Municipality of Lakeshore
Amy Croft Sanitary Servicing Study

Prepared for:
Municipality of Lakeshore

Prepared by:
Stantec Consulting Ltd.

May 6, 2021

Sign-off Sheet

This document entitled Municipality of Lakeshore – Amy croft Sanitary Servicing Study was prepared by Stantec Consulting Ltd. ("Stantec") for the Municipality of Lakeshore (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by _____

(signature)

Lina Florian, EIT

Approved by_____

(signature)

Clarence Jubenville, P.Eng.

Stantec

Table of Contents

EXECUTIVE SUMMARY ..... **I**

ABBREVIATIONS ..... **IV**

1.0 INTRODUCTION **1.1**
1.1 BACKGROUND 1.1
1.2 REVIEW OF ALTERNATIVE SOLUTIONS 1.2
1.3 OBJECTIVE 1.3
1.4 DATA SOURCE 1.3
1.5 SERVICING STUDY METHODOLOGY 1.3
1.5.1 Overview 1.3
1.5.2 Population Data 1.3
1.5.3 Considerations 1.4
1.6 EXISTING CONDITIONS 1.4
1.6.1 Topography 1.4
1.6.2 Soil Conditions 1.4
1.6.3 Environmental Conditions 1.5

2.0 INFRASTRUCTURE AND SERVICE AREAS **2.1**
2.1 EXISTING INFRASTRUCTURE AND SERVICE AREAS 2.1
2.1.1 General 2.1
2.1.2 Existing Wastewater Collection System 2.1
2.2 PROPOSED HIGH DENSITY DEVELOPMENT 2.2
2.2.1 General 2.2
2.2.2 Proposed Options to Accommodate High Density Development 2.2

3.0 SANITARY DESIGN CRITERIA **3.1**
3.1 WASTEWATER FLOW CRITERIA 3.1
3.2 TRIBUTARY AREAS AND POPULATIONS 3.2
3.2.1 Existing Sanitary Servicing Area 3.2
3.2.2 Northwest Area 3.2
3.3 EXISTING AND PROJECTED WASTEWATER FLOWS 3.2

4.0 OPINION OF PROBABLE COST AND COST SHARING **4.1**
4.1 GENERAL 4.1
4.2 LEVEL OF ACCURACY 4.1
4.3 OPINION OF PROBABLE COST 4.2

5.0 SUMMARY **5.1**
5.1 RECOMMENDATIONS 5.1
5.2 PERMITS AND APPROVALS 5.1

6.0 REFERENCES **6.1**

LIST OF TABLES

TABLE 3-1: SANITARY FLOW PROJECTION DESIGN CRITERIA 3.2
TABLE 4-1: CLASSIFICATION OF OPINIONS OF PROBABLE COST 4.2
TABLE 4-2: OPINION OF PROBABLE COST SUMMARY 4.3

LIST OF APPENDICES

APPENDIX A FIGURES

FIGURE A and B - Summary of Options
FIGURE 1 - Option 1
FIGURE 2 – Option 1A
FIGURE 3 – Option 2
FIGURE 4 – Option 2A
FIGURE 5 – Option 3
FIGURE 6 – Option 3A
FIGURE 7 – Option 4
FIGURE 8 – Option 4A
FIGURE 9 – Option 4B
FIGURE 10 – Option 4C
FIGURE 11 - Option 5

APPENDIX B PRELIMINARY SEWER DESIGN SHEETS

SANITARY SEWER DESIGN SHEET 1 – Option 1-4C
SANITARY SEWER DESIGN SHEET 2 – Option 1
SANITARY SEWER DESIGN SHEET 3 – Option 1A
SANITARY SEWER DESIGN SHEET 4 – Option 5

Executive Summary

GENERAL

Proposed new medium to high density developments are expected in the Municipality of Lakeshore's northwest service area which covers approximately 16.35 hectares (ha). The northwest area comprises mostly of agricultural or fallow land surrounded by residential and commercial land use.

In 2006 when the Amy Croft Secondary Plan Study was conducted, it was anticipated that the area would be developed as commercial use with low density sewage servicing requirements similar to the existing commercial developments in the abutting areas.

In 2017, the Municipality approached the property owners in the study area to discuss cost sharing of the required infrastructure to help facilitate the construction of the servicing improvements. The 2017 discussions revealed that some of the developments were proposing uses with medium density sewage capacity requirements. Prior to finalizing agreements with the developers, CH2MHill had conducted the Lakeshore Sanitary Masterplan and confirmed that the added sewage from the submitted developments could be accommodated into the system downstream of Amy Croft and the sewers along Lanoue St were designed to accommodate this anticipated medium density sewage servicing requirements.

The area is presently serviced by an existing municipal wastewater collection system that was sized to support low to medium density future growth. Wastewater generated by the proposed new developments in the northwest area is to be conveyed to the St Clair Shore Pumping station and ultimately to the Denis St Pierre Water Pollution Control Plant (DSPWPCP). Some developers in the northwest area have requested that the Municipality of Lakeshore allow higher density development and provide the necessary sanitary servicing infrastructure in the area to allow for the orderly development of the lands.

The intent of this servicing study is to review the existing municipal infrastructure and identify upgrades or new infrastructure required to provide higher density sanitary servicing for the proposed new developments, within the northwest area of the Municipality of Lakeshore. This report discusses anticipated costs of the municipal infrastructure and includes various development scenarios as well as the preferred strategy.

This study comprises of Sections 1 to 6 inclusive and Appendix A to C. A brief description of each section follows.

SECTION 1 – INTRODUCTION

This section describes the circumstances necessitating a sanitary servicing study for the Municipality of Lakeshore's Amy Croft area and provides background history of the existing infrastructure in the Municipality and current conditions of the area.

SECTION 2 – INFRASTRUCTURE AND SERVICE AREAS

This section describes the existing infrastructure in the Municipality of Lakeshore as it relates to sanitary sewers and pumping stations. This section also describes the proposed sanitary servicing requirements needed for proposed higher density new developments in northwestern area of the Municipality.

SECTION 3 – SANITARY DESIGN CRITERIA

This section outlines the existing and projected wastewater flows based on established tributary areas, estimated total population densities and the Municipality of Lakeshore design standards. The sanitary design criteria establish the parameters utilized to develop projected flows, evaluate system capacities and determine future needs. For the northwest sanitary service area, various development scenarios were examined to determine the proposed new conveyance infrastructure and location as well as verify if the existing infrastructure in the Municipality has sufficient capacity for the additional wastewater flows.

SECTION 4 – INFRASTRUCTURE REQUIREMENTS

This section summarizes the options to adequately service the ultimate buildout of the proposed new higher density developments in northwest area of the Municipality.

In order to accommodate the proposed higher density buildout of all the potential developments identified in this report, improvements to the existing sanitary sewer along Amy Croft Drive and downstream should be constructed with new pumping stations, forcemain and gravity sewers to the existing Oakwood Trunk Sanitary sewer along West Puce River Rd. If the changes to the system are contemplated to provide addition capacity to the northwest service area, these changes should be reflected in the Municipality's Stormwater Master Plan when updates to the Mater Plan are conducted.

SECTION 5 – OPINION OF PROBABLE COST AND COST SHARING

A total of ten alternatives were reviewed to provide additional servicing capacity to the undeveloped lands in the Amy Croft area. This section summarizes anticipated probable costs for proposed works with the various alternatives that were analyzed (in 2021 dollars). Additional options or modifications to options can be reviewed if requested by the Municipality.

SECTION 6 – SUMMARY

This section summarizes recommendations that are made with respect to this study.

If higher density future development in the northwest area were to be accommodated, upgrades to the existing sanitary sewer system will be required. Since the anticipated costs of the options to upgrade the sewer conveyance are very high and the added sanitary flow to the system significantly impacts the systems downstream, it is recommended that the Option 6 "Do Nothing" is accepted. If there is a desire by the developers and Municipality to pursue higher density development in the Amy Croft area, the Municipality's Sanitary Master Plan would have to be revisited and amended to accommodate the significant added flows.

For this recommended Option 6 "Do Nothing", the following works are proposed as follows:

- With this option, no improvements to the existing sanitary conveyance system would be made, so there would be no additional costs.
- With no improvements to the sanitary sewer system, the future development of lands would be subject to the low to medium density as designed.

SECTION 7 – REFERENCES

This section lists previously completed reports referenced in this sanitary servicing study.

Abbreviations

DSPWPCP	Denis St Pierre Water Pollution Control Plant
AVDY	Average Day Demands
ECA	Environmental Compliance Approval
ERCA	Essex Region Conservation Authority
FUS	Fire Underwriters Survey
ICI	Industrial, Commercial, and Institutional
I&I	Inflow and Infiltration
kPa	Kilopascal
L/cap/day	Liters per capita per day
MECP	The Ontario Ministry of the Environment, Conservation and Parks
MXDY	Maximum Day Demands
psi	Pounds per square inch
TDH	Total Dynamic Head

1.0 INTRODUCTION

1.1 BACKGROUND

Proposed new developments are expected in the Municipality of Lakeshore's northwest service area west of West Pike Creek Rd and north of County Rd No. 22. The undeveloped lands in this area cover approximately 16.35 hectares (ha). The northwest undeveloped area comprises mostly of agricultural or fallow land surrounded by residential and commercial land use.

An Infrastructure Component of the Amy Croft Secondary Plan Study was completed in 2006 by Stantec Consulting to implement recommended solutions for servicing. At that time, it was anticipated that the area would be developed as commercial to match existing abutting land use with low sewage requirements. The design criteria used included 3.25 people per lot for existing residential, 25 people (equivalent population) per Ha for commercial, 450 L/capita/day consumption and 0.10 L/Ha/s for peak extraneous flow. The MOE guidelines at that time recommended that residential populations be estimated based on the anticipated population for the area, a minimum of 25 people per Ha where low density development is anticipated but the use is unknown, 225 to 450 L/capita/day consumption and peak extraneous flow subject to designer's judgement based on pipe joint type, etc.

In 2017, the Municipality approached the property owners in the study area to discuss cost sharing of the required infrastructure to help facilitate the construction of the servicing improvements. The 2017 discussions revealed that some of the developments were proposing uses with medium density sewage capacity requirements. Prior to finalizing agreements with the developers, CH2M Hill had conducted the Lakeshore Sanitary Masterplan and confirmed that the added sewage from the submitted developments could be accommodated into the system downstream of Amy Croft and the sewers along Lanoue St were designed to accommodate this anticipated low to medium density sewage servicing requirements.

The area is presently serviced by an existing municipal wastewater collection system that was sized to support low to medium density commercial future growth. Wastewater generated by the proposed new developments in the northwest area is currently designed to be conveyed to the St Clair Shores Pumping station and ultimately to the DSPWPCP. Some developers in the northwest area have requested that the Municipality of Lakeshore allow medium to high density (some properties are proposing densities as high as 343 people per Ha.) development and provide the necessary sanitary servicing infrastructure in the area to allow for the orderly development of the lands.

In order to allow for higher sewage requirements, the existing sewage conveyance infrastructure would have to be reviewed to determine what upgrades, if any would be required.

In 2018, the Municipality of Lakeshore extended the Oakwood Trunk sanitary sewer across Puce River to service lands west of Puce River. When the downstream sections of this trunk sanitary

sewer were designed and constructed nearly twenty years ago, it was anticipated that the lands to the west in the undeveloped service area would be low density (Residential density of 25 people per Ha. and Commercial / Industrial equivalent density of 15 people per Ha.). It was also anticipated that the existing areas that were currently serviced by the trunk sanitary sewer along County Rd No. 2 would continue to drain to that trunk sewer. The Oakwood Trunk sanitary sewer can accommodate some diverted flows from the County Rd No. 2 trunk sewer in the interim but ultimately, the Sanitary Masterplan should be updated in the future with strategies to accommodate these changes and potentially higher density development in the future service area.

1.2 REVIEW OF ALTERNATIVE SOLUTIONS

The Provincial Policy Statement, 2014 (PPS) sets the policy foundation for regulating the development and use of land. Section 1.6.6.2 of the PPS clearly states that municipal sewage services are the preferred form of servicing for settlement areas. We considered feasible alternatives to service the existing undeveloped lands within the western portion of the service area with higher density development. The following alternatives were screened out from further consideration in this design study:

- **Holding Tank / Limited Discharge**– this alternative is not desirable by the Municipality of Lakeshore as the potential for failure would be significant.
- **Septic Tank/Weeping Bed Systems** – this alternative is not feasible or desirable by the Municipality of Lakeshore as numerus tanks/weeping beds would be required. The ground conditions in the study area do not support this (i.e., clay) and the proposed developments in densely populated areas.
- **Low Pressure Sewers/Grinder Pumps** – this alternative is not feasible or desirable by the Municipality of Lakeshore as it would require servicing each individual building and new collector/trunk sewers or pumping stations. Forcemains would still be needed.
- **Vacuum Sewers** – this alternative is not feasible or desirable by the Municipality of Lakeshore as it would still require a more conventional means of sewage collection through the use of a pump station/force main system or gravity sanitary sewers.
- **Package Treatment Plants** – this alternative is not feasible or desirable by the Municipality of Lakeshore as numerous package plants would be required with a collection piping system. Also, the Municipality is currently proceeding with completing the necessary upgrades to the Main Sewage Treatment Plant to accommodate current and future wastewater flows. There is an existing package plant near Patillo Rd that is currently not in service. The costs to improve this pumping station to meet current effluent requirements and the costs to maintain this system would far outweigh the small benefits of removing this sewage from the sewer system.

1.3 OBJECTIVE

The intent of this servicing study is to review the existing municipal infrastructure and identify upgrades or new infrastructure required to provide additional sanitary servicing capacity for the proposed new developments, within the northwest area of the Municipality of Lakeshore. This report discusses anticipated costs and includes various development scenarios as well as development of design criteria.

1.4 DATA SOURCE

The sources of information referred to in this study include record drawings, reports, codes, standards and guidelines. The list of references includes:

- Municipality of Lakeshore Interactive Mapping Service
- Municipality of Lakeshore GIS data
- Municipality of Lakeshore Sanitary Sewer Design Criteria
- Ontario Ministry of the Environment, Conservation and Parks (MECP) Sewage Design Guidelines for Sewage Works (2008)

Specific information addressing requests received from the developers and the staff of the Municipality of Lakeshore, together with the results of the Sanitary Master Plan were also used in preparing this report.

1.5 SERVICING STUDY METHODOLOGY

1.5.1 Overview

This study evaluates the existing wastewater collection systems in the northwest area of the Municipality of Lakeshore, with a focus on the sanitary infrastructure capacities that are ultimately serviced by the Municipality's Denis St Pierre Water Pollution Control Plant.

The wastewater flows are calculated based on current Municipality of Lakeshore design criteria and MECP sewage design guidelines. The capacities of the existing systems are compared with the existing and proposed demands of the northwest service area to identify gaps which require new or upgraded infrastructure to address servicing needs.

Various scenarios were considered and evaluated based on environmental and economic impacts.

1.5.2 Population Data

This study presents estimated total population density for the Municipality of Lakeshore based on existing number of homes, industrial, commercial, and institutional land use within the sanitary drainage area. Shopping centers, schools, community halls, etc. have been accounted for and

converted to equivalent number of residential lots for population estimating purposes. The Municipality's standard design criteria is used to conservatively estimate existing and future population for the various development scenarios and preferred servicing strategy.

1.5.3 Considerations

This study considered the following:

- Physical and Natural Environment:
  - Surface drainage, soil and geology
  - Impact on areas of natural and scientific interest, and environmentally sensitive areas
  - Review of topographical features
- Social and Economic Environment:
  - Impact on existing and proposed development
  - Impact on other utilities
- Financial Factors:
  - Construction, operation and maintenance (life-cycle) costs
  - Best use of existing infrastructure
- Technical Factors:
  - Level of service
  - Impact on existing infrastructure
  - Constructability
  - Impact on operations and maintenance
  - Meeting legislative criteria and regulations

1.6 EXISTING CONDITIONS

1.6.1 Topography

The Municipality of Lakeshore's northwest area's topography is somewhat flat. The land falls from south to north between Manning Road and West Pike Creek Rd with elevations varying from 178.5 m to 177.0 m., generally sloping towards Pike Creek.

1.6.2 Soil Conditions

Soil conditions for the site were determined based on the Soils Map of Essex County. Majority of the lands in the Municipality of Lakeshore from Manning Road to Puce River can be generally classified as Brookston Clay (Bc) with some Wauseon Sandy Loam just south of County Rd No. 2 northerly to Lake St Clair.

1.6.3 Environmental Conditions

The northwest area of the Municipality of Lakeshore lies within the Puce River and Pike Creek watersheds. The watershed is made up of various municipal drains that collect municipal residential and agricultural runoff and outlet to river and creek.

Environmental protection zones are located around the watersheds (primarily at water courses) and require buffer zones.

2.0 INFRASTRUCTURE AND SERVICE AREAS

2.1 EXISTING INFRASTRUCTURE AND SERVICE AREAS

2.1.1 General

The northwest portion of the Municipality of Lakeshore is serviced by wastewater treatment facilities at the DSPWPCP located along Rourke Line Rd.

Wastewater generated by the proposed new developments in the northwest area of the Municipality will be conveyed to the DSPWPCP.

2.1.2 Existing Wastewater Collection System

2.1.2.1 Wastewater Treatment Plant

The DSPWPCP is located along Rourke Line Rd just south of County Rd 22 and services existing urban areas within the Municipality of Lakeshore.

The Engineering and Infrastructure Services Department is responsible for the maintenance of the Municipality's sewage collection systems working in cooperation with Ontario Clean Water Agency (OCWA).

The Municipality of Lakeshore is currently working on completing upgrades and expansion of the existing DSPWPCP to accommodate current and future wastewater flows. Wastewater generated by the proposed new developments in the northwest area is to be conveyed with pumping stations, forcemains and gravity sewers and ultimately to the DSPWPCP.

2.1.2.2 Sanitary Pumping Stations, Forcemains and Gravity Sewers

Sanitary sewage from developments in the northwest area of the Municipality of Lakeshore currently drain by gravity sewers easterly to the St Clair Shores Pumping Station, then northerly through a forcemain that outlets to a run of gravity sewers along County Rd 2 and Elmgrove Dr. The sewer run continues easterly along Russell Woods Rd, where flows from Pump Station No 7 are additionally introduced. The sewer run continues to drain easterly to Pumping Station No 6, then southerly / easterly to Pumping Station No 5, then easterly through gravity sewers to Pumping Station No 4, then easterly through gravity sewers to Pumping Station No 2 and ultimately though gravity sewers to the DSPWPCP.

The Municipality's Water and Wastewater Master Plan was completed by Stantec Consulting and CH2M Hill in 2018. As part of the work, CH2M Hill prepared a sanitary sewer model to review capacities of the existing infrastructure. CH2M Hill confirmed that the original anticipated low to medium density design commercial flows from the undeveloped lands west of West Pike Creek

Rd at the northwest area of the Municipality could be accommodated into the existing sanitary conveyance system, however, the system could not accommodate higher density design flows.

In 2009, the Municipality upgraded the above noted pumping stations to optimize conveyance capacity through the system from the west end of the Municipality to the DSPWPCP. Our analysis of the improvements that were made to the pumping stations noted above were to optimize flows through the system. No significant flow conveyance can be added without major improvements or replacement of the pumping stations and trunk sanitary sewers all the way from Amy Croft Drive to the DSPWPCP. The pumping station capacity was reviewed on a case-by-case basis to determine if it could be upgraded or if it would require total replacement to accommodate the anticipated flows for the various options.

2.2 PROPOSED HIGH DENSITY DEVELOPMENT

2.2.1 General

The undeveloped lands west of West Pike Creek Rd north of County Rd 22 in the Municipality of Lakeshore covers an area of approximately 16.35 hectares of land.

The area lies within the DSPWPCP service area. The area is currently serviced by an existing municipal wastewater collection system but will require upgrades to allow for the orderly development of higher density lands.

2.2.2 Proposed Options to Accommodate High Density Development

Several alternatives were reviewed to provide additional sewage capacity for undeveloped lands at the northwest area of the Municipality west of West Pike Creek Rd to accommodate higher density development on these lands. The various options that were reviewed can be seen in **Figures A and B**.

2.2.2.1 Option 1

Option 1 can be seen in **Figure 1** and will involve the following improvements:

- Replacement of deficient sewers west of St Clair Shores Pumping Station.
- Replacement of St Clair Shores Pumping Station.
- Replacement of forcemain and gravity sewers between Pumping Station No 7 and Pumping Station No 6.
- Replacement of Pumping Station No 6.
- Replacement of deficient gravity sewers between Pumping Station No 6 and Pumping Station No 5.
- Replacement of deficient gravity sewers between Pumping Station No 5 and new Pumping Station at West Puce River Rd.
- Diverting flows from Advance Boulevard Pumping Station (Pump Station No. 9) easterly along County Rd 22 with a new forcemain from Patillo Rd to West Puce River Rd

- Construction of a new Pumping Station at West Puce River Rd.
- Construction of a new forcemain along West Puce River Rd from County Rd 22 to the existing Oakwood Trunk Sanitary Sewer.

The above improvements would provide the following benefits to the conveyance system:

- Provides additional capacity for high density development west of West Pike Creek Rd.
- Replacement of older sewers and pumping stations with new infrastructure.
- May address some I & I issues in the existing conveyance system west of Puce River along County Rd 2. This will reduce the risk of surcharging of the sanitary sewer system during wet weather events.
- Will provide some additional capacity in the existing system along County Rd 22 from Puce River easterly to the DSPWPCP. This will reduce the risk of surcharging of the sanitary sewer system during wet weather events.

2.2.2.2 Option 1A

Option 1A is similar to Option 1, however, with this option flows along Patillo Rd are not diverted easterly along County Road 22 to West Puce River Rd.

Option 1A can be seen in **Figure 2** and will involve the following improvements:

- Replacement of deficient sewers west of St Clair Shores Pumping Station.
- Replacement of St Clair Shores Pumping Station.
- Replacement of forcemain and gravity sewers between Pumping Station No 7 and Pumping Station No 6.
- Replacement of Pumping Station No 6.
- Replacement of forcemain and gravity sewers between Pumping Station No 6 and Pumping Station No 5.
- Replacement of Pumping Station No 5.
- Replacement of forcemain and gravity sewers between Pumping Station No 5 and West Puce River Rd.
- Construction of a new Pumping Station at West Puce River Rd.
- Construction of a new forcemain along West Puce River Rd from County Rd 22 to the existing Oakwood Trunk Sanitary Sewer.

The above improvements would provide the following benefits to the conveyance system:

- Provides additional capacity for high density development west of West Pike Creek Rd.
- Replacement of older sewers and pumping stations with new infrastructure.
- May address some I & I issues in the existing conveyance system along County Rd 2 west of Puce River. This will reduce the risk of surcharging of the sanitary sewer system during wet weather events.

- Will provide additional capacity in the existing system along County Rd 22 from Puce River easterly to the DSPWPCP. This will reduce the risk of surcharging of the sanitary sewer system during wet weather events.

2.2.2.3 Option 2

Option 2 can be seen in **Figure 3** and will involve the following improvements:

- Replacement of deficient sewers west of St Clair Shores Pumping Station.
- Replacement of St Clair Shores Pumping Station.
- Divert flows from the St Clair Shores Pumping Station southerly and easterly in a new forcemain to a new Pumping Station near Wallace Line / County Rd 22.
- Construction of a new Pumping Station near Wallace Line / County Rd 22.
- Construction of a new forcemain along County Rd 22 from Wallace Line to West Puce River Rd.
- Construction of a new forcemain along West Puce River Rd from County Rd 22 to the existing Oakwood Trunk Sanitary Sewer.

The above improvements would provide the following benefits to the conveyance system:

- Provides additional capacity for high density development west of West Pike Creek Rd.
- Will provide additional capacity in the existing system along County Rd 2 / 22 from West Pike Creek Rd easterly to the DSPWPCP. This will reduce the risk of surcharging of the sanitary sewer system during wet weather events.

2.2.2.4 Option 2A

Option 2A is similar to Option 2, however, with this option flows along Patillo Rd are diverted easterly along County Road 22 to West Puce River Rd.

Option 2A can be seen in **Figure 4** and will involve the following improvements:

- Replacement of deficient sewers west of St Clair Shores Pumping Station.
- Replacement of St Clair Shores Pumping Station.
- Divert flows from the St Clair Shores Pumping Station southerly and easterly in a new forcemain to a new Pumping Station at Advance Boulevard (Pump Station No.9).
- Divert flows from the Advance Boulevard Pumping Station (Pump Station No.9) with a forcemain easterly to east of Patillo Rd
- Construction of a new forcemain along County Rd 22 from east of Patillo Rd to West Puce River Rd.
- Construction of a new forcemain along West Puce River Rd from County Rd 22 to the existing Oakwood Trunk Sanitary Sewer.

The above improvements would provide the following benefits to the conveyance system:

- Provides additional capacity for high density development west of West Pike Creek Rd.
- Will provide additional capacity in the existing system along County Rd 2 / 22 from West Pike Creek Rd easterly to the DSPWPCP. This will reduce the risk of surcharging of the sanitary sewer system during wet weather events.

2.2.2.5 Option 3

Option 3 can be seen in **Figure 5** and will involve the following improvements:

- Replacement of deficient sewers west of St Clair Shores Pumping Station.
- Replacement of St Clair Shores Pumping Station.
- Divert flows from the St Clair Shores Pumping Station southerly and easterly in a new forcemain to a new Pumping Station at Advance Boulevard (Pump Station No.9).
- Divert flows from the Advance Boulevard Pumping Station (Pump Station No.9) with a forcemain easterly to Wallace Line
- Construction of a new Pumping Station near Wallace Line / County Rd 22.
- Construction of a new forcemain along Wallace Line southerly and then easterly to West Puce River Rd the existing Oakwood Trunk Sanitary Sewer.

The above improvements would provide the following benefits to the conveyance system:

- Provides additional capacity for high density development west of West Pike Creek Rd.
- Will provide additional capacity in the existing system along County Rd 2 / 22 from West Pike Creek Rd easterly to the DSPWPCP. This will reduce the risk of surcharging of the sanitary sewer system during wet weather events.

2.2.2.6 Option 3A

Option 3A is similar to Option 3, however, with this option the forcemain along Wallace Line Road and the future road easterly is replaced with a gravity sewer.

Option 3A can be seen in **Figure 6** and will involve the following improvements:

- Replacement of deficient sewers west of St Clair Shores Pumping Station.
- Replacement of St Clair Shores Pumping Station.
- Divert flows from the St Clair Shores Pumping Station southerly and easterly in a new forcemain to a new Pumping Station at Advance Boulevard.
- Advance Boulevard (Pump Station No. 9) Upgrades.
- Divert flows from the Advance Boulevard Pumping Station (Pump Station No.9) with a forcemain easterly to Wallace Line
- Construction of a new gravity sewer along Wallace Line southerly and then easterly to West Puce River Rd the existing Oakwood Trunk Sanitary Sewer.

The above improvements would provide the following benefits to the conveyance system:

- Provides additional capacity for high density development west of West Pike Creek Rd.
- Will provide additional capacity in the existing system along County Rd 2 / 22 from West Pike Creek Rd easterly to the DSPWPCP. This will reduce the risk of surcharging of the sanitary sewer system during wet weather events.
- With a gravity sewer constructed through the vacant lands west of East Puce River Rd, this will facilitate development of these vacant lands.

2.2.2.7 Option 4

Option 4 can be seen in **Figure 7** and will involve the following improvements:

- Replacement of deficient sewers west of St Clair Shores Pumping Station.
- Replacement of St Clair Shores Pumping Station.
- Divert flows from the St Clair Shores Pumping Station southerly and easterly in a new forcemain along County Rd 22 to a new Pumping Station at Advance Boulevard (Pump Station No.9).
- Divert flows from the Advance Boulevard Pumping Station (Pump Station No.9) with a forcemain southerly along Patillo Rd to Little Baseline Rd
- Construction of a new Pump Station at the intersection of Patillo Rd and Little Baseline Rd.
- Construction of a new forcemain along future road easterly to West Puce River Rd the existing Oakwood Trunk Sanitary Sewer.

The above improvements would provide the following benefits to the conveyance system:

- Provides additional capacity for high density development west of West Pike Creek Rd.
- Will provide additional capacity in the existing system along County Rd 2 / 22 from West Pike Creek Rd easterly to the DSPWPCP. This will reduce the risk of surcharging of the sanitary sewer system during wet weather events.

2.2.2.8 Option 4A

Option 4A is similar to Option 4, however, with this option the forcemain along County Road 22 is realigned along Croft Drive.

Option 4A can be seen in **Figure 8** and will involve the following improvements:

- Replacement of deficient sewers west of St Clair Shores Pumping Station.
- Replacement of St Clair Shores Pumping Station.
- Divert flows from the St Clair Shores Pumping Station southerly and easterly in a new forcemain along Advance Blvd to a new Pumping Station at Advance Boulevard (Pump Station No.9).
- Divert flows from the Advance Boulevard Pumping Station (Pump Station No.9) with a forcemain southerly along Patillo Rd to Little Baseline Rd

- Construction of a new Pump Station at the intersection of Patillo Rd and Little Baseline Rd.Construction of a new forcemain along future road easterly to West Puce River Rd the existing Oakwood Trunk Sanitary Sewer.

The above improvements would provide the following benefits to the conveyance system:

- Provides additional capacity for high density development west of West Pike Creek Rd.
- Will provide additional capacity in the existing system along County Rd 2 / 22 from West Pike Creek Rd easterly to the DSPWPCP. This will reduce the risk of surcharging of the sanitary sewer system during wet weather events.

2.2.2.9 Option 4B

Option 4B is similar to Option 4A, however, with this option flows from the trailer park are added to the system along Croft Drive.

Option 4B can be seen in **Figure 9** and will involve the following improvements:

- Replacement of deficient sewers west of St Clair Shores Pumping Station.
- Replacement of St Clair Shores Pumping Station.
- Divert flows from the St Clair Shores Pumping Station southerly and easterly in a new forcemain along Advance Blvd to a new Pumping Station at Advance Boulevard (Pump Station No.9).
- Add flows from the existing trailer park into Advance Boulevard gravity sewer system.
- Divert flows from the Advance Boulevard Pumping Station (Pump Station No.9) with a forcemain southerly along Patillo Rd to Little Baseline Rd
- Construction of a new Pump Station at the intersection of Patillo Rd and Little Baseline Rd.
- Construction of a new forcemain along future road easterly to West Puce River Rd the existing Oakwood Trunk Sanitary Sewer.

The above improvements would provide the following benefits to the conveyance system:

- Provides additional capacity for high density development west of West Pike Creek Rd.
- Will provide additional capacity in the existing system along County Rd 2 / 22 from West Pike Creek Rd easterly to the DSPWPCP. This will reduce the risk of surcharging of the sanitary sewer system during wet weather events.
- The trailer park is now serviced and the sewage lagoon could be decommissioned. Cost sharing with the park owners would reduce the overall shared costs with the other proponents.

2.2.2.10 Option 4C

Option 4C is similar to Option 4B, however, with this option the forcemain along Patillo Rd and easterly along the future road is replaced with gravity sewers.

Option 4C can be seen in **Figure 10** and will involve the following improvements:

- Replacement of deficient sewers west of St Clair Shores Pumping Station.
- Replacement of St Clair Shores Pumping Station.
- Divert flows from the St Clair Shores Pumping Station southerly and easterly in a new forcemain along Advance Blvd to a new Pumping Station at Advance Boulevard (Pump Station No.9).
- Add flows from the existing trailer park into Advance Boulevard gravity sewer system.
- Divert flows from the Advance Boulevard Pumping Station (Pump Station No.9) with a forcemain southerly along Patillo Rd to Little Baseline Rd
- Construction of a new Pump Station at the intersection of Patillo Rd and Little Baseline Rd.
- Construction of a new forcemain along future road easterly to West Puce River Rd the existing Oakwood Trunk Sanitary Sewer.

The above improvements would provide the following benefits to the conveyance system:

- Provides additional capacity for high density development west of West Pike Creek Rd.
- Will provide additional capacity in the existing system along County Rd 2 / 22 from West Pike Creek Rd easterly to the DSPWPCP. This will reduce the risk of surcharging of the sanitary sewer system during wet weather events.
- The trailer park is now serviced and the sewage lagoon could be decommissioned. Cost sharing with the park owners would reduce the overall shared costs with the other proponents.
- With a gravity sewer constructed through the vacant lands west of East Puce River Rd, this will facilitate development of these vacant lands.

2.2.2.11 Option 5

Option 5 can be seen in **Figure 11** and will involve the following improvements:

- Construction of new pumping station to service property at southeast corner of Lanoue St / Manning Rd.
- Construction of a new forcemain along Lanoue St, and the bermed up area north of Amy Croft Linear Pond, West Pike Cr, Advance Blvd, Patillo Rd.
- New Pump station on the intersection of Little Baseline Rd and Patillo Rd.
- Construction of forcemain on future road to the existing Oakwood Trunk Sanitary Sewer at West Puce River Rd.

The above improvements would provide the following benefits to the conveyance system:

- Provides additional capacity for one high density development west of West Pike Creek Rd.

2.2.2.12 Option 6

Option 6 is the **"Do Nothing"** option.

- With this option, no improvements to the existing sanitary conveyance system would be made, so there would be no additional costs.
- With no improvements to the sanitary sewer system, the future development of lands would be subject to the low to medium density as per secondary plan and zoning bylaw.

3.0 SANITARY DESIGN CRITERIA

The sanitary design criteria utilized for the Municipality of Lakeshore Amy Croft Sanitary Servicing Study is based on the Municipality's current design standards and the MECP Sewage Design Guidelines (2008).

The sanitary design criteria establish the parameters utilized to develop projected flows, evaluate system capacities and determine future needs.

3.1 WASTEWATER FLOW CRITERIA

Municipal wastewater flows are made up of waste discharges from residential, industrial, commercial, and institutional establishments plus extraneous non-waste flow components from sources such as groundwater and surface runoff.

Extraneous flow includes inflow and infiltration (I&I). Infiltration is water entering a sewer system and service connections from the ground through such means as defective pipes, pipe joints, connections and manholes. Inflow is water discharged into a sewer system and service connections from such sources as roof leaders, cellar, yard and area drains, foundation drains, cooling water discharges, drains from springs and swampy areas, manhole covers, cross connections from storm sewers and combined sewers, catch basins, storm water, surface run-off and street washes or drainage. In general, inflow increases with the amount of precipitation. Increases in inflow have also been observed during winter thaws that produce runoff from melting of accumulated snow cover.

According to the MECP Sewage Design Guidelines for Sewage Works (2008), the recommended design value for average daily domestic flow ranges from 225 to 450 L/cap/day plus an extraneous flow allowance. The MECP sewage design guidelines recommend the designer to consider pipe joints, soil conditions, etc. when determining a suitable allowance for peak extraneous flow factor, in L/(ha·s). The Municipality's Development Manual was referenced and the applicable factor is fairly conservative at 0.21 L/(ha·s) The guidelines further recommend the domestic component of the peak sewage flow be calculated using peaking factors in accordance with the Harmon Formula.

Projected wastewater flows for the existing sewer system in the Municipality and future development within the northwest area was established based on the Municipality's standard design criteria. This design criteria generally complies with the MECP sewage design guidelines noted above and is considered a conservative approach when estimating wastewater flows. Past experience and studies have shown that the design parameters used to estimate peak sewage flows are notably conservative and thus yield higher flow rates than measured actual peak flows.

The design criteria used in the analysis is present in **TABLE 3-1**

TABLE 3-1: SANITARY FLOW PROJECTION DESIGN CRITERIA

Parameter	Design Criteria
Hydraulic sewer sizing	Manning's Equation
Manning's Roughness Coefficient 'n'	0.013
Peaking Factor	Based on Harmon Formula
Infiltration allowance/peak extraneous flow	0.21 L/ha/s (18,144 L/ha/day)
Industrial/Commercial/Institutional (ICI) population densities	Unit sewage Flow Rates – MECP Table 5-3
Future development – high density	300 persons/ha
Residential population densities (single home)	3 persons/unit
Average daily domestic flow	350 L/cap/day
Note: The Municipality of Lakeshore design parameters are considered conservative values when estimating peak sewage flows.	

3.2 TRIBUTARY AREAS AND POPULATIONS

3.2.1 Existing Sanitary Servicing Area

For the existing DSPWPCP service area, the tributary areas and populations were estimated. Tributary areas were estimated based on a review of the Municipality's existing sanitary sewer system. Populations were estimated based on the existing number of homes, and equivalent population for ICI land uses. The equivalent residential population was estimated from unit sewage flows based on anticipated use.

3.2.2 Northwest Area

The northwest area has approximately 16.35 ha of future development. For a majority of this undeveloped area, the proposed land use is unknown in this mixed-use area. The sanitary sewer system in this area is currently designed to accommodate low to medium density sewage requirements. Some of the developer's in the area have requested additional sewage capacity for much denser development. In order to accommodate this request, a future population density (where type of development was unknown) was estimated based on the high-density development site plan that was submitted for the property at the southeast corner of Lanoue St / Manning Rd to ensure that the sewage system improvements are properly sized.

3.3 EXISTING AND PROJECTED WASTEWATER FLOWS

The existing sanitary sewer capacities, within the DSPWPCP service area, were evaluated to determine if the existing sanitary sewer system is adequate to convey additional wastewater flows generated by the proposed new developments in the northwest area of the Municipality.

The associated sanitary sewer design spreadsheets included in **Appendix B** were created using record drawings and the above noted design parameters for the DSPWPCP sanitary service area. The future sanitary sewers are preliminary designs only and should be confirmed during the

detailed design stage. The associated sanitary sewer design spreadsheets were used to determine the theoretical Total Sewage and Infiltration Maximum Flow from the existing and proposed developments, within the Municipality of Lakeshore, that can be conveyed to the DSPWPCP without exceeding the sanitary trunk sewer capacities.

4.0 OPINION OF PROBABLE COST AND COST SHARING

4.1 GENERAL

This section discusses and provides an opinion on the probable cost of the various options for the design and construction of new sanitary trunk sewers, forcemains and pumping stations for the higher density development of future lands of the northwest area in the Municipality of Lakeshore.

An opinion of probable cost of the various options for the design and construction of new sanitary trunk sewers, forcemains and pumping stations have been developed to project what someone else would be willing to contract for in the future to do design and construction work which has not yet been defined in detail and which is subject to changes in scope, design and market conditions.

4.2 LEVEL OF ACCURACY

Opinions of probable cost are typically provided throughout various stages of a project's life cycle. There are several classifications for estimates that identify typical minimum and maximum probable costs or levels of accuracy. These classifications vary widely by industry and the level of accuracy is directly proportional to the level of detail available at the time the opinions of probable cost are prepared at each stage of the project.

The level of accuracy increases as the project moves through the various stages of the project life cycle from planning to preliminary design to final design. A wide range of accuracy would be expected at the planning stage of project development because many details are unknown. As the project moves closer to completion of final design, the opinion of probable cost becomes more accurate due to the increased level of detail available and the reduced number of unknown issues.

The following **TABLE 4-1** summarizes typical cost classifications throughout a project's life cycle including a description of the project stage and range of accuracy.

The opinions of probable cost in **Section 4.3** below are estimated at the servicing study stage (Class 2) and the corresponding level of accuracy could range from –15% to +30% from the opinion presented in the report.

TABLE 4-1: CLASSIFICATION OF OPINIONS OF PROBABLE COST

Class	Description	Level of Accuracy	Stage of Project Lifecycle
1	Conceptual Stage	+50% to -30%	Screening of alternatives
2	Study Stage	+30% to -15%	Servicing study
3	Preliminary Stage	+25% to -10%	Pre-design report
4	Detailed Stage	+15% to -5%	Completed plans and specifications
5	Tender Stage	+10% to -3%	Tendered price (varies depending on the amount of contingency allowance consumed)

4.3 OPINION OF PROBABLE COST

The opinion of probable costs for the proposed servicing requirements for the Lakeshore northwest service area are presented below in **TABLE 4-2**. Refer to **Section 5.0** for explanation of proposed servicing requirements.

The following factors were considered when developing the opinions of probable cost:

- All estimates are 2021 dollars.
- Costs do not include utility relocation work, if necessary.
- It is assumed 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.
- An allowance is included for mobilization and demobilization and the Contractor's overhead and profit.
- Equipment costs are based on vendor supplied price quotations and historical pricing of similar equipment.
- Bulk material and equipment rental costs used are typical for the Windsor area.
- Costs of application or permit fees are excluded.
- All taxes including HST are not included.
- Allowances for engineering and contingencies (15% and 15% respectively) are included.
- No allowance is included for interim financing costs or legal costs.
- No allowance is included for property acquisition costs. Actual cost may vary significantly.
- No allowance is included for escalation beyond the date of this report.

TABLE 4-2: OPINION OF PROBABLE COST SUMMARY

	Sub - Total	Contingency (+/-15%)	Engineering (+/-15%)	EA if Required	Total (not incl. H.S.T. or Property Acquisition)
Option 1	$13,528,100.00	$2,029,300.00	$2,333,600.00	$80,000.00	$17,971, 00.00
Option 1A	$11,791,000.00	$1,768,700.00	$2,034,000.00	$80,000.00	$15,673,700.00
Option 2	$8,072,500.00	$1,210,900.00	$1,392,500.00	$80,000.00	$10,755,900.00
Option 2A	$8,929,000.00	$1,339,400.00	$1,540,300.00	$80,000.00	$11,888,700.00
Option 3	$8,952,700.00	$1,343,000.00	$1,544,400.00	$80,000.00	$11,920,100.00
Option 3A	$8,767,600.00	$1,315,200.00	$1,512,500.00	$80,000.00	$11,675,300.00
Option 4	$8,577,000.00	$1,286,600.00	$1,479,600.00	$80,000.00	$11,423,200.00
Option 4A	$8,567,900.00	$1,285,200.00	$1,478,000.00	$80,000.00	$11,411,100.00
Option 4B	$8,810,000.00	$1,321,500.00	$1,519,800.00	$80,000.00	$11,731,300.00
Option 4C	$10,324,600.00	$1,548,700.00	$1,781,000.00	$80,000.00	$13,734,300.00
Option 5	$5,226,100.00	$784,000.00	$901,600.00	$80,000.00	$ 6,991,700.00

5.0 SUMMARY

5.1 RECOMMENDATIONS

In order to accommodate higher density future development in the northwest area of the Municipality of Lakeshore, upgrades to the existing sanitary sewer system will be required. Since the anticipated costs of the options to upgrade the sewer conveyance are very high and the added sanitary flow to the system significantly impacts the systems downstream, it is recommended that the **Option 6 "Do Nothing"** is accepted. If there is a desire by the developers and Municipality to pursue higher density development in the Amy Croft area, the Municipality's Sanitary Master Plan would have to be revisited and amended to accommodate the significant added flows.

For this recommended Option 6 "Do Nothing", the following works are proposed as follows:

- With this option, no improvements to the existing sanitary conveyance system would be made, so there would be no additional costs.

- With no improvements to the sanitary sewer system, the future development of lands would be subject to the low to medium density as designed.

5.2 PERMITS AND APPROVALS

If improvements are made to the sanitary sewer system, a MECP Environmental Compliance Approval (ECA) (formerly known as a Certificate of Approval) is to be obtained prior to tendering the sanitary service portions of the project. Application is to be made upon completion of the design brief followed by completion of the detailed design drawings and specifications. A permit will also be required from the Essex Regional Conservation Authority (ERCA) to cross any municipal drain and for all works in ERCA regulated lands. The permit should be obtained prior to tendering the project.

The options require work to be completed along County Roads. Approval from the County of Essex would be required prior to proceeding.

Some of the options require work to be completed across VIA Railway. Approval from the railway would be required for those options prior to proceeding.

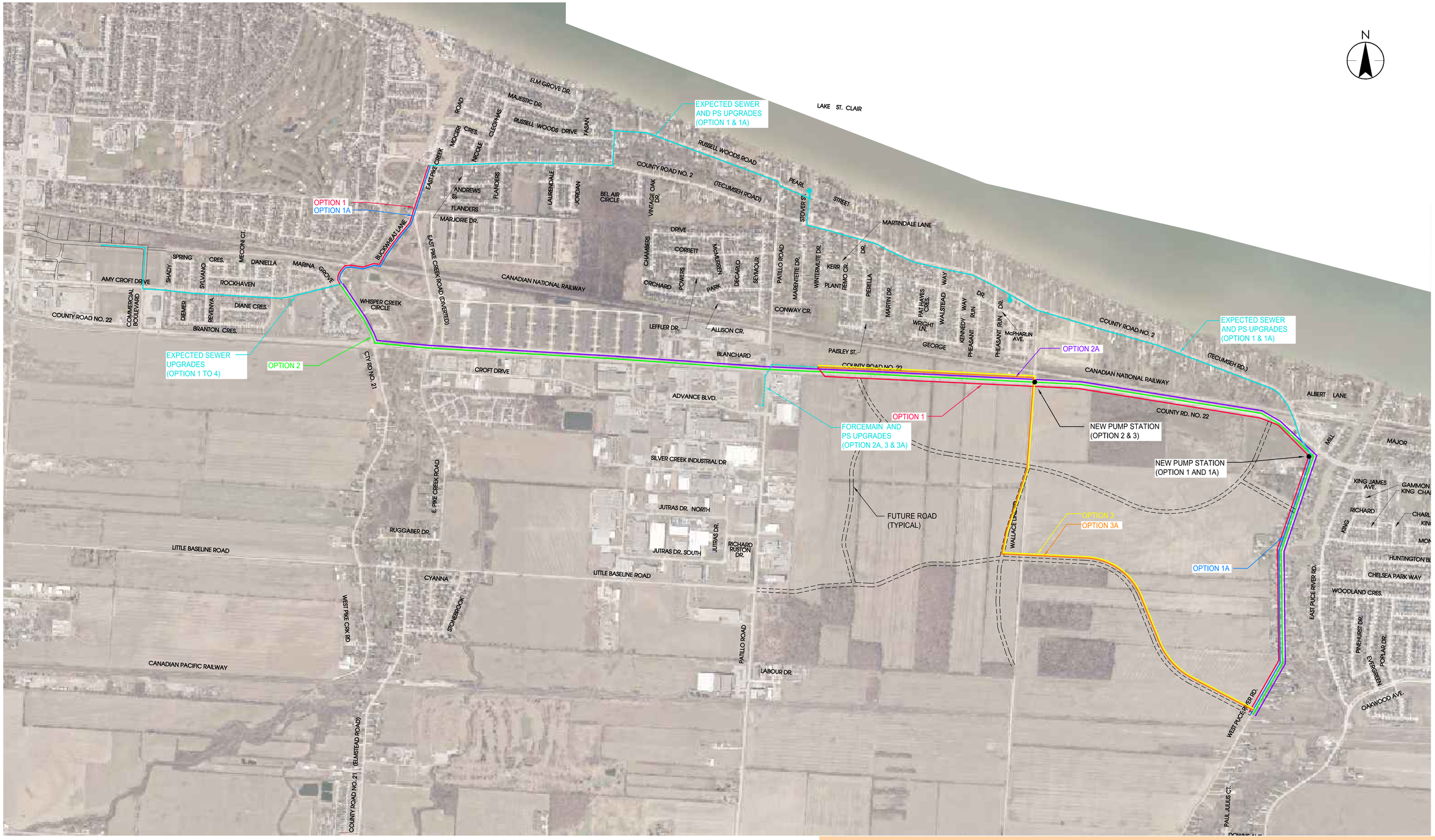
Stantec is not aware of any other regulatory permits and approvals that are necessary with respect to the proposed improvements.

6.0 REFERENCES

- Stantec Consulting Ltd. & CH2M Hill Canada Limited. (2018). *Municipality of Lakeshore Water and Wastewater Master Plan*.

- Stantec Consulting Limited. (2006). *Municipality of Lakeshore d) Master Plan and Water Tower Class Environmental Assessment*

Appendix A FIGURESFIGURES



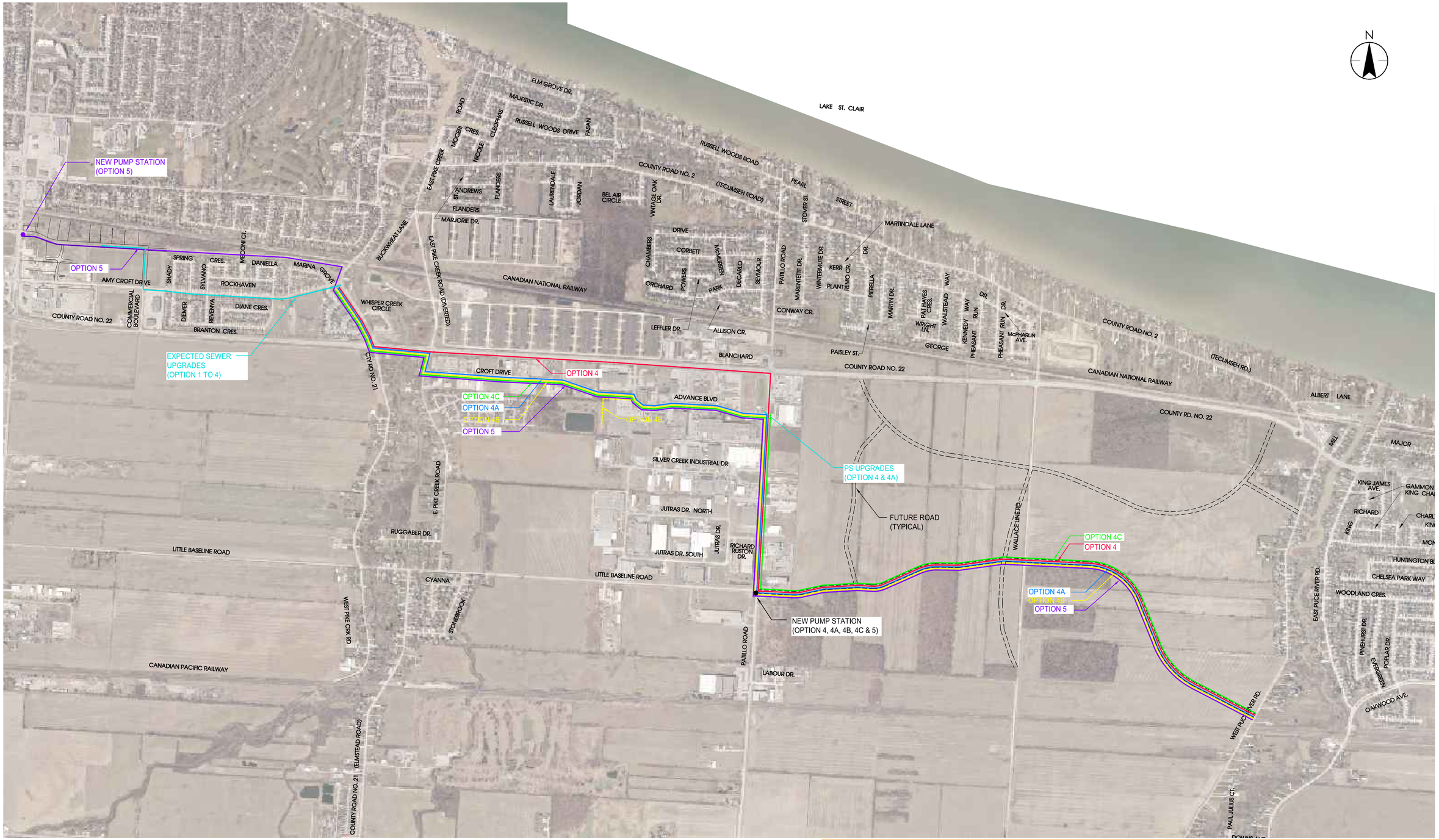
Stantec

TOWN OF LAKESHORE
AMY CROFT WASTEWATER SERVICING

OVERALL SERVICING OPTIONS PLAN – 1 TO 3

PROJECT NO.		DRAWING NO.
165620128	1:10,000 (0 100 300 500m)	FIGURE A

\\cd1223-f01\work_group\01658\active\165620128\design\report\drawings\20128_FIGURE_D-11.dwg
2021-5-06 02:03pm BY: kfox



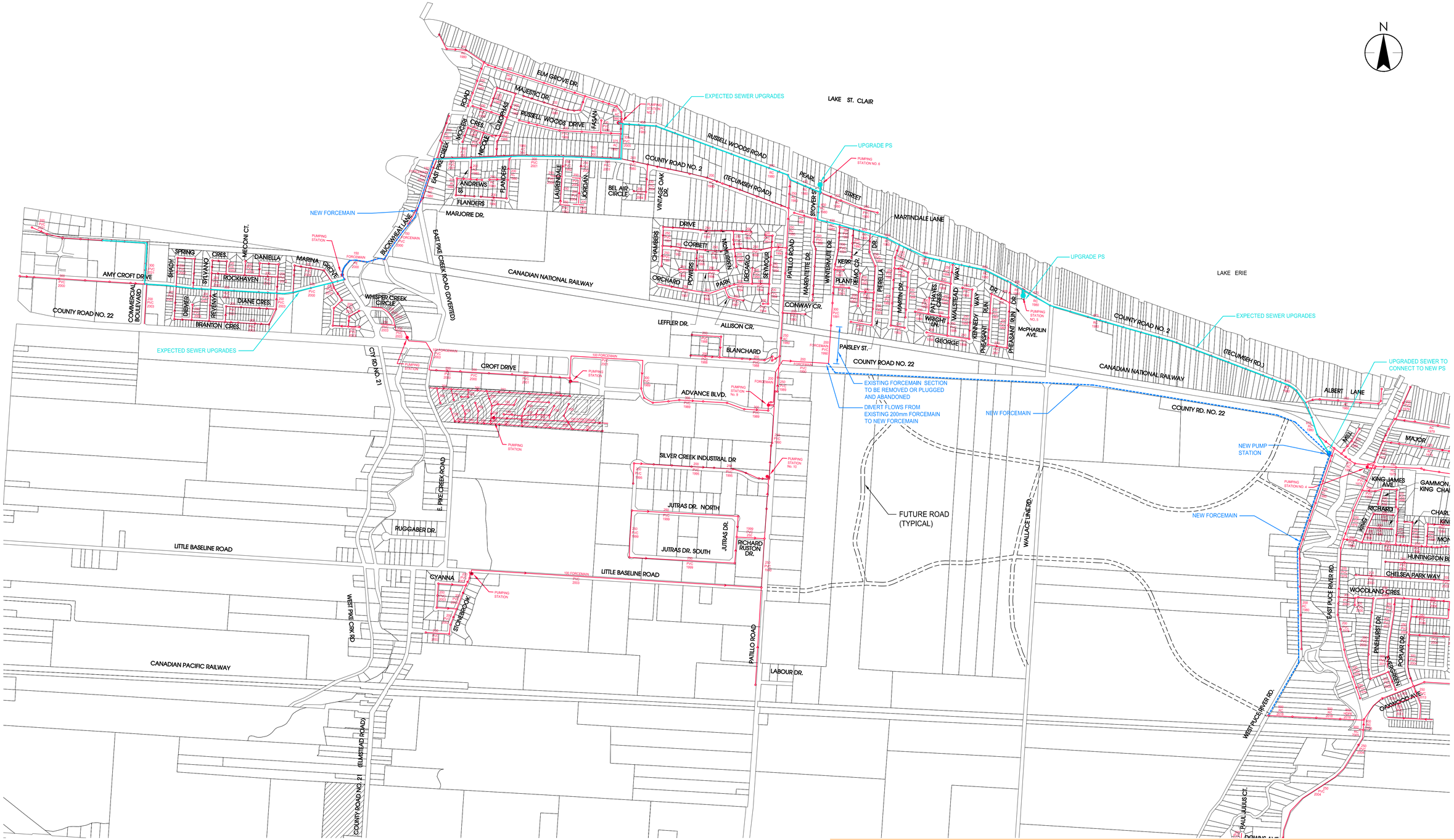
Stantec

TOWN OF LAKESHORE
AMY CROFT WASTEWATER SERVICING

OVERALL SERVICING OPTIONS PLAN – 4 & 5

PROJECT NO.		DRAWING NO.
165620128	1:10,000 (0 100 300 500m)	FIGURE B

\\cd1223-f01\work_group\01656\active\165620128\design\report\drawings\20128_FIGURE_D-11.dwg
2021-5-06 02:02pm BY: kfox



LEGEND

- NEW FORCEMAIN
- EXPECTED SEWER UPGRADES

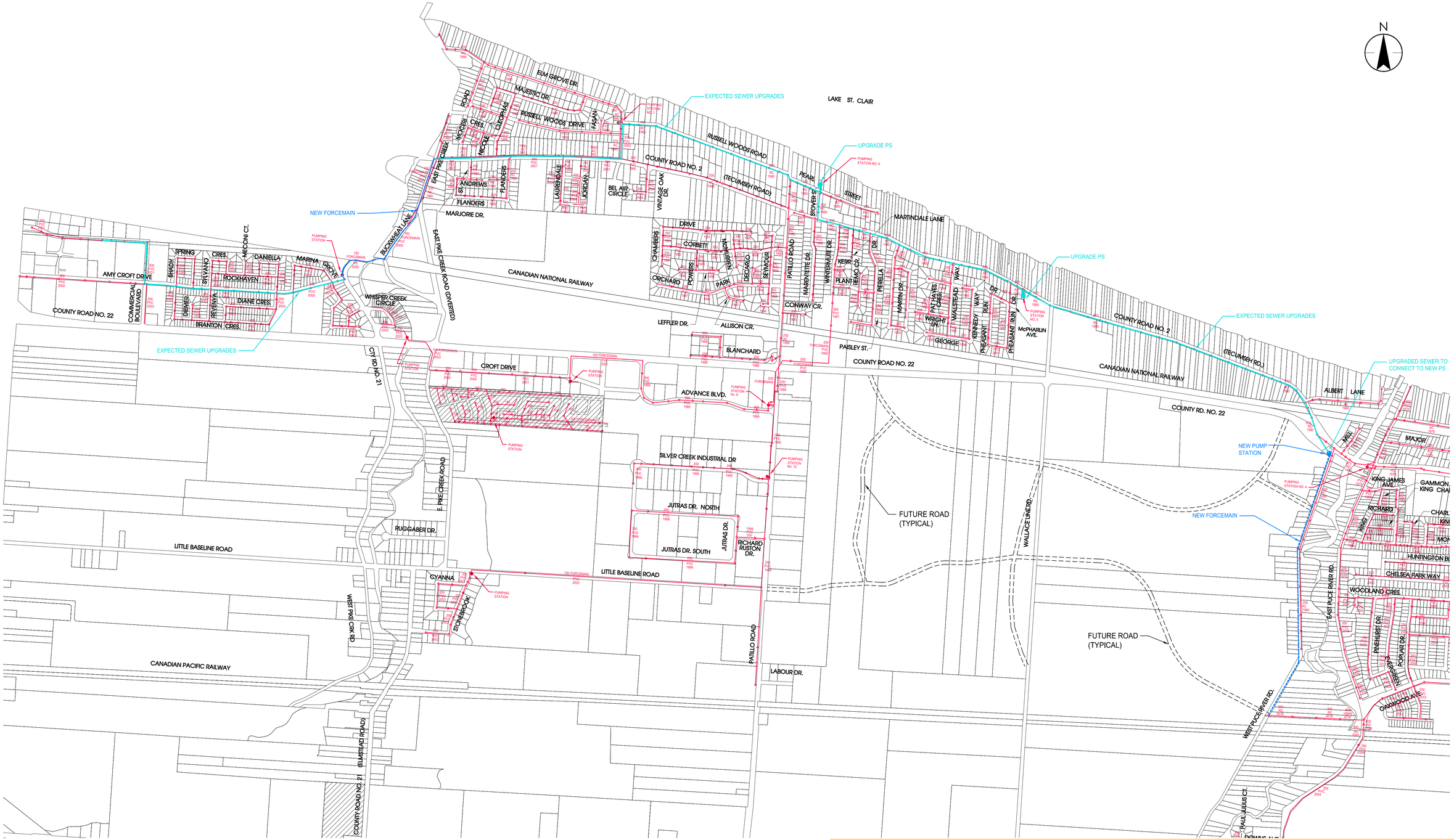
Stantec

TOWN OF LAKESHORE
AMY CROFT WASTEWATER SERVICING

SANITARY SERVICING – OPTION 1

PROJECT NO.		DRAWING NO.
165620128	1:10,000 (0 100 300 500m)	FIGURE 1

\\cst1223-01\work_group\01656\active\165620128\design\report\drawings\20128_FIGURE_0-11.dwg
2021-5-06 02:01pm BY: kfox



LEGEND

- NEW FORCEMAIN
- EXPECTED SEWER UPGRADES

Stantec

TOWN OF LAKESHORE
AMY CROFT WASTEWATER SERVICING

SANITARY SERVICING – OPTION 1A

PROJECT NO.		DRAWING NO.
165620128	1:10,000 0 100 300 500m	FIGURE 2

\\cst1223-01\work_group\01656\active\165620128\design\report\drawings\20128_FIGURE_0-11.dwg
2021-5-06 02:00pm BY: kfox

LEGEND

- NEW FORCEMAIN
- EXPECTED SEWER UPGRADES

Stantec

TOWN OF LAKESHORE
AMY CROFT WASTEWATER SERVICING

SANITARY SERVICING – OPTION 2

PROJECT NO.		DRAWING NO.
165620128	1:10,000 0 100 300 500m	FIGURE 3

\\cst1223-01\work_group\01656\active\165620128\design\report\drawings\20128_FIGURE_0-11.dwg
2021-5-06 02:00pm BY: kfox

Stantec

TOWN OF LAKESHORE
AMY CROFT WASTEWATER SERVICING

SANITARY SERVICING – OPTION 2A

PROJECT NO.		DRAWING NO.
165620128	1:10,000 0 100 300 500m	FIGURE 4

\\cst1223-01\work_group\01656\active\165620128\design\report\drawings\20128_FIGURE_0-11.dwg
2021-5-06 01:59pm BY: kfox

LEGEND

- NEW FORCEMAIN
- EXPECTED SEWER UPGRADES

Stantec

TOWN OF LAKESHORE
AMY CROFT WASTEWATER SERVICING

SANITARY SERVICING – OPTION 3

PROJECT NO.		DRAWING NO.
165620128	1:10,000 0 100 300 500m	FIGURE 5

\\cst1223-01\work_group\01656\active\165620128\design\report\drawings\20128_FIGURE_0-11.dwg
2021-5-06 01:36pm BY: kfox

LEGEND

- NEW FORCEMAIN
- EXPECTED SEWER UPGRADES

Stantec

TOWN OF LAKESHORE
AMY CROFT WASTEWATER SERVICING

SANITARY SERVICING – OPTION 3A

PROJECT NO.		DRAWING NO.
165620128	1:10,000 0 100 300 500m	FIGURE 6

\\cst1223-01\work_group\01656\active\165620128\design\report\drawings\20128_FIGURE_0-11.dwg
2021-5-06 01:36pm BY: kfox

LEGEND

- NEW FORCEMAIN
- EXPECTED SEWER UPGRADES

Stantec

TOWN OF LAKESHORE
AMY CROFT WASTEWATER SERVICING

SANITARY SERVICING – OPTION 4

PROJECT NO.		DRAWING NO.
165620128	1:10,000 (0 100 300 500m)	FIGURE 7

\\cst1223-01\work_group\01656\active\165620128\design\report\drawings\20128_FIGURE_0-11.dwg
2021-5-06 01:57pm BY: kfox

LEGEND

- NEW FORCEMAIN
- EXPECTED SEWER UPGRADES

Stantec

TOWN OF LAKESHORE
AMY CROFT WASTEWATER SERVICING

SANITARY SERVICING – OPTION 4A

PROJECT NO.		DRAWING NO.
165620128	1:10,000 (0 100 300 500m)	FIGURE 8

\\cst1223-01\work_group\01656\active\165620128\design\report\drawings\20128_FIGURE_0-11.dwg
2021-5-06 01:56pm BY: kfox

LEGEND

- NEW FORCEMAIN
- EXPECTED SEWER UPGRADES

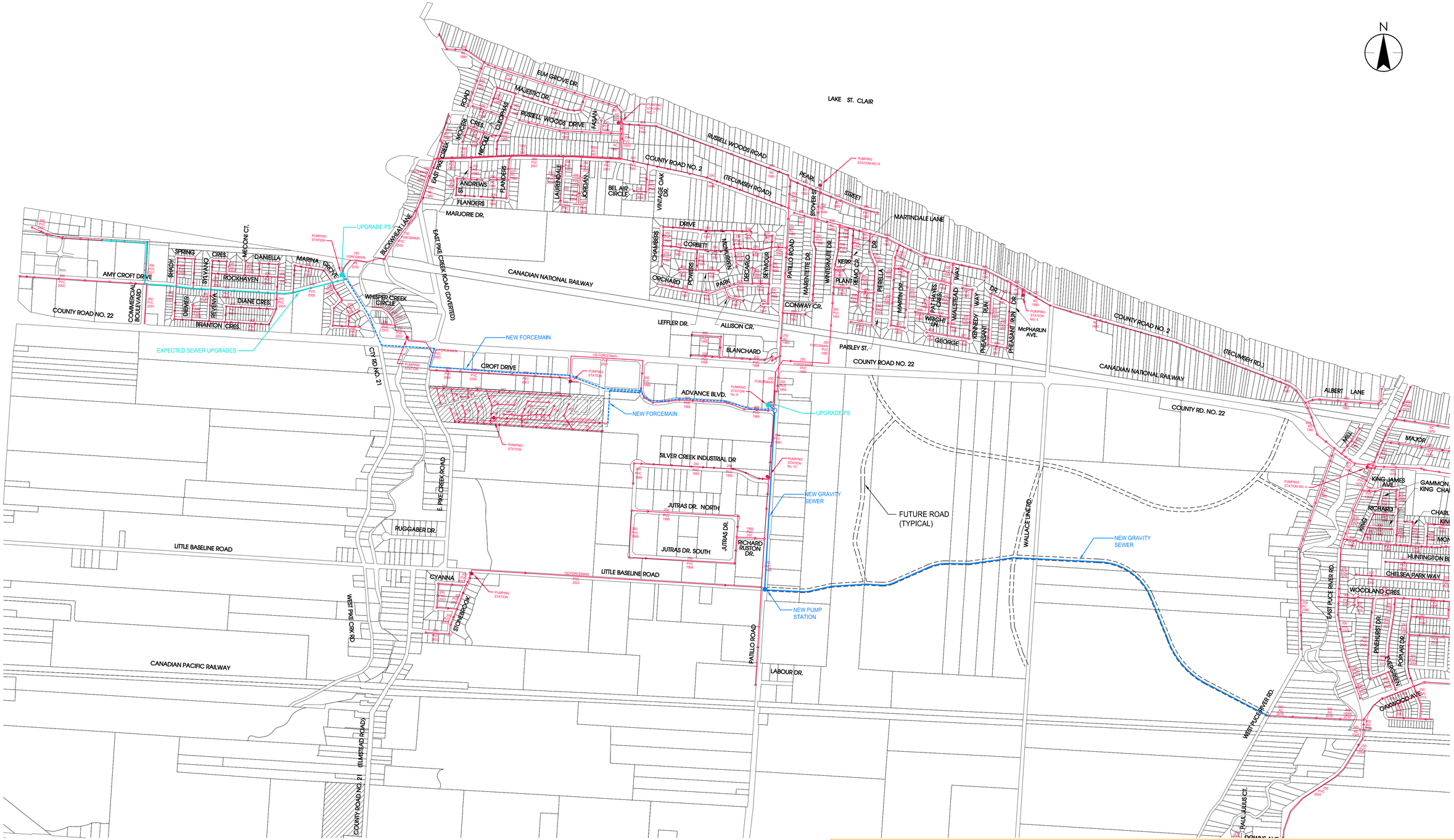
Stantec

TOWN OF LAKESHORE
AMY CROFT WASTEWATER SERVICING

SANITARY SERVICING – OPTION 4B

PROJECT NO.		DRAWING NO.
165620128	1:10,000 (0 100 300 500m)	FIGURE 9

\\cst1223-01\work_group\01656\active\165620128\design\report\drawings\20128_FIGURE_0-11.dwg
2021-5-06 01:35pm BY: kfox



LEGEND

- NEW FORCEMAIN
- EXPECTED SEWER UPGRADES

Stantec

TOWN OF LAKESHORE
AMY CROFT WASTEWATER SERVICING

SANITARY SERVICING – OPTION 4C

PROJECT NO.		DRAWING NO.
165620128	1:10,000 (0 100 300 500m)	FIGURE 10

\\cst1223-01\work_group\01656\active\165620128\design\report\drawings\20128_FIGURE_0-11.dwg
2021-5-06 01:35pm BY: kfox

LEGEND

NEW FORCEMAIN

EXPECTED SEWER UPGRADES

Stantec

TOWN OF LAKESHORE
AMY CROFT WASTEWATER SERVICING

SANITARY SERVICING – OPTION 5

PROJECT NO.		DRAWING NO.
165620128	1:10,000 0 100 300 500m	FIGURE 11

\\cst1223-01\work_group\01656\active\165620128\design\report\drawings\20128_FIGURE_0-11.dwg
2021-5-06 01:54pm BY: kfox

Appendix B SEWER DESIGN SHEETS

Croft Dr											
Use	Classification	Unit Sewage Flow (L/d)	Source	Flow Unit per	Area (m²)	Assumed Unit count	Total Flow (L/d)	Conversion to residential population equivalent (L/cap*d)	Residential Person equivalence		
Aerospace NorthStar 204 E Pike Creek Rd, Tecumseh, ON N8N 2L9	Industrial	75	Metcalf & Eddy	Employee	3082.8	23.0	1724.9	350	4.9	0.007	Average transposed to other industrial sites (ppl/sq.m)
301 Croft Dr, Tecumseh, ON N8N 2L9	Office	50	Metcalf & Eddy	Employee	1321.9	94.2	4711.4	350	13.5		
All State Fastener of Canada 307 Croft Dr	Office	50	Metcalf & Eddy	Employee	1322.0	94.2	4711.8	350	13.5		
310 Croft Dr	Office	50	Metcalf & Eddy	Employee	1302.2	92.8	4641.3	350	13.3		
311 Croft Dr	Industrial	75	Metcalf & Eddy	Employee	625.4	4.7	349.9	350	1.0		
317 Croft Dr	Office	50	Metcalf & Eddy	Employee	1017.2	72.5	3625.6	350	10.4		
320 Croft Dr	Office	50	Metcalf & Eddy	Employee	1189.6	84.8	4240.0	350	12.1		
340 Croft Dr	Shopping Centre	3.5	MOE	Area (m²)	916.4	916.4	3207.5	350	9.2		
344 Croft Dr	Shopping Centre	3.5	MOE	Area (m²)	817.8	817.8	2862.3	350	8.2		
354 Croft Dr	Recreational	7.5	MOE	Area (m²)	2079.5	2079.5	15600.0	350	44.6		
360 Croft Dr	Automobile Service Station	50	Metcalf & Eddy	Employee	688.0	6.0	300.0	350	0.9		
357 Croft Dr	Industrial	75	Metcalf & Eddy	Employee	712.2	5.3	398.5	350	1.1		
361 Croft Dr	Industrial	75	Metcalf & Eddy	Employee	683.3	5.1	382.3	350	1.1		
375 Croft Dr	Office	50	Metcalf & Eddy	Employee	1033.8	73.7	3684.6	350	10.5		

354 Croft Dr	Assumed 10 hr day:		
	4 sinks	375	L/fixture/day
	4 water closets	150	L/fixture/hr
	Sewage Flows =	15600	L/d
	Area =	2079.5	m²

Advance Blvd											
Use	Classification	Unit Sewage Flow (L/d)	Source	Flow Unit per	Area (m²)	Assumed Unit count	Total Flow (L/d)	Conversion to residential population equivalent (L/cap*d)	Residential Person equivalence		
417 Advance Blvd	Industrial	75	Metcalf & Eddy	Employee	8358.9	62.4	4677.1	350	13.4		
416 Advance Blvd	Industrial	75	Metcalf & Eddy	Employee	3024.0	22.6	1692.1	350	4.8		
430 Advance Blvd	Daycare	75	OBC	Staff/Student	1223.3	82.0	6150.0	350	17.6	0.067	Average transposed to other industrial sites (ppl/sq.m)
440 Advance Blvd	Office	50	Metcalf & Eddy	Employee	1103.5	78.7	3933.2	350	11.2		
444 Advance Blvd	Daycare	75	OBC	Staff/Student	1008.0	67.6	5068.0	350	14.5		
447 Advance Blvd	Industrial	75	Metcalf & Eddy	Employee	24527.9	183.0	13724.2	350	39.2		
201 Advance Blvd	Industrial	75	Metcalf & Eddy	Employee	26649.3	198.8	14911.2	350	42.6		
446 Advance Blvd	Gym	4.6		Area (m²)	3374.7	3374.7	15600.0	350	44.6		
462 Advance Blvd	Church	36	OBC	Area (m²)	1888.9	100.0	3600.0	350	10.3		
468 Advanxe Blvd	Shopping Centre	3.5	MOE	Area (m²)	5482.5	5482.5	19188.9	350	54.8		

446 Advance Blvd	Assumed 10 hr day:		
	8 sinks	375	L/fixture/day
	8 water closets	150	L/fixture/hr
	Sewage Flows =	15600	L/d
	Area =	3374.73	m²

Flows Mobile Home Park

Assumed	**2.5**	**ppl/unit**	**Units**	224
Area	112171.24	sq.m²		
Area	11.2	ha		
People	560		**Density**	49.9 ppl/ha

Ex. S-MH-01318 - PS9									
Use	**Classification**	**Unit Sewage Flow (L/d)**	**Source**	**Flow Unit per**	**Area (m²)**	**Assumed Unit count**	**Total Flow (L/d)**	**Conversion to residential population equivalent (L/cap*d)**	**Residential Person equivalence**
409 Patillo Rd	Industrial	75	Metcalf & Eddy	Employee	18410.1	137.3	10301.1	350	29.4
500 Harvard Dr	Industrial	75	Metcalf & Eddy	Employee	1018.4	7.6	569.8	350	1.6
501 Harvard Dr	Industrial	75	Metcalf & Eddy	Employee	2420.3	18.1	1354.2	350	3.9
502 Harvard Dr	Industrial	75	Metcalf & Eddy	Employee	430.4	3.2	240.8	350	0.7
505 Harvard Dr	Industrial	75	Metcalf & Eddy	Employee	1167.9	8.7	653.5	350	1.9
504 Harvard Dr	Industrial	75	Metcalf & Eddy	Employee	973.2	7.3	544.6	350	1.6
383 Patillo Rd	Industrial	75	Metcalf & Eddy	Employee	13537.4	101.0	7574.6	350	21.6
326 Patillo Rd	Office	50	Metcalf & Eddy	Employee	2706.8	193.0	9647.7	350	27.6
302 Patillo Rd	Office	50	Metcalf & Eddy	Employee	2389.6	170.3	8516.8	350	24.3
288 Patillo Rd	Office	50	Metcalf & Eddy	Employee	2350.4	167.5	8377.3	350	23.9
278 Patillo Rd	Office	50	Metcalf & Eddy	Employee	791.4	56.4	2820.7	350	8.1
268 Patillo Rd	Office	50	Metcalf & Eddy	Employee	876.2	62.5	3122.8	350	8.9
250 Patillo Rd	Office	50	Metcalf & Eddy	Employee	230.2	16.4	820.6	350	2.3
305 Patillo Rd	Industrial	75	Metcalf & Eddy	Employee	8380.0	62.5	4688.9	350	13.4
360 Richard Ruston	Industrial	75	Metcalf & Eddy	Employee	7631.1	56.9	4269.9	350	12.2
472 Justras Rd N	Industrial	75	Metcalf & Eddy	Employee	1892.6	14.1	1059.0	350	3.0
464 Justras Rd N	Industrial	75	Metcalf & Eddy	Employee	1057.7	7.9	591.8	350	1.7
434 Justras Rd N	Industrial	75	Metcalf & Eddy	Employee	2404.7	17.9	1345.5	350	3.8
424 Justras Rd N	Industrial	75	Metcalf & Eddy	Employee	1530.9	11.4	856.6	350	2.4
428 Justras Rd N	Industrial	75	Metcalf & Eddy	Employee	16786.0	125.2	9392.3	350	26.8
360 Silvercreek Industrial Dr	Industrial	75	Metcalf & Eddy	Employee	20336.6	151.7	11379.0	350	32.5
446 Justras Rd N	Industrial	75	Metcalf & Eddy	Employee	11282.3	84.2	6312.8	350	18.0
477 Justras Rd N	Industrial	75	Metcalf & Eddy	Employee	17453.8	130.2	9766.0	350	27.9
417 Justras Rd S	Industrial	75	Metcalf & Eddy	Employee	5918.9	44.2	3311.8	350	9.5
439 Justras Rd S	Industrial	75	Metcalf & Eddy	Employee	3172.2	23.7	1775.0	350	5.1
402 Justras Rd S	Industrial	75	Metcalf & Eddy	Employee	3941.2	29.4	2205.3	350	6.3
465 Justras Rd S	Industrial	75	Metcalf & Eddy	Employee	7691.2	57.4	4303.5	350	12.3
418 Silvercreek Industrial Dr	Industrial	75	Metcalf & Eddy	Employee	9354.3	69.8	5234.0	350	15.0
440 Silvercreek Industrial Dr	Industrial	75	Metcalf & Eddy	Employee	2185.9	16.3	1223.1	350	3.5
452 Silvercreek Industrial Dr	Industrial	75	Metcalf & Eddy	Employee	4700.7	35.1	2630.2	350	7.5
456 Silvercreek Industrial Dr	Industrial	75	Metcalf & Eddy	Employee	6219.6	46.4	3480.1	350	9.9
466 Silvercreek Industrial Dr	Industrial	75	Metcalf & Eddy	Employee	10295.2	76.8	5760.5	350	16.5
255 Silvercreek Industrial Dr	Industrial	75	Metcalf & Eddy	Employee	17117.7	127.7	9577.9	350	27.4
435 Silvercreek Industrial Dr	Industrial	75	Metcalf & Eddy	Employee	1299.2	9.7	727.0	350	2.1
439 Silvercreek Industrial Dr	Industrial	75	Metcalf & Eddy	Employee	1699.4	12.7	950.9	350	2.7
447 Silvercreek Industrial Dr	Industrial	75	Metcalf & Eddy	Employee	283.2	2.1	158.4	350	0.5
455 Silvercreek Industrial Dr	Industrial	75	Metcalf & Eddy	Employee	4652.3	34.7	2603.1	350	7.4
469 Silvercreek Industrial Dr	Industrial	75	Metcalf & Eddy	Employee	5804.9	43.3	3248.1	350	9.3
481 Silvercreek Industrial Dr	Industrial	75	Metcalf & Eddy	Employee	8074.8	60.2	4518.1	350	12.9
447 Advance - Phase 4	Industrial	75	Metcalf & Eddy	Employee	4190.0	31.3	2344.4	350	6.7
485 Silvercreek Industrial Dr	Industrial	75	Metcalf & Eddy	Employee	13700.4	102.2	7665.8	350	21.9

Patillo - Blanchard											
Use	**Classification**	**Unit Sewage Flow (L/d)**	**Source**	**Flow Unit per**	**Area (m²)**	**Assumed Unit count**	**Total Flow (L/d)**	**Conversion to residential population equivalent (L/cap*d)**	**Residential Person equivalence**		
Leisure Trailer Sales 204 Patillo Rd, Tecumseh, ON N8N 2L9	Industrial	75	Metcalf & Eddy	Employee	2332.7	17.4	1305.2	350	3.7		
Relax Pools and Spas 216 Patillo Rd, Tecumseh, ON N8N 2L9	Shopping Centre	3.5	MOE	Area (m²)	1537.0	1537.0	5379.5	350	15.4		
GW Anglin 220 Patillo Rd, Tecumseh, ON N8N 2L9	Industrial	75	Metcalf & Eddy	Employee	4257.6	31.8	2382.3	350	6.8		
Flex n' Gate 538 Blanchard Park, Tecumseh, ON N8N 2L9	Industrial	75	Metcalf & Eddy	Employee	16084.8	120.0	9000.0	350	25.7	0.007	Average transposed to other industrial sites (ppl/sq.m)
Guardian Storage 538 Blanchard Park, Tecumseh, ON N8N 2L9	Office	50	Metcalf & Eddy	Employee	140.9	10.0	502.2	350	1.4		
Special Events & Tents Inc 492 Blanchard Park Unit # 1, Tecumseh, ON N8N 2L9	Office	50	Metcalf & Eddy	Employee	1291.7	92.1	4604.0	350	13.2		
ITALUIL 498 Blanchard Park, Tecumseh, ON N8N 2L9	Office	50	Metcalf & Eddy	Employee	655.2	46.7	2335.2	350	6.7		
Industrial Fastener 179 BLANCHARD DR	Industrial	75	Metcalf & Eddy	Employee	581.5	4.3	325.3	350	0.9		
Garage 183 BLANCHARD DR	Office	50	Metcalf & Eddy	Employee	581.5	41.4	2072.4	350	5.9		
Lakeshore Carwash 187 Blanchard Dr, Windsor, ON N8N 2L9	Car Wash	189	Nova Scotia Sewage Guidelines	Car	297.0	20.0	3780.0	350	10.8		
Lakeshore Stamping 528 Blanchard Park, Tecumseh, ON N8N 2L9	Industrial	75	Metcalf & Eddy	Employee	6386.0	47.6	3573.2	350	10.2	0.007	Average transposed to other industrial sites (ppl/sq.m)
CSN Emeryville Collision Auto 516 Blanchard Park, Tecumseh, ON N8N 2L9	Automobile Service Station	50	Metcalf & Eddy	Employee	1749.5	20.0	1000.0	350	2.9		

Old Tecumseh Road									
Use	**Classification**	**Unit Sewage Flow (L/d)**	**Source**	**Flow Unit per**	**Area (m²)**	**Assumed Unit count**	**Total Flow (L/d)**	**Conversion to residential population equivalent (L/cap*d)**	**Residential Person equivalence**
PureCycle Spin and Yoga Studio 540 Old Tecumseh Rd, Belle River, ON N0R 1A0	Recreational Centre	3.1	Metcalf & Eddy	Area (m²)	1245.5	1245.5	3900.0	350	11.1
NAPA Auto Parts - NAPA Lakeshore Auto Parts & Tofflemire Auto Centre 962 Old Tecumseh Rd, Belle River, ON N0R 1A0	Shopping Centre	3.5	MOE	Area (m²)	2520.5	2520.5	8821.6	350	25.2

PureCycle Spin and Yoga Studio
540 Old Tecumseh Rd, Belle River, ON N0R 1A0

Assumed 10 hr day:
1 sinks
1 water closets

ɔ/day150 L/fixture/hr

Sewage Flows = 3900 L/d
Area = 1245.51 m²

SANITARY SEWER DESIGN SHEET - OPTION (1-4) SEWER UPGRADES TRUNK SEWER

DESIGN CRITERIA

RESIDENTIAL SINGLE FAMILY	3	People/Unit	AVERAGE DAILY PER CAPITA FLOW	350 L/cap/day			
RESIDENTIAL CONDO / TOWN HOUSE	2	People/Ha.	PEAK EXTRANEOUS FLOW	0.21 L/ha/s			
COMMERCIAL	1	People/180 m² building	HARMON'S PEAK FACTOR	1+14/(4+(P/1000)^0.5)		Project :	Lanoue Street Extension from Manning Road to Amy Croft Drive
INSTITUTIONAL	37	People/Ha.	VELOCITY RANGE	0.61 m/s to	0.71 m/s	Client :	Town of Lakeshore
			MINIMUM PIPE SIZE	300 mm			Project No. : 165620128

Upgraded Sewers

LOCATION									PEAK	MAXIMUM FLOW			SEWER DESIGN				
STREET OR EASEMENT	FROM MH	TO MH	SEWER LENGTH (m)	DESIGN AREA SERVED (HECTARES) INCREMENT	TOTAL	DESIGN POPULATION (PERSONS) UNITS	INCREMENT	TOTAL	FACTOR	INFILTRATION (L/s)	SEWAGE (L/s)	TOTAL SEWAGE AND INFILTRATION (L/s)	SEWER SLOPE (%)	DIAMETER (mm)	MANNING'S "n"	CAPACITY FULL (L/s)	VELOCITY FULL (m/s)
Lanoue Street	MH S-9	MH S-8	82.1	3.18	3.18		954	954	3.81	0.67	14.74	**15.40**	0.20%	300	0.013	**43.3**	0.61
Lanoue Street	MH S-8	MH S-7	95.5	1.10	4.28		330	1284	3.73	0.90	19.39	**20.29**	0.20%	300	0.013	**43.3**	0.61
Lanoue Street	MH S-7	MH S-6	97.0	**3.35**	7.63		663	1947	3.59	1.60	28.36	**29.96**	0.20%	300	0.013	**43.3**	0.61
Lanoue Street	MH S-6	MH S-5	118.4	2.10	9.73		629	2576	3.50	2.04	36.51	**38.55**	0.20%	300	0.013	**43.3**	0.61
Lanoue Street	MH S-5	MH S-4	122.1	2.05	11.78		616	3193	3.42	2.47	44.22	**46.70**	0.20%	375	0.013	**78.4**	0.71
Lanoue Street	MH S-4	MH S-3	121.7	0.73	12.51		219	3412	3.39	2.63	46.91	**49.54**	0.20%	375	0.013	**78.4**	0.71
Lanoue Street	MH S-3	MH S-2	111.7	3.84	16.35		1152	4564	3.28	3.43	60.66	**64.10**	0.20%	375	0.013	**78.4**	0.71
Lanoue Street	MH S-2	MH S-1	111.7	0.00	**16.35**		0	**4564**	3.28	3.43	60.66	**64.10**	0.20%	375	0.013	**78.4**	0.71
Amycroft Drive	Ex MH: S-MH-00739	Ex MH: S-MH-01886	71.7	2.24	2.24		9	9	4.42	0.47	0.16	**0.63**	0.22%	300	0.013	**45.4**	0.64
Amycroft Drive	Ex MH: S-MH-01886	Ex MH: S-MH-00740	42.6	0.00	2.24		0	9	4.42	0.47	0.16	**0.63**	0.22%	300	0.013	**45.4**	0.64
Amycroft Drive	Ex MH: S-MH-00740	Ex MH: S-MH-01885	78.9	2.63	4.87		38	47	4.32	1.02	0.82	**1.85**	0.22%	300	0.013	**45.4**	0.64
Amycroft Drive	Ex MH: S-MH-01885	Ex MH: S-MH-00741	36.5	**3.65**	8.52		389	436	4.00	1.79	7.07	**8.86**	0.22%	300	0.013	**45.4**	0.64
Amycroft Drive	Ex MH: S-MH-00741	Ex MH: S-MH-00742	114.2	2.31	10.83		29	465	3.99	2.27	7.52	**9.79**	0.22%	300	0.013	**45.4**	0.64
Amycroft Drive	Ex MH: S-MH-00742	Ex MH: S-MH-00743	114.9	4.10	14.93		346	811	3.86	3.14	12.67	**15.81**	0.22%	300	0.013	**45.4**	0.64
Amycroft Drive	Ex MH: S-MH-00743	Ex MH: S-MH-00744	114.5	2.88	17.81		864	1675	3.64	3.74	24.73	**28.47**	0.22%	300	0.013	**45.4**	0.64
Amycroft Drive	Ex MH: S-MH-00744	Ex MH: S-MH-01887	96.3	3.55	21.36		697	2372	3.53	4.49	33.89	**38.38**	0.22%	300	0.013	**45.4**	0.64
Amycroft Drive	Ex MH: S-MH-01887	MH S-1	8.8	0.00	21.36		0	2372	3.53	4.49	33.89	**38.38**	0.22%	300	0.013	**45.4**	0.64
Amycroft Drive	MH S-1	Ex MH: S-MH-00745	9.7	**16.35**	37.71		**4564**	6936	3.11	7.92	87.39	**95.31**	0.31%	375	0.013	**97.6**	0.88
Amycroft Drive	Ex MH: S-MH-00745	Ex MH: S-MH-00746	110.8	4.90	42.61		149	7085	3.10	8.95	89.01	**97.96**	0.22%	450	0.013	**133.7**	0.84
Amycroft Drive	Ex MH: S-MH-00746	Ex MH: S-MH-00747	51.4	0.37	42.98	4.0	12	7097	3.10	9.03	89.15	**98.17**	0.22%	450	0.013	**133.7**	0.84
Amycroft Drive	Ex MH: S-MH-00747	Ex MH: S-MH-00748	92.2	3.31	46.28	42.0	126	7223	3.09	9.72	90.51	**100.23**	0.22%	450	0.013	**133.7**	0.84
Amycroft Drive	Ex MH: S-MH-00748	Ex MH: S-MH-00749	97.3	2.63	48.91	31.0	93	7316	3.09	10.27	91.52	**101.79**	0.22%	450	0.013	**133.7**	0.84
Amycroft Drive	Ex MH: S-MH-00749	Ex MH: S-MH-00750	120.3	5.38	54.29	64.0	192	7508	3.08	11.40	93.59	**104.99**	0.22%	450	0.013	**133.7**	0.84
Amycroft Drive	Ex MH: S-MH-00750	Ex MH: S-MH-00751	119.2	1.17	55.46	17.0	51	7559	3.07	11.65	94.13	**105.78**	0.22%	450	0.013	**133.7**	0.84
Amycroft Drive	Ex MH: S-MH-00751	Ex MH: S-MH-00752	119.8	0.95	56.41	13.0	39	7598	3.07	11.85	94.55	**106.40**	0.22%	450	0.013	**133.7**	0.84
Amycroft Drive	Ex MH: S-MH-00752	Ex MH: S-MH-00800	88.6	12.11	68.52	149.0	447	8045	3.05	14.39	99.33	**113.72**	0.27%	450	0.013	**148.2**	0.93
Amycroft Drive	Ex MH: S-MH-00800	Ex MH: S-MH-00801	114.8	1.87	70.39	19.0	57	8102	3.04	14.78	99.93	**114.71**	0.29%	450	0.013	**153.6**	0.97
Amycroft Drive	Ex MH: S-MH-00801	Ex MH: S-MH-00802	105.5	4.44	74.83	3.0	21	8123	3.04	15.71	100.16	**115.87**	0.31%	450	0.013	**158.8**	1.00
Amycroft Drive	Ex MH: S-MH-00802	Ex MH: S-MH-00803	66.1	8.66	83.49	74.0	222	8345	3.03	17.53	102.50	**120.04**	0.39%	450	0.013	**178.1**	1.12
Amycroft Drive	Ex MH: S-MH-00803	**Sanitary PS**	22.0	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.39%	450	0.013	**178.1**	1.12

Notes:

Shopping Centres	2.5 L/s.m./day	**Equivalent population calculated and included in calculations.**
Church - Kitchen and Facilities Provided	36 L/d	**Value from the OBC per seat, assumed 150 seats. Equivalent population calculated and included in calculations.**

High Residential Dev				
Townhomes	2.5	ppl/unit	300	ppl/ha
Condos	3	ppl/unit		

From ALEO - FSR : 450 people in 1.5 ha is used to find the allocated populations of future development which in this scenario are designated as High Density Residential

SANITARY SEWER DESIGN SHEET - OPTION 1 SEWER UPGRADES TRUNK SEWER (PS7 - New PS)

DESIGN CRITERIA
RESIDENTIAL SINGLE FAMILY 3 People/Unit
EXISTING COMMERCIAL/ INDUSTRIAL Total Flow based on Unit Sewage Flow Converted to Residential Person Equivalence

AVERAGE DAILY PER CAPITA FLOW 350 L/cap/day
PEAK EXTRANEOUS FLOW 0.21 L/ha/s
HARMON'S PEAK FACTOR 1+14/(4+(P/1000)^0.5)
VELOCITY RANGE 0.56 m/s to 4.40 m/s
MINIMUM PIPE SIZE 300 mm

Upgraded Sewers

Project : Langue Street Extension from Manning Road to Amy Croft Drive
Client : Town of Lakeshore
Project No. : 165620128

LOCATION									PEAK	MAXIMUM FLOW			SEWER DESIGN				
STREET OR EASEMENT	FROM MH	TO MH	SEWER LENGTH (m)	DESIGN AREA SERVED (HECTARES) INCREMENT	DESIGN AREA SERVED (HECTARES) TOTAL	DESIGN POPULATION (PERSONS) UNITS	DESIGN POPULATION (PERSONS) INCREMENT	DESIGN POPULATION (PERSONS) TOTAL	FACTOR	INFILTRATION (L/s)	SEWAGE (L/s)	TOTAL SEWAGE AND INFILTRATION (L/s)	SEWER SLOPE (%)	DIAMETER (mm)	MANNING'S "n"	CAPACITY FULL (L/s)	VELOCITY FULL (m/s)
Old Tecumseh Rd	Ex MH: S-MH-01530	Ex MH: S-MH-01862	13.6	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01862	Ex MH: S-MH-01524	119.3	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01524	Ex MH: S-MH-01863	61.2	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01863	Ex MH: S-MH-01525	84.2	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01525	Ex MH: S-MH-01526	124.3	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01526	Ex MH: S-MH-01527	120.6	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01527	Ex MH: S-MH-01528	122.2	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01528	Ex MH: S-MH-01529	121.4	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01529	Ex MH: S-MH-01532	122.4	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01532	Ex MH: S-MH-01864	90.5	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01864	Ex MH: S-MH-01531	31.4	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Elmgrove Dr	Ex MH: S-MH-01531	Ex MH: S-MH-01533	101.0	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Elmgrove Dr	Ex MH: S-MH-01533	Ex MH: S-MH-01435	98.0	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Russell Woods Dr	**PS 7 - Outlet**	Ex MH: S-MH-01435	28.8	99.03	99.03	563	1690	1690	3.64	20.80	24.93	**45.73**	0.13%	450	0.013	**102.8**	0.65
Russell Woods Dr	Ex MH: S-MH-01435	Ex MH: S-MH-01804	93.4	0.73	183.25	3.0	9	10044	2.95	38.48	120.14	**158.63**	0.07%	600	0.013	**162.5**	0.57
Russell Woods Dr	Ex MH: S-MH-01804	Ex MH: S-MH-01200	82.3	2.34	185.59	6.0	18	10062	2.95	38.97	120.33	**159.30**	0.14%	600	0.013	**229.8**	0.81
Russell Woods Dr	Ex MH: S-MH-01200	Ex MH: S-MH-01803	116.8	2.50	188.09	7.0	21	10083	2.95	39.50	120.54	**160.04**	0.11%	600	0.013	**203.7**	0.72
Russell Woods Dr	Ex MH: S-MH-01803	Ex MH: S-MH-01805	122.0	2.79	190.88	7.0	21	10104	2.95	40.08	120.76	**160.84**	0.11%	600	0.013	**203.7**	0.72
Russell Woods Dr	Ex MH: S-MH-01805	Ex MH: S-MH-01448	119.6	2.39	193.27	6.0	18	10122	2.95	40.59	120.94	**161.53**	0.15%	600	0.013	**237.8**	0.84
Russell Woods Dr	Ex MH: S-MH-01448	Ex MH: S-MH-01447	121.7	2.62	195.89	7.0	21	10143	2.95	41.14	121.15	**162.29**	0.13%	600	0.013	**221.4**	0.78
Russell Woods Dr	Ex MH: S-MH-01447	Ex MH: S-MH-01446	120.0	3.33	199.22	7.0	21	10164	2.95	41.84	121.37	**163.20**	0.12%	600	0.013	**212.7**	0.75
Russell Woods Dr	Ex MH: S-MH-01446	Ex MH: S-MH-01445	111.3	2.07	201.29	5.0	15	10179	2.95	42.27	121.52	**163.79**	0.11%	600	0.013	**203.7**	0.72
Russell Woods Dr	Ex MH: S-MH-01445	Ex MH: S-MH-01093	56.8	1.36	202.65	4.0	12	10191	2.95	42.56	121.64	**164.20**	0.16%	600	0.013	**245.6**	0.87
Russell Woods Dr	Ex MH: S-MH-01093	Ex MH: S-MH-01094	29.6	0.00	202.65	0.0	0	10191	2.95	42.56	121.64	**164.20**	0.26%	600	0.013	**313.1**	1.11
Patillo Rd	Ex MH: S-MH-01439	Ex MH: S-MH-01094	80.4	65.83	65.83	386	1157	1157	3.76	13.82	17.61	**31.44**	0.30%	250	0.013	**32.6**	0.66
Pearl St	Ex MH: S-MH-01094	Ex MH: S-MH-01440	100.1	2.20	270.68	6.0	18	11366	2.90	56.84	133.49	**190.33**	0.18%	600	0.013	**260.5**	0.92
Pearl St	Ex MH: S-MH-01440	Ex MH: S-MH-01442	75.8	1.14	271.82	4.0	12	11378	2.90	57.08	133.61	**190.69**	0.22%	600	0.013	**288.0**	1.02
Pearl St	Ex MH: S-MH-01739	Ex MH: S-MH-01740	84.7	1.89	1.89	8.0	24	24	4.37	0.40	0.42	**0.82**	0.48%	200	0.013	**22.7**	0.72
Pearl St	Ex MH: S-MH-01740	Ex MH: S-MH-01444	48.1	0.64	2.53	2.0	6	30	4.35	0.53	0.53	**1.06**	0.87%	200	0.013	**30.6**	0.97
Pearl St	Ex MH: S-MH-01444	Ex MH: S-MH-01443	93.7	2.01	4.54	9.0	27	57	4.30	0.95	0.99	**1.95**	0.41%	200	0.013	**21.0**	0.67
Pearl St	Ex MH: S-MH-01443	Ex MH: S-MH-01442	109.3	1.90	6.44	5.0	15	72	4.28	1.35	1.25	**2.60**	0.35%	200	0.013	**19.4**	0.62
Easement	Ex MH: S-MH-01442	**PS - 6 Inlet**	29.30	**0.00**	278.26	0.00	0	11450	2.90	58.43	134.33	**192.76**	0.17%	600	0.013	**251.0**	0.89
Stover Street	**PS 6 - Outlet**	Ex MH: S-MH-01441	34.30	**0.00**	278.26	0	0	11450	2.90	58.43	134.33	**192.76**	0.29%	525	0.013	**231.6**	1.07
Stover Street	Ex MH: S-MH-01441	Ex MH: S-MH-01806	74.90	**0.34**	278.60	1	3	11453	2.90	58.51	134.36	**192.86**	0.19%	600	0.013	**267.7**	0.95
Stover Street	Ex MH: S-MH-01806	Ex MH: S-MH-01097	74.50	**0.32**	278.92	1	3	11456	2.90	58.57	134.39	**192.96**	0.19%	600	0.013	**267.7**	0.95
Old Tecumseh Rd	Ex MH: S-MH-01097	Ex MH: S-MH-01098	108.00	**8.00**	286.92	53	159	11615	2.89	60.25	135.97	**196.23**	0.26%	600	0.013	**313.1**	1.11
Old Tecumseh Rd	Ex MH: S-MH-01098	Ex MH: S-MH-01099	102.80	**0.44**	287.36	0	0	11615	2.89	60.35	135.97	**196.32**	0.22%	600	0.013	**288.0**	1.02
Old Tecumseh Rd	Ex MH: S-MH-01099	Ex MH: S-MH-00977	85.60	**15.89**	303.25	102	306	11921	2.88	63.68	139.01	**202.69**	0.10%	675	0.013	**265.9**	0.74
Old Tecumseh Rd	Ex MH: S-MH-00977	Ex MH: S-MH-01100	94.20	**1.61**	304.86	6	18	11939	2.88	64.02	139.19	**203.21**	0.08%	675	0.013	**237.8**	0.66
Old Tecumseh Rd	Ex MH: S-MH-01100	Ex MH: S-MH-01101	77.30	**10.73**	315.59	72	216	12155	2.87	66.27	141.32	**207.60**	0.08%	675	0.013	**237.8**	0.66
Old Tecumseh Rd	Ex MH: S-MH-01101	Ex MH: S-MH-01102	15.50	**0.15**	315.74	1	3	12158	2.87	66.31	141.35	**207.66**	0.07%	675	0.013	**222.4**	0.62
Old Tecumseh Rd	Ex MH: S-MH-01102	Ex MH: S-MH-01103	110.00	**3.03**	318.77	9	27	12185	2.87	66.94	141.62	**208.56**	0.09%	675	0.013	**252.2**	0.70
Old Tecumseh Rd	Ex MH: S-MH-01103	Ex MH: S-MH-01434	93.30	**2.99**	321.76	7	21	12206	2.87	67.57	141.83	**209.39**	0.10%	675	0.013	**265.9**	0.74
Old Tecumseh Rd	Ex MH: S-MH-01434	Ex MH: S-MH-00994	99.40	**18.29**	340.05	116	348	12554	2.86	71.41	145.25	**216.66**	0.10%	675	0.013	**265.9**	0.74
Old Tecumseh Rd	Ex MH: S-MH-00994	Ex MH: S-MH-01227	106.40	**2.46**	342.51	8	24	12578	2.86	71.93	145.48	**217.41**	0.07%	675	0.013	**222.4**	0.62
Old Tecumseh Rd	Ex MH: S-MH-01227	Ex MH: S-MH-01228	63.40	**1.46**	343.97	6	18	12596	2.85	72.23	145.66	**217.89**	0.12%	675	0.013	**291.2**	0.81
Old Tecumseh Rd	Ex MH: S-MH-01228	Ex MH: S-MH-01229	130.90	**2.99**	346.96	14	42	12638	2.85	72.86	146.07	**218.93**	0.12%	675	0.013	**291.2**	0.81
Old Tecumseh Rd	Ex MH: S-MH-01229	Ex MH: S-MH-01585	20.70	**0.57**	347.53	2	6	12644	2.85	72.98	146.13	**219.11**	0.12%	675	0.013	**291.2**	0.81
Old Tecumseh Rd	Ex MH: S-MH-01585	Ex MH: S-MH-01231	87.10	**8.44**	355.97	66	198	12842	2.85	74.75	148.06	**222.82**	0.10%	675	0.013	**265.9**	0.74
Old Tecumseh Rd	Ex MH: S-MH-01231	**PS 5 - Inlet**	26.40	**0.00**	355.97	0	0	12842	2.85	74.75	148.06	**222.82**	0.10%	675	0.013	**265.9**	0.74
Old Tecumseh Rd	Ex MH: S-MH-01232	Ex MH: S-MH-01230	24.00	**5.85**	361.82	50	150	12992	2.84	75.98	149.53	**225.51**	0.08%	675	0.013	**237.8**	0.66
Old Tecumseh Rd	Ex MH: S-MH-01230	Ex MH: S-MH-01233	88.10	**2.19**	364.01	8	24	13016	2.84	76.44	149.76	**226.20**	0.09%	675	0.013	**252.2**	0.70
Old Tecumseh Rd	Ex MH: S-MH-01233	Ex MH: S-MH-01234	89.50	**1.59**	365.60	6	18	13034	2.84	76.78	149.93	**226.71**	0.12%	675	0.013	**291.2**	0.81
Old Tecumseh Rd	Ex MH: S-MH-01234	Ex MH: S-MH-01235	115.00	**3.68**	369.28	11	33	13067	2.84	77.55	150.26	**227.80**	0.05%	750	0.013	**249.0**	0.56
Old Tecumseh Rd	Ex MH: S-MH-01235	Ex MH: S-MH-01236	122.90	**11.36**	380.64	92	276	13343	2.83	79.93	152.94	**232.87**	0.07%	750	0.013	**294.6**	0.67
Old Tecumseh Rd	Ex MH: S-MH-01236	Ex MH: S-MH-01237	123.00	**2.94**	383.58	12	36	13379	2.83	80.55	153.29	**233.84**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01237	Ex MH: S-MH-01238	115.20	**4.66**	388.24	10	30	13409	2.83	81.53	153.58	**235.11**	0.07%	750	0.013	**294.6**	0.67
Old Tecumseh Rd	Ex MH: S-MH-01238	Ex MH: S-MH-01239	113.10	**4.93**	393.17	11	33	13442	2.83	82.57	153.90	**236.46**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01239	Ex MH: S-MH-01240	86.00	**3.63**	396.80	8	24	13466	2.83	83.33	154.13	**237.46**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01240	Ex MH: S-MH-01241	120.20	**4.10**	400.90	8	24	13490	2.82	84.19	154.36	**238.55**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01241	Ex MH: S-MH-01242	120.40	**4.77**	405.67	10	30	13520	2.82	85.19	154.65	**239.84**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01242	Ex MH: S-MH-01243	119.00	**3.52**	409.19	11	33	13553	2.82	85.93	154.97	**240.90**	0.09%	750	0.013	**334.0**	0.76
Old Tecumseh Rd	Ex MH: S-MH-01243	Ex MH: S-MH-01244	123.90	**3.33**	412.52	10	30	13583	2.82	86.63	155.26	**241.89**	0.07%	750	0.013	**294.6**	0.67
Old Tecumseh Rd	Ex MH: S-MH-01244	Ex MH: S-MH-01245	106.90	**3.81**	416.33	9	27	13610	2.82	87.43	155.52	**242.95**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01245	Ex MH: S-MH-01246	90.70	**1.92**	418.25	6	18	13628	2.82	87.83	155.69	**243.53**	0.10%	750	0.013	**352.1**	0.80
Old Tecumseh Rd	Ex MH: S-MH-01246	Ex MH: S-MH-01247	57.90	**1.54**	419.79	4	12	13640	2.82	88.16	155.81	**243.97**	0.28%	750	0.013	**589.2**	1.33
Old Tecumseh Rd	Ex MH: S-MH-01247	Ex MH: S-MH-01210	67.50	**0.82**	420.61	2	6	13646	2.82	88.33	155.87	**244.20**	0.14%	750	0.013	**416.6**	0.94
Old Tecumseh Rd	Ex MH: S-MH-01210	Ex MH: S-MH-01222	72.30	**8.79**	429.40	18	54	13700	2.82	90.17	156.39	**246.56**	0.19%	750	0.013	**485.3**	1.10
Old Tecumseh Rd	Ex MH: S-MH-01222	Ex MH: S-MH-01223	121.90	**0.38**	429.78	0	20	13720	2.82	90.25	156.58	**246.83**	0.09%	750	0.013	**334.0**	0.76
Old Tecumseh Rd	Ex MH: S-MH-01223	Ex MH: S-MH-01211	109.70	**1.86**	431.64		0	13720	2.82	90.64	156.58	**247.22**	0.10%	750	0.013	**352.1**	0.80
Old Tecumseh Rd	Ex MH: S-MH-01211	**New PS**															

SANITARY SEWER DESIGN SHEET - OPTION 1A SEWER UPGRADES TRUNK SEWER (PS7 - NEW PS)

DESIGN CRITERIA
RESIDENTIAL SINGLE FAMILY 3 People/Unit
EXISTING COMMERCIAL/ INDUSTRIAL Total Flow based on Unit Sewage
Flow Converted to Residential Person
Equivalence

AVERAGE DAILY PER CAPITA FLOW 350 L/cap/day
PEAK EXTRANEOUS FLOW 0.21 L/ha/s
HARMON'S PEAK FACTOR 1+14/(4+(P/1000)^0.5)
VELOCITY RANGE 0.57 m/s to 2.27 m/s
MINIMUM PIPE SIZE 300 mm

Upgraded Sewers

Project : Lanoue Street Extension from Manning Road to Amy Croft Drive
Client : Town of Lakeshore
Project No. : 165620128

LOCATION									PEAK	MAXIMUM FLOW			SEWER DESIGN				
STREET OR EASEMENT	FROM MH	TO MH	SEWER LENGTH (m)	DESIGN AREA SERVED (HECTARES) INCREMENT	DESIGN AREA SERVED (HECTARES) TOTAL	DESIGN POPULATION (PERSONS) UNITS	DESIGN POPULATION (PERSONS) INCREMENT	DESIGN POPULATION (PERSONS) TOTAL	FACTOR	INFILTRATION (L/s)	SEWAGE (L/s)	TOTAL SEWAGE AND INFILTRATION (L/s)	SEWER SLOPE (%)	DIAMETER (mm)	MANNING'S "n"	CAPACITY FULL (L/s)	VELOCITY FULL (m/s)
Old Tecumseh Rd	Ex MH: S-MH-01530	Ex MH: S-MH-01862	13.6	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01862	Ex MH: S-MH-01524	119.3	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01524	Ex MH: S-MH-01863	61.2	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01863	Ex MH: S-MH-01525	84.2	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01525	Ex MH: S-MH-01526	124.3	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01526	Ex MH: S-MH-01527	120.6	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01527	Ex MH: S-MH-01528	122.2	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01528	Ex MH: S-MH-01529	121.4	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01529	Ex MH: S-MH-01532	122.4	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01532	Ex MH: S-MH-01864	90.5	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Old Tecumseh Rd	Ex MH: S-MH-01864	Ex MH: S-MH-01531	31.4	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Elmgrove Dr	Ex MH: S-MH-01531	Ex MH: S-MH-01533	101.0	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Elmgrove Dr	Ex MH: S-MH-01533	Ex MH: S-MH-01435	98.0	0.00	83.49		0	8345	3.03	17.53	102.50	**120.04**	0.22%	450	0.013	**133.7**	0.84
Russell Woods Dr	**PS 7 - Outlet**	Ex MH: S-MH-01435	28.8	99.03	99.03	564	1691	1691	3.64	20.80	24.94	**45.74**	0.13%	450	0.013	**102.8**	0.65
Russell Woods Dr	Ex MH: S-MH-01435	Ex MH: S-MH-01804	93.4	0.73	183.25	3.0	9	10045	2.95	38.48	120.15	**158.63**	0.07%	600	0.013	**162.5**	0.57
Russell Woods Dr	Ex MH: S-MH-01804	Ex MH: S-MH-01200	82.3	2.34	185.59	6.0	18	10063	2.95	38.97	120.33	**159.30**	0.14%	600	0.013	**229.8**	0.81
Russell Woods Dr	Ex MH: S-MH-01200	Ex MH: S-MH-01803	116.8	2.50	188.09	7.0	21	10084	2.95	39.50	120.55	**160.04**	0.11%	600	0.013	**203.7**	0.72
Russell Woods Dr	Ex MH: S-MH-01803	Ex MH: S-MH-01805	122.0	2.79	190.88	7.0	21	10105	2.95	40.08	120.76	**160.84**	0.10%	600	0.013	**194.2**	0.69
Russell Woods Dr	Ex MH: S-MH-01805	Ex MH: S-MH-01448	119.6	2.39	193.27	6.0	18	10123	2.95	40.59	120.94	**161.53**	0.15%	600	0.013	**237.8**	0.84
Russell Woods Dr	Ex MH: S-MH-01448	Ex MH: S-MH-01447	121.7	2.62	195.89	7.0	21	10144	2.95	41.14	121.16	**162.29**	0.13%	600	0.013	**221.4**	0.78
Russell Woods Dr	Ex MH: S-MH-01447	Ex MH: S-MH-01446	120.0	3.33	199.22	7.0	21	10165	2.95	41.84	121.37	**163.21**	0.12%	600	0.013	**212.7**	0.75
Russell Woods Dr	Ex MH: S-MH-01446	Ex MH: S-MH-01445	111.3	2.07	201.29	5.0	15	10180	2.95	42.27	121.52	**163.79**	0.10%	600	0.013	**194.2**	0.69
Russell Woods Dr	Ex MH: S-MH-01445	Ex MH: S-MH-01093	56.8	1.36	202.65	4.0	12	10192	2.95	42.56	121.65	**164.20**	0.16%	600	0.013	**245.6**	0.87
Russell Woods Dr	Ex MH: S-MH-01093	Ex MH: S-MH-01094	29.6	0.00	202.65	0.0	0	10192	2.95	42.56	121.65	**164.20**	0.26%	600	0.013	**313.1**	1.11
Patillo Rd	Ex MH: S-MH-01439	Ex MH: S-MH-01094	80.4	65.83	65.83	386	1157	1157	3.76	13.82	17.61	**31.44**	0.30%	250	0.013	**32.6**	0.66
Pearl St	Ex MH: S-MH-01094	Ex MH: S-MH-01440	100.1	2.20	270.68	6.0	18	11366	2.90	56.84	133.49	**190.34**	0.18%	600	0.013	**260.5**	0.92
Pearl St	Ex MH: S-MH-01440	Ex MH: S-MH-01442	75.8	1.14	271.82	4.0	12	11378	2.90	57.08	133.61	**190.69**	0.22%	600	0.013	**288.0**	1.02
Pearl St	Ex MH: S-MH-01739	Ex MH: S-MH-01740	84.7	1.89	1.89	8.0	24	24	4.37	0.40	0.42	**0.82**	0.48%	200	0.013	**22.7**	0.72
Pearl St	Ex MH: S-MH-01740	Ex MH: S-MH-01444	48.1	0.64	2.53	2.0	6	30	4.35	0.53	0.53	**1.06**	0.87%	200	0.013	**30.6**	0.97
Pearl St	Ex MH: S-MH-01444	Ex MH: S-MH-01443	93.7	2.01	4.54	9.0	27	57	4.30	0.95	0.99	**1.95**	0.41%	200	0.013	**21.0**	0.67
Pearl St	Ex MH: S-MH-01443	Ex MH: S-MH-01442	109.3	1.90	6.44	5.0	15	72	4.28	1.35	1.25	**2.60**	0.35%	200	0.013	**19.4**	0.62
Easement	Ex MH: S-MH-01442	**PS 6 Inlet**	29.30	**0.00**	278.26	0.00	0	11450	2.90	58.43	134.33	**192.77**	0.17%	600	0.013	**251.0**	0.89
Stover Street	**PS 6 - Outlet**	Ex MH: S-MH-01441	34.30	**0.00**	278.26	0	0	11450	2.90	58.43	134.33	**192.77**	0.29%	525	0.013	**231.6**	1.07
Stover Street	Ex MH: S-MH-01441	Ex MH: S-MH-01806	74.90	**0.34**	278.60	1	3	11453	2.90	58.51	134.36	**192.87**	0.19%	600	0.013	**267.7**	0.95
Stover Street	Ex MH: S-MH-01806	Ex MH: S-MH-01097	74.50	**0.32**	278.92	1	3	11456	2.90	58.57	134.39	**192.96**	0.19%	600	0.013	**267.7**	0.95
Old Tecumseh Rd	Ex MH: S-MH-01097	Ex MH: S-MH-01098	108.00	**8.00**	286.92	53	159	11616	2.89	60.25	135.98	**196.23**	0.26%	600	0.013	**313.1**	1.11
Old Tecumseh Rd	Ex MH: S-MH-01098	Ex MH: S-MH-01099	102.80	**0.44**	287.36	0	0	11616	2.89	60.35	135.98	**196.32**	0.22%	600	0.013	**288.0**	1.02
Old Tecumseh Rd	Ex MH: S-MH-01099	Ex MH: S-MH-00977	85.60	**176.11**	463.47	102	3126	14742	2.79	97.33	166.36	**263.69**	0.10%	675	0.013	**265.9**	0.74
Old Tecumseh Rd	Ex MH: S-MH-00977	**Ex MH: S-MH-01100**	94.20	**1.61**	465.08	6	18	14760	2.79	97.67	166.53	**264.20**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01100	Ex MH: S-MH-01101	77.30	**10.73**	475.81	72	216	14976	2.78	99.92	168.59	**268.51**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01101	Ex MH: S-MH-01102	15.50	**0.15**	475.96	1	3	14979	2.78	99.95	168.61	**268.57**	0.06%	750	0.013	**272.7**	0.62
Old Tecumseh Rd	Ex MH: S-MH-01102	Ex MH: S-MH-01103	110.00	**3.03**	478.99	9	27	15006	2.78	100.59	168.87	**269.46**	0.09%	750	0.013	**334.0**	0.76
Old Tecumseh Rd	Ex MH: S-MH-01103	Ex MH: S-MH-01434	93.30	**2.99**	481.98	7	21	15027	2.78	101.22	169.07	**270.29**	0.10%	750	0.013	**352.1**	0.80
Old Tecumseh Rd	Ex MH: S-MH-01434	Ex MH: S-MH-00994	99.40	**18.29**	500.27	116	348	15375	2.77	105.06	172.36	**277.42**	0.10%	750	0.013	**352.1**	0.80
Old Tecumseh Rd	Ex MH: S-MH-00994	Ex MH: S-MH-01227	106.40	**2.46**	502.73	8	24	15399	2.77	105.57	172.59	**278.16**	0.07%	750	0.013	**294.6**	0.67
Old Tecumseh Rd	Ex MH: S-MH-01227	Ex MH: S-MH-01228	63.40	**1.46**	504.19	6	18	15417	2.77	105.88	172.76	**278.64**	0.12%	750	0.013	**385.7**	0.87
Old Tecumseh Rd	Ex MH: S-MH-01228	Ex MH: S-MH-01229	130.90	**2.99**	507.18	14	42	15459	2.77	106.51	173.15	**279.66**	0.12%	750	0.013	**385.7**	0.87
Old Tecumseh Rd	Ex MH: S-MH-01229	Ex MH: S-MH-01585	20.70	**0.57**	507.75	2	6	15465	2.76	106.63	173.21	**279.84**	0.12%	750	0.013	**385.7**	0.87
Old Tecumseh Rd	Ex MH: S-MH-01585	Ex MH: S-MH-01231	87.10	**8.44**	516.19	66	198	15663	2.76	108.40	175.08	**283.47**	0.10%	750	0.013	**352.1**	0.80
Old Tecumseh Rd	Ex MH: S-MH-01231	**PS 5 - Inlet**	26.40	**0.00**	516.19	0	0	15663	2.76	108.40	175.08	**283.47**	0.10%	750	0.013	**352.1**	0.80
Old Tecumseh Rd	Ex MH: S-MH-01232	Ex MH: S-MH-01230	24.00	**5.85**	522.04	50	150	15813	2.76	109.63	176.48	**286.11**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01230	Ex MH: S-MH-01233	88.10	**2.19**	524.23	8	24	15837	2.75	110.09	176.71	**286.80**	0.09%	750	0.013	**334.0**	0.76
Old Tecumseh Rd	Ex MH: S-MH-01233	Ex MH: S-MH-01234	89.50	**1.59**	525.82	6	18	15855	2.75	110.42	176.88	**287.30**	0.12%	750	0.013	**385.7**	0.87
Old Tecumseh Rd	Ex MH: S-MH-01234	Ex MH: S-MH-01235	115.00	**3.68**	529.50	11	33	15888	2.75	111.20	177.19	**288.38**	0.07%	750	0.013	**294.6**	0.67
Old Tecumseh Rd	Ex MH: S-MH-01235	Ex MH: S-MH-01236	122.90	**11.36**	540.86	92	276	16164	2.75	113.58	179.77	**293.35**	0.07%	750	0.013	**294.6**	0.67
Old Tecumseh Rd	Ex MH: S-MH-01236	Ex MH: S-MH-01237	123.00	**2.94**	543.80	12	36	16200	2.74	114.20	180.11	**294.31**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01237	Ex MH: S-MH-01238	115.20	**4.66**	548.46	10	30	16230	2.74	115.18	180.39	**295.57**	0.08%	750	0.013	**304.9**	0.69
Old Tecumseh Rd	Ex MH: S-MH-01238	Ex MH: S-MH-01239	113.10	**4.93**	553.39	11	33	16263	2.74	116.21	180.70	**296.91**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01239	Ex MH: S-MH-01240	86.00	**3.63**	557.02	8	24	16287	2.74	116.97	180.92	**297.90**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01240	Ex MH: S-MH-01241	120.20	**4.10**	561.12	8	24	16311	2.74	117.84	181.15	**298.98**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01241	Ex MH: S-MH-01242	120.40	**4.77**	565.89	10	30	16341	2.74	118.84	181.43	**300.26**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01242	Ex MH: S-MH-01243	119.00	**3.52**	569.41	11	33	16374	2.74	119.58	181.73	**301.31**	0.09%	750	0.013	**334.0**	0.76
Old Tecumseh Rd	Ex MH: S-MH-01243	Ex MH: S-MH-01244	123.90	**3.33**	572.74	10	30	16404	2.74	120.28	182.01	**302.29**	0.08%	750	0.013	**304.9**	0.69
Old Tecumseh Rd	Ex MH: S-MH-01244	Ex MH: S-MH-01245	106.90	**3.81**	576.55	9	27	16431	2.74	121.08	182.27	**303.34**	0.08%	750	0.013	**314.9**	0.71
Old Tecumseh Rd	Ex MH: S-MH-01245	Ex MH: S-MH-01246	90.70	**1.92**	578.47	6	18	16449	2.74	121.48	182.43	**303.91**	0.10%	750	0.013	**352.1**	0.80
Old Tecumseh Rd	Ex MH: S-MH-01246	Ex MH: S-MH-01247	57.90	**1.54**	580.01	4	12	16461	2.74	121.80	182.55	**304.35**	0.28%	750	0.013	**589.2**	1.33
Old Tecumseh Rd	Ex MH: S-MH-01247	Ex MH: S-MH-01210	67.50	**0.82**	580.83	2	6	16467	2.74	121.97	182.60	**304.58**	0.14%	750	0.013	**416.6**	0.94
Old Tecumseh Rd	Ex MH: S-MH-01210	Ex MH: S-MH-01222	72.30	**8.79**	589.62	18	54	16521	2.74	123.82	183.10	**306.92**	0.19%	750	0.013	**485.3**	1.10
Old Tecumseh Rd	Ex MH: S-MH-01222	Ex MH: S-MH-01223	121.90	**0.38**	590.00	0	20	16540	2.74	123.90	183.29	**307.19**	0.09%	750	0.013	**334.0**	0.76
Old Tecumseh Rd	Ex MH: S-MH-01223	Ex MH: S-MH-01211	109.70	**1.86**	591.86		0	16540	2.74	124.29	183.29	**307.58**	0.10%	750	0.013	**352.1**	0.80
Old Tecumseh Rd	Ex MH: S-MH-01211	**New PS**															

SANITARY SEWER DESIGN SHEET - OPTION 4C SEWER UPGRADES TRUNK SEWER (Whisper Creek - Oakwood Trunk Sewer)

DESIGN CRITERIA
RESIDENTIAL SINGLE FAMILY 3 People/Unit
EXISTING COMMERCIAL/ INDUSTRIAL

Total Flow based on Unit
Sewage Flow Converted
to Residential Person
Equivalence

AVERAGE DAILY PER CAPITA FLOW 350 L/cap/day
PEAK EXTRANEOUS FLOW 0.21 L/ha/s
HARMON'S PEAK FACTOR 1+14/(4+(P/1000)^0.5)
VELOCITY RANGE 0.57 m/s to 0.79 m/s
MINIMUM PIPE SIZE 300 mm

Legend
Upgraded Sewers
New Sewers

Project : Lanoue Street Extension from Manning Road to Amy Croft Drive
Client : Town of Lakeshore
Project No. : 165620128

LOCATION									PEAK	MAXIMUM FLOW			SEWER DESIGN					PROFILE					
STREET OR EASEMENT	FROM MH	TO MH	SEWER LENGTH (m)	DESIGN AREA SERVED (HECTARES) INCREMENT	TOTAL	DESIGN POPULATION (PERSONS) UNITS	INCREMENT	TOTAL	FACTOR	INFILTRATION (L/s)	SEWAGE (L/s)	TOTAL SEWAGE AND INFILTRATION (L/s)	SEWER SLOPE (%)	DIAMETER (mm)	MANNING'S "n"	CAPACITY FULL (L/s)	VELOCITY FULL (m/s)	UPSTREAM ELEVATION INVERT (m)	GROUND (m)	COVER (m)	DOWNSTREAM ELEVATION INVERT (m)	GROUND (m)	COVER (m)
Whisper Creek	Ex MH: S-MH-00732	Ex MH: S-MH-00733	54.3	0.87	0.87	3.0	9	9	4.42	0.18	0.16	**0.34**	0.43%	200	0.013	**21.5**	0.68	-	-	-	-	-	-
Whisper Creek	Ex MH: S-MH-00733	Ex MH: S-MH-00734	40.8	0.40	1.27	6.0	18	27	4.36	0.27	0.48	**0.74**	0.38%	200	0.013	**20.2**	0.64	-	-	-	-	-	-
Whisper Creek	Ex MH: S-MH-00734	Ex MH: S-MH-00735	46.7	0.46	1.73	7.0	21	48	4.32	0.36	0.84	**1.20**	0.39%	200	0.013	**20.5**	0.65	-	-	-	-	-	-
Whisper Creek	Ex MH: S-MH-00735	Ex MH: S-MH-00736	35.2	0.90	2.63	7.0	21	69	4.28	0.55	1.20	**1.75**	0.36%	200	0.013	**19.7**	0.63	-	-	-	-	-	-
Whisper Creek	Ex MH: S-MH-00736	Ex MH: S-MH-00738	31.0	0.19	2.82	6.0	18	87	4.26	0.59	1.50	**2.09**	0.39%	200	0.013	**20.5**	0.65	-	-	-	-	-	-
Whisper Creek	Ex MH: S-MH-00738	PS -Whisper Creek	46.0	0.83	3.65	7.0	21	108	4.23	0.77	1.85	**2.62**	0.39%	200	0.013	**20.5**	0.65	-	-	-	-	-	-
Croft Dr	Ex MH: S-MH-00893	Ex MH: S-MH-00894	142.7	3.26	6.91	31.9	96	204	4.15	1.45	3.42	**4.87**	0.40%	200	0.013	**20.7**	0.66	-	-	-	-	-	-
Croft Dr	Ex MH: S-MH-00894	Ex MH: S-MH-00895	132.9	2.61	9.52	36.7	110	314	4.07	2.00	5.17	**7.17**	0.40%	200	0.013	**20.7**	0.66	-	-	-	-	-	-
Croft Dr	Ex MH: S-MH-00895	Ex MH: S-MH-00896	133.0	0.73	10.25	8.2	25	338	4.06	2.15	5.56	**7.71**	0.40%	200	0.013	**20.7**	0.66	-	-	-	-	-	-
Croft Dr	Ex MH: S-MH-00896	Ex MH: S-MH-00897	133.0	1.80	12.05	44.6	134	472	3.99	2.53	7.62	**10.15**	0.40%	200	0.013	**20.7**	0.66	-	-	-	-	-	-
Croft Dr	Ex MH: S-MH-00897	Ex MH: S-MH-00898	132.9	1.42	13.47	2.0	6	478	3.98	2.83	7.71	**10.54**	0.49%	200	0.013	**23.0**	0.73	-	-	-	-	-	-
Croft Dr	Ex MH: S-MH-00898	Ex MH: S-MH-00899	54.5	0.47	13.94	1.1	3	481	3.98	2.93	7.76	**10.69**	0.54%	200	0.013	**24.1**	0.77	-	-	-	-	-	-
Croft Dr	Ex MH: S-MH-00899	PS - Croft	24.0	0.97	14.91	10.5	32	513	3.97	3.13	8.24	**11.38**	0.46%	200	0.013	**22.2**	0.71	-	-	-	-	-	-
Advance Blvd	Ex MH: S-MH-01588	Ex MH: S-MH-01591	96.3	16.28	31.19	18.2	615	1127	3.77	6.55	17.20	**23.75**	0.24%	300	0.013	**47.4**	0.67	-	-	-	-	-	-
Advance Blvd	Ex MH: S-MH-01591	Ex MH: S-MH-01471	48.7	0.58	31.77	17.6	53	1180	3.75	6.67	17.94	**24.61**	0.32%	300	0.013	**54.7**	0.77	-	-	-	-	-	-
Advance Blvd	Ex MH: S-MH-01471	Ex MH: S-MH-01500	57.2	0.00	31.77	0.0	0	1180	3.75	6.67	17.94	**24.61**	0.34%	300	0.013	**56.1**	0.79	-	-	-	-	-	-
Advance Blvd	Ex MH: S-MH-01500	Ex MH: S-MH-01472	78.1	1.16	32.93	25.7	77	1257	3.73	6.92	19.02	**25.93**	0.20%	300	0.013	**43.3**	0.61	-	-	-	-	-	-
Advance Blvd	Ex MH: S-MH-01472	Ex MH: S-MH-01592	80.4	10.56	43.49	39.2	118	1375	3.71	9.13	20.64	**29.78**	0.19%	300	0.013	**42.5**	0.60	-	-	-	-	-	-
Advance Blvd	Ex MH: S-MH-01592	Ex MH: S-MH-01473	103.1	2.00	45.49	44.6	134	1509	3.68	9.55	22.48	**32.03**	0.18%	300	0.013	**41.0**	0.58	-	-	-	-	-	-
Advance Blvd	Ex MH: S-MH-01473	Ex MH: S-MH-01474	97.0	2.76	48.25	10.3	31	1540	3.67	10.13	22.90	**33.03**	0.25%	300	0.013	**48.3**	0.68	-	-	-	-	-	-
Advance Blvd	Ex MH: S-MH-01474	Ex MH: S-MH-01475	88.7	8.43	56.68	42.6	128	1667	3.65	11.90	24.63	**36.53**	0.18%	300	0.013	**41.0**	0.58	-	-	-	-	-	-
Advance Blvd	Ex MH: S-MH-01475	Ex MH: S-MH-01476	88.4	2.95	59.63	54.8	164	1832	3.62	12.52	26.83	**39.35**	0.17%	300	0.013	**40.2**	0.57	-	-	-	-	-	-
Advance Blvd	Ex MH: S-MH-01476	Ex MH: S-MH-01477	101.2	0.00	59.63	0.0	0	1832	3.62	12.52	26.83	**39.35**	0.18%	300	0.013	**41.0**	0.58	-	-	-	-	-	-
Advance Blvd	Ex MH: S-MH-01477	PS9	30.0	0.00	59.63	0.0	0	1832	3.62	12.52	26.83	**39.35**	0.18%	300	0.013	**41.0**	0.58	-	-	-	-	-	-
Patillo Rd	Ex. S-MH-01318	PS9	30.0	111.79	111.79	516.1	1548	1548	3.67	23.48	23.01	**46.49**	0.25%	300	0.013	**48.4**	0.68	-	-	-	-	-	-
Patillo Rd	PS9	New: MH1	40.0	0.00	171.42	0.0	0	3380	3.40	36.00	46.52	**82.52**	0.10%	450	0.013	**90.2**	0.57	177.541	178.500	0.959	177.501	178.500	0.999
Patillo Rd	New: MH1	New: MH2	100.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	177.481	178.500	1.019	177.421	178.500	1.079
Patillo Rd	New: MH2	New: MH3	100.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	177.401	178.549	1.148	177.341	178.597	1.256
Patillo Rd	New: MH3	New: MH4	100.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	177.321	178.597	1.276	177.261	178.646	1.385
Patillo Rd	New: MH4	New: MH5	100.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	177.241	178.646	1.405	177.181	178.694	1.513
Patillo Rd	New: MH5	New: MH6	100.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	177.081	178.743	1.662	177.021	178.791	1.770
Patillo Rd	New: MH6	New: MH7	100.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	177.161	178.694	1.533	177.101	178.743	1.642
Patillo Rd	New: MH7	New: MH8	100.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	177.081	178.743	1.662	177.021	178.791	1.770
Patillo Rd	New: MH8	New: MH9	100.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	177.001	178.791	1.790	176.941	178.840	1.899
Patillo Rd	New: MH9	New: MH10	100.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	176.921	178.840	1.919	176.861	178.888	2.027
Patillo Rd	New: MH10	New: MH11	100.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	176.841	178.888	2.047	176.781	178.937	2.156
Patillo Rd	New: MH11	New: MH12	100.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	176.761	178.937	2.176	176.701	178.985	2.284
Patillo Rd	New: MH12	New PS - Little River Patillo	30.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	176.681	178.985	2.304	176.663	179.000	2.337
Future Rd	New PS - Little River Patillo	New: MH12	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	176.643	179.000	2.357	176.571	179.000	2.429
Future Rd	New: MH12	New: MH13	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	176.551	179.000	2.449	176.479	179.000	2.521
Future Rd	New: MH13	New: MH14	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	176.459	179.000	2.541	176.387	179.000	2.613
Future Rd	New: MH14	New: MH15	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	176.367	179.000	2.633	176.295	179.000	2.705
Future Rd	New: MH15	New: MH16	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	176.275	179.000	2.725	176.203	179.000	2.797
Future Rd	New: MH16	New: MH17	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	176.183	179.000	2.817	176.111	179.000	2.889
Future Rd	New: MH17	New: MH18	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	176.091	179.000	2.909	176.019	179.000	2.981
Future Rd	New: MH18	New: MH19	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	175.999	179.000	3.001	175.927	179.000	3.073
Future Rd	New: MH19	New: MH20	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	175.907	179.000	3.093	175.835	179.000	3.165
Future Rd	New: MH20	New: MH21	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	175.815	179.000	3.185	175.743	179.000	3.257
Future Rd	New: MH21	New: MH22	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	175.723	179.000	3.277	175.651	179.000	3.349
Future Rd	New: MH22	New: MH23	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	175.631	179.000	3.369	175.559	179.000	3.441
Future Rd	New: MH23	New: MH24	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	175.539	179.000	3.461	175.467	179.000	3.533
Future Rd	New: MH24	New: MH25	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	175.447	179.000	3.553	175.375	179.000	3.625
Future Rd	New: MH25	New: MH26	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	175.355	179.000	3.645	175.283	179.000	3.717
Future Rd	New: MH26	New: MH27	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	175.263	179.000	3.737	175.191	179.000	3.809
Future Rd	New: MH27	New: MH28	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	175.171	179.000	3.829	175.099	179.000	3.901
Future Rd	New: MH28	New: MH29	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	175.079	179.000	3.921	175.007	179.000	3.993
Future Rd	New: MH29	New: MH30	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	174.987	179.000	4.013	174.915	179.000	4.085
Future Rd	New: MH30	New: MH31	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	174.895	179.000	4.105	174.823	179.000	4.177
Future Rd	New: MH31	New: MH32	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	174.803	179.000	4.197	174.731	179.000	4.269
Future Rd	New: MH32	New: MH33	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	174.711	179.000	4.289	174.639	179.000	4.361
Future Rd	New: MH33	New: MH34	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	174.619	179.000	4.381	174.547	179.000	4.453
Future Rd	New: MH34	New: MH35	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	174.527	179.000	4.473	174.455	179.000	4.545
Future Rd	New: MH35	New: MH36	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	174.435	179.000	4.565	174.363	179.000	4.637
Future Rd	New: MH36	New: MH37	120.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	174.343	179.000	4.657	174.271	179.000	4.729
Future Rd	New: MH37	New: MH38	35.0	0.00	254.91	0.0	0	11725	2.89	53.53	137.06	**190.59**	0.06%	675	0.013	**205.9**	0.58	174.251	179.000	4.749	174.230	179.000	4.770