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Lakeshore-Essex Fringe Study Area

Sanitary Sewer Servicing Study

Feasibility analysis of connecting the Lakeshore-Essex Fringe Study Area to the Town of Essex sanitary sewer and wastewater treatment system.

December 5th, 2025

Prepared for:
Municipality of Lakeshore

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1.0: Introduction

1.1: Background

The Lakeshore-Essex Fringe Area is a group of residential and agricultural areas that are currently not serviced with municipal sewer collection or treatment systems. These areas are generally located north and northwest of the Town of Essex within the Municipality of Lakeshore. Based on aerial imagery from 2024, the Lakeshore-Essex Fringe Study Area, provided by the Municipality, includes approximately 149 residential dwellings and 21 industrial, institutional, and commercial (ICI) establishments which support an equivalent population of approximately 480 people.

The largest fringe area is located to the north and west of the Essex Town Centre along County Road 34 (Talbot Road North) and includes adjacent side streets. These residences are serviced by privately owned onsite septic systems typically consisting of a holding tank and leaching bed. Many of the septic systems in these areas are over 20 years old and are unlikely to be providing the necessary degree of sewage treatment prior to discharge. The Municipality of Lakeshore Water and Wastewater Master Plan identified that malfunctioning septic tank systems were a source of pollution in local watercourses throughout unserviced areas. To address environmental concerns and allow growth in the Fringe Area the Municipality of Lakeshore has initiated this study to evaluate the feasibility of connecting the Fringe Study Area to the Town of Essex sanitary sewer and wastewater treatment system.

The Town of Essex owns two wastewater treatment facilities this includes the Essex Pollution Control Plant (PCP) and the Essex Northeast Sewage Treatment Lagoons (NE Lagoons). Both of these facilities are owned by the Town of Essex and operated by the Ontario Clean Water Agency (OCWA). The Essex PCP is located in the Town of Essex and the Essex NE Lagoons are located within the Municipality of Lakeshore. These facilities present an opportunity for the Town of Essex to expand service from the Essex PCP or Essex NE Lagoons to the Lakeshore-Essex Fringe Study Area within the Town of Lakeshore.

The Municipality of Lakeshore Official Plan currently prohibits additional development in this Fringe Study Area until they provided municipal sanitary services. It is the hope of the Municipality of Lakeshore that connecting this Fringe Study Area to the Town of Essex sanitary system will encourage future growth in the area. This report will outline the technical feasibility of connecting the Lakeshore-Essex Fringe Study Area to the Town of Essex Sewage works, more specifically, highlighting sewer, pumping station, and wastewater treatment capacity upgrades that may be required as a result of extending the service area.

1.2: Supporting Documents

The following documents were referenced to complete this study:

- Town of Essex Development Standards Manual (2022)
- Town of Essex Official Plan (2024)
- Ministry of Environment, Conservation and Parks (MECP) Design Guidelines for Sewage Works (2016)

- Municipality of Lakeshore Water and Wastewater Masterplan (2024)
- Municipality of Lakeshore Official Plan (2024)
- Municipality of Lakeshore Development Standards Manual (2017)
- Essex Sanitary Sewer System Hydraulic Model Development, Calibration and Capacity Assessment (2015)

1.3: Purpose of this Report

There is approximately 378 ha of land in the Municipality of Lakeshore along the municipal boundary with the Town of Essex and Town of Kingsville, which is currently not provided sanitary sewer services. The Municipality of Lakeshore is interested in increasing development in these lands, known as the Lakeshore-Essex Fringe Study Area. Planning guidelines for the Municipality of Lakeshore prevent additional development in areas that do not have access to sanitary sewer service.

Therefore, the purpose of this report is to assess the viability of connecting the Lakeshore-Essex Fringe Study Area to the Town of Essex sanitary sewer and wastewater treatment system. This report will outline the existing conditions in the Town of Essex sanitary sewer system and how it will be impacted by connecting the Lakeshore-Essex Fringe Study Area. It will provide an overview of the available capacity at the Town of Essex wastewater treatment facilities and express the remaining capacity in terms of population that can be added without upgrading the system. This information will be used to create and assess alternative design solutions for connecting the Lakeshore-Essex Fringe Study Area to the Town's sewer system to provide policy makers in both municipalities the information they need to make informed decisions regarding expanding sanitary sewer service to the Lakeshore-Essex Fringe Study Area.

1.4: Comment on Sharing of Essex Sanitary Infrastructure and Essex Centre Population and Flow Projections

The recommendations in this report should be considered as a standalone study for the feasibility of servicing the Lakeshore-Essex Fringe Study Area. In general, sewer, pumping station, and treatment facility upgrades are outlined in this report; however, sharing scheme, timing, and responsible party was not included in our scope of work. With this in mind, Stantec would offer the following comments regarding the sharing of the Town of Essex sanitary infrastructure.

As outlined in the Town of Essex Official Plan, it is anticipated that the municipalities population will grow from 21,900 in 2021 to 29,900 in 2051 with employment growth from 6,800 in 2021 to 11,100 in 2051. These growth projections are for the entire municipality including the Hamlets of Colchester and Harrow. They have not been broken down further to delineate Essex Centre from other regions of the municipality. It is reasonable to expect a significant portion of the population growth to occur in Essex Centre which is the largest community in the Town of Essex. This population growth will increase average and peak wastewater flows to both of the treatment facilities.

Based on the municipal boundaries, future development in Essex Centre is assumed to occur as infill (in the northern portion of the town) with heavier development occurring to the southwestern portion of the existing town. Therefore, connection schemes for the Fringe Study Area that would have more impact on

the Essex PCP capacity and collection network were seen as less favourable. Although, the Essex PCP was designed to allow construction of an additional three SBRs to increase the capacity of the plant when it becomes necessary to accommodate growth in the southwestern portion of the community.

In addition, connection schemes for the Fringe Study Area that would have more impact on the Essex NE Lagoons capacity and collection network, instead of that for the Essex PCP, were seen as more favourable. This is because the Maidstone Ave trunk sewer, Pumping Station No. 4, and Essex NE Lagoons are considered less likely to be significantly affected by the potential developments in the Town of Essex. With this being said, if flows from the Lakeshore-Essex Fringe Study Area are to be directed to Pumping Station No. 4 and Essex NE Lagoons, upgrades would be required sooner than previously expected. When these upgrades are triggered, additional consideration should be given to the Fringe Study Area and projections should be reviewed to ensure appropriate capacity is achieve through the upgrades.

More generally, the Town of Essex is expecting to initiate a Water, Wastewater, and Stormwater Master Plan (MP) Study for the municipality in the near future. This MP Study should review the findings of this feasibility review and make considerations for the required upgrades and timing of such upgrades in conjunction with the needs for the Town of Essex.

2.0: Study Area

2.1: General Description of the Study Area

Figure 2.1 shows the boundary of the Lakeshore-Essex Fringe Area as outlined in the Municipality of Lakeshore Official Plan (2010) and Lakeshore Water and Wastewater Master Plan (2024).

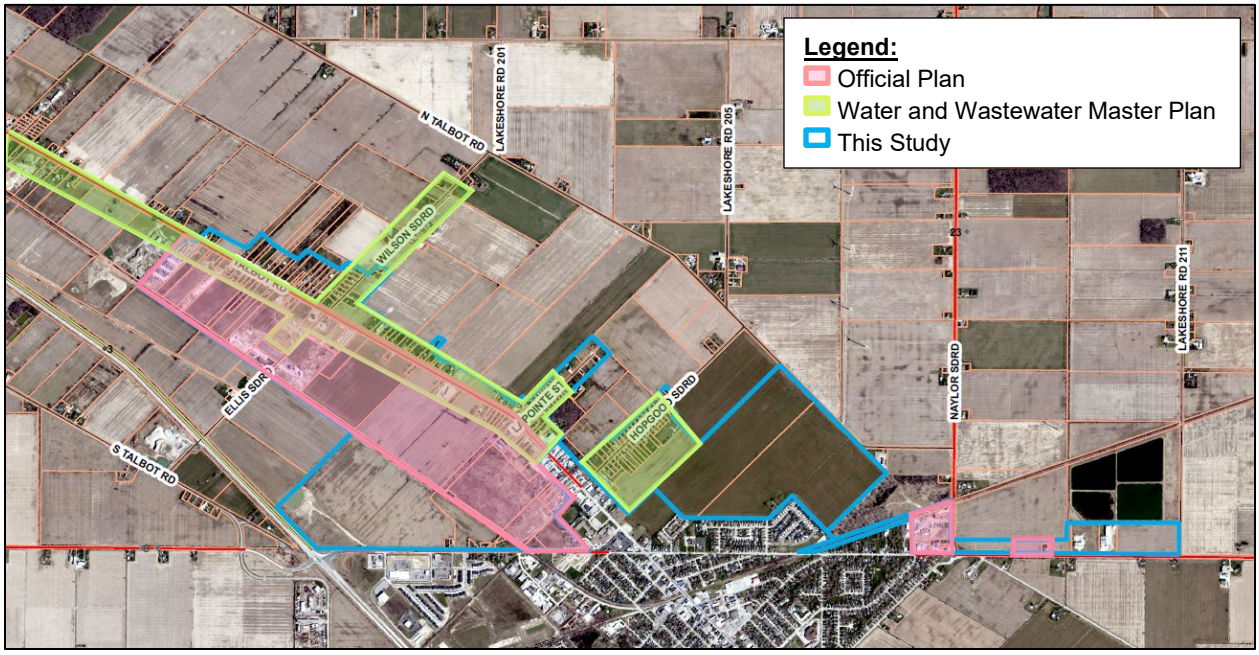

Figure 2.1: Lakeshore-Essex Fringe Area from Planning Reports

For the purpose of this study, additional lands currently zoned for agriculture north of Essex Center on either side of Talbot Rd N were also considered as a part of the Fringe Study Area. These additional lands may be rezoned and developed at a future date and therefore are included in this feasibility study to determine if they can be connected to the existing sanitary sewer system.

The Lakeshore-Essex Fringe Study Area is approximately 378 ha of lands is located in the Municipality of Lakeshore along the border of the Town and Essex and Municipality of Kingsville. The Fringe Study Area includes lands north of Essex Center, generally along each side of Talbot Road North and north of Maidstone Avenue. More specifically the Fringe Study Area includes properties along Talbot Rd North; Hopgood Side Rd, Lapointe St, Wilson Side Rd, and Ellis Side Rd; lands on the northwest corner of County Rd 8 and Naylor Side Rd; and properties adjacent to the Town of Essex NE Lagoons on County Rd 8.

Figure 2.2 shows the boundary of the Lakeshore-Essex Fringe Study Area which was developed and outlined by the Municipality of Lakeshore for this study.

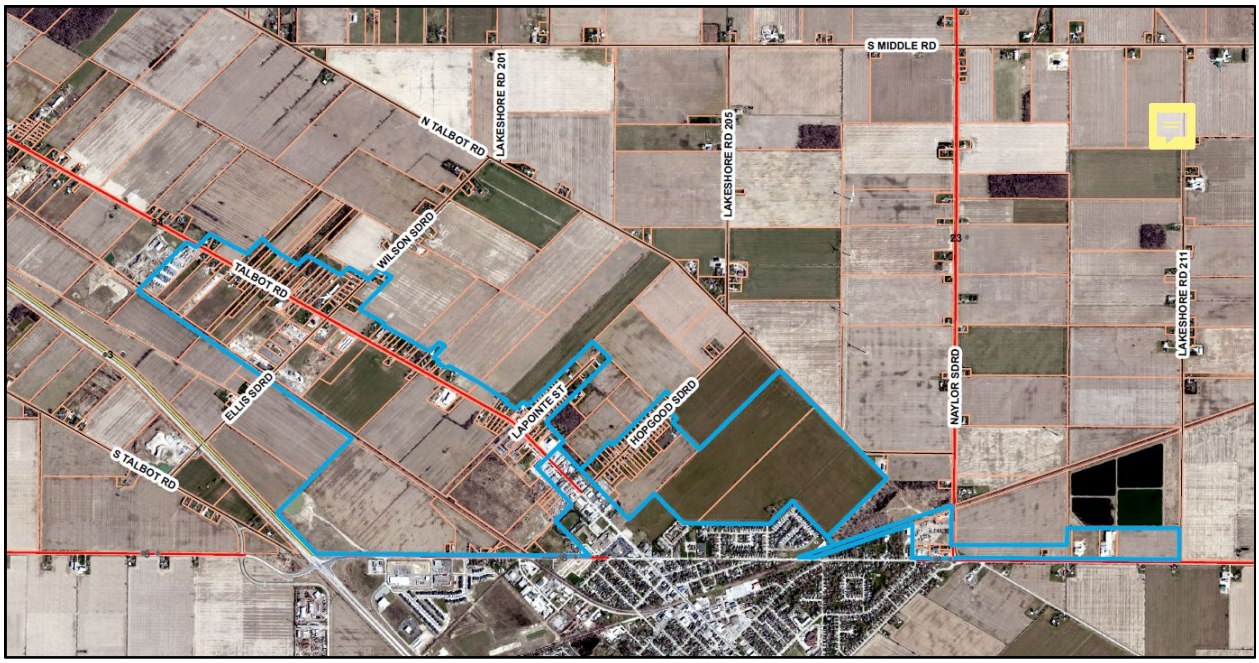

Figure 2.2: Lakeshore-Essex Fringe Study Area

2.2: Land Use

2.2.1: Talbot Road & Side Roads

Talbot Road is comprised of mixed-use highway commercial development. The road has a mix of single-family homes with a variety of commercial uses. Hopgood Side Road, Lapointe Street, and Wilson Side Road are all comprised of residential single-family homes, while Ellis Side Road is a mix of commercial and residential development. The total area of these lands comprises 130 ha.

Talbot Road has sixty-six (66) residential and twelve (12) commercial properties between the edge of the Fringe Study Area and the municipal boundary with the Town of Essex. These businesses include trucking companies, farm equipment suppliers, and car dealerships.

Hopgood Side Rd is the most southerly side road in the Fringe Study Area off Talbot Rd. There are forty (40) residences currently built with zoning allocation for two (2) additional residences in the future should sanitary sewer service be extended to the area.

Lapointe St is North of Hopgood Side Rd off Talbot Rd. It has 28 residences currently constructed with limited zoning allocation for two (2) additional residences.

Wilson Side Rd is located north of Lapoint St and East of Ellis Side Rd off Talbot Rd. It has 24 residences currently constructed with zoning allocation for five (5) additional residences in the future should sanitary sewer service be extended to the area.

Ellis Side Rd is located west of Wilson Side Rd off Talbot Rd. This road has three (3) residential properties, and three (3) commercial properties currently constructed with some commercial/industrial land that could be rezoned for future development. The commercial properties include landscaping, plumbing, and construction companies.

2.2.2: Northwest Corner of County Rd 8 and Naylor Side Rd

The lands on the northwest corner of County Rd 8 and Naylor Side Rd total 5.7 ha and include one (1) residence and four (4) commercial properties with no zoning allocation for additional development. The commercial properties include two (2) auto body repair shops, a gas station, and a school bus depot.

2.2.3: Lands South of the Essex NE Lagoons

Lands along Highway 8 between Naylor Side Rd and Lakeshore Rd 211 total 17.5 ha. These lands include two (2) commercial properties south of the Essex NE Lagoons. The commercial properties include a Hydro One maintenance facility and Topcrop Sales head office. Additionally, there is one (1) residential dwelling currently constructed in the area.

There are 12 ha of undeveloped land currently being used for agriculture in the area. A 5.5 ha area between Naylor Side Rd and the Essex NE Lagoons where the currently constructed residence exists has zoning allocation for an additional fifteen (15) residences. A 7 ha area south of the Essex NE Lagoons and east of the existing commercial properties could be developed for residential or commercial purposes. A residential development in the area could have space for as many as thirty-five (35) residences.

2.2.4: Agricultural Lands

137 ha west of Talbot Rd and 83 ha east of Talbot Road are primarily zoned as agricultural land at present. The lands west of Talbot Rd include a school building that is now vacant and a small number of homes along County Rd 8. Arial photos show the lands east of Talbot Rd have a single farmhouse with no other existing developments. These lands will need to be rezoned for development in the future.

The Lakeshore Planning Department has indicated that the lands east of Talbot Road are anticipated to be developed for residential use. If the lands are entirely developed at a density similar to that of Hopgood Side Road there would be approximately 415 housing units that would house 1,245 people. If the Municipality were to develop these lands at a higher density of 30 ppl/ha, in accordance with development standards for the region, there would be approximately 830 new housing units that would house 2,490 additional people.

The lands west of Talbot Road are intended to be developed for a mix or residential and employment purposes. For the residential portion of these lands in the Municipality were to develop with a density of 30 ppl/ha, there would be approximately 1,370 new housing units that would house 4,110 additional people. Based on water consumption data for the area, the existing commercial properties in the Fringe Study Area consume water at a rate of 1.31 m^3/ha/day (or a residential equivalent of an additional 4 ppl/ha). If all 137

ha in this area are developed as mixed residential and employment purposes, it would equate to approximately 4,658 additional equivalent people.

2.3: Town of Essex Sanitary Collection System

The Town of Essex is provided services via a communal sewage collection system that includes two distinct service areas (i) the northeast, which contains the commercial area and (ii) the southwest, which is comprised of newer residential developments. **Figure 2.4** illustrates the sewers, pumping stations and treatment facilities for the two service areas in the Town of Essex.

In 2015, the Town of Essex retained Stantec Consulting Ltd to develop a hydraulic model of the Essex Sanitary Sewer System. This hydraulic model was developed based on existing infrastructure and developments as outlined in the 'Essex Sanitary Sewer System Hydraulic Model Development, Calibration and Capacity Assessment' (2015). For this study, the 2015 model was utilized to evaluate the feasibility of developing and connecting the Lakeshore-Essex Fringe Study Area to the existing sanitary sewer network. The 2015 model was used as a basis for the analysis with infill development in the areas impacted by the flows directed from the Fringe Study Areas being incorporated into the model. This included adding developments in the northeastern portion of the Town Centre which have occurred between 2015 to 2025 and adding some known potential developments along Talbot Road North.

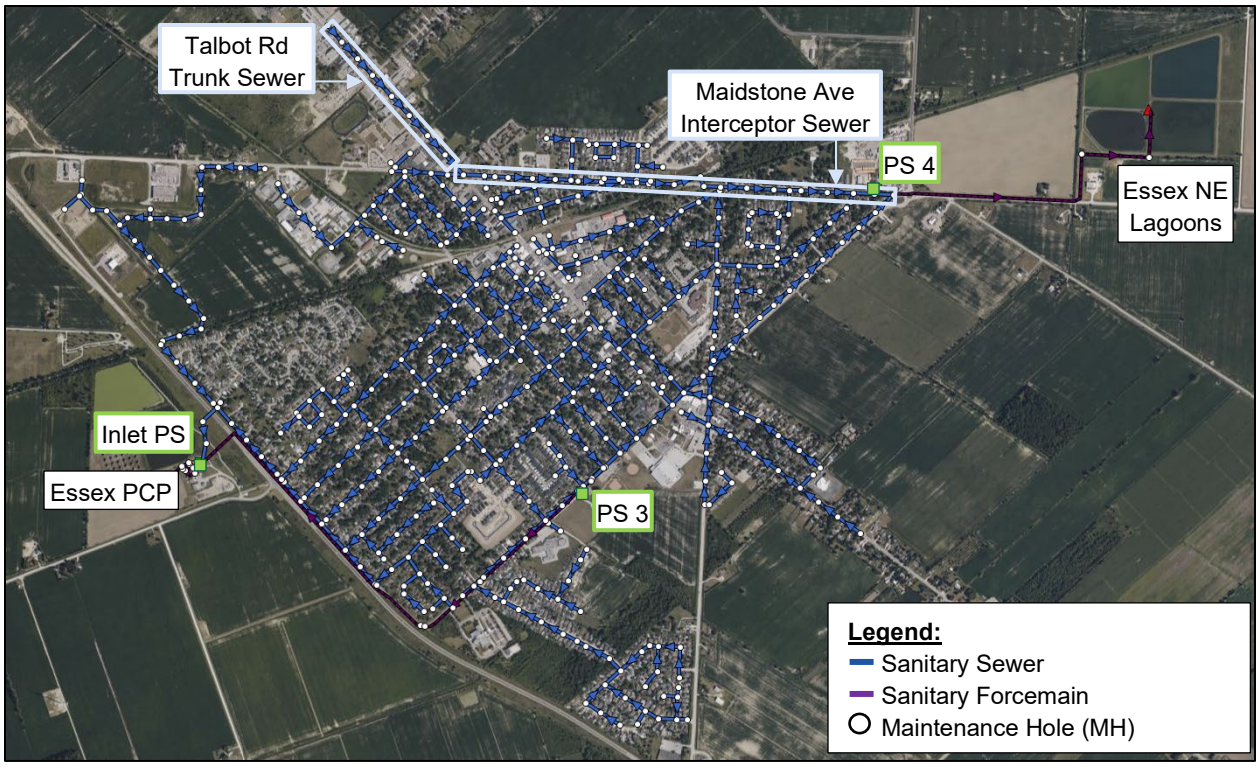

Figure 2.3: Essex Sanitary Collection System

2.3.1: Talbot Rd Sanitary Trunk Sewer

The Talbot Rd sanitary sewer extends from the municipal boundary with Lakeshore to the Maidstone Ave Sewer. It is a gravity fed sanitary sewer that ranges in size from 200 mm to 250 mm that currently operates with excess capacity. The sewer conveys sewage to the Maidstone Ave E interceptor sewer, Pumping Station No. 4, and to the Essex NE Lagoons for treatment. This sewer currently operates at 15 % capacity during a 100-year 12 Hour Canadian Atmospheric Environment Service (AES) Design Storm Event and could accommodate additional wastewater flows before requiring upgrades.

2.3.2: Maidstone Ave E Interceptor Sewer

The Maidstone Ave East Interceptor Sewer conveys flows from Talbot Rd and other local sewers to Pumping Station No. 4. This is a gravity fed sanitary sewer that ranges in size from 600 mm to 750 mm that operates with excess capacity. The sewer conveys sewage to Pumping Station No. 4 and to the Essex NE Lagoons for treatment. This sewer currently operates at 50 % capacity during a 100-year 12 Hour AES Design Storm Event and could accommodate additional wastewater flows before requiring upgrades.

2.3.3: Essex PCP Inlet Pumping Station

The Essex PCP Inlet Pumping Station is located in the southwestern portion of the Town of Essex at the Essex PCP. This pumping station collects flow from the southwestern portion of the collection system and lifts sewage to the inlet works of the treatment plant for treatment. This pumping station has a Rated Capacity of 250 L/s.

2.3.4: Pumping Station No. 3

Pumping Station No. 3 is located on Fairview Avenue near Kimball Drive in the Town of Essex. This pumping station collects flow from a portion of the southwest service area and discharges to a forcemain that conveys wastewater northwesterly to the Inlet Pumping Station at the Essex PCP. This pumping station has a Rated Capacity of 220 L/s.

2.3.5: Pumping Station No. 4

Pumping Station No. 4 is located at 359 Maidstone Avenue in the Town of Essex. This pumping station collects flow from the northeast service area and discharges to a forcemain that conveys sewage easterly to the Essex NE Lagoons. This pumping station has a Rated Capacity of 230 L/s.

2.4: Town of Essex Wastewater Treatment Facilities

2.4.1: Essex Pollution Control Plant

The Essex Pollution Control Plant is located at 3980-4000 North Malden Rd West of Essex Center. It uses Sequential Batch Reactors (SBR) to treat sewage from Essex Urban Town Center. The plant was commissioned in 2005 and has a rated capacity of 4,590 m^3/day. The plant is owned by the Town of Essex and operated by the Ontario Clean Water Agency (OCWA). Monthly average flows to the Essex PCP can be seen in **Figure 2.4** and peak monthly flows can be seen in **Figure 2.5**.

Under conditions where the peak flow exceeds the capacity of the Essex PCP, flows are diverted to a wet weather retention cell where wastewater is stored and later returned to the Essex PCP following the high flow event. The monthly average flow to the Essex PCP typically falls below 50% of the plant's capacity. In 2023 the Essex PCP experienced higher than average flows with an annual average of 2124 m^3/day, a significant increase from the 2022 annual average of 1728 m^3/day. 2023 was an unusually wet year in southwestern Ontario with municipalities within Essex County recording their highest annual precipitation total since 1979. In addition, many municipalities within Essex County experienced widespread flooding due to a severe storm event on August 23rd, 2023. This storm event saw 188 mm of rainfall in less than a 24-hour period which is more intense than the 1 in 100-year storm event.

From 2019 to 2023 the plant saw an average daily flow of 1,910 m^3/day, leaving 2,680 m^3/day of available capacity. This capacity would accommodate an additional 5,955 equivalent people, assuming a generation rate of 450 L/cap/day, before requiring expansion of the plant. If expansion is triggered when the plant

reaches 90% capacity an additional 5,360 equivalent people can receive service before expansion is triggered.

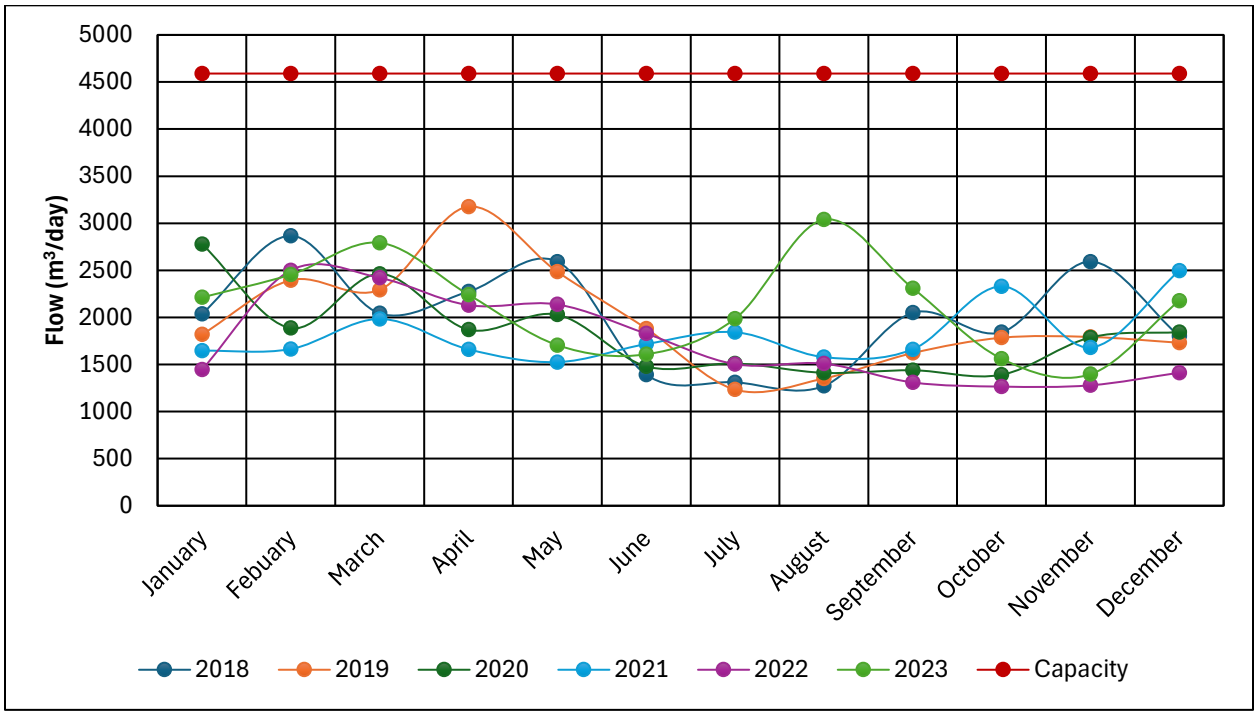

Figure 2.4: Average Sewage Flows to the Essex PCP

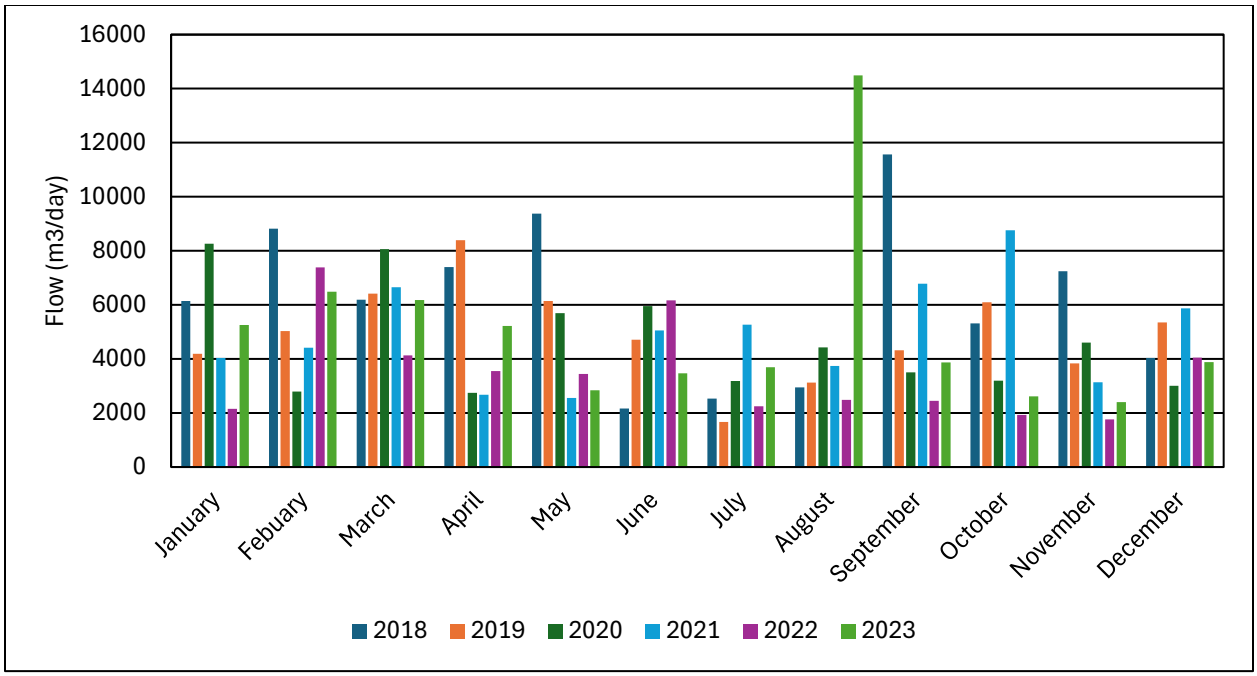

Figure 2.5: Peak Sewage Flows at Essex PCP

2.4.2: Essex Northeast Sewage Treatment Lagoons

The Essex Northeast Sewage Treatment Lagoons are located northeast of Essex Urban Town Center in the Municipality of Lakeshore on Lakeshore Road 211. The lagoons were commissioned in 1963 and have a rated capacity of 2,910 m^3/day. The plant is owned by the Town of Essex and operated by OCWA. Average monthly flows to the lagoons can be seen in **Figure 2.6** and peak monthly flows to the lagoons can be seen in **Figure 2.7.**

The average monthly flow to the NE Lagoons was below 50% of capacity in each of the last 6 years. Assuming a wastewater generation rate of 450 L/cap/day the NE Lagoons can accommodate an additional

3,453 people before requiring upgrades. If expansion is triggered when the lagoons reach 90% capacity the NE Lagoons can provide service to an additional 3,108 people before expansion is triggered.

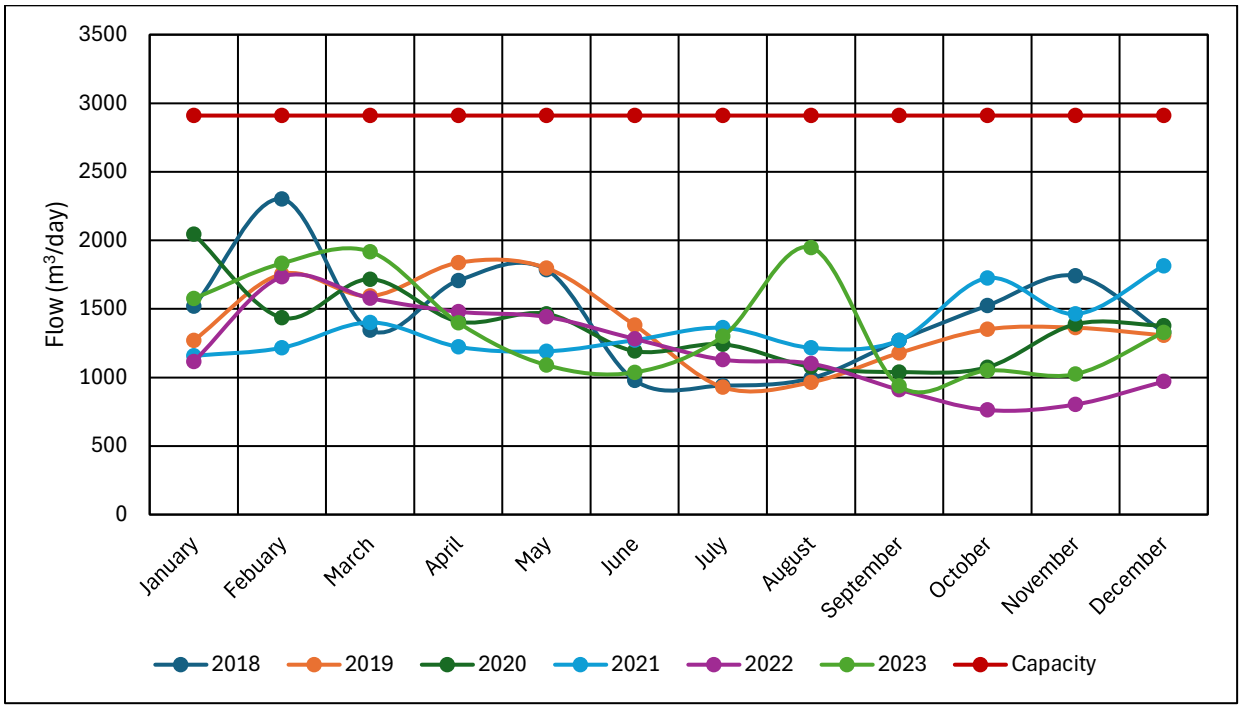

Figure 2.6: Average Sewage Flows at Essex NE Lagoons

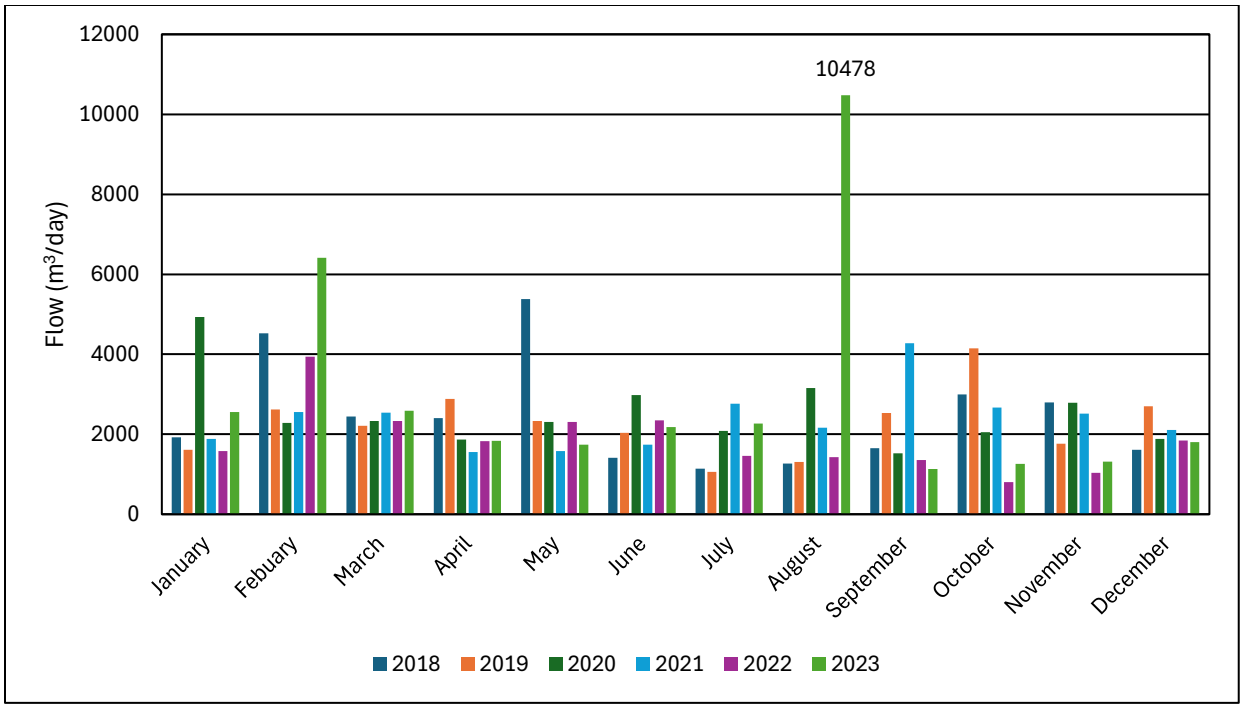

Figure 2.7: Peak Sewage Flows at Essex NE Lagoons

2.4.3: Available Capacity in Town of Essex Sanitary Sewage Works

2.4.3.1: Available Conveyance Capacity

Table 2.1 outlines the available capacity in key components based on a 100-year design storm event and remaining capacity of the conveyance system. The rated capacity of the pipe and the % of pipe capacity are calculated based on the pipe under full conditions with no surcharging of the manholes. This is more conservative than the theoretically allowed capacity for the 100-year design storm event, which is typically evaluated as maintaining the hydraulic grade line more than 1.3 m below the ground elevation.

Table 2.1: Available Conveyance Capacity During a 100-Year Design Storm Event

Component	Anticipated Wet Weather Flow (L/s)	Rated Capacity (L/s)	% of Pipe Capacity	Remaining Capacity (L/s)
Talbot Road Gravity Sewer	4.7	32	14.7 %	27
Maidstone Ave E Interceptor Sewer	188	420	44.8 %	232
Pumping Station No. 4 (NE Lagoons Inlet PS)	201	230	87.4 %	29
Pumping Station No. 3	213	220	96.8 %	7
Essex PCP Inlet PS	252	250	100.8 %	-2

2.4.3.2: Available Treatment Capacity

Table 2.2 outlines the available capacity and the equivalent households that can be accommodated with the remaining capacity at the Town of Essex treatment facilities.

Table 2.2: Available Capacity at Treatment Facilities

Component	Existing Average Daily Flow (m^3/d)	Rated Capacity (m^3/d)	Remaining Capacity (m^3/d)	Equivalent Population	Equivalent Households
Essex PCP	1,910	4,590	2,680	5,956	1,985
Essex NE Lagoons	1,356	2,910	1,554	3,453	1,151

3.0: Population and Flow Projections

3.1: Design Criteria

The wastewater flows for the developable lands in the Fringe Study Area were estimated based on the standards outlined in the Municipality of Lakeshore Development Manual and land use indicated in the by the Municipality. Sanitary flows for the developable lands in the Fringe Study Area were calculated based on the design criteria and assumptions presented in **Table 3.1**. Peak sanitary flows were estimated based on inflow and infiltration flow (I/I) and peak population flow, calculated using the Harmon equation.

Table 3.1: Design Criteria for Lakeshore Sanitary Sewers

Design Component	Design Criteria
Population Density	Residential: 3 persons per unit
	Industrial, commercial, and institutional (ICI): Based on anticipated use
Average Domestic Flow Rate	450 L/capita/d
Flow Peaking Factor	Harmon formula applied to average domestic flow: $1+14/(4+P^{0.5})$ P = population in thousands Minimum Peaking Factor = 2.0
Extraneous Flow	0.21 L/ha/s

Portions of the Lakeshore-Essex Fringe Study Area are provided water services from the Municipality of Lakeshore; therefore, to verify the use of the 450 L/capita/d as the Average Domestic Flow Rate a review of water consumption data was performed. The water consumption data provided by the Municipality of Lakeshore showed that the actualized average domestic flow rate in the Fringe Study Area in for a five-month period in 2024 varied from 261 L/cap/day to 414 L/cap/day. Based on the short period that was assessed it is assumed that using an average domestic flow rate of 450 L/cap/d is appropriate for this area.

3.2: Essex Population and Flow Projections

The Town of Essex is anticipating infill developments throughout the settlement area. For the purposes of this study, major developments in the northeastern portion of the study area which have occurred since the original model development (2015) and developments anticipated to occur in the near future were added to the base model prior to evaluating the addition of the Lakeshore Fringe Study Area. Please note that these flows are accounted for in the anticipated wet weather flows and resulting available capacity of the system presented in **Section 2.4.3**.

The equivalent population for the residential units were calculated based on a population density of 3.0 persons per unit. The equivalent population for ICI establishments were calculated based on values provided by site developers. The anticipated average wastewater flow (Qavg) from existing developments was calculated based on an Average Domestic Flow Rate of 450 L/capita/d.

The location and anticipated sewage flow for these existing developments are shown in **Figure 3.1** and **Table 3.2**, respectively.

Table 3.2: Wastewater Flow from Proposed Developments in the Town of Essex

Location	Area (ha)	Residential Unit Count	Commercial Unit Count	Eq. Pop (ppl)	Qavg (m^3/d)
Talbot St. North	5.86	308	1*	880	396.0
Wilson Road	0.62	200	N/A	600	270.0
Note: * Commercial Unit Flow Allowance of 28 m^3/ha/day with anticipated Total Area of 0.4959 ha.					

Figure 3.1: Proposed Developments in the Town of Essex

3.3: Urban Fringe Area Population and Flow Projections

3.3.1: Flow from Existing Dwellings

The lands in the Lakeshore-Essex Fringe Study Area have been partially developed with commercial and residential properties. The unit counts for the private dwellings and ICI establishments were estimated based on 2025 aerial imagery. The equivalent population for the residential units were calculated based on a population density of 3.0 persons per unit. The equivalent population for ICI establishments were calculated based on best practices outlined in Metcalf and Eddy (2013) and other industry accepted values.

The anticipated average wastewater flow (Qavg) from existing developments was calculated based on an Average Domestic Flow Rate of 450 L/capita/d.

The location and anticipated sewage flow for these existing developments are shown in **Figure 3.2** and **Table 3.3**, respectively.

Table 3.3: Wastewater Flow from Existing Properties in the Fringe Study Area

Location	Area (ha)	Residential Unit Count	Commercial Unit Count	Eq. Pop (ppl)	Qavg (m^3/day)
Hopgood Side Rd	7.5	38	0	114	51.3
Lapointe St	6	27	0	81	36.5
Ellis Side Rd	4.5	3	3	13	5.7
Wilson Side Rd	13.5	13	0	39	17.6
Talbot Rd	37.4	66	12	205	92.3
South of Lagoons	5	1	2	6	2.5
Country Rd 8 / County Rd 23	5.7	1	4	20	9.0

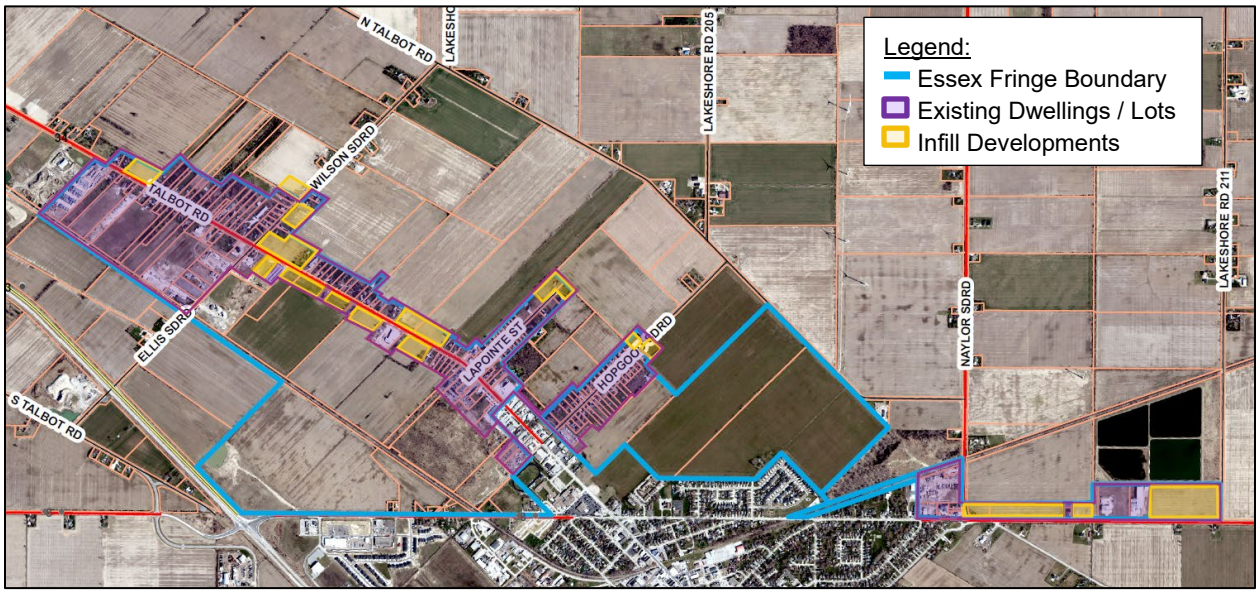

Figure 3.2: Existing Lots and Potential Infill Developments in the Fringe Study Area

3.3.2: Flow from Anticipated Developments

The Fringe Study Area has land to accommodate additional development in the future, which both the Town of Essex and the Municipality of Lakeshore are interested in pursuing.

Figure 3.2 shows the location of lots in the Fringe Study Area that are available for additional development. Areas with space for infill development are outlined in yellow. These lots are available for residential development through municipal zoning procedures. In these infill areas, projections for future development

were made by using arial photos to count vacant lots within the already developed area. It was assumed that lot frontage will remain consistent with existing development in these areas. Population projections were made using an occupancy rate of 3 people/unit and flow projections were made using a rate of 450 L/person/day.

Table **3.4** shows the lot count, equivalent population, and projected average day sewage flow for these lands.

Table 3.4: Wastewater Flow from Developable Lots in the Fringe Study Area

Location	Unit Count	Eq. Pop (ppl)	Qavg (m^3/day)
Hopgood Side Rd	2	6	2.7
Lapointe St	2	6	2.7
Wilson Side Rd	5	15	6.8
Talbot Rd	29	87	39.1
South of Treatment Lagoon	25	75	33.8

Figure 3.3 shows the location of other developable lands within the Fringe Study Area outlined in green. These lands have not been divided into lots; therefore, the assumptions outlined in the following paragraphs, provided by the Municipality of Lakeshore, have been used for estimating the flow projections and equivalent population.

Figure 3.3 Other Developable Lands in the Fringe Study Area

In the east agricultural lands, it is assumed that the entire 83 ha area will eventually be developed as residential subdivision with a density as 10 units per hectare, as directed by the Municipality of Lakeshore

Planning Department. Population projections were made using 3 people/unit and flow projections were made using a rate of 450 L/person/day.

In the west agricultural lands, it is assumed that the 137 ha area will be developed as a mix of residential and employment lands. Population projection equivalent for this area was made using a rate of 34 equivalent people per hectare to include employment and residential development, as directed by the Municipality of Lakeshore Planning Department. Flows projections were made using a generation rate of 450L/person/day.

Table **3.5** summarizes the lot count, equivalent population, and projected average day sewage flow for these lands.

Table 3.5: Wastewater Flow from Other Developable Lands in the Fringe Study Area

Location	Area (ha)	Unit Count	Eq. Pop (ppl)	Qavg (m^3/day)
East Agricultural Lands	83	830 Residential	2,490	1,120
West Agricultural Lands	137	1370 Mixed Use	4,658	2,096

3.3.3: Total Projected Flows from the Fringe Study Area

Based on the flow from existing dwellings and anticipated developments outlined in the previous sections, **Ta**ble **3.6** summarizes the total anticipated population and flows from the Fringe Study Area when fully built.

The peak wastewater flow (Qpeak) was calculated based on the Harmon's Peaking Factor and wet weather flow allowance of 0.21 L/ha/s, which is typical of current municipal Development Standards Manuals in the region.

Table 3.6: Total Projected Wastewater Flow from the Fringe Study Area

Location	Area (ha)	Design Basis	Eq. Pop (ppl)	Qavg (m^3/day)	Qpeak (L/s)
Hopgood Side Road	7.5	Existing plus infill	120	54.0	4.2
Lapoint St	6	Existing plus infill	87	39.2	3.2
Ellis Side Road	4.5	Existing	13	5.7	1.2
Wilson Side Road	13.5	Existing plus infill	54	24.3	4.0
Talbot Rd.	37.4	Existing plus infill	292	131.5	14.3
Country Rd 8 / County Rd 23	5.7	Existing	20	9.0	1.7
South of Treatment Lagoon	5	Existing plus infill	81	36.5	2.9
East Agricultural Lands	83	Assumed Development	2,490	1,120	62.9
West Agricultural Lands	137	Assumed Development	4,658	2,096	108.2
Total	300	-	7,815	3,516	202.6

4.0: Sanitary Sewer Servicing Analysis

4.1: Introduction

In this section of the report, alternative design solutions will be identified and evaluated leading to the selection of the recommended design. Several conceptual alternative solutions were proposed to address the identified problems and needs of the Fringe Study Area. The following broad planning level alternative solutions have been considered and will be outlined in the following sections:

Alternative No. 1: Route Flows to the Essex NE Lagoons
Alternative No. 2: Divide Flows Between the Treatment Lagoons and Essex PCP
Alternative No. 3: Divide Flows Between the Treatment Lagoons and Essex PCP via Forcemain

In all alternatives, the lands on the (i) northwest corner of County Rd 8 and Naylor Side Rd and (ii) south of the NE Lagoons are assumed to be connected via gravity sewer to Pumping Station No. 4 and the Essex NE Lagoons. As such, these alternatives only discuss options for connecting the lands along Talbot Rd N, adjoining side roads, and agricultural lands to sanitary sewer services.

The alternative solutions were evaluated based on a variety of social, natural environmental, economic, technical and cultural heritage criteria. These evaluation criteria were developed based on servicing needs at the wastewater treatment facility, applicable municipal plans / commitments, design principles, and past industrial experience. The evaluation criteria are as follows:

Technical Criteria:

- Ability to meet current and future wastewater servicing needs;
- Constructability, implementation timeline, and phasing;
- Flexibility to meet future needs and/or climate change projections; and
- No adverse impacts on existing infrastructure (operations and/or maintenance).

Social Criteria:

- Impact to archaeological, built heritage, and cultural heritage;
- Noise, vibration, odour, or air pollution emissions;
- Permanent changes or impacts to society / community;
- Development policies and agreements; and
- Ability to increase development and improve housing supply.

Natural Environmental Criteria:

- Impacts to vegetation, fish and wildlife, areas of natural and scientific interest, environmentally sensitive areas, and soil / geology;
- Regulatory compliances; and

- Development and planning policies.

Economic Criteria:

- Capital, operational and maintenance (O&M) costs.

The advantages and disadvantages of each alternative together with their effects on the socioeconomic and natural environment are discussed in the following sections.

4.1.1: Alternative No.1: Route Flows to the Essex NE Lagoons

4.1.1.1: Alternative No.1A: Route All Flows to the Existing Sewer on Talbot Road N.

4.1.1.1.1: Overview

In this scenario, flows from Talbot Rd. N., surrounding side roads, and agricultural lands will be conveyed via new gravity fed sanitary sewers to the existing sanitary sewer on Talbot Rd. N. Based on preliminary evaluation of ground elevations and cover requirements, it is anticipated that a new sewage lift pumping station will be required to make the connection. Sewage would then be conveyed to the Maidstone Ave E Interceptor Sewer and to Pumping Station No. 4 where a forcemain will convey it to the NE Sewage Treatment Lagoons.

The areas including Lapoint St, Talbot Rd N., Ellis Sideroad, Wilson Sideroad, and the west agricultural lands will be connected to the end of the existing sewer near 289 Talbot Rd N. and the areas including Hopgood Sideroad and the east agricultural lands will be connected to the existing Talbot St N sewer at the intersection of Hopgood Sideroad and Talbot Rd N. **Table 4.1** shows the additional projected wastewater flows at the connection points when the Fringe Study Area is fully developed.

Figure 4.1 shows the sewer capacities and the location of the proposed connection points for this alternative for the sanitary flows in response to the 1 in 100-year design storm event. Under these conditions, the existing 200/250 mm sewer on Talbot Rd N. is unable to accommodate the projected design flow. The red section of sewer along Talbot Rd N will exceed capacity in this scenario and will need to be upgraded from a 200/250 mm sewer to a 450/525 mm sewer to make this alternative viable. This requires replacing approximately 840 m of existing sewer. Existing capacity concerns shown in the southern portion of Essex Centre were unaffected by the additional flows from the Fringe Study Area.

Table 4.1: Wastewater Flows for Alternative No. 1A

Connection No.	Location	Areas Connected	Destination	Qavg (m^3/day)	Qpeak (L/s)
1	289 Talbot Rd. N.	Lapoint St., Talbot Rd N., Ellis Sideroad, Wilson Sideroad, W. Ag. Lands	Pumping Station No. 4	2,297	89.25
2	319 Talbot Rd. N.	Hopgood Sideroad, E. Ag. Lands	Pumping Station No. 4	1,174	48.14

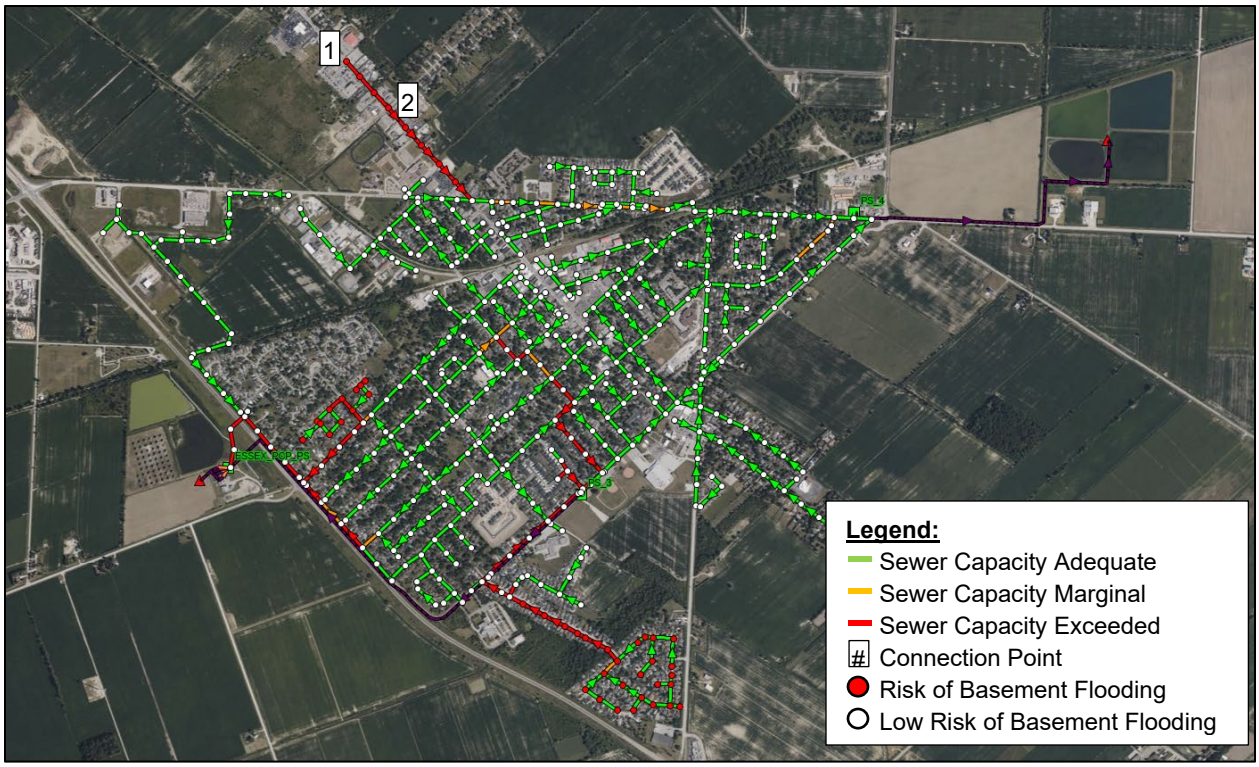

Figure 4.1: Connection Points and Sanitary System Response for Alternative No. 1A Connection Scheme to Existing Essex System

Figure 4.2 shows the sewer capacities with the proposed sewer upgrades.

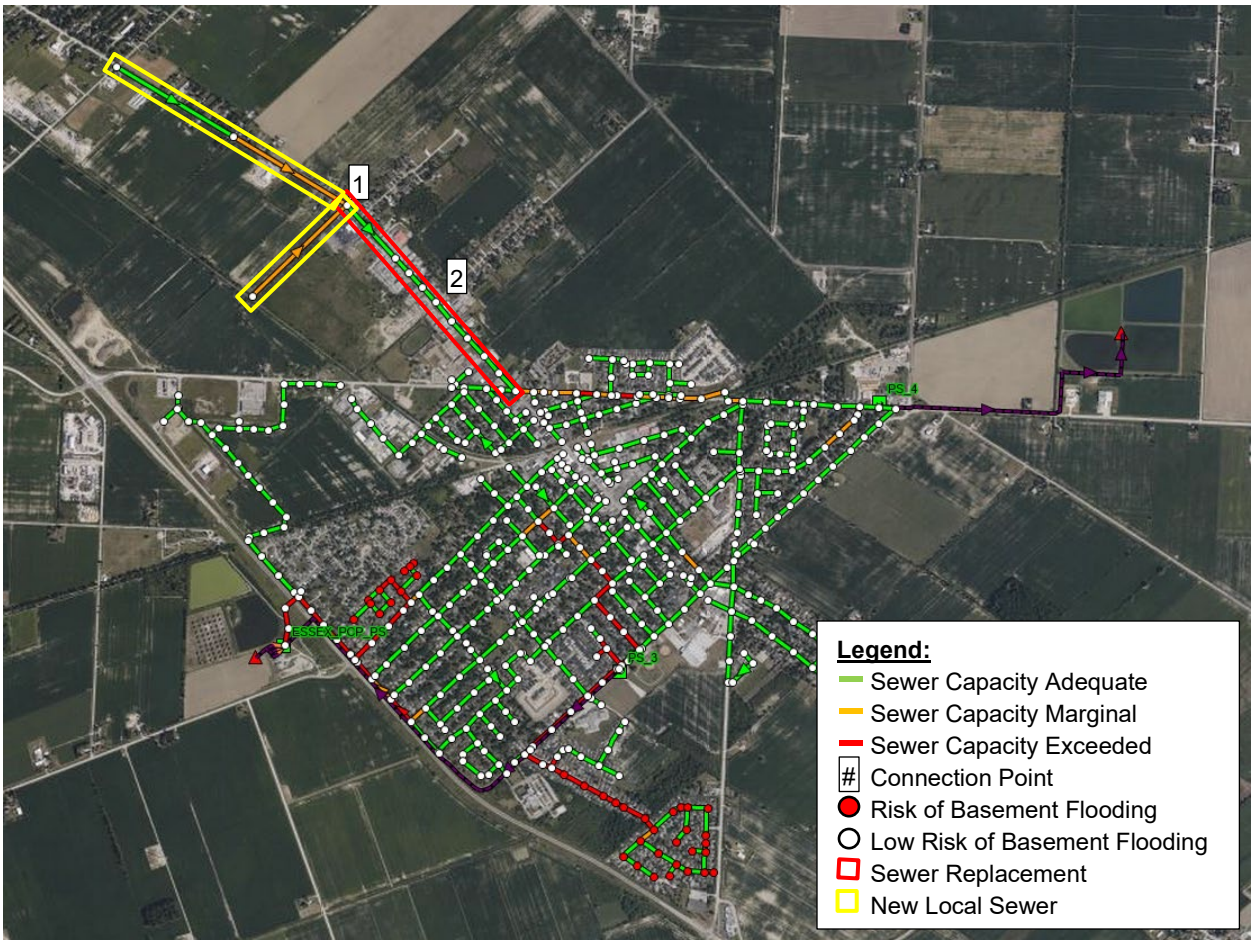

Figure 4.2: Sanitary System Response for Alternative No. 1A with Pipe Upgrades

Table 4.2 outlines the projected flow to and the remaining capacity at the pumping stations. Based on the analysis, Pumping Station No. 4 would be operating above its rated capacity during the 100-year design storm event. However, this is not anticipated to significantly limit the sewer capacity of incoming sewers or increase the risk of basement flooding in the collection system. As development progresses in the area pumping station upgrades should be considered and may be carried out in conjunction with upgrades to the Essex NE Lagoons.

Table 4.2: Projected Flow from Alternative No. 1A and Available Capacity at Pumping Stations

Component	Anticipated Wet Weather Flow (L/s)	Rated Capacity (L/s)	% of Capacity
Pumping Station No. 4 (NE Lagoons Inlet PS)	256	230	111 %
Pumping Station No. 3	213	220	96.8 %
Essex PCP Inlet PS	252	250	100.8 %

Table 4.3 outlines the projected flow to and the remaining capacity at the Town of Essex treatment facilities. Based on the analysis, the Essex NE Lagoons would be operating above their rated capacity due to the projected average day flow. Development in the northeastern region of the Town of Essex is assumed to be less likely in comparison to the southwestern portion; therefore, this alternative may have lower potential for impact to the Town of Essex. There is approximately 1,554 m^3/d of remaining capacity at the Essex NE Lagoons which would allow for a significant level of development in the Fringe Study Area before these treatment facility upgrades would be required. Therefore, upgrades to the Essex NE Lagoons may be considered and implemented in phases as development progresses in the service area.

Table 4.3: Projected Flow from Alternative No. 1A and Available Capacity at Treatment Facilities

Component	Existing Average Daily Flow (m^3/d)	Rated Capacity (m^3/d)	% of Capacity
Essex PCP	1,910	4,590	41.6 %
Essex NE Lagoons	4,872	2,910	167 %

4.1.1.1.2: Screening Result

This alternative would satisfy the desire of the Municipality of Lakeshore to provide the Fringe Study Area with sanitary sewer services and meet the municipality's requirement to allow future development in the Fringe Study Area. It is likely this alternative will require the construction of a raw sewage pumping station located near the end of the existing sewer on Talbot Rd. N. A slope of 0.002 m/m results in a drop in elevation of 5.5 m from the edge of the Fringe Study Area to the existing sewer.

The Essex NE Lagoons do not have sufficient available capacity to receive the ultimate design flow in this scenario without upgrades. Should this alternative be selected, the lagoons will require upgrades prior to the agricultural lands being fully developed. Given the uncertain time horizon for full development of the agricultural lands, this does not necessarily preclude Alternative No. 1A from consideration.

This alternative will be carried forward for further evaluation.

4.1.1.2: Alternative No.1B: Connect the Fringe Study Area to the Existing Sewer Network at Multiple Locations

4.1.1.2.1: Overview

In this scenario, sewage flows from Talbot Rd N, Ellis Sideroad, Wilson Sideroad, and Lapoint St will be routed to the existing sanitary sewer at 289 Talbot Rd N. Sewage flows from Hopgood Sideroad will connect to the existing sanitary sewer on Talbot Rd N at the intersection of Hopgood Sideroad and Talbot Rd N. Flows from the west agricultural lands will connect to the Maidstone Ave sanitary sewer at the intersection of College St and Maidstone Ave W. Flows from the east agricultural lands will be routed to the sanitary sewer on Galos Dr.

Figure 4.3 shows the sewer capacities and proposed connection points for this alternative for the sanitary flows in response to the 1 in 100-year design storm event. Under these conditions, the existing 200 mm sewer on Galos Dr. does not have sufficient capacity to accommodate additional flows from the east agricultural lands if they are fully developed. Upgrading the Galos Dr. sewer to a 300 mm sewer will alleviate these capacity concerns. In addition, the 200/250 mm sewer on Talbot Rd. N. does not have sufficient capacity to accommodate additional flows and mitigate risk of basement flooding. Upgrading the 200/300 mm sewer to a 250/375 mm sewer will alleviate that capacity concerns.

Table 4.4: Wastewater Flows for Alternative No. 1B

Connection No.	Location	Areas Connected	Destination	Q_{avg} (m^3/day)	Qpeak (L/s)
1	289 Talbot Rd. N.	Lapoint St., Talbot Rd N., Ellis Sideroad, Wilson Sideroad	Pumping Station No. 4	200.6	9.84
2	319 Talbot Rd. N.	Hopgood Sideroad	Pumping Station No. 4	54	2.64
3	College St.	W. Ag. Lands	Pumping Station No. 4	2096	79.41
4	Galos Dr.	E. Ag. Lands	Pumping Station No. 4	1120	45.5

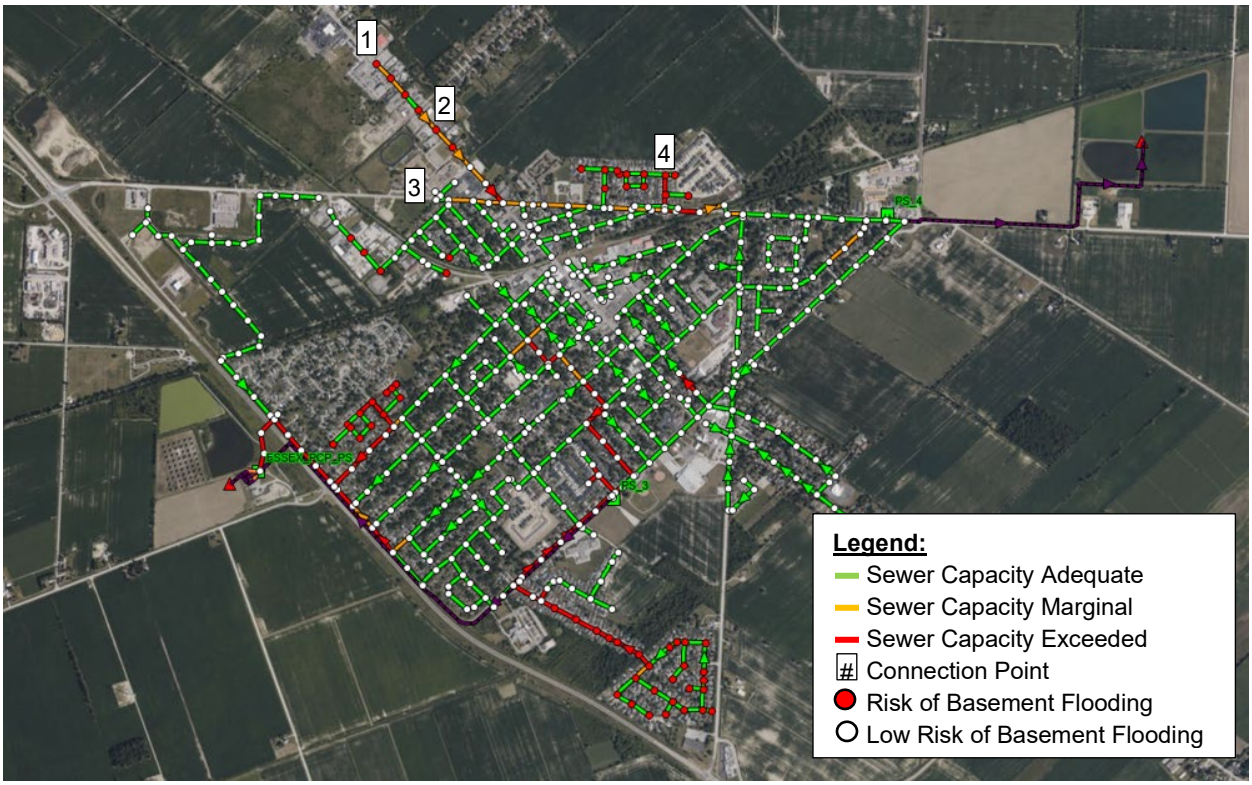

Figure 4.3: Connection Points and Sanitary System Response for Alternative No. 1B Connection Scheme to Existing Essex System

Figure 4.4 shows the sewer capacities with the proposed sewer upgrades.

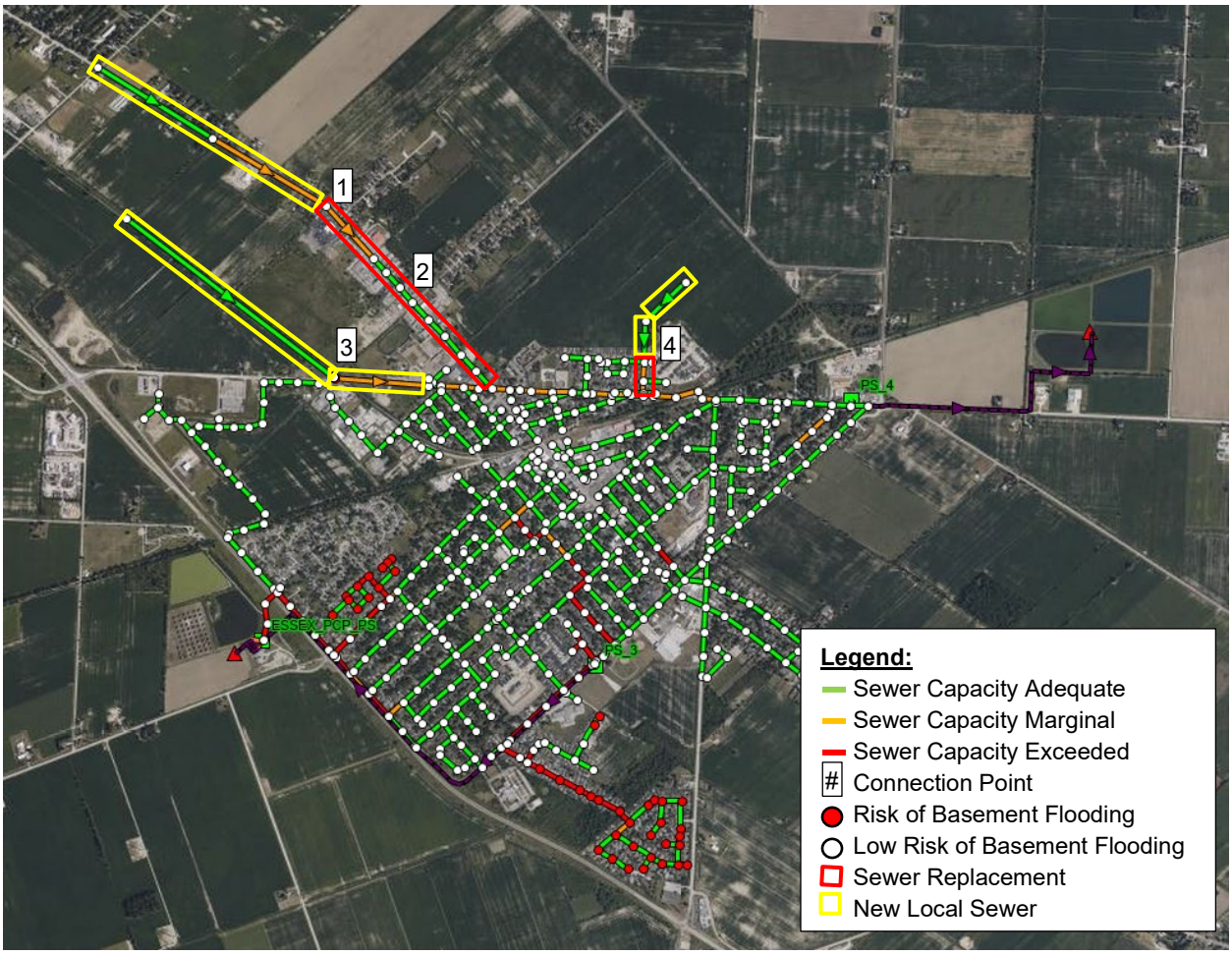

Figure 4.4: Sanitary System Response for Alternative No. 1B with Pipe Upgrades

Table 4.5 outlines the projected flow to and the remaining capacity at the pumping stations. Based on the analysis, Pumping Station No. 4 would be operating above its rated capacity during the 100-year design storm event. However, this is not anticipated to significantly limit the sewer capacity of incoming sewers or increase the risk of basement flooding in the collection system. As development progresses in the area pumping station upgrades should be considered and may be carried out in conjunction with upgrades to the Essex NE Lagoons.

Table 4.5: Projected Flow from Alternative No. 1B and Available Capacity at Pumping Stations

Component	Anticipated Wet Weather Flow (L/s)	Rated Capacity (L/s)	% of Capacity
Pumping Station No. 4 (NE Lagoons Inlet PS)	262	230	117 %
Pumping Station No. 3	213	220	96.8 %
Essex PCP Inlet PS	252	250	100.8 %

Table 4.6 outlines the projected flow to and the remaining capacity at the Town of Essex treatment facilities. Based on the analysis, the Essex NE Lagoons would be operating above their rated capacity due to the projected average day flow. Development in the northeastern region of the Town of Essex is assumed to be less likely in comparison to the southwestern portion; therefore, this alternative may have lower potential for impact to the Town of Essex. Similarly to alternative 1A, there is remaining capacity at the Essex NE Lagoons which would allow for a significant level of development in the Fringe Study Area before these treatment facility upgrades would be required. Therefore, upgrades to the Essex NE Lagoons may be considered and implemented in phases as development progresses in the service area.

Table 4.6: Projected Flow from Alternative No. 1B and Available Capacity at Treatment Facilities

Component	Existing Average Daily Flow (m^3/d)	Rated Capacity (m^3/d)	% of Capacity
Essex PCP	1,910	4,590	41.6 %
Essex NE Lagoons	4,872	2,910	167 %

4.1.1.2.2: Screening Result

This alternative would satisfy the desire of the Municipality of Lakeshore to provide the Fringe Study Area with sanitary sewer services and meet the municipality's requirement to allow future development in the Fringe Study Area. Based on preliminary evaluation of ground elevations and cover requirements, it is anticipated that one new sewage lift pumping station will be required to make the connection at the end of Talbot Rd. N.

The Essex NE Lagoons do not have sufficient available capacity to receive the ultimate design flow without upgrades. Should this alternative be selected, the lagoons will require upgrades prior to the agricultural lands being fully developed. Given the uncertain time horizon for full development of the agricultural lands, this does not necessarily preclude Alternative No. 1A from consideration.

This alternative will be carried forward for further evaluation.

4.1.2: Alternative No.2: Divide Flows Between the Treatment Lagoons and Essex PCP

4.1.2.1: Overview

In this scenario, sewage flows from Talbot Rd N., Wilson Sideroad, Ellis Sideroad, and Lapointe St will be connected to the existing sanitary sewer at 289 Talbot Rd. N. and conveyed to the Essex NE Lagoons. Hopgood Sideroad will be connected to the existing sanitary sewer at 319 Talbot Rd N. and be conveyed to the Essex NE Lagoons. Sewage Flows from the East Agricultural Lands will be connected to the existing sewer system at Galos Dr. and conveyed to the Essex NE Lagoons. Sewage flows from the West Agricultural Lands will be connected to the existing sewer system at 320 South Talbot Rd and be conveyed

to the Essex PCP. **Table 4.7** outlined the additional projected wastewater flows at the connection points when the Fringe Study Area is fully developed.

Figure 4.5 shows the sewer capacities and proposed connection points for this alternative for the sanitary flows in response to the 1 in 100-year design storm event. Under these conditions, the existing sewer on Talbot Rd. N. does not require upgrades to maintain functionality. The Galos Dr. sanitary sewer does not have sufficient capacity to accommodate flows if the east agricultural lands are fully developed, replacing approximately 200 m of the existing 200 mm sewer with a 300 mm sewer will alleviate this issue. The Essex NE Lagoons have sufficient excess capacity to accept the ultimate design flow from this alternative.

The additional sewage flows from the West Agricultural Lands will compound existing sewer capacity issues in southwestern portion of the Essex Centre causing worsened sanitary sewer capacities and increasing the risk of basement flooding in the area. Alleviating capacity issues in the west Essex Centre sewer system will require significant upgrades across the system. The Essex PCP has sufficient excess capacity to accept the ultimate design flow from this alternative.

Table 4.7: Wastewater Flows for Alternative No. 2

Connection No.	Location	Areas Connected	Destination	Q_{avg} (m^3/day)	Qpeak (L/s)
1	289 Talbot Rd. N.	Lapoint St., Talbot Rd N., Ellis Sideroad, Wilson Sideroad	Pumping Station No. 4	200.6	9.84
2	319 Talbot Rd. N.	Hopgood Sideroad	Pumping Station No. 4	54	2.64
3	320 South Talbot Rd	W. Ag. Lands	Essex PCP	2096	79.41
4	Galos Dr.	E. Ag. Lands	Pumping Station No. 4	1120	45.5

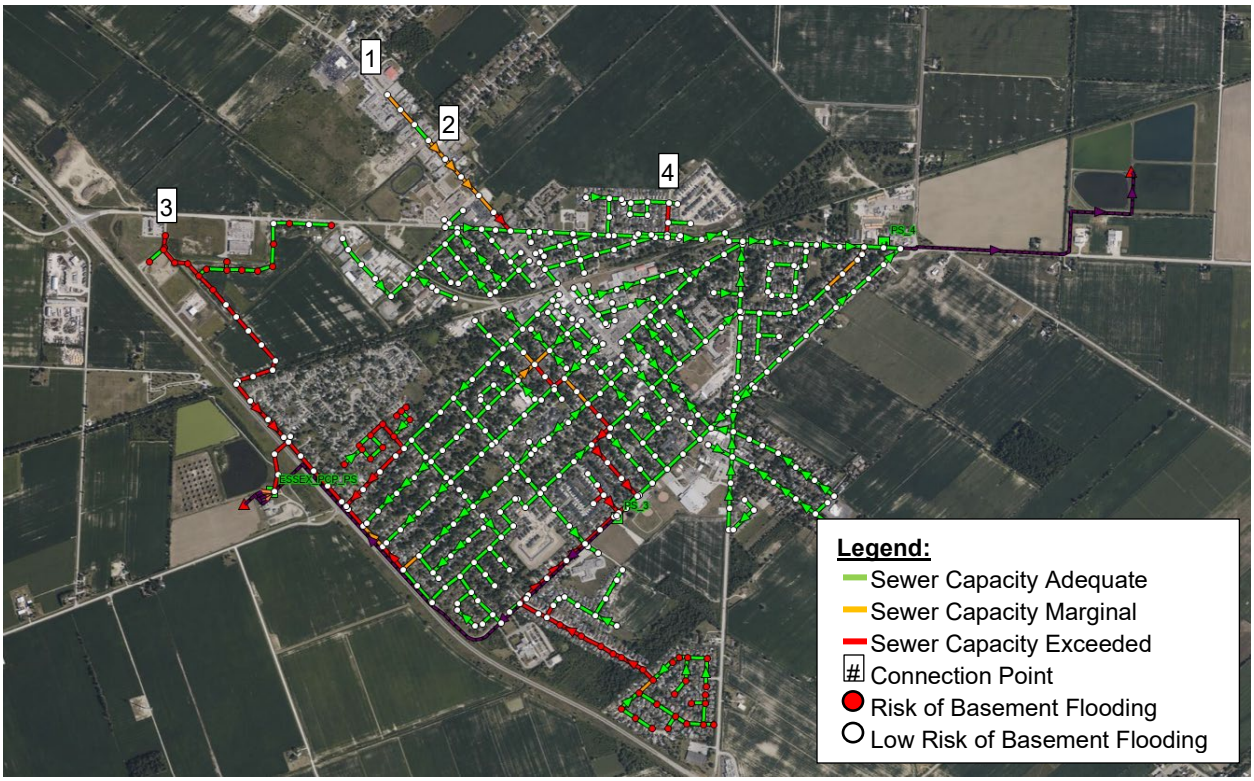

Figure 4.5: Connection Points and Sanitary System Response for Alternative No. 2 Connection Scheme to Existing Essex System

Table 4.8 outlines the projected flow to and the remaining capacity at the pumping stations. Based on the analysis, Pumping Station No. 4 would be operating above its rated capacity during the 100-year design storm event. However, this is not anticipated to significantly limit the sewer capacity of incoming sewers or increase the risk of basement flooding in the collection system. As development progresses in the area pumping station upgrades should be considered and may be carried out when current equipment reaches its end of service life.

In addition, the Essex PCP Inlet Pumping Station would be operating significantly above its rated capacity during the 100-year design storm event. This is contributing to flooding and increased risk of basement surcharging within the southwestern portion of the Town of Essex. Major PS upgrades would be required at the Essex PCP; however, the facility would likely have capacity to accommodate these additional wet weather flows in the onsite wet weather retention pond.

Table 4.8: Projected Flow from Alternative No. 2 and Available Capacity at Pumping Stations

Component	Anticipated Wet Weather Flow (L/s)	Rated Capacity (L/s)	% of Capacity
Pumping Station No. 4 (NE Lagoons Inlet PS)	250	230	109 %
Pumping Station No. 3	213	220	96.8 %
Essex PCP Inlet PS	448	250	179 %

Table 4.9 outlines the projected flow to and the remaining capacity at the Town of Essex treatment facilities. Based on the analysis, both facilities would be operating within their rated treatment capacities. Although upgrades would not be required specifically for the Lakeshore-Essex Fringe Study Area servicing, these developments would significantly limit the allowable capacity for other development within the Town of Essex. Development in the southwestern region of the Town of Essex is ongoing and therefore upgrades to the Essex PCP would likely still be required as a result of providing service to the Fringe Study Area.

Table 4.9: Projected Flow from Alternative No. 2 and Available Capacity at Treatment Facilities

Component	Existing Average Daily Flow (m^3/d)	Rated Capacity (m^3/d)	% of Capacity
Essex PCP	4,006	4,590	87%
Essex NE Lagoons	2,776	2,910	95 %

4.1.2.2: Screening Result

This alternative would satisfy the desire of the Municipality of Lakeshore to provide the Fringe Study Area with sanitary sewer services and meet the municipalities own requirements to allow future development in the Fringe Study Area. This alternative conveys some of the sewage from the Fringe Study Area to the Essex PCP instead of the Essex NE Lagoons, which may temporarily alleviates some capacity concerns for the treatment lagoons at ultimate design flow.

This alternative will require substantial replacements of existing sanitary sewers along South Talbot Rd to alleviate concerns about sewage backflow into adjacent neighborhoods. Due to anticipated adverse impacts on existing infrastructure in the southwestern portion of the Essex sanitary sewer network, this alternative will not be carried forward for further evaluation.

4.1.3: Alternative No.3: Divide Flows Between the Treatment Lagoons and Essex PCP via Forcemain

4.1.3.1: Overview

In this alternative, sewage flows from Lapointe Street, and the southern most areas of Talbot Road North adjacent to the municipal boundary will be connected to the Town of Essex sanitary sewer system at 289 Talbot Rd. N. and Hopgood Sideroad will be connected at 319 Talbot Rd N, these flows will be conveyed to Essex NE Lagoons. The East Agricultural Lands will be connected to the existing sewer system at Galos Dr. and conveyed to the Essex NE Lagoons.

Flows from Ellis Sideroad, Wilson Sideroad, and the west agricultural lands will have sewage flows directed to a new pumping station with a forcemain directly to the Essex PCP. These flows will bypass the existing sewer system and have no impact on existing capacity issues in west Essex Centre. **Table 4.10** shows the

additional projected wastewater flows at the connection points when the Fringe Study Area is fully developed.

Figure 4.6 shows the sewer capacities and proposed connection points for this alternative for the sanitary flows in response to the 1 in 100-year design storm event. Under these conditions, the existing sewer on Talbot Rd. N. has available capacity to accommodate these additional flows. Upgrades to the sewer on Galos Dr. will be required to accommodate the ultimate design flow from the east agricultural lands, this will require approximately 200 m of 200 mm sewer to be replaced with 300 mm sewer. There will be no impact on the existing sanitary sewers in west Essex Centre from this alternative.

Table 4.10: Wastewater Flows for Alternative No. 3

Connection No.	Location	Areas Connected	Destination	Q_{avg} (m^3/day)	Qpeak (L/s)
1	289 Talbot Rd. N.	Lapoint St., Talbot Rd N.	Pumping Station No. 4	121.44	5.93
2	319 Talbot Rd. N.	Hopgood Sideroad	Pumping Station No. 4	54	2.64
3	New Forcemain	W. Ag. Lands, Ellis Sideroad, Wilson Sideroad	Essex PCP	2175.16	83.32
4	Galos Dr.	E. Ag. Lands	Pumping Station No. 4	1120	45.5

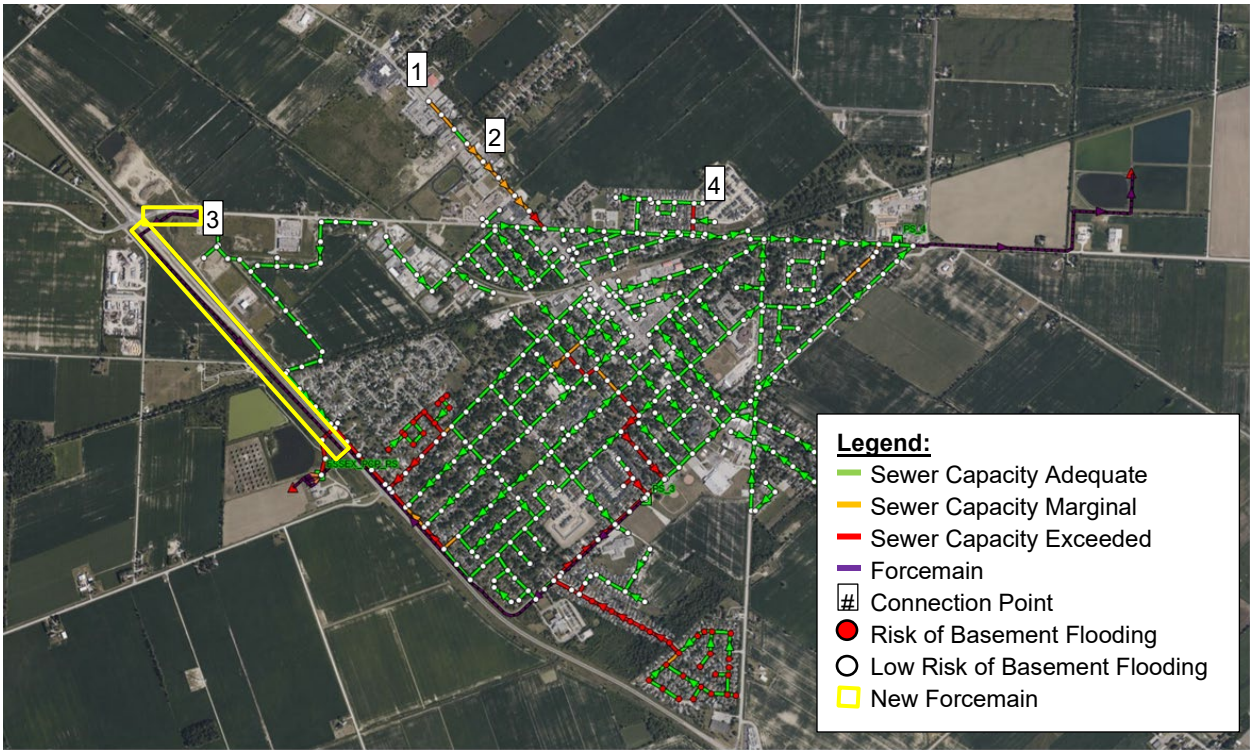

Figure 4.6: Connection Points and Sanitary System Response for Alternative No. 3 Connection Scheme to Existing Essex System

Table 4.11 outlines the projected flow to and the remaining capacity at the pumping stations. Based on the analysis, Pumping Station No. 4 would be operating above its rated capacity during the 100-year design storm event. However, this is not anticipated to significantly limit the sewer capacity of incoming sewers or increase the risk of basement flooding in the collection system. As development progresses in the area pumping station upgrades should be considered and may be carried out in conjunction with upgrades to the Essex NE Lagoons.

In addition, the Essex PCP Inlet Pumping Station would be operating significantly above its rated capacity during the 100-year design storm event. However, due to the use of a forcemain, this is not significantly contributing to flooding or increased risk of basement surcharging within the southwestern portion of the Town of Essex. Major PS upgrades would be required at the Essex PCP. The facility would likely have capacity to accommodate these additional wet weather flows in the onsite wet weather retention pond.

Table 4.11: Projected Flow from Alternative No. 3 and Available Capacity at Pumping Stations

Component	Anticipated Wet Weather Flow (L/s)	Rated Capacity (L/s)	% of Capacity
Pumping Station No. 4 (NE Lagoons Inlet PS)	250	230	109 %
Pumping Station No. 3	213	220	96.8 %
Essex PCP Inlet PS	362	250	145 %

Table 4.12 outlines the projected flow to and the remaining capacity at the Town of Essex treatment facilities. Based on the analysis, both facilities would be operating within their rated treatment capacities. Although upgrades would not be required specifically for the Lakeshore-Essex Fringe Study Area servicing, these developments would significantly limit the allowable capacity for other development within the Town of Essex. Development in the southwestern region of the Town of Essex is ongoing and therefore upgrades to the Essex PCP would likely still be required as a result of providing service to the Fringe Study Area.

Table 4.12: Projected Flow from Alternative No. 3 and Available Capacity at Treatment Facilities

Component	Existing Average Daily Flow (m^3/d)	Rated Capacity (m^3/d)	% of Capacity
Essex PCP	4,006	4,590	87%
Essex NE Lagoons	2,776	2,910	95 %

4.1.3.2: Screening Result

This alternative would satisfy the desire of the Municipality of Lakeshore to provide the Fringe Study Area with sanitary sewer services and meet the municipalities own requirements to allow future development in the Fringe Study Area. Based on preliminary evaluation of ground elevations and cover requirements, this alternative will require the construction of two pumping stations and the construction of a 3.5 km forcemain to the Essex PCP making it the most capital-intensive alternative. This can be somewhat offset by the flexibility in construction this alternative provides as it can be constructed in phases. The Municipality of

Lakeshore would have the option of connecting Hopgood Side Rd, Lapointe St, and the areas of Talbot Rd N adjacent to the municipal boundary to the existing sewer network and plan to build the new pumping station and forcemain to the Essex PCP for the rest of the Fringe Study Area as future developments justify the expense.

Flows from the west agricultural lands, Ellis Side Road, and Wilson Side Road will be directed to a new sewage pumping station that will pump sewage directly to the Essex PCP, avoiding the existing sewer system. This alternative avoids increasing impacts to the southwestern portion of the service area where there are existing capacity issues. However, this requires the construction of a new raw sewage pumping station and lengthy forcemain which will add significant cost to the project.

Both the Essex PCP and the Essex NE Lagoons have sufficient excess capacity to accept the ultimate design flow in this alternative. However, servicing the Fringe Study Area would significantly limit the allowable capacity for other development within the Town of Essex. Development in the southwestern region of the Town of Essex is ongoing and therefore upgrades to the Essex PCP would likely still be required as a result of providing service to the Fringe Study Area.

This alternative will be carried forward for further evaluation.

4.2: Evaluation of Alternative Design Solutions

Based on the screening results, Alternative No. 2 was deemed unsatisfactory and will not be further evaluated. Alternative No.'s 1 and 3 were selected for further evaluation using the criteria outlined in **Section 4.1** of this report. **Table 4.13** shows the colour rating legend for evaluation and **Table 4.14** shows the results of the evaluation of the chosen alternatives.

Table 4.13: Description of Colour Rating for Evaluation Criteria

Colour	Scale	Description
	Poor	Unsuitable or not fit for the desired application; negative impacts; disadvantageous; and/or undesirable given the project timeline, budget, scope, and standards.
	Fair	Acceptable for the desired application; minimal negative impacts; adequate given the project timeline, budget, scope, and standards.
	Good	Suitable or good for the desired application; negligible impacts; and/or agreeable given the project timeline, budget, scope, and standards.
	Great	Favorable; positive impacts; advantageous; excellent given the project timeline, budget, scope, and standards.

Table 4.14: Evaluation of Alternatives

Evaluation Criteria	Alternative No. 1A: Route Flows to the Essex NE Lagoons via One Connection on Talbot Rd N	Alternative No. 1B: Route Flows to the Essex NE Lagoons via Multiple Connection Points	Alternative No. 3: Divide Flows Between the Treatment Lagoons and Essex PCP via New Pumping Station and Forcemain
Technical Suitability	Good • Essex NE Lagoons do not have sufficient capacity for Ultimate Design Flow, upgrades to the treatment lagoons will be required in the future • No impact to Essex PCP capacity • Maidstone Trunk Sewer can accommodate Ultimate Design Flow • The existing sewer on Talbot Rd. N. will need to be upgraded to accommodate additional flows • Minor upgrades required at Pumping Station No. 4 • One additional pumping station would be required • There is limited ability to phase the construction of this alternative • This alternative is not expected to negatively impact existing infrastructure provided recommended upgrades are completed	Great • Essex NE Lagoons do not have suffiecient capacity for Ultimate Design Flow, upgrades to the treatment lagoons will be required in the future • No impact to Essex PCP capacity • The Maidstone Trunk Sewer can accommodate Ultimate Design Flows • The existing sewers on Galos Dr. and Talbot Rd. N. will need to be upgraded • Minor upgrades required at Pumping Station No. 4 • One additional pumping station would be required • This alternative can be phased with capital expenses delayed until agricultural lands are developed • This alternative is not exected to negatively impact existing infrastructure	Poor • Essex NE Lagoons would have limited capacity following the upgrade • Essex PCP would likely require upgrade to accommodate other development in the region • The Maidstone Trunk Sewer can accommodate the additional flows • Upgrades to the existing sewer on Galos Dr. will be required • Minor upgrades required at Pumping Station No. 4 • Major upgrades to the Essex PCP Inlet Pumping Station would be required • Two additional pumping stations would be required • An extended forcemain to the Essex PCP required • This alternative can be phased with capital expenses delayed until agricultural lands are developed • This alternative is not expected to negatively impact existing infrastrucutre
Social	Fair • Upgrades to the Talbot Rd. N. sewer will be disruptive for residents and businesses	Fair • Upgrades to the Galos Dr. and Talbot Rd. N. sewers will be disruptive for residents and businesses • Development enabled by expanding sanitary sewer service will bring new	Poor • Upgrades to the Galos Dr. sewer will be disruptive for residents • Construction of a new forcemain to the Essex PCP may be disruptive to

	• Development enabled by expanding sanitary sewer service will bring new people and business to the community • Construction is not expected to have significant long-term impacts on archaeological, built heritage, or cultural heritage sites • No permanent impacts to the community beyond the desired expansion of service are expected • Noise, vibration, odour, and air pollution emissions are expected to be confined to the construction period	people and business to the community • Construction is not expected to have significant long-term impacts on archaeological, built heritage, or cultural heritage sites • No permanent impacts to the community beyond the desired expansion of service are expected • Noise, vibration, odour, and air pollution emissions are expected to be confined to the construction period	traffic on Highway 3 and local residents • Development enabled by expanding sanitary sewer service will bring new people and business to the community • Construction is not expected to have significant long-term impacts on archaeological, built heritage, or cultural heritage sites • No permanent impacts to the community beyond the desired expansion of service are expected • Noise, vibration, odour, and air pollution emissions are expected to be confined to the construction period
Natural Environment	Comparable • Expanding sanitary sewer service will reduce the number of septic systems in use, reducing the chance these systems leak into groundwater • Construction activities will take place largely in developed areas which should limit impacts on local habitats and wildlife • Expanding sanitiary sewer service will allow for the development of lands currently used for agriculture in compliance with Lakeshore planning policies • Expanding sanitary sewer service will ensure regulatory compliance for future developments	Comparable • Expanding sanitary sewer service will reduce the number of septic systems in use, reducing the chance these systems leak into groundwater • Construction activities will take place largely in developed areas which should limit impacts on local habitats and wildlife • Expanding sanitiary sewer service will allow for the development of lands currently used for agriculture in compliance with Lakeshore planning policies • Expanding sanitary sewer service will ensure regulatory compliance for future developments	Comparable • Expanding sanitary sewer service will reduce the number of septic systems in use, reducing the chance these systems leak into groundwater • Construction activities will take place largely in developed areas which should limit impacts on local habitats and wildlife • Expanding sanitiary sewer service will allow for the development of lands currently used for agriculture in compliance with Lakeshore planning policies • Expanding sanitary sewer service will ensure regulatory compliance for future developments

Economic	Good • Construction activities are likely to have a temporary negative effect on local businesses • Development enabled by expanding the sanitary sewer service will expand the Lakeshore tax base and provide additional economic opportunity for businesses in Essex Centre • Construction costs are expected to be lower compared with Alternative No. 3 • Operating and maintenance costs are expected to be lower than Alternative No. 3	Good • Construction activities are expected to have a temporary negative impact on local busineses • Development enabled by expanding the sanitary sewer service will expand the Lakeshore tax base and provide additional economic opportunity for businesses in Essex Centre • Construction costs are expected to be lower compared with Alternative 3 • Operating and maintenance costs are expected to be lower than Alternative No. 3	Poor • Construction activities are expected to have a temporary negative impact on local businesses • Development enabled by expanding the sanitary sewer service will expand the Lakeshore tax base and provide additional economic opportunity for businesses in Essex Centre • Construction costs are expected to be the higest amonst the alternatives • Operating and maintenance costs are expected to the highest
Overall	**Good**	**Good-Great**	**Poor**

4.3: Recommended Alternative

Based on the above analysis, the preferred solution was determined to be Alternative No. 1B for providing sanitary sewer service to the Lakeshore-Essex Fringe Study Area. This solution involves connecting the Fringe Study Area to the existing sewer network at multiple locations. The major benefit of this solution is the ability to complete the work in phases to meet the needs and timing of development in the area.

In terms of the technical suitability, this alternative is expected to allow the Municipality of Lakeshore service the Lakeshore-Essex Fringe Study Area with no negative impacts to existing infrastructure and no increase to flooding risk in the service area, provided necessary upgrades are completed. Upgrades to Pumping Station No. 4 and the Essex NE Lagoons will be required to accommodate the ultimate design flow, however this is not considered a significant downside due to the long-time horizon before full development of the agricultural lands is expected to be completed.

In terms of social impacts, each alternative is anticipated to have temporary negative effects on the community during the construction period of the sanitary sewer network. However, there will be socio-economic impacts for the community as a whole as development enabled by expanding sanitary sewer service will bring new people, businesses, and growth to the community.

The evaluation found no significant differences between the three alternatives with respect to the natural environment and defined cultural heritage. Expanding sanitary sewer service will reduce the number of septic systems in use, reducing the chance these systems leak into groundwater. Further, construction activities will take place largely in developed areas which should limit impacts on local habitats and wildlife.

In terms of the economic impact, all of the alternatives will enable future development in the Fringe Study Area and allow Lakeshore and Essex to benefit from enhanced economic growth. The preferred alternative is expected to have lower capital and operating costs when compared to the other alternatives.

5.0: Opinion of Probable Cost

5.1: Level of Accuracy

Opinions of probable cost are commonly provided throughout various stages of a project lifecycle and there are several classifications for these estimates that identify the level of accuracy. These classifications can vary based on the industry, but all are based on the fact that the level of accuracy is directly proportional to the level of detail available at each stage of the project.

The level of accuracy for the opinion of probable cost increases as the project moves from the planning stage to the preliminary design and final design. A wide range of accuracy is expected at the planning stage of a project because a number of details remain unknown. As the project moves closer to completion and final design, the estimate would become more accurate due to the increased level of detail and the reduced number of unknowns.

Table 5.1 includes a summary of typical estimate classifications used throughout a project's development including a description of the project stage and range of accuracy. The opinions of probable cost in this study are estimated at the conceptual stage (Class 1) and the corresponding level of accuracy could range from –30% to +50% from the opinion presented in the report.

Table 5.1: Classification System for Cost Estimates

Class	Description	Level of Accuracy	Stage of Project
1	Conceptual Estimate	+50% to -30%	Screening of alternatives.
2	Study Estimate	+30% to -15%	Master Plan or Class EA.
3	Preliminary Estimate	+25% to -10%	Pre-design report.
4	Detailed Estimate	+15% to -5%	Final design report and specifications.
5	Tender Estimate	+10% to -3%	Estimate received from the contractor in response to the Tender.

5.2: Opinion of Probable Cost

Table 5.2 shows a planning level cost estimate for the preferred alternative. The cost estimate is based on the following assumptions:

- All estimates are in 2025 Canadian dollars based on an Engineering News Record (ENR) Construction Cost Index of 1200.
- It is assumed that the Contractor will have unrestricted access to the site and will complete the work during normal working hours from 7:00 am to 6:00 pm Monday to Friday. There is no allowance for premium time included.
- Labour costs are based on union labour rates for the Windsor area. Bulk material and equipment rental costs used are typical for the Windsor area.

- Equipment costs are based on vendor supplied price quotations and historical pricing of similar equipment.
- The estimate does not include the cost of application or permit fees.
- HST (+13%) is not included in the estimate.
- Allowances for engineering and contingency allowances (approximately 30% and 10%, respectively) are included in the estimate.
- No allowance is included for interim financing costs or legal costs.
- No allowance is included for escalation or uncertainty in market pricing factors.
- A factor that could impact the estimate is the possible presence of archaeological resources in the construction area. The potential for these resources has been identified to be low and therefore no allowance is included in the estimate.

Table 5.2: Opinion of Probable Capital Cost for Recommended Solution

Category	Item	Description	Upgrade Trigger	Opinion of Probable Cost
Sewer Replacement	1	Galos Drive Sewer Replacement - Upgrade from 200 mm to 300 mm Depth: 4 ~ 5 m Length: ~ 145 m Peak Flow Rate: ~ 48 L/s No. of Connections: Moderate, Under Residential Roadway	This sewer currently operates at 21 % capacity during the 100-year design storm event and could accommodate an additional peak flow of 16 L/s prior to upgrades being required.	$ 500,000.00
	2	Talbot Road Sewer Replacement - Upgrade from 200/300 mm to 250/375 mm Depth: ~ 5 m Length: ~ 840 m Peak Flow Rate: ~ 54 L/s No. of Connections: Moderate, Under Commercial Roadway	This sewer currently operates at 15 % capacity during the 100-year design storm event and could accommodate an additional peak flow of 27 L/s prior to upgrades being required.	$ 2,500,000.00
Trunk Sewer Additions	3	Trunk Sewer on Talbot Road N. - Extent as shown on **Figure 4.4** Size: 200/250 mm Depth: ~ 3 m Length: ~ 1600 m Peak Flow Rate: ~ 18 L/s No. of Connections: Moderate, Under Commercial Roadway	May be completed at anytime based on the Municipalities desire to connect the existing residential dwellings on North Talbot Road.	$ 4,300,000.00
	4	Trunk Sewer on Galos Drive / Development - Extent as shown on **Figure 4.4** Size: 300 mm Depth: 3 ~ 4 m Length: ~ 650 m Peak Flow Rate: ~ 45 L/s No. of Connections: Moderate, New Development	As development progresses throughout the East Agricultural Lands.	$ 1,800,000.00
	5	Trunk Sewer on Maidstone Avenue / Development - Extent as shown on **Figure 4.4** Size: 375 mm Depth: 3 ~ 4 m Length: ~ 1700 m Peak Flow Rate: ~ 81 L/s No. of Connections: Moderate, New Development	As development progresses throughout the West Agricultural Lands.	$ 4,000,000.00

	6	Allowance for Smaller Local Sewers (allowance for sewers only i.e., not including road construction or other linear infrastructure).	As local development progresses and necessitates local sewer additions.	$ 2,500,000.00
Pumping Station Upgrades	7	Upgrade to Pumping Station No. 4 • Peak Flow from Current Development = 201 L/s • Existing Rated Capacity = 230 L/s • Proposed Rated Capacity = minimum 262 L/s Upgrading the pumping capacity is assumed to be accomplished through equipment replacement (pump replacement or impeller replacement) and review of power distribution system. The addition of an emergency generator upgrade is not included in this OPC and should be reviewed in more detail once pumping electrical and power requirements are confirmed.	As equipment reaches the end of its service life pumping station upgrades should be considered and may be carried out in conjunction with upgrades to the Essex NE Lagoons.	$ 1,250,000.00
	8	New Talbot Road Pumping Station • Proposed Rated Capacity = 10 L/s The required capacity may vary depending on exact location of the proposed pumping station. It is assumed that this new pumping station will be a cast in place concrete chamber with two (2) submersible pumps, building to house electrical system, and emergency generator.	May be completed at anytime based on the Municipalities desire to connect the existing residential dwellings on North Talbot Road.	$ 2,650,000.00
Wastewater Treatment Plant Upgrades	9	Upgrades to Essex Northeast Lagoons • Historical Average Daily Flow = 1,356 m^3/d • Existing Rated Capacity = 2,910 m^3/d • Proposed Rated Capacity = 4,872 m^3/d Upgrading the Essex NE Lagoons is assumed to be accomplished through the addition of a mechanical treatment facility and all accessory equipment / buildings. Please note that it is assumed the new mechanical facility would replace the existing Lagoons, which would then be decommissioned and or repurposed. Therefore, the cost associated with this facility is not for the incremental additional flows but rather all flows from both the Town and Municipality.	Upgrades to the Essex NE Lagoons would be triggered by the addition of 3,453 equivalent people to the service area (~ 1,151 residential dwellings).	$36,500,000.00
			Sub-total Capital Cost	$ 56,000,000.00
			Contingency Allowance (30%)	$ 16,800,000.00
			Engineering Allowance (15%)	$ 10,900,000.00
			Total Capital Cost (Excluding Taxes)	$ 83,700,000.00

6.0: Conclusions and Recommendations

In conclusion, the recommended solution to provide sanitary sewer service to the Lakeshore-Essex Fringe Study Area was determined to be connecting to the existing sewer network at multiple locations on Talbot Road, Galos Drive, and Maidstone Avenue. Upgrades to Trunk Sewers, Pumping Station No. 4 and the Essex NE Lagoons will be required to accommodate the ultimate design flow from the Fringe Study Area. These upgrades may be completed in phases to meet the needs and timing of development in the area.

The anticipated total capital cost to service the Fringe Study Area is approximately $ 83,700,000.00 (including contingency and engineering allowance but excluding taxes). A significant portion of this cost is associated with capacity upgrades to the Essex NE Lagoons, which would not be necessary in the immediate future. There will be socio-economic impacts for the community as a whole as development enabled by expanding sanitary sewer service will bring new people, businesses, and growth to the community.

Table 6.1 summarizes the proposed upgrades to service the Lakeshore-Essex Fringe Study Area and the anticipated Municipal Class Environmental Assessment (EA) Schedule.

Table 6.1: Summary of Recommended Upgrades – EA Schedule

Category	Item	Description	EA Schedule
Sewer Replacement	1	Galos Drive Sewer Replacement	Exempt(1)
	2	Talbot Road Sewer Replacement	Exempt(1)
Trunk Sewer Additions	3	Trunk Sewer on Talbot Road N.	Exempt(1)
	4	Trunk Sewer on Galos Drive / Development	Exempt(2)
	5	Trunk Sewer on Maidstone Avenue / Development	Exempt(2)
	6	Allowance for Smaller Local Sewers	Exempt(2)
Pumping Station Upgrades	7	Upgrade to Pumping Station No. 4	Exempt(3)
	8	New Talbot Road Pumping Station	Eligible for Screening to Exempt(4)
Wastewater Treatment Plant Upgrades	9	Upgrades to Essex Northeast Lagoons	Schedule C

Notes:
(1) Exempt provided upgrades occur within existing road allowance or utility corridor.
(2) Exempt provided the development is condition to a site plan, consent plan of subdivision, or plan of condominium which will come into effect under the *Planning Act*. If not Schedule 'B' EA may be required.
(3) Exempt provided upgrades occur by adding or replacing equipment and appurtenances, where new equipment is located in an existing building or structure. If new building or structure is required on the existing pumping station site, the project may be Eligible for Screening to Exempt through an Archaeological Screening Process. If archaeological potential or resources are identified on the site a Schedule 'B' Class EA may be required.
(4) Eligible for Screening to Exempt(3) with completion of Archaeological Screening Process. If archaeological potential or resources are identified on the site a Schedule 'B' Class EA may be required.

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