APPENDIX C WASTEWATER SERVICING REPORT

Middlesex Centre Master Servicing Plan – Wastewater Servicing Report

April 19, 2024

Prepared for:

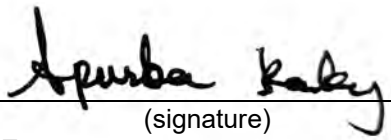
The Municipality of Middlesex Centre

Prepared by:

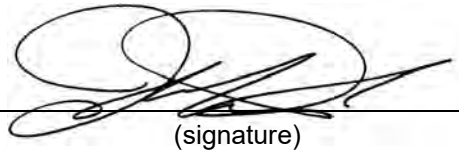
Stantec Consulting Ltd.
400-1305 Riverbend Road
London, ON N6K 0J5

Revision	Description	Author		Quality Check		Independent Review	
0	Draft	JH/AK	20240202	JP	20240216		
1	Final	JH/AK	20240418	JP	20240418		

This document entitled Middlesex Centre Master Servicing Plan – Wastewater Servicing Report was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of Middlesex County (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)

Apurba Karky, P. Eng

Reviewed by 
(signature)

Jeff Paul, P. Eng

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by the Municipality of Middlesex Centre (the Municipality) to update its Master Servicing Plan (MSP), which was last updated in 2010. The MSP considers the Municipality's water, wastewater, stormwater, and solid waste infrastructure. The MSP aims to be a roadmap to guide the Municipality's future infrastructure decisions, considering existing and future conditions over a 25-year horizon (to the year 2046).

This report addresses the wastewater servicing infrastructure component of the 2023 MSP. This involves evaluating existing servicing and infrastructure, identifying future needs, and recommending alternatives for implementation. Other servicing components are addressed and reported under separate covers.

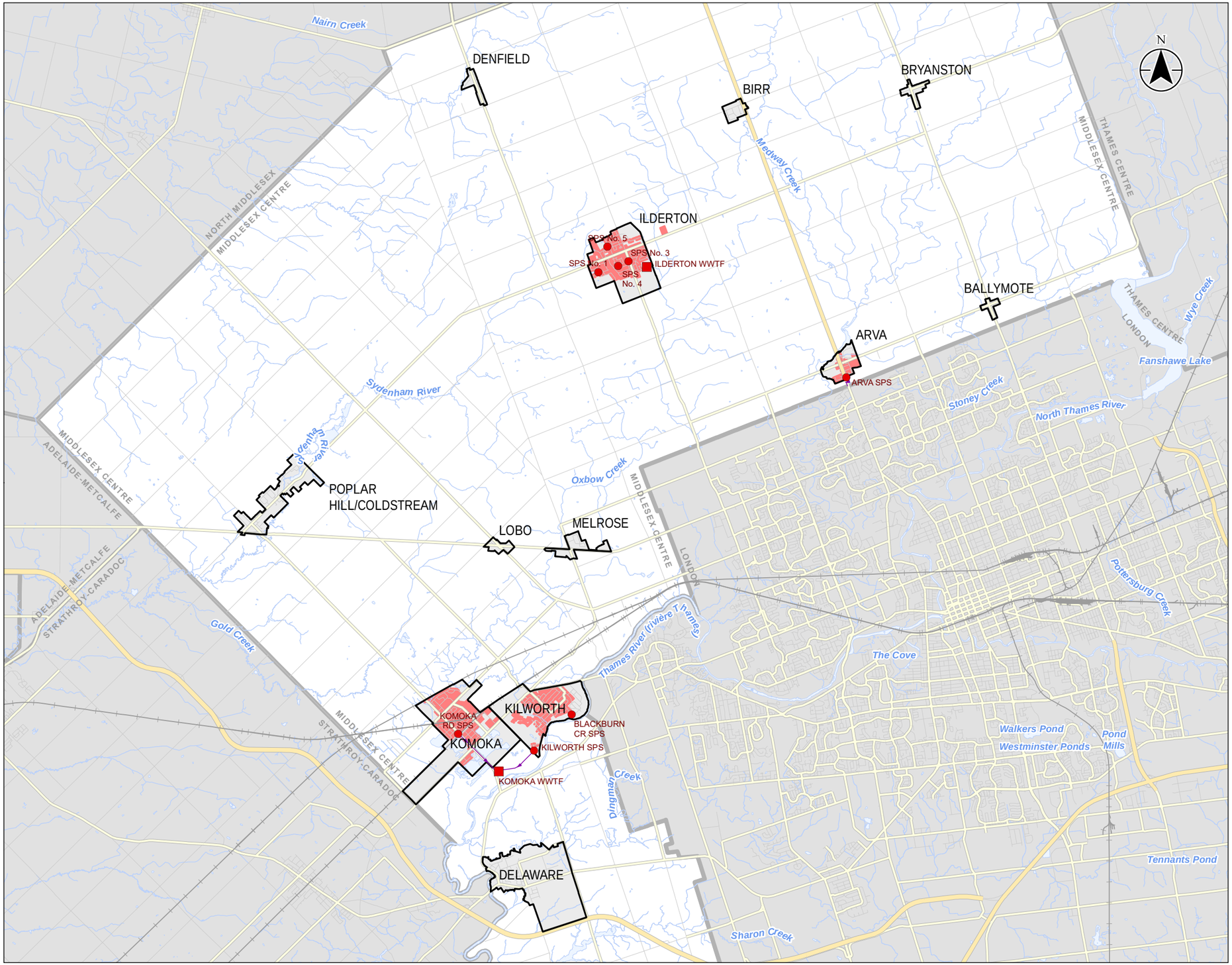
Figure 1-1 illustrates the location of the communities and the type of sanitary infrastructure that is present in each of those communities.

1.1 BACKGROUND

1.1.1 Overview

The Municipality completed its Official Plan (OP) review, dated August 2023. The intent of the OP is to provide guidance for growth and development within the Municipality, and outline goals and policies pertaining to land use and servicing of the different settlement areas. The current 2023 MSP supplements the OP and provides guidance on the servicing infrastructure needs of the Municipality to meet the growth and development needs presented in the OP.

Over the study period from 2023-2046 of the MSP, Middlesex Centre's population is expected to show significant growth. This growth will be primarily within communities designated for growth under the Official Plan. As population grows, this will create additional wastewater servicing needs.



Stantec

Legend

- Settlement Boundary

Sanitary Servicing

- Serviced
- Not Serviced

Sanitary Facilities

- Pumping Station
- Wastewater Treatment Facility
- Key Forcemain

0 2 4 km

1:120,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Contains information licensed under Open Government License - Ontario. Contains information © County of Middlesex 2022.

Project Location
Municipality of Middlesex

165630236 REVA
Prepared by KDB on 2024-01-22

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
1-1

Title
Overview of Middlesex Centre Sanitary Infrastructure

1.1.2 Assessment of Existing Servicing Components

This technical memorandum will review the existing level of service and servicing components. This includes the following tasks:

- Compile wastewater generation data for each existing system.
- Review municipal and provincial level of service criteria.
- Provide recommendations for criteria to be used in the Servicing Master Plan.
- Identify flow capacity of existing treatment facilities.
- Identify biosolids storage capacity at existing treatment facilities and haulage.
- Review and provide comment on the expandability of existing treatment facilities.
- Comment on potential limiting factors including assimilative capacities of existing receiving water courses.
- Provide recommendations as to areas and/or conditions, where limited servicing on private systems exists.

From this analysis, a summary of existing servicing constraints will be identified for consideration in the development of alternative solutions.

1.1.3 Assessment of Growth Needs

This technical memorandum will further assess the growth needs of the Municipality. This includes the following:

- Provide estimated projected wastewater demands for each growth area over the 2023-2046 planning horizon based on residential and employment growth projections.
- Comment on the adequacy of existing treatment facilities to meet demand from the projected 2046 population.
- Comment on the adequacy of the existing collections systems to meet demand from the projected 2046 population.

From this analysis, a summary of future servicing constraints will be identified for consideration in the development of alternative solutions.

1.1.4 Alternative Development and Preferred Solutions

With a listing of the servicing constraints identified, the study will progress to the identification of alternative solutions. These solutions are then analyzed and evaluated and a preferred solution is selected. An Opinion of Probable Cost is generated for each of the preferred alternatives and an

implementation plan completed. Further sections of this report will outline and refine this process as it relates to specific solutions.

1.2 REVIEW OF PREVIOUS STUDIES

The following documents were reviewed to provide context to the current study:

- Master Servicing Plan Municipal Class Environment Assessment (Stantec, 2010).
- Komoka WWTP Expansion Design Brief (Stantec, 2010).
- Ilderton WWTP Class EA Environmental Study Report (Stantec, 2013).
- Glendon Drive Class EA (Stantec, 2018).
- Kilworth Wastewater Outlet Schedule 'B' Class Environmental Assessment (Delcan, 2013)
- Kilworth Pumping Station Design Brief (Stantec, 2016)
- Komoka-Delaware Municipal Servicing Implementation Study (Stantec, 2009)
- Growth Management Strategy Technical Report (Watson and Associates, 2022)
- Sewage Pumping Station Conditional Assessments (GM BluePlan Engineering Ltd., 2022).

1.2.1 Summary of Findings from 2010 Master Servicing Plan

A Master Servicing Plan Municipal Class Environmental Assessment was completed in 2010. The purpose of the Plan was to assist the Municipality with the overall planning for a period of up to 20 years for the five servicing areas of wastewater, water, solid waste, stormwater management, and transportation. The Plan provides a summary of existing conditions for services with recommended community-wide and municipal-wide recommendations, in addition to implementation of servicing recommendations. An update to the Master Servicing Plan was anticipated in 2021/2022 when the 2010 Master Plan was commissioned.

Key findings of the 2010 Master Plan for each settlement area are summarized as follows:

1.2.1.1 Ilderton

Ilderton has five municipal and two private pumping stations. Therefore, it is recommended that should a future pumping station be required, an existing pumping station should be eliminated. Additional pumping stations add complexity in both operation and cost for the Municipality. If possible, the number of pumping stations should be reduced. Gravity servicing is the preferred method for Ilderton.

Most of the Ilderton WWTF capacity has been committed to proposed development, however, actual flow rates are much less than the rated WWTF capacity, subject to this development proceeding. The Ilderton Water and Wastewater Servicing Class EA was noted to be underway at the time of issuance of the Master Plan to allow for future development to proceed based on the provision of wastewater treatment capacity.

1.2.1.2 Arva

There are three sanitary servicing options to be considered by Middlesex Centre for Arva. The options are as follows:

- Do nothing.
- Amend City of London agreement.
- Construct a new municipal wastewater treatment facility for Arva.

After review, the do-nothing option was not carried forward as the lack of sanitary capacity in Arva would not be solved.

Amending the City of London Sanitary Agreement was determined to be the preferred option. The Municipality would be responsible for negotiating the terms of an amended agreement. If a revised agreement cannot be achieved, then the Municipality may need to proceed with a Class EA as soon as possible to evaluate the above options.

1.2.1.3 Delaware

The Komoka-Delaware Municipal Servicing Implementation Study Class EA addressed the potential for implementation of full wastewater servicing in Delaware. Sanitary flows were proposed to be transported through a pumping station in Delaware via forcemain along Gideon Drive to the expanded Komoka WWTF.

1.2.1.4 Komoka-Kilworth

The Komoka-Delaware Municipal Servicing Implementation Study Class EA identified the need to expand the Komoka WWTF. The expansion to treatment capacity is necessary to service future development, and to accommodate future flows for Kilworth and Delaware, if a communal municipal system is eventually constructed.

It has been previously identified that areas within the growth boundary west of the Kilworth WWTF service area are to be serviced by the Komoka WWTF.

1.3 ADDITIONAL DATA SOURCES

The following sources of information was reviewed in preparation of this report:

- Relevant GIS data.
- As-built drawings.
- Pumping Station Annual Reports.
- Ilderton and Komoka WWTP Performance Reports.
- SCADA Data.

2.0 EXISTING WASTEWATER SYSTEMS

The Municipality of Middlesex Centre is divided into a three-level hierarchy, outlined in the Middlesex County Official Plan. The three settlement area types, ranging from largest to smallest, are: Urban Settlement Areas, Community Settlement Areas, and Hamlets. See **Figure 1-1** for an overview of the serviced settlement areas.

Urban Settlement Areas include Ilderton and Komoka-Kilworth. Community Settlement Areas include Arva and Delaware. Hamlets consist of Ballymote, Birr, Bryanston, Denfield, Lobo, Melrose, and Poplar Hill-Coldstream.

The following subsections summarize current wastewater servicing in each community. The summary list below provides an overview of wastewater collection and treatment within the Municipality.

Table 2-1: Wastewater Collection and Treatment Summary

Community	Collection System present (Yes/No)	Treatment
Ilderton	Yes	Extended Aeration (EA) WWTF
Komoka	Yes	Extended Aeration (EA) WWTF
Arva	Yes	Sewage sent to City of London collection system through Agreement[1]
Delaware	No	Private Sewage Systems
Ballymote	No	Private Sewage Systems
Birr	No	Private Sewage Systems
Bryanston	No	Private Sewage Systems
Denfield	No	Private Sewage Systems
Lobo	No	Private Sewage Systems
Melrose	No	Private Sewage Systems
Poplar Hill-Coldstream	No	Private Sewage Systems

Notes:

1. Sewage Treatment Agreement (April 12, 2000)

2.1 ILDERTON

Ilderton is situated to the northwest of the City of London, near Ilderton Road & Hyde Park Road. It is classified as an *Urban Settlement Area* and has a population of approximately 3,695 people (2021 Census estimate). **Figure 1-1** shows the location of Ilderton in relation to the other settlement areas.

Ilderton's wastewater infrastructure, shown in **Figure 2-1**, consists primarily of:

- Sanitary sewer collection network.
- Four (4) municipal pumping station and respective forcemains, which collect sanitary flow from the collection network and transports flows to downstream pumping stations and then to the Ilderton Wastewater Treatment Facility (WWTF).
- The Ilderton WWTF which was updated in 2019 and is now rated for 1,300 m^3/day.
- The Ilderton WWTF has a biosolids storage capacity of 1,500 m^3.

2.2 KOMOKA-KILWORTH

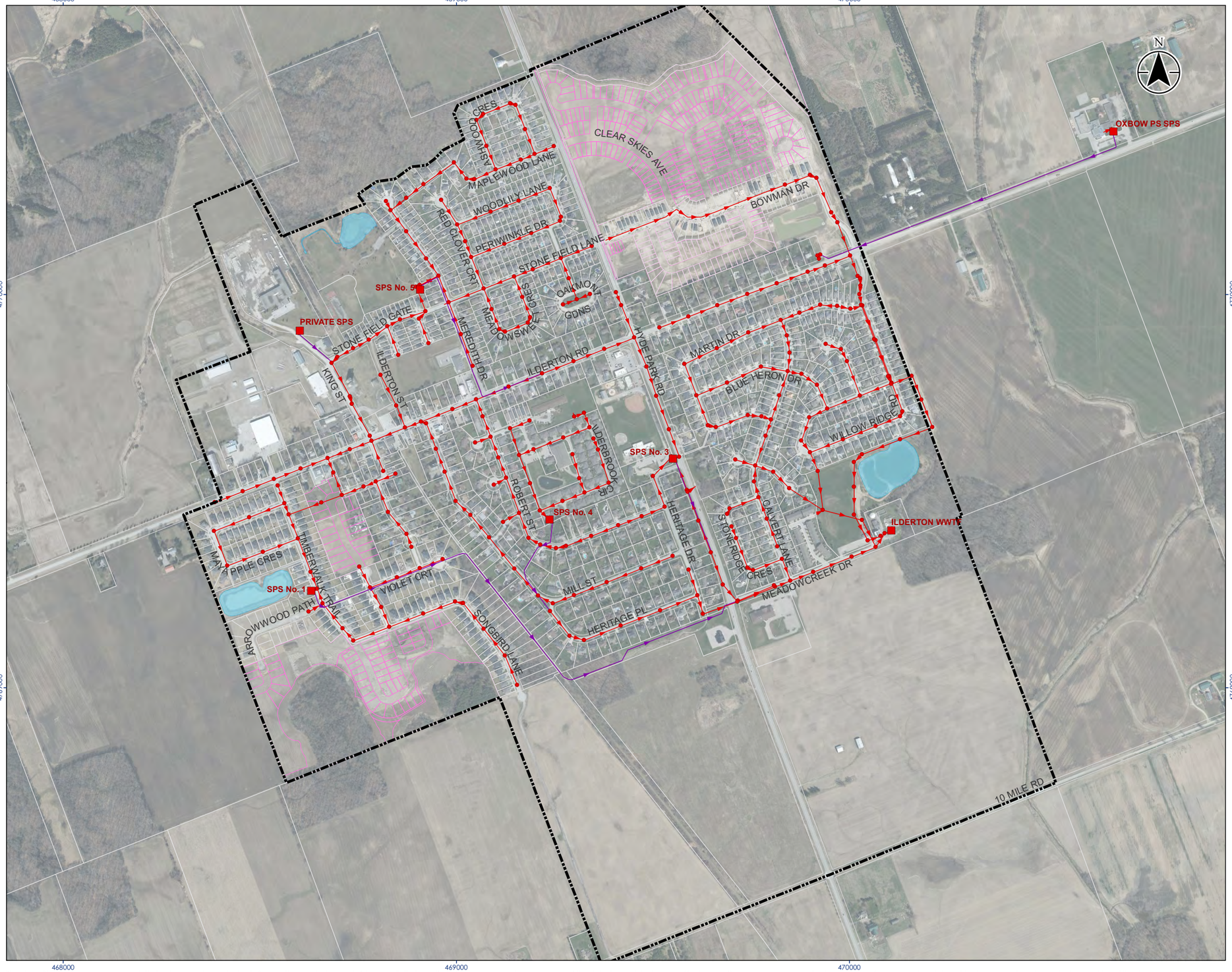
Komoka-Kilworth is situated to the west of the City of London, along Glendon Drive. It is classified as an *Urban Settlement Area.* Komoka has a population of approximately 2,536 people and Kilworth has a population of approximately 3,113 people (2021 Census estimates). **Figure 1-1** shows the location of Komoka-Kilworth in relation to the other settlement areas.

The present settlement area is serviced by the Komoka WWTP. Komoka's wastewater infrastructure, shown in **Figure 2-2**, consists primarily of:

- Sanitary sewer collection network.
- One (1) pumping station and respective forcemain which collects sanitary flow from the entire area, and pumps to the Komoka WWTP
- The Komoka WWTP with a rated capacity of 2250 m^3/d.
- The Komoka WWTP has a biosolids storage capacity of 2500 m^3.

Kilworth's wastewater infrastructure, shown in **Figure 2-3**, consists primarily of:

- Sanitary sewer collection network for the majority of Kilworth.
- Private septic systems service the eastern portion of Kilworth.
- Two (2) pumping stations and respective forcemains; the Blackburn PS (Kilworth PS #1) collects sanitary flow from a small section of development in the southeast of Kilworth and pumps into the gravity sewer at Westbrook Crescent. Kilworth PS #2 collects the entirety of Kilworth's sanitary flow and pumps through the respective forcemain to the Komoka WWTP.



Stantec

Legend

- Settlement Boundary
- Parcel
- Future Subdivision

Sanitary System

- Facility
- Maintenance Hole
- Sewer
- Forcemain

0 340 680 m

1:10,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Includes material © 2023 of the King's Printer for Ontario. All Rights Reserved. Imagery date Spring 2020.
3. Parcels © Teranet Enterprises Inc. and its suppliers. All rights reserved. Not a plan of

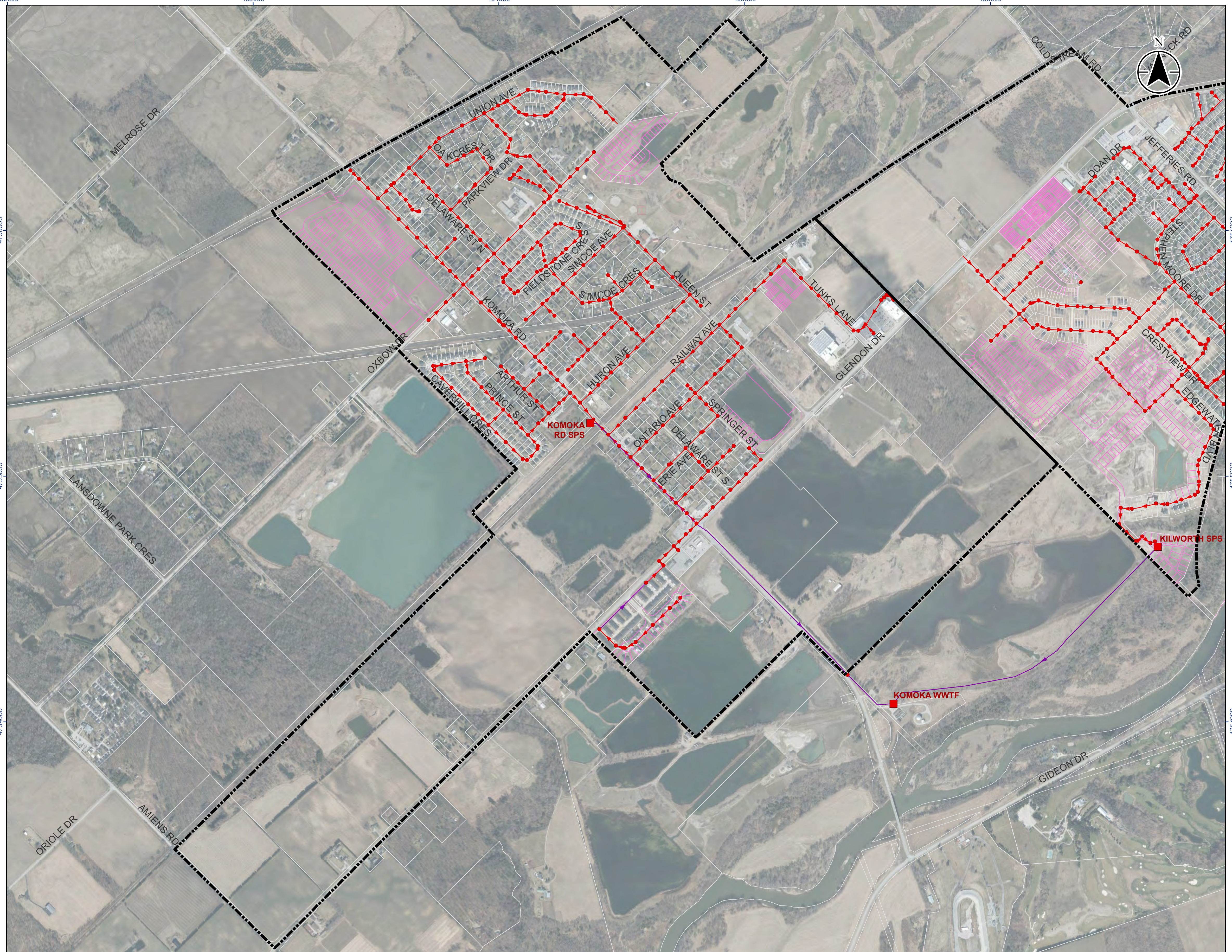
Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-01-22

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
2-1

Title
Ilderton Current Wastewater Infrastructure



Stantec

Legend

- Settlement Boundary
- Parcel
- Future Subdivision

Sanitary System

- Facility
- Maintenance Hole
- Sewer
- Forcemain

0 550 1,100 m

1:16,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Includes material © 2023 of the King's Printer for Ontario. All Rights Reserved. Imagery date Spring 2020.
3. Parcels © Teranet Enterprises Inc. and its suppliers. All rights reserved. Not a plan of

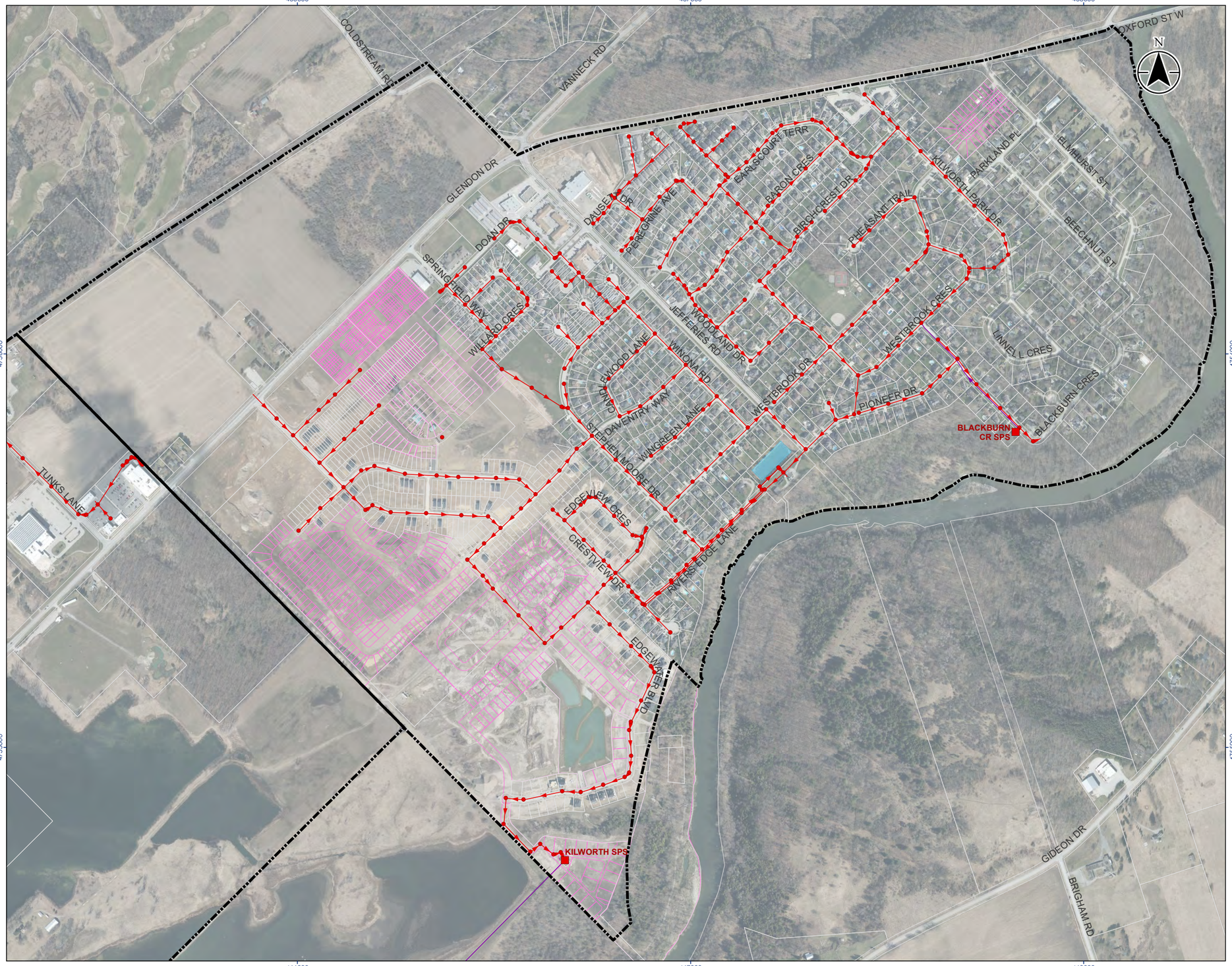
Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-01-22

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
2-2

Title
Komoka Current Wastewater Infrastructure



Stantec

Legend

- Settlement Boundary
- Parcel
- Future Subdivision

Sanitary System

- Facility
- Maintenance Hole
- Sewer
- Forcemain

0 340 680 m

1:10,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Includes material © 2023 of the King's Printer for Ontario. All Rights Reserved. Imagery date Spring 2020.
3. Parcels © Teranet Enterprises Inc. and its suppliers. All rights reserved. Not a plan of

Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-01-22

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
2-3

Title
Kilworth Current Wastewater Infrastructure

2.3 ARVA

Arva is situated to the north of the City of London, near Richmond Street North & Medway Road. It is classified as a *Community Settlement Area* and has a population of approximately 455 people (2021 Census estimates). **Figure 1-1** shows the location of Arva in relation to the other settlement areas.

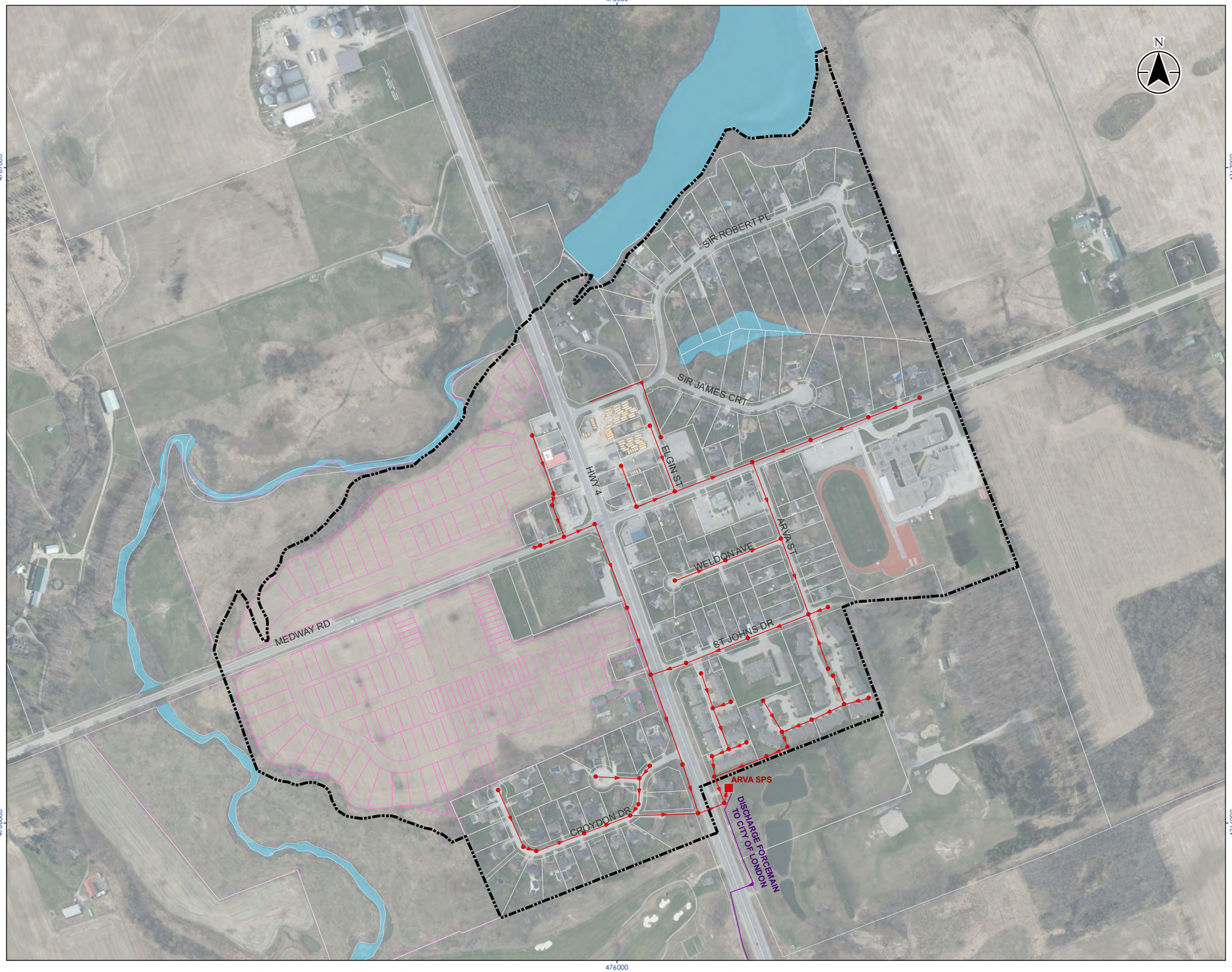
Arva's wastewater infrastructure, shown in **Figure 2-4**, consists primarily of:

- Sanitary gravity sewer collection network for the majority of Arva.
- Private septic systems service existing residential in the northeast corner of Arva.
- Arva Pumping Station (PS) which collects sanitary flow from the collection network; and
- Sanitary forcemain from the Arva PS south along Richmond Street North which connects to the City of London sanitary trunk sewer main to a manhole at Plane Tree Drive and Richmond Street North.
- The servicing agreement with the City of London limits flow to a maximum of 175 m^3/d.

2.4 DELAWARE

Delaware is situated to the west of the City of London, near Longwoods Road & Gideon Drive. It is classified as a *Community Settlement Area* and has a population of approximately 1,601 people (2021 Census estimates). Error! Reference source not found. shows the location of Delaware in relation to the o ther settlement areas.

Delaware does not currently have municipal wastewater servicing. It relies on private sewage services for individual properties.



Stantec

Legend

- Settlement Boundary
- Parcel
- Future Subdivision

Sanitary System

- Facility
- Maintenance Hole
- Sewer
- Forcemain

0 200 400 m

1:6,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Includes material © 2023 of the King's Printer for Ontario. All Rights Reserved. Imagery date Spring 2020.
3. Parcels © Teranet Enterprises Inc. and its suppliers. All rights reserved. Not a plan of

Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-01-22

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
2-4

Title
Arva Current Wastewater Infrastructure

2.5 HAMLET AREAS AND RURAL AREAS

Table 2-2 below provides a summary of all of the Hamlets in the Municipality along with the wastewater servicing provided.

Table 2-2: Hamlet Information

Hamlet	Population	Location	Wastewater Servicing
Ballymote	113	Northeast of the City of London, near Highbury Avenue North & Medway Road	Individual private septic systems
Birr	248	North of the City of London, near Richmond Street North & Thirteen Mile Road	Individual private septic systems
Bryanston	179	Northeast of the City of London, near Highbury Avenue North & Twelve Mile Road	Individual private septic systems
Denfield	237	Northwest of the City of London, near Denfield Road & Sixteen Mile Road	Individual private septic systems
Lobo	82	Northwest of the City of London, near Egremont Drive & Nairn Road	Individual private septic systems
Melrose	296	Northwest of the City of London, near Egremont Drive & Vanneck Road	Individual private septic systems
Poplar Hill - Coldstream	763	Northwest of the City of London, along Ilderton Road, between Komoka Road and Coldstream Road	Individual private septic systems

3.0 EXISTING AND FUTURE POPULATIONS

Stantec established a methodology to estimate existing populations and future residential and employment growth by using the 2020 Growth Management Study prepared by Watson and Associates and the 2021 census data.

3.1 RESIDENTIAL DATA

The 2021 census data was used to estimate the residential populations of Middlesex Centre. A Net Under Coverage Rate of 2.8% as per the Ontario 2016 census was applied to this as the 2021 value was not yet released. This was referred to as Adjusted 2021 Population which was used as a base for future projections as shown in **Table 3-1** below. Residential growth was projected for each settlement up to 2046 using annual growth rates provided by the Growth Management Study (Watson and Associates, 2020).

Table 3-1: Residential Population Growth

	2021		2026	2031	2036	2041	2046
Settlement Area	**Adjusted Population**	**Annual Growth Rate**	**Projected Populations**				
Settlement Areas	**11,399**		**13,437**	**15,868**	**18,771**	**22,243**	**26,404**
Ilderton	3,695	2.4%	4,160	4,684	5,273	5,937	6,685
Komoka-Kilworth (Summed)	5,649	4.2%	6,939	8,524	10,471	12,862	15,800
Arva	455	2.3%	509	571	639	716	803
Delaware	1,601	2.7%	1,829	2,090	2,387	2,728	3,116
Sum of Hamlets and Remaining Rural Areas	**8,059**		**8,140**	**8,221**	**8,304**	**8,387**	**8,472**
Hamlets	1,984		2,004	2,024	2,045	2,065	2,086
Ballymote	113		114	115	117	118	119
Birr	248		250	253	255	258	260
Bryanston	179	0.2%	181	182	184	186	188
Coldstream/Poplar Hill	763		771	779	787	795	803
*Middlesex Terrace	67		67	68	69	70	70
Denfield	237		239	241	244	246	249
Lobo	82		83	84	85	86	86
Melrose	296		299	302	305	308	311
Remaining Rural Area	6,075		6,136	6,197	6,259	6,322	6,386
Total Residential Population	**19,458**		**21,577**	**24,089**	**27,075**	**30,631**	**34,875**

* Middlesex Terrace is considered part of Delaware

3.2 EMPLOYMENT DATA

The existing employment population of each settlement area was estimated using GIS data of the industrial, commercial and institutional (ICI) areas designated in the Official Plan. An assumption of 50 jobs per hectare was made for Middlesex Centre to estimate the number of jobs represented by each lot. Manual adjustments were made to the populations of a selection of known businesses to improve accuracy.

To project employment population growth up to 2046, the employee growth forecast for Middlesex Centre was used from the Growth Management Study. Only industrial, commercial, and institutional activities were taken into consideration. Existing employment data from 2016 was used as a baseline with overall employment growth in the Municipality added to that baseline to establish future years employment. Employment growth by settlement area was not defined, however, a distribution percentage was provided in the Growth Management Study. Accordingly, future employment projections were estimated using the overall employment growth rate for the Municipality and assigned to the settlement areas by the distribution percentage. As a baseline employment number was not available for 2021, similar to the Residential Population Growth, the 2021 employment was based on the growth rates assumed in the Growth Management Study. Employment growth is represented as linear in the forecasts but in actuality is anticipated to occur in a non-linear manner. Accordingly, the approach noted creates some discrepancy between projections and actual for some of the interim years. Delaware in particular showed a high employment number in the short term which does not align with anecdotal data.

Table 3-2: Employment Growth Projections

Growth by Area	% Growth	Existing	Planning Horizon (Growth)					
		2016	2021	2026	2031	2036	2041	2046
Total Growth			480	1140	1890	2620	3310	3870
Ilderton	11%	614	668	742	826	907	985	1047
Komoka-Kilworth	18%	1157	1244	1364	1501	1634	1759	1861
Arva	2%	307	318	332	349	365	380	392
Delaware	59%	399	683	1074	1518	1950	2359	2690
Hamlets and Remaining Rural Areas	9%	1083	1127	1188	1257	1324	1388	1439

Existing and Future Populations
April 19, 2024

Table 3.2.1: Summary of Total Existing and Future Residential (RES) & Employment (EMP) Populations

Horizon	2021		2026		2031		2036		2041		2046	
Settlement Area	**RES**	**EMP**	**RES**	**EMP**	**RES**	**EMP**	**RES**	**EMP**	**RES**	**EMP**	**RES**	**EMP**
Arva	455	318	509	332	571	349	639	365	716	380	803	392
Ballymote	113	0	114	0	115	0	117	0	118	0	119	0
Birr	248	0	250	0	253	0	255	0	258	0	260	0
Bryanston	179	0	181	0	182	0	184	0	186	0	188	0
Coldstream/Poplar Hill	763	0	771	0	779	0	787	0	795	0	803	0
Delaware	1,601	683	1,829	1,074	2,090	1,518	2,387	1,950	2,728	2,359	3,116	2,690
Middlesex Terrace(1)	67	0	67	0	68	0	69	0	70	0	70	0
Denfield	237	0	239	0	241	0	244	0	246	0	249	0
Ilderton	3,695	668	4,160	742	4,684	826	5,273	907	5,937	985	6,685	1,047
Komoka-Kilworth	5,649	1,244	6,939	1,364	8,524	1,501	10,471	1,634	12,862	1,759	15,800	1,861
Kilworth	3,113	255(2)	3,824	279(2)	4,697	307(2)	5,770	335(2)	7,088	360(2)	8,707	381(2)
Komoka	2,536	990(2)	3,115	1,085(2)	3,826	1,194(2)	4,700	1,299(2)	5,774	1,399(2)	7,093	1,480(2)
Lobo	82	0	83	0	84	0	85	0	86	0	86	0
Melrose	296	0	299	0	302	0	305	0	308	0	311	0
Remaining Rural Area	6,075	1,127	6,136	1,188	6,197	1,257	6,259	1,324	6,322	1,388	6,386	1,439
Total	19,458	4,040	21,577	4,700	24,089	5,450	27,075	6,180	30,631	6,870	34,875	7,430

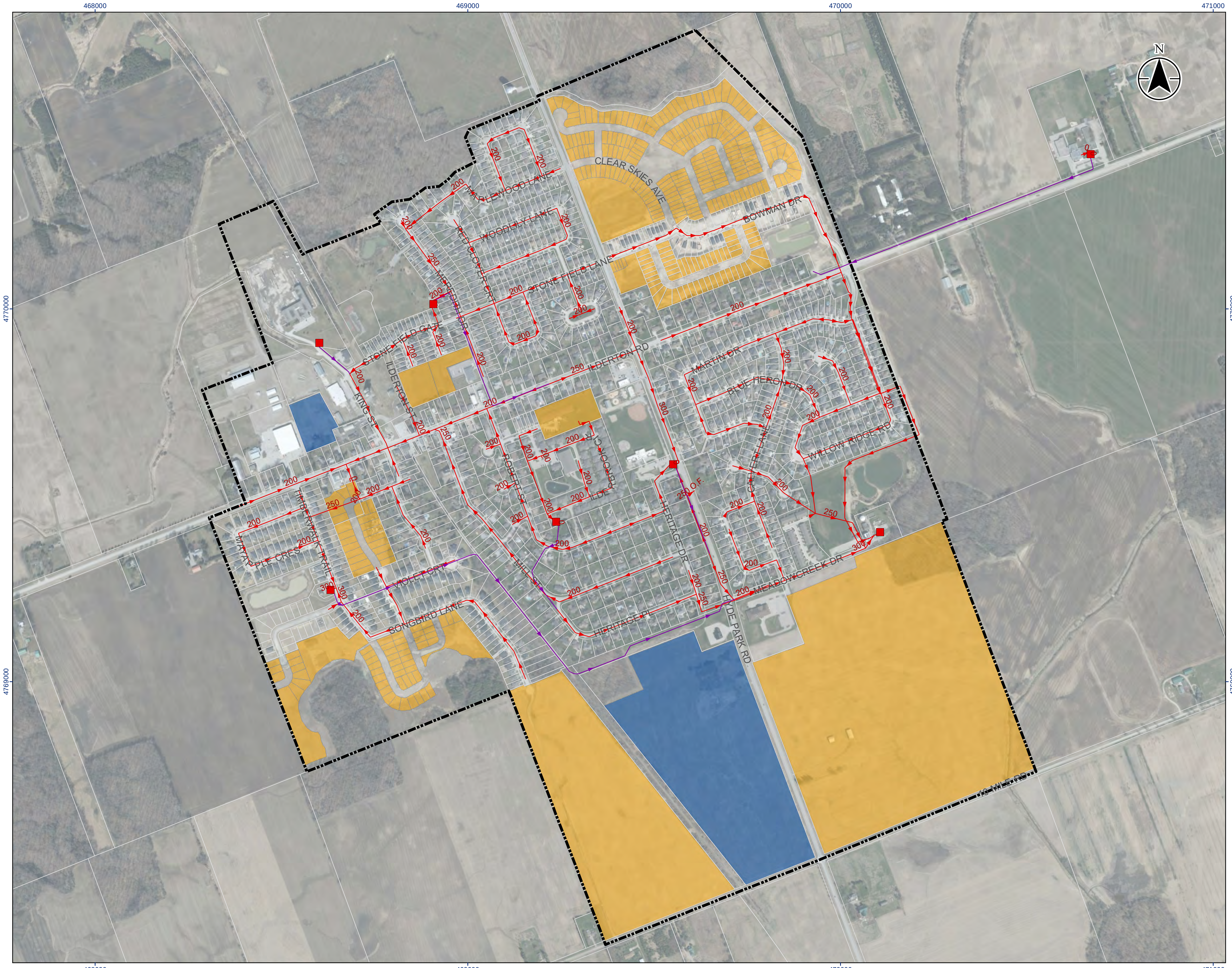
Notes:

(1) Middlesex Terrace is considered part of Delaware.

(2) Employment population breakdown between Kilworth and Komoka based on percentage of ICI parcel areas within each settlement (Komoka: 80%; Kilworth: 20%).

3.3 FUTURE DEVELOPMENT

Figure 3-1 to Figure 3-5 depict the future development areas for each community.



Stantec

Legend

Settlement Boundary

Parcel

Future Servicing

Existing Area to Consider Servicing

Development Area - Residential

Development Area - ICI

Existing Sanitary System

Facility

Gravity Sewer

Forcemain

0 360 720 m

1:10,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Orthoimagery © First Base Solutions, 2018. Imagery Date, 20XX.

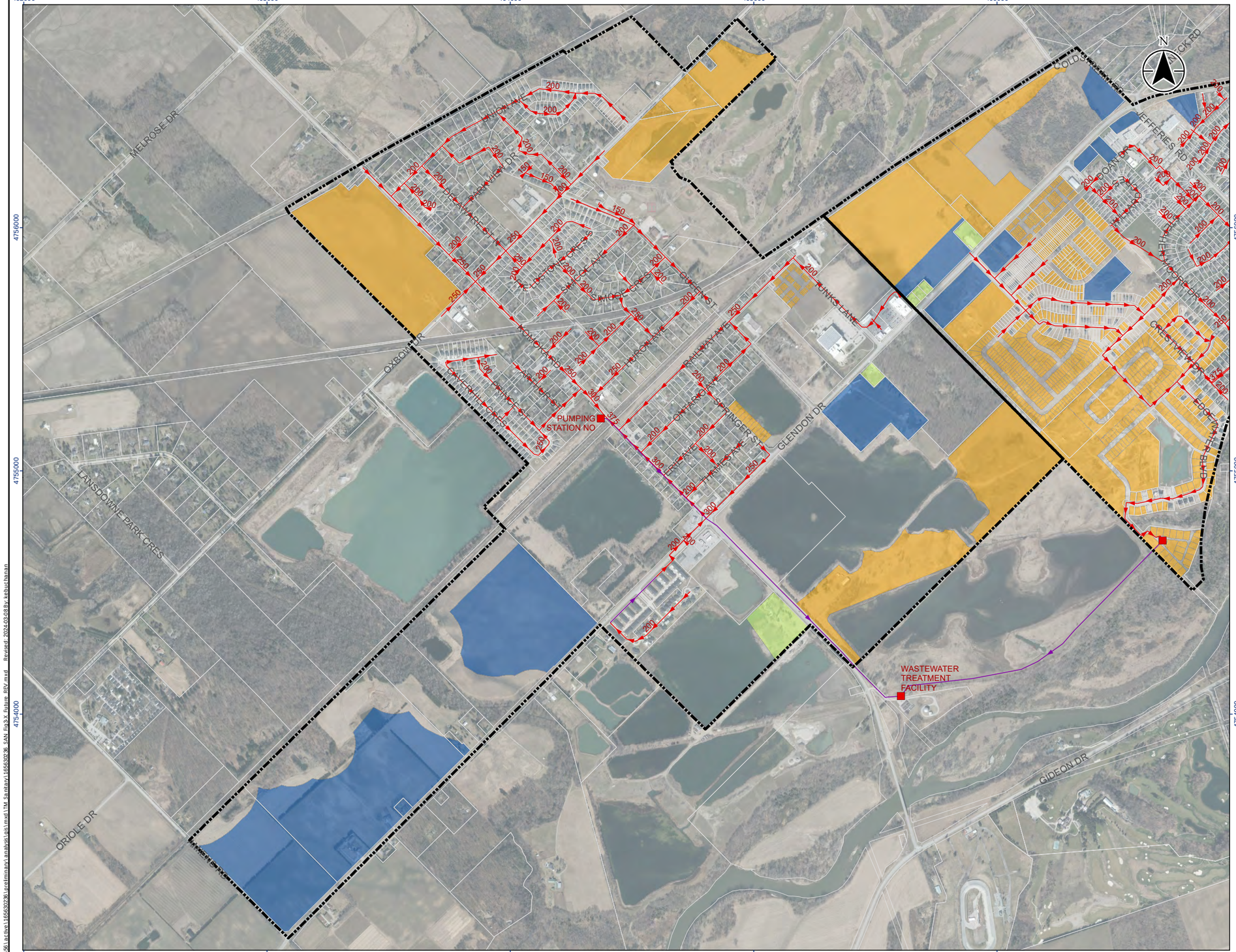
Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-03-08

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
3-1

Title
Ilderton
Future Development



Stantec

Legend

- Settlement Boundary
- Parcel

Future Servicing

- Existing Area to Consider Servicing
- Development Area - Residential
- Development Area - ICI

Existing Sanitary System

- Facility
- Gravity Sewer
- Forcemain

0 550 1,100 m

1:16,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Orthoimagery © First Base Solutions, 2018. Imagery Date, 20XX.

Project Location
Municipality of Middlesex Centre

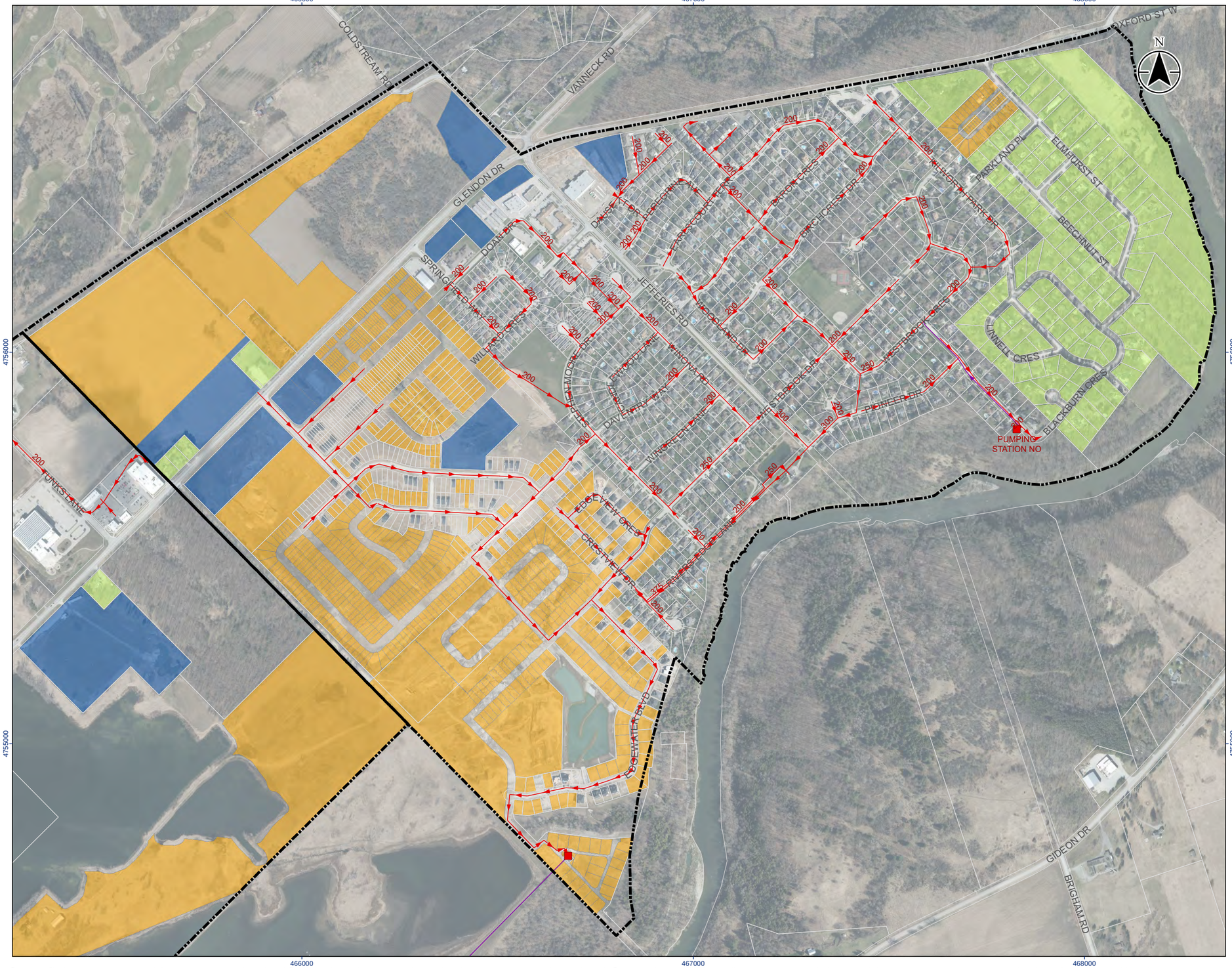
165630236 REVA
Prepared by KDB on 2024-03-08

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
3-2

Title
Komoka
Future Development

V:\0165\active\165630236\preliminary\analysis\gis\mxd\1TM_Sanitary\165630236_SAN_Fig3-X_future_REV.mxd Revised: 2024-03-08 By: kchurchanan



Stantec

Legend

- Settlement Boundary
- Parcel

Future Servicing

- Existing Area to Consider Servicing
- Development Area - Residential
- Development Area - ICI

Existing Sanitary System

- Facility
- Gravity Sewer
- Forcemain

0 340 680 m

1:10,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Orthoimagery © First Base Solutions, 2018. Imagery Date, 20XX.

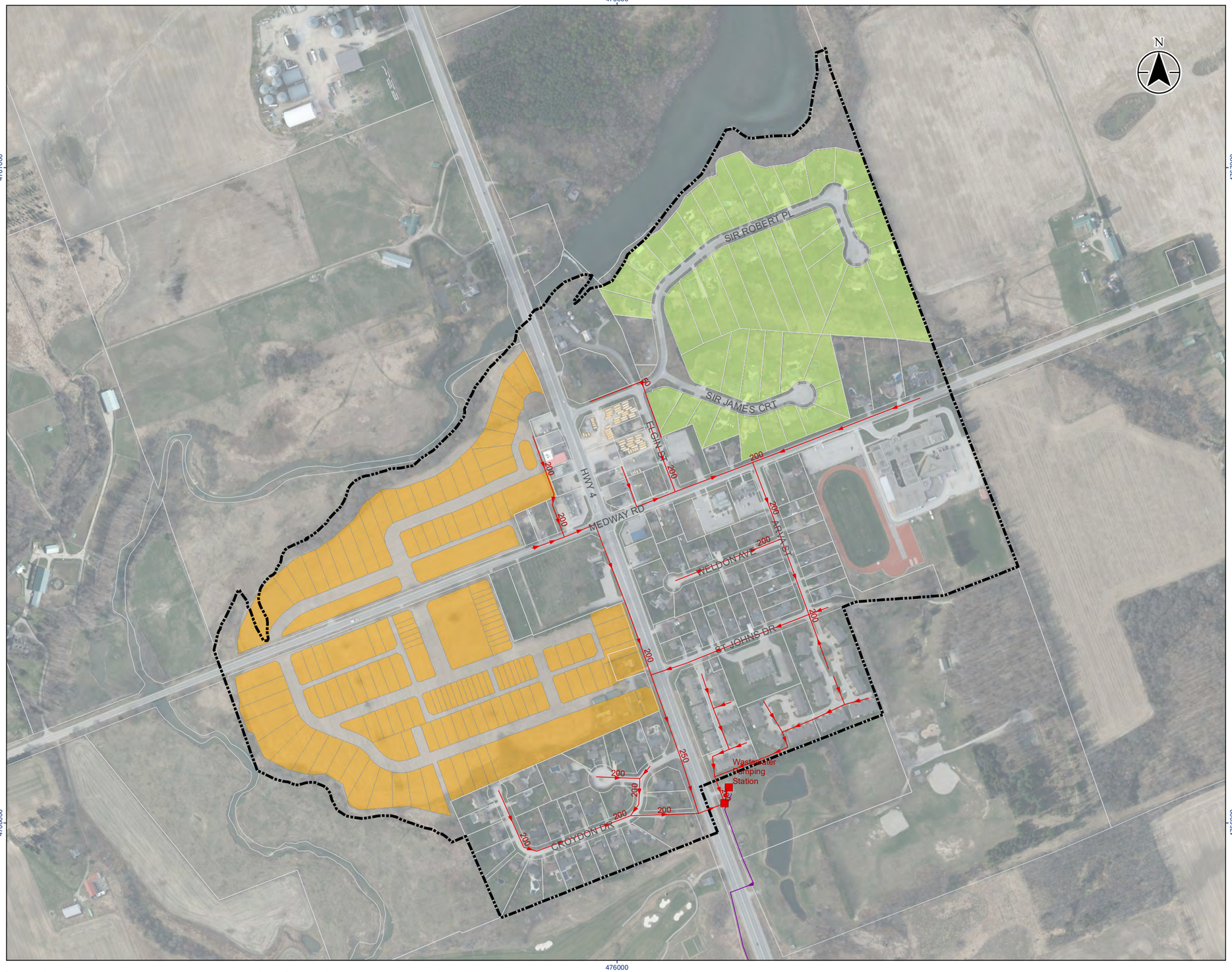
Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-03-08

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
3-3

Title
Kilworth
Future Development



Stantec

Legend

- Settlement Boundary
- Parcel

Future Servicing

- Existing Area to Consider Servicing
- Development Area - Residential
- Development Area - ICI

Existing Sanitary System

- Facility
- Gravity Sewer
- Forcemain

0 200 400 m

1:6,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Orthoimagery © First Base Solutions, 2018. Imagery Date, 20XX.

Project Location
Municipality of Middlesex Centre

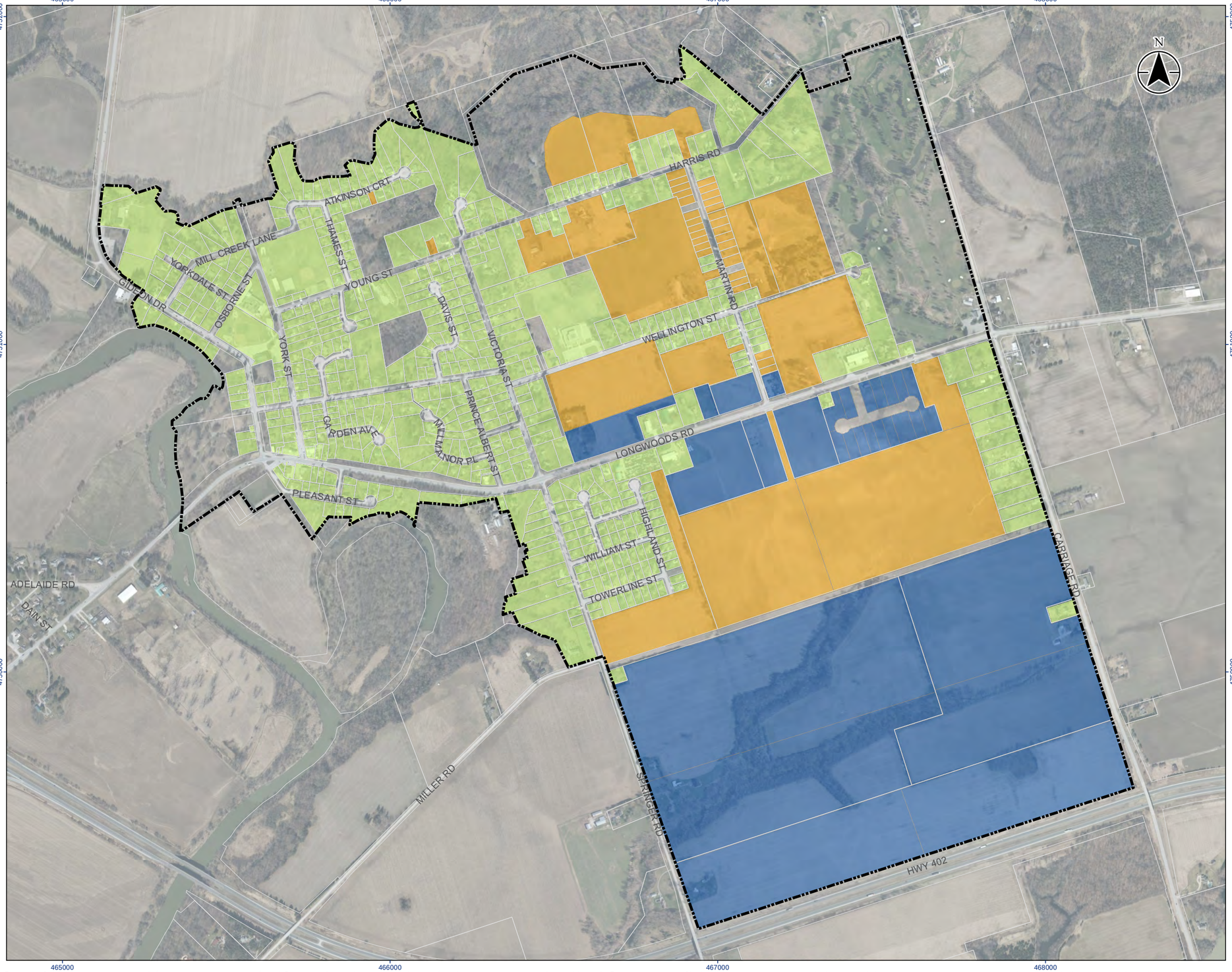
165630236 REVA
Prepared by KDB on 2024-03-08

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
3-4

Title
Arva
Future Development

V:\0165\active\165630236\preliminary\analysis\gis\mxd\1M_Satellite\165630236_SAN_Fig3-X_Future_REV.mxd Revised: 2024-03-08 By: kdbuchanan



Stantec

Legend

- Settlement Boundary
- Parcel

Future Servicing

- Existing Area to Consider Servicing
- Development Area - Residential
- Development Area - ICI

Existing Sanitary System

- Facility
- Gravity Sewer
- Forcemain

0 410 820 m

1:12,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Orthoimagery © First Base Solutions, 2018. Imagery Date, 20XX.

Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-03-08

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
3-5

Title
Delaware
Future Development

4.0 ASSESSMENT OF EXISTING SYSTEMS

The following section describes the applicable standards and design guidelines used to define the target level of service (LOS) criteria for the baseline conditions assessment, and identification of future servicing needs. These criteria are then used to assess the existing systems, under existing and growth demand conditions.

4.1 APPLICABLE STANDARDS AND DESIGN GUIDELINES

The following standards and design guidelines were referred to throughout this 2023 MSP for the assessment of the wastewater systems:

- Middlesex Centre Infrastructure Design Standards, Municipality of Middlesex Centre, January 2018.
- Design Guidelines for Sewage Works, Ministry of Environment Conservation and Parks (formerly Ministry of Environment), 2008.

4.2 TARGET LEVEL OF SERVICE

4.2.1 Per Capita Sewage Flow

The Per Capita Sewage Flow per the Middlesex Infrastructure Design Standards (January 2018) is 350 L/c/d. While this design value is appropriate for the site-level design of sewers for new subdivisions/sites where a more conservative flow estimate may be appropriate, it is higher than actual sewage generation, and using this value can lead to the identification of upgrades in the sanitary system that may not be required.

A review was undertaken of existing flows in the sewer system in comparison to existing populations. In particular, the actual average daily flow at both the Komoka WWTP and Ilderton WWTP for 2020 and 2021 were used and compared to 2021 population (census residential plus estimated employment). Based on this comparison, it is estimated that the actual flow ranged from 193 to 216 liters per capita per day. A more conservative value of 240 l/c/d was selected for use in the Master Plan which aligns with the value used in the water distribution system analysis.

Use of this lower design standard is not intended to suggest that the Municipality revise their design standards. Using the lower flow rate for the Master Plan is considered appropriate because it is more in line with actual flows. Accordingly, projects identified under this Master Plan are thus triggered by actual capacity issues.

4.2.2 Collection Systems

Each sewer manhole segment was assessed based on current and future demand. For sewers that do not have adequate capacity or were part of a proposed servicing alignment, new infrastructure is

proposed. As per Middlesex Centre Infrastructure Guidelines, sewers parameters are proposed based on the following parameters:

- Minimum scour velocity of 0.6 m/sec.
- Minimum grade for 200 mm diameter wastewater pipe of 0.33%; for all other sewer sizes, the minimum grade necessary to achieve a velocity of at least 0.6 m/sec.
- Peaking Factor Harmon (ratio of peak flow to average flow), used to establish peak flow.
- Infiltration allowance of 0.1 L/sec/hectare applied to peak flow.
- Full depth pipe flow.
- A flow generation rate of 240 liters/capita/day was applied to existing and future populations to estimate flows.

The following **Table 4-1** provides the Land Use type and associated populations density used to estimate population based on land use.

Table 4-1: Lot-Count Densities

Land Use	Population Density
Low Density Residential	3 people/unit
Medium Density Residential	2.4 people/unit
ICI	100 people/hectare
Elementary School	400 students
Secondary School	1500 students

4.2.3 Pumping Stations

Each sewage pumping station was assessed based on current and future demand. For pumping stations that do not have adequate capacity or were part of a proposed servicing alignment, new infrastructure or upgrades on the existing infrastructure is proposed. As per Middlesex Centre Infrastructure Guidelines, pumping stations are proposed based on the following parameters:

- Firm capacity is based on one of largest pump out of service. At least two pumps will be provided and sized to provide firm capacity.
- Pump station should be capable of handling the design peak flow.
- A flow generation rate of 240 liters/capita/day was applied to existing and future populations to estimate flows.
- The volume of the wet well will be based on the design average flow with a filling time to not exceed 30 minutes unless if the pumping station is designed to provide flow equalization.

- All pumping station will be equipped with an emergency onsite generator. Generator shall be of sufficient capacity of running full station load.

4.2.4 Wastewater Treatment Facilities

- A flow generation rate of 240 liters/capita/day was applied to future populations to estimate additional treatment plant flows.
- If flow exceeded 85% of the treatment plant capacity, this indicated a need for a WWTP expansion.

4.3 EXISTING COLLECTION SYSTEMS TECHNICAL ASSESSMENT

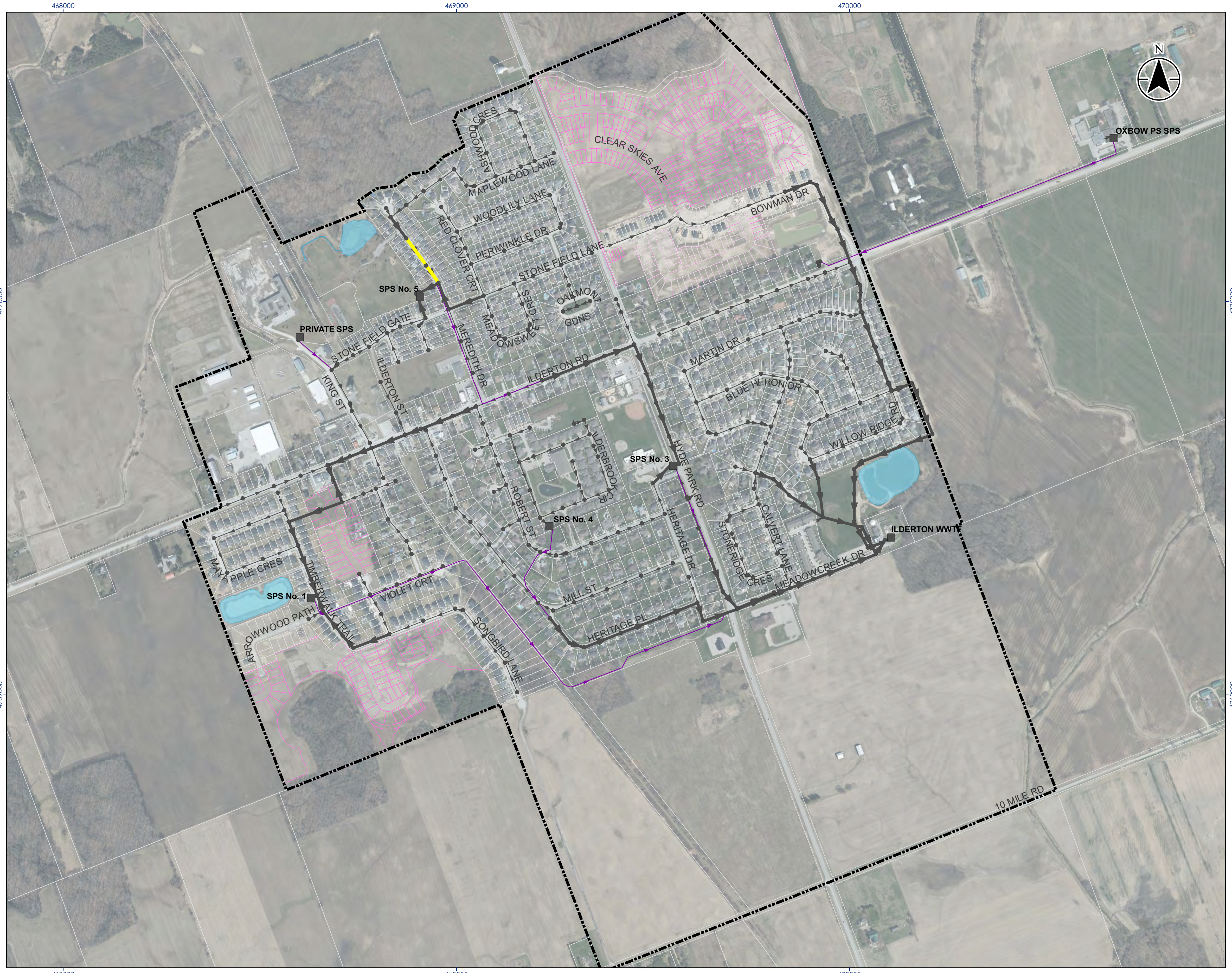
The key sewers within the communities of Ilderton, Komoka-Kilworth and Arva were identified. Each area had a corresponding design sheet constructed, which subdivided the key sewers into manhole segments to review sewer capacity. Sewage generation was calculated based on lot count population data, given by Middlesex Centre Infrastructure Guidelines for residential, ICI properties, and schools. Where available, school enrollment populations were used in lieu of design standards. To account for the effects of future development in design sheets, the projected flows were assigned to the nearest upstream existing manhole. Inflow and infiltration was modelled using the design parameters outlined in the Municipal standards.

The collection systems were reviewed under both the existing conditions scenario and the future growth scenarios to determine if the existing collection systems had sufficient capacity under each scenario and whether they met the minimum scour velocities under each scenario. The future growth scenario for this analysis was considered as the ultimate buildout of the sewer catchment area to the limit of the current settlement boundary. Accordingly, population figures used in the spreadsheet analysis may not align with the growth projections noted in section 3.0. Ultimate buildout populations were utilized given the uncertain nature of development in each community and inability of the study to assign population growth to specific catchments for the projected 2046 growth horizon. Findings from this analysis is presented in the following sections.

4.3.1 Ilderton

Under both the existing conditions scenario and the future growth scenario the existing sewers in Ilderton operated within their capacity limits. Under both existing and future conditions there are 2 pipe segments that do not meet the minimum scour velocity permitted in the design guidelines.

Figure 4-1 shows the location of these sewers. These two pipes had values of 0.45 and 0.48 m/s. Given that these values are marginally below the Municipal standard, they are not recommended for replacement at this time. It is recommended that the Municipal conduct regular inspections and flushing of these lines.



Stantec

Legend

- Settlement Boundary
- Parcel
- Future Subdivision

Existing Sanitary System

- Facility
- Maintenance Hole
- Assessed Sewer
- Other Sewer
- Forcemain

Sewer Assessment

- Under Velocity
- Near Capacity
- Over Capacity

0 340 680 m

1:10,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Includes material © 2023 of the King's Printer for Ontario. All Rights Reserved. Imagery date Spring 2020.
3. Parcels © Teranet Enterprises Inc. and its suppliers. All rights reserved. Not a plan of

Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-02-23

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
4-1

Title
Ilderton Existing Collection System Assessment

V:\01656\active\165630236\preliminary\analysis\gis\mxd\TM_Sanitary\165630236_SAN_Fig4-X_CollectionSystemAssessment.mxd Revised: 2024-02-23 By: kebuchanan

4.3.2 Komoka

Under the existing conditions scenario the existing sewers in Komoka operated within their capacity limits. Under the future conditions scenario four sewers on Komoka Road showed slightly over capacity and one shows as significantly over capacity. The only segment recommended for replacement is the segment which is significantly over capacity which is immediately upstream of the Komoka PS. For the remaining segments, it is recommended that the Municipality undertake flow monitoring in these sewers as development progresses to determine if upgrades may be required. **Figure 4-2** depicts these findings.

In the existing conditions and future growth scenarios, there are nine pipe segments which do not meet the minimum scour velocity permitted in the design guidelines. **Figure 4-2** depicts these findings. Velocities in the design sheet indicated these operate between 0.56 and 0.58 m/s. As this is only slightly below the design standard of 0.6 m/s, no further action is recommended.

4.3.3 Kilworth

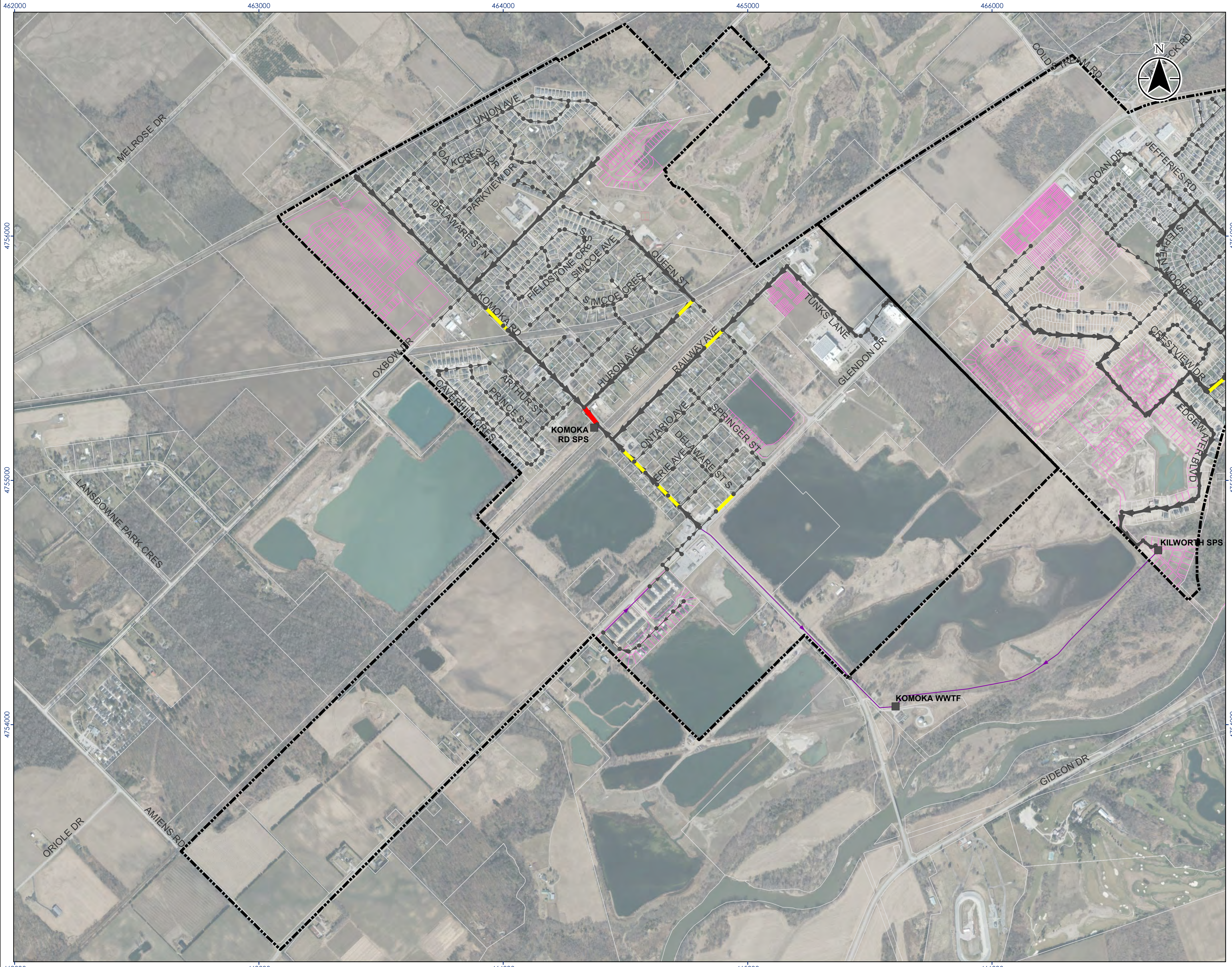
Under both the existing conditions scenario and the future growth scenario the existing sewers in Kilworth operated within their capacity limits. Kilworth has five pipe segments that do not meet the minimum scour velocity permitted in the design guidelines. These five pipes had values between 0.46 and 0.58 m/s. It is recommended that the Municipal conduct regular inspections and flushing of these lines as they do not meet the minimum scour velocity. **Figure 4-3** depicts these findings.

4.3.4 Arva

Arva has five pipe segments where flows exceed capacity under the existing scenario. Note that one of these pipe segments is located inside the PS facility and is not included in **Figure 4-4,** which depicts these findings. In the future development scenario, the same 5 pipe segments would be operating above capacity.

Of the 5 pipe segments identified, four of these are located on Arva Street and St. Johns Drive. These segments are slightly over capacity under existing conditions and, as they do not accept additional growth flows, remain unchanged in the future conditions analysis. The largest contributing factor to the over capacity issue is the estimated population of the high school. These sewers show in the design sheet as slightly over capacity and it is our understanding that no surcharging issues are currently noted in these sections of pipe. Accordingly, no further action is recommended for these sewers. Should an expansion to the high school be undertaken or the high school population increase, further review and flow monitoring is recommended.

For the final segment, which is upstream of the pumping station, it is recommended that this pipe segment be considered for upgrade concurrent with upgrades in the Arva pumping station. Actual flows in the pumping station should be analyzed and compared to the upstream sewer to determine if the pipe capacity has been exceeded.



Stantec

Legend

- Settlement Boundary
- Parcel
- Future Subdivision

Existing Sanitary System

- Facility
- Maintenance Hole
- Assessed Sewer
- Other Sewer
- Forcemain

Sewer Assessment

- Under Velocity
- Near Capacity
- Over Capacity

0 550 1,100 m

1:16,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Includes material © 2023 of the King's Printer for Ontario. All Rights Reserved. Imagery date Spring 2020.
3. Parcels © Teranet Enterprises Inc. and its suppliers. All rights reserved. Not a plan of

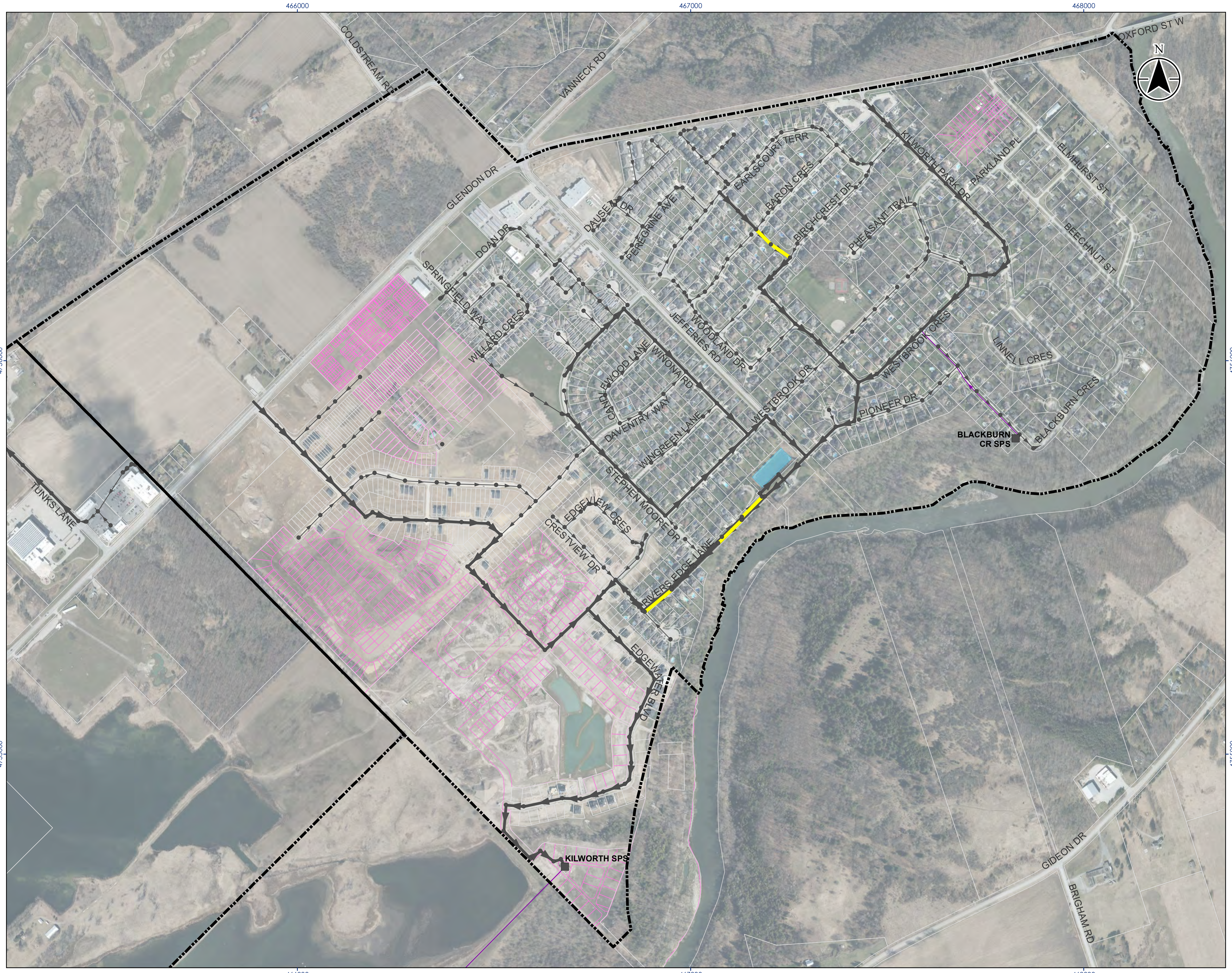
Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-02-23

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
4-2

Title
Komoka Existing Collection System Assessment



Stantec

Legend

- Settlement Boundary
- Parcel
- Future Subdivision

Existing Sanitary System

- Facility
- Maintenance Hole
- Assessed Sewer
- Other Sewer
- Forcemain

Sewer Assessment

- Under Velocity
- Near Capacity
- Over Capacity

0 340 680 m

1:10,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Includes material © 2023 of the King's Printer for Ontario. All Rights Reserved. Imagery date Spring 2020.
3. Parcels © Teranet Enterprises Inc. and its suppliers. All rights reserved. Not a plan of

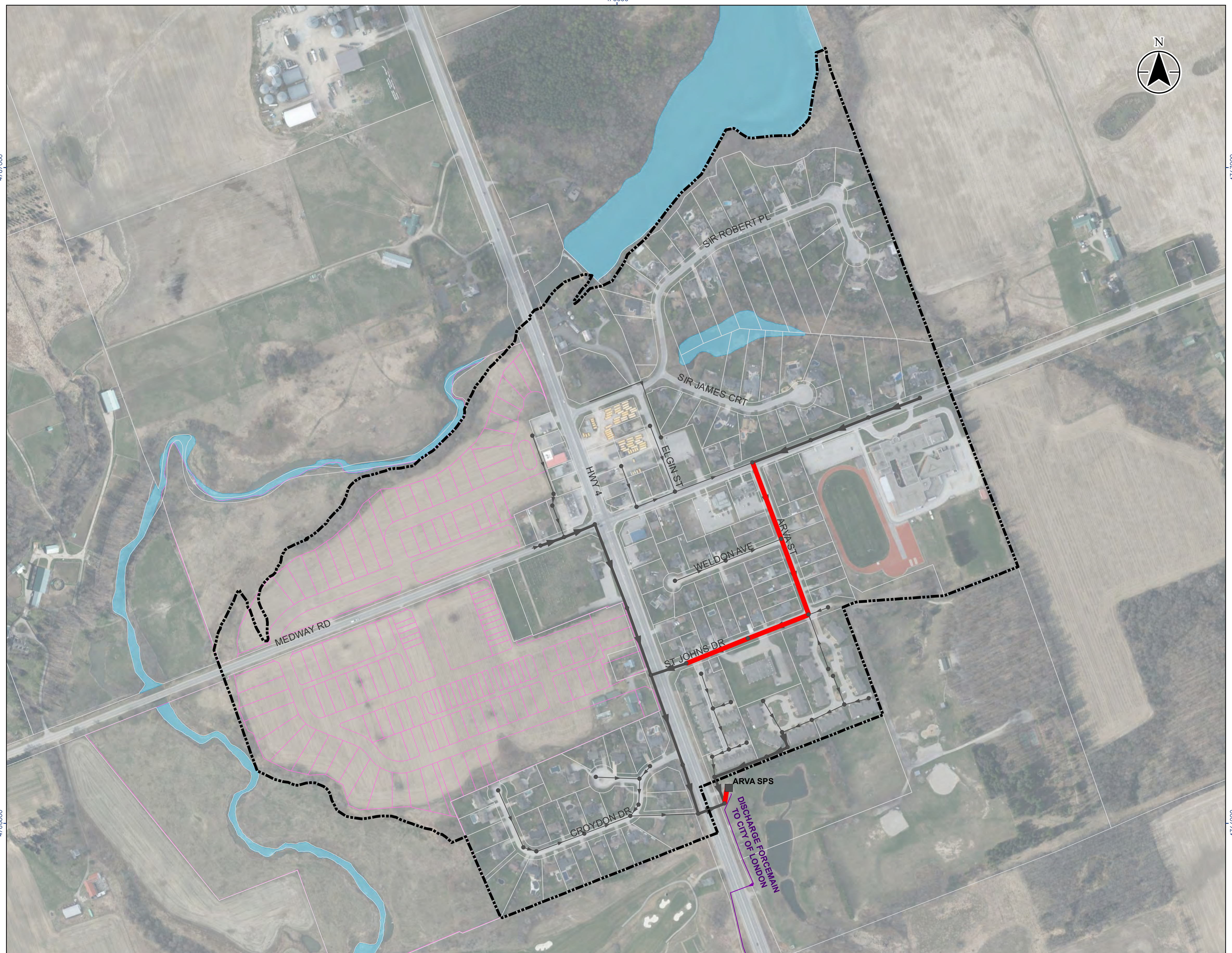
Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-02-23

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
4-3

Title
Kilworth Existing Collection System Assessment



Stantec

Legend

Settlement Boundary	
Parcel	
Future Subdivision	

Existing Sanitary System

■	Facility
•	Maintenance Hole
	Assessed Sewer
	Other Sewer
	Forcemain

Sewer Assessment

	Under Velocity
	Near Capacity
	Over Capacity

0 200 400 m

1:6,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Includes material © 2023 of the King's Printer for Ontario. All Rights Reserved. Imagery date Spring 2020.
3. Parcels © Teranet Enterprises Inc. and its suppliers. All rights reserved. Not a plan of

Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-02-23

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
4-4

Title
Arva Existing Collection System Assessment

4.4 EXISTING PUMP STATION TECHNICAL ASSESSMENT

A review process considering the Condition Assessment Reports by GM BluePlan Engineering and Environmental Compliance Approvals was used to evaluate the capacity of all pump stations, seen in **Table 4-2**. The lowest of the two capacities was taken as the 'design capacity' and compared to the observed average flow calculated from available pump station flow data. Pump station readings from January 2021 to December 2022 were used to determine an average observed daily flow. It should be noted that Arva PS and Kilworth PS #2 had flow meter data available, whereas the remaining readings were generated from pump run times and the rated capacity applied. The maximum recorded flow was also compared to capacity to note disparities. To estimate future performance in **Table 4-2**, the development populations were included in their adjacent catchment area to be included as pump station flow.

From this analysis, and as shown in **Table 4-2**, it was determined that the maximum flow during the observed period exceeded the design capacity for Ilderton PS #1a, Ilderton PS #3 and Ilderton PS #5. The flow exceedance at Ilderton PS #1a and Ilderton PS #5 are considered minor, and no upgrades are recommended. The exceedance at Ilderton PS #3 is more significant but appears to be related to a single wet weather event. In all cases, there appears to be a higher than normal infiltration flow in Ilderton and this report recommends further Inflow and Infiltration investigation work to determine mitigation measures.

Table 4-2: Pumping Stations Under Current Observed Conditions

Pumping Station	Existing Population (2021)	ECA Rated Capacity (m^3/day)	CA Rated Capacity (m^3/day)	Design Capacity (m^3/day)	Observed Average Flow (m^3/day)	Observed Maximum Flow (m^3/day)
Arva	652	2592	2627	**2592**	85	158
Ilderton PS #1a	2562	4320	3724	**3724**	794	3868
Ilderton PS #3	1740	916	1175	**916**	289	1846
Ilderton PS #4	323	1037	916	**916**	36	209
Ilderton PS #5	1025	1797	1642[1]	**1642**	272	1706
Kilworth PS #1	108	413	199	**199**	27	141
Kilworth PS #2	3289	9850	NA[1]	**9850**	756	1354
Komoka PS	3183	2799	2246	**2246**	598	844

Note 1: Rated capacity was not observed due to headworks capacity limitations.

4.5 EXISTING WASTEWATER TREATMENT PLANTS TECHNICAL ASSESSMENT

The capacity of both the Ilderton and Komoka WWTPs were reviewed under current flow conditions in **Table 4-3**.

Table 4-3: WWTP Flow Analysis Under Current Conditions

WWTP	Existing Population (2021)	Rated Capacity (m^3/day)	Actual Average Flow (m^3/day)	Residual Capacity (m^3/day)	% Average Flow to Rated Capacity
Ilderton	4,393	1,300	897.5	402.5	69%
Komoka/Kilworth	6,607	2,250	1298.5	951.5	58%

4.6 EXISTING BIOSOLIDS MANAGEMENT TECHNICAL ASSESSMENT

Current biosolids generation and storage were reviewed for the Ilderton and Kilworth/Komoka WWTPs in **Table 4-4**. Biosolids generation volumes were provided in Annual Reports for 2020 and 2021 based on reported haulage volumes.

In order to assess the adequacy of biosolids storage, an assessment of hauling rate was required. Middlesex Centre land applies their biosolids, so there is a limited window in spring and fall when this can occur. While the Nutrient Management Act, (2002) recommends 4 months of storage, after discussions with the Municipality, it was decided that a higher standard was necessary in order to ensure that sufficient storage was available to allow flexibility in the timing of application. Accordingly, it was determined that 8 months (240 days) of storage should be provided as a minimum.

Table 4-4: WWTP Sludge Analysis Under Current Conditions

WWTP	Existing Population (2021)	Sludge Generation (m^3)	Sludge Storage Capacity (m^3)	Maximum Haulage/ Storage (m^3)	% of Capacity Based on 8 Mths Storage
Ilderton	4,393	1,947[1]	1,500	1,355	85%
Komoka	6,607	3,531[1]	2,500	2,297	93%

Note 1: The average sludge volume from 2020 and 2021 is shown here.

5.0 DEVELOPMENT OF ALTERNATIVE SOLUTIONS FOR WASTEWATER CONVEYANCE

The Master Plan undertook a review of the sanitary servicing opportunities and constraints for the entire Municipality. The development of the constraints generally considered the following factors:

- Resolution of capacity issues under existing conditions noted in preceding sections
- Provision of sanitary servicing to identified growth needs in the settlement area of the Municipality
- Provision of opportunities to integrate areas which are currently on private septic systems into a communal collection and treatment system
- Consideration of opportunities to reduce operation and maintenance complexity and costs by consolidating facilities.

For each constraint, a long list of alternative solutions was developed. Long list alternatives were refined with some alternatives not carried forward due to clear technical, economic or social reasons. In some cases, this refined the long list alternatives to a single alternative, whereas in other cases a short list of alternatives were generated and evaluated at a greater level of detail using a decision matrix. The short list focused on eliminating alternatives that would not be feasible based on topography and elevations of existing infrastructure. Reducing operational complexity was prioritized by decommissioning pumping stations and their associated force mains which could be conveyed by gravity. Alternatives were also decided based on constructability which included the depth of excavations, creek crossings, and proximity to water and sensitive lands. All solutions were reviewed against the 'do nothing' alternative.

5.1 ILDERTON

Under existing conditions Ilderton provides sanitary servicing for most of the residents, however there is a disproportion number of pumping stations that creates a complicated conveyance of sanitary flows. For the purposes of operations and maintenance, there is a preference for a smaller number of operational pumping stations. Furthermore, planned growth in the southern portion of Ilderton requires servicing.

5.1.1 Treatment

Planned growth in Ilderton will require additional treatment capacity of 500 m^3/d. Long list alternatives considered are as follows:

1. Do Nothing
2. Expand the existing Ilderton WWTP from its current capacity of 1,300 m^3/d to 1,800 m^3/d.
3. Convey flows to the Komoka WWTP for treatment at the Komoka WWTP. This would require the construction of a pumping station in Ilderton to convey the flows and a forcemain which would carry the flows to the Komoka WWTP.

4. Convey flows to the London system for treatment at Greenway WWTP. This would require the construction of a pumping station in Ilderton to convey the flows and a forcemain which would carry the flows to the nearest point of connection with the London gravity sewer system.

From the list of alternatives above, the Do Nothing Alternative was not considered further as it does not meet the needs of the Municipality. Conveying flows to the either the Greenway WWTP or the Komoka WWTP carry significant costs associated with construction of the pumping station and forcemain infrastructure and would incur further costs to upgrade the downstream facilities. These options also introduce additional operation and maintenance costs on the Municipality. Ilderton has a functioning wastewater treatment facility which has the capacity to expand to treat the future growth flows. Accordingly, the preferred alternative is to expand the existing Ilderton WWTP.

5.1.2 Biosolids Management

Planned growth in Ilderton will require additional biosolids capacity of 500 m^3/d. Long list alternatives considered are as follows:

1. Do Nothing. Under this alternative the Municipality would continue to utilize the existing biosolids storage capacity but would increase the hauling rate to manage an increase in flows associated with growth.
2. Expand existing liquid biosolids storage facilities at the Ilderton WWTP and continue hauling liquid sludge for disposal by farmland application.
3. Provide biosolids management by dewatering with disposal by landfilling. This option would be considered in conjunction with the management of biosolids at the Komoka WWTP. If a dewatering facility were to be proposed, the facility would be located at the Komoka WWTP. Biosolids from Ilderton would be trucked to Komoka for treatment.

From the long list of alternatives, all alternatives were short listed for further evaluation in the decision matrix contained in **Appendix A**. Construction of a new dewatering facility carried much higher capital and operations costs over the alternative of expansion of the current liquid storage. Additionally, the introduction of a dewatering facility introduced new technical requirements for Operations staff at the Municipality. While it reduced overall trucking of flows from the Komoka WWTP, Alternative 3 ranked behind Alternative 2 for the above noted reasons. Based on the evaluation table, it was determined that expansion the existing liquid biosolids storage facility at the Ilderton WWTP was the preferred alternative.

5.1.3 Sanitary Conveyance System

Servicing of the growth lands in the southern portion of Ilderton was considered in the Master Plan. The only viable alternative to service these lands that was considered was to provide a sanitary sewer alignment within the development lands with discharge to the Ilderton WWTP. The Ilderton WWTP is located immediately north east of this development area. Topography in the growth lands generally falls from west to east so a sanitary sewer alignment which provides a gravity connection to the Ilderton WWTP is considered feasible.

5.1.4 Existing Pumping Station Assessment

As noted above, Ilderton has a disproportion number of pumping stations. In general, Ilderton has a topographic constraint with a low but elevated ridge running from north to south in the general vicinity of Hyde Park Road. This divide creates a condition where servicing would normally require pumping solutions to manage flows. Ignoring the existing servicing arrangement, Ilderton would likely be serviced by a wastewater treatment facility on the east side in the general vicinity of the existing Ilderton WWTP and a sanitary pumping station in the general vicinity of Pumping Station #1 which would convey flows to the WWTP. Accordingly, it can be concluded that all other pumping stations in Ilderton could discharge to these two receivers if the existing sewers could be reconfigured to suit. Given this understanding of the topography, the Master Plan considered options to eliminate some of the existing pumping stations.

Pumping Station #3 was reviewed and the following long list of alternatives was developed.

1. Do Nothing
2. Decommission PS #3 and construct new sewers on Hyde Park Road and Meadowcreek Drive in order to discharge to the existing sanitary sewer on Meadow Creek Drive.
3. Decommission PS #3 and construct new sewers on Hyde Park Road, within an easement along the southern portion of 22606 Hyde Park Road and within an existing easement to Calvert Lane, reconstruct existing sewers on Calvert Lane, Trillium Court and Meadowcreek Park in order to discharge to the existing sanitary sewer upstream of the Ilderton WWTP

From the long list of alternatives, all alternatives were short listed for further evaluation in the decision matrix contained in **Appendix A** Based on the evaluation table, it was determined that alternative 3 was the preferred option. While this option had additional impacts on the local residents, it was significantly more cost effective than Alternative 2. Alternative 2 was also considered more cost effective than the Do Nothing alternative since that alternative would maintain the existing pumping station which will continue to incur operation and maintenance costs.

Pumping Station #4 was reviewed, however, there were no viable alternatives identified to permit the decommissioning of this station.

Pumping Station #5 was reviewed and the following long list of alternatives was developed.

1. Do Nothing
2. Decommission PS #5 and construct new sewers within an easement in Deer Haven Optimist Park and reconstruct the existing sewers on Stonefield Gate, King Street, Ilderton Road and Timberwalk Trail in order to outlet flows to pumping station #1.

From the long list of alternatives, all alternatives were short listed for further evaluation in the decision matrix contained in **Appendix A** Based on the evaluation table, it was determined that alternative 1 was the preferred option. This option had the least impact to residents and the environmental, although it maintains PS #5 in its existing location and continues to incur operation and maintenance costs. Alternative 2 was found to have a very high capital cost due to the extensive amount of sanitary sewer construction required for this alternative.

It is worth noting that should the Municipality expand the boundary of Ilderton further to the west, there are likely more cost effective alternatives that would allow for Pumping Station #5 and Pumping Station #1 to be combined into a new station which would be located further west which could also service a potential growth boundary expansion in this direction.

These recommended solutions are further refined in **Section 7.0.**

5.2 KOMOKA

5.2.1 Treatment

Growth in Komoka/Kilworth will require an additional treatment capacity of 1,800 m^3/d. Long list alternatives considered are as follows:

1. Do Nothing
2. Expand the existing Komoka WWTP to accommodate the future flows.
3. Convey flows to the London system for treatment at Oxford WWTP. This would require the construction of a pumping facilities and a forcemain which would carry the flows to the Oxford WWTP.

From the list of alternatives above, the Do Nothing Alternative was not considered further as it does not meet the needs of the Municipality. Conveying flows to the Oxford WWTP carries significant costs associated with construction of the pumping station and forcemain infrastructure as well as introducing additional operation and maintenance costs on the Municipality. Komoka has a functioning wastewater treatment facility which has the capacity to expand to treat the future growth flows. Accordingly, the preferred alternative is to expand the existing Komoka WWTP.

5.2.2 Biosolids Management

Planned growth in Komoka / Kilworth will require additional biosolids capacity of 600 m^3/d. Long list alternatives considered are as follows:

1. Do Nothing. Under this alternative the Municipality would continue to utilize the existing biosolids storage capacity but would increase the hauling rate to manage an increase in flows associated with growth.
2. Expand existing liquid biosolids storage facilities at the Komoka WWTP.
3. Provide biosolids management by dewatering with disposal by land application or landfilling. This option would be considered in conjunction with the management of biosolids at the Ilderton WWTP. If a dewatering facility were to be proposed, the facility would be located at the Komoka WWTP. Biosolids from Ilderton would be trucked to Komoka for treatment.

From the long list of alternatives, all alternatives were short listed for further evaluation in the decision matrix contained in **Appendix A**. Construction of a new dewatering facility carried much higher capital

and operations costs over the alternative of expansion of the current liquid storage. Additionally, the introduction of a dewatering facility introduced new technical requirements for Operations staff at the Municipality. While it reduced overall trucking of flows from the Komoka WWTP, Alternative 3 ranked behind Alternative 2 for the above noted reasons. Based on the evaluation table, it was determined that expansion the existing liquid biosolids storage facility at the Ilderton WWTP was the preferred alternative.

5.2.3 Sanitary Conveyance System

In Komoka there are several Future Growth Areas located in Northwest Komoka (North of Oxbow Drive and West of Komoka Road), Northeast Komoka (South of Oxbow Drive and West of Queen Street), Glendon Drive east of Komoka Road (10095 Glendon Drive), Glendon Drive west of Komoka Road, and Komoka Road south (22372 Komoka Road). Providing sanitary servicing to these Future Growth Areas would trigger gravity sewer system expansions in Komoka.

Sanitary servicing for growth in Northwest Komoka (North of Oxbow Drive and West of Komoka Road) has been previously considered by the Municipality and involves constructing new sanitary sewers within development lands and connect to the existing sanitary sewers on Komoka Road. As there were no other reasonable alternatives to this servicing solution, no further alternative evaluation was undertaken for this area.

Sanitary servicing for growth in Northeast Komoka (South of Oxbow Drive and West of Queen Street) has been previously considered by the Municipality and involves constructing new sanitary sewers within development lands and connecting to the existing sanitary sewers on Queen Street through Komoka Park. As there were no other reasonable alternatives to this servicing solution, no further alternative evaluation was undertaken for this area.

Sanitary servicing for growth on Glendon Drive East of Komoka Road (10095 Glendon Drive) has not been previously considered but was reviewed as part of the Master Plan. The existing sewers on Glendon Drive to the west were analyzed to determine if they had sufficient capacity and it was confirmed that sufficient capacity was available for these lands. The servicing solution for this property would require construction of a new sanitary sewers along Glendon Drive which would connect to the existing sanitary sewers on Glendon Drive at Springer Street. As there were no other reasonable alternatives to this servicing solution, no further alternative evaluation was undertaken for this area.

Sanitary servicing for growth in the south end of Komoka (22372 Komoka Road was reviewed to determine the most viable servicing alternative. A variety of alternatives were considered to collect flows in either the existing Komoka PS #1 or a potential new pumping station on Glendon Drive. Due to topographical constraints, many of these options created excessively deep sewers. This was complicated by the fact that Komoka experiences high groundwater levels. Accordingly, these options were abandoned due to the potential complexity and cost. Alternatives were also considered which discharged flows directly to the Komoka WWTP. That plant currently receives pumped flows so any gravity discharge would require changes to the plant headworks which was not considered cost effective given the size of the development area. The only reasonable alternative identified is to direct flows to the east into the existing sewers in Kilworth. Design sheet analysis determined that there is available capacity in these

sewers for this development parcel and the depth of the existing sewers is sufficient to receive flows from these lands.

Sanitary servicing for growth on Glendon Drive West of Komoka Road was reviewed to determine if a connection to an existing sanitary sewer was possible. It was concluded that these lands could not discharge to any existing sanitary sewers and would require construction of a pumping solution in order to be serviced. As one of the goals of the Master Plan is to ensure the plan does not increase the operational complexity of the system, this servicing solution included options to decommission Komoka PS #1 and redirect those flows to a new pumping station. This would maintain only one pumping station for Komoka. Similar to the options noted for 22372 Komoka Road, the topographic constraints in the area created some very deep sanitary sewers which were not considered cost effective due to potential dewatering costs. The only viable alternative identified is to construct a new pumping station on Glendon Drive immediately east of Komoka Creek within development lands. Komoka PS #1 can be decommissioned with the construction of a new sanitary sewers within an existing easement west of the existing pumping station. That sewer would be constructed across the railroad tracks and would convey the flows through the development lands to the proposed sanitary pumping station.

These recommended solutions are further refined in **Section 7.0.**

5.3 KILWORTH

5.3.1 Sanitary Conveyance System

Sanitary servicing for the growth lands north of Glendon Drive was studied. The current servicing strategy for the lands south of Glendon Drive includes the extension of a sewer northernly within ongoing development to the intersection of Glendon Drive and Crestview Drive. This sewer has been designed to allow additional flows from development lands north of Glendon Drive. An alignment of a new sanitary sewer was considered to collect flows from these growth lands. The area is bisected by a woodlot with a small development parcel to the east near the intersection of Glendon Drive and Vanneck Road. The Glendon Drive Class Environmental Assessment (Stantec, 2018) provided a new alignment of Coldstream Road through the woodlot with a connection to Glendon Drive at Springfield Road. This study concluded that an alignment of the sanitary sewer across the development lands and within the proposed extension of Coldstream Road was the only reasonable alternative to service this area.

The goal of providing a viable servicing option for unserviced lands referred to as Old Kilworth, specifically along Blackburn Crescent, Linnell Cresent, Beechnut Street and Elmhurst Street, was considered. Given the topography of these lands, there is no viable gravity sewer connection. The only viable alternative considered was to connect these lands to the existing Blackburn Pumping Station. This station does not have sufficient capacity and would require upgrade as well as a new forcemain constructed to discharge flows to the existing gravity sewer on Westbrook Crescent. A capacity analysis of the existing sanitary sewer system downstream of this discharge point was undertaken and sufficient capacity is available in the downstream sewer system. Gravity sanitary sewers could be constructed from the Blackburn Pumping station within the road allowances of the Old Kilworth area in order to service these lands.

These recommended solutions are further refined in **Section 7.0.**

5.4 ARVA

5.4.1 Treatment

Arva currently discharges flows to the City of London for treatment via an existing pumping station. The current agreement with the City limits flows to a maximum of 175 m^3/day. While there is reserve capacity for growth in this agreement, projected growth is anticipated to exceed this amount. Long list alternatives for the long term sanitary treatment for Arva are as follows:

1. Do Nothing. This option would limit growth to the maximum under the current agreement with the City at 175 m^3/day.
2. Renegotiate the agreement with the City to raise the maximum flow. The Servicing study looked at downstream capacity constraints. The design of the recently constructed sanitary sewer on Villagewalk Boulevard, accounted for growth flows from Arva and has sufficient capacity. The existing forcemain could be connected to this sewer where it intersects with Richmond Street. Further analysis of any downstream improvements and/or treatment plant upgrades within the City of London was not reviewed under the servicing plan.
3. Construct a new wastewater treatment plant in Arva.
4. Construct a new sanitary pumping station and forcemain to discharge flows to the Komoka wastewater treatment plant.

Of the above noted long list alternatives, the Do Nothing alternative does not meet the planned needs of the Municipality. Alternative 3 was not carried forward as a short list alternative as the cost of constructing a new wastewater facility is not cost effective to service a relatively small growth area. In addition, Medway Creek would likely require advanced treatment to meet the presumed required effluent criteria. Similarly, alternative 4 would require an extensive forcemain in the range of 20km which is also not considered cost effective. Given these constraints, the preferred solution is alternative 2 which is to renegotiate the agreement with the City of London. Should the City not be agreeable to this alternative, the Municipality should revisit the alternatives, however, it is recommended that if alternative 2 or 3 are considered, the Municipality should also consider identifying additional development lands beyond the current settlement boundary. The addition of these development lands would assist in the cost effectiveness of these solutions.

5.4.2 Sanitary Conveyance System

Consideration was given to providing sanitary servicing to the unserviced areas in the north east corner of Arva. Extension of a sanitary sewer connecting to the existing sanitary sewers was not considered feasible due to topographical constraints. Given that this area does not experience failing septic systems, provision of sanitary servicing was not considered necessary or feasible.

Provision of Sanitary servicing to the growth lands in the western part of Arva was considered with the following long list of alternatives:

1. Do Nothing
2. Decommission the existing Arva PS and redirect flows within a sewer through an easement South and West of Croydon Drive and through the development lands West of Richmond Street to a new pumping station on the west end of Medway Road.
3. Decommission the existing Arva PS and redirect flows within a sewer north on Richmond Street and through the development lands west of Richmond Street to a new pumping station on the west end of Medway Road.
4. Decommission the existing Arva PS and redirect flows within a sewer along Croydon Drive and through the development lands west of Richmond Street to a new PS on the west end of Medway Road.
5. Maintain the existing Arva PS, construct a new PS that discharges to a forcemain which travel easterly on Medway Road and southerly on Richmond Street discharging to the existing Arva PS. This alternative would likely trigger upgrades to the existing Arva PS to accommodate the additional flows.

While the topography in Arva falls from east to west, which favours a single pumping station at the west end of Medway Road, the depth of the existing sewers discharging into the existing Arva pumping station are quite deep and the location of the existing Arva pumping station does not easily facilitate a redirection of these sewers to a proposed new pumping station on the west end of Medway Road. All options (Alternatives 2, 3 and 4) that considered redirecting flows in this manner resulted in very deep sewer installations. Due to topography, there were no feasible options which would allow flows from the development lands to be serviced back to the existing Arva pumping station.

Alternative 3 was not carried forward due to challenges in gravity sewer depth along Richmond Street. The remaining alternatives were considered in a decision matrix contained in **Appendix A**. Alternatives 2 and 4 resulted in very deep sewers that were considered feasible but resulted in high construction costs. Additionally, Alternative 2 required an easement along the backs of the lots on Croydon Drive which impacted existing vegetation and would have an impact on both the residents and the natural environment. Alternative 5 was selected as the preferred alternative as it significantly reduced the requirement for construction of additional sewers to connect the existing Arva pumping station to the new pumping station and reduced disruption to existing residents. This recommended solution is further refined in **Section 7.0.**

5.5 DELAWARE

5.5.1 Treatment

As Delaware currently lacks a sanitary treatment facility, the following long list of alternatives were considered.

1. Do Nothing. Under this alternative Delaware would remain without sanitary servicing and would lack the ability to service potential growth thus restricting new development.

2. Construct a new sewage treatment plant in Delaware. A specific site for this facility was not selected, however, at a high level, a site selection would involve a site proximate to the Thames River in order to provide an effluent receiver. The facility would also need to be located away from existing residential development. Locations of this nature are available but would require flows to be pumped and would be located some distance from the development.

3. Pump flows to the City of London sanitary sewer system for treatment. Potential receivers in the City could be the Oxford PCP or the Dingman pumping station which pumps to the Greenway PCP. Either option would require a lengthy forcemain and the agreement of the City.

4. Pump flows to the Komoka Wastewater Treatment Facility for treatment.

Of the options above, alternative 3 was not advanced as a short list alternative as it required extensive infrastructure to connect to the City and would require an agreement with the City in order to do so. The remaining alternatives were considered in a decision matrix contained in **Appendix A**. The Do Nothing alternative did not meet the growth needs of the Municipality and was not selected as the preferred option. The alternatives of building a new sewage treatment facility in Delaware (Alternative 2) and pumping flows to the Komoka WWTP (Alternative 4) were relatively similar in terms of capital cost. A new facility in Delaware is slightly higher cost but was balanced off by a shorter forcemain. Alternative 4 was selected as the preferred alternative because it reduced the operation and maintenance costs and burden on the Municipality through the operation of only one facility (the Komoka WWTP) instead of introducing an additional facility. Alternative 2 also carried the additional burden of impacts on the environment and adjacent residents associated with the establishment of a new plant and outfall sewer to the Thames River. This recommended solution is further refined in **Section 7.0.**

5.5.2 Sanitary Conveyance System

Under existing conditions Delaware does not have sanitary servicing. Delaware has a substantial future growth area, predominantly in the proposed employment lands to the south.

The following long list solutions were discussed to address the above noted challenges at an overview level to evaluate feasibility and further fine tune through short list alternatives.

1. Do Nothing. This means Delaware would remain without sanitary servicing and would lack the ability to service potential growth thus restricting new development.

2. Construct a new pumping station (Delaware PS #1) within the employment lands south of Longwoods Road and construct a sanitary sewer network to service the lands east of Victoria Street to this pumping station. Pumping station #1 will discharge to a forcemain which will follow Longwoods Road, Carriage Road, Gideon Drive and Komoka Road and discharge to the Komoka WWTP. Construct a new pumping station (Delaware PS #2) on municipal lands at 2652 Gideon Drive and construct a sanitary sewer network to service all unserviced development west of Victoria Street. Pumping station #2 will discharge by forcemain along Gideon Drive and Longwoods Road with discharge into the proposed gravity sanitary sewer on Longwoods Road which will in turn discharge to Delaware PS #1.

3. Construct a new pumping station (Delaware PS #2) on municipal lands at 2652 Gideon Drive and construct a sanitary sewer network to service all unserviced development north of Longwoods Road. Pumping station #2 will discharge by forcemain along Gideon Drive and Komoka Road and discharge to the Komoka WWTP. Construct new pumping station (Delaware PS #1) within the employment lands south of Longwoods Road and construct a sanitary sewer network to service the employment lands south of Longwoods Road. Pumping station #1 will discharge to a forcemain which will discharge to the proposed sanitary sewer on Longwoods Road which will in turn discharge to pumping station #2.

All alternatives were evaluated in a decision matrix contained in **Appendix A**. Alternative 2 was selected as the preferred alternative because it provided more immediate servicing of the growth lands in Delaware which was considered a priority over servicing the existing Village. The existing Village is currently serviced by functioning septic systems and there is no compelling reason to implement construction of pumping station #2 in the near term. This recommended solution is further refined in **Section 7.0.**

5.6 HAMLETS

Sanitary servicing for each Hamlet within Middlesex Centre was reviewed and the following long list alternatives were developed.

1. Do Nothing
2. Construct conveyance system and wastewater treatment facilities for each Hamlet.
3. Construct conveyance system and communal treatment facilities for each Hamlet.
4. Construction conveyance system and convey flows to existing or planned wastewater facilities in Middlesex Centre or facilities in adjacent Municipalities.

As each Hamlet has a small population and limited potential growth, Alternatives 2 and 3 were not considered cost effective and were not short listed for further evaluation. Each Hamlet was considered for connection to a nearby collection and treatment system, however, with the exception of Ballymote, each Hamlet was considered too distant from any nearby system to make a this a viable option. While Ballymote is proximate to the City of London and could be serviced by this system in future, the small size of Ballymote also renders this solution not cost effective. Accordingly, all options except the Do Nothing alternative were screened out and thus the Do Nothing alternative is the preferred solution.

6.0 RECOMMENDED PROJECTS

6.1 WASTEWATER TREATMENT

The capacity of both the Ilderton and Komoka WWTPs were reviewed under projected flow conditions. As outlined in **Section 4.2**, an average flow of 240 liters/capita/day was applied to future populations to estimate flow in the wastewater treatment plants.

As noted in Section 5, growth in Ilderton will be serviced by expansion of the Ilderton Wastewater Treatment Facility. A summary of projected flows is noted in **Table 6-1** below.

As noted in Section 5, growth in Komoka / Kilworth will be serviced by expansion of the Komoka WWTP. Additionally, sanitary flows from Delaware will be pumped to the Komoka WWTP. A summary of projected flows from these three communities is noted in **Table 6-1** below. These flows assume that the areas which are currently serviced by septic systems will be conveyed and treated by the Komoka WWTP within the study time horizon.

It is recommended that the WWTP upgrades be completed when the flow exceeds 85% of the treatment plant's rated capacity.

Based on the analysis the projected growth in Ilderton requires additional treatment capacity of 500 m^3/day. Development in Komoka, Kilworth and Delaware necessitates the Komoka WWTP to have an additional 3,750 m^3/day of treatment capacity.

Table 6-1: WWTP Flow Analysis Under Future Conditions

	Future Population (2046)	Current Rated Capacity (m^3/day)	Projected Future Flow (m^3/day)	Proposed Expansion (m^3/day)
Ilderton Wastewater Treatment Facility	7954	1300	1797	500
Komoka Wastewater Treatment Facility	25000	2250	5713	3750

Komoka is currently constructed in treatment trains which treat approximately 1,250 m^3/day in each train. Accordingly, the above noted expansion is recommended to be implemented in 3 phases, with each phase adding an additional treatment train.

6.2 BIOSOLIDS

As noted in Section 5, the preferred alternative for the management of biosolids is to expand the existing liquid biosolids tanks and continue with land application on available farmland. It is noted that Komoka WWTP experiences operational issues with their current process and current information is that total solids are in the range of 1.45%. Further study is recommended to remedy this as the standard is

generally around 3% total solids and the lower amount current evidenced is resulting in additional liquid sludge volume. The preferred solution and the values in **Table 6-2** below assumes that the Komoka facility can achieve this 3% goal.

Table 6-2: WWTP Sludge Analysis Under Future Conditions

WWTP	Future Population (2046)	Projected Sludge Generation (m^3)[1]	Projected Sludge Storage Requirements (m^3)[1]	Current Sludge Storage capacity (m^3)[1].	Required Sludge Storage Expansion (m^3)[1]
Ilderton Future Expansion	7954	2903	1909	1500	400
Komoka Future Expansion with Delaware	25000	6435	4232	2500	1800

Note 1: The Sludge generation volume is a yearly volume. It is assumed that the tanks will not hold the sludge for the full year, and likely hauled offsite for disposal at least bi-annually. Therefore, only half of the annual sludge amount needs to be stored.
Note 2: The max haulage/storage volume is the half of future projected sludge generation volume. Must be less than future tank size.

6.3 PUMPING STATIONS

Table 6-3 provides the complete listing of existing and future pumping stations with calculated flows under future conditions and are based on calculated peak flows in the sewer design sheets for each of the catchment areas. It is recommended that the Municipality continue to monitor flows and refine the planning of pumping station upgrades based on actual flows.

Upgrades are recommended for Arva PS #1 based on flows shown in the design sheet. As noted in previous sections, the sewer system in Arva is heavily influenced by the calculated flows from Medway High School. These calculated flows are not borne out in the current actual flows. While this pumping station upgrade is identified as project in the Master Plan, continue monitoring of actual flows should be the determining factor as to whether the upgrade is necessary.

Upgrades to Kilworth Blackburn PS #1 are recommended if the Municipality chooses to providing servicing to the Old Kilworth area.

Upgrades to Kilworth PS #2 are recommended based on growth in the sewer catchment area, which includes the potential servicing of the Old Kilworth area.

Ilderton PS #1 is noted to be under capacity in **Table 4-2** under existing conditions when compared to the condition assessment capacity. By comparison, **Table 6-3** indicates that this station should be operating under capacity based on future flows in the design sheet. This station is noted to have high infiltration amounts and, additionally, the pumps appear to be underperforming their design capacity. As noted above, further inflow and infiltration study and mitigation is recommended for Ilderton. This station is not recommended for upgrade as the calculated flows are within the station capacity. Additional measures to limit infiltration should ensure this station continues to operate within its existing capacity.

Table 6-3: Pumping Stations Under Future Conditions

Pumping Station	Existing ECA Rated Capacity (L/s)	Existing CA Rated Capacity (L/s)	Future Projected Flow (L/s)	Future Proposed Firm Capacity (L/s)
Delaware PS #1	N/A	N/A	133.2	133.2
Delaware PS #2	N/A	N/A	66.7	66.7
Arva PS #1	30	30.4	45.3	45.3
Arva PS #2	N/A	N/A	13.1	13.1
Ilderton PS #1	50	43	35.9	50
Ilderton PS #3	10.6	13.6	Rec to be decommissioned	
Ilderton PS 4	12	11	4.3	12
Ilderton PS 5	20.8	19[1]	15.3	20.8
Kilworth Blackburn PS #1	4.37	2.3	16.9	16.9
Kilworth PS #2	114	NA[1]	147	147
Komoka PS #1	32	26	Rec to be decommissioned	
Komoka PS #2	N/A	N/A	88.4	88.4

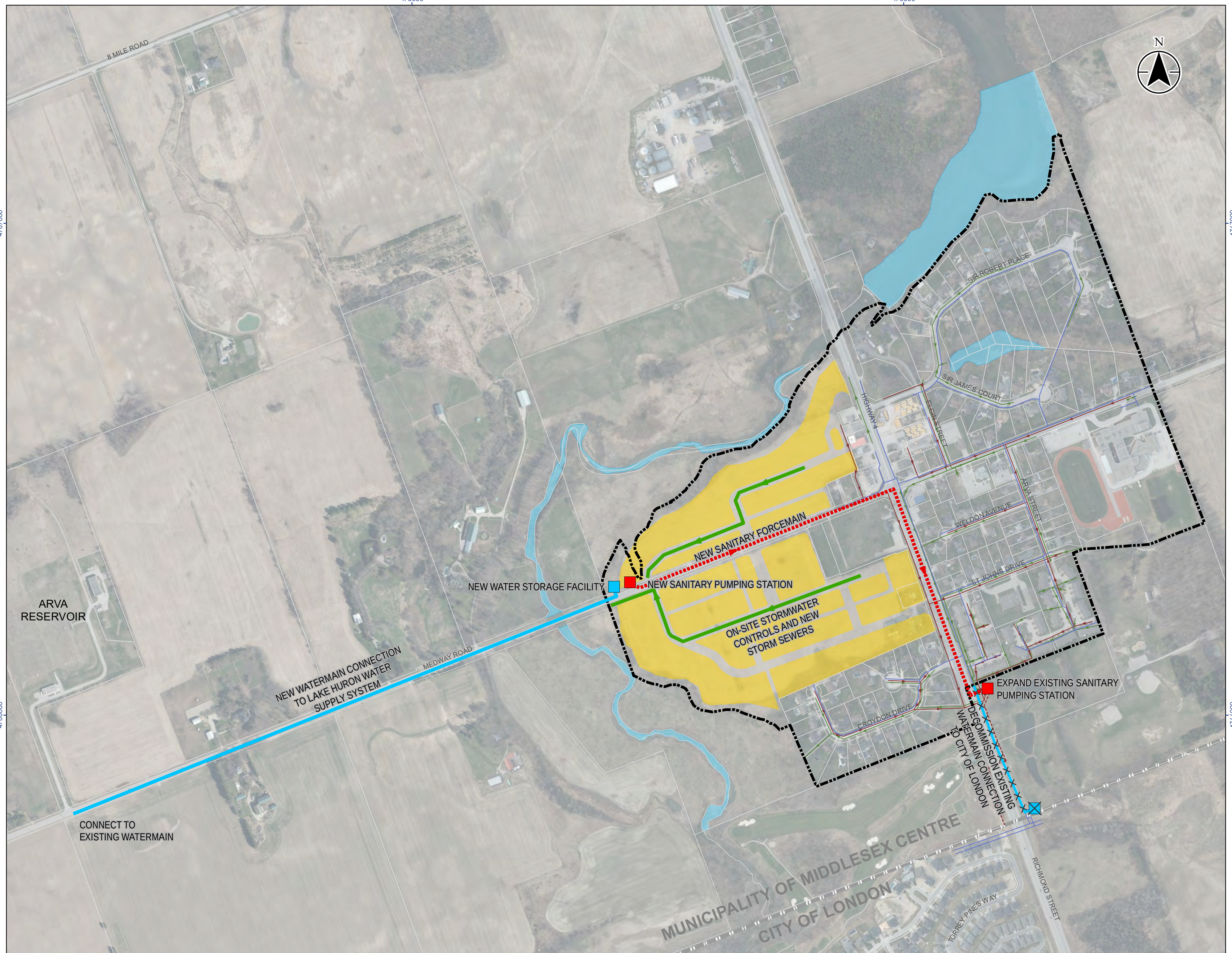
Note 1: Rated capacity was not observed due to headworks capacity limitations.

6.4 SANITARY CONVEYANCE SYSTEMS

Based on the preferred solutions outlined in Section 5, the following works are proposed and detailed in the following figures. These figures also represent the solutions derived for water and stormwater solutions in an effort to show consolidated recommendations. Separate Technical Memos outline solutions for the Water and Stormwater systems.

6.4.1 Arva

Arva is currently serviced by an existing sanitary pumping station which discharges via forcemain to the City of London for treatment. Growth lands on the west end of Medway Road will require connection to that system. Given the topographic constraints in Arva, the preferred solution is to provide a new pumping station at the west end of Medway Road. That pumping station will discharge via forcemain east on Medway Road and south on Richmond Street and connect to the existing pumping station. Further evaluation should be undertaken as development occurs south of Medway Road and west of Richmond Street to determine if an alignment of the forcemain can be accommodated within the subdivision which will substantially reduce the project cost.



Stantec

Legend

- Settlement Boundary
- Parcel
- Future Growth Area

Proposed Project

- Sanitary
- Water
- Storm

Existing Servicing

- Sanitary Facility
- Sanitary Sewer
- Sanitary Forcemain
- Water Facility
- Watermain
- Storm Sewer

0 250 500 m

1:8,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Produced using information licensed under Open Government License - Ontario. Produced using information © County of Middlesex 2023. Parcels © Teranet Enterprises Inc. and its suppliers. All rights reserved. Not a plan of survey.
3. Spring 2020 orthoimagery © 2023 King's Printer for Ontario. All Rights Reserved.

Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-04-19

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
6-1

Title
Proposed Projects
Arva

6.4.2 Ilderton

Ilderton is currently serviced by the Ilderton WWTP and a total of 4 sanitary pumping stations. One of the projects recommended is to decommission Pumping Station #3 located on Hyde Park Road and to redirect flows by gravity to the wastewater treatment plant. The preferred alignment of this proposed sewer is south on Hyde Park Road, within a proposed easement along the southern portion of 22606 Hyde Park Road and within an existing easement to Calvert Lane. From there the reconstruction of the existing sewers on Calvert Lane, Trillium Court and Meadowcreek Park would be required in order to discharge to the existing sanitary sewer upstream of the Ilderton WWTP.

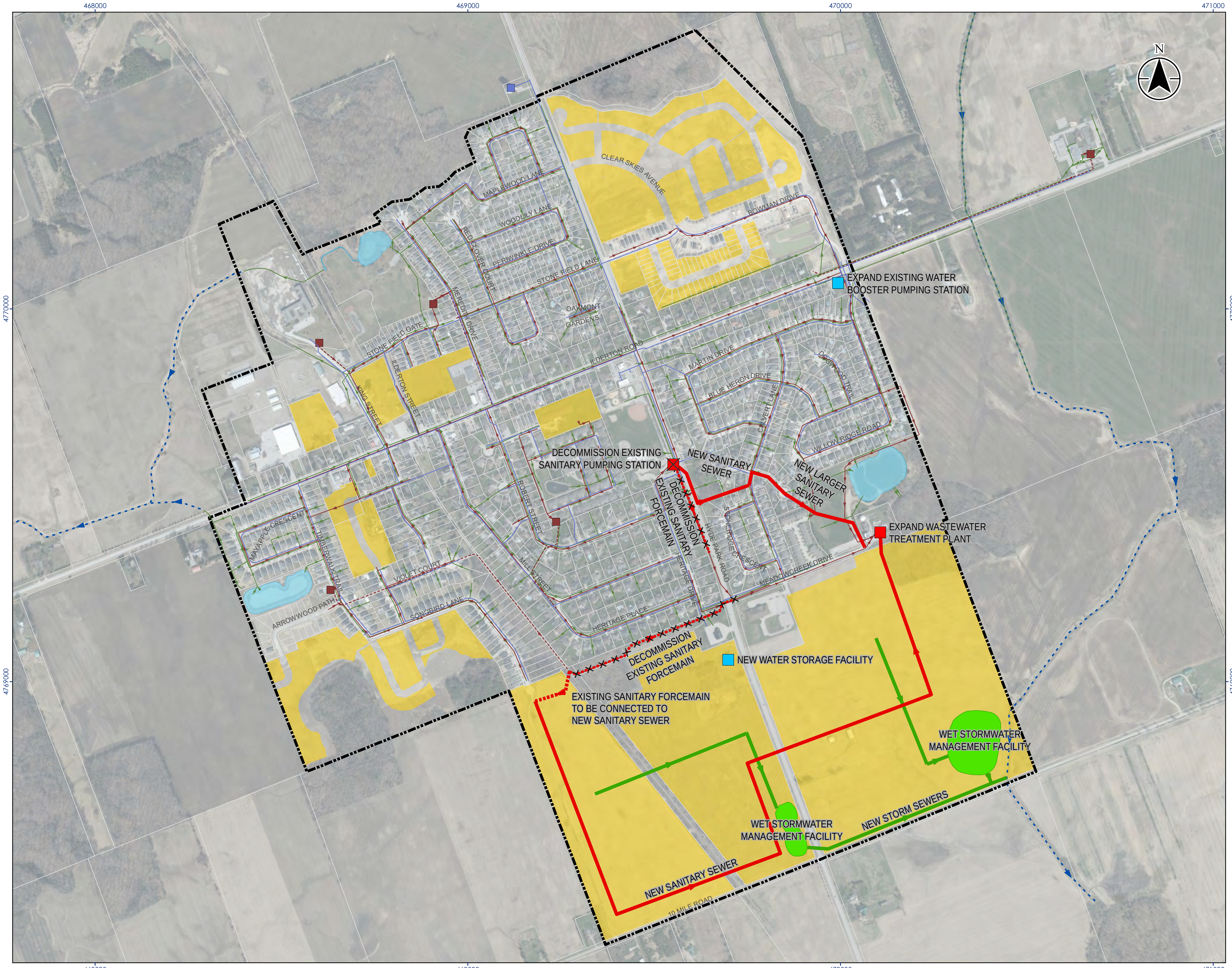
Growth in the south end of Ilderton can be serviced by a gravity connection to the Ilderton WWTP. The precise alignment of this sewer can be determined by the Municipality during the planning stages of the proposed developments. The alignment shown on **Figure 6-2** is a conceptual alignment only. It is notable that some planning will be required to consider the crossing of Hyde Park Road as the profile of Hyde Park drops to the south, thus this crossing location should be strategically chosen.

The forcemain for Pumping Station #1 was also considered to determine if it could be intercepted by the proposed gravity sewer system. The current forcemain follows the road network in the Timberwalk subdivision before following an alignment along the former rail line to the south and then easterly along an easement south of Heritage Place and then within the road allowance of Meadowcreek Drive. With the potential extension of sanitary sewers through the growth lands in the southern end of Ilderton, this introduces the opportunity to connect the forcemain to these sewers. Accordingly, it is recommended that this forcemain be connected to the proposed sanitary sewer on the extension on Songbird Lane. This will serve to reduce the length of forcemain from Pumping Station #1 thus reducing the infrastructure requirements of the Municipality. In addition, reducing the length of the forcemain may improve pump performance and longevity in Pumping Station #1.

6.4.3 Komoka

Sanitary servicing for growth in Northwest Komoka (North of Oxbow Drive and West of Komoka Road) has been previously considered by the Municipality and involves constructing new sanitary sewers within development lands and connecting to the existing sanitary sewers on Komoka Road. The downstream sewers on Komoka Road are noted to have adequate capacity with the exception of the last length of sewer from Huron Avenue to the pumping station.

Sanitary servicing for growth in Northeast Komoka (South of Oxbow Drive and West of Queen Street) has been previously considered by the Municipality and involves constructing new sanitary sewers within development lands and connecting to the existing sanitary sewers on Queen Street through Komoka Park. The downstream sewers on Queen Street and Huron Avenue are noted to have adequate capacity with the exception of the last length of sewer from Huron Avenue to the pumping station.



Stantec

Legend

- Settlement Boundary
- Parcel
- Future Growth Area

Proposed Project

- Sanitary
- Water
- Storm

Existing Servicing

- Sanitary Facility
- Sanitary Sewer
- Sanitary Forcemain
- Water Facility
- Watermain
- Storm Sewer

0 250 500 m

1:10,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Produced using information licensed under Open Government License - Ontario. Produced using information © County of Middlesex 2023. Parcels © Teranet Enterprises Inc. and its suppliers. All rights reserved. Not a plan of survey.
3. Spring 2020 orthoimagery © 2023 King's Printer for Ontario. All Rights Reserved.

Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-04-19

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
6-2

Title
Proposed Projects
Ilderton

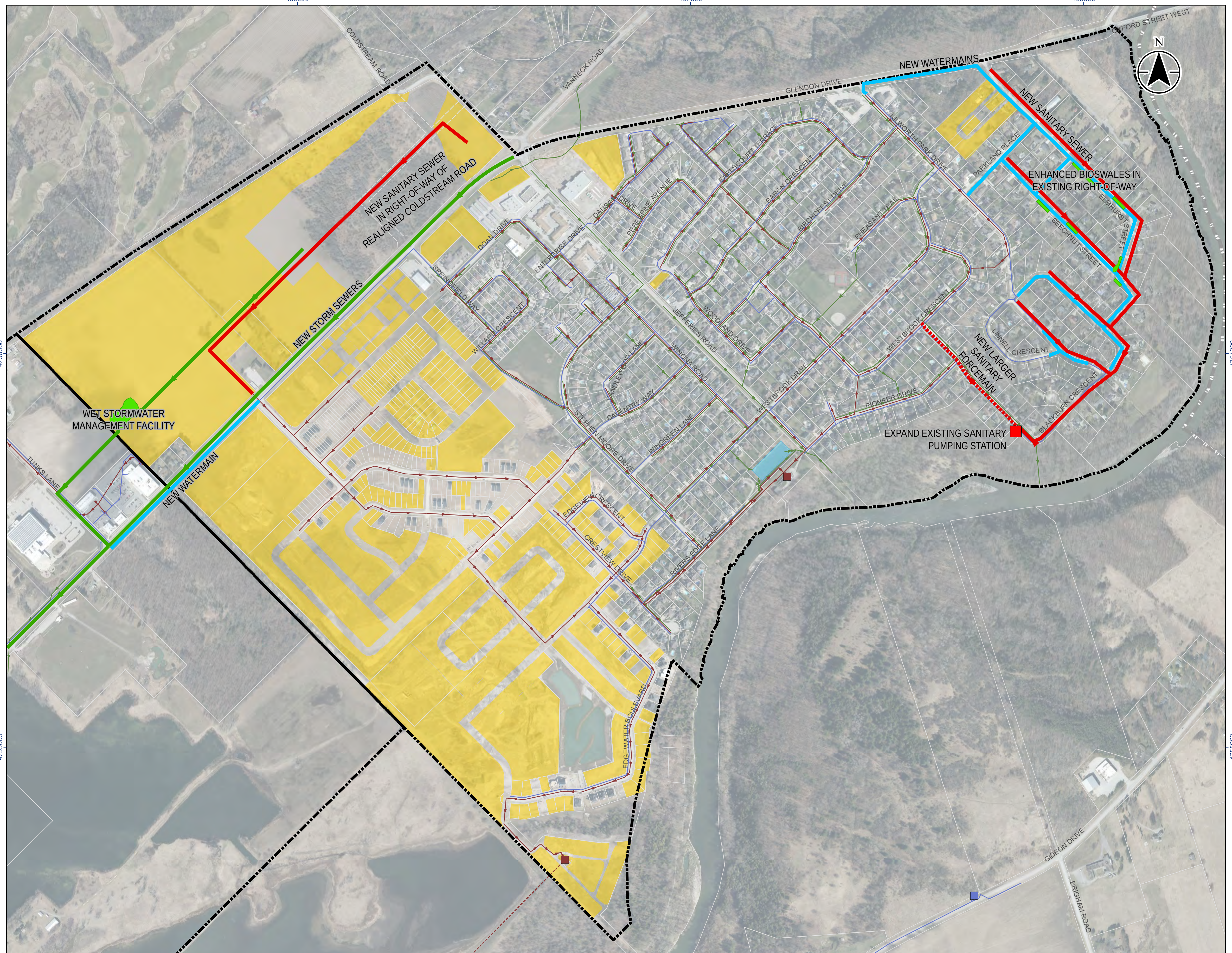
The above growth areas discharge into separate sanitary collection systems and converge at Komoka Road and Huron Avenue. Based on full buildout of both of these developments, the sanitary sewer on Komoka Road from Huron Avenue to the pumping station is noted to be over capacity and is recommended for replacement. It is estimated that a 25% buildout of the two developments combined will reach full capacity of this sewer. Accordingly, it is recommended that the Municipality monitor development of these areas and plan for the requisite sewer upgrade accordingly.

Sanitary servicing for growth on Glendon Drive East of Komoka Road (10095 Glendon Drive) will require construction of a new sanitary sewers along Glendon Drive which would connect to the existing sanitary sewers on Glendon Drive at Springer Street. The downstream sewers are noted to have adequate capacity to manage these flows.

Sanitary servicing for growth in the south end of Komoka (22372 Komoka Road) is proposed to be directed to the existing sanitary sewer to the east on Edgewater Boulevard. Design sheet analysis determined that there is available capacity in these sewers and the depth of the existing sewers is sufficient to receive flows from these lands.

Sanitary servicing for growth on Glendon Drive West of Komoka Road is proposed to be serviced by a new pumping station on Glendon Drive immediately east of Komoka Creek located within the development lands. That pumping station will discharge flows via forcemain easterly on Glendon Drive and southerly on Komoka Road, discharging directly to the Komoka WWTP. A conceptual alignment of sanitary sewers within the development lands is shown on **Figure 6-3**. This alignment is conceptual and can be revised by the Municipality at the planning stages for these developments. All sewers shown on the development lands are assumed to be constructed by those developments, with the exception of the section of the sewer shown on Glendon Drive (from the proposed pumping station westerly 450m) which has been included on the overall project list.

The existing Komoka pumping station can be decommissioned and a new gravity sanitary sewer constructed within an existing easement west of the existing pumping station. That sewer can extend across the rail line and connect to the proposed sewers in the development lands south of the rail line thus conveying flows to the proposed sanitary pumping station. Costing on the Project List in Section 7.0 includes the sewer within the easement and crossing the rail line, however, it is assumed that the sewer within the development lands south of the rail line will be constructed as part of the development.



Stantec

Legend

Settlement Boundary
Parcel
Future Growth Area

Proposed Project

Sanitary
Water
Storm

Existing Servicing

Sanitary Facility
Sanitary Sewer
Sanitary Forcemain
Water Facility
Watermain
Storm Sewer

0 250 500 m
1:10,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Produced using information licensed under Open Government License - Ontario. Produced using information © County of Middlesex 2023. Parcels © Teranet Enterprises Inc. and its suppliers. All rights reserved. Not a plan of survey.
3. Spring 2020 orthoimagery © 2023 King's Printer for Ontario. All Rights Reserved.

Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-04-19

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

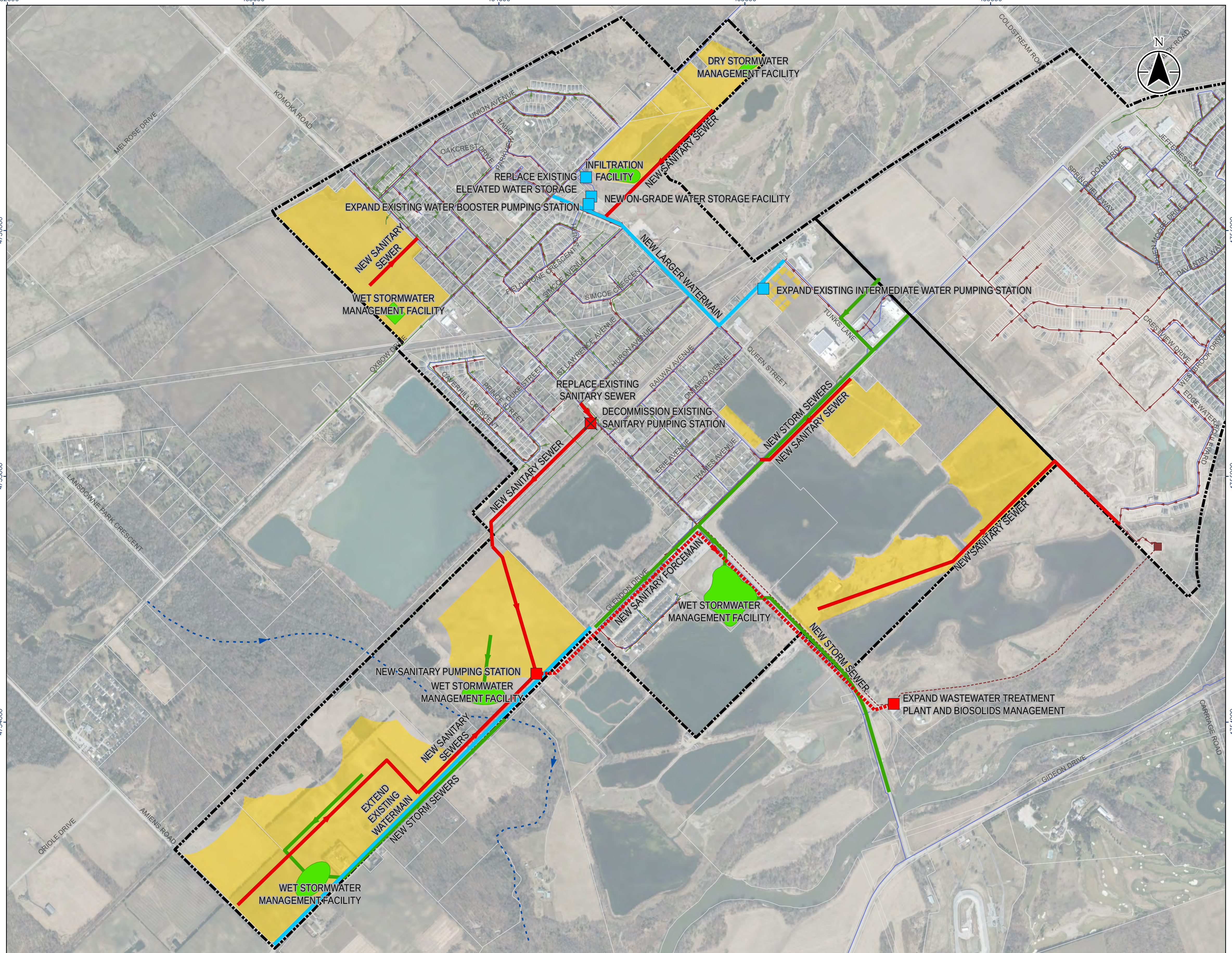
Figure No.
6-3

Title
Proposed Projects
Kilworth

6.4.4 Kilworth

Sanitary servicing for the majority of the growth lands south of Glendon Drive in the western portion of Kilworth has been previously planned and constructed as part of the ongoing developments in the western portion of Kilworth. Those sewers have been designed with reserve capacity for the lands north of Glendon Drive. The proposed alignment for the sewer in the lands north of Glendon Drive entails an alignment which connects to the proposed extension of the sanitary sewer at Glendon Drive and Crestview Drive and within the proposed extension of Coldstream Road in order to provide a connection to the development lands on the north western corner of Glendon Drive and Vanneck Road as shown in **Figure 6-4**. This alignment is conceptual and can be revised by the Municipality at the planning stages for these developments.

Provision of servicing of the Old Kilworth lands is proposed by connecting these lands to the existing Blackburn Pumping Station. This station does not have sufficient capacity and would require upgrade as well as a new forcemain constructed to discharge flows to the existing gravity sewer on Westbrook Crescent. A capacity analysis of the existing sanitary sewer system downstream of this discharge point was undertaken and sufficient capacity is available in the downstream sewer system. Gravity sanitary sewers could be constructed within the road allowances of the Old Kilworth area and discharging to the Blackburn Pumping Station in order to service these lands. This area does not currently experience significant issues with the existing septic systems, so this solution would be implemented based on the strategic direction of the Municipality and the residents of Old Kilworth.



Stantec

Legend

- Settlement Boundary
- Parcel
- Future Growth Area

Proposed Project

- Sanitary
- Water
- Storm

Existing Servicing

- Sanitary Facility
- Sanitary Sewer
- Sanitary Forcemain
- Water Facility
- Watermain
- Storm Sewer

0 250 500 m

1:16,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Produced using information licensed under Open Government License - Ontario. Produced using information © County of Middlesex 2023. Parcels © Teranet Enterprises Inc. and its suppliers. All rights reserved. Not a plan of survey.
3. Spring 2020 orthoimagery © 2023 King's Printer for Ontario. All Rights Reserved.

Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-04-19

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

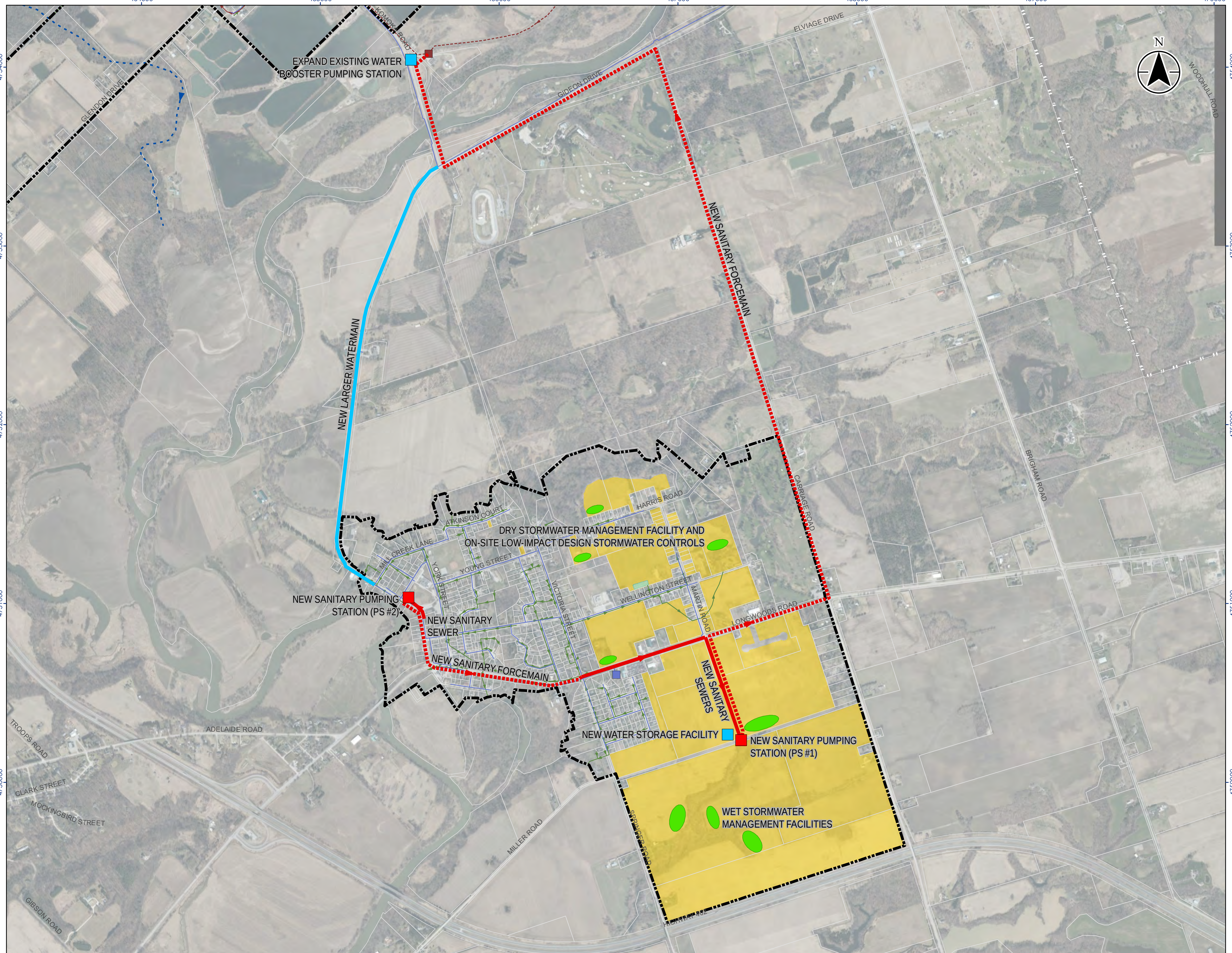
Figure No.
6-4

Title
Proposed Projects
Komoka

6.4.5 Delaware

Delaware currently has no sanitary servicing and the planned servicing is intended to satisfy the requirements of near term growth while working with the existing topography. **Figure 6-5** shows the planned servicing which consists of a new pumping station (Delaware PS #1) within the employment lands south of Longwoods Road. This pumping station would service all of the growth lands and some of the existing development from Victoria Street easterly. The pumping station would discharge to a forcemain which would follow the future road allowance of Martin Road north to Longwoods Road, easterly on Longwoods Road to Carriage Road, northerly on Carriage Road to Gideon Drive, westerly on Gideon Drive to Komoka Road and northerly on Komoka Road to the Komoka WWTP. Crossing of the Thames River is proposed to be accomplished by hanging the forcemain on the side of the bridge on Komoka Road.

Servicing for the majority of the existing development in Delaware (i.e.. the lands on Victoria Street westerly) would be by a new pumping station (Delaware PS #2) located on municipal lands at 2652 Gideon Drive. Pumping station #2 will discharge by forcemain along Gideon Drive and Longwoods Road to a future gravity sanitary sewer on Longwoods Drive which would convey flows to Pumping Station #1. Costing on the Project List in Section 7.0 includes the pumping station, all sewers to service the existing streets in Delaware from Victoria Street westerly as well as the forcemain and the gravity sewer on Longwoods Road. The gravity sewer on the extension of Martin Road from Longwoods Road southerly to Delaware PS #1 is assumed to be constructed as part of the development application. The existing development in Delaware does not currently experience significant issues with the existing septic systems, so this solution would be implemented based on the strategic direction of the Municipality and the residents of Delaware.



Stantec

Legend

- Settlement Boundary
- Parcel
- Future Growth Area

Proposed Project

- Sanitary
- Water
- Storm

Existing Servicing

- Sanitary Facility
- Sanitary Sewer
- Sanitary Forcemain
- Water Facility
- Watermain
- Storm Sewer

0 250 500 m

1:22,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Produced using information licensed under Open Government License - Ontario. Produced using information © County of Middlesex 2023. Parcels © Teranet Enterprises Inc. and its suppliers. All rights reserved. Not a plan of survey.
3. Spring 2020 orthoimagery © 2023 King's Printer for Ontario. All Rights Reserved.

Project Location
Municipality of Middlesex Centre

165630236 REVA
Prepared by KDB on 2024-04-19

Client/Project
MUNICIPALITY OF MIDDLESEX CENTRE
MASTER SERVICING PLAN

Figure No.
6-5

Title
Proposed Projects
Delaware

7.0 IMPLEMENTATION PLAN

The recommended Project List with the Opinions of Probable costs, Project Triggers and Class Environmental Assessment schedule is presented in the following page under **Table 7-1** Project list.

For the expansion of the Ilderton WWTP, a previous Environmental Assessment was completed in 2013. That study recommended some minor improvements to the plant in order to rerate the facility and further made recommendations for the expansion to 1800 m^3/day noted in this study. As the recommended works to rerate the plan were undertaken, this study is still valid and additional study work to satisfy Schedule C of the Class EA is not required.

A previous study of the Komoka WWTP was completed in 2010, however, it is considered outdated and it is recommended that additional study work be completed to satisfy the requirements of the Class EA. The Master Plan will be considered to have completed the first two phases of the Class EA.

The solutions proposed under this Master Plan are intended to service the Municipality to 2046 and consider only development within the current settlement boundaries. As projects identified in this Master Plan are advanced to implementation, consideration should be given to logical expansions of the settlement boundaries in future. As the projects under the Master Plan are implemented, where feasible, oversizing of sanitary sewers that are constructed and/or minor deepening should be considered to service lands which are currently outside of the settlement boundary but are logical extensions of those boundaries. These considerations should extend to pumping station and forcemain sizing.

Projects listed on the Project List are only those projects which are assumed will be constructed by the Municipality. Some of these projects may be eligible for cost recovery through the Municipality's Development Charge By-law. Projects noted in previous sections which are within development lands and are not specifically noted in the Project List are assumed to be constructed as a part of a development application and thus the cost and obligation to construct these works are with the development.

While some projects noted on the Project List have an estimated year of implementation, many are dependent on development of specific areas or development applications and are thus inextricably linked to those applications. For those projects where an implementation year has been estimated, this is based on the assumption of linear growth in these communities as calculated in Section 3.0. Historically, while growth may be linear across the Municipality, individual communities will often have periods of slow and fast growth which will influence the implementation timing of the projects identified. Accordingly, we recommend a high degree of monitoring and flexibility in the manner in which these projects are budgeted and implemented.

Servicing to the unserviced areas of the Municipality is noted as at the 'Discretion of the Municipality'. The intention of the Master Plan for these projects is to provide a roadmap for the Municipality on the implementation of services to provide for these areas. No documentation was received through the Master Plan to indicate that these projects were needed because of failing septic systems or groundwater contamination issues. Accordingly, the implementation of these projects are based on whether these factors become prevalent in the future or the Municipality chooses to proceed for other reasons.

Table 7-1: Implementation Plan

Settlement	Description	Scope	Project Trigger	Approximate Timeline	Total OPC (incl. Contingency & Engineering) [2023$]	Class EA Schedule
Ilderton	Upgrade Ilderton Wastewater Treatment Plant	Upgrade Ilderton WWTP from 1,300 m^3/day to 1,800 m^3/day including expansion of biosolids storage from 1500 m^3 to 1900 m^3	Flow exceeds 85% of WWTP Rated Capacity of 1300 m3/d	2028	$ 9.1M	C (completed in 2015 study)
	Decommission Sanitary pumping station #3	New gravity sewer transporting flow from PS3 to Ilderton WWTP. Decommission existing FM and pump station.	Discretion of Municipality.	Discretion of Municipality	$ 4.7M	B
	Redirect forcemain from pumping station #1	Connect to existing forcemain on Rail Trail and construct new forcemain to connect to future gravity sewer on Songbird Lane	Dependent on construction of sewer system from Songbird Lane to the WWTP. Easement to be included in draft plan for future development.	Dependent on Development	$ 0.1M	A+
Komoka	Expansion of the Komoka Wastewater Treatment Plant – phase 1	Upgrade Phase 1: Upgrade Komoka WWTP from 2,250 m3/day to 3,500 m3/day including expansion of biosolids storage by 600 m^3	Flow exceeds 85% of WWTP Rated Capacity of 2250 m3/d	2028	$ 22.8M	C
	Expansion of the Komoka Wastewater Treatment Plant – phase 2	Upgrade Phase 2: Upgrade Komoka WWTP from 3,500 m3/day to 4,750 m3/day including expansion of biosolids storage by 600 m^3	Flow exceeds 85% of WWTP Rated Capacity of 3500 m3/d	2033	$ 22.8M	C

Settlement	Description	Scope	Project Trigger	Approximate Timeline	Total OPC (incl. Contingency & Engineering) [2023$]	Class EA Schedule
	Expansion of the Komoka Wastewater Treatment Plant – phase 3	Upgrade Phase 3: Upgrade Komoka WWTP from 4,750 m3/day to 6,000 m3/day including expansion of biosolids storage by 600 m^3	Flow exceeds 85% of WWTP Rated Capacity of 4750 m3/d	2038	$ 22.8M	C
	Decommission existing Komoka sanitary pumping station and connect to new pumping station	Decommissioning the existing Komoka SPS 1 on Komoka and Railway Ave. New Gravity servicing to take flows to PS2.	Monitoring of existing flows recommended as upstream development proceeds. Timing will depend on construction of downstream sewer and pumping station.	2035	$ 4.7M	A+
	Upgrade sanitary sewer on Komoka Road	Gravity sewer on Komoka road from pumping station to Huron Ave.	Triggered by upstream development in NW and NE Komoka. Triggered at 25% buildout of combined development population.	Dependent on Development	$ 1.4M	A+
	New Komoka sanitary pumping station	Construct a new Komoka SPS2 with Capacity of 88.4 L/s, Pump to Komoka WWTP. New FM from new PS on Glendon Drive to the Komoka WWTP.	Dependent on Development	Dependent on Development	$ 6.1M	B
	New sanitary sewer on Glendon Drive	Sanitary sewer within the Glendon Drive road allowance from Komoka SPS2 to the west side of Komoka Creek (450m total length)	Dependent on Development	Dependent on Development	$ 4.5M	A+
Kilworth	Provide sanitary servicing for Old Kilworth	Gravity servicing for the Old Kilworth area. New FM from Blackburn PS (PS1) along Blackburn Crest. Upgrade the existing Backburn SPS's capacity to 1459 m3/d (16.9 L/s), Pump to Ex. Kilworth SPS2.	Municipality/Old Kilworth residents' decision to proceed with connecting to the existing sewer system	Discretion of Municipality	$ 14.2M	A+

Settlement	Description	Scope	Project Trigger	Approximate Timeline	Total OPC (incl. Contingency & Engineering) [2023$]	Class EA Schedule
	Upgrade Kilworth sanitary pumping station	Upgrade the new Kilworth SPS2's capacity to 12,737 m3/d (147 L/s), Pump to Komoka WWTP.	Required when PS reaches capacity of 114 l/s which equates to an approximate population of 10,000.	2040	$ 0.8M	A
Delaware	New Delaware sanitary pumping station to service employment lands	Construct a new Delaware SPS1 with Capacity of 134 L/s, Pump to Komoka WWTP. New FM from new PS1 to Komoka WWTP.	Coincident with employment lands' development.	Dependent on Development	$ 11.9M	B
	Sanitary sewers, pumping station and forcemain to service existing Delaware west of Victoria Street	Construct a new Delaware SPS2 with Capacity of 67 L/s, Pump to Delaware SPS1. New FM from PS2 to gravity sewer (discharges to PS1). Incl 7.5 km of local sewers.	Discretion of Municipality	Discretion of Municipality	$ 48.0M ($ 36.3M local sewer construction + $ 2.7M PS and $9.0M Forcemain and sewer to connect to SPS1)	B
Arva	New Arva Sanitary Pumping Station and Forcemain	Construct a new Arva SPS2 with Capacity of 1,129 m3/day (13.1 L/s), Pump to Existing Arva SPS1.	Dependent on Development	Dependent on Development	$ 3.8M	B
	Upgrade existing Arva Pumping Station	Upgrade the existing Arva SPS1 to Capacity of 3,915 m3/day (45.3 L/s).	Dependent on Development	Dependent on Development	$ 1.4M	A

Cost estimates represented in Table 7-1 are Class D estimates and are program or feasibility level estimates. The level of accuracy is estiamted at +30% /-25%. All estimates contain a contingency allowance and an allowance for engineering costs and are thus represented as project costs. All costs are in 2023 dollars and are based on historic information on projects of a similar nature and are not project specific.

8.0 SUMMARY AND NEXT STEPS

This Technical Memo addresses the sanitary servicing component of the Middlesex Centre Master Servicing Plan. It includes the following discussions:

- Introduction, including background review (**Section 1.0**).
- Overview of the existing water systems (**Section 2.0**).
- Overview of existing and future populations (**Section 3.0**).
- Assessment of existing systems and identification of issues (**Section 4.0**).
- Development of alternative solutions to address the issues identified (**Section 5.0**); and,
- Recommended projects and implementation plan (**Section 6.0**).

The findings of this Technical Memo will be used to inform the overall Servicing Master Plan report to guide the Municipality's long-term infrastructure planning to meet its Official Plan goals.

APPENDIX A
DECISION MATRIX

Ranking		Biosolids Management in Komoka WWTP and Ilderton WWTP		
Category	Evaluation Criteria	1 - Do Nothing	2 - Expand existing liquid biosolids facilities	3 - Construct new dewatering facility at Komoka WWTP
Socio-Economic	Potential to impact existing residences, businesses and community features	Existing facilities will not accommodate planned growth in the communities	Potential expansions contained within existing sites, allows for planned growth, no negative impact on socio-economic factors	Potential facility contained within existing Komoka WWTP site, allows for planned growth, no negative impact on socio-economic factors
	Potential effect on approved/planned land uses			
	Potential effects on known or potential significant archaeological resources, built heritage resources and cultural landscape features			
	Potential to accommodate planned significant population and job growth in strategic growth areas			
Natural Environment	Potential to impact fish and aquatic habitat	No impact to natural environment.	Potential expansions contained within existing sites, impacts to natural environment are minimal	Potential facility contained within existing Komoka WWTP site, impacts to natural environment are minimal
	Potential to impact water resources including surface water (i.e. rivers, creeks, etc.), groundwater recharge areas and wellhead protection areas			
	Potential to impact significant natural heritage features			
	Potential to impact significant wildlife habitat and species at risk			
Technical Considerations	Potential land requirements including land purchase and temporary/permanent easements	No change to existing operation and maintenance	Expansion of existing biosolids facilities are consistent with existing and meet the needs of the Municipality	Creation of a dewatering facility would require new procedures and staff training to operate. Regular trucking of flows from Ilderton WWTP to Komoka would be necessary.
	Constructability			
	Effect on existing utilities and infrastructure (number and type of potential conflicts)			
	Ability to coordinate with existing and planned infrastructure improvements			
	System resiliency and system suitability			
Financial	Lifecycle operations and maintenance costs	No change to existing operation costs and no capital cost	Lowest cost compared to Alternative 3	Highest cost of all alternatives
	Estimated capital cost			
Summary Ranking	**Green is best aligned with the criteria, Yellow is somewhat aligned with the criteria, and red is the least aligned with the criteria.**	**Not Preferred - Does not meet the needs of the Municipality**	**Preferred Alternative**	**Less Preferred Alternative**

Ranking		Decommissioning of Ilderton Pumping Station #3		
Category	Evaluation Criteria	1 - Do Nothing	2 - Construct new sewers on Hyde Park Road to decommission station	3 - Construct new sewers in subdivision to decommission station
Socio-Economic	Potential to impact existing residences, businesses and community features	Existing pumping station experiences high inflow and infiltration which could impact growth and existing residents.	High impact on residents and businesses as large portion of construction is on a major road. Accomodates population growth.	Will impact residents and businesses as portion of construction is on major road. Accomodates population growth.
	Potential effect on approved/planned land uses			
	Potential effects on known or potential significant archaeological resources, built heritage resources and cultural landscape features			
	Potential to accommodate planned significant population and job growth in strategic growth areas			
Natural Environment	Potential to impact fish and aquatic habitat	No impact to natural environment.	No potential to impact fish and aquatic habitat, water resources, natural heritage, or wildlife habitats and species at risk.	No potential to impact fish and aquatic habitat, water resources, natural heritage, or wildlife habitats and species at risk.
	Potential to impact water resources including surface water (i.e. rivers, creeks, etc.), groundwater recharge areas and wellhead protection areas			
	Potential to impact significant natural heritage features			
	Potential to impact significant wildlife habitat and species at risk			
Technical Considerations	Potential land requirements including land purchase and temporary/permanent easements	Maintaining existing pumping station places operation and maintenance burden on Municipality.	Potential impact on existing utilities as majority of construction is on major road. Entire system will be newly constructed.	Easement may be required. Potential impact on existing utilities. Can connect to existing system with some reconstruction required downstream.
	Constructability			
	Effect on existing utilities and infrastructure (number and type of potential conflicts)			
	Ability to coordinate with existing and planned infrastructure improvements			
	System resiliency and system suitability			
Financial	Lifecycle operations and maintenance costs	Operation and maintenance costs continue to be a burden on the Municipality.	Highest capital cost of all alternatives.	Lowest cost alternative when compared to life cycle cost of alternative 1
	Estimated capital cost			
Summary Ranking	**Green is best aligned with the criteria, Yellow is somewhat aligned with the criteria, and red is the least aligned with the criteria.**	**Not Preferred**	**Less Preferred Alternative**	**Preferred Alternative**

Ranking		Decommissioning of Ilderton Pumping Station #5	
		1 - Do Nothing	2 - Construct new downstream sewers to decommission station
Category	**Evaluation Criteria**		
Socio-Economic	Potential to impact existing residences, businesses and community features	Existing pumping station experiences high inflow and infiltration but no capacity issues are noted.	Some impact during construction on residents and businesses due to downstream sewer construction.
	Potential effect on approved/planned land uses		
	Potential effects on known or potential significant archaeological resources, built heritage resources and cultural landscape features		
	Potential to accommodate planned significant population and job growth in strategic growth areas		
Natural Environment	Potential to impact fish and aquatic habitat	No impact to natural environment.	No potential to impact fish and aquatic habitat, water resources, natural heritage, or wildlife habitats and species at risk.
	Potential to impact water resources including surface water (i.e. rivers, creeks, etc.), groundwater recharge areas and wellhead protection areas		
	Potential to impact significant natural heritage features		
	Potential to impact significant wildlife habitat and species at risk		
Technical Considerations	Potential land requirements including land purchase and temporary/permanent easements	Maintaining existing pumping station places operation and maintenance burden on Municipality.	Potential impact on existing utilities as majority of construction is on major road. Entire system will be newly constructed.
	Constructability		
	Effect on existing utilities and infrastructure (number and type of potential conflicts)		
	Ability to coordinate with existing and planned infrastructure improvements		
	System resiliency and system suitability		
Financial	Lifecycle operations and maintenance costs	Operation and maintenance costs continue to be a burden on the Municipality.	Higher cost as compared to life cycle cost of continued operation of pumping station.
	Estimated capital cost		
Summary Ranking	**Green is best aligned with the criteria, Yellow is somewhat aligned with the criteria, and red is the least aligned with the criteria.**	**Preferred Alternative**	**Less Preferred Alternative**

Ranking		Sanitary conveyance to service Arva growth			
		1 - Do Nothing	2 - Decommission PS and construct new PS and new sewers in development lands and easement	4 - Decommission PS and construct new PS and new sewers in development lands and along Croydon Drive	5 - Maintain existing PS and construction new PS at west end of Medway Road
Category	**Evaluation Criteria**				
Socio-Economic	Potential to impact existing residences, businesses and community features	Will not accommodate new growth.	Some impact residents as part of new system will be constructed in an easement behind existing homes. Accomodates population growth.	Some construction impact to residents on Croydon Drive. Accomodates population growth.	Minimal impact on existing residents as all work will be constructed on new development lands. Accomodates population growth.
	Potential effect on approved/planned land uses				
	Potential effects on known or potential significant archaeological resources, built heritage resources and cultural landscape features				
	Potential to accommodate planned significant population and job growth in strategic growth areas				
Natural Environment	Potential to impact fish and aquatic habitat	No impact to natural environment.	Construction of the sewer in the easement will have some impact to the natural environment.	No potential to impact fish and aquatic habitat, water resources, natural heritage, or wildlife habitats and species at risk.	No potential to impact fish and aquatic habitat, water resources, natural heritage, or wildlife habitats and species at risk.
	Potential to impact water resources including surface water (i.e. rivers, creeks, etc.), groundwater recharge areas and wellhead protection areas				
	Potential to impact significant natural heritage features				
	Potential to impact significant wildlife habitat and species at risk				
Technical Considerations	Potential land requirements including land purchase and temporary/permanent easements	No land requirements, effect on existing utilities and infrastructure or need to coordinate with future projects. Not suitable for future system.	Land acquisition required for new PS. Less conflict with existing utilities while constructing in easement. Construction can be coordinated with new developments. Sewer depth is a technical issue during construction as well as ongoing maintenance.	Land acquisition required for new PS. Minimal conflict with existing utilities when constructing on Croydon Drive. Construction can be coordinated with new developments. Sewer depth is a technical issue during construction as well as ongoing maintenance.	Land acquisition required for new PS. No conflict with existing utilities as works are on new development lands. Sewers are at a reasonable depth. Requires ongoing maintenance of existing PS.
	Constructability				
	Effect on existing utilities and infrastructure (number and type of potential conflicts)				
	Ability to coordinate with existing and planned infrastructure improvements				
	System resiliency and system suitability				
Financial	Lifecycle operations and maintenance costs	No additional capital cost	High construction cost for new sewer due to depth of existing sewers.	High construction cost for new sewer due to depth of existing sewers.	Lowest capital cost over alternatives 2 and 4. Ongoing lifecycle cost of the existing PS is a consideration but this is still the lowest cost alternative.
	Estimated capital cost				
Summary Ranking	**Green is best aligned with the criteria, Yellow is somewhat aligned with the criteria, and red is the least aligned with the criteria.**	**Not Preferred - Does not meet the needs of the Municipality**	**Less Preferred Alternative**	**Not Preferred**	**Preferred Alternative**

Ranking		Sanitary Treatment for Delaware		
Category	**Evaluation Criteria**	**1 - Do Nothing**	**2 - Construct new sewage treatment plant in Delaware**	**4 - Pump flows to the Komoka WWTP**
Socio-Economic	Potential to impact existing residences, businesses and community features	Will not accommodate new growth.	Some impact to existing residents as siting of new facility will likely have proximity to some residents. Accomodates population growth.	Some impact to existing residents during construction of forcemain. Accomodates population growth.
	Potential effect on approved/planned land uses			
	Potential effects on known or potential significant archaeological resources, built heritage resources and cultural landscape features			
	Potential to accommodate planned significant population and job growth in strategic growth areas			
Natural Environment	Potential to impact fish and aquatic habitat	No impact to natural environment.	Treatment plant outfall will likely be to the Thames River which will require extensive study to mitigate environmental concerns	Forcemain route will follow existing road allowances and crossing of the Thames River will be on the side of the existing bridge. Impacts should be minimal.
	Potential to impact water resources including surface water (i.e. rivers, creeks, etc.), groundwater recharge areas and wellhead protection areas			
	Potential to impact significant natural heritage features			
	Potential to impact significant wildlife habitat and species at risk			
Technical Considerations	Potential land requirements including land purchase and temporary/permanent easements	No impact on existing system	Will require land purchase for treatment facility. New facility will introduce additional operation and maintenance burden on the Municipality.	Forcemain route will have some impact on existing utilities. Forcemain is lengthy and may require chemical dosing of sewage.
	Constructability			
	Effect on existing utilities and infrastructure (number and type of potential conflicts)			
	Ability to coordinate with existing and planned infrastructure improvements			
	System resiliency and system suitability			
Financial	Lifecycle operations and maintenance costs	No additional capital cost	Similar capital cost to alternative 4 but higher operation and maintenance cost	Similar capital cost to alternative 2 but lower operation and maintenance cost
	Estimated capital cost			
Summary Ranking	**Green is best aligned with the criteria, Yellow is somewhat aligned with the criteria, and red is the least aligned with the criteria.**	**Not Preferred - Does not meet the needs of the Municipality**	**Less Preferred Alternative**	**Preferred Alternative**

Ranking		Delaware Sanitary Conveyance System		
Category	Evaluation Criteria	1 - Do Nothing	2 - Construct new PS #1 which discharges to the Komoka WWTP, Construct PS #2 discharges to PS #1	3 - Construct new PS #2 which discharges to the Komoka WWTP, Construct PS #1 discharges to PS #2
Socio-Economic	Potential to impact existing residences, businesses and community features	Will not accommodate new growth.	Initial construction limited to growth areas and minimizes impact to existing residents until existing village is serviced.	Requires construction of both pumping stations in order to service new growth which causes a greater impact during initial construction
	Potential effect on approved/planned land uses			
	Potential effects on known or potential significant archaeological resources, built heritage resources and cultural landscape features			
	Potential to accommodate planned significant population and job growth in strategic growth areas			
Natural Environment	Potential to impact fish and aquatic habitat	No impact to natural environment.	Minimal impact on fish and aquatic habitat, water resources, natural heritage features and wildlife habitat and species at risk.	Minimal impact on fish and aquatic habitat, water resources, natural heritage features and wildlife habitat and species at risk.
	Potential to impact water resources including surface water (i.e. rivers, creeks, etc.), groundwater recharge areas and wellhead protection areas			
	Potential to impact significant natural heritage features			
	Potential to impact significant wildlife habitat and species at risk			
Technical Considerations	Potential land requirements including land purchase and temporary/permanent easements	No impact	Projects can be implements in multiple phases as growth occurs.	Requires construction of both pumping stations in initial phase to service growth lands as well as extensive forcemain and trunk sewer construction.
	Constructability			
	Effect on existing utilities and infrastructure (number and type of potential conflicts)			
	Ability to coordinate with existing and planned infrastructure improvements			
	System resiliency and system suitability			
Financial	Lifecycle operations and maintenance costs	No additional capital cost	Total capital cost is higher than alternative 3 but costs for initial phases are much lower.	Lower total capital cost but cost of initial phases is higher than alternative 2.
	Estimated capital cost			
Summary Ranking	**Green is best aligned with the criteria, Yellow is somewhat aligned with the criteria, and red is the least aligned with the criteria.**	**Not Preferred - Does not meet the needs of the Municipality**	**Preferred Alternative**	**Less Preferred Alternative**

APPENDIX B
PROJECT LIST AND OPINION OF PROBABLE COST

Project List and Opinion of Probable costs.

Settlement	Description	Scope	Project Trigger	Approximate Timeline	Total OPC (incl. Contingency & Engineering) [2023$]	Class EA Schedule
Ilderton	Upgrade Ilderton Wastewater Treatment Plant	Upgrade Ilderton WWTP from 1,300 m3/day to 1,800 m3/day.	Flow exceeds 85% of WWTP Rated Capacity of 1300 m3/d	2028	$ 9.1M	C (completed in 2015 study)
	Decommission Sanitary pumping station #3	New gravity sewer transporting flow from PS3 to Ilderton WWTP. Decommission existing FM and pump station.	Discretion of Municipality.	Discretion of Municipality	$ 4.7M	B
	Redirect forcemain from pumping station #1	Connect to existing forcemain on Rail Trail and construct new forcemain to connect to future gravity sewer on Songbird Lane	Dependent on construction of sewer system from Songbird Lane to the WWTP. Easement to be included in draft plan for future development.	Dependent on Development	$ 0.1M	A+
Komoka	Expansion of the Komoka Wastewater Treatment Plant – phase 1	Upgrade Phase 1: Upgrade Komoka WWTP from 2,250 m3/day to 3,500 m3/day	Flow exceeds 85% of WWTP Rated Capacity of 2250 m3/d	2028	$ 22.8M	C
	Expansion of the Komoka Wastewater Treatment Plant – phase 2	Upgrade Phase 2: Upgrade Komoka WWTP from 3,500 m3/day to 4,750 m3/day	Flow exceeds 85% of WWTP Rated Capacity of 3500 m3/d	2033	$ 22.8M	C
	Expansion of the Komoka Wastewater Treatment Plant – phase 3	Upgrade Phase 3: Upgrade Komoka WWTP from 4,750 m3/day to 6,000 m3/day	Flow exceeds 85% of WWTP Rated Capacity of 4750 m3/d	2038	$ 22.8M	C
	Decommission existing Komoka sanitary pumping station and connect to new pumping station	Decommissioning the existing Komoka SPS 1 on Komoka and Railway Ave. New Gravity servicing to take flows to PS2.	Monitoring of existing flows recommended as upstream development proceeds. Timing will depend on construction of downstream sewer and pumping station.	2035	$ 6.3M	A+
	Upgrade sanitary sewer on Komoka Road	Gravity sewer on Komoka road from pumping station to Huron Ave.	Triggered by upstream development in NW and NE Komoka. Triggered at 25% buildout of combined development population.	Dependent on Development	$ 1.6M	A+
	New Komoka sanitary pumping station	Construct a new Komoka SPS2 with Capacity of 37.5 L/s, Pump to Komoka WWTP. New FM from new PS on Glendon Drive to the Komoka WWTP.	Dependent on Development	Dependent on Development	$ 5.5M	B
Kilworth	Provide sanitary servicing for Old Kilworth	Gravity servicing for the Old Kilworth area. New FM from Blackburn PS (PS1) along Blackburn Crest. Upgrade the existing Backburn SPS's capacity to 1459 m3/d (16.9 L/s), Pump to Ex. Kilworth SPS2.	Municipality/Old Kilworth residents' decision to proceed with connecting to the existing sewer system	Discretion of Municipality	$ 14.1M	A+
	Upgrade Kilworth sanitary pumping station	Upgrade the new Kilworth SPS2's capacity to 12,737 m3/d (147 L/s), Pump to Komoka WWTP.	Required when PS reaches capacity of 114 l/s which equates to an approximate population of 10,000.	2040	$ 1.4M	A
Delaware	New Delaware sanitary pumping station to service employment lands	Construct a new Delaware SPS1 with Capacity of 134 L/s, Pump to Komoka WWTP. New FM from new PS1 to Komoka WWTP.	Coincident with employment lands' development.	Dependent on Development	$ 11.9M	B
	Sanitary sewers, pumping station and forcemain to service existing Delaware west of Victoria Street	Construct a new Delaware SPS2 with Capacity of 67 L/s, Pump to Delaware SPS1. New FM from PS2 to gravity sewer (discharges to PS1). Incl 7.5 km of local sewers.	Discretion of Municipality	Discretion of Municipality	$ 40.8M	B
Arva	New Arva Sanitary Pumping Station and Forcemain	Construct a new Arva SPS2 with Capacity of 1,129 m3/day (13.1 L/s), Pump to Existing Arva SPS1.	Dependent on Development	Dependent on Development	$ 3.7M	B
	Upgrade existing Arva Pumping Station	Upgrade the existing Arva SPS1 to Capacity of 3,915 m3/day (45.3 L/s).	Dependent on Development	Dependent on Development	$ 1.3M	A