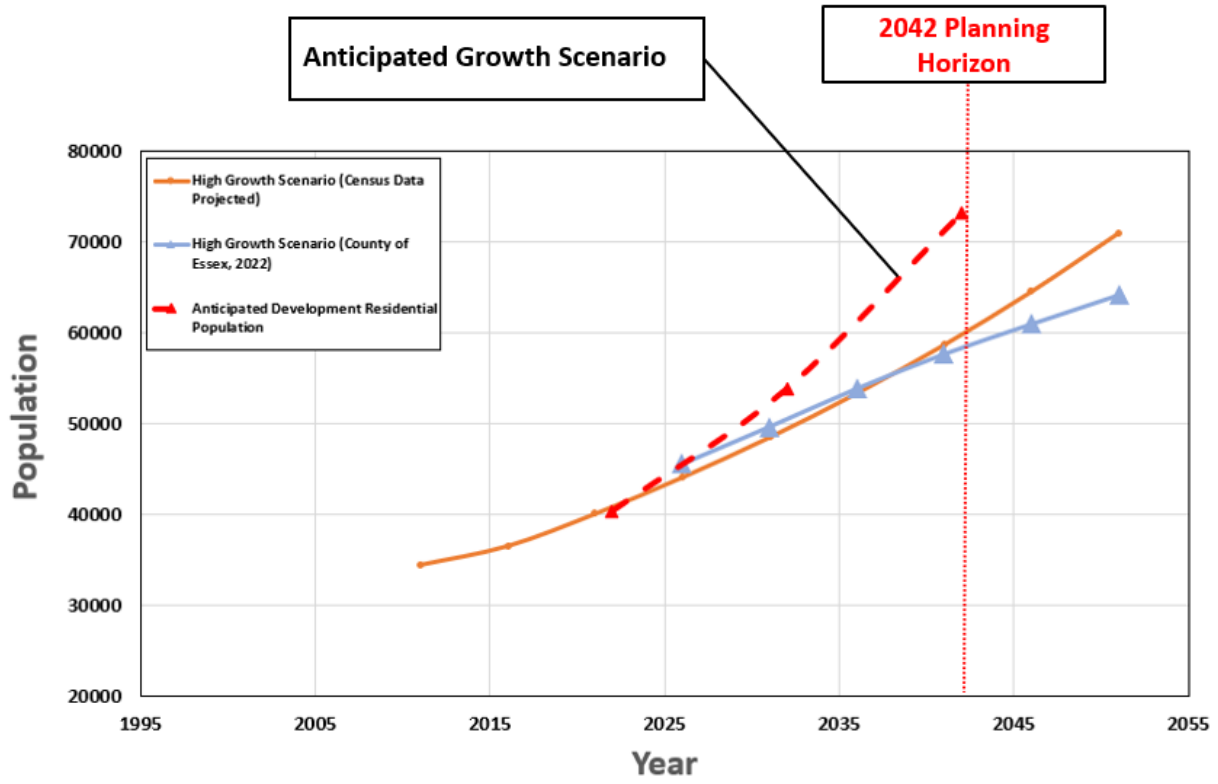
[b] Not applicable: water service area is not within the scope of the WWMP

Table 6-3. Future Residential Population by Wastewater Service Area

Wastewater Servicing Area	2032 Population [a]	2042 Population [a]
Denis St. Pierre	38,974	55,880
Stoney Point	2,280	4,540
Comber	1,272	1,368
North Woodslee	510	510
South Woodslee	400	400

[a] Total population

Figure 6-1. Growth Projections



As shown in Figure 6-1, the high growth scenario projected using census data is relatively consistent with the County of Essex (County of Essex, 2022) projected growth scenario through 2042. The anticipated growth scenario is higher than the census projected growth scenario and the County of Essex projected growth scenario.

ICI equivalent population projections are also important to consider during master planning. If the ratio of ICI to residential populations within each water and wastewater servicing area change substantially during the planning horizon, per capita water demand and per capita wastewater generation rates may no longer be representative. A comparison of the ratio of ICI equivalent populations to residential populations for existing conditions, the 2032 scenario, and the 2042 scenario was completed for each water and wastewater servicing area as presented in Table 6-4 and Table 6-5, respectively. Note that greenhouse developments are not anticipated within Lakeshore and therefore were not considered during this WWMP.

Table 6-4. Percentage of ICI Populations to Residential Populations by Water Servicing Area

Water Servicing Area	Existing	2032	2042
Belle River	44%	39%	31%
Stoney Point	6%	6%	19%

Table 6-5. Percentage of ICI Populations to Residential Populations by Wastewater Servicing Area

Wastewater Servicing Area	Existing	2032	2042
Comber	138%	138%	231%
Denis St. Pierre	48%	41%	32%
Stoney Point	17%	17%	9%

As shown in Table 6-5, the ICI to residential population in Comber wastewater servicing area and Stoney Point water servicing area increases substantially over the planning horizon. Therefore, the future wastewater generation rate in Comber and water demand rate in Stoney Point should be re-evaluated during subsequent design stages of the preferred alternative.

6.2 Projected Water Demands

Future water demands were projected based on growth projections presented in Section 6.1 and using the following methodology:

- Future water demands for the existing population were assumed to remain consistent with existing water demands (i.e., no change in per capita water demands and maximum day factors).
- Future water demands for new growth were calculated using the historical maximum day factor (determined in Section 5.5) and MECP design guideline for per capita water demand. This approach is somewhat conservative, as the historical maximum day factor and per capita water demands in the BRWSS and SPWSS are below the MECP design guideline values.

Future water demands are presented for each WTP in Table 6-6 and are broken down by pressure zone in Table 6-7.

Table 6-6. Water Demand Projections by WTP

Treatment Plant	Year	ADD (m^3/d)	MDD (m^3/d)
Lakeshore WTP	Existing	10,104	16,367
	2032	14,734	24,650
	2042	20,651	35,235
Stoney Point WTP	Existing	2,044	3,354
	2032	2,122	3,510
	2042	2,952	5,177

Table 6-7. Water Demand Projections by Pressure Zone

Pressure Zone	Year	Population	ADD (m^3/d)	MDD (m^3/d)
Belle River Pressure Zone	Existing	29,981	10,104	16,367
	2031	43,211	14,734	24,650
	2041	60,117	20,651	35,235
Stoney Point Pressure Zone	Existing	4,349	1,237	2,393
	2031	4,482	1,284	2,483
	2041	5,447	1,622	3,136
Haycroft Pressure Zone	Existing	328	139	286
	2031	328	139	286
	2041	328	139	286
Comber Pressure Zone	Existing	1,378	496	734
	2031	1,378	527	780
	2041	2,875	1,020	1,509

Pressure Zone	Year	Population	ADD (m^3/d)	MDD (m^3/d)
Tilbury West Pressure Zone	Existing	480	140	286
	2031	480	140	286
	2041	480	140	286

6.3 Projected Wastewater Flows

Wastewater flows are made up of wastewater discharges from residential, commercial, industrial, and institutional establishments, as well as extraneous flow from inflow and infiltration such as groundwater and rainfall. The process for identifying capacity constraints at wastewater treatment facilities is different than identifying in-pipe and pump station capacity constraints in the sanitary collection system. Therefore, the wastewater flow projections and sanitary conveyance and collection system flow projections were estimated using different methodologies over the Master Plan planning horizon.

6.3.1 Projected Wastewater Generation

Wastewater flow projections for the respective wastewater treatment plant were estimated by multiplying the annual average daily flow per capita (AADF per capita) with the projected population, presented in Section 6.1. A review of the historical wastewater flow data from their respective sewage treatment facilities for the years 2018 to 2022 was conducted to determine the AADF. The AADF per capita was then computed by dividing the AADF (2018-2022) by the existing population of the service area.

Table 6-8 summarizes the projected AADF for the five wastewater treatment plants over the Master Plan planning horizon. The projection is based on the population projections presented in Section 6.1. Planning for the development of the treatment plant starts as soon as the facility reaches 80 percent of the rated capacity.

Table 6-8. Lakeshore's Projected Wastewater Generation (2022-2042)

Treatment Plant	Year	Treatment Capacity (m^3/day)	AADF per capita (L/day/cap)	Population	AADF (Projected) (m^3/day)	% Rated Capacity
Denis St. Pierre WPCP	Existing (2023)	25,000	527	25,744	13,558	54
	2032	25,000	527	38,974	20,525	82
	2042	25,000	527	55,880	29,429	118
Stoney Point STF	Existing (2023)	949	531	2,280	1,211	127
	2032	949	531	2,280	1,211	127
	2042	949	531	4,540	2,412	254
Comber STF	Existing (2023)	430	383	1,050	402	94
	2032	430	383	1,272	487	113
	2042	430	383	1,386	531	123

Treatment Plant	Year	Treatment Capacity (m^3/day)	AADF per capita (L/day/cap)	Population	AADF (Projected) (m^3/day)	% Rated Capacity
North Woodslee STF	Existing (2023)	330	85	510	44	13
	2032	330	85	510	44	13
	2042	330	85	510	44	13
South Woodslee STF	Existing (2023)	210	116	400	46	22
	2032	210	116	400	46	22
	2042	210	116	400	46	22

Comparing the projected versus the available plant treatment capacity, the following observations are noted:

- **The Denis St. Pierre WPCP** is operating at 54 percent of its rated capacity. It is predicted that wastewater flows will reach 80 percent of the new rated capacity in 2032, triggering the planning process to expand the treatment capacity of the plant. The design for the ongoing expansion includes the provision for an expansion to 30,000 m^3/day. If growth is realized more quickly than projected, the Municipality could proceed with expansion without undertaking a subsequent Schedule C Class EA, with MECP approval, as the current Schedule C Class EA is valid for 10 years. If growth is realized as projected or more slowly than projected, the Municipality will need to initiate a Schedule C Class EA to expand the plant when 80 percent capacity is reached (anticipated to occur in 2032). However, from 2032 to 2042, the population in Belle River/Maidstone wastewater service area is anticipated to increase by approximately 46 percent and capacity for the plant will not be sufficient to treat the projected wastewater flows. As the population projections put forward in this Master Plan predict that 80 percent of the 30,000 m^3/day could be reached before 2042 it is recommended that the need to expansion beyond 30,000 m^3/day be considered at that time. Subsequent Master Plan updates will assist the Municipality in refining the timing of these future needs. It is recommended that the Municipality monitor how flows are realized relative to the Master Plan projections to adjust the need for subsequent Master Plan updates and the need to trigger a plant expansion.
- **The Stoney Point STF** is operating at 127 percent of the rated capacity. The existing capacity at the STF is not adequate to meet the present and future treatment requirements and expansion of the plant is needed before any further growth can be accommodated. In addition, performance issues (i.e., Stoney Point STF exceeded effluent TAN, TSS and E.coli for several months from 2018 to 2022) have been identified under existing conditions (Section 5.4.3). During engagement activities on the project the MECP has emphasized the need for a long-term plan to address both existing and future capacity needs to protect the environment and public health.
- **The Comber STF** is operating near its rated capacity. The population in the Comber servicing area is expected to grow by 30 percent over the planning horizon and the plant capacity is not adequate to meet future treatment requirements and expansion of the facility is needed before any growth beyond what was already approved can be accommodated. In addition, performance issues (i.e., effluent objectives for TAN were exceeded numerous times) have been identified under existing conditions (Section 5.4.4). During engagement activities on the project the MECP has emphasized the need for a long-term plan to address both existing and future capacity needs to protect the environment and public health. All reserved capacity at this STF has been allocated.

- **The North and South Woodslee STFs** are operating at 13 percent and 22 percent of the rated capacity, respectively. Minimal increase in AADF is anticipated for the North and South Woodslee STF between 2022-2042 and the capacity at North and South Woodslee is adequate to meet treatment requirements over the planning horizon.

6.3.2 Projected Sanitary Conveyance System Flows

The wastewater conveyance system flows for the 2032 and 2042 future scenarios were based on the projected residential and equivalent ICI populations. The design flow rate for the future residential and ICI equivalent population is 450 LPCD in accordance with the Municipality of Lakeshore's Development Manual (Town of Lakeshore, 2017). The peaking factor for each proposed development corresponds to the calibrated diurnal profiles from the sanitary hydraulic model calibrated by Jacobs in 2021. The peaking factor was assigned based on the location of the developments and the diurnal profile used for the nearby existing catchments. This approach is assumed more realistic to evaluate the capacity at the pumping stations compared to a constant Harmon peak factor value. Similarly, calibrated real-time kinematic values that represent inflow and infiltration (l/l) during wet weather events have been specified for the future projected parcels instead of using a constant design rate that may overestimate the total volumes arriving to the pumping stations. However, a sensitivity analysis can be performed on the recommended alternative to determine the impact of the I/I estimation methodology on the sizing of proposed infrastructure.

6.4 Summary of Future Needs

This section summarizes the future needs identified for drinking water, sanitary collection and conveyance, and wastewater treatment to the Master Plan planning horizon of 2042.

6.4.1 Future Water Treatment System Needs

The future water demands developed in Section 6.2 were compared against the rated capacities of the Lakeshore WTP and Stoney Point WTP to identify future water treatment needs. This comparison is presented in Table 6-9. Future demand increases are partially dependent on ICI growth timing, so overall demands should be monitored and expansion timing should be adjusted as required.

- **The Lakeshore WTP** is currently operating at 45 percent of its current rated capacity and is not expected to exceed its rated capacity within the planning horizon of 2042. However, it will be operating at 98 percent capacity by 2042, meaning that the planning process for expansion should be initiated within the planning period.
- **The Stoney Point WTP** is projected to reach its rated capacity by 2035 and will exceed its rated capacity by 632 m^3/d in 2042.

Table 6-9. Water Treatment Plant Percent Capacity Projections

WTP	Year	Treatment Capacity (m^3/day)	MDD (m^3/day)	Percent of Rated Capacity
Lakeshore WTP	2022	36,400	16,367	45
	2032	36,400	24,650	68
	2042	36,400	35,235	98
Stoney Point WTP	2022	4,545	3,354	74
	2032	4,545	3,510	77
	2042	4,545	5,177	114

6.4.2 Future Water Storage and Distribution Needs

Future treated water storage needs were identified based on the methodology described in Section 5.6.2, considering future water demands in each pressure zone.

As discussed in Section 5.6.2, the required storage capacity for each pressure zone/servicing area is made up of the fire flow requirement, equalization storage and emergency storage components. The fire flow requirements were presented in Table 5-13 which are also applied to the projected storage needs. The equalization storage component is equal to 25 percent of MDD in the corresponding pressure zone. MDD in each pressure zone was projected based on the following components:

$$Projected\ MDD = A + (B)(C - D)(E)$$

A = Current MDD (2022)

B = Per capita water demand (350 Lpcd per MECP design guidelines (MECP, 2008))

C = Projected population

D = Current population (2022)

E = Pressure Zone Maximum Day Factor (Belle River = 1.79; Stoney Point = 1.93; Haycroft = 2.05; Comber = 1.48; Tilbury West = 2.05)

A future storage needs assessment for each pressure zone is presented in Table 6-10.

Table 6-10. Future Water Storage Needs

Pressure Zone	Year	MDD (m^3/d)	Required Storage Capacity (m^3)	Available Storage Capacity (m^3)	Storage Surplus/Deficit (m^3)
Belle River Pressure Zone	2022	16,367	9,320	15,722	6,402
	2032	24,650	11,908	15,722	3,814
	2042	35,235	15,216	15,722	506
Stoney Point Pressure Zone	2022	2,393	1,978	1,464	-514
	2032	2,483	2,144	1,464	-680
	2042	3,136	2,348	1,464	-884
Haycroft Pressure Zone	2022	286	89	470	381
	2032	286	89	470	381
	2042	286	89	470	381
Comber Pressure Zone	2022	734	1,426	985	-442
	2032	780	1,441	985	-456
	2042	1,509	1,669	985	-684
Tilbury West Pressure Zone	2022	286	89	89	0
	2032	286	89	89	0
	2042	286	89	89	0

No storage deficits are projected in the Belle River, Haycroft and Tilbury West pressure zones within the planning horizon. The Stoney Point and Comber pressure zones have storage deficits under current conditions, which are expected to increase to 884 m^3 and 684 m^3 by 2042, respectively.

6.4.3 Future Water Distribution System Pumping Needs

Future treated water pumping needs were identified based on the methodology described in Section 5.6.3, considering future water demands in each pressure zone. Future needs are presented in Table 6-11.

As discussed in Section 5.6.3, pumping requirements for each pressure zone were identified based on the following:

- **Systems with floating storage** require sufficient pumping capacity to meet the pressure zone MDD plus the MDD of any downstream pressure zones (i.e., Haycroft, Comber and Tilbury West pressure zones are downstream of the Stoney Point pressure zone).
- **Systems without floating storage** require sufficient pumping capacity to meet the pressure zone MDD and fire flow requirements identified in Section 5.6.2, plus the MDD of any downstream pressure zones.

Table 6-11. Future Water Pumping Needs

Pressure Zone	Year	Required Pumping Capacity (m^3/day)	Available Pumping Capacity (m^3/day)	Pumping Surplus/ Deficit (m^3/day)
Belle River	2022	16,367	36,400	20,033
	2032	24,650	36,400	11,750
	2042	35,235	36,400	1,165
Stoney Point	2022	16,831	5,530	-11,301
	2032	16,967	5,530	-11,437
	2042	18,350	5,530	-12,820
Haycroft	2022	823	2,851	2,028
	2032	823	2,851	2,028
	2042	823	2,851	2,028
Comber	2022	12,224	3,067	-9,157
	2032	12,271	3,067	-9,204
	2042	13,000	3,067	-9,933
Tilbury West	2022	436	1,970	1,534
	2032	436	1,970	1,534
	2042	436	1,970	1,534

No pumping deficits are projected in the Belle River, Haycroft and Tilbury West pressure zones within the planning horizon. The Stoney Point and Comber pressure zones have storage deficits under current conditions, which are expected to increase to 12,820 m^3 and 9,933 m^3 by 2042, respectively.

6.4.4 Future Wastewater Treatment Needs

Population in Lakeshore is anticipated to grow within the planning horizon, as summarized in Table 6-3. Table 6-12 summarizes what is required for Lakeshore to accept additional wastewater flows and accommodate growth.

- **The Denis St. Pierre WPCP** was operating at 94 percent of the rated capacity and the plant capacity was not adequate to meet the existing treatment requirements. However, a recent expansion to the Denis St. Pierre WPCP has been completed and is currently operational. The new rated capacity of Denis St. Pierre WPCP is 25,000 m^3/day and is expected to be able to meet the treatment requirements to 2032 based on the population projections presented in Section 6.1. The plant is currently operating at 54 percent of its rated capacity.
  - In 2032 it is predicted that wastewater flows will reach 80 percent of the new rated capacity, triggering the planning process to expand the treatment capacity of the plant. The design for the ongoing expansion includes the provision for an expansion to 30,000 m^3/day. If growth is realized more quickly than projected, the Municipality could proceed with expansion without undertaking a subsequent Schedule C Class EA, with MECP approval, as the current Schedule C Class EA is valid for 10 years.
  - If growth is realized as projected or more slowly than projected, the Municipality will need to initiate a Schedule C Class EA to expand the plant when 80 percent capacity is reached (anticipated to occur in 2032). It is recommended that the Municipality monitor how flows are realized relative to the Master Plan projections to adjust the need for subsequent Master Plan updates and the need to trigger a plant expansion.
- **Stoney Point STF** is operating at 127 percent of the rated capacity. The existing capacity at the STF is not adequate to meet the present and future treatment requirements and expansion of the plant is needed before any further growth can be accommodated. In addition, performance issues (i.e., Stoney Point STF exceeded effluent TAN, TSS and E.coli for several months from 2018 to 2022) have been identified under existing conditions (Section 5.4.3). During engagement activities on the project the MECP has emphasized the need for a long-term plan to address both existing and future capacity needs to protect the environment and public health.
- **Comber STF** is operating near its the rated capacity. The population in the Comber servicing area is expected to grow by 30 percent over the planning horizon and the plant capacity is not adequate to meet future treatment requirements and expansion of the facility is needed before any growth beyond that already approved can be accommodated. All reserve capacity has been allocated. The development anticipated to bring the Comber STF over its rated capacity are under construction at the time of this Master Plan. In addition, performance issues (i.e., effluent objectives for TAN were exceeded numerous times) have been identified under existing conditions (Section 5.4.4). During engagement activities on the project the MECP has emphasized the need for a long-term plan to address both existing and future capacity needs to protect the environment and public health.
- **North and South Woodslee STF** have sufficient hydraulic capacity and no increase in the average daily flows to the plants is projected till 2042. Hence, expansion of the North and South Woodslee STF is not required.

Table 6-12. Lakeshore's Future Wastewater Treatment Needs

Treatment Plant	Current Rated Capacity (m^3/day)	Existing Average Daily Flows 2023 (m^3/day)	Projected Average Daily Flows 2032 (m^3/day)	Projected Average Daily Flows 2042 (m^3/day)	Remarks
Denis St. Pierre Water Pollution Control Plant	25,000	13,558	20,525	29,429	The Denis St. Pierre WPCP was commissioned in spring 2024 and increased the capacity to 25,000 m^3/day. Based on the population projections, the Denis St. Pierre WPCP will reach 80 percent of its rated capacity by 2032, triggering the Phase 2 expansion to 30,000 m^3/d.
Stoney Point Lagoon Facility	949	1,211	1,211 [a]	2,412 [a]	The Stoney Point Lagoon Facility is currently over the rated hydraulic capacity.
Comber Lagoon Facility	430	402	487 [a]	531 [a]	The Comber Lagoon Facility is near capacity, triggering the need for expansion. Existing reserve capacity has already been allocated.
North Woodslee Treatment Facility	330	44	44	44	The North Woodslee facility has remaining hydraulic capacity.
South Woodslee Treatment Facility	210	46	46	46	The South Woodslee facility has remaining hydraulic capacity.

Notes:

[a] Project growth and flows are impacted due to capacity constraints

6.4.5 Future Sanitary System Needs

The conveyance constraints at Stoney Point, Comber, North Woodslee, and South Woodslee remain unknown and flow monitoring is recommended to better understand the constraints (in Section 5.4).

The sanitary hydraulic model was used to identify the future conveyance constraints within the Denis St. Pierre sewershed. Model scenarios were developed for 2032 and 2042 using the population projections described in Section 6.1 and the sanitary flow projection methodology described in Section 6.3.2. The constraints identified under the projected 2032 and 2042 scenarios, as well as the existing conditions scenario, are described in Table 6-13 and shown in Figure 6-2.

Table 6-13. Future Sanitary System Needs -Denis St. Pierre Sewershed

Constraints	Constrained under Existing Conditions	Constrained under Future (2032) Conditions	Constrained under Future (2042) Conditions	Description
Amy Croft Drive Trunk Sewer	No	Yes	Yes	Insufficient sewer capacity along Amy Croft Drive
St. Clair Shores PS	No	Yes	Yes	Insufficient pumping capacity
Russel Woods Drive Trunk Sewer	Yes	Yes	Yes	Insufficient pipe capacity causes surcharge to PS07
Maidstone PS06	Yes	Yes	Yes	Insufficient pumping capacity causes surcharge to PS07
Wintermute Avenue Sewers	No	Yes	Yes	Insufficient pipe capacity along Wintermute Avenue downstream of Maidstone PS09
Patillo Road Sewers	Yes	Yes	Yes	Sections of pipe downstream of Maidstone PS10
East Puce Road Sewers	Yes	Yes	Yes	Insufficient pipe capacity from Monarch Meadsown Drive to Country Road 22
Maidstone PS04	Yes	Yes	Yes	Insufficient pump capacity
Sewers Downstream of Chelsea Park PS	Yes	Yes	Yes	Insufficient pipe capacity along IC Roy Drive, Mancini Drive, and Poplar Drive to Oakwood Avenue
Maidstone PS05 [a]	No	No	No	PS05 capacity becomes insufficient if flows along Old Tecumseh Drive increase due to upstream conveyance system upgrades

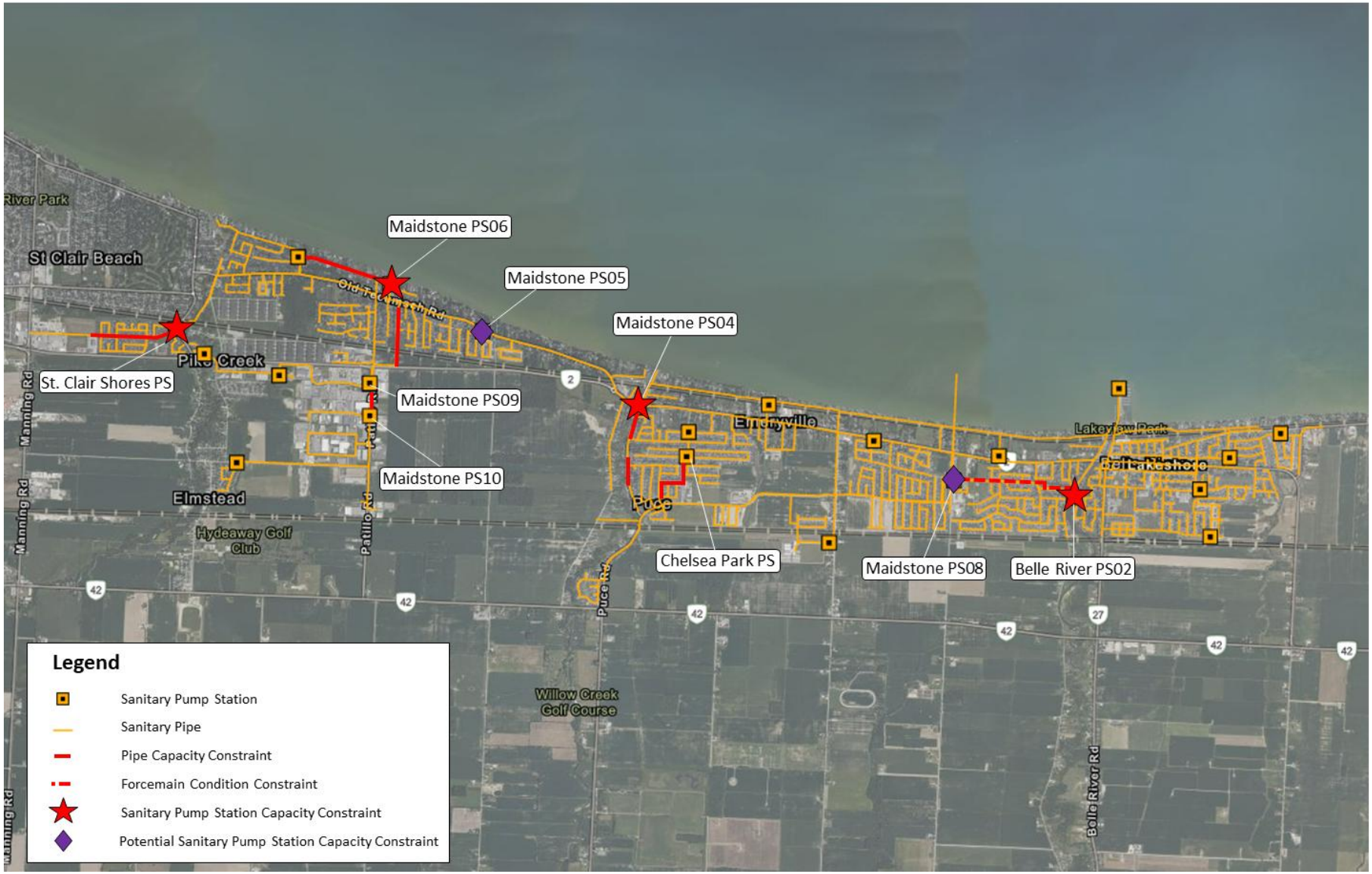
Constraints	Constrained under Existing Conditions	Constrained under Future (2032) Conditions	Constrained under Future (2042) Conditions	Description
Maidstone PS08 and Oakwood Trunk Sewer [a]	No	No	No	PS08 capacity becomes insufficient if flows to PS08 increase due to upstream conveyance system upgrades. This results in constraints due to backwater within the Oakwood Trunk Sewer
Belle River PS02	Condition-based	Yes	Yes	One of two forcemains is in poor condition. The pumping capacity at Belle River PS02 is also insufficient

Notes:
[a] Becomes a constraint if recommended alternatives result in increased flows to infrastructure location

Existing constraints along Russel Woods Drive Trunk Sewer, Patillo Road Sewers, East Puce Road Sewers, Sewers Downstream of Chelsea Park PS, and at Maidstone PS06 and Maidstone PS04 are identified and described in Section 5.4.2.3. Belle River PS02 forcemain was identified as an existing condition-based need in Section 5.4.2.3, and under future conditions the Belle River PS02 capacity is also identified as a constraint. Additional future constraints include insufficient capacity along Amy Croft Drive Trunk Sewer and at St. Clair Shores PS, as well as insufficient pipe capacity downstream of Maidstone PS09 along Wintermute Avenue.

The capacity of Maidstone PS05 and Maidstone PS08 will no longer be sufficient if infrastructure alternatives recommended to resolve the constraints presented in Table 6-13 increase the flows to these pump stations. Insufficient pumping capacity at Maidstone PS08 causes water to backup into the Oakwood Trunk Sewer, resulting in the Oakwood Trunk Sewer surcharging to a level higher than existing conditions.

Figure 6-2. Future Conveyance System Constraints in Denis St. Pierre Sewershed



7. Problem and Opportunity Statement

The goal of the WWMP Class EA is to plan for the future of water and wastewater servicing for the Municipality of Lakeshore to provide capacity for growth in a manner that is sustainable, financially responsible, and protects the environment.

This Class EA provides a long-term plan to guide how Lakeshore will continue to meet the demands of a growing community to 2042. The decisions are driven by goals for:

- Infrastructure reliability and the ability to provide an appropriate level of service
- Ability to accept and accommodate growth
- Regulatory compliance
- Public health and safety
- Legislation
- Sustainability
- Climate Change adaptation and mitigation
- Meeting priorities put forward through Municipal and County Official Plans

Lakeshore has realized growth more quickly than projected in the 2018 WWMP Update. Lakeshore continues to experience rapid growth and increased interest in new development. This presents challenges and opportunities for Lakeshore as follows:

- Multiple wastewater treatment facilities (specifically Stoney Point STP and Comber STP) have previously triggered the requirement to expand to continue to receive and treat wastewater from the existing communities and accommodate growth. The Denis St. Pierre WPCP is expected to trigger the need to expand within the planning horizon.
- Lagoon systems at Stoney Point STP and Comber STF have drawn attention from regulatory authorities and provincial agencies due to long-term hydraulic capacity constraints (identified in 2008 and 2018 Master Plans) and recent effluent quality non-compliance at the Stoney Point STF.
- There are numerous sanitary conveyance capacity constraints in the Denis St Pierre sewershed limiting Lakeshore's ability to service planned growth areas and accept new development.
- Conveyance and treatment system capacities are significantly impacted by high levels of inflow and infiltration within the collection systems.
- Provincial policy and direction emphasize redevelopment to provide additional housing opportunities, including intensification, and allowing for the approval of additional residential units (ARUs).
- Intensification of residential areas result in increased wastewater flow and drinking water demands greater than the designed capacity of the infrastructure.
- Growth realized since the 2018 WWMP Update has exceeded projections impacting Lakeshore's ability to proactively implement the recommendations.

When addressing these challenges, there are opportunities to implement solutions that provide adaptation to a changing climate, decrease energy usage, protect the environment, and protect human health and safety. Unimplemented Master Plan recommendations are likely to limit growth and economic development within Lakeshore.

8. Water Treatment Alternatives Identification and Evaluation

This section presents alternative identification and evaluation for water treatment. The Lakeshore WTP is not projected to exceed its rated capacity within the planning horizon. The Stoney Point WTP is projected to exceed its rated capacity by 2035. Alternative solutions were developed to address the Stoney Point WTP capacity constraints and are presented in the following sub-sections.

8.1 Long List of Alternatives Development and Screening

A long list of alternative solutions were developed to address the water treatment capacity constraints identified at the Stoney Point WTP within the planning horizon. Alternatives considered various potential treated water sources in addition to upgrades at the Stoney Point WTP. The long list of alternatives is as follows:

- Alternative 1: Do Nothing
- Alternative 2: Expand the Stoney Point WTP
- Alternative 3: Build a new Stoney Point WTP
- Alternative 4: Supply Stoney Point from the Lakeshore WTP
- Alternative 5: Supply Stoney Point from Chatham-Kent (i.e., the Tilbury WTP)

The long list of alternatives were screened for implementation feasibility prior to proceeding with alternative concept development and evaluation as presented in Figure 8-1. Table 8-1 presents the screening results and rationales. While the alternative related to supplying Stoney Point from the Lakeshore WTP was screened out, this alternative solution would be more feasible if the Lakeshore WTP water demand projections were to change and an expansion of Lakeshore WTP would not be required to meet area demand (having excess capacity). Lakeshore WTP water demands should be monitored in the future and this alternative could be reconsidered in more detail (if Stoney Point can be supplied without expanding the Lakeshore WTP).

Figure 8-1. Overview of Decision-Making Process

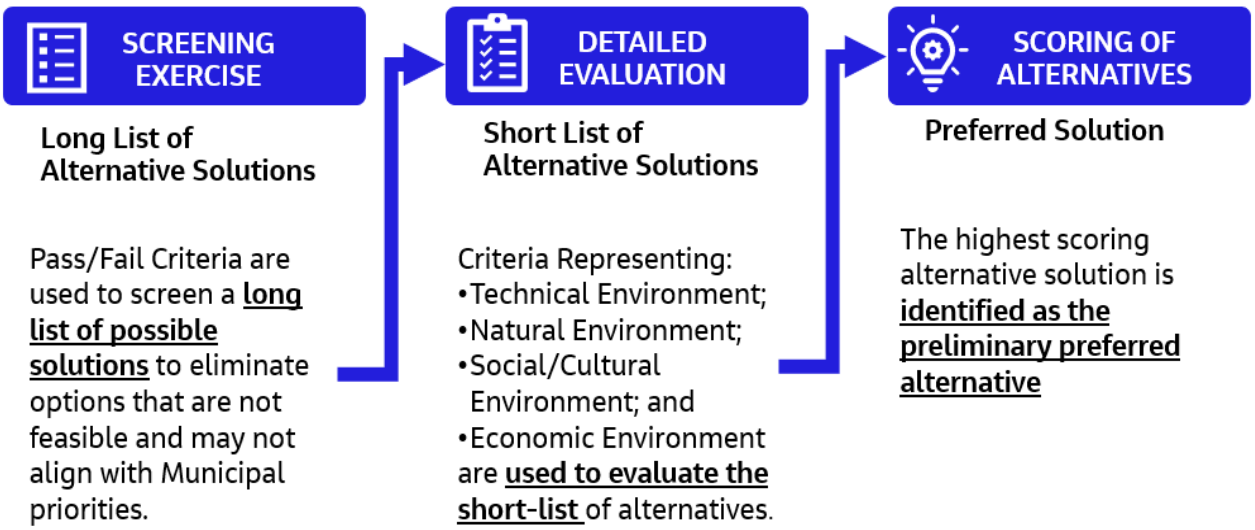


Table 8-1. Long List of Water Treatment Alternatives Screening

Alternative Solution	Carried Forward?	Rationale
Do Nothing	Yes	Required for baseline comparison as part of the Municipal Class EA process.
Expand the Stoney Point WTP	Yes	Technically feasible as there is space onsite for future expansion.
Build a new Stoney Point WTP	No	Technically feasible, however, does not provide any significant benefit vs expanding and upgrading the existing WTP.
Supply Stoney Point from the Lakeshore WTP	No	Technically feasible, however, would result in the need for Lakeshore WTP expansion in addition to significant distribution system upgrades. Cost-prohibitive.
Supply Stoney Point from Chatham-Kent	No	Would require coordination with Chatham-Kent to confirm available capacity and would require significant distribution system upgrades. Cost-prohibitive.

8.2 Alternative Concept Development

This section presents the alternative concept development for alternative solutions that were carried forward during the screening process.

8.2.1 Alternative 1: Do Nothing

Alternative 1 is to do nothing. This alternative is required as part of the Municipal Class EA process for baseline comparison purposes and does not address future needs at the Stoney Point WTP. The Stoney Point WTP would not be able to meet future water demands in this scenario.

8.2.2 Alternative 2: Expand the Stoney Point WTP

Alternative 2 is to expand the Stoney Point WTP to a minimum of 5,177 m^3/d, which is the projected water demand in 2042. The following individual unit processes require expansion based on their current rated capacity as stated in the DWWP:

- Low-Lift Pumping
- Clarification
- Intermediate Pumping
- Filtration
- High-lift Pumping

The expansion concept (i.e., filter expansion vs membrane filter retrofit) and future rated capacity would be confirmed through a Schedule C Class EA but is based on a future capacity of 5,177 m^3/d for this Master Plan. A process optimization study is also recommended prior to expansion to maximize the capacity of existing infrastructure, which may modify the timelines of the implementation of this alternative, pending the outcome.

An expansion with like-for-like processes was assumed for concept development purposes.

Figure 8-2 presents potential locations for the low-lift pumping station and clarifier expansion, and Figure 8-3 presents a potential location for the treatment building expansion (i.e., intermediate pumping, filter and high-lift pumping upgrades).

Figure 8-2. Low-Lift Pump and Clarifier Expansion Potential Locations

Figure 8-3. Stoney Point WTP Treatment Building Expansion Potential Location

8.3 Evaluation of Water Treatment Alternatives

8.3.1 Evaluation Criteria

Evaluation criteria were developed for water treatment alternatives to allow for a comparative assessment in line with the Municipal Class EA evaluation framework. Evaluation criteria are grouped into four general categories: Technical Environment, Natural Environment, Social/Cultural Environment and Economic Environment. Each category is weighted equally at 25 percent of the overall score, and each criterion is weighted equally within its respective category. Each criterion was scored on a scale of 1 to 10, with 10 being the most desirable and 1 being the least desirable. Criteria definitions and scoring scales are presented in Table 8-2.

Table 8-2. Water Treatment Alternatives Evaluation Criteria

Category	Criteria	Definition	Scoring Scale
Technical Environment	Maximize Constructability	The ability of the alternative to be implemented without significant complications, including disruptions to existing service.	10 – The alternative can be implemented with no disruption to existing service. 5 – The implementation of the alternative may result in minor disruptions to existing service. 1 – The implementation of the alternative may require significant or periodic disruptions to existing service.
	Maximize Performance Record	The degree to which the alternative employ established technologies and practices that have been demonstrated consistently to be reliable and effective.	10 – The alternative includes proven technology with a high degree of reliable performance. 5 – The alternative includes newer technology with a growing record of demonstrated performance reliability. 1 – The alternative includes innovative technology with a limited performance record and unconfirmed reliability – requires further testing/demonstration to determine feasibility for Municipality of Lakeshore.
	Minimize Operational Complexity	The alternative's ability to be operated and maintained with ease and minimal complexity.	10 - The alternative has the highest Operations and Maintenance (O&M) complexity. 5 – The alternative has moderate O&M complexity. 1 - The alternative has lowest O&M complexity.
	Minimize Risks with obtaining Permit and Approvals	The ability of the alternative to be approved with minimal, if any, conditions.	10 – The alternative can be readily approved. 5 – The alternative can be approved with minimal conditions. 1 – The alternative can be approved with significant or onerous conditions.

Category	Criteria	Definition	Scoring Scale
Technical Environment	Ability to Meet Treatment Capacity Requirements	The alternative's ability to address or alleviate the concerns that it was designed to, considering short-term, medium-term and long-term effects.	10 - The alternative can meet short-term, medium- and long-term requirements. 5 – The alternative will be somewhat effective in addressing the concerns for some time periods. 1 - The alternative may only meet short-term requirements.
	Flexibility to Accommodate Potential Future Municipality Land Use	The alternative's site footprint and location's capacity to allow for future land use utilization.	10 -The site can be easily designed with provisions to accommodate potential future land use (e.g., space available to allow for future expansion of plant while not affecting other site operations). 5 – The site can be designed with provisions to accommodate potential future land use, with some impacts to existing operations (e.g., space available to allow for future expansion of plant but will affect or limit future expansion of other site operations). 1 - The site has limited flexibility to accommodate potential future land use or will result in significant changes to existing operations (e.g., space not available for future expansion of plant or limit future expansion of other site operations).
	Minimize Footprint Requirements	The amount of footprint the alternative requires to be implemented.	10 - The alternative's footprint is relatively small compared to other alternatives. 5 – The alternative's footprint is relatively moderate compared to other alternatives. 1 - The alternative's footprint is relatively large compared to other alternatives.
	Minimize Energy Requirements	The resources and fuel the alternative requires in order to function, include electrical, gas, oil, water, etc.	10 – The alternative has lower energy requirements. 5 – The alternative's maintains existing energy requirements. 1 – The alternative has higher energy requirements.

Category	Criteria	Definition	Scoring Scale
Natural Environment	Ability to meet Municipality's Climate Change/Resiliency Goals	The alternative's ability to provide climate adaptation and resiliency benefits.	10 – The alternative will make a significant contribution to the Municipality's goal to achieving Municipality's Climate Change/Resiliency Goals. 5 – The alternative will make a modest contribution to achieving Municipality's Climate Change/Resiliency Goals. 1 – The alternative will not make a measurable contribution to achieving Municipality's Climate Change/Resiliency Goals.
	Minimize Impact to the Local Hydrogeology and Groundwater System	The alternative's potential to induce water table impacts, hydrogeological setting, and surface and groundwater quality degradation.	10 – The alternative will result in minimal impacts to the hydrogeology environment and groundwater system. 5 – The alternative will result in moderate impacts to the hydrogeology environment and groundwater system. 1 – The alternative will result in significant impacts to the hydrogeology environment and groundwater system.
	Minimize Impact to the Terrestrial Habitat and Corridors	The alternative's potential to negatively impact SAR, wildlife, and vegetation.	10 – The alternative will avoid terrestrial habitats and corridors. 5 – The alternative may require special measures to protect terrestrial habitats and corridors. 1 – The alternative will result in an unacceptable loss of terrestrial habitats and corridors.
	Minimize Impact to Aquatic Habitats and Fisheries	The alternative's potential to negatively impact the aquatic environment and proximity to aquatic habitat.	10 – The alternative will protect aquatic habitats and fisheries and has the potential to provide enhancements. 5 – The alternative may require special measures to protect aquatic habitats and fisheries. 1 – The alternative will result in an unacceptable loss of aquatic habitat and fisheries.

Category	Criteria	Definition	Scoring Scale
Natural Environment	Minimize Impacts to Soil Quality	The alternative's potential to negatively impact surface water quality and quantity.	10 – The alternative has the potential to improve the quality and/or productivity of the soil. 5 – The alternative provides for similar quality or productivity of the soil. 1 – The alternative has the potential to reduce the quality and/or productivity of the soil.
	Minimize Impacts to Floodplain	The alternative's potential to negatively impact floodplain integrity.	10 - The alternative will maintain the existing floodplain and flood volume capacity. 5 – The alternative will require specials measures to maintain the existing flood plain and flood volume capacity. 1 - The alternative will result in an unacceptable loss of floodplain and will require significant measures to replace lost flood volume capacity.
	Minimize Impacts to Air Quality	The alternative's potential to negatively impact air quality.	10 - The alternative has the potential to improve the air quality. 5 – The alternative provides for similar air quality. 1 - The alternative has the potential to reduce the air quality.
	Minimize Impacts to Wetlands	The alternative's potential to negatively impact wetland environments.	10 – The alternative will avoid wetlands. 5 – The alternative may require special measures to maintain wetland protection. 1 – The alternative will result in an unacceptable threat to wetlands.
Social/Cultural Environment	Minimize Occupational Health & Safety Risks	The alternative's potential to induce negative effects on the existing community's health and safety.	10 – There are no risks to occupational health and safety. 5 – There are minor risks to occupation health and safety that can be properly managed. 1 – There are significant risks to occupation health and safety which require significant training and or risk management plans to minimize risks to acceptable levels.

Category	Criteria	Definition	Scoring Scale
Social/Cultural Environment	Minimize Community Health & Safety Risks	The alternative's potential to induce negative effects on the personnel who need to access the implementation for inspection, maintenance, and construction.	10 – There are significant risks to community health and safety which require significant measures and risk management plans to minimize risks to acceptable levels. 5 – There are minor risks to community health and safety that can be properly managed. 1 – There are no risks to community health and safety.
	Minimize Noise Levels	The alternative's potential to generate noise and its' proximity to sensitive receptors.	10 – The alternative has little or no potential to produce noise. 5 – The alternative has moderate potential to produce noise; noise control measures may be needed to prevent migration off site. 1 – The alternative has a high potential to produce noise; significant mitigation would be needed to control migration off site.
	Minimize Disruption from Construction	The alternative's level of disruption to the existing community during construction.	10 – The alternative will result in minimal disruption to the existing community and transportation. 5 – The alternative will result in a moderate level of disruption to the existing community and transportation. 1 – The alternative will result in a high level of disruption to the existing community and transportation.
	Maximize Positive Community Perception	The opinions about the implementation and operation of the alternative held by the general public, including members of the surrounding community.	10 – The alternative has the potential to receive a high level of support and endorsement from the public. 5 – The alternative has the potential to receive moderate level of support and endorsement from the public. 1 – The alternative has the potential to receive little to no support and endorsement from the public.

Category	Criteria	Definition	Scoring Scale
Social/Cultural Environment	Maximize Aesthetic Considerations	The likely visual effect the alternative will have on the surrounding environment and community if implemented.	10 – The alternative will contribute positively toward the aesthetic environment of its occupied space. 5 – The alternative will not significantly impact the aesthetic environment of its occupied space. 1 – The alternative will negatively affect the aesthetic environment of its occupied space.
	Minimize Impact on Archaeological Resources	The likely adverse impact to archaeological resources or areas of archaeological potential.	10 – The site has no known archaeological resources or areas of archaeological potential. 5 – The site contains areas of archaeological potential. 1 – The site contains archaeological resources and areas of archaeological potential.
Social/Cultural Environment	Minimize Impact on Built Heritage Resources and Cultural Heritage Landscapes	The likely adverse impact to known or potential built heritage resources and cultural heritage landscapes	10 – The site has no known or potential built heritage resources or cultural heritage landscapes. 5 – The site contains or is in proximity to potential built heritage resources and or cultural heritage landscapes. 1 – The site contains known and potential built heritage resources and cultural heritage landscapes.
	Maximize Municipal Planning Objectives Compatibility	The alternative's adherence and contribution to the planning objectives of the Municipality of Lakeshore.	10 – The alternative is fully compatible with municipal planning objectives. 5 – The alternative is somewhat compatible with municipal planning objectives. 1 – The alternative is not compatible with municipal planning objectives.
Economic Environment	Minimize Life Cycle Cost	The alternative's overall lifecycle cost, including both O&M and required replacement costs compared to other alternatives.	10 – The alternative has a low life cycle cost relative to the other alternatives. 5 – The alternative has a medium life cycle cost relative to the other alternatives. 1 – The alternative has a high life cycle cost relative to the other alternatives.

Category	Criteria	Definition	Scoring Scale
	Minimize Capital Costs	The capital costs of the alternative.	10 – The alternative's capital costs are low relative to other alternatives. 5 – The alternative's capital costs are moderate relative to other alternatives. 1 – The alternative's capital costs are high relative to other alternatives.
Economic Environment	Minimize O&M Costs	The recurring economic costs to maintain the alternative after implementation.	10 – The alternative's maintenance and operation costs are low relative to other alternatives. 5 – The alternative's maintenance and operation costs are moderate relative to other alternatives. 1 – The alternative's maintenance and operation costs are high relative to other alternatives.

8.3.2 Stoney Point Water Treatment Alternatives Evaluation

The Stoney Point water treatment alternatives evaluation results are presented in Table 8-3. **Alternative 2: Expand the Stoney Point WTP** was identified as the preferred solution for the following reasons:

- The "do nothing" alternative does not address future water treatment needs.
- The expansion provides water supply capacity to facilitate future projected growth within the SPWSS.

Detailed scoring rationales are presented in Appendix D.

Table 8-3. Stoney Point WTP Alternatives Evaluation Results

Criteria Category	Alternative 1: Do Nothing	Alternative 2: Expand the Stoney Point WTP
Economic	5.3	5.0
Technical	4.3	7.5
Social/Cultural	5.9	8.3
Natural Environment	4.5	5.6
Overall Score (Out of 10)	5.0	6.6

The following steps are required to implement this solution:

- The Municipality should complete a process optimization study to identify opportunities to maximize the treatment capacity of the existing processes.
- The Municipality should initiate a Schedule C Class EA to identify the preferred strategy to expand the Stoney Point WTP. The Schedule C Class EA will also confirm the future water demands and the ultimate plant capacity This is anticipated to be required in approximately 2030. It is expected that this will cost approximately $350,000.

Table 8-4 presents the capital cost estimate for the preferred solution. This cost estimate is based on an expansion with like-for-like technologies and will be confirmed in the Schedule C Class EA. A review of land acquisition requirements and needs was not completed and land acquisition costs are not included in the alternative cost.

Table 8-4. Estimated Capital Cost for Stoney Point WTP Expansion

Component	Unit Cost (CAD)
Low-lift Pump Station Upgrades	$400,000
Clarifier Expansion	$1,180,000
Intermediate Pumping Station Upgrades	$400,000
Filter Expansion	$3,300,000
Allowances	$1,250,000
Subtotal	**$6,500,000**
Mobilization/Demobilization, Bonds, Insurance, and Contract Profit (15%)	$975,000
Contractor overhead (10%)	$650,000
Design Development Contingency (30%)	$1,950,000
Design and Engineering Fees (20%)	$1,300,000
Total	**$11,400,000**

Notes:

Capital costs are presented at a 2024 dollar value and are at a planning level of detail with a confidence of +50% / -30%

9. Water Storage and Pumping Alternatives Identification and Evaluation

This section presents alternative identification and evaluation for water distribution and storage. While future needs for these components were assessed independently, the preferred future storage strategies could impact pumping requirements in each system. For example, implementing floating storage in a system that currently only has below-grade storage would eliminate the requirement to provide fire flow via pumping. Therefore, water storage and pumping alternatives were developed as one set of alternatives.

The following future needs were identified for water storage and distribution system pumping in Lakeshore:

- **BRWSS:** No storage or pumping constraints within the planning period.
- **SPWSS**
  - **Stoney Point Pressure Zone:** Storage and pumping capacity constraints under current and future conditions.
  - **Haycroft Pressure Zone:** No storage or pumping constraints within the planning period.
  - **Comber Pressure Zone:** Storage and pumping capacity constraints under current and future conditions.
  - **Tilbury West Pressure Zone:** No storage or pumping constraints within the planning period.

Therefore, alternative solutions were developed to address the constraints identified for the Stoney Point and Comber pressure zones. These alternative solutions are presented in the following sub-sections.

Distribution system pipe constraints (i.e., pipe capacity and system pressure under min DD, MDD and fire flow conditions) were not assessed as part of this Master Plan, as a calibrated water distribution system model was not available.

9.1 Stoney Point Pressure Zone Alternatives

The following alternatives were developed to address the pumping and storage constraints in the Stoney Point pressure zone:

- Alternative 1: Do Nothing
- Alternative 2: Increase below-grade storage and pumping capacity
- Alternative 3: Implement floating storage
- Alternative 4: Integrate the Belle River and Stoney Point Servicing Areas

These alternatives are discussed in further detail in the following sub-sections.

9.1.1 Alternative 1: Do Nothing

Alternative 1 is to do nothing. This alternative is required as part of the Municipal Class EA process for baseline comparison purposes and does not address the future needs identified for the Stoney Point pressure zone.

9.1.2 Alternative 2: Increase Below-Grade Storage and Pumping Capacity

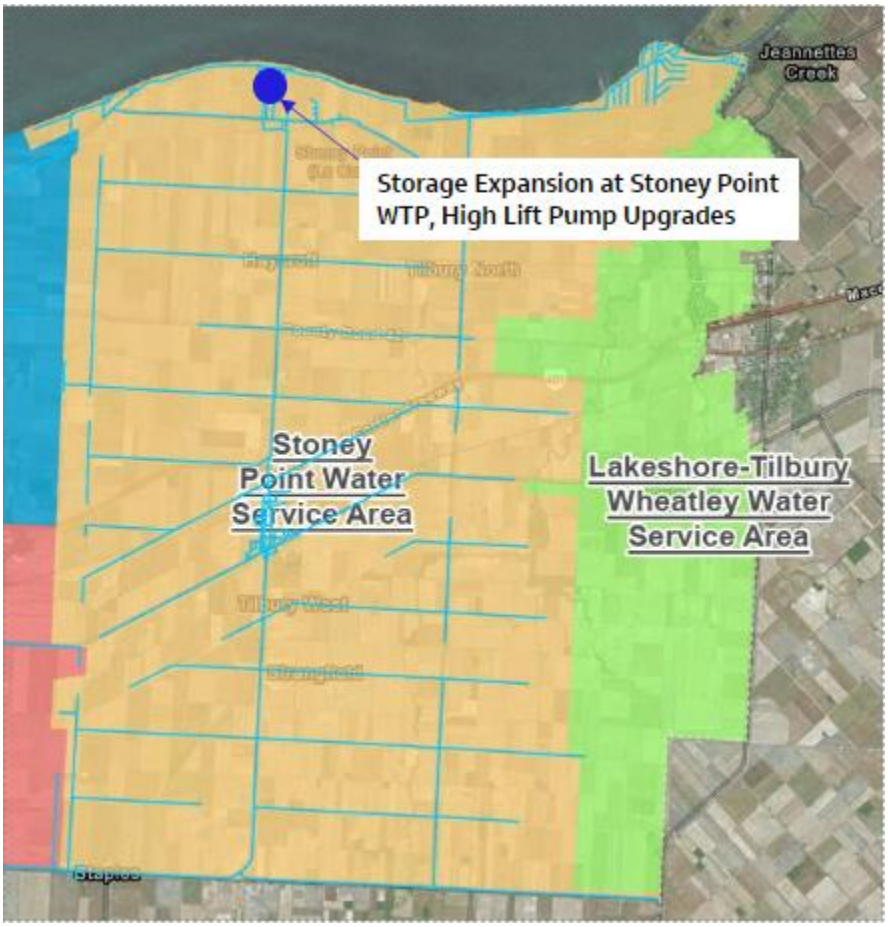
Alternative 2 is to expand below-grade storage and pumping capacity in Stoney Point. The pressure zone would remain a closed system and therefore, fire flow and overall system pressure would continue to be maintained by continuous pumping. A minimum of 1,000 m^3 additional storage volume and 13,700 m^3/d additional pumping capacity are required.

There are two options for implementing this alternative:

1. Expand the Stoney Point WTP reservoir and upgrade the high-lift pumps to meet fire flow needs.
2. Construct a new reservoir and booster pump station in the Stoney Point area.

Option 1 was carried forward for evaluation in this Master Plan, as it would require the least footprint and least amount of distribution system upgrades, although it would reduce the area available for the future Stoney Point WTP expansion. These options would be evaluated in further detail as part of a separate Schedule B Class EA if Alternative 2 was selected as the preferred solution in this Master Plan. Alternative 2 is presented in Figure 9-1.

Figure 9-1. Stoney Point Storage and Distribution Alternative 2

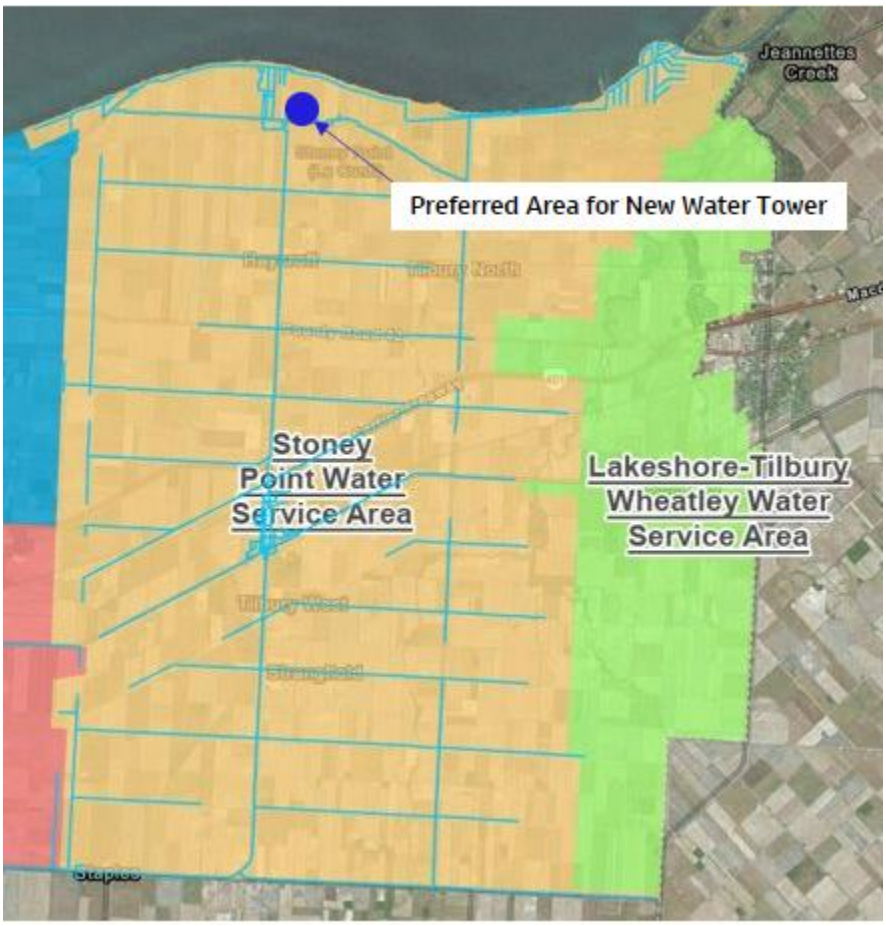


9.1.3 Alternative 3: Implement Floating Storage

Alternative 3 is to implement floating storage (i.e., a water tower) in the Stoney Point pressure zone. Stoney Point would become an open pressure zone, with fire flow and system pressure maintained by the water tower rather than through continuous pumping. The Stoney Point WTP HLPS would only be required to meet MDD and therefore, pumping upgrades are not required as part of this alternative.

A minimum of 1,000 m^3 is required to address storage constraints within the planning period, however, a new water tower would likely be larger than this (1,500 m^3 to 5,000 m^3 are typical water tower volumes). A preliminary volume of 3,200 m^3 was selected but would be confirmed through a separate Schedule B Class EA. A location near the intersection of Comber Side Road and Tecumseh Road was identified as the preferred location for a new water tower in Stoney Point in the previous Master Plan and has been carried forward as part of this alternative. The location would be confirmed as part of a Schedule B Class EA if this alternative was selected as the preferred solution in this Master Plan. This preliminary preferred location is presented in Figure 9-2.

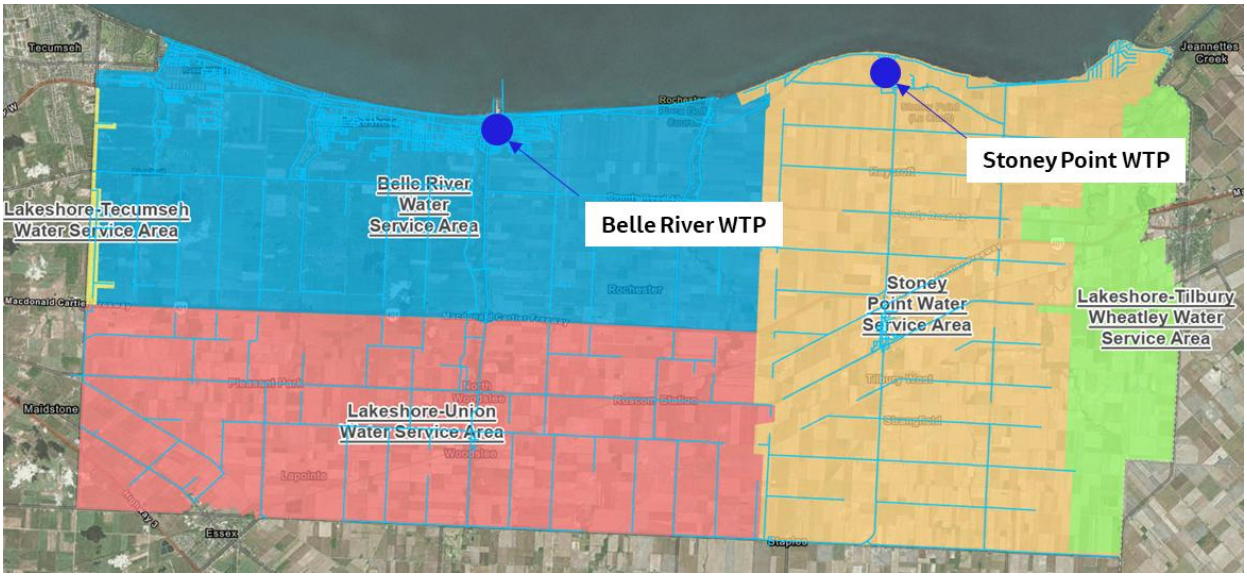
Figure 9-2. Stoney Point Storage and Distribution Alternative 3



9.1.4 Alternative 4: Integrate the Belle River and Stoney Point Servicing Areas

Alternative 4 is to integrate the Belle River and Stoney Point servicing areas. A new watermain would be constructed from the Belle River WTP area to the Stoney Point WTP, approximately 13 km in length. The Stoney Point WTP would be converted to a reservoir and BPS. Additional storage upgrades in Stoney Point may still be required and would depend on the ultimate distribution system configuration (i.e., if portions of the current SPWSS were serviced directly by the BRWSS). This alternative would also require expansion of the Lakeshore WTP and HLPS. This alternative would be analyzed in further detail (i.e., distribution system configuration, interconnecting watermain alignment, other upgrades) through a Schedule B Class EA if this alternative is selected as the preferred solution in this WWMP. The locations of the Lakeshore WTP and the Stoney Point WTP are presented in Figure 9-3. Their distance represents the approximate length of interconnecting watermain required for this alternative.

Figure 9-3. Stoney Point Storage and Distribution Alternative 4



9.2 Comber Pressure Zone

The following alternatives were developed to address the pumping and storage constraints in the Comber Pressure Zone:

- Alternative 1: Do Nothing
- Alternative 2: Increase below-grade storage and pumping capacity
- Alternative 3: Implement floating storage

These alternatives are discussed in further detail in the following sub-sections.

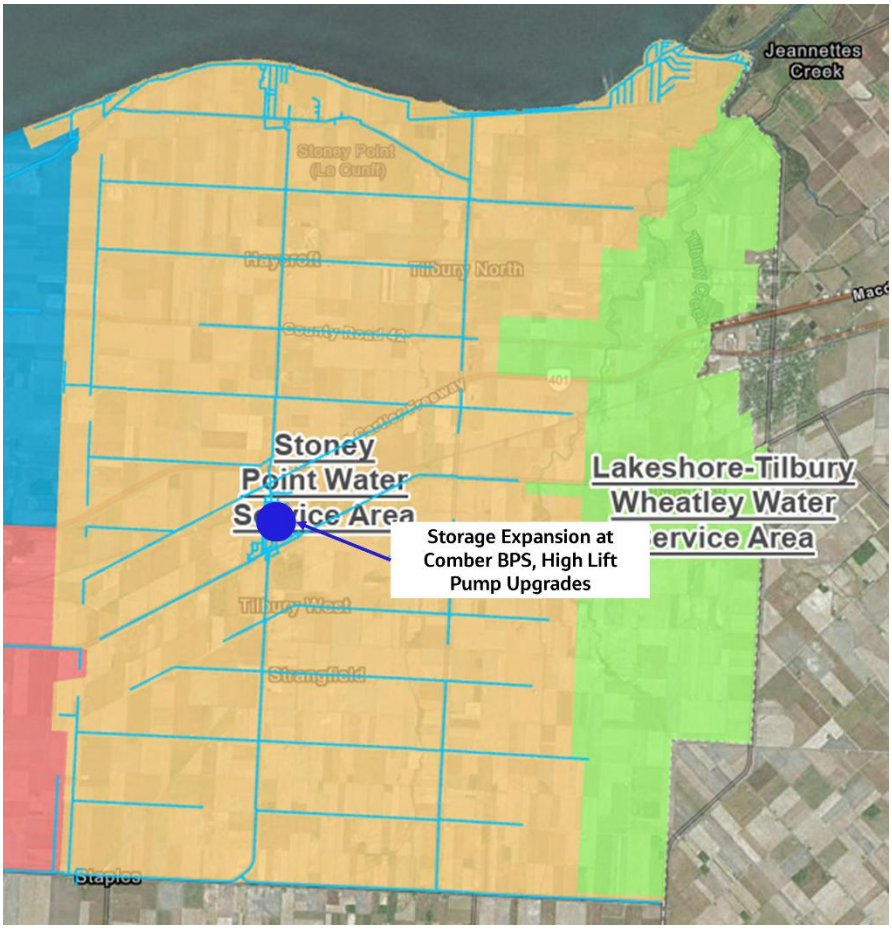
9.2.1 Alternative 1: Do Nothing

Alternative 1 is to do nothing. This alternative is required as part of the Municipal Class EA process for baseline comparison purposes and does not address the future needs identified for the Comber Pressure Zone.

9.2.2 Alternative 2: Increase Below-Grade Storage and Pumping Capacity

Alternative 2 is to expand below-grade storage and pumping capacity at the Comber BPS. The pressure zone would remain a closed system and therefore, fire flow and overall system pressure would continue to be maintained by continuous pumping. A minimum of 700 m^3 additional storage volume and 10,600 m^3/d additional pumping capacity are required. Alternative 2 is presented in Figure 9-4.

Figure 9-4. Comber Storage and Distribution Alternative 2

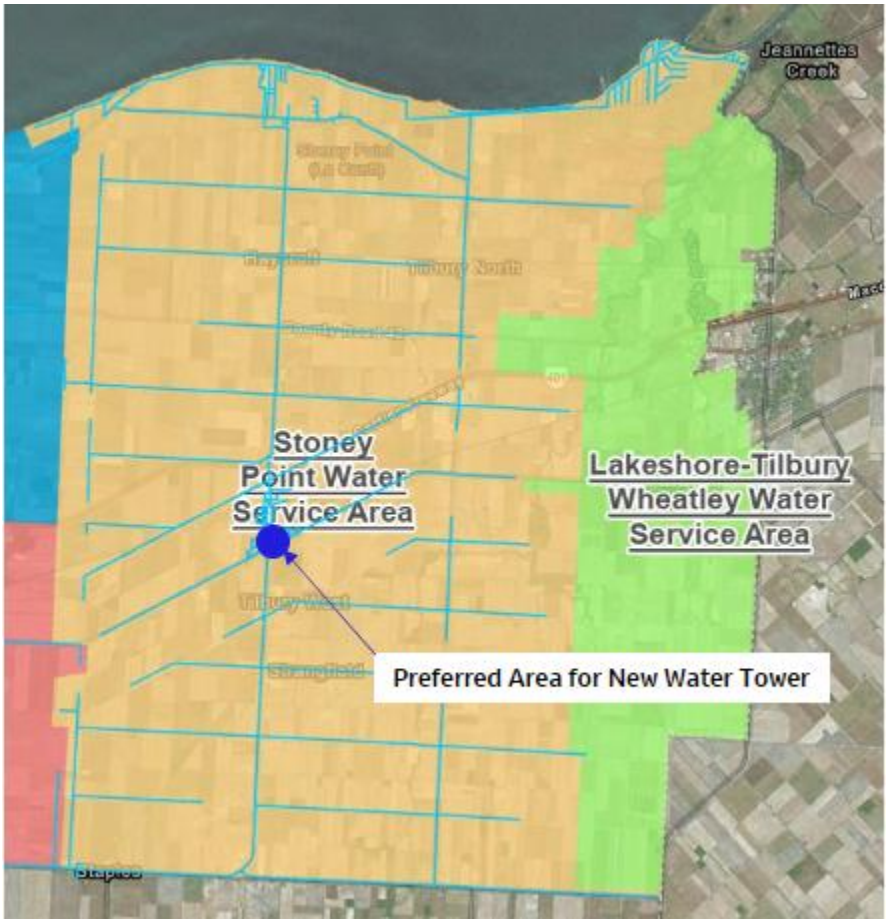


9.2.3 Alternative 3: Implement Floating Storage

Alternative 3 is to implement floating storage (i.e., a water tower) in the Comber Pressure Zone. Comber would become an open pressure zone, with fire flow and system pressure maintained by the water tower rather than through continuous pumping. The Comber BPS high-lift pumps would only be required to meet MDD and therefore, pumping upgrades are not required as part of this alternative.

A minimum of 700 m^3 is required to address storage constraints within the planning period, however, a new water tower would likely be larger than this (1,500 m^3 to 5,000 m^3 are typical water tower volumes). A preliminary volume of 3,200 m^3 was selected but would be confirmed through a separate Schedule B Class EA. A potential location for a new water tower in Comber is near the Comber BPS, as this would minimize distribution system upgrades required to implement the water tower. The potential locations for the new water tower would be studied as part of a Schedule B Class EA if this alternative was selected as the preferred solution in this Master Plan. This potential location is presented in Figure 9-5.

Figure 9-5. Comber Storage and Distribution Alternative 3



9.3 Detailed Evaluation of Water Storage and Pumping Alternatives

9.3.1 Evaluation Criteria

The criteria used for the detailed evaluation of the alternatives are grouped into four categories: Technical Environment criteria, Natural Environment criteria, Social/Cultural Environment criteria and Economic Environment criteria. Each category is weighted equally, at 25 percent of the overall score, and each criterion within the respective categories are weighted equally to make up the scoring for that category. Each criterion is scored out of 10, with 10 being the most desirable score and 1 being the least. The detailed definition and scoring scale for the criteria of the alternative evaluation process are presented in Table 9-1.

Table 9-1. Water Storage and Pumping Evaluation Criteria Definitions and Scoring Scale

Category	Criteria	Definition	Scoring Scale
Technical Environment	Maximize Constructability	The ability of the alternative to be implemented without significant complications, including having easy construction access, minimal length of pipe, gentle pipe slope, etc.	10 – The alternative can be implemented with relative ease and easy construction access. 5 – The alternative can be implemented with some difficulty and access for construction require some effort. 1 – The alternative can be implemented with major difficulty and access for construction require significant effort.
Technical Environment	Minimize Operational Accessibility Difficulties	The access requirements of the alternative for O&M, including easement requirements, existence or lack of right-of-way.	10 – O&M access for the alternative requires no additional provisions. 5 – O&M access for the alternative requires some additional provisions and is somewhat physically difficult to reach. 1 – O&M access for the alternative requires significant additional provisions and is physically difficult to reach.
Technical Environment	Minimize Disruption to Existing Infrastructure	The ability of the alternative to be implemented with minimal disruption to the existing distribution system.	10 – The alternative is very compatible and complimentary to the existing conveyance system and can be integrated with the existing system with minimal impact. 5 – The alternative is somewhat compatible and complimentary to the existing conveyance system and will result in some impact to the existing system if integrated. 1 – The alternative is not compatible or complementary to the existing conveyance system and will result in significant impact to the existing system if integrated.

Category	Criteria	Definition	Scoring Scale
Technical Environment	Maximize Integration with Future Infrastructure	The alternative's compatibility with planned future infrastructure.	10 – The alternative is very compatible and complimentary to future planned infrastructure and can be integrated with minimal impact to future infrastructure plans. 5 – The alternative is somewhat compatible and complimentary to future planned infrastructure and can be integrated with moderate impacts to future infrastructure plans. 1 – The alternative is incompatible with future planned infrastructure and will be highly disruptive to future infrastructure plans.
Technical Environment	Minimize Risks with Obtaining Permit and Approvals	The ability of the alternative to be approved with minimal, if any, conditions.	10 – The alternative can be readily approved. 5 – The alternative can be approved with minimal conditions. 1 – The alternative can be approved with significant or onerous conditions.
Technical Environment	Maximize Effectiveness of Alternative	The alternative's ability to address or alleviate the concerns that it was designed to, considering short-term, medium-term and long-term effects.	10 – The alternative will be highly effective in addressing the concerns for all time periods. 5 – The alternative will be somewhat effective in addressing the concerns for some time periods. 1 – The alternative will not be very effective in addressing the concerns for limited time periods.
Technical Environment	Minimize Risk/Reliability of Alternative	The level of risk associated with the alternative relating to probability of failure, water supply and regulatory compliance.	10 – There are limited to no risks associated with the alternative. 5 – There is a moderate level of risk associated with the alternative. 1 – There is a high level of risk associated with the alternative.
Technical Environment	Minimize Footprint Requirements	The amount of footprint the alternative requires to be implemented	10 – The alternative's footprint is relatively small compared to other alternatives. 5 – The alternative's footprint is relatively moderate compared to other alternatives. 1 – The alternative's footprint is relatively large compared to other alternatives.

Category	Criteria	Definition	Scoring Scale
Technical Environment	Minimize Energy Requirements	The resources and fuel the alternative requires in order to function, include electrical, gas, oil, water, etc.	10 – The alternative has lower energy requirements. 5 – The alternative's maintains existing energy requirements. 1 – The alternative has higher energy requirements.
Natural Environment	Maximize Climate Change Adaptation	The alternative's ability to provide climate adaptation and resiliency benefits.	10 – The alternative provides several climate change adaptation benefits. 5 – The alternative provides some adaptation benefits to climate change. 1 – The alternative provides no adaptation benefits to climate change.
	Minimize Impact to the Local Hydrogeology and Groundwater System	The alternative's potential to induce water table impacts, hydrogeological setting, and surface and groundwater quality degradation.	10 – The alternative will result in minimal impacts to the hydrogeology environment and groundwater system. 5 – The alternative will result in moderate impacts to the hydrogeology environment and groundwater system. 1 – The alternative will result in significant impacts to the hydrogeology environment and groundwater system.
	Minimize Impact to the Terrestrial Habitat and Corridors	The alternative's potential to negatively impact SAR, wildlife, and vegetation.	10 – The alternative will result in minimal impacts to the wildlife and vegetation in the area. 5 – The alternative will result in moderate impacts to the wildlife and vegetation in the area. 1 – The alternative will result in significant impacts to the wildlife and vegetation in the area.
	Minimize Impact to Aquatic Habitats and Fisheries	The alternative's potential to negatively impact the aquatic environment and proximity to aquatic habitat.	10 – The alternative will result in minimal impacts to the aquatic environment. 5 – The alternative will result in moderate impacts to the aquatic environment. 1 – The alternative will result in significant impacts to the aquatic environment.

Category	Criteria	Definition	Scoring Scale
Natural Environment	Minimize Impacts to Surface Water Quality and Quantity	The alternative's potential to negatively impact surface water quality and quantity	10 – The alternative will result in minimal impacts to surface water quality and quantity. 5 – The alternative will result in moderate impacts to surface water quality and quantity. 1 – The alternative will result in significant impacts to surface water quality and quantity.
	Minimize Impacts to Air Quality	The alternative's potential to negatively impact air quality.	10 – The alternative will result in minimal impacts to air quality. 5 – The alternative will result in moderate impacts to air quality. 1 – The alternative will result in significant impacts to air quality.
	Minimize Impacts to Wetlands	The alternative's potential to negatively impact wetland environments.	10 – The alternative will result in minimal impacts to the wetland environment. 5 – The alternative will result in moderate impacts to the wetland environment. 1 – The alternative will result in significant impacts to the wetland environment.
Social/Cultural Environment	Minimize Community Health & Safety Risks	The alternative's potential to induce negative effects on the existing community's health and safety.	10 – The alternative will not present any health & safety risks to the community. 5 – The alternative will present some health & safety risks to the community. 1 – The alternative will present significant health & safety risks to the community.
	Minimize Occupational Health & Safety Risks	The alternative's potential to induce negative effects on the personnel who need to access the implementation for inspection, maintenance, and construction.	10 – The alternative reduces health & safety risks to the occupational workers. 5 – The alternative maintains the status quo of health & safety risks to the occupational workers. 1 – The alternative will present increased health & safety risks to the occupational workers.

Category	Criteria	Definition	Scoring Scale
Social/Cultural Environment	Minimize Noise Levels	The alternative's potential to generate noise and its' proximity to sensitive receptors.	10 – The alternative is unlikely to generate noise. 5 – The alternative generates some level of noise that can be mitigated. 1 – The alternative generates a high level of noise that requires a high level of mitigation and is close to sensitive receptors.
	Minimize Disruption from Construction	The alternative's level of disruption to the existing community during construction.	10 – The alternative will result in minimal disruption to the existing community and transportation. 5 – The alternative will result in a moderate level of disruption to the existing community and transportation. 1 – The alternative will result in a high level of disruption to the existing community and transportation.
	Minimize Public Perception	The opinions about the implementation and operation of the alternative held by the general public, including members of the surrounding community.	10 – The public is expected to be highly receptive to the alternative. 5 – The public is expected to be somewhat receptive to the alternative. 1 – The public is expected to not be receptive to the alternative.
	Maximize Aesthetic Considerations	The likely visual effect the alternative will have on the surrounding environment and community if implemented.	10 – The alternative will contribute positively toward the aesthetic environment of its occupied space. 5 – The alternative will maintain the aesthetic environment of its occupied space. 1 – The alternative will negatively impact the aesthetic environment of its occupied space.
Social/Cultural Environment	Minimize Impact on Archaeological Resources	The likely adverse impact to archaeological resources or areas of archaeological potential.	10 – The site has no known archaeological resources or areas of archaeological potential. 5 – The site contains areas of archaeological potential. 1 – The site contains archaeological resources and areas of archaeological potential.

Category	Criteria	Definition	Scoring Scale
	Minimize Impact on Built Heritage Resources and Cultural Heritage Landscapes	The likely adverse impact to known or potential built heritage resources and cultural heritage landscapes	10 – The site has no known or potential built heritage resources or cultural heritage landscapes. 5 – The site contains or is in proximity to potential built heritage resources and or cultural heritage landscapes. 1 – The site contains known and potential built heritage resources and cultural heritage landscapes.
	Maximize the Opportunity for Economic Development	The alternative's potential for providing the necessary infrastructure and environment for fostering economic development and future projects.	10 – The alternative allows for planned development and can accommodate future development or service area expansion. 5 – The alternative allows for planned development. 1 – The alternative allows no further opportunity for development.
Social/Cultural Environment	Maximize Municipal Planning Objectives Compatibility	The alternative's adherence and contribution to the planning objectives of the Municipality of Lakeshore.	10 – The alternative is compatible with municipal planning objectives and provides additional opportunities for growth in the Municipality 5 – The alternative is compatible with municipal planning objectives. 1 – The alternative is not compatible with municipal planning objectives.
Economic Environment	Minimize Life Cycle Cost	The alternative's overall lifecycle cost, including both O&M and required replacement costs compared to other alternatives.	10 – The alternative has a low life cycle cost relative to the other alternatives. 5 – The alternative has a medium life cycle cost relative to the other alternatives. 1 – The alternative has a high life cycle cost relative to the other alternatives.
	Minimize Capital Costs	The capital costs of the alternative.	10 – The alternative’s capital costs are low relative to other alternatives. 5 – The alternative's capital costs are moderate relative to other alternatives. 1 – The alternative's capital costs are high relative to other alternatives.

Category	Criteria	Definition	Scoring Scale
	Minimize O&M Costs	The recurring economic costs to maintain the alternative after implementation.	10 – The alternative's maintenance and operation costs are low relative to other alternatives. 5 – The alternative's maintenance and operation costs are moderate relative to other alternatives. 1 – The alternative's maintenance and operation costs are high relative to other alternatives.

9.3.2 Stoney Point Pressure Zone Alternatives Evaluation

The Stoney Point pressure zone alternatives evaluation results are presented in Table 9-2. Alternative 3: Implement Floating Storage was selected as the preferred alternative for the following reasons:

- Floating storage addresses storage and pumping capacity constraints at the same time
- Increased storage redundancy within the system, boosting system resiliency
- Floating storage provides opportunities for energy efficient pumping regimes
- Relatively moderate capital, O&M and lifecycle costs
- Floating storage is more flexible in terms of site selection to meet footprint requirements

The preferred water tower location will be identified through a separate Schedule B Class EA. Detailed scoring rationales are presented in Appendix D.

Table 9-2. Stoney Point Pressure Zone Alternatives Evaluation

Criteria Category	Alternative 1: Do Nothing	Alternative 2: Below-grade Storage	Alternative 3: Floating Storage	Alternative 4: Integration with Belle River
Economic	1.7	0.6	1.3	0.3
Technical	1.2	1.3	1.8	1.1
Social/Cultural	1.3	2.0	1.9	1.6
Natural Environment	1.5	1.6	1.8	1.6
Score (Out of 10)	5.6	5.5	6.7	4.5

The following steps are required to implement this solution:

- The Municipality should complete hydraulic modelling to identify upgrades that are required in the distribution system.
- The Municipality should initiate a Schedule B Class EA to confirm the preferred location for the new water tower. It is expected that this will cost approximately $150,000.

Table 9-3 presents the capital cost estimate for the preferred solution. This cost estimate does not include distribution system upgrades required to implement the water tower, which will be identified through a separate hydraulic modelling assignment. A review of land acquisition requirements and needs was not completed and land acquisition costs are not included in the alternative cost.

Table 9-3. Estimated Capital Cost for Stoney Point Water Tower

Component	Unit Cost (CAD)
Water Tower (3,200 m^3)	$6,200,000
Subtotal	**$6,200,000**
Mobilization/demobilization, bonds, insurance, and contract profit (15%)	$930,000
Contractor overhead (10%)	$620,000
Design development contingency (30%)	$1,860,000
Design and Engineering Fees (20%)	$1,240,000
Total	**$10,900,000**

Notes:
Capital costs are presented at a 2024 dollar value and are at a planning level of detail with a confidence of +50% / -30%

9.3.3 Comber Pressure Zone Alternatives Evaluation

The Comber Pressure Zone alternatives evaluation results are presented in Table 9-4. Alternative 3: Implement Floating Storage was selected as the preferred alternative for the following reasons: was selected as the preferred alternative for the following reasons:

- Floating storage addresses storage and pumping capacity constraints at the same time
- Increased storage redundancy within the system, boosting system resiliency
- Floating storage provides opportunities for energy efficient pumping regimes
- Moderate relative capital, O&M, and lifecycle costs

The exact location for the floating storage implementation will be identified through a Schedule B Class EA. For a detailed breakdown of the evaluation process by criterion and the rationale for each scoring decision, refer to Appendix D.

Table 9-4. Comber Pressure Zone Alternatives Evaluation

Criteria Category	Alternative 1: Do Nothing	Alternative 2: Below-grade Storage	Alternative 3: Floating Storage
Economic	1.7	0.6	1.3
Technical	1.2	1.4	1.8
Social/Cultural	1.3	2.0	1.9
Natural Environment	1.5	1.6	1.8
Score	5.6	5.6	6.7

The following steps are required to implement this solution:

- The Municipality should complete hydraulic modelling to identify upgrades that are required in the distribution system. The Comber Sideroad watermain is a known constraint and must be replaced prior to water tower implementation.
- The Municipality should initiate a Schedule B Class EA to select the preferred location for the new water tower. It is expected that this will cost approximately $150,000. This Class EA could be combined with the Stoney Point Water Tower Schedule B Class EA at the Municipalities discretion.

Table 9-5 presents the capital cost estimate for the preferred solution. This cost estimate does not include distribution system upgrades required to implement the water tower, which will be identified through a separate hydraulic modelling assignment. A review of land acquisition requirements and needs was not completed and land acquisition costs are not included in the alternative cost.

Table 9-5. Estimated Capital Cost for Comber Water Tower

Component	Unit Cost (CAD)
Water Tower (3,200 m^3)	$6,200,000
Subtotal	**$6,200,000**
Mobilization/demobilization, bonds, insurance, and contract profit (15%)	$930,000
Contractor overhead (10%)	$620,000
Design development contingency (30%)	$1,860,000
Design and Engineering Fees (20%)	$1,240,000
Total	**$10,900,000**

Notes:

Capital costs are presented at a 2024 dollar value and are at a planning level of detail with a confidence of +50% / -30%

9.3.4 Summary of Preferred Solutions

The preferred solutions for water storage and distribution are to implement floating storage in Stoney Point and Comber. Table 9-6 presents a summary of the preferred solutions, requirements, and costs, which do not include costs for distribution system upgrades (if required) that will be identified through a separate hydraulic modelling assignment. The costs also do not include any required land acquisition costs.

Table 9-6. Summary Preferred Solutions for Water Storage and Pumping

Component	Cost	Year Required	Planning Requirements
Stoney Point Water Tower	$ 10,900,000	Near-term	Schedule B Archaeological Screening or Assessment Cultural Heritage Report
Comber Water Tower	$ 10,900,000	Near-term	Schedule B Archaeological Screening or Assessment Cultural Heritage Report

Notes:

Capital costs are presented at a 2024 dollar value and are at a planning level of detail with a confidence of +50% / -30%

The preferred locations for new water towers in Stoney Point and Comber will be confirmed through separate Schedule B Class EAs. Supportive studies include Archaeological Screening or Archaeological Assessments and Cultural Heritage Reports will be required to be completed through the Schedule B Class EAs.

10. Wastewater Treatment Alternatives Identification and Evaluation

Lakeshore has realized growth more quickly than projected in the 2018 WWMP and is expected to continue to experience rapid growth and increasing interest in new development. As summarized in sections 5.6.4 and 6.4.3, expansion of the Denis St. Pierre WPCP, Stoney Point STF, and Comber STF are needed to service the existing population and accommodate growth over the planning horizon (to 2042).

10.1 Stoney Point and Comber STF Alternatives Identification and Screening

10.1.1 Summary of Stoney Point and Comber STF Needs

Hydraulic capacity, treatment performance, and regulatory non-compliance constraints were identified at both the Stoney Point and Comber STFs. Both facilities are seasonal discharge lagoon facilities and are approved to discharge after 180-days of retention time. Discharge prior to 180-days is considered a discharge of untreated wastewater. Both facilities discharged prior to the approved 180-days in 2023 in contravention of their MECP approvals. The MECP has expressed concerns regarding the compliance of both facilities, in particular Stoney Point, through the Master Plan agency engagement process (refer to Section 12.4 and Appendix C). Expansion of these facilities was identified as a need in previous Water and Wastewater Master Plans but the recommended solutions put forward in previous Class EAs have not been implemented by the Municipality.

- The Stoney Point STF is operating at 127 percent of the hydraulic rated capacity (949 m^3/day) in contravention of the CofA. Additional capacity is needed to accommodate current and future wastewater flows. The Stoney Point STF facility has had recent discharges of untreated wastewater to Lake St. Clair within the Stoney Point WTP's IPZ 2 in 2023 and it is likely that this will occur again in the future. The discharge quality of wastewater that is released with 180-days of treatment, as required under the facility CofA, is not meeting approved limits and objectives (refer to Appendix D). Discharges from Stoney Point STF are likely to have environmental impacts, are a source water protection risk, and a risk to human health and safety.
- The Comber STF is operating near its rated hydraulic capacity (94 percent) and is expected to reach 111 percent of its rated capacity in the near term. This facility is now in contravention of its CofA as it had an uncontrolled release of untreated wastewater from the facility in summer 2023, and will soon exceed the hydraulic rated capacity. It is likely that the Comber STF will discharge untreated wastewater before the approved 180-day more frequently and will continue to struggle to meet discharge quality limits and objectives.

Sections 5.4 and 6.3 identified the wastewater treatment needs are summarized in Table 10-1.

Table 10-1. Wastewater Treatment Needs

Facility	Need	Rationale
Stoney Point STF	Existing – Additional Capacity Future – Additional Capacity	Comply with regulations, protect public health and safety, service existing customers and accommodate growth
Comber STF	Existing – Additional Capacity Future – Additional Capacity	Comply with regulations, service existing customers and accommodate growth

10.1.2 Methodology for Stoney Point and Comber Decision-Making Process

Several alternatives were identified for Stoney Point STF and Comber STF to address the problem and opportunity statement defined in Section 7. A two-stage evaluation process was applied as illustrated in Figure 8-1. This process included the following steps:

1. Identify a long list of alternatives
2. Screen the long list of alternatives to develop a short-list of alternatives using a set of pass/fail criterion
3. Evaluate the shortlisted alternatives using a detailed multi-objective decision (MODA) methodology

The alternative solution that scores the highest from the detailed MODA evaluation represents the alternative that appropriately balances cost and benefit to the Municipality using a transparent and defensible decision-making process. Identification and evaluation of wastewater treatment alternatives are discussed in detail in the following sections.

10.1.3 Long list of Wastewater Treatment Solutions for the Stoney Point and Comber STFs

A long list of alternatives to address the constraints identified for Stoney Point and Comber STFs was developed. The intent of this exercise is to identify a wide range of solutions that may address the identified constraints. As the long list of alternatives may include solutions that are not feasible or cannot address the needs identified, the long list will be screened using a set of pass/fail criteria. The alternatives identification and screening exercises also incorporated the Municipality's experience with treatment technologies and strategies.

The long list of alternatives considered for the Stoney Point and Comber STFs include:

- Individual mechanical STPs at Comber and Stoney Point STFs
- Common mechanical STP at Stoney Point STF
- Divert flows from Comber and Stoney Point STP to Denis. St Pierre WPCP
- Divert flows from Comber and Stoney Point STP to Tilbury Wastewater Treatment Plant (WWTP)
- Divert flows from Comber STP to Tilbury WWTP (with a new facility at Stoney Point)
- Divert flows from Stoney Point STP to Tilbury WWTP (with a new facility at Comber)
- Divert flows from Comber and Stoney Point STF to North and South Woodslee WWTPs
- Retrofit of the Stoney Point and Comber STF Lagoons within existing footprint
- Expand lagoons at the Stoney Point and Comber STFs

10.1.4 Screening of the Long-Listed Wastewater Treatment Solutions for the Stoney Point and Comber

A screening of the long-listed wastewater treatment alternatives identified for the Stoney Point and Comber STFs was completed. The alternatives were subjected to a set of mandatory screening criteria to identify possible alternatives for Stoney Point and Comber STFs. Solutions that passed all three criteria are included in the short-list of alternative and carried forward for detailed evaluation.

The screening criteria are listed in Table 10-2.

Table 10-2. Long list Screening Criteria

Question No.	Criteria	Screening Questions
1	Treatment Capability (Meet Ontario regulations)	Is the option allowed in Ontario by Regulations?
2	Supportive of Municipality's Planning Objectives	Is the option aligned to Municipal Planning Objectives (i.e., able to support growth)?
3	Successful applications/ Proven performance records	Is the option able to provide reliable treatment?

The screening questions result in a yes or no answer. A solution is eliminated when it receives a single no response to the screening questions. The screening of the long-listed solutions is presented int Table 10-3. This table also provides detailed rationale for the evaluation.

The alternatives that meet all the criteria are carried forward for detailed evaluation in Section 10.1.5.

Table 10-3. Screening of Long list of Wastewater Treatment Alternatives for Stoney Point and Comber STFs

Alternative No.	Alternatives	Criterion 1 Is This Option Allowed In Ontario By Regulation?	Criterion 2 Is This Option Aligned To Municipal Planning Objectives?	Criterion 3 Is This Option Able To Provide Reliable Treatment?	Pass/Fail	Rationale
1	Do Nothing	No	No	No	**Fail**	Inclusion of the "Do Nothing" alternative is required to be considered in the evaluation per the MEA Class EA process. The Municipality must implement a solution to meet regulatory requirements, protect the environment, and protect human health and safety.
2	Individual new mechanical STPs at Comber and Stoney Point STFs	Yes	Yes	Yes	**Pass**	Alternative is shortlisted
3	Common mechanical STP at Stoney Point STF	Yes	Yes	Yes	**Pass**	Alternative is shortlisted
4	Diverting flows from Comber and Stoney Point STP to Denis. St Pierre WPCP	Yes	No	Yes	**Fail**	The significant future growth that is expected in the area serviced by Denis St. Pierre WPCP and the capacity made available by the recent expansion is expected to be allocated to development in that area in the near term. It is important to reserve capacity to accommodate the anticipated future growth in the Denis St Pierre WPCP service area. Based on the population projections, Denis St. Pierre WPCP will reach its capacity (i.e., 25,000 m^3/day) by approximately 2032.

Alternative No.	Alternatives	Criterion 1 Is This Option Allowed In Ontario By Regulation?	Criterion 2 Is This Option Aligned To Municipal Planning Objectives?	Criterion 3 Is This Option Able To Provide Reliable Treatment?	Pass/Fail	Rationale
5	Diverting flows from Comber and Stoney Point STP to Tilbury WWTP	Yes	Yes	No	**Fail**	Tilbury WPCP is operating at 35% capacity (performance report 2022) and has unallocated capacity. Tilbury WWTP does not have capacity to treat flows from both Comber and Stoney Point to 2042. Diverting flows to Tilbury (Municipality of Chatham-Kent) would require approvals from Chatham-Kent.
6	Diverting flows from Comber STP to Tilbury WWTP and a new STP at Stoney Point	Yes	Yes	Yes	**Pass**	Alternative is shortlisted
7	Diverting flows from Stoney Point STP to Tilbury WWTP	Yes	Yes	No	**Fail**	Tilbury WPCP is operating at 35% capacity (performance report 2022) and has capacity. However, diverting flows to Tilbury (Municipality of Chatham-Kent) would require approvals from Chatham-Kent. Tilbury WWTP does not have capacity to treat flows from Stoney Point to 2042.

Alternative No.	Alternatives	Criterion 1 Is This Option Allowed In Ontario By Regulation?	Criterion 2 Is This Option Aligned To Municipal Planning Objectives?	Criterion 3 Is This Option Able To Provide Reliable Treatment?	Pass/Fail	Rationale
8	Diverting flows from Comber and Stoney Point STF to North and South Woodslee plants	Yes	Yes	No	**Fail**	North/South Woodslee facilities have performance issue and are not able to meet regulatory requirements. While the plants have sufficient capacity, these plants are not reliable and might not be able to meet effluent regulatory limits with additional flows. It is also important to keep some reserve capacity to accommodate growth and allow for the facilities the ability to respond to the additional wet weather flows expected over the planning horizon due to a changing climate.
9	Retrofit the Stoney Point and Comber STF Lagoons within existing footprint	Yes	No	No	**Fail**	Comber and Stoney Point STF are hydraulically constrained. Retrofitting the lagoons with a newer treatment technology (process intensification) cannot mitigate the hydraulic capacity issue without conversion of the lagoons to continuous discharge lagoons, which is unfeasible as there is insufficient capacity in the existing facilities to allow for the construction of lagoon retrofit solutions while providing service under existing conditions. This solution does not meet municipal planning objectives for growth.

Alternative No.	Alternatives	Criterion 1 Is This Option Allowed In Ontario By Regulation?	Criterion 2 Is This Option Aligned To Municipal Planning Objectives?	Criterion 3 Is This Option Able To Provide Reliable Treatment?	Pass/Fail	Rationale
10	Expand Lagoons at the Stoney Point and Comber STFs	No	No	No	**Fail**	Lagoon expansion to accommodate additional hydraulic capacity would not be approved under current Ontario Regulations or MECP Policy. This was confirmed through engagement with the MECP as part of this Master Plan update (refer to Agency Engagement). Any changes to the existing STFs will result in changes to the effluent discharge targets and objectives that are unachievable through lagoon treatment.

10.1.5 Shortlisted Wastewater Treatment Alternatives for Stoney Point and Comber STF

Table 10-4 summarizes the shortlisted alternatives identified from the screening of solutions for the Stoney Point and Comber STFs described in Section 10.1.4.

As Stoney Point and Comber STF are both at capacity, are performing poorly, and are not in compliance with their approvals or relevant regulations, Alternative 1 (Do Nothing) cannot be implemented without significant risk to the Municipality, public health and safety, and the environment. In accordance with the Class EA process the Do Nothing alternative is included in the short-list to provide a baseline comparison relative to the other shortlisted alternatives.

Table 10-4. Screening of Short :ist of Wastewater Treatment Alternatives for Stoney Point and Comber STF

Shortlisted Alternatives	Description
Alternative 1 Do nothing	This alternative represents the baseline comparison and is necessary to consider under the Master Planning Class EA process.
Alternative 2 New Individual mechanical STFs at the Comber & Stoney Point STFs	This alternative includes the construction of two new mechanical STFs, one at both the Comber and Stoney Point Lagoon sites. Once the new treatment plants are commissioned, the lagoons at both the locations will be decommissioned. Land adjacent to Stoney Point STF has been acquired by the Municipality and can be used for construction of a new mechanical STP. Land acquisition adjacent to the Comber STF would need to be identified and acquired to accommodate a new treatment facility.
Alternative 3 Common mechanical STF at the Stoney Point Lagoon Site	This alternative includes the construction of a new 'common' STF at Stoney Point Lagoon. Flows to Comber STF will be diverted to the to the new 'common' STF once the new plant is commissioned. Land adjacent to Stoney Point STF has been acquired by the Municipality and can be used to accommodate a new 'common' mechanical STP. Once the new 'common' treatment plant is commissioned and the Comber flows diverted, the lagoons at Stoney Point and Comber STF may be decommissioned.
Alternative 4 A new mechanical STF at Stoney Point and divert flows from the Comber STF to the Tilbury WWTP	This alternative includes conveying flows from the Comber Lagoon Facility to the Tilbury WWTP for treatment and the construction of a new mechanical treatment facility at the Stoney Point Lagoon Facility to treat flows from Stoney Point. Land adjacent to Stoney Point STF has been acquired by the Municipality and can be used for construction of a new mechanical STP. Once the new treatment plant is commissioned, then Stoney Point lagoons will be decommissioned. Conveying flows from Comber STF to Tilbury WWTP can be an acceptable short-term solution to mitigate capacity constraints at Comber STF. However, the solution may not provide capacity for the development of all available vacant lands identified in the OP in Comber beyond 2042.

10.2 Denis St. Pierre WPCP Alternatives Identification

10.2.1 Summary of Denis St. Pierre WPCP Needs

The first phase of expansion of the Denis St. Pierre WPCP was commissioned in spring 2024 and increased the capacity to 25,000 m^3/day. The newly expanded capacity is expected to be sufficient to meet the wastewater treatment needs in the near term; however, the plant is anticipated to reach 80 precent of its new rated capacity by approximately 2032. The Schedule C Class EA completed by Stantec to allow for the recent expansion allows for a further expansion of the Denis St Pierre WPCP to 30,000 m^3/day and is expected to be required before 2032. Based on the projected growth, the Denis St Pierre WPCP is expected to reach 80 percent of the future 30,000 m^3/day expansion capacity and require a subsequent expansion toward the end of the planning horizon of 2042. Therefore, this Master Plan will identify alternatives for future expansion of the Denis St Pierre WPCP beyond 30,000 m^3/day.

10.2.2 Denis St. Pierre WPCP Alternatives

Table 10-5 summarizes the possible alternatives to implement between 2032-2042 for the Denis St. Pierre service area. These alternatives are identified to determine how the Municipality should provide treatment capacity beyond the 30,000 m^3/day expansion identified to be required around 2032.

To identify the preferred solution these alternatives were subjected to a detailed evaluation as described in the section 10.3.

Table 10-5. Screening of Short-list of Wastewater Treatment Alternatives for Denis St. Pierre WPCP

Shortlisted Alternative	Description
Alternative 1 Do Nothing (2032-2042)	The first phase of expansion of the Denis St. Pierre WPCP was commissioned in spring 2024 and increased the capacity to 25,000 m^3/day. Based on the population projections, Denis St. Pierre WPCP will reach 80 percent of its rated capacity by 2032 – triggering the initiation of the Phase 2 expansion to 30,000 m^3/day in 2032. Additional capacity within the Denis St. Pierre WPCP sewershed will be required by 2042.
Alternative 2 Expand plant on existing site (2032-2042)	This alternative expands the treatment capacity at the existing Denis St. Pierre WPCP site. Land acquisition to accommodate the plant expansion will be required, including adequate buffer zone area for planned and future expansions. The buffer zone requirement is based on the MECP requirement to maintain a minimum 150 m buffer between municipal wastewater treatment plants with a capacity greater than 25 ML/d and surrounding land users. The buffer zone requirement should be confirmed through air and noise modelling.
Alternative 3 Service with distributed packaged plants (2032-2042)	This alternative will consider the use of small package plants to provide distributed treatment capacity in the Denis St. Pierre service area.

Shortlisted Alternative	Description
Alternative 4 Site a new WPCP within the servicing boundary (2032-2042)	This alternative will consider the siting of a new conventional wastewater treatment plant facility to provide treatment capacity in the Denis St. Pierre service area.

10.3 Detailed Evaluation of Wastewater Treatment Alternatives

10.3.1 Evaluation Criteria & Weightings

The identified alternatives were evaluated using a set of criteria identified to be consistent with the Municipality's needs and priorities. Criteria were identified within the following four categories:

- The **Economic Environment** criteria category consists of criteria that assess the alternative's required level of financial commitment.
- The **Technical Environment** criteria category consists of criteria that assess the alternatives' technical aspects such as constructability, ability to reliably comply with regulations, and ease of implementation, reliability.
- The **Social and Cultural Environment** criteria category consists of criteria that assess the alternatives' impacts on sites of cultural, archaeological, and social value, the quality of life of the surrounding community.
- The **Natural Environment** criteria category consists of criteria that assess the alternatives' impacts on the natural habitat, surrounding ecosystem, water quality and quantity and air quality.

A three-part scale is used to evaluate the level of performance for each alternative against each sub-criterion. In general terms the scale is applied as follows:

- 10 – Represents the highest possible score, the alternative performs well and significantly progresses the study objectives.
- 5 – Represents an acceptable score, the alternative reflects the current situation.
- 1 – Represents an unacceptable performance, the alternative is not well aligned with the study objectives.

Table 10-6 describes the detailed evaluation criteria, as well as the sub-criteria and the scoring scale to be used.

Table 10-6. Wastewater Treatment Evaluation Criteria Definitions and Scoring Scale

Category	Criteria	Definition	Scoring Scale
Technical Environment	Maximize Ease of Implementation (Constructability)	The ability of the alternative to be implemented with minimal disruption to existing wastewater treatment operations during implementation; minimal need to require system modifications.	10 – The alternative can be implemented with no disruption to existing operations. 5 – The implementation of the alternative may result in minor disruptions to existing service. 1 – The implementation of the alternative may require significant or periodic disruptions to existing service.
	Maximize Performance Record	The ability of the alternative to perform with a high degree of reliability and predictability in both process operations and effluent quality and/or biosolids quality.	10 – The alternative includes proven technology with a high degree of reliable performance. 5 – The alternative includes newer technology with a growing record of demonstrated performance reliability. 1 – The alternative includes innovative technology with a limited performance record and unconfirmed reliability – requires further testing/demonstration to determine feasibility.
	Minimize Energy Requirements	The energy required from all sources (electricity, natural gas, fuel).	10 – The alternative requires less energy than the existing system. 5 – The alternative requires a similar amount of energy as the existing system. 1 – The alternative uses more energy than the existing system.
	Minimize Risks with Obtaining Permit and Approvals	The ability of the alternative to be approved with minimal, if any, conditions.	10 - The alternative can be readily approved. 5 – The alternative can be approved with minimal conditions. 1 - The alternative can be approved with significant or onerous conditions.

Category	Criteria	Definition	Scoring Scale
Technical Environment	Minimize Operational Complexity	The degree of operational complexity with implementation of the alternative.	10 – The alternative will result in minor or no increase in maintenance complexity compared to the existing processes. 5 – The alternative will result in moderate increase in operational complexity compared to the existing processes. 1 – The alternative will result in a significant increase in operational complexity compared to the existing processes.
	Ability to Meet Treatment Capacity Requirements (short-term, medium-term, & long-term)	The ability of the alternative to provide the wastewater treatment requirements for short-, medium-, and/or long-term needs.	10 - The alternative can provide short-term and may provide medium-term requirements. 5 – The alternative can provide short-term and may provide medium-term requirements. 1 - The alternative may only provide short-term requirements.
	Flexibility to Accommodate Potential Future Municipality Land Use	The alternative provides flexibility to accommodate future facility expansion (e.g., space not available for future expansion of the facility and/or will affect or limit future expansion of other site operations).	10 - The alternative's footprint is relatively small compared to other alternatives. 5 – The site can be designed with provisions to accommodate potential future land use, with some impacts to existing operations (e.g., space available to allow for future expansion of biosolids composting facility but will affect or limit future expansion of other site operations). 1 - The site has limited flexibility to accommodate potential future land use or will result in significant changes to existing operations (e.g., space not available for future expansion of biosolids composting facility and/or will affect or limit future expansion of other site operations).

Category	Criteria	Definition	Scoring Scale
Technical Environment	Minimize Maintenance Complexity	The degree of maintenance complexity associated with implementation of the alternative.	10 – The alternative will result in minor or no increase in maintenance complexity compared to the existing processes. 5 – The alternative will result in a moderate increase in maintenance complexity compared to the existing processes. 1 – The alternative will result in a significant increase in maintenance complexity compared to the existing processes.
Social/Cultural Environment	Maximize Compatibility with Current Agricultural Practices	The ability of the alternative to be implemented with minimal disruption to existing and developing practices during implementation; minimal need to require modifications.	10 – The alternative provides added value to current practices and developing practices. 5 – The alternative is compatible with current and developing practices. 1 – The alternative is not compatible with existing and developing practices; modifications may be required to achieve compatibility.
	Minimize Impacts to Occupational Health and Safety	The potential for the alternative to minimize risks to occupational health and safety (operations, maintenance and during construction).	10 – There are no risks to occupational health and safety. 5 – There are minor risks to occupation health and safety that can be properly managed. 1 – There are significant risks to occupation health and safety which require significant training and or risk management plans to minimize risks to acceptable levels.

Category	Criteria	Definition	Scoring Scale
Social/Cultural Environment	Minimize Impacts to Community Health and Safety	The potential for the alternative to minimize risk to community health and safety.	10 – There are no risks to community health and safety. 5 – There are minor risks to community health and safety that can be properly managed. 1 – There are significant risks to community health and safety which require significant measures and risk management plans to minimize risks to acceptable levels.
Social/Cultural Environment	Minimize Noise	The potential for the occurrence of noise events.	10 – The alternative has little or no potential to produce noise. 5 – The alternative has moderate potential to produce noise; noise control measures may be needed to prevent migration off site. 1 – The alternative has a high potential to produce noise; significant mitigation would be needed to control migration off site.
	Minimize Odour	The potential of the occurrence of odour events.	10 – The alternative has little or no potential to produce odour. 5 – The alternative has moderate potential to produce odour; odour control measures may be needed to prevent migration off site. 1 – The alternative has a high potential to produce odour; significant mitigation would be needed to control migration off site.
	Maximize Positive Community Perception	The potential of the alternative to receive community support for wastewater treatment and biosolids management.	10 – The alternative has the potential to receive a high level of support and endorsement from the public. 5 – The alternative has the potential to receive a moderate level of support and endorsement from the public. 1 – The alternative has the potential to receive little to no support and endorsement from the public.

Category	Criteria	Definition	Scoring Scale
Social/Cultural Environment	Maximize Positive Aesthetics	The potential for the alternative to support the Municipality's design standards and community aesthetics.	10 – The alternative is consistent with and supports the Municipality's design standards and community aesthetics. 5 – The alternative requires special measures to be consistent with the Municipality's design standards and community aesthetics. 1 – The alternative is not consistent with the Municipality's design standards and community aesthetics.
Social/Cultural Environment	Minimize Impacts to Transportation System	The potential for the alternative to avoid increased demands on the transportation systems (patterns, volumes, and infrastructure requirements).	10 – The alternative will place minimal or no demands on the transportation system. Considers localized community impacts. 5 – The alternative will place moderate demands on the transportation system compared to other alternatives. Considers localized community impacts. 1 – The alternative will place high demands on the transportation system compared to other alternatives. Considers localized community impacts.
Social/Cultural Environment	Minimize Impact on Archaeological Resources	The likely adverse impact to archaeological resources or areas of archaeological potential.	10 – The site has no known archaeological resources or areas of archaeological potential. 5 – The site contains areas of archaeological potential. 1 – The site contains archaeological resources and areas of archaeological potential.

Category	Criteria	Definition	Scoring Scale
Social/Cultural Environment	Minimize Impact on Built Heritage Resources and Cultural Heritage Landscapes	The likely adverse impact to known or potential built heritage resources and cultural heritage landscapes	10 – The site has no known or potential built heritage resources or cultural heritage landscapes. 5 – The site contains or is in proximity to potential built heritage resources and or cultural heritage landscapes. 1 – The site contains known and potential built heritage resources and cultural heritage landscapes.
	Maximize Municipal Planning Objectives Compatibility	The alternative's adherence and contribution to the planning objectives of the Municipality of Lakeshore.	10 – The alternative is fully compatible with municipal planning objectives. 5 – The alternative is somewhat compatible with municipal planning objectives. 1 – The alternative's capital costs are high relative to other alternatives.
Social/Cultural Environment	Minimize Impact to Private Property	The potential for alternative to have the least impact on private property.	10 – The alternative has some impacts on private properties (i.e., adjacent properties require no rezoning). 5 – The alternative has some impacts on private properties. (i.e., some properties but may not rezoning due to buffer zone requirements). 1 – The alternative has significant impacts on private properties. (i.e., adjacent properties require rezoning due to buffer zone requirements).
Natural Environment	Ability to meet Municipality's Climate Change/Resiliency Goals	The ability of the alternative to contribute to achieving Municipality's Change/Resiliency Goals.	10 – The alternative will make a significant contribution to achieving Municipality's Climate Change/Resiliency Goals. 5 – The alternative will make a modest contribution to achieving Municipality's Climate Change/Resiliency Goals. 1 – The alternative will not make a measurable contribution to achieving Municipality's Climate Change/Resiliency Goals.

Category	Criteria	Definition	Scoring Scale
	Minimize Impacts on Groundwater Quality and Quantity	The potential to impact sensitive groundwater resources in the City of Guelph and protect overall groundwater quality and quantity.	10 – The alternative provides the greatest level of protection to sensitive groundwater resources and to the overall groundwater quality and quantity. 5 – The alternative provides an acceptable level of protection to sensitive groundwater resources and to overall groundwater quality and quantity. May require careful monitoring over the long-term to maintain protection. Contingency measure may be required. 1 – The alternative provides the lowest level of protection to sensitive groundwater resources and to the overall groundwater quality and quantity.
Natural Environment	Minimize Impacts to Terrestrial Habitats and Corridors	The potential impacts to terrestrial habitats and corridors.	10 – The alternative will avoid terrestrial habitats and corridors. 5 – The alternative may require special measures to protect terrestrial habitats and corridors. 1 – The alternative will result in an unacceptable loss of terrestrial habitats and corridors.
	Minimize Impacts to Aquatic Habitats and Fisheries	The potential for the alternative to protect or enhance aquatic habitats and fisheries.	10 – The alternative will protect aquatic habitats and fisheries and has the potential to provide enhancements. 5 – The alternative may require special measures to protect aquatic habitats and fisheries. 1 – The alternative will result in an unacceptable loss of aquatic habitat and fisheries.

Category	Criteria	Definition	Scoring Scale
	Minimize Impacts to Floodplain	The potential impact to surrounding wetland features.	10 – The alternative will maintain the existing flood plan and flood volume capacity. 5 – The alternative will require specials measures to maintain the existing flood plain and flood volume capacity. 1 – The alternative will result in an unacceptable loss of floodplain and will require significant measures to replace lost flood volume capacity.
	Minimize Impacts to Surface Water Quality	The potential impact to the existing surface water quality.	10 – The alternative will provide a high degree of protection to the water quality all year, and treated effluent can be readily assimilated. 5 – The alternative will provide a moderate degree of protection to the water quality most of the year, and treated effluent may require seasonal discharge conditions to meet assimilation requirements. 1 – The alternative may present a threat to the surface water quality and there may be significant restrictions to treated effluent discharge conditions.
Natural Environment	Minimize Impacts to Soil Quality	The potential impact to soil as a result of construction of forcemains and STPs.	10 – The alternative has the potential to improve the quality and/or productivity of the soil. 5 – The alternative provides for similar quality or productivity of the soil. 1 – The alternative has the potential to reduce the quality and/or productivity of the soil.
	Minimize Impacts to Air Quality	The potential impact to the quality of the air.	10 – The alternative has the potential to improve the air quality. 5 – The alternative provides for similar air quality. 1 – The alternative has the potential to reduce the air quality.

Category	Criteria	Definition	Scoring Scale
	Minimize Impacts to Wetlands	The potential for the alternative to protect and maintain wetlands.	10 – The alternative will avoid wetlands. 5 – The alternative may require special measures to maintain wetland protection. 1 – The alternative will result in an unacceptable threat to wetlands.
Economic Environment	Minimize Life Cycle Cost	The relative life cycle costs (including O&M and Depreciation/Replacement) when compared to other alternatives.	10 – The alternative has the lowest lifecycle costs relative to other alternatives. 5 – The alternative is in the mid-range of lifecycle costs relative to other alternatives. 1 – The alternative has the highest lifecycle costs relative to other alternatives.
	Minimize Capital Costs	The relative costs of land, equipment, and facilities when compared to other alternatives.	10 – The alternative has the lowest capital costs relative to other alternatives. 5 – The alternative is in the mid-range of capital costs relative to other alternatives. 1 – The alternative has the highest capital costs relative to other alternatives.
Economic Environment	Minimize O&M Costs	The relative O&M when compared to other alternatives.	10 – The alternative has the lowest O&M costs relative to other alternatives. 5 – The alternative is in the mid-range of O&M costs relative to other alternatives. 1 – The alternative has the highest O&M costs relative to other alternatives.

10.3.2 Detailed Evaluation of Wastewater Treatment Solutions

This section presents the evaluation for the wastewater treatment alternatives based on the existing and future needs, opportunities, and priorities identified in Section 7. The detailed evaluation for these alternatives can be found in Appendix D.

10.3.3 Stoney Point and Comber STP Evaluation

Ten possible solutions were identified on the long list of alternatives for the Stoney Point and Comber STFs. Four alternatives were screen to form the short-list of alternatives for detailed evaluation. These include:

- Alternative 1 – Do nothing, representing the base condition for purposes of comparisons
- Alternative 2 – New Individual mechanical STFs at the Comber & Stoney Point STFs
- Alternative 3 - Common mechanical STF at the Stoney Point Lagoon Site
- Alternative 4 - A new mechanical STF at Stoney Point and divert flows from the Comber STF to the Tilbury WWTP

The results of the detailed evaluation scoring exercise are presented in Table 10-7. The do nothing alternative is eliminated because it does not address existing facilities operating in contravention of their respective approvals, in violation of provincial regulations, poses a risk to source water protection, and presents a risk to public health and safety. The scoring also reflects the Municipality's past experience with the proposed alternatives, for instance challenges related to reliably operating small package plants (the Patillo Road Package Plant) is reflected in the detailed evaluation. Alternatives 2 and 4 received high scores in the natural environment category due to their relatively low environmental impact, but low on the economic environment (representing cost) due to their relatively high costs. In conclusion, Alternative 3 scored the highest overall and within each individual category. Therefore Alternative 3 – a new common mechanical treatment facility located at Stoney Point - represents the alternative with the greatest benefits and lowest cost.

The detailed scores and rationale for this evaluation can be found in Appendix D.

The estimated capital costs to implement the recommended solution for the Stoney Point and Comber STFs is presented in Table 10-8. The following are necessary to implement the recommended solution:

- The Municipality should complete a Schedule C Class EA for the preferred solution as ten years have passed since the Eastern Communities Schedule C Class EA was completed. It is recommended that the Municipality engage with the MECP to confirm if a receiving water assessment will be required to determine the effluent requirements when developing the scope for the Schedule C Class EA.
- The Municipality should move toward completing the design and construction of the recommended solution immediately after completing and filing the Schedule C ESR.
- In accordance with the 2020 PPS and communications from the MECP received through engagement on this Master Plan, development within the Stoney Point and Comber servicing areas cannot be approved until a "suitable Class EA process is completed, the requisite tenders are let, and the contracts for the required municipal sanitary sewage works expansion/upgrades are awarded" (Appendix C).
- Refer to Section 8 for recommendations for the Stoney Point WTP to mitigate the risk to drinking water supply posed from the seasonal discharges from the existing Stoney Point STF.

It is recommended that the Municipality undertake these recommendations immediately after filing this Master Plan report with the MECP due to the regulatory non-compliance identified at both facilities, the poor quality of the discharge from both facilities, the associated source water protection and public health risks, and environmental impacts.

The capital costs related to implementing this solution in an area that is outside the Municipality's priority growth areas was raised as a concern through engagement activities conducted through this Master Plan. The alternatives identification and evaluation identified that the recommended solution is the alternative that is able to most cost-effectively meet the performance and regulatory requirements. However, understanding that the capital costs to implement this recommendation are significant the following recommendations are identified to mitigate the financial burden of this recommendation:

- The Municipality should proactively seek funding sources to support the implementation of the recommended solution.
- There is the opportunity to implement the recommended solution at Stoney Point and defer the implementation of the pump station and forcemain to the facility from Comber. However, Master Plan projections indicate that the Comber STF will be operating above its approved rated capacity in the near term.
- The Municipality should consider suitable opportunities for alternative delivery methods to accelerate the implementation of this solution. Information on alternative delivery methods has been provided in Section 14.

Table 10-7. Detailed Evaluation Scores for Stoney Point-Comber STF Alternative Solutions

Criteria Category	Alternative No.1: Do Nothing	Alternative No.2: Individual New Mechanical STPs	Alternative No.3: Common Mechanical STP	Alternative No.4: Diverting Flows from Comber STP to Tilbury STP
Economic Environment	6.7	3.7	6.7	3.7
Technical Environment	5.5	8.7	8.8	6.3
Social and Cultural Environment	3.8	6.8	8.3	7.9
Natural Environment	1.9	7.2	8.3	8.9
Overall Score (out of 10)	4.5	6.5	8.0	6.7

Table 10-8. Estimated Capital Cost for Stoney Point- Comber STF Preferred Alternative

Wastewater Infrastructure	Unit Cost (CAD)
Stoney Point Lagoon PS Upgrades and Forcemain	$1,282,000
Comber Lagoon PS Upgrades and Forcemain	$13,827,000
Screening and Grit Removal	$4,547,000
Aeration Tanks	$3,170,000
Secondary Clarifiers	$2,422,000
UV Disinfection	$2,045,000
Return Activated Sludge/Waste Activated Sludge Pumping Station	$1,651,000
Aerobic Digesters	$1,955,000
Aeration System	$5,072,000
Solids Storage & Loading	$2,542,000
Outfall	$370,000
Allowances	$8,138,000
Subtotal	**$47,000,000**
Mobilization/Demobilization, Bonds, Insurance, And Contract Profit (15%)	$5,425,000
Contractor Overhead (10%)	$3,617,000
Design Development Contingency (30%)	$10,850,000
Design and Engineering Fees (20%)	$7,234,000
Total	**$74,100,000**

Notes:
Capital costs are presented at a 2024 dollar value and are at a planning level of detail with a confidence of +50% / -30%

10.3.4 Denis St. Pierre WPCP Evaluation

Four alternatives were identified for detailed evaluation to address the identified constraints. These include:

- Alternative 1: Do Nothing (2032-2042)
- Alternative 2: Expand plant on existing site (2032-2042)
- Alternative 3: Service with distributed packaged plants (2032-2042)
- Alternative 4: Site a new WPCP within the servicing boundary (2032-2042)

The results of the detailed evaluation scoring exercise are presented in Table 10-9. The do nothing alternative is eliminated because it does not address the identified needs or support the Municipality's goals.

Alternative 2 is identified as the preferred alternative. It is recommended that the Municipality continue to provide servicing and wastewater treatment from the existing Denis St. Pierre WPCP site. The detailed scores and rationale for this evaluation can be found in Appendix D.

Table 10-9. Detailed Evaluation for Denis St. Pierre WPCP

Criteria Category	Alternative No.1 Do Nothing	Alternative No.2 Expand Plant on Existing Site (2032-2042)	Alternative No.3 Service with Distributed Packaged Plants (2032-2042)	Alternative No.4 Site a New WWTP within Urban Boundary
Economic Environment	10	8.3	3.7	3.7
Technical Environment	5.5	9.4	4.1	4.8
Social and Cultural Environment	6.5	8.8	4.1	4.7
Natural Environment	4.2	6.7	6.1	6.7
Overall Score (out of 10)	6.6	8.3	4.5	4.9

The following steps are required to implement this solution:

- The Municipality should proactively acquire the land required for future expansion and the associated buffer zone required by the MECP. Land acquisition costs have not been included in this Master Plan.
- The Municipality should implement the planned expansion of the Denis St. Pierre WPCP to 30,000 m^3/day when 80 percent of the current capacity of 25,000 m^3/day is reached (19,600 m^3/day) or before 2032. The anticipated capital cost for this expansion is $6.4 Million based on a cost estimate provided by Stantec.
- The Municipality should initiate a Schedule C Class EA for the further expansion of the Denis St. Pierre WPCP beyond 30,000 m^3/day when 80 percent of the 30,000 m^3/day is reached (24,000 m^3/day). This is anticipated to be required in approximately 2035. It is expected that the Schedule C Class EA will cost approximately $350,000.
- As this recommendation occurs at the end of the planning horizon, the capital cost estimates for the future expansion of the Denis St. Pierre WPCP should be completed in subsequent WWMP Updates.

10.3.5 Summary of Recommended Wastewater Treatment Solutions

Table 10-10 outlines the preferred municipal wastewater treatment works required within the municipality to service the needs of the community to 2042. It also summarizes the capital costs, anticipated timing, and Class EA Schedule for each preferred alternative.

Table 10-10. Summary of Identified Wastewater Treatment Facilities Projects

Wastewater Projects	Recommended Solution	Capital Cost [a]	Year Required	Class EA Schedule
Denis St. Pierre WPCP Expansion to 30 MLD	Expansion from 25,000 m^3/day to 30,000 m^3/day	$6,400,000	2032	Schedule C (previously completed)
Denis St. Pierre WPCP Expansion on Existing Site	Expand Plant on Existing Site beyond 30,000 m^3/day	To be completed in future water and wastewater MPs	2042	Schedule C recommended to be completed by 2035

Wastewater Projects	Recommended Solution	Capital Cost [a]	Year Required	Class EA Schedule
Stoney Point-Comber STF	Common Mechanical STP in Stoney Point	$74,450,000	2023	Schedule C

Notes:
[a]Capital costs are presented at a 2024 dollar value and are at a planning level of detail with a confidence of +50% / -30%

The following are recommendations to implement the solutions:

- The Municipality should proactively acquire the land required for future expansion and the associated buffer zone required by the MECP. Land acquisition costs have not been included in this Master Plan.
- The Municipality should move toward completing the design and construction of the recommended solution for Stoney Point and Comber STFs immediately after completing and filing the Schedule C ESR.
- In accordance with the 2020 PPS and communications from the MECP received through engagement on this Master Plan, development within the Stoney Point and Comber servicing areas cannot be approved until a "suitable Class EA process is completed, the requisite tenders are let, and the contracts for the required municipal sanitary sewage works expansion/upgrades are awarded" (Appendix C).
- Refer to Section 8 for recommendations for the Stoney Point WTP to mitigate the risk to drinking water supply posed from the seasonal discharges from the existing Stoney Point STF.
- The Municipality should proactively seek funding sources to support the implementation of the recommended solution for the Stoney Point and Comber STFs.
- The Municipality should consider suitable opportunities for alternative delivery methods to accelerate the implementation of this solution. Information on alternative delivery methods have been provided in Section 14.

11. Sanitary Collections and Conveyance Alternatives Identification and Evaluation

Lakeshore has realized growth more quickly than projected in the 2018 WWMP and is expected to continue to experience rapid growth and increasing interest in new development. As summarized in sections 5 and 6, there are a number of areas within the Denis St Pierre conveyance system without capacity to service the existing population or accept growth without increased risk of basement flooding.

11.1 Summary of Conveyance Needs

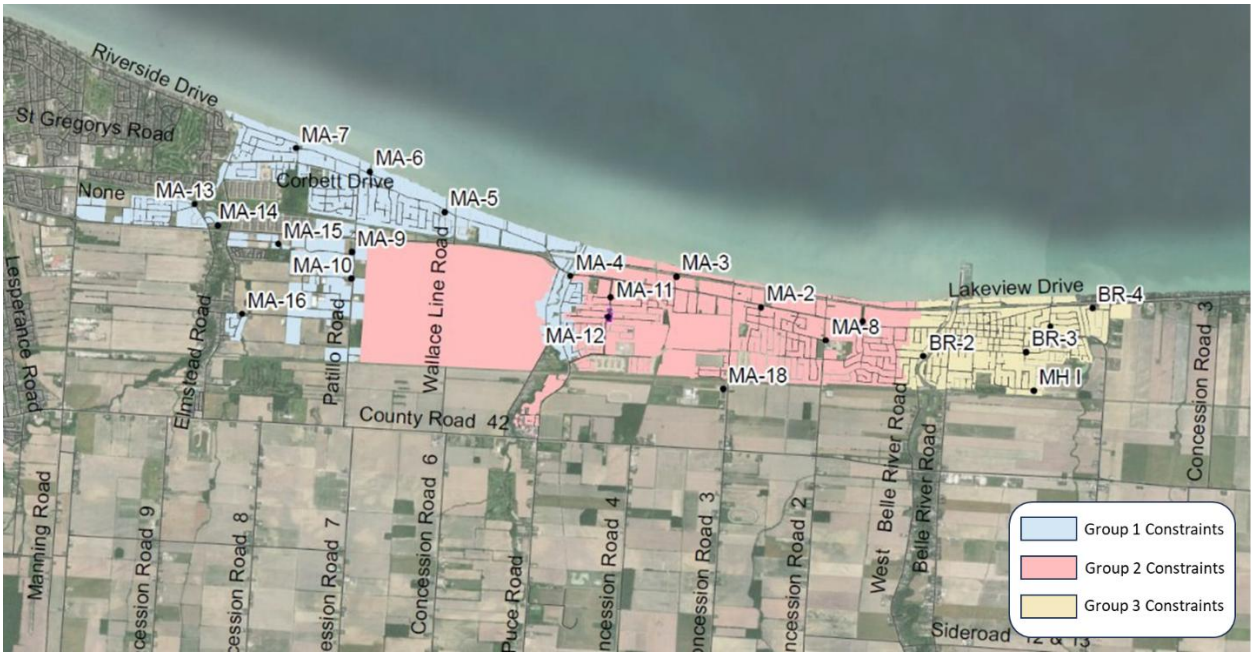
The identified constraints were divided into three groups based on spatial location and hydraulic connectivity within the Denis St. Pierre sewershed. These groups include:

- Group 1: the sanitary system upstream of, and including, Maidstone PS04. Geographically this includes the sewershed from Amy Croft Drive to Puce Road.
- Group 2: the sanitary system downstream of Group 1 from Maidstone PS04 to, and including, Maidstone PS08. Geographically this includes the central portion of the system from Puce Road to Rourke Line Road.
- Group 3: the sanitary system upstream of Belle River PS02. Geographically this includes the community of Belle River.

The location of each of these constraint groups are presented in Figure 11-1.

The division of constraints into hydraulically connected groups allows for the identification of alternatives which address the constraints specific to each area of the system.

Figure 11-1. Conveyance Constraint Groupings Map



11.2 Screening of the Long List of Conveyance Alternatives

The initial long list of conveyance solutions is a compilation of established industry solutions and best practices intended to alleviate hydraulic capacity issues or strategies to maintain reserve capacity. These include source control, conveyance control, flow diversion, and end-of-pipe controls.

Each alternative within the long list was given a "pass" or "fail" based on a preliminary assessment of its efficacy, its feasibility of implementation, and whether it has already been put in place by the Municipality. If it was determined that a given alternative could be effective at addressing the sanitary conveyance constraints, could feasibly be implemented, and has not yet been implemented by an analogous program, it was given a "pass" and would advance to the short-list of alternatives. Table 11-1 presents the summary and screening results of the long list of alternatives, as well as a rationale for the alternatives that failed the screening and were not carried forward to the short-list of alternatives.

Table 11-1. Long List of Conveyance Solutions Screening

Alternative	Category	Pass/Fail	Remarks
Downspout Disconnection	Source Control	**Fail**	Source Control alternatives are currently being implemented by the Municipality of Lakeshore; however, these cannot be relied on as the primary solution to address conveyance needs.
Rain Barrel Program	Source Control	**Fail**	Source Control alternatives cannot be relied on as the primary solution to address conveyance needs.
Weeping Tile (Foundation Drain Disconnection)	Source Control	**Fail**	Source Control alternatives cannot be relied on as the primary solution to address conveyance needs.
Sewer Lining	Source Control	**Fail**	Source Control alternatives cannot be relied on as the primary solution to address conveyance needs.
Cross-Connection Disconnection	Source Control	**Fail**	Source Control alternatives cannot be relied on as the primary solution to address conveyance needs.
Inline Storage	Conveyance Control	**Pass**	Alternative is shortlisted
Sewer Separation	Conveyance Control	**Fail**	The Municipality of Lakeshore does not have combined sewers.
Pipe Upsizing or Twinning	Conveyance Control	**Pass**	Alternative is shortlisted

Alternative	Category	Pass/Fail	Remarks
Increase Pump Station Capacity and/or replacement of Pump Station(s)	Conveyance Control	**Pass**	Alternative is shortlisted
Weir	Flow Diversions and End-of-Pipe Controls	**Fail**	No feasible locations.
Flow Diversion	Flow Diversions and End-of-Pipe Controls	**Fail**	No feasible locations for flow diversion to existing sewers within the Denis St. Pierre sewershed.
New Trunk Sewer to New WWTP in Maidstone	Flow Diversions and End-of-Pipe Controls	**Fail**	Timing inconsistent with treatment capacity needs.
New Trunk Sewer in Maidstone to Denis St. Pierre WPCP	Flow Diversions and End-of-Pipe Controls	**Pass**	Alternative is shortlisted
Offline Storage (at pump station or WWTP)	Flow Diversions and End-of-Pipe Controls	**Pass**	Alternative is shortlisted

The Municipality has undertaken two of the source control alternatives through municipal programs (Municipality of Lakeshore, 2021), including:

- A downspout disconnection program, where a subsidy of up to $75 may be provided to residents (downspout disconnection)
- The Municipality's Sewer Use By-Law includes language enabling the Municipality to respond to cross-connections (stormwater) to the sanitary system from private sources.

It is recommended that the Municipality continue to implement the source control best management practices. These alternatives cannot be relied on to address the constraints identified through this Master Plan but they will proactively protect the system reserve capacity to facilitate future growth and responsible management of municipal infrastructure.

The shortlisted alternatives are:

- Inline Storage
- Pipe Upsizing or Twinning
- Pump Station Capacity Upgrades
- New Trunk Sewer in Maidstone to the Denis St. Pierre WPCP
- Offline Storage

11.3 Shortlisted Conveyance Alternatives

Four alternatives are identified for each constraint group and are tailored to address the needs identified in each respective constraint group. A "do nothing" alternative representing a baseline for the other alternatives is included, as required through the MEA Class EA process. The alternatives are based on the shortlisted alternatives discussed in Section 11.2.

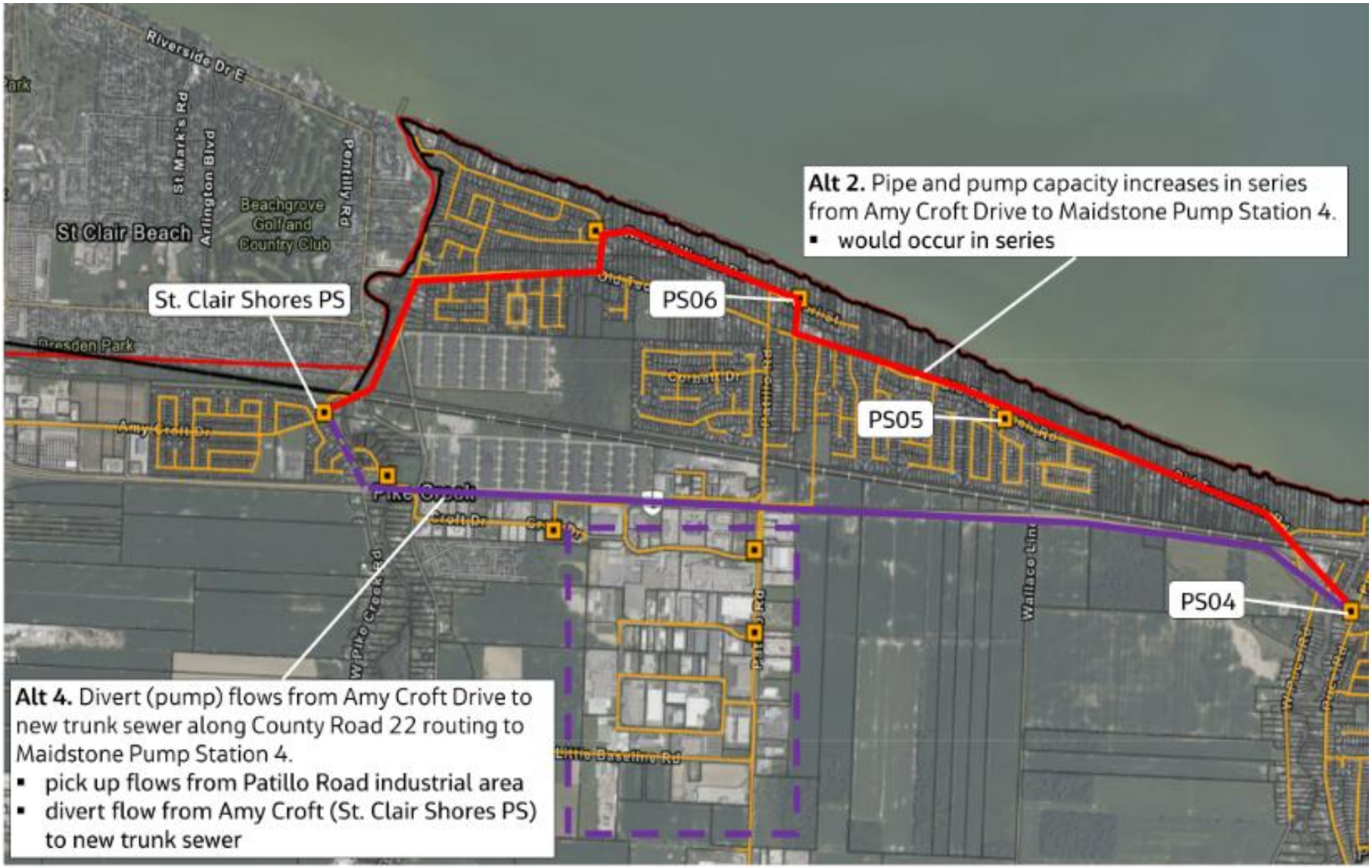
11.3.1 Conveyance Alternatives for Constraint Group 1

The constraint group 1 alternatives include:

- Alternative 1 – do nothing
- Alternative 2 – pipe and pump capacity increases in series from Amy Croft Drive to Maidstone PS04, including local sewer upgrades
- Alternative 3 – offline storage at PS with local sewer upgrades
- Alternative 4 – divert flows from Amy Croft Drive to a new trunk sewer along County Road 22 routing to Maidstone PS04, including local sewer upgrades

The trunk sewer alternatives within Alternative 2 and Alternative 4 are illustrated in

Figure 11-2. Conveyance Constraint Group 1 Alternatives



11.3.1.1 Conveyance Constraint Group 1 – Alternative 1 (Do Nothing)

Alternative 1 is to do nothing. This alternative is required as part of the Municipal Class EA process for baseline comparison purposes and does not address constraint group 1 needs. Doing nothing would result in continued risk of basement flooding in the area and insufficient capacity to accept development within the planning horizon.

11.3.1.2 Conveyance Constraint Group 1 Alternative 2: Increase Trunk and PS Capacities Along Existing Route

This alternative mainly consists of:

- upsizing the existing trunk sewer from East Pike Road to Puce Road
- upsizing the St. Clair Shores PS, Maidstone PS06, Maidstone PS05, and Maidstone PS04
- local pipe upgrades on Amy Croft Drive, Wintermute Avenue, and Patillo Road to address local capacity constraints

The sanitary sewer upgrades included in Group 1 Alternative 2 are summarized in Table 11-2.

Table 11-2. Conveyance Constraint Group 1 Alternative 2 Sewer Upgrades

Item	Pipe Segment	Type	Upgrade Length	Current Pipe Diameter
St. Clair Shores PS	N/A	PS Upgrade	N/A	N/A
Maidstone PS06	N/A	PS Upgrade	N/A	N/A
Maidstone PS05	N/A	PS Upgrade	N/A	N/A
Maidstone PS04	N/A	PS Upgrade	N/A	N/A
Existing Trunk Sewer Upgrades (Old Tecumseh Road and Russel Woods Road)	Amy Croft Drive at West Pike Creek Road to Puce Road	Trunk Sewer and Forcemain Upgrades	6,700 m	450mm – 675mm
Amy Croft Drive	Commercial Boulevard to West Pike Creek Road	Pipe Upgrades	1,200 m	300 mm
Wintermute Avenue	Old Tecumseh Road to southern end of Wintermute Avenue	Pipe Upgrades	400 m	300 mm
Patillo Road	Advance Boulevard to Silver Creek Industrial Road	Pipe Upgrades	400 m	250 mm

Note:
N/A = Not applicable

Group 1 Alternative 2 has several potential conflicts with features of note, which have been preliminarily identified in Table 11-3, along with the relevant criterion that will consider the impacts of these feature crossings in this alternative's evaluation. This information will be used to evaluate the potential environmental and social cultural impacts of the alternative in the detailed evaluation (Section 11.4.3).

Table 11-3. Constraint Group 1 Alternative 2 Feature Crossings

Feature Crossing Description	Relevant Criterion
Trunk sewer upgrades on Old Tecumseh Road crosses a stream at the intersection with Wallace Line Road	Minimize Impacts to Surface Water Quality and Quantity)
Trunk sewer upgrades on Old Tecumseh Road passes through Puce River to the west of Maidstone PS04	Minimize Impacts to Surface Water Quality and Quantity
Local sewer upgrades are required within the vicinity of a pond at Patillo Road and Advance Boulevard	Minimize Impacts to Surface Water Quality and Quantity
Local sewer upgrades on Russell Woods Road cross a stream running alongside Patillo Road	Minimize Impacts to Surface Water Quality and Quantity
St. Clair Shores PS forcemain upgrades cross Pike Creek	Minimize Impacts to Surface Water Quality and Quantity
Trunk sewer upgrades at the intersection of Old Tecumseh Road and Elmgrove Drive briefly runs close to a non-sensitive wetland and wooded area	Minimize Impacts to Wetlands, Minimize Impact to the Terrestrial Habitat and Corridors
Local sewer upgrades on Wintermute Avenue may be north of a heritage site (Municipality of Lakeshore, 2023)	Minimize impact on Built Heritage Resources and Cultural Heritage Landscapes
Forcemain upgrades cross Via Rail line to the north of St. Clair Shores PS and sewer upgrades cross Via Rail line again to the southeast of the intersection between Albert Lane and Old Tecumseh Road	Maximize Constructability; Minimize Risks with obtaining Permit and Approvals

11.3.1.3 Conveyance Constraint Group 1 Alternative 3: Offline Storage

This alternative mainly consists of:

- offline storage at each PS with identified capacity constraints (St. Clair Shores PS, Maidstone PS06, Maidstone PS05, Maidstone PS04)
- pipe capacity increases including on Russell Woods Road, Amy Croft Drive, and Patillo Road
- inline storage along Wintermute Avenue

The sanitary sewer upgrades included in Group 1 Alternative 3 are summarized in Table 11-4.

Table 11-4. Conveyance Constraint Group 1 Alternative 3

Item	Pipe Segment	Type	Upgrade Length	Current Pipe Diameter
St. Clair Shores PS	N/A	Offline Storage	N/A	N/A
Maidstone PS06	N/A	Offline Storage	N/A	N/A
Maidstone PS05	N/A	Offline Storage	N/A	N/A
Maidstone PS04	N/A	Offline Storage	N/A	N/A
Russell Woods Road	Elmgrove Drive to Pearl Street	Pipe Upgrades	1,200 m	450 mm
Amy Croft Drive	Commercial Boulevard to West Pike Creek Road	Pipe Upgrades	1,100 m	300 mm
Patillo Road	Advance Boulevard to Silver Creek Industrial Road	Pipe Upgrades or Twinning	400 m	250 mm
Wintermute Avenue	Old Tecumseh Road to southern end	Inline Storage	400 m	300 mm

Note:
N/A = Not applicable

The proposed pipe upgrades and offline storage have several potential conflicts with features of note, which have been preliminarily identified in Table 11-5 along with the relevant criterion that will consider the impacts of these feature crossings in this alternative's evaluation. This information will be used to evaluate the potential environmental and social cultural impacts of the alternative in the detailed evaluation (Section 11.4.2).

Table 11-5. Constraint Group 1 Alternative 3 Feature Crossings

Feature Crossing Description	Relevant Criterion
Offline storage at Maidstone PS04 is within the vicinity of Puce River which may be disturbed by the implementation of a storage tank	Minimize Impacts to Surface Water Quality and Quantity
Local sewer upgrades on Russell Woods Road cross a stream running on Patillo Road	Minimize Impacts to Surface Water Quality and Quantity
Local sewer upgrades are required within the vicinity of a pond at Patillo Road and Advance Boulevard	Minimize Impacts to Surface Water Quality and Quantity
Local sewer upgrades cross a stream running on Patillo Road	Minimize Impacts to Surface Water Quality and Quantity
Local sewer upgrades on Wintermute Avenue may be north of a heritage site (Municipality of Lakeshore, 2023)	Minimize impact on Built Heritage Resources and Cultural Heritage Landscapes

11.3.1.4 Conveyance Constraint Group 1 Alternative 4: New County Road 22 Trunk Sewer

This alternative mainly consists of:

- a new trunk sewer along County Road 22 connecting St. Clair Shores PS to Maidstone PS04 to divert flows from Amy Croft Drive
- upsizing the St. Clair Shores PS and Maidstone PS04
- local sewer capacity upgrades

The sanitary sewer upgrades included in Group 1 Alternative 4 are summarized in Table 11-6.

Table 11-6. Conveyance Constraint Group 1 Alternative 4 Sewer Upgrades

Item	Pipe Segment	Type	Upgrade Length	Current Pipe Diameter
St. Clair Shores PS	N/A	PS Upgrade	N/A	N/A
Maidstone PS04	N/A	PS Upgrade	N/A	N/A
New County Road 22 Trunk Sewer	Amy Croft Drive at West Pike Creek Road to Puce Road	New Trunk Sewer and Forcemain	5,900 m	N/A
Patillo Road	Advance Boulevard to Silver Creek Industrial Drive	Pipe Upgrades	400 m	250 mm
Amy Croft Drive	Commercial Boulevard to West Pike Creek Road	Pipe Upgrades	1,100 m	300 mm

Note:
N/A = Not applicable

The upgrades included in Group 1 Alternative 3 have several potential conflicts with features of note, which have been preliminarily identified in Table 11-7, along with the relevant criterion that will consider the impacts of these feature crossings in this alternative's evaluation. This information will be used to evaluate the potential environmental and social cultural impacts of the alternative in the detailed evaluation (Section 11.4.2).

Table 11-7. Constraint Group 1 Alternative 4 Feature Crossings

Feature Crossing Description	Relevant Criterion
New trunk sewer on County Road 22 passes crosses a stream at the intersection with Wallace Line Road	Minimize Impacts to Surface Water Quality and Quantity
New trunk sewer on County Road 22 crosses Puce River west of Maidstone PS04	Minimize Impacts to Surface Water Quality and Quantity
Local sewer upgrades are required within the vicinity of a pond at Patillo Road and Advance Boulevard	Minimize Impacts to Surface Water Quality and Quantity
New trunk sewer on County Road 22 crosses Pike Creek east of St. Clair Shores pump station	Minimize Impacts to Surface Water Quality and Quantity
New trunk sewer on County Road 22 crosses a stream at the intersection with Patillo Road	Minimize Impacts to Surface Water Quality and Quantity
New trunk on County Road 22 runs alongside a wetland southeast of County Road 22 and Wallace Line	Minimize Impacts to Wetlands

Feature Crossing Description	Relevant Criterion
New trunk sewer on County Road 22 runs alongside a stretch of wooded area east of Wallace Line and west of West Puce Road	Minimize Impact to the Terrestrial Habitat and Corridors

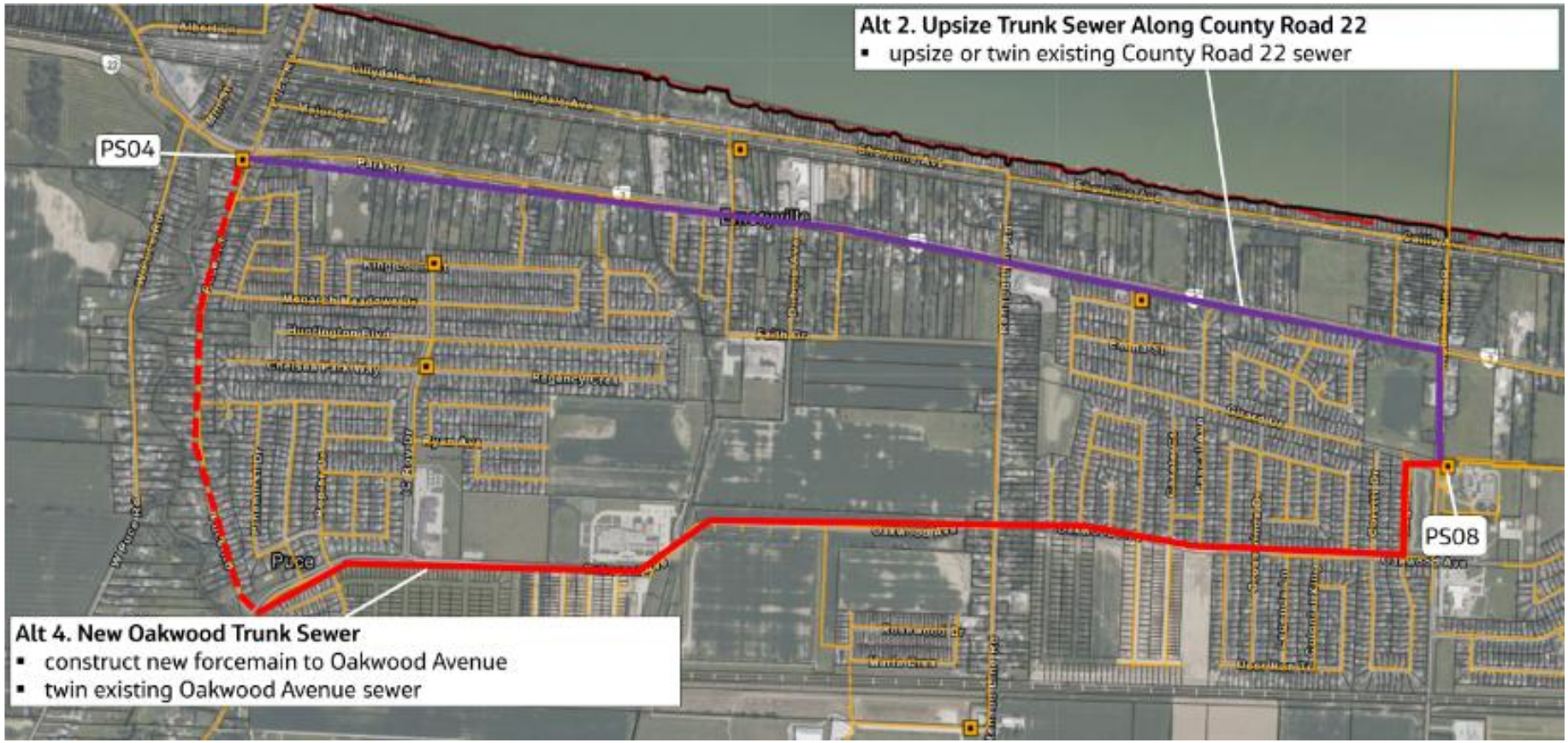
11.3.2 Conveyance Alternatives for Constraint Group 2

The constraint group 2 alternatives include:

- Alternative 1 - do nothing
- Alternative 2 – increase capacity of County Road 22 sewer with local sewer and pump station upgrades as required
- Alternative 3 – combined with Alternative 2 or Alternative 4, this alternative includes offline storage at Maidstone PS08 in place of PS08 capacity upgrades
- Alternative 4 –divert flows from Maidstone PS04 and twin the existing Oakwood Trunk Sewer with local sewer and pump station upgrades as required.

The trunk sewer alternatives within Alternative 2 and Alternative 4 are illustrated in Figure 11-3. The purpose of the trunk sewer upgrades described in Constraint Group 2 Alternative 2 and the new trunk sewer described in Constraint Group 2 Alternative 4 is to accommodate increased flows that would result from the implementation of Constraint Group 1 Alternative 2 or Alternative 4. This analysis has been completed with the conservative assumption that Constraint Group 1 Alternative 2 or Alternative 4 is selected as the preferred alternative.

Figure 11-3. Trunk Sewer Alternatives within Conveyance Constraint Group 2 Alternative 2 and Alternative 4



11.3.2.1 Conveyance Constraint Group 2 Alternative 1: Do Nothing

Alternative 1 is to do nothing. This alternative is required as part of the Municipal Class EA process for baseline comparison purposes and does not address constraint group 2 needs. Doing nothing would result in continued risk of basement flooding in the area and insufficient capacity to accept development within the planning horizon.

11.3.2.2 Conveyance Constraint Group 2 Alternative 2: County Road 22 and Pump Station Upgrades

This alternative mainly consists of:

- upsizing the existing trunk sewer along County Road 22 from Puce Road to Maidstone PS08 on Rourke Line Road
- upsizing Maidstone PS02 (if required) and Maidstone PS08
- local capacity upgrades to alleviate local capacity constraints along Puce Road, IC Roy Drive, Mancini Drive and Poplar Drive

The need for Maidstone PS02 upgrades depends on the future tie-in locations for the Wallace Woods developments which should be considered during implementation of the preferred alternative. For this analysis it is assumed that the Wallace Woods developments tie-in upstream of Maidstone PS04, resulting in the need for a capacity increase at Maidstone PS02.

The sanitary sewer upgrades included in Group 2 Alternative 2 are summarized in Table 11-8.

Table 11-8. Conveyance Constraint Group 2 Alternative 2

Item	Pipe Segment	Type	Upgrade Length	Current Pipe Diameter
Maidstone PS02	N/A	PS Upgrade	N/A	N/A
Maidstone PS08	N/A	PS Upgrade	N/A	N/A
Existing Trunk Sewer (County Road 22)	Puce Road to Rourke Line Road at Girard Drive	Major Trunk Upgrades	4,300 m	750 mm
Puce Road	West of Woodland Crescent to County Road 22	Pipe Upgrades	700 m	200 mm
IC Roy Drive	South of Regency Crescent to Mancini Drive, including segment turning onto Mancini Drive	Pipe Upgrades	400 m	250 mm
Mancini Drive	Pinehurst Drive to Poplar Drive	Pipe Upgrades	200 m	300 mm
Poplar Drive	Mancini Drive to Pinehurst Drive	Pipe Upgrades	200 m	300 mm

Note:
N/A = Not applicable

The proposed pipe and PS upgrades have several potential conflicts with features of note, which have been preliminarily identified in Table 11-9, along with the relevant criterion that will consider the impacts of these feature crossings in this alternative's evaluation. This information will be used to evaluate the potential environmental and social cultural impacts of the alternative in the detailed evaluation (Section 11.4.3).

Table 11-9. Constraint Group 2 Alternative 2 Feature Crossings

Feature Crossing Description	Relevant Criterion
Trunk sewer upgrades along County Road 22 cross Major Creek west of Pierre Avenue	Minimize Impacts to Surface Water Quality and Quantity
Trunk sewer upgrades along Rourke Line Road run alongside Stover Creek from County Road 22 to Maidstone PS08	Minimize Impacts to Surface Water Quality and Quantity
Maidstone PS08 upgrades are in the vicinity of a pond west of Rourke Line Road	Minimize Impacts to Surface Water Quality and Quantity

11.3.2.3 Conveyance Constraint Group 2 Alternative 3: Trunk Sewer and Offline Storage

Group 2 Alternative 3 for constraint group is a variation of either alternative 2 or 4 and is not a stand-alone solution for the group 2 constraints. This represents the option to implement offline storage at Maidstone PS08 rather than implementing a capacity upgrade.

11.3.2.4 Conveyance Constraint Group 2 Alternative 4: Oakwood Trunk and Maidstone PS08 Upgrade

This alternative mainly consists of:

- a new trunk sewer diverting flows from Maidstone PS04 and routing along Puce Road and Oakwood Avenue to Maidstone PS08 to twin the existing Oakwood Trunk Sewer
- local pipe capacity upgrades including upgrades along Puce Road, IC Roy Drive, Mancini Drive, and Poplar Drive to alleviate local capacity constraints.

Maidstone PS08 may require upgrading as part of the solution. The sanitary sewer upgrades included in Group 2 Alternative 4 are summarized in Table 11-10.

Table 11-10. Conveyance Constraint Group 2 Alternative 4

Item	Pipe Segment	Type	Upgrade Length	Current Pipe Width
Maidstone PS08	N/A [a]	PS Upgrade	N/A [a]	N/A [a]
New Oakwood Avenue Trunk Sewer	Along Puce Road, Oakwood Avenue and Rourke Line Road	New Trunk	5,500 m	N/A [a]
Puce Road	West of Woodland Crescent to County Road 22	Pipe Upgrades	700 m	200 mm
IC Roy Drive	South of Regency Crescent to Mancini Drive, including segment turning onto Mancini Drive	Pipe Upgrades	400 m	250 mm
Mancini Drive	Pinehurst Drive to Poplar Drive	Pipe Upgrades	200 m	300 mm
Poplar Drive	Mancini Drive to Pinehurst Drive	Pipe Upgrades	200 m	300 mm

[a] Not applicable

The upgrades included in Group 2 Alternative 4 have several potential conflicts with features of note, which have been preliminarily identified in Table 11-11, along with the relevant criterion that will consider

the impacts of these feature crossings in this alternative's evaluation. This information will be used to evaluate the potential environmental and social cultural impacts of the alternative in the detailed evaluation (Section 11.4.3.

Table 11-11. Constraint Group 2 Alternative 4 Feature Crossings

Feature Crossing Description	Relevant Criterion
New trunk sewer on Oakwood Avenue runs close to a pond at intersection with Rego Drive	Minimize Impacts to Surface Water Quality and Quantity
New trunk sewer on Oakwood Avenue crosses Stover Creek on Rourke Line Road west of Maidstone PS08	Minimize Impacts to Surface Water Quality and Quantity
New trunk sewer on Oakwood Avenue crosses Major Creek at intersection with St Anne Drive	Minimize Impacts to Surface Water Quality and Quantity
New trunk sewer on Oakwood Avenue runs parallel to a wooden area east of the intersection with St Anne Drive	Minimize Impact to the Terrestrial Habitat and Corridors

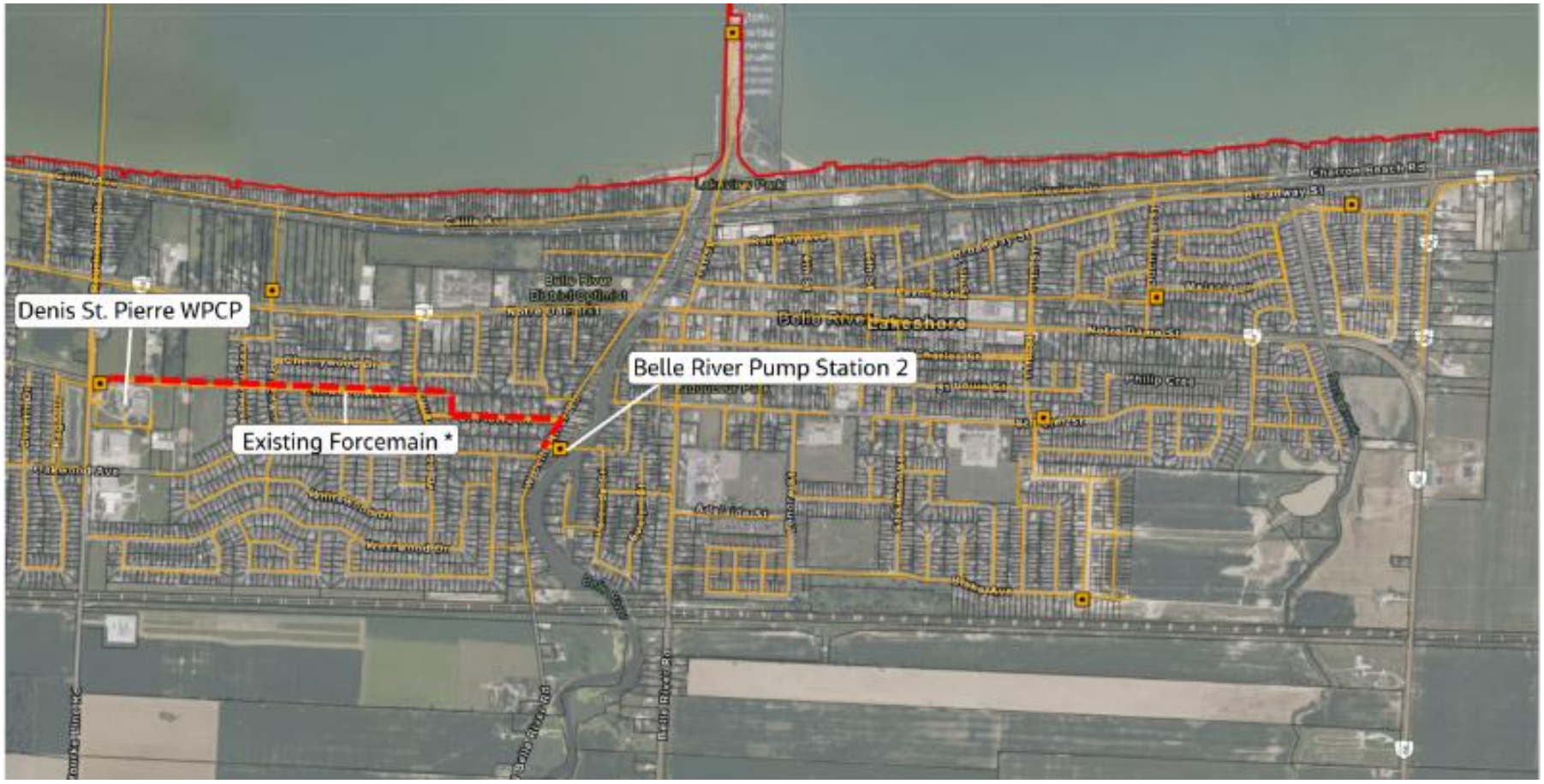
11.3.3 Conveyance Alternatives for Constraint Group 3

Constraint group 3 alternatives include:

- Alternative 1 - do nothing
- Alternative 2 - replace the Belle River PS02 forcemain
- Alternative 3 - upgrade Belle River PS02 and replace forcemain
- Alternative 4 - construct a new PS and forcemain

The location of the existing forcemain and Belle River PS02 are illustrated in Figure 11-4.

Figure 11-4. Belle River PS02 Location



11.3.3.1 Conveyance Constraint Group 3 Alternative 1: Do Nothing

Alternative 1 is to do nothing. This alternative is required as part of the Municipal Class EA process for baseline comparison purposes and does not address constraint group 3 needs. Doing nothing would result in continued risk of forcemain failure and basement flooding in the area and insufficient capacity to accept development within the planning horizon.

11.3.3.2 Conveyance Constraint Group 3 Alternative 2: Replace the Belle River PS02 Forcemain

Constraint Group 2 Alternative 2 proposes the replacement of the Belle River Pump Station 2 forcemain, which is currently in poor condition. The forcemain connecting Belle River PS02 and Maidstone PS08 is approximately 1,600 m long.

11.3.3.3 Conveyance Constraint Group 3 Alternative 3: Belle River PS02 Upgrade

Constraint group 3 Alternative 3 proposes the upgrade of Belle River PS02 in capacity and the associated forcemain replacement and wet well expansion. The forcemain connecting Belle River PS02 and Maidstone PS08 is approximately 1,600 m long. The wet well expansion would be in close proximity to Belle River, which may be relevant in the assessment of the "Minimize Impacts to Surface Water Quality and Quantity" criterion.

11.3.3.4 Conveyance Constraint Group 3 Alternative 4: New Pump Station in Belle River

Constraint group 3 Alternative 4 proposes the construction of a new pump station to replace Belle River PS02. This pump station would be situated at a location that may allow for easier access for future development tie-ins. Depending on the location of the new pump station, it may require a crossing with Belle River, which may be relevant in the assessment of the "Minimize Impacts to Surface Water Quality and Quantity" criterion.

11.4 Detailed Evaluation of Sanitary Collections and Conveyance Alternatives

11.4.1 Evaluation Criteria & Weightings

The identified alternatives were evaluated using a set of criteria identified to be consistent with the Municipality's needs and priorities. Criteria were identified within the following four categories:

- The **Economic Environment** criteria category consists of criteria that assess the alternative's required level of financial commitment.
- The **Technical Environment** criteria category consists of criteria that assess the alternatives' technical aspects such as constructability, ability to reliably comply with regulations, and ease of implementation, reliability.
- The **Social and Cultural Environment** criteria category consists of criteria that assess the alternatives' impacts on sites of cultural, archaeological, and social value, the quality of life of the surrounding community.
- The **Natural Environment** criteria category consists of criteria that assess the alternatives' impacts on the natural habitat, surrounding ecosystem, water quality and quantity and air quality.

A three-part scale is used to evaluate the level of performance for each alternative against each sub-criterion. In general terms the scale is applied as follows:

- 10 – Represents the highest possible score, the alternative performs well and significantly progresses the study objectives.
- 5 – Represents an acceptable score, the alternative reflects the current situation.
- 1 – Represents an unacceptable performance, the alternative is not well aligned with the study objectives.

Table 11-12 describes the detailed evaluation criteria, as well as the sub-criteria and the scoring scale to be used.

Table 11-12. Conveyance Alternatives Evaluation Criteria

Category	Criterion	Definition	Scoring Scale
Technical Environment	Maximize Constructability	The ability of the alternative to be implemented without significant complications, including having easy construction access, minimal length of pipe, gentle pipe slope, etc.	10 – The alternative can be implemented with relative ease and easy construction access. 5 – The alternative can be implemented with some difficulty and access for construction require some effort. 1 – The alternative can be implemented with major difficulty and access for construction require significant effort.
	Minimize Operational Accessibility Difficulties	The access requirements of the alternative for O&M, including easement requirements, existence or lack of right-of-way.	10 – O&M access for the alternative requires no additional provisions. 5 – O&M access for the alternative requires some additional provisions and is somewhat physically difficult to reach. 1 – O&M access for the alternative requires significant additional provisions and is physically difficult to reach.

Category	Criterion	Definition	Scoring Scale
Technical Environment	Maximize Compatibility with Existing Infrastructure	The ability of the alternative to be implemented with minimal disruption to the existing conveyance system.	10 – The alternative is very compatible and complimentary to the existing conveyance system and can be integrated with the existing system with minimal impact. 5 – The alternative is somewhat compatible and complimentary to the current conveyance system and will result in some impact to the existing system if integrated. 1 – The alternative is not compatible or complementary to the current conveyance system and will result in significant impact to the existing system if integrated.
	Maximize Integration with Future Infrastructure	The alternative's compatibility with planned future infrastructure.	10 - The alternative is very compatible and complimentary to future planned infrastructure and can be integrated with minimal impact to future infrastructure plans. 5 – The alternative is somewhat compatible and complimentary to future planned infrastructure and can be integrated with moderate impacts to future infrastructure plans. 1 - The alternative is incompatible with future planned infrastructure and will be highly disruptive to future infrastructure plans.
	Minimize Risks with obtaining Permit and Approvals	The ability of the alternative to be approved with minimal, if any, conditions.	10 – The alternative can be readily approved. 5 – The alternative can be approved with minimal conditions. 1 – The alternative can be approved with significant or onerous conditions.

Category	Criterion	Definition	Scoring Scale
Technical Environment	Maximize Effectiveness of Alternative	The alternative's ability to address or alleviate the concerns that it was designed to, considering short-term, medium-term and long-term effects.	10 - The alternative will be highly effective in addressing the concerns for all time periods. 5 – The alternative will be somewhat effective in addressing the concerns for some time periods. 1 - The alternative will not be very effective in addressing the concerns for limited time periods.
	Maximize Reliability of Alternative	The level of certainty at which the alternative is able to deliver its resolution of the concerns that it was designed to address.	10 - The alternative will deliver on its intended effectiveness consistently and continuously. 5 – The alternative will deliver on its intended effectiveness some of the time. 1 - The alternative will deliver on its intended effectiveness a minority of the time.
	Maximize Performance Records:	The alternative's historic efficacy in other similar projects.	10 – The alternative has been highly effective in similar past projects. 5 - The alternative has been somewhat effective in similar past projects. 1 – The alternative has not been effective in similar past projects.
	Minimize Footprint Requirements	The amount of land use the alternative requires to be implemented.	10 – The alternative's footprint is relatively small compared to other alternatives. 5 - The alternative's footprint is relatively moderate compared to other alternatives. 1 - The alternative's footprint is relatively large compared to other alternatives.
	Minimize Energy Requirements	The resources and fuel the alternative requires in order to function, include electrical, gas, oil, water, etc.	10 – The alternative has lower energy requirements. 5 – The alternative's maintains existing energy requirements. 1 – The alternative has higher energy requirements.

Category	Criterion	Definition	Scoring Scale
Natural Environment Natural Environment	Maximize Climate Change Adaptation	The alternative's ability to provide climate adaptation and resiliency benefits.	10 – The alternative provides several climate change adaptation benefits. 5 – The alternative provides some adaptation benefits to climate change. 1 – The alternative provides no adaptation benefits to climate change.
	Minimize Impact to the Local Hydrogeology and Groundwater System	The alternative's potential to induce water table impacts, hydrogeological setting, and surface and groundwater quality degradation.	10 – The alternative will result in minimal impacts to the hydrogeology environment and groundwater system. 5 – The alternative will result in moderate impacts to the hydrogeology environment and groundwater system. 1 – The alternative will result in significant impacts to the hydrogeology environment and groundwater system.
	Minimize Impact to the Terrestrial Habitat and Corridors	The alternative's potential to negatively impact SAR, wildlife, and vegetation.	10 – The alternative will result in minimal impacts to the wildlife and vegetation in the area. 5 – The alternative will result in moderate impacts to the wildlife and vegetation in the area. 1 – The alternative will result in significant impacts to the wildlife and vegetation in the area.
	Minimize Impact to Aquatic Habitats and Fisheries	The alternative's potential to negatively impact the aquatic environment and proximity to aquatic habitat.	10 – The alternative will result in minimal impacts to the aquatic environment. 5 – The alternative will result in moderate impacts to the aquatic environment. 1 – The alternative will result in significant impacts to the aquatic environment.

Category	Criterion	Definition	Scoring Scale
Natural Environment	Minimize Impacts to Surface Water Quality and Quantity	The alternative's potential to negatively impact surface water quality and quantity.	10 - The alternative will result in minimal impacts to surface water quality and quantity. 5 – The alternative will result in moderate impacts to surface water quality and quantity. 1 - The alternative will result in significant impacts to surface water quality and quantity.
	Minimize Impacts to Air Quality	The alternative's potential to negatively impact air quality.	10 - The alternative will result in minimal impacts to air quality. 5 – The alternative will result in moderate impacts to air quality. 1 - The alternative will result in significant impacts to air quality.
	Minimize Impacts to Wetlands	The alternative's potential to negatively impact wetland environments.	10 – The alternative will result in minimal impacts to the wetland environment. 5 – The alternative will result in moderate impacts to the wetland environment. 1 – The alternative will result in significant impacts to the wetland environment.
Social/Cultural Environment	Minimize Community Health & Safety Risks	The alternative's potential to induce negative effects on the existing community's health and safety.	10 – The alternative will not present any health & safety risks to the community. 5 – The alternative will present some health & safety risks to the community. 1 – The alternative will present significant health & safety risks to the community.
	Minimize Occupational Health & Safety Risks	The alternative's potential to induce negative effects on the personnel who need to access the implementation for inspection, maintenance, and construction.	10 – The alternative reduces health & safety risks to the occupational workers. 5 – The alternative maintains the status quo of health & safety risks to the occupational workers. 1 – The alternative will present increased health & safety risks to the occupational workers.

Category	Criterion	Definition	Scoring Scale
Social/Cultural Environment	Minimize Noise Levels	The alternative's potential to generate noise and its' proximity to sensitive receptors.	10 – The alternative is 11-22unlikely to generate noise. 5 – The alternative generates some level of noise that can be mitigated. 1 – The alternative generates a high level of noise that requires a high level of mitigation and is close to sensitive receptors.
	Minimize Odour Generation	The alternative's potential to emit undesirable odours and its' proximity to sensitive receptors.	10 – The alternative is unlikely to generate odours. 5 – The alternative has the potential to generate odours, but will not require mitigation measures. 1 – The alternative is likely to generate odours requiring mitigation measures.
	Minimize Disruption from Construction	The construction process of the alternative's level of disruption to the existing community, including to passing transportation.	10 – The alternative will result in minimal disruption to the existing community and transportation. 5 – The alternative will result in a moderate level of disruption to the existing community and transportation. 1 – The alternative will result in a high level of disruption to the existing community and transportation.
	Minimize Public Perception	The opinions about the implementation and operation of the alternative held by the general public, including members of the surrounding community.	10 – The public is expected to be highly receptive to the alternative. 5 – The public is expected to be somewhat receptive to the alternative. 1 – The public is expected to not be receptive to the alternative.
	Maximize Aesthetic Considerations	The likely visual effect the alternative will have on the surrounding environment and community if implemented.	10 – The alternative will contribute positively toward the aesthetic environment of its occupied space. 5 – The alternative will not significantly impact the aesthetic environment of its occupied space. 1 – The alternative will negatively affect the aesthetic environment of its occupied space.

Category	Criterion	Definition	Scoring Scale
Social/Cultural Environment	Minimize Impact on Archaeological Resources	The likely adverse impact to archaeological resources or areas of archaeological potential.	10 – The site has no known archaeological resources or areas of archaeological potential. 5 – The site contains areas of archaeological potential. 1 – The site contains archaeological resources and areas of archaeological potential.
Social/Cultural Environment	Minimize Impact on Built Heritage Resources and Cultural Heritage Landscapes	The likely adverse impact to known or potential built heritage resources and cultural heritage landscapes	10 – The site has no known or potential built heritage resources or cultural heritage landscapes. 5 – The site contains or is in proximity to potential built heritage resources and or cultural heritage landscapes. 1 – The site contains known and potential built heritage resources and cultural heritage landscapes.
	Maximize the Opportunity for Economic Development	The alternative's potential for providing the necessary infrastructure and environment for fostering economic development and future projects.	10 – The alternative allows for planned development and can accommodate future development or service area expansion. 5 – The alternative allows for planned development. 1 – The alternative allows no further opportunity for development.
	Maximize Municipal Planning Objectives Compatibility	The alternative's adherence and contribution to the planning objectives of the Municipality of Lakeshore.	10 – The alternative is compatible with municipal planning objectives and provides additional opportunities. 5 – The alternative is compatible with municipal planning objectives. 1 – The alternative is not compatible with municipal planning objectives.
Economic Environment	Minimize Life Cycle Cost	The alternative's overall lifecycle cost, including both O&M and required replacement costs compared to other alternatives.	10 – The alternative has a low life cycle cost relative to the other alternatives. 5 – The alternative has a medium life cycle cost relative to the other alternatives. 1 – The alternative has a high life cycle cost relative to the other alternatives.

Category	Criterion	Definition	Scoring Scale
	Minimize Capital Costs	The economic costs of the alternative to begin operations.	10 – The alternative's capital costs are low relative to other alternatives. 5 – The alternative's capital costs are moderate relative to other alternatives. 1 – The alternative's capital costs are high relative to other alternatives.
	Minimize O&M Costs	The recurring economic costs to maintain the alternative after implementation.	10 – The alternative's maintenance and operation costs are low relative to other alternatives. 5 – The alternative's maintenance and operation costs are moderate relative to other alternatives. 1 – The alternative's maintenance and operation costs are high relative to other alternatives.

11.4.2 Constraint Group 1 Alternatives Evaluation

Four alternatives were identified for constraint group 1. These include:

- Alternative 1 – do nothing
- Alternative 2 – pipe and pump capacity increases in series from Amy Croft Drive to Maidstone PS04, including local sewer upgrades
- Alternative 3 – offline storage at PS with local sewer upgrades
- Alternative 4 – divert flows from Amy Croft Drive to a new trunk sewer along County Road 22 routing to Maidstone PS04, including local sewer upgrades

The results of the detailed evaluation scoring exercise are presented in Table 11-13. Although the do nothing alternative scored highest under the economic criteria, it is eliminated because it does not allow for growth and development and presents a risk to public health and safety through basement flooding. Constraint Group 1 Alternative 4 scored highest under the technical, social/cultural, and natural environment criteria. Group 1 Alternative 4, selected as the preferred alternative with an overall score of 5.9. This alternative is preferred because it:

- Can improve existing infrastructure capacity by collecting flows along Patillo Avenue and carrying the flows directly to Maidstone PS04
- Accommodates potential flows from developments south of County Road 22, which also may allow for future servicing boundary expansion
- Accommodates planning needs within the planning horizon (2042)
- Increases flow resiliency by providing an alternate route for flows in this constraint group
- Diverts flows away from basement-flooding-prone areas which reduces risk of basement flooding
- The County Road 22 Trunk Sewer could largely be constructed without interfering with the existing system operation.

The detailed scores and rationale for this evaluation can be found in Appendix D.

The following is required to implement this solution:

- The Municipality should develop a full buildout model that reflects an "ultimate build out" scenario, including consideration for potential intensification, ahead of preliminary design of this alternative to inform the sizing of the infrastructure.
- The Municipality should confirm tie-in locations for future developments.
- The Municipality should develop and implement a sanitary capacity allocation policy. Refer to Section 13.3.1.
- The downstream constraint group 2 preferred alternative needs to be implemented prior to the constraint group 1 preferred alternative.
- Technical studies, including all recommended archaeological assessments, Cultural Heritage Evaluation Reports, and Heritage Impact Assessments, as well as an Environmental Impact Assessment (EIA) are required as early as possible during detailed design and prior to any ground disturbing activities.
- Consultation with the MECP, DFO, and ERCA is required prior to project implementation.
- Pump station draw down tests are recommended to confirm capacities prior to implementation.

There may be an opportunity for the local sewer upgrades to coincide with other planned roadworks.

Table 11-13. Constraint Group 1 Alternatives Evaluation

Category	Alternative 1: Do Nothing	Alternative 2: Increase Trunk and PSs Along Existing Route	Alternative 3: Offline Storage	Alternative 4: County Road 22 Trunk
Technical Environment	5.7	4.5	4.2	6.9
Social/Cultural Environment	5.0	4.7	3.5	5.5
Natural Environment	3.6	5.7	5.6	7.1
Economic Environment	8.0	3.3	4.3	4.0
Overall Score	5.6	4.6	4.4	5.9

A summary of the cost estimate for Constraint Group 1 Alternative 2 is provided in Table 11-14.

Table 11-14. Constraint Group 1 Alternatives Capital Costs

Conveyance Component	Estimated Capital Cost (CAD)
St. Clair Shores PS and Forcemain Upgrades	$1,788,000
Maidstone PS04 PS and Forcemain Upgrades	$2,172,000
Sanitary Sewer	$20,847,000
Sanitary Manhole	$ 2,219,000
Subtotal	**$27,026,000**

Conveyance Component	Estimated Capital Cost (CAD)
Mobilization/Demobilization, Bonds, Insurance, and Contract Profit (15%)	$4,0543,000
Contractor Overhead (10%)	$2,703,000
Design Contingency (30%)	$8,108,000
Design and Engineering Fees (20%)	$5,405,000
Total	**$47,295,000**

Notes:
Capital costs are presented at a 2024 dollar value and are at a planning level of detail with a confidence of +50% / -30%

11.4.3 Constraint Group 2 Alternatives Evaluation

Three alternatives were identified for constraint group 1. These include:

- Alternative 1 - do nothing
- Alternative 2 – increase capacity of County Road 22 sewer with local sewer and pump station upgrades as required
- Alternative 3 – combined with Alternative 2 or Alternative 4, this alternative includes offline storage at Maidstone PS08 in place of PS08 capacity upgrades
- Alternative 4 –divert flows from Maidstone PS04 and twin the existing Oakwood Trunk Sewer with local sewer and pump station upgrades as required.

The results of the detailed evaluation scoring exercise are presented in Table 11-15. Although the do nothing alternative scored highest under the economic criteria, it is eliminated because it does not allow for growth and development and presents a risk to public health and safety through basement flooding. Constraint Group 2 Alternative 2 and Alternative 4 scored similarly under economic, technical, social/cultural, and natural environment criteria. Alternative 2 scored slightly higher overall (overall score of 5.9) and was selected as the preferred alternative. This alternative is preferred because it:

- Overlaps with planned works on County Road 22
- Accommodates planning needs within the planning horizon (2042)
- Accommodates projected growth and planned development in the area and supports the municipal objective of pursuing high-density/full buildout on County Road 22
- Reduces risk of sewer surcharging and basement flooding
- Minimizes disruption from construction by avoiding the potential risk of simultaneous construction on County Road 22 and Oakwood Avenue.

The detailed scores and rationale for this evaluation can be found in Appendix D.

The following is required to implement this solution:

- The Municipality should develop a full buildout model which reflects an “ultimate build out” scenario ahead of preliminary design of this alternative to inform the appropriate sizing of the infrastructure.
- The Municipality should confirm tie-in locations for future developments.
- The Municipality should develop and implement a sanitary capacity allocation policy. Refer to Section 13.3.1.

- Technical studies, including all recommended archaeological assessments, Cultural Heritage Evaluation Reports, and Heritage Impact Assessments, as well as an EIA are required as early as possible during detailed design and prior to any ground disturbing activities.
- Consultation with the MECP, DFO, and ERCA is required prior to project implementation.
- Pump station draw down tests are recommended to confirm capacities prior to implementation.

It should be noted that the County Road 22 Trunk Sewer does not become a constraint until the constraint group1 preferred alternative is implemented. However, the constraint group 2 preferred alternative must be implemented prior to the implementation of the constraint group 1 preferred alternative to avoid capacity issues potentially resulting in basement flooding in group 2. The County Road 22 conveyance upgrades can overlap with the planned County Road 22 Widening Project. There may be an opportunity for the local sewer upgrades to coincide with other planned roadworks.

As noted in Section 11.3.2.2, the need for Maidstone PS02 upgrades depends on the future tie-in locations for the Wallace Woods developments. For this analysis it is assumed that the Wallace Woods developments tie-in upstream of Maidstone PS04, resulting in the need to increase the capacity of Maidstone PS02. It is recommended that future development tie-in locations are confirmed prior to the design of this alternative.

Table 11-15. Constraint Group 2 Alternatives Evaluation

Category	Alternative 1: Do Nothing	Alternative 2: County Road 22 and Maidstone PS08 Upgrades	Alternative 3: Offline Storage Alternative	Alternative 4: Oakwood Trunk and Maidstone PS08 Upgrades
Technical Environment	6.3	6.1	5.0	6.7
Social/Cultural Environment	4.7	5.8	4.2	5.3
Natural Environment	3.6	7.0	6.6	7.0
Economic Environment	6.7	4.7	3.3	4.3
Overall Score	5.3	5.9	4.8	5.8

A summary of the cost estimate for Alternative 2 is provided in Table 11-16.

Table 11-16. Constraint Group 2 Alternatives Capital Costs

Conveyance Component	Estimated Capital Cost (CAD)
Maidstone PS02 Upgrades	$2,289,000
Maidstone PS08 Upgrades	$2,857,000
Sewer	$18,461,000
Manhole	$1,959,000
Subtotal	**$25,566,000**
Mobilization/Demobilization, Bonds, Insurance, and Contract Profit (15%)	$3,835,000
Contractor Overhead (10%)	$2,557,000

Conveyance Component	Estimated Capital Cost (CAD)
Design Contingency (30%)	$7,670,000
Design and Engineering Fees (20%)	$5,113,000
Total	**$44,741,000**

Notes:
Capital costs are presented at a 2024 dollar value and are at a planning level of detail with a confidence of +50% / -30%

11.4.4 Constraint Group 3 Alternatives Evaluation

Four alternatives were identified for constraint group 1. These include:

- Alternative 1 - do nothing
- Alternative 2 - replace the Belle River PS02 forcemain
- Alternative 3 - upgrade Belle River PS02 and replace forcemain
- Alternative 4 - construct a new PS and forcemain

The results of the detailed evaluation scoring exercise are presented in Table 11-17. Although the do nothing alternative scored highest under the economic criteria, it is eliminated because it does not allow for growth and development and presents a risk to public health and safety through risk of forcemain failure. Constraint group 3 Alternative 3 scored highest under social/cultural and natural environment criteria, and scored similarly to Alternative 1 and Alternative 2 under the technical criteria. Constraint group 3 Alternative 3 was selected as the preferred alternative with an overall score of 5.3. This alternative is preferred because it:

- Accommodates planning needs within the planning horizon (2042)
- Is compatible with existing infrastructure
- Reduces risk of sewer surcharging and basement flooding
- Reduces risk of forcemain failure as the current forcemain is in poor condition, which reduces risk of sewage spills and potential impacts to health and safety.

The detailed scores and rationale for this evaluation can be found in Appendix D.

The following is required to implement this solution:

- The Municipality should develop a full buildout model which reflects an “ultimate build out” scenario ahead of preliminary design of this alternative to inform the appropriate sizing of the infrastructure.
- The Municipality should confirm tie-in locations for future developments.
- The Municipality should develop and implement a sanitary capacity allocation policy. Refer to Section 13.3.1.
- Technical studies, including all recommended archaeological assessments, Cultural Heritage Evaluation Reports, and Heritage Impact Assessments, as well as an EIA are required as early as possible during detailed design and prior to any ground disturbing activities.
- Consultation with the MECP and ERCA is required prior to project implementation.
- Pump station draw down tests are recommended to confirm capacities prior to implementation.

It is recommended that Alternative 3 is implemented immediately due to the risk of forcemain failure.

A summary of the cost estimate for Alternative 2 is provided in Table 11-18.

Table 11-17. Constraint Group 3 Alternatives Evaluation

Category	Alternative 1: Do Nothing	Alternative 2: Replace Belle River PS02 Forcemain	Alternative 3: Belle River PS02 Upgrades	Alternative 4: Construct New PS
Technical Environment	5.2	5.2	4.9	3.8
Social/Cultural Environment	3.9	4.5	5.5	5.1
Natural Environment	2.7	5.3	6.6	6.4
Economic Environment	6.7	4.7	4.0	3.3
Overall Score	4.6	4.9	5.3	4.7

Table 11-18. Constraint Group 3 Alternatives Capital Costs

Conveyance Component	Estimated Capital Cost (CAD)
Belle River PS02 Upgrades and Forcemain Replacement	$4,545,000
Subtotal	**$4,545,000**
Mobilization/Demobilization, Bonds, Insurance, And Contract Profit (15%)	$682,000
Contractor Overhead (10%)	$455,000
Design Contingency (30%)	$1,364,000
Design and Engineering Fees (20%)	$909,000
Total	**$7,954,000**

Notes:

Capital costs are presented at a 2024 dollar value and are at a planning level of detail with a confidence of +50% / -30%

11.5 Summary of Recommended Sanitary Collection System Solutions

Table 11-19 outlines the preferred sanitary collection works required within the Denis St. Pierre sewershed to service the needs of the community to 2042. It also summarizes the capital costs, anticipated timing, and Class EA Schedule for each preferred alternative.

Table 11-19. Summary of Identified Sanitary Collections and Conveyance Projects

Sanitary Collections and Conveyance Projects	Recommendation	Capital Cost [a]	Year Required	Planning Requirements
Group 1	Add new trunk sewer along County Road 22 from West Pike Creek Road to Puce Road. Includes pump station upgrades and local sewer upgrades.	$47,295,000	Near-term [b],[c]	Schedule B Class EA, Archaeological Assessment, Cultural Heritage Assessment, EIA
Group 1 components	New trunk sewer along County Road 22			Exempt from further Class EAs Archeological work previously completed, PIF# P053-057 (D.R. Poulton & Associates Inc. , 2004)
Group 1 components	St. Clair Shores Pump Station Expansion and Forcemain			Schedule B Class EA Archaeological Assessment Cultural Heritage Report
Group 2	Increase capacity of County Road 22 Trunk Sewer from Puce Road to Denis St. Pierre WPCP. Includes pump station upgrades and local sewer upgrades.	$44,740,000	Near-term [b]	Schedule B Class EA, Archaeological Assessment, Cultural Heritage Assessment, EIA
Group 2 components	New trunk sewer along County Road 22			Exempt from further Class EAs Archeological work previously completed, PIF# P053-057 (D.R. Poulton & Associates Inc. , 2004)
Group 2 components	Maidstone PS02 expansion			Schedule B Class EA Archaeological Assessment Cultural Heritage Report

Sanitary Collections and Conveyance Projects	Recommendation	Capital Cost [a]	Year Required	Planning Requirements
Group 2 components	Maidstone PS08 expansion			To be completed as part of future Denis St Pierre WPCP expansion Refer to Table 10-10
Group 3	Increase the capacity of Belle River PS02 and replace forcemain.	$7,954,000	Immediately	Schedule B Class EA, Archaeological Assessment, Cultural Heritage Assessment

Notes:

[a] Capital costs are presented at a 2024 dollar value and are at a planning level of detail with a confidence of +50% / -30%

[b] Near term is within 5-years

[c] Constraint Group 2 recommendations must be completed prior to Conveyance Group 1 implementation

The new trunk sewer routes are identified to be within the existing road allowance or within the road allowance for the County Road 22 road widening project. Archaeological assessments and cultural heritage reports have been completed previously through the Class EA completed for the County Road widening by the County of Essex (D.R. Poulton & Associates Inc. , 2004). The pump stations identified as requiring expansion in Table 11-19 will be expanded on their existing site. It is recommended that the Municipality completed the Archaeological Screening Process (ASP) to confirm that a Schedule B Class EA is required, however, review of the sites and their proximity to known archaeological sites indicate that it is highly likely that these pump station sites have archaeological potential and will require a Schedule B Class EA.

Maidstone Pump Station 8 is located on the Denis St Pierre WPCP and it is recommended that this pump station expansion be included in the Schedule C Class EA required in the recommended future WPCP expansion (in Table 10-10).

The following are necessary to implement this solution:

- The Municipality should develop a full buildout model that reflects an “ultimate build out” scenario ahead of preliminary design of this alternative to inform the appropriate sizing of the infrastructure. The potential for intensification should also be considered.
- The Municipality should confirm tie-in locations for future developments. This will inform infrastructure sizing and confirm the need for Maidstone PS02 upgrades.
- The Municipality should develop and implement a sanitary capacity allocation policy.
- The downstream constraint group 2 preferred alternative needs to be implemented prior to the constraint group 1 preferred alternative.
- Technical studies, including all recommended archaeological assessments, Cultural Heritage Evaluation Reports, and Heritage Impact Assessments, as well as an EIA are required as early as possible during detailed design and prior to any ground disturbing activities.

- Consultation with the MECP, DFO, and ERCA is required prior to project implementation.
- Pump station draw down tests are recommended to confirm capacities prior to implementation.
- A review of land acquisition requirements and needs was not completed and land acquisition costs are not included in the cost of the alternatives.

12. Public, Agency, and First Nations Consultation and Engagement

As an integral part of the MCEA process, active and ongoing consultation and engagement with the public and stakeholders including First Nations and Indigenous communities, community members and government entities is maintained. A project mailing list was established where interested members of the public could sign up to receive updates on the progress of the projects and be notified of key communication points and sessions open to the public. This essential procedure fosters a transparent and responsible planning process.

A project contact list was developed at the onset of the project which includes stakeholders from relevant government agencies, First Nations community representatives and interested members of the public who signed up to the project mailing list. The contact list was maintained and updated throughout the master planning process. Key opportunities for the public to receive information about the project and express their input were communicated through project notices distributed to the mailing list, posted on the Municipality's project website (lakeshore.ca/WWMP), and printed in the local newspaper. A dedicated project mailbox was set up to allow for interested members of the community to ask questions and provide feedback at any phase of the project A copy of the project contact list is provided in Appendix A.

12.1 Project Notices

Project notices were used to raise awareness of the project and inform the community of an opportunity to provide input. Notices were posted on the project's engagement webpage, emailed to the project mailing list and agency contact list, and published in local print newspaper (Lakeshore News).

Notices provided a clear overview of the project rationale and objectives, description of the process, advise the community where to find project updates, an invitation to participate, and provide contact information for the study project team.

Notices were distributed and published at the following phases of the Master Plan:

- Notice of Commencement
- Notices of Public Information Centres
- Notice of Study Completion

The various communication methods and associated dates that each of these notices were issued are presented in Table 12-1:

All project notices for this Master Plan are provided in Appendix A.

Table 12-1. Study Notices

Communication Method	Study Commencement	Public Information Centre 1	Public Information Centre 2	Public Information Centre 3	Study Completion
Project Webpage	N/A	May 31, 2023	November 9, 2023	May 13, 2024	TBD
Municipality Website	N/A	May 31, 2023	November 9, 2023	May 13, 2024	TBD
Project Contact List	May 31, 2023	May 31, 2023	November 9, 2023	May 13, 2024	TBD
Council	N/A	May 31, 2023	November 9, 2023	May 13, 2024	TBD
Traditional Media	N/A	June 16, 2023	October 25, 2023	May 29, 2024	TBD

Note:
N/A = Not applicable
TBD = To be determined

12.2 First Nations Engagement

Meaningful engagement with First Nations, Indigenous, and Métis communities and the Municipality's Treaty Rights Holders was an important component of this study. Record of the correspondence conducted with these parties can be found in Appendix B.

The Treaty Rights Holders relevant to this Master Plan include:

- Chippewas of the Thames First Nation (COTTFN)
- Chippewas of Kettle and Stoney Point First Nation
- Oneida Nation of the Thames
- Delaware Nation
- Caldwell First Nation
- Aamjiwnaang First Nation
- Métis Nation of Ontario Windsor-Essex-Kent Métis Council
- Munsee-Delaware Nation
- Walpole Island First Nation

Consultation with COTTFN was initiated at the beginning of the Master Plan. Information regarding the Water/Wastewater Master Plan update was provided to the COTTFN on July 13, 2023, through the Nations Connect online consultation portal. The COTTFN expressed in their response, dated August 11, 2023, that their main concern regarding the Mater Plan update was for the project approach to adequately incorporate climate change considerations. The COTTFN requested additional information on how climate change and its effects on increased rainfall would be considered in the development of Master Plan alternatives. In response, the project team indicated, through an email sent on November 8, 2023, that climate change factors were incorporated as part of the natural environment criteria when developing and evaluation alternative water and wastewater solutions, as required under the MECA process. Climate change considerations related to the project approach are further discussed in Section 13.3.2.

12.3 Public and Stakeholder Engagement Activities

For the purposes of this assignment, the main objectives of consultation with the public are:

- Notify the public of the assignment's commencement
- To provide information about the Master Plan to the public regarding the current and future conditions and needs, identified shortlisted alternatives, and the preliminary preferred alternative at different points in the process
- Receive input and comments on the project from interested stakeholders regarding the identified servicing needs and alternatives
- Receive input and feedback on the preliminary preferred alternative

Three PICs were held to communicate with the public and stakeholders to accomplish these engagement goals, where comments and survey responses from participants were received to collect feedback for the Master Plan. The number of attending participants and the feedback received are summarized in Table 12-2.

Table 12-2. PIC Participation

PIC	Number of Participants	Number of Survey Responses
PIC 1	17	16
PIC 2	19	6
PIC 3	29	0

12.3.1 Public Information Centre 1

PIC 1 was held on June 28, 2023, from 5:30-8:30pm at the Atlas Tube Recreation Centre in Belle River, Ontario. This PIC presented attendees with background information related to the project, including Lakeshore's water and wastewater system, current conditions and future servicing needs, and next steps for the project through a series of display boards. Attendees had the opportunity to ask questions during the session and voice potential concerns at the end of the session through a project survey. A total of 17 members of the public were in attendance. The PIC presentation material was published on the project webpage for the public to access and provide feedback with an online form that could be filled out for a period of 30 days.

A landowner meeting was held from 3:00-5:00pm, prior to PIC 1, with landowners in the Municipality to speak with Lakeshore staff before the PIC session.

All questions and comments received during PIC 1 and their associated responses are documented and can be found in Appendix A.

12.3.2 Landowner Engagement Activities

Ahead of PIC 1, Municipal staff reached out to landowners known to have interest in the study and invited them to meet with staff in relation to the information presented in PIC 1. Several landowner meetings were held between Municipality staff and landowners in the Municipality to discuss the project and concerns that the landowners may have. A total of 12 meetings were held in June and July of 2023 between various landowners and the Municipality.

12.3.3 Public Information Centre 2

PIC 2 was held on November 22, 2023, from 5:30-8:30pm at Lakeshore's Town Hall in Council Chambers. This PIC presented attendees with a summary of identified constraints and opportunities, the criteria for identifying the long list of alternatives and a preliminary list of project alternatives for the wastewater treatment and conveyance system through a series of display boards. Attendees had the opportunity to ask questions during the session and voice potential concerns at the end of the session through a project survey. A total of 19 members of the public were in attendance. The PIC presentation material was published on the project webpage for the public to access and provide feedback with an online form that could be filled out for a period of 30 days.

All questions and comments received during PIC 2 and their associated responses are documented and can be found in Appendix A.

12.3.4 Public Information Centre 3

PIC 3 was held on June 10, 2024 from 5:30 to 8:30pm at Lakeshore's Town Hall in Council Chambers. This PIC presented attendees with the evaluation criteria and results of the shortlisted alternatives for the water and wastewater system, the resulting preliminary recommendations, and the implementation plan for the

proposed projects. Attendees had the opportunity to ask questions during the session and voice potential concerns at the end of the session through a project survey. A total of 29 members of the public signed in on the sign in sheet. The PIC presentation material was published on the project webpage for the public to access and provide feedback with an online form that could be filled out for a period of 30 days.

All questions and comments received during PIC 3 and their associated responses are documented and can be found in Appendix A.

12.4 Agency Engagement

Relevant agencies and stakeholders were engaged at various stages of the Master Plan to provide their input and concerns to inform the project team in the planning process. The following agencies were engaged:

- County of Essex
- Fisheries and Oceans Canada (DFO)
- ERCA
- Ministry of Citizenship and Multiculturalism (MCM)
- MECP
- Ontario Ministry of Transportation (MTO)
- Town of Essex
- Town of Tecumseh
- Ministry of Municipal Affairs and Housing (MMAH)
- Municipality of Chatham-Kent

The project team conducted two meetings with the MECP to communicate project progress and discuss any concerns that the MECP may have. The first meeting took place on November 22, 2023, where key progress on the Master Plan was presented to the MECP, including the list of identified short-list alternatives for the Stoney Point and Comber STF Lagoon facilities. The MECP expressed that they did not have particular concerns regarding the identified short-list of alternatives but were concerned about the nutrient releases, particularly unionized ammonia, from the Municipality. The MECP communicated that the Municipality had exhausted its available interim solutions at the Lagoon facilities to support future growth, and that they were seeking express commitment from the Municipality to phase out the lagoon facilities. The MECP also advised that the County of Essex should be engaged regarding approval for further growth as the planning authority. The Municipality adhered to this advice and set up a meeting with the County on January 22, 2024.

A second meeting with the MECP was conducted on June 11, 2024, to provide a progress update on the Master Plan. The project team summarized the preferred alternatives for the Stoney Point and Comber STF Lagoon facilities. The MECP expressed concerns regarding the Municipality's failure to meet effluent targets at the lagoon facilities, highlighting that the September discharge from the Stoney Point facility was four times the concentration considered to be acutely toxic. The MECP also expressed concerns related to the continued recommendations of solutions through the Class EA process that fail to be implemented due to capital costs and noted that the MECP is willing to provide support on funding applications to the Municipality to maintain regulatory compliance.

Records of engagement with these agencies can be found in Appendix C.

12.5 How the Preferred Solutions Incorporates Engagement Feedback

Consultation and engagement conducted throughout this Master Plan resulted in the team receiving valuable feedback at key stages in the study. The following common themes were identified through feedback received during engagement activities:

1. **Sanitary system capacity is a high priority.** Many landowners indicated that they cannot develop their lands in accordance with the Municipality's applicable OP and secondary plans because of insufficient sanitary sewer capacity. The team heard from Council that enabling development is a high priority for the economic development of the Municipality and implementing the 2020 PPS.
2. **Insufficient wastewater treatment capacity at Stoney Point and Comber is a significant concern.** Engagement with provincial agencies (MECP) indicated that the Municipality is at risk of receiving a Control Order under the Ontario Water Resources Act and Ontario Clean Water Act. Untreated wastewater has been discharged within the Municipality's Intake Protection Zone 2 for the Stoney Point WTP which poses an environmental risk and threat to source water protection. The MECP is waiting for the conclusion of this Master Plan to determine if issuing a Control Order is appropriate.
3. **The cost of the recommendations is a concern.** Councillors and Municipal staff indicated that the recommendations will be financially challenging for the Municipality to implement.
4. **The ability to provide fire flow in emergencies is a concern.** The Municipal fire department expressed concerns with the ability of the treatment and distribution system to provide fire flows in the case of a significant fire without resulting in a boil water advisory in Comber, Stoney Point, and Maidstone. Fire flow deficiencies and preferred solutions to address the deficiencies were identified in this Master Plan.

The feedback received through the engagement process impacted the decision-making process as follows:

1. **Alternative Development:**
    a. **Sanitary Conveyance Alternatives.** The feedback received through engagement activities informed the identification of alternatives. The team heard from the community early in the process that alleviating sanitary sewer capacity constraints to enable development was a high priority. Alternatives were developed to provide sufficient sanitary system capacity to facilitate the planned future growth in Lakeshore.
    b. **Stoney Point and Comber STF Alternatives:** Feedback received through Agency consultation and engagement informed the identification and screening of alternatives for the Stoney Point and Comber STFs. The alternatives identified prioritized an approach that will bring the facilities into regulatory compliance and able to meet anticipated regulatory requirements that will be imposed when changes to the facility approvals are required., It is anticipated that effluent limits and objectives for nitrogen and phosphorous will be much more stringent than currently approved at these facilities. The team heard that the cost of implementing new infrastructure at these facilities will be fiscally challenging for the Municipality. The alternatives identified included a wide range of options to identify cost-effective solutions. Recommendations also include considerations that can be included in subsequent work to implement the recommendations to manage the cost of implementing the recommended solution. There are also development pressures within these communities that cannot be considered without treatment and conveyance capacity.

2. **Evaluation Framework:**

    a. **Sanitary Conveyance Alternatives:** The feedback received from the community and Council informed the development of the evaluation criteria and scoring of alternatives to consider priorities related to enabling development and growth in the Municipality.

    b. **Stoney Point and Comber STF Alternatives:** Feedback received through Agency engagement activities informed the evaluation of alternatives for the Stoney Point and Comber STFs. The evaluation included criteria which captured the environmental and public safety concerned related to the baseline (do nothing) alternative. The team heard that the cost of implementing new infrastructure at these facilities will be fiscally challenging for the Municipality. A detailed sensitivity assessment of the evaluation category weightings was performed to identify if the scoring of alternatives would change if one category was given a higher weighting relative to the other categories. The recommended solution was the highest ranked alternative for all scenarios conducted during the sensitivity analysis, indicating that the recommended alternative represents the greatest benefit and lowest overall cost to the Municipality.

3. **Project Prioritization in the Implementation Plan:** The project team heard through engagement activities that enabling growth is a high priority for the community. This was an important consideration when identifying the timing of recommended projects in the Implementation Plan. With respect to the Sanitary Conveyance recommendations, those that could be implemented more quickly because they can be implemented in parallel with other planned projects (such as road reconstruction projects) were prioritized. The project team also considered which recommendations could facilitate more growth relative to the others to help determine the recommended timing to implement the recommendations.

4. **Financial Strategy.** The project team heard concerns related to the costs of the recommendations through the engagement activities. This Master Plan includes a section providing guidance to Municipal staff on funding and financing considerations and alternative project delivery models that maybe enable the Municipality to manage the capital costs of the recommendations put forward in this Master Plan.

13. Implementation Plan

Section 13 summarizes the recommended water and wastewater alternatives. This section also provides general recommendations including the recommendation of implementing a Sanitary Allocation Policy and climate change considerations.

13.1 Recommended Solutions

This section summarizes the preferred solutions for this Master Plan. Figure 13-1 illustrates the recommended timeline for the preferred alternatives identified in this Master Plan. The implementation requirements of each project and their sequencing plan are discussed in subsequent sections.

Table 13-1. Master Plan Recommended Solutions

System	Recommended Solution	Year Required	Drivers	Capital Cost (CAD) [a], [b]	Implementation Requirements
Water Treatment	Upgrade Stoney Point WTP capacity	Near to Medium-term	Growth	$11,950,000	Schedule C Class EA
Water Treatment	Planning for Lakeshore WTP	Medium to Long-term	Growth	$550,000	Optimization Study, Schedule C Class EA
Water Distribution and Storage	Stoney Point Pressure Zone Alternative 3: Floating Storage	Near-term	Growth	$10,900,000	Schedule B Class EA
Water Distribution and Storage	Comber Pressure Zone Alternative 3: Floating Storage [c]	Near-term	Growth Level of Service	$10,900,000	Schedule B Class EA
Watermain Upgrades	Upgrade various watermain	Various	Condition	$46,257,000 [d]	None
Wastewater Treatment	Stoney Point and Comber STF Alternative 3: Common Mechanical STP	Immediate	Regulatory Compliance	$74,450,000	Schedule C Class EA
Wastewater Treatment	Denis St. Pierre WPCP Alternative 2: Expand Plant on Existing Site	Immediate to Long-term	Growth	$6,400,000 [e]	Schedule C Class EA
Sanitary Collection and Conveyance	Constraint Group 1 Alternative 4: Add new trunk sewer along County Road 22 from West Pike Creek Road to Puce Road. Includes pump station upgrades and local sewer upgrades.	Near-term	Level of Service Growth	$47,295,000	Schedule B Class EA Stage 1 Archaeological Assessment Cultural Heritage Assessment Report EIA
	Group 1 components: New trunk sewer along County Road 22				Exempt from further Class EAs Archeological work previously completed, PIF# P053-057 (D.R. Poulton & Associates Inc. , 2004)

System	Recommended Solution	Year Required	Drivers	Capital Cost (CAD) [a], [b]	Implementation Requirements
	Group 1 component: St. Clair Shores Pump Station Expansion and Forcemain				Schedule B Class EA Archaeological Assessment Cultural Heritage Report
Sanitary Collection and Conveyance	Constraint Group 2 Alternative 2: Increase capacity of County Road 22 Trunk Sewer from Puce Road to Denis St. Pierre WPCP. Includes pump station upgrades and local sewer upgrades. [f]	Near-term	Level of Service Growth	$44,740,000	Schedule B Class EA Stage 1 Archaeological Assessment Cultural Heritage Assessment Report EIA
	Group 2 components: New trunk sewer along County Road 22				Exempt from further Class EAs Archeological work previously completed, PIF# P053-057 (D.R. Poulton & Associates Inc. , 2004)
	Group 2 components: Maidstone PS02 expansion				Schedule B Class EA Archaeological Assessment Cultural Heritage Report
	Group 2 components: Maidstone PS08 expansion				To be completed as part of future Denis St Pierre WPCP expansion Refer to Table 10-10
Sanitary Collection and Conveyance	Constraint Group 3 (Belle River) Alternative 3: Belle River PS02 Upgrades	Immediate	Condition Growth	$7,954,000	Schedule B Class EA Stage 1 Archaeological Assessment Cultural Heritage Assessment Report EIA

Notes:

[a] Capital costs are presented at a 2024 dollar value and are at a planning level of detail with a confidence of +50% / -30%

[b] Excluding cost of property acquisition

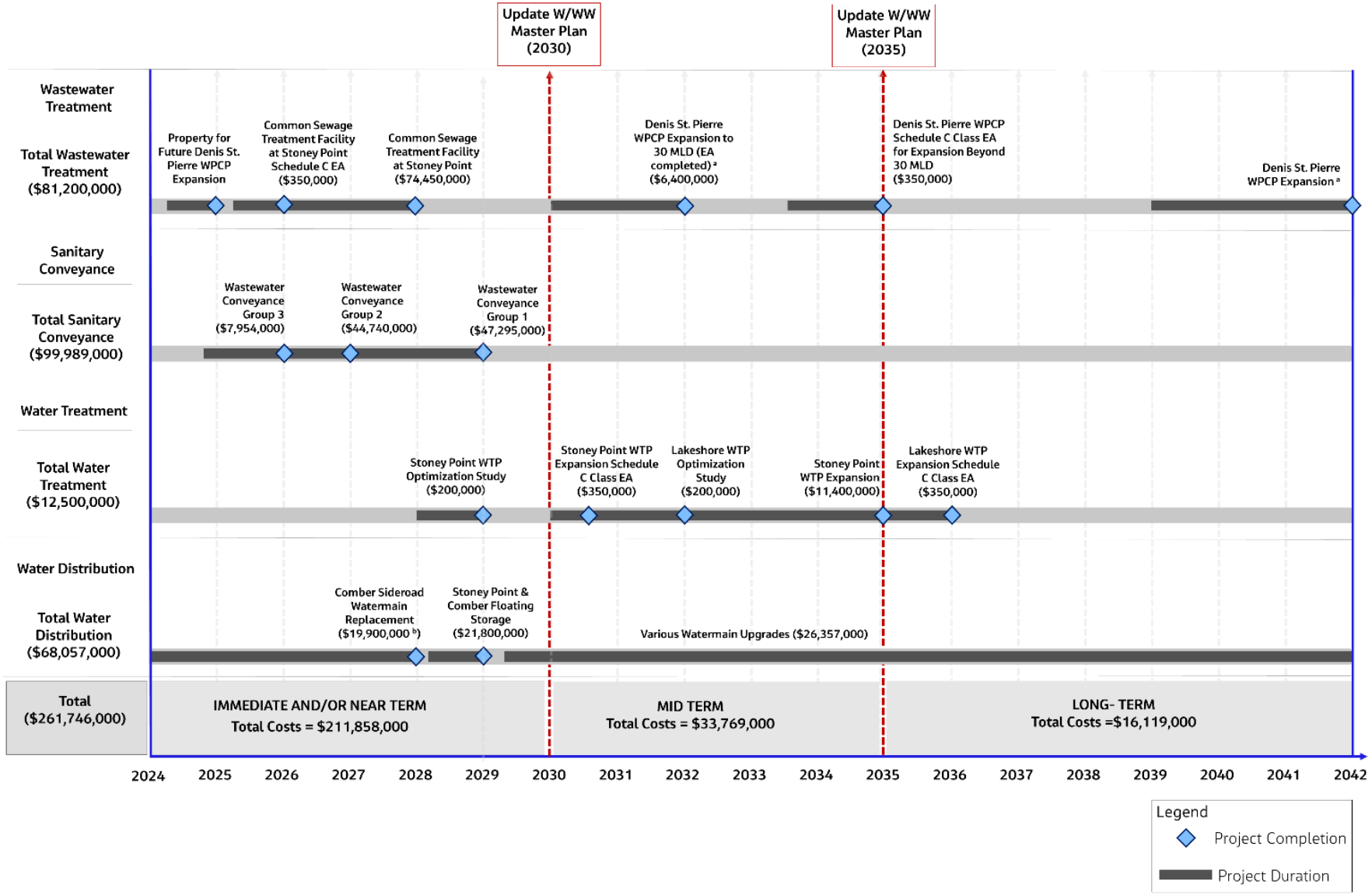
[c] Comber sideroad watermain must be replaced before this recommendation can be implemented

[d] Cost basis is from previous Master Plan (water distribution model calibration and hydraulic modelling is required to confirm constraints within the water distribution system)

[e] Excluding cost of expansion beyond 30 MLD

[f] Constraint Group 2 recommendations must be completed prior to Conveyance Group 1 implementation

Figure 13-1. Implementation Plan



13.2 Impacts and Mitigation Measures

13.2.1 Built Heritage Resources and Cultural Heritage Landscapes Impact

A Cultural Heritage Evaluation Report and Heritage Impact Assessment has not been completed for the preferred alternatives. These technical studies are required to be completed as early as possible during the necessary Schedule B and C Class EAs. Any subsequent recommended investigations should be completed as early as possible during detailed design and prior to any ground disturbing activities for the preferred alternatives.

13.2.2 Archaeological Impact

Archaeological Assessments have not been completed for all of the recommendations. All recommended archaeological assessment (identified in Section 13.1) are required to be completed as early as possible during the necessary Schedule B or C Class EAs. Any subsequent recommended investigations should be completed as early as possible during detailed design and prior to any ground disturbing activities for implementation. It is recommended that archeological assessments be completed prior to commencing geotechnical investigations.

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

The *Funeral, Burial, and Cremation Services Act, 2022, S.O. 2002, c.33* requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with Ontario Regulation 30/11 the coroner shall notify the Registrar, Ontario Ministry of Public and business Service Delivery, which administers provision of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism should also be notified (at archaology@ontario.ca) to ensure that the archaeological site is not subject to unlicesened alterations which would be a contravention of the *Ontario Heritage Act*.

13.2.3 Noise and Vibration Impact

The noise and vibration associated with the construction can be addressed by the following measures:

- Working within Lakeshore's noise bylaw
- Working within the MECP's Environmental Noise Guideline - Stationary and Transportation Sources - Approval and Planning
- Minimizing construction traffic in local residential streets

Larger pumps have the ability to increase the noise level at the pump stations. However, the impact is expected to be minimal.

13.2.4 Odour Impact

Odour is not expected to increase substantially related to the recommended alternative or during construction. Odour at the Comber and Stoney Point STFs are expected to be mitigated and improved by the identified recommendations.

The potential for odour generation at the PSs and WWTP may increase due to increased flows from population growth. However, the impact is expected to be minimal and can be explored further during design stages.

13.2.5 Natural Environment Impacts

The impacts of waterbody crossings depend on the construction methodology selected. Construction methods will be investigated at the detailed design stage. Construction of the recommended projects pose potential impacts to vegetation and tree removals, wildlife habitat removal, and aquatic habitats. Erosion and sedimentation plans will be developed and implemented to limit or eliminate the impact to the adjacent habitats and aquatic environment.

A detailed natural environment monitoring study with field verification and an Environmental Impact Assessment is required to be completed **for the** preferred alternatives **through the identified Schedule B and C Class EAs**. Mitigation measures will be developed following the detailed natural environmental monitoring study during the design phase. Mitigation measures are expected to include an Erosion and Sedimentation Plan, a Spills Management Plan, a Tree Impact and Preservation Plan, compliance with the Species Act and Migratory Birds Convention Act, and compliance with the **Essex Source Water Projection Plan (Section 5.1.9).**

13.3 General Recommendations

The following general recommendations have been identified throughout the Master Plan through engagement activities:

- Complete Master Plan updates every 5 to 8 years. While Master Plans are typically undated every 8 to 10 years, more frequent updates appropriate when recommendations when there are changes within the Municipality that change the identified problem and opportunity statement sooner than planned. Lakeshore is experiencing rapid growth and has a high demand for development it is recommended that an update to the Master Plan is conducted in 2030 and again in 2035 to help the Municipality proactively respond to the rapid growth.
- Future Master Plan updates should continue to review if it is appropriate to expand sanitary servicing to Lighthouse Cove and Rochester Place.
- The next Master Plan Update is recommended to address the performance of the South Woodslee Sewage Treatment Plan. The agency engagement related to this Master Plan have been spills to residential properties associated with the South Woodslee treatment facility.
- Follow the Municipality's Secondary Plans to avoid servicing impacts.
- The Municipality should monitor the level of interest in the community to add accessory dwelling units to identify how that may impact sanitary conveyance system capacity.
- Future Master Plan updates should consider the effects of potential drought on water demand and supply.
- **General recommendations related to the Municipality's water treatment systems:**

- The relevant policies and procedures required for significant threats to drinking water prescribed in the Source Protection Plan are recommended to be put in place at the Stoney Point WTP for IPZ-2 to mitigate the threat to the drinking water supply posed by untreated discharged wastewater from the Stoney Point STF until the recommended preferred solution is implemented and commissioned.
- A quantitative microbial risk assessment is recommended to identify the need for enhancing multi-barrier disinfection in Stoney WTP. This assessment should capture Stoney Point STF Lagoon discharges to adequately assess the risk.
- Monitor growth and update projections in the BRWSS throughout the planning period, as supplying the Stoney Point WTP from the Lakeshore WTP may become a viable solution if a Lakeshore WTP expansion is no longer required.
- The Municipality should complete a process optimization study at the Stoney Point WTP to identify opportunities to maximize the treatment capacity of the existing processes.

- **General recommendations related to the Municipality's water distribution systems:**
  - Complete monitoring of Lakeshore water distribution systems and calibrate water distribution models with monitoring results. Update distribution system constraints and recommendations based on distribution modelling results.
- **General recommendations related to the Municipality's wastewater treatment facilities:**
  - The Municipality should proactively acquire the land required for future expansion and the associated buffer zone required by the MECP. Land acquisition costs have not been included in this Master Plan.
  - The Municipality should secure the funding and implement the expansion of the Denis St Pierre WPCP to 30,000 m^3/day before 2032 to avoid the costs associated with needing to complete a subsequent Schedule C Class EA. If growth is realized more slowly than anticipated, the Municipality should complete a Schedule C Class EA to expand beyond the current rated capacity.
  - The Municipality should move toward completing the design and construction of the recommended solution for Stoney Point and Comber STFs immediately after completing and filing the Schedule C ESR.
  - In accordance with the 2020 PPS and communications from the MECP received through engagement on this Master Plan, development within the Stoney Point and Comber servicing areas cannot be approved until "suitable Class EA process is completed, the requisite tenders are let, and the contracts for the required municipal sanitary sewage works expansion/upgrades are awarded" (Appendix C).
  - Refer to Section 8 for recommendations for the Stoney Point WTP to mitigate the risk to drinking water supply posed from the seasonal discharges from the existing Stoney Point STF. As identified in Section 8, the Municipality should complete a process optimization study to identify opportunities to maximize the treatment capacity of the existing processes and reduce risk.
  - The Municipality should proactively seek funding sources to support the implementation of the recommended solution for the Stoney Point and Comber STFs. The Municipality should engage with the MECP for support when seeking funding to implement these recommendations.
  - The Municipality should consider suitable opportunities for alternative delivery methods to accelerate the implementation of this solution. Information on alternative delivery methods are provided in Section 14.
  - It is also recommended that the Municipality review the 5-year rolling average for average daily flows received at the Denis St Pierre WPCP to identify how growth is being realized relative to the

Master Plan projections to determine the timing of the next WPCP expansion and Master Plan update.

- **General recommendations related to the Municipality's sanitary conveyance systems:**
  - Complete flow monitoring within the Stoney Point, Comber, and North and South Woodslee wastewater collection systems to monitor and identify sources of inflow and infiltration as well as to understand current capacities. Stoney Point and Comber investigations should be prioritized.
  - Continue to actively investigate and mitigate inflow and infiltration within Lakeshore's wastewater collection systems. It is recommended that Municipal Staff develop an approach to define the necessary support and resourcing to implement this recommendation.
  - The Municipality should implement a Sanitary Allocation Policy. Refer to Section 13.3.1 for more information.
  - The Municipality should develop a full buildout scenario in the hydraulic model representing servicing the entire Denis St Pierre WPCP servicing boundary identified in the OP to support the preliminary design and sizing of the identified conveyance alternatives. The potential for intensification in accordance with the 2020 PPS should also be considered. The full buildout modelling scenario can also be used as a tool to implement the Municipality's sanitary sewer allocation policy.
  - It is recommended that the Municipality formally define a sanitary conveyance system level of service which accounts for climate change. This is important for sizing infrastructure to provide resiliency for the future.
  - The Municipality should confirm tie-in locations for future developments. This will inform infrastructure sizing and confirm the need for Maidstone PS02 upgrades.
  - Pump station draw down tests are recommended to confirm capacities.
  - The downstream constraint group 2 preferred alternative needs to be implemented prior to the constraint group 1 preferred alternative.
  - Supportive studies, including Archaeological and Cultural Heritage Assessments, as well as an EIA, are required prior to implementation.
  - The Municipality should continue to proactively implement source control measures and enforce the Municipal Sewer Use By-Law to protect reserve capacity. Effective source control can delay the need for costly capital projects.
  - It is recommended that the Municipality carefully consider development applications that do not comply with the approved secondary plans. The Sanitary Allocation Policy will aid the Municipality in evaluating proposed changes in density in secondary planning areas.

13.3.1 Sanitary Allocation Policy

A Sanitary Allocation Policy sets out regulatory guidance regarding the management of the allotment of sanitary servicing capacity. It aims to enable the allocation of sanitary servicing in a sustainable, transparent and responsible way. Sanitary Allocation Policies examine and consider a number of factors including:

- Wastewater treatment and conveyance system capacity and pump station performance
- I/I problems and obstacles
- Effect of rezoning and amendment application to the OP
- Process milestones and timelines for allocation requests
- Expiration and renewal of allocation

- Feedback regarding policy frameworks

To better inform the process of sanitary capacity allocation, it is recommended that Lakeshore adopt a Sanitary Allocation Policy by early 2025.

13.3.2 Climate Change Considerations

Climate change is an increasingly salient issue, the effects of which warrant special consideration in the Municipality's water and wastewater infrastructure. As well, the COTTFN has expressed particular interest in the ways in which climate change considerations were incorporated in the project approach, therefore it is important to discuss the climate change considerations in the Master Plan. Climate change within the context of this Master Plan can impact wet weather flows to the sanitary system as well as water supply and demand during periods of drought.

Lakeshore's 5-year design storm was used to determine current and future sanitary constraints and needs in the Municipality's wastewater collection system. It is recommended that the 5-year design storm be compared to those projected under climate change scenarios to confirm that they appropriately account for climate change. A sensitivity analysis is also recommended to be completed during subsequent design stages to determine the impact of climate change on infrastructure sizing. Furthermore, the alternatives evaluation process in this Master Plan employs the MODA methodology, which includes the Natural Environment criteria category. An adaptation to climate change criterion was included for each of the evaluation processes (conveyance and treatment for both the wastewater and the water system), which assesses the alternatives' ability to equip the Municipality to combat and adapt to climate change and help the Municipality to meet its climate change goals. With these considerations, the likely impact of more frequent and intense precipitation from climate change are incorporated in the findings of this Master Plan.

The modelled flow increases for Denis. St Pierre WPCP and Stoney Point STP from the modelling efforts in this Master Plan may be compared with results from the Intensity-duration-frequency-climate-change (IDF_CC) tool available on the IDF_CC Tool website to further assess the potential impacts of climate change induced floods and precipitation events. Lakeshore can continue to explore further strategies to address climate change concerns in upcoming Master Plan updates.

14. Funding and Financing Considerations

A preliminary assessment of funding and financing options is included identifying sources the Municipality may utilize to deliver the alternatives and recommendations discussed in this Master Plan. The funding and financing options considered can be divided into three categories which include internal, external, and alternative sources. Internal sources refer to revenue or capital that the Municipality can generate within its internal governmental organization. External sources refer to any sources where a third party that is outside the daily governance of the Municipality contribute. In addition to traditional internal and external sources, there are alternative sources to raising capital that may or may not yet be common practice in the Municipality.

14.1 Internal Funding and Financing Options

Municipalities provide a range of regional and local services including those related to utilities, local roads and transit, emergency services, public health, recreation, and social and housing services. Provincial legislation provides municipalities with limited powers to generate revenue and issue debt to pay for these services. The main funding sources for municipalities, such as the Municipality, include the following:

- Property taxes (main source)
- Federal and provincial transfers
- User fees and service charges (such as development and stormwater fees)
- Development charges
- Land transfer tax
- Fines and penalties
- Licences, permits, rent.

Water, wastewater, and stormwater servicing infrastructure is typically funded through user service fees and development charges. Municipalities also may maintain reserve funds to finance future spending requirements and protect budgets against unexpected changes in revenue and expenses.

14.2 External Funding and Financing Options

Federal and provincial funding programs (i.e., grants, loans, and other financial assistance) are key sources of funding and financing designed to support targeted initiatives, objectives, or projects that municipalities may apply for. Table 14-1 presents a list of potential funding and financing options that the Municipality may pursue. A screening of each program is recommended to assess eligibility, application requirements, and program compliance.

Table 14-1. External Funding and Financing Options Screening

Funding Source	Entity	Eligibility	Funding Availability
Clean Water and Wastewater Fund	Infrastructure Canada	Municipalities that provide water or wastewater service. Eligible investment areas include immediate clean water and wastewater projects that help foster economic growth and cultivate a healthier environment for communities.	Total funding from all sources may cover up to 50% of total eligible cost per project in the provinces.

Funding Source	Entity	Eligibility	Funding Availability
Canada Community Building Fund	Association of Municipalities Ontario	All municipalities in Ontario. Eligible investment areas include 18 specified project categories to address local priorities.	$800 million to Ontarian municipalities as a whole, distributed on a per capita basis. Funds provided to municipalities on front, twice per year.
Municipal Energy Plan Program	Province of Ontario	All Ontarian municipalities may apply. Eligible investment areas include Initiatives that can help communities improve energy efficiency, bring down energy consumption and greenhouse gas emissions or study the impact of future development on energy requirements.	50% of eligible costs up to a maximum of $90,000 for the creation of a new plan, and up to $25,000 for continuing work on an existing plan.
Housing-Enabling Water Systems Fund	Province of Ontario	To be eligible for funding, projects must focus on either the rehabilitation and repair, reconstruction, or expansion of water infrastructure. Projects can be stand-alone or a component of a larger project. To meet the outcomes of the program, eligible projects should: enable growth and housing development, increase access to clean drinking water, increase treatment and/or management of wastewater and stormwater.	To be eligible for funding, projects must focus on either the rehabilitation and repair, reconstruction, or expansion of water infrastructure. Projects can be stand-alone or a component of a larger project. To meet the outcomes of the program, eligible projects should: enable growth and housing development, increase access to clean drinking water, increase treatment and/or management of wastewater and stormwater.

Funding Source	Entity	Eligibility	Funding Availability
Ontario Community Infrastructure Fund	Province of Ontario	Provides funding to help small, rural, and northern communities renew and rehabilitate critical infrastructure. The following Ontario municipalities are eligible: Small municipalities (municipalities with populations less than 100,000) Northern municipalities Rural municipalities	The size of grants is determined by: Estimated Current Replacement Values for core infrastructure owned by municipalities, including roads, bridges, water, and wastewater. The Municipality's economic conditions. The minimum grant size is $100,000.
Building Ontario Fund	Province of Ontario	Ontario's new infrastructure bank, the Building Ontario Fund, will support the financing and building of critical infrastructure projects across the province to help build Ontario. Building Ontario Fund will receive and assess unsolicited ideas and proposals for infrastructure projects that come from qualified institutional investors, public sector entities, governments, or Indigenous communities.	Building Ontario Fund is developing a detailed process to ensure there is appropriate criteria for selecting projects and partners in priority areas.
Green Municipal Fund	Federation of Canadian Municipalities	Municipalities are eligible. Eligible investment areas include five sectors of municipal activity: brownfields, energy, transportation, waste, and water. Grants may be used to conceive sustainable community plans and carry out feasibility studies and field tests. For wastewater capital projects, 60 percent of the municipal wastes to landfills in the municipality must be diverted by the project.	The value of the program totals $1.6 billion funded by the federal government. Loans can be applied for capital projects and an additional grant of up to 15% of the loan value may be received.

Funding Source	Entity	Eligibility	Funding Availability
Capital Project: Net-Zero Transformation	Federation of Canadian Municipalities	Municipalities are eligible. Combined loan and grant funding to support municipalities in constructing innovative infrastructure that has the potential to result in a significant contribution to net-zero. Green Municipal Fund capital projects are usually composed of physical assets. There are no pre-set environmental targets or thresholds for this funding program.	Combined grant and loan for up to 80% of eligible costs. Combined grant and loan to a maximum of $10M. Grant up to 15% of the total loan amount. Additional 5% grant available if the project involves the remediation of a brownfield site.

14.3 Alternative Funding and Financing Options

Alternative funding and financing options offer municipalities innovative approaches to meet their financial needs for water and wastewater projects. A summary of alternative funding and financing options that may be utilized by the Municipality to realize the recommendations in this Master Plan are presented in Table 14-2.

Table 14-2. Alternative Funding Opportunities

Source	Description
Delivering Wastewater Treatment As A Service	Similar to providing energy as a service, residents and businesses are provided wastewater treatment and charged on a per-volume basis. This model may incentivize residents and businesses to cut down on their water usage which can help reduce the required wastewater treatment capacity in the Municipality.
Wastewater Heat Recovery for Commercial Ventures	Heat generated from wastewater treatment activities may be offered and sold to partners that could benefit from these products. For example, biogas produced from anaerobic digesters in wastewater treatment may be provided for heating or energy generation in heavy industry.
Data Monetization	Wastewater treatment data may be collected and sold to researchers, consultants, and other entities as a product.
Air Rights	Air rights of the Municipality's infrastructure right-of-way may be sold to developers for adjacent development.
Sponsorship and Naming Rights	Naming rights for major infrastructure and promotional opportunities may be sold to partners looking to promote their brand.
Local Business Sponsorship in Exchange for Goods/Services	Sponsorship for local businesses by way of advertising and promotional opportunities may be offered in exchange for services and materials that fulfill project needs, including construction equipment, material or even labour.

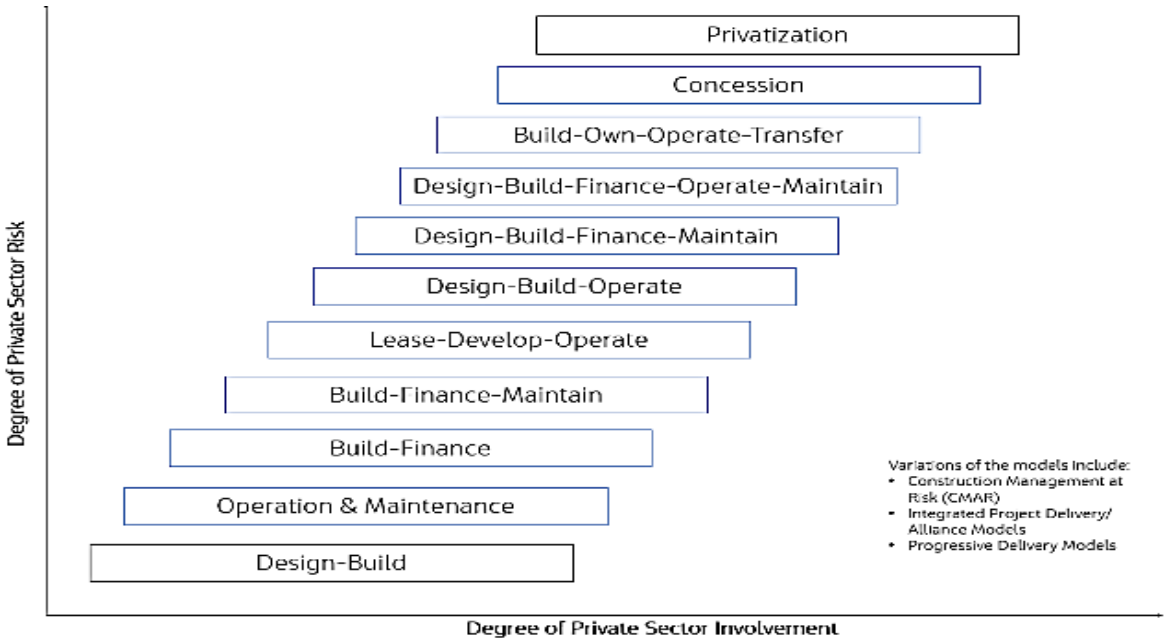
Source	Description
Collaboration with Educational Institutions	Partnership with universities may be established to allow for access to existing and planned water and wastewater treatment sites for research in exchange for funding. Universities may particularly be interested in collecting water and wastewater treatment samples for research in emerging treatment technologies.
Greenhouse Gas Offset Credit System	The Canada Greenhouse Gas Offset Credit System awards municipalities for undertaking projects that result in a reduction in greenhouse gas emissions. Municipalities can register with the system and receive federal offset credits, which can further be sold to third parties. Lakeshore may consider carrying out projects that have such an emissions reduction potential or modifying existing projects to be able to reduce emissions so that offset credits and be monetized for water and wastewater projects.

14.3.1 Alternative Delivery

The procurement and delivery of major public infrastructure could be completed using a range of alternative delivery models. Alternative delivery models could help generate value for the Municipality while overcoming funding shortfalls by introducing new sources of funding, thus allowing projects to be delivered. The most successful alternative delivery models are those that optimize value which includes:

- Providing performance incentives rather than disincentives.
- Empowering and rewarding all parties for work performance, including the owner and project contractors.
- Placing responsibility for performance with the entity best suited to deliver and recognize successful delivery, and
- Sharing risk equitably between responsible parties.

Figure 14-1. Alternative Delivery Options



Alternative project delivery options can be categorized based on the extent of public and private sector involvement and the degree of risk allocation. Figure 14-1 illustrates common alternative delivery models used to deliver public infrastructure for consideration. In addition, variations of the common alternative delivery models include:

- Progressive Delivery Models: Prior to entering a final fixed-price (Progressive P3) or target price (Progressive Design-Build) contract, owner, and contracting partner work together to define the project requirements, design, pricing, and risk through a development phase that commences following the selection of the partner through a competitive procurement process.
- Construction Manager at Risk: Contractor is engaged by the owner to provide consultancy services during the pre-construction stage (constructability and value engineering reviews, tender administration, etc.). They are later contracted to deliver the construction of the project under a cost-plus-fee arrangement that includes a Guaranteed Maximum Price.
- Integrated Project Delivery/Alliance Model: Contract is formed by the owner, designer, construction contractor, suppliers and potentially stakeholders (e.g., local organization, community stakeholder, funding organization, etc.) to plan, design, construct, and commission a capital project.

The procurement of infrastructure using alternative delivery models in Canada, including in the water and wastewater sector, has been successful and continues to evolve, either as the result of the complexity of the project, from lessons learned in other transactions, or based on the specific needs of the agency sponsoring the project.

A preliminary review of the recommended solutions based on capital cost and level of investment, indicate that the preferred solution for the Stoney Point and Comber STF (a common treatment facility located at Stoney Point STF) could be a suitable candidate for alternative delivery, however additional analysis is required. When selecting the alternative delivery model, the goal is to maximizes value for the Municipality while optimizing project delivery and stakeholder needs. A few key areas to be considered when evaluating alternative delivery options may include availability of funds, applicability or strategic fit, political appetite, agreement terms, project scheduling, project risks, amount of capital required, and alignment with the project goals and objectives. Developing a strategy for implementation incorporating alternative delivery requires time and upfront investment.

The use of alternative delivery methods for the remaining solutions could be a challenge due to the smaller scale of those projects. Therefore, we recommended exploring the use of traditional delivery models, progressive design-build, or potentially bundling the smaller projects into an overall, larger, single project package. Bundling procurements may also result in economies of scale, streamlined workflows, optimized resource utilization, and potential cost savings.

14.4 Market Considerations

Throughout 2020 to 2023, economic instability, concerns regarding rising inflation, and labour and supply chain issues have created a landscape where many agencies and contractors are experiencing unforeseen challenges leading to project schedule delays and cost increases. As the time of writing in 2024, inflationary pressures appear to be reducing after significantly higher than typical inflation over the last four to five years, with some indication that material commodity pricing may be decreasing. However, these recent trends are not long enough to be indicative of stable long-term trends and are subject to a multitude of external factors (geopolitical, economic, etc.). Therefore, it is recommended to continue to monitor the market and perform continual stress testing to capture market changes and volatility that may impact funding and delivery considerations as the projects progress.

15. References

Birds Ontario. (2023). *Ontario Breeding Birds Atlas.* Retrieved from Birds Ontario: https://www.birdsontario.org/

Statiscs Canada. (2023, November 15). *Census Profile, 2021 Census of Population.* Retrieved from Statistics Canada: https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/page.cfm?Lang=E&SearchText=Lakeshore&DGUIDlist=2021A00053537064&GENDERlist=1,2,3&STATISTIClist=1&HEADERlist=0

City of Guelph. (2020). *Guiding Principles for Community Engagement.* Retrieved February 2022, from https://guelph.ca/city-hall/communicate/community-engagement/

ERCA. (2023). Retrieved from ERCA: https://essexregionconservation.ca/about-us/

Essex Region Conservation Authority. (2015). *Essex Region Source Protection Plan.* Essex Region Conservation Authority.

Essex Region Conservation Authority. (2016). *Town of Lakeshore Natural Heritage Discussion Paper.*

Essex Region Conservation Authority. (2023). *Essex Region Conservation Authority Interactive Mapping.* Retrieved from Essex Region Conservation Authority Interactive Mapping: https://ercamaps.countyofessex.ca/?viewer=http%3A%2F%2Fgisweb.countyofessex.ca%2Fhtmlerca%2Findex.html%3FconfigBase%3Dhttp%3A%2F%2Fgisweb.countyofessex.ca%2FGeocortex%2FEssentials%2FERCA%2FREST%2Fsites%2FERCA__Public%2Fviewers%2Fhtmlpublic%2Fvirtualdirect

Fire Underwriters Survey. (2020). *Water Supply for Public Fire Protection – A Guide to Recommended Practice in Canada, Fire Underwriters Survey.* Fire Underwriters Survey.

Fisheries and Oceans Canada. (2023). *Aquatic Species at Risk Map.* Retrieved from https://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html

Government of Ontario. (2023). *Species at Risk.* Retrieved from https://www.ontario.ca/page/species-risk-ontario

Health Canada. (2012). *Guideline for Canadian Drinking Water Quality- Guideline Technical Document Escherichia Coli.* Health Canada.

IBI Group. (2008). *Town of Lakeshore Transportation Master Plan.* Lakeshore.

iNaturalist. (2023). *iNaturalist.* Retrieved from iNaturalist: https://www.inaturalist.org/places/ontario-ca

Jacobs. (2018). *Denis St. Pierre WPCP Capacity Assessment and Bottlenecks.* Kitchener: Jacobs.

Lakeshore, M. o. (2022). *Sanitary Treatment Capacity Update - Comber & Stoney Point Lagoon.* Essex County: Municipality of Lakeshore.

Lower Thames Conservation Authority. (2023). *Lower Thames Conservation Authority.* Retrieved from Lower Thames Conservation Authority: https://www.lowerthames-conservation.on.ca/

MECP. (2008). *Design Guidelines for Drinking Water Systems.*

MECP. (2023, December 12). *Source Protection Information Atlas.* Retrieved from https://www.lioapplications.lrc.gov.on.ca/SourceWaterProtection/index.html?viewer=SourceWaterProtection.SWPViewer&locale=en-CA

Ministry of Tourism and Culture. (2022). Criteria for Evaluating Archaeological Potential. Toronto, Ontario: Programs and Services Branch.

Ministry of Tourism, Culture and Sport. (2022). Criteria for Evaluating Marine Archaeological Potential. *A Checklist for Non-Marine Archaeologists*. toronto, Ontario: Programs and Services Branch.

MNRF. (2023). Make a Map: Natural Heritage Areas. Retrieved from Ministry of Natural Resoruces and Forestry: https://www.lioapplications.lrc.gov.on.ca/Natural_Heritage/index.html?viewer=Natural_Heritage.Natural_Heritage&locale=en-CA

Municipal Class Environmental Assessment (MCEA). (2015). *Municiplal Class Environemtnal Assessment (MCEA).* Retrieved from https://municipalclassea.ca/manual/page1.html

Municipality of Lakeshore. (2021, August 5). *Flood Mitigation and Protection Framework.* Retrieved from Municipality of Lakeshore: https://events.lakeshore.ca/Meetings/Detail/2021-08-10-1800-Regular-Council-Meeting/66d6a1dd-6ebb-48a6-945b-ad7c012ae2a3

Municipality of Lakeshore. (2021). *Stormwater Master Plan - Phase 2.* Retrieved from Municipality of Lakeshore: https://www.lakeshore.ca/en/living-here/stormwater-master-plan-phase-2.aspx#:~:text=What%20is%20the%20Stormwater%20Master,future%20growth%20and%20climate%20change.

Municipality of Lakeshore. (2021). *Subsidies.* Retrieved from Municipality of Lakeshore: https://www.lakeshore.ca/en/living-here/water-services-and-billing-subsidies.aspx#Downspout-Disconnection

Municipality of Lakeshore. (2023). Municipality of Lakeshore GIS Data. Lakeshore, Ontario, Canada.

NHIC. (2023). *NHIC.* Retrieved from Natural Heritage Information Centre: https://www.ontario.ca/page/natural-heritage-information-centre

Ontario Conservation. (2023). *Ontario Conservation.* Retrieved from Ontario Conservation: https://ontarioconservationareas.ca/find-a-conservation-area/map/

Province of Ontario. (2017). *Nutrient Management Act, 2002.* Retrieved from Ontario Regulation 267/03: General : http://www.ontario.ca/laws/regulation/030267

Province of Ontario. (2020). *Provincial Policy Statement, 2020.*

SHS Consulting. (2016). *Town of Lakeshory Affordable Housing Strategy.*

(2022). *Stage 1 Archaeological Assessment Guelph WRRC.* Archaeological Research Associates Ltd.

Stantec. (2008). *Water and Wastewater Masterplan.* Municipality of Lakeshore.

Stantec. (2012). *Town of Lakeshore Assessment Environmental Study Report for Lakeshore Eastern Communities Sewage Works.* Municipality of Lakeshore.

Stantec. (2022). *Lighthouse Cove Sanitary Servicing Report.* Municipality of Lakeshore.

Stantec Consulting Ltd et al. (2022). *Municipality of Lakeshore Shoreline Management Plan Final Report.*

Statistics Canada. (2023, Feburary 1). *Census Profile, 2021 Census of Population.* Retrieved from Statistics Canada: https://www12.statcan.gc.ca/census-recensement/2021/dp-

pd/prof/details/page.cfm?Lang=E&SearchText=Lakeshore&DGUIDlist=2021A00053537064&GENDERlist=1,2,3&STATISTIClist=1&HEADERlist=0

Survey, F. U. (2020). *Water Supply For Public Fire Protection in Canada.*

Thames-Sydenham and Region. (2023). *Source Protection Plan, 2023.* Thames-Sydenham and Region.

Town of Lakeshore. (2017, July). *Town of Lakeshore Development Manual.* Retrieved from Lakeshore: https://www.lakeshore.ca/en/business-and-development/resources/Documents/Development-Manual.pdf

Watson & Associates. (2015). *Town of Lakeshore official Plan Review- Growth Analysis Study.* Municipality of Lakeshore.

WSP. (2021). *Municipality of Lakeshore Official Plan Draft.*

WSP, & MMM Group. (2016). *Lakeshore 5-Year Official Plan Review - Residential Intensification Strategy.*

Appendix A
Community and Stakeholder Engagement

(To be provided upon request.)

Appendix B
First Nations Engagement

(To be provided upon request.)

Appendix C
Agency Engagement

(To be provided upon request.)

Appendix D
Technical Information

Appendix D.1 – Historic Wastewater Characteristics and Compliance

Appendix D.2 – Detailed Evaluation of Water Treatment Alternatives

Appendix D.3 – Detailed Evaluation of Water Pumping and Storage Alternatives

Appendix D.4 – Detailed Evaluation of Wastewater Treatment Alternatives

Appendix D.5 – Detailed Evaluation of Sanitary Conveyance Alternatives

(To be provided upon request.)

Appendix E
30-day Review Period

(To be completed upon completion of the 30-day review period.)