MIDDLESEX CENTRE SERVICING MASTER PLAN

November 12, 2024

Prepared for:
Municipality of Middlesex Centre

Prepared by:
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Revision	Description	Author	Date	Quality Check	Date
1	MECP Comments	C. Stauffer	Sept 16/24	J. Paul	Sept 16/24
2	Komoka MSP Comments	J. Paul	Nov 12/24	J. Paul	Nov 12/24

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Prepared by:  on behalf of

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Signature

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EXECUTIVE SUMMARY

The Municipality of Middlesex Centre retained Stantec Consulting Ltd. (Stantec) to complete the Middlesex Centre Servicing Master Plan (SMP). The purpose of the Master Plan was to update the strategy previously developed in 2010. Since the completion of the 2010 Master Servicing Plan, the Municipality has experienced growth in settlement areas which has prompted servicing extensions and infrastructure upgrades not captured in the previous study. As such, the SMP examines the servicing system by:

- Reviewing new planning policies
- Considering population and development growth projections
- Reviewing current and future needs that exist in the Municipality
- Aligning with and supporting the Municipality's Official Plan and other strategic plans and policies; and,
- Supporting planned growth within the Municipality to the year 2046.

The SMP focusses on the water, wastewater, stormwater and solid waste servicing systems. The SMP will identify areas in the existing system which may have capacity issues under existing and future conditions and recommend infrastructure upgrades to address this issues to support planned growth in Middlesex Centre to the year 2046.

The study area for this SMP includes the following Settlement Areas, and Hamlet Areas within Middlesex Centre.

Settlement Areas:

- Ilderton
- Komoka – Kilworth
- Arva
- Delaware

Hamlet Areas:

- Ballymote
- Birr
- Bryanston
- Denfield

- Lobo
- Melrose
- Poplar Hill-Coldstream

This Master Plan is being undertaken in accordance with Approach #2 of the Master Planning Process, as outlined in Appendix 4 of the Municipal Class EA document (2015). Master plans are long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. These plans examine an infrastructure system(s) or group of related projects to outline a framework for planning for subsequent projects and/or developments. This report is intended to fulfill the requirements of Schedule B projects which may be identified through the Master Planning process.

Consultation

A project contact list was created which includes multi-level government agencies and officials, Municipality of Middlesex Centre staff, committees, emergency service contacts, potentially interested Indigenous communities, members of the public, utility services, and special interest groups. The list was regularly updated to include those who expressed interest in the study.

Project notices issued to date include the Notice of Study Commencement & Public Information Centre 1 (December 2022), Notice of Public Information Centre 2 (September 2023). The Notice of Study Completion is anticipated to be issued in September 2024. All notices have been emailed and mailed (as requested) to the study contact list, emailed to Indigenous communities, published in the Middlesex Centre newspaper, and posted to the project website.

Two Public Information Centres (PICs) were held throughout the study, to provide the public with an opportunity to ask questions, share feedback, and express concerns throughout the study process, while assisting the development of a preferred strategy. The first PIC was hosted online on the Municipality's website. A joint information session and discussion was held together with the Municipality's Transportation Master Plan on January 11, 2023. The second PIC was hosted as an in-person joint information session and discussion with the Municipality's Transportation Master Plan on Thursday, October 19, 2023.

All input from the public, review agencies, committees, and other stakeholders has been documented. All consultation with Indigenous communities has also been documented in a Consultation Log.

Problem and Opportunities

A problem and opportunity statement was developed at the onset of the study.

The Municipality of Middlesex Centre has water, wastewater, stormwater and solid waste infrastructure which needs to be managed throughout the Municipality. The infrastructure provides full or partial-servicing to several settlement areas and hamlets throughout the Municipality.

The growing population within the Municipality, as identified in the Official Plan Update, may require additional servicing to accommodate the proposed growth.

The Servicing Master Plan will assess the current state of the Municipality's infrastructure. Where issues may be identified, the Municipality will identify potential solutions that will maintain servicing to homes and businesses as well as provide the ability to service the identified growth areas.

Alternative Solutions / Servicing Assessment

A detailed analysis of the water, wastewater and stormwater systems were undertaken for each of the hamlets and settlement areas within Middlesex Centre. Servicing for rural areas outside of the settlement boundaries were not studied. A detailed analysis of the methodology applied and methods of analysis are contained in Appendix B, C, D and E. For each community the following steps were completed:

- Review of background studies and available data
- Preparation of modelling tools.
- Identification of any constraints in the existing system under existing conditions
- Application of growth projections as outlined in Section 1.5
- Identification of any constraints in the existing system under growth projections
- Identification of alternative solutions to address each servicing system constraint identified.
- Evaluation of the alternatives and selection of a preferred solution
- Preparation of Opinions of Probable Costs for each preferred solution or project recommended and identification of the trigger for the project.

The findings of the Municipality of Middlesex Centre Settlement Area Stormwater Master Plan (2020) and the Delaware Community Settlement Area Stormwater Master Plan (2015) have been carried forward into the SMP. More detailed information on the stormwater alternatives and preferred solutions can be located within those studies. The recommendations of those studies have been supplemented for areas that were not previously studied in either of these previous studies.

The text in Section 4.0 includes the findings of the detailed servicing analysis completed for the SMP. More detailed reports relating to wastewater, water, stormwater and solid waste are contained in Appendix B, C, D and E.

Recommended Solutions

A list of the projects recommended as part of this Master Plan is provided in Table 1. All cost estimates noted are Class D estimates and are program or feasibility level estimates. The level of accuracy is estimated 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.

Projects listed in Table 1 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 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. The projects are displayed in Figures ES-1 to ES-5.

Table 1: Consolidated Project List

Settlement	Description	Scope	Project Trigger	Approximate Timeline	Total OPC (incl. Contingency & Engineering) [2023$]	Class EA Schedule
Ilderton	Upgrade Ilderton Wastewater Treatment Plant	Upgrade Ilderton Wastewater Treatment Plant from 1,300 m3/day to 1,800 m3/day.	Flow exceeds 85% of Wastewater Treatment Plant 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 pumping station 3 to Ilderton Wastewater Treatment Plant. Decommission existing forcemain 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 Wastewater Treatment Plant. Easement to be included in draft plan for future development.	Dependent on Development	$ 0.1M	A+
	Expand Ilderton water booster pumping station	Add +9 L/s of pumping capacity at 59 m TDH to the existing Ilderton booster pumping station.	Maximum Day Demand = 34 L/s in Ilderton Or Population (Future Residential + Employment) = 6,124 persons	2035	$ 0.9M	A+
	Build water new storage facility	Build a new 2,000 m^3 storage facility on Hyde Park Rd, at the south end of Ilderton on proposed development lands.	Maximum Day Demand = 30 L/s in Ilderton Or Population (Future Residential + Employment) = 5,488 persons	2030	$ 7.0M	B
	Construct stormwater facilities to service growth lands in South Ilderton	Construct two wet stormwater facilities to service growth lands in South Ilderton	Dependent on Development	Dependent on Development	Developer Cost	A
Komoka	Expansion of the Komoka Wastewater Treatment Plant – phase 1	Upgrade Phase 1: Upgrade Komoka Wastewater Treatment Plant from 2,250 m3/day to 3,500 m3/day	Flow exceeds 85% of Wastewater Treatment Plant Rated Capacity of 2250 m3/d	2028	$ 22.8M	C
	Expansion of the Komoka Wastewater Treatment Plant – phase 2	Upgrade Phase 2: Upgrade Komoka Wastewater Treatment Plant from 3,500 m3/day to 4,750 m3/day	Flow exceeds 85% of Wastewater Treatment Plant Rated Capacity of 3500 m3/d	2033	$ 22.8M	C
	Expansion of the Komoka Wastewater Treatment Plant – phase 3	Upgrade Phase 3: Upgrade Komoka Wastewater Treatment Plant from 4,750 m3/day to 6,000 m3/day	Flow exceeds 85% of Wastewater Treatment Plant 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 sanitary pumping station 1 on Komoka and Railway Ave. New Gravity servicing to take flows to pumping station 2.	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 North West and North East Komoka. Triggered at 25% buildout of combined development population.	Dependent on Development	$ 1.4M	A+
	Expand Komoka water booster pumping station	Add +59 L/s of pumping capacity at 34.3 m TDH to the existing Komoka booster pumping station.	Maximum Day Demand = 53.7 L/s in Komoka-Kilworth-Delaware Or Population (Future Residential + Employment) = 11,948 persons	2027	$ 1.1M	A
	New Komoka sanitary pumping station	Construct a new Komoka sanitary pumping station 2 with Capacity of 88.4 L/s, Pump to Komoka Wastewater Treatment Plant. New forcemain from new pumping station on Glendon Drive to the Komoka Wastewater Treatment Plant.	Dependent on Development	Dependent on Development	$ 6.1M	B

Settlement	Description	Scope	Project Trigger	Approximate Timeline	Total OPC (incl. Contingency & Engineering) [2023$]	Class EA Schedule
	Expand Komoka intermediate water pumping station	Upgrade the Komoka intermediate pumping station (increase rated capacity to 90 L/s at 45 m TDH).	Short-term (to address existing minimum pressure issues in Kilworth)	2026	$ 1.1M	B
	Expand existing water storage (in-ground reservoir)	Expand the existing at-grade storage reservoir at the Komoka booster pumping station; add a total volume of 3,334 m^3 when combined with the Komoka elevated tank/ elevated tower replacement (KKD-ST-2B).	Maximum Day Demand = 71 L/s in Komoka-Kilworth-Delaware Or Population (Future Residential + Employment) = 15,645 persons	2034	$ 3.0M	B
	Replace existing Komoka elevated tower	Decommission the existing Komoka elevated tank/ elevated tower and replace with a higher and larger elevated tank/ elevated tower; add a total volume of 3,334 m^3 when combined with the Komoka booster pumping station reservoir expansion (KKD-ST-2A).	Earliest of: Medium-term to address future minimum pressure issues in Kilworth, observed when Peak Hour Demand = ~1.6 x existing Peak Hour Demand, i.e., 2036 under current projections Needed to meet overall storage needs for Komoka-Kilworth-Delaware when combined with KKD-ST-A Maximum Day Demand = 71 L/s in Komoka-Kilworth-Delaware Or Population (Future Residential + Employment) = 15,645 person	2034	$ 10.8M	B
	Upgrade existing watermains on Queen Street and Railway Ave	Twin existing watermain on Queen St (from Oxbow Dr to Railway Ave) and on Railway Ave (from Queen St to Tunks Ln) with 1.1 km of 300 mm diameter watermain.	Once Komoka elevated tank/ elevated tower has been replaced (see KKD-ST-2B), i.e., Medium-term to address future minimum pressure issues in Kilworth, observed when Peak Hour Demand = ~1.6 x existing Peak Hour Demand	2036	$ 3.8M	A+
	Construct new watermain on Glendon Drive	Build 1.8 km of 200 mm diameter watermain along Glendon Dr (extend existing watermain to Amiens Rd), to service employment development lands southwest of Komoka.	Dependent on Development	Dependent on Development	$ 5.8M	A+
	Construct stormwater facilities to service growth lands in West Komoka	Construct two wet stormwater facilities to service growth lands in West Komoka	Dependent on Development	Dependent on Development	Developer Cost	A
	Construct stormwater facilities to service growth lands in in South Komoka	Construct on-site low impact development controls to service growth lands in South Komoka	Dependent on Development	Dependent on Development	Developer Cost	A
	Construct stormwater facilities to service growth lands in in North East Komoka	Construct two stormwater facilities (infiltration facility and dry pond) to service growth in North East Komoka	Dependent on Development	Dependent on Development	Developer Cost	A
	Construct stormwater facilities to service growth lands in North West Komoka	Construct wet stormwater facility to service growth in North West Komoka	Dependent on Development	Dependent on Development	Developer Cost	A
	Construct stormwater facilities to service growth lands in central Komoka	Construct a wet stormwater management facility to service existing lands and growth in central Komoka	Dependent on Development	2025	$ 6.0M	B
Kilworth	Provide sanitary servicing for Old Kilworth	Gravity servicing for the Old Kilworth area. New forcemain from Blackburn pumping station (pumping station 1) along Blackburn Crest. Upgrade the existing Backburn sanitary pumping station's capacity to 1459	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
		m3/d (16.9 L/s), Pump to Ex. Kilworth sanitary pumping station 2.				
	Water distribution system to supply Old Kilworth	Build 2.6 km of new 150 mm diameter watermain within the existing rights-of-way in Old Kilworth to service existing properties.	Municipality/Old Kilworth residents' decision to proceed with connecting to the existing distribution system	Discretion of Municipality	$ 8.3M	A+
	Construct bioswales for Old Kilworth	Bioswales would be designed to collect runoff from minor storm events within the adjacent lots and road rights-of-way to be infiltrated. Overflows would be implemented to bypass the filter bed media, and be conveyed downstream during a large storm event.	Implementation at the discretion of the Municipality, however, this project is recommended to be completed in the near term as this is an existing drainage issue.	Discretion of Municipality	$ 0.5M	B
	Upgrade Kilworth sanitary pumping station	Upgrade the new Kilworth sanitary pumping station 2's capacity to 12,737 m3/d (147 L/s), Pump to Komoka Wastewater Treatment Plant.	Required when pumping station reaches capacity of 114 l/s which equates to an approximate population of 10,000.	2040	$ 0.8M	A
	New watermain looping between Komoka and Kilworth	Developer-driven project – alignment and sizing to be determined in detailed design.	Earliest of: Short-term (for reliability) Coincident with development	Dependent on Development	Developer Cost	A
	Construct stormwater facilities to service growth lands in North Kilworth.	Construct on-site low impact development controls and a wet stormwater facility to service growth in North Kilworth.	Dependent on Development	Dependent on Development	Developer Cost	A
Delaware	New Delaware sanitary pumping station to service employment lands	Construct a new Delaware sanitary pumping station 1 with Capacity of 134 L/s, Pump to Komoka Wastewater Treatment Plant. New forcemain from new pumping station 1 to Komoka Wastewater Treatment Plant.	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 sanitary pumping station 2 with Capacity of 67 L/s, Pump to Delaware sanitary pumping station 1. New forcemain from pumping station 2 to gravity sewer (discharges to pumping station 1). Incl 7.5 km of local sewers.	Discretion of Municipality	Discretion of Municipality	$ 48.0M ($ 36.3M local sewer construction + $ 2.7M pumping station and $9.0M Forcemain and sewer to connect to sanitary pumping station 1)	B
	Expand Delaware water booster pumping station	Add +20 L/s of pumping capacity to the existing Delaware booster pumping station.	Maximum Day Demand = 13 L/s in Delaware Or Population (Future Residential + Employment) = 2,770 persons	Dependent on Development	$ 0.7M	A
	Build new water storage	Build a new 1,300 m^3 storage facility in the employment development lands in the south of Delaware, adjacent to the proposed sanitary pumping station #1.	Coincident with employment lands' development.	Dependent on Development	$ 4.4M	B
	Upgrade existing watermains	Upgrade the existing watermain on Gideon Dr (from Komoka Rd to Millcreek Ln) to 2.6 km of 300 mm diameter watermain.	Coincident with upstream Delaware booster pumping station upgrade, i.e., Maximum Day Demand = 13 L/s in Delaware Or Population (Future Residential + Employment) = 2,770 persons	Dependent on Development	$ 4.6M	A+
	Construct stormwater facilities to service employment lands.	Construct on-site low impact development controls and dry end of pipe stormwater facilities to service employment lands.	Dependent on Development	Dependent on Development	Developer Cost	A

Settlement	Description	Scope	Project Trigger	Approximate Timeline	Total OPC (incl. Contingency & Engineering) [2023$]	Class EA Schedule
	Construct stormwater facilities to service growth lands in Delaware.	Construct on-site low impact development controls and dry end of pipe stormwater facilities to service infill growth in Delaware.	Dependent on Development	Dependent on Development	Developer Cost	A
Arva	New Arva Sanitary Pumping Station and Forcemain	Construct a new Arva sanitary pumping station 2 with Capacity of 1,129 m3/day (13.1 L/s), Pump to Existing Arva sanitary pumping station 1.	Dependent on Development	Dependent on Development	$ 3.8M	B
	Upgrade existing Arva Pumping Station	Upgrade the existing Arva sanitary pumping station 1 to Capacity of 3,915 m3/day (45.3 L/s).	Dependent on Development	Dependent on Development	$ 1.4M	A
	Connect water system to Lake Huron system	Build a new 1.25 km long 200 mm diameter feedermain on Medway Rd, from pumping station #4 at the Arva Reservoir to the proposed new water storage facility within Arva (see ARV-REL-2).	Dependent on Development	Dependent on Development	$2.0M	A+
	Build water new storage and water booster pumping station	Build a new 900 m^3 storage facility with a 14.8 L/s booster pumping station at the west end of Arva, on Medway Rd, adjacent to the proposed sanitary pumping station.	Dependent on Development	Dependent on Development	$4.0M	B
	Construct stormwater facilities to service growth.	Construct on-site low impact development controls and dry end of pipe stormwater facilities to service growth.	Dependent on Development	Dependent on Development	Developer Cost	A

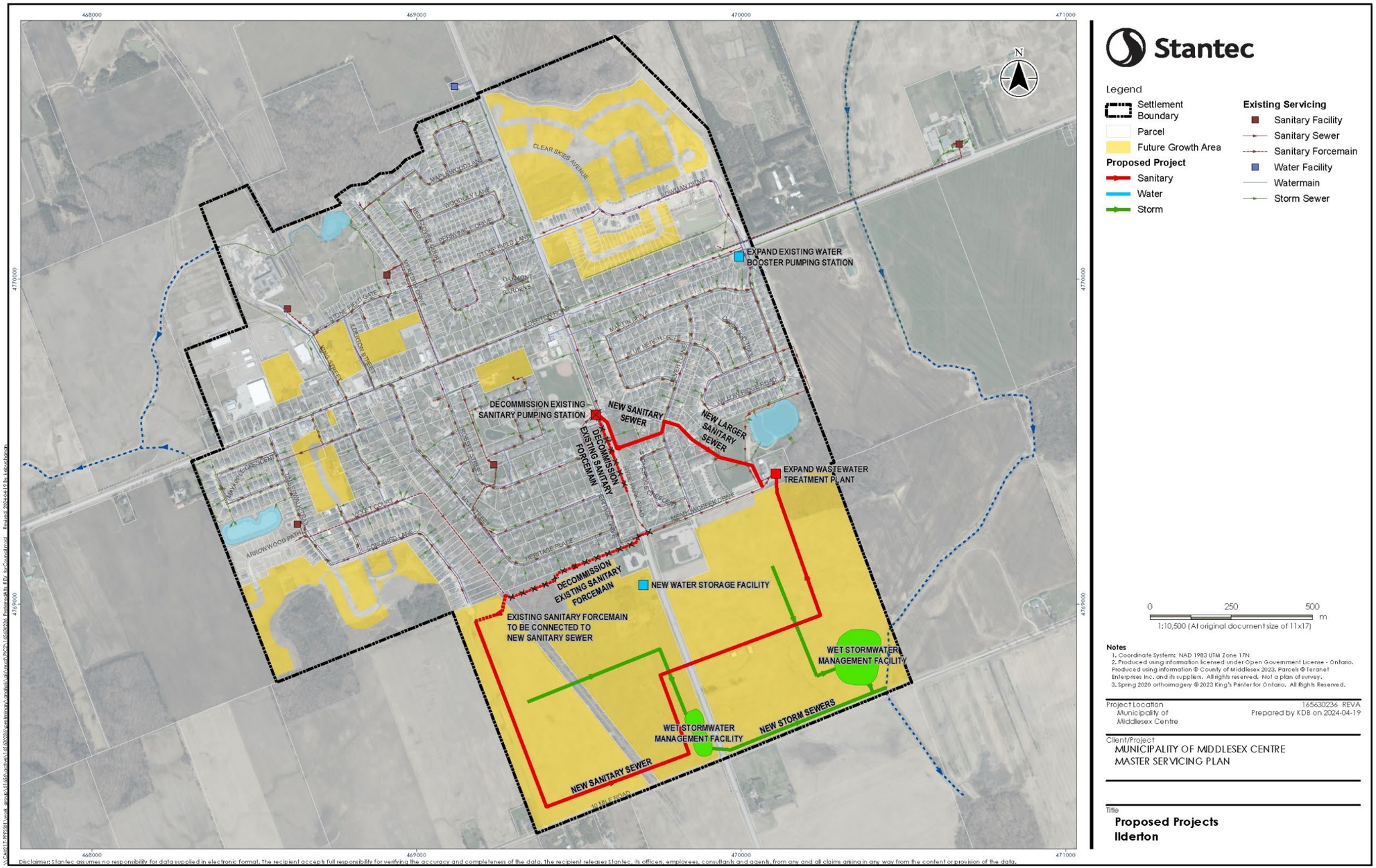

Figure ES- 1: Ilderton Proposed Projects

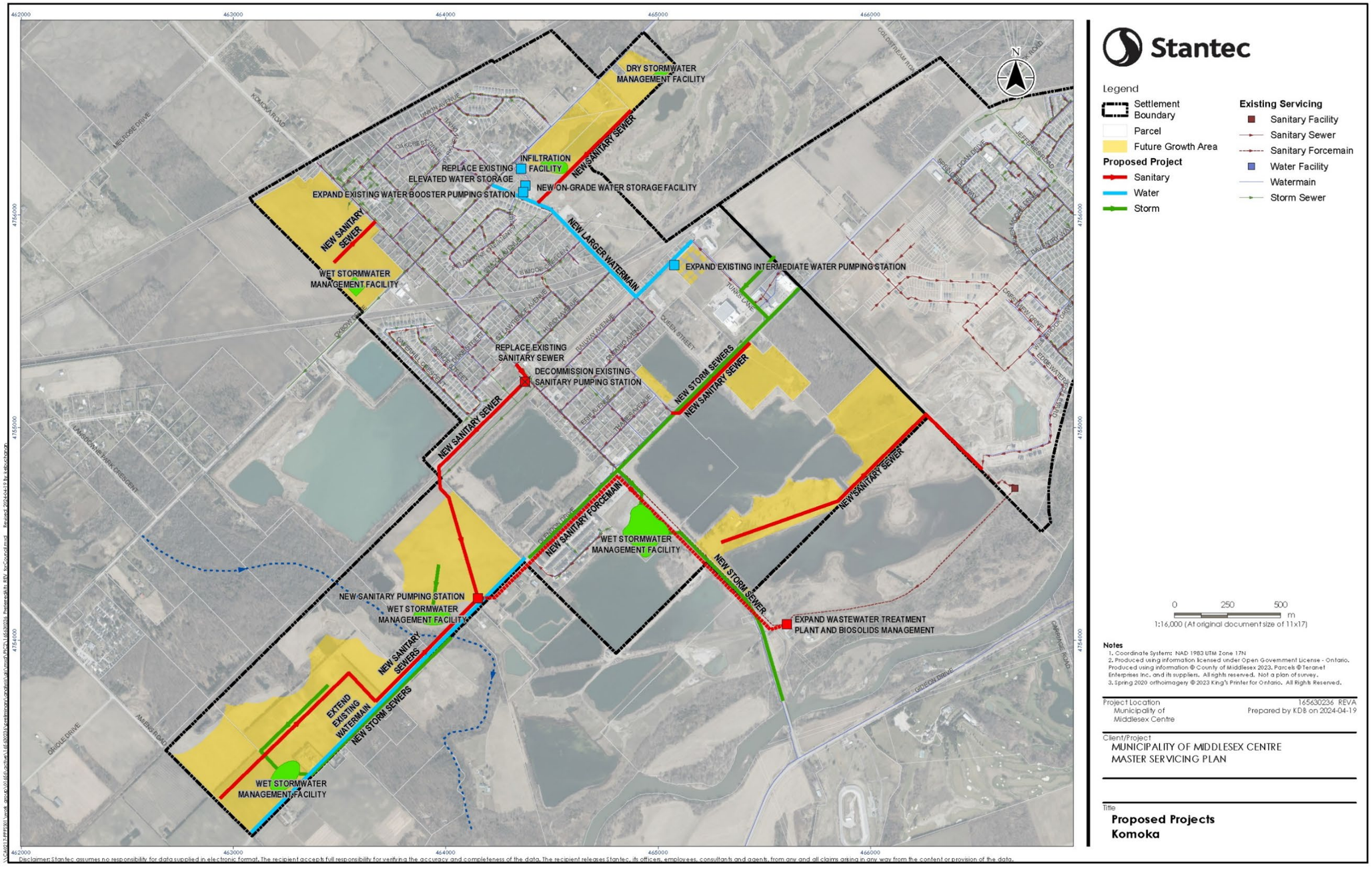

Figure ES- 2: Komoka Proposed Projects

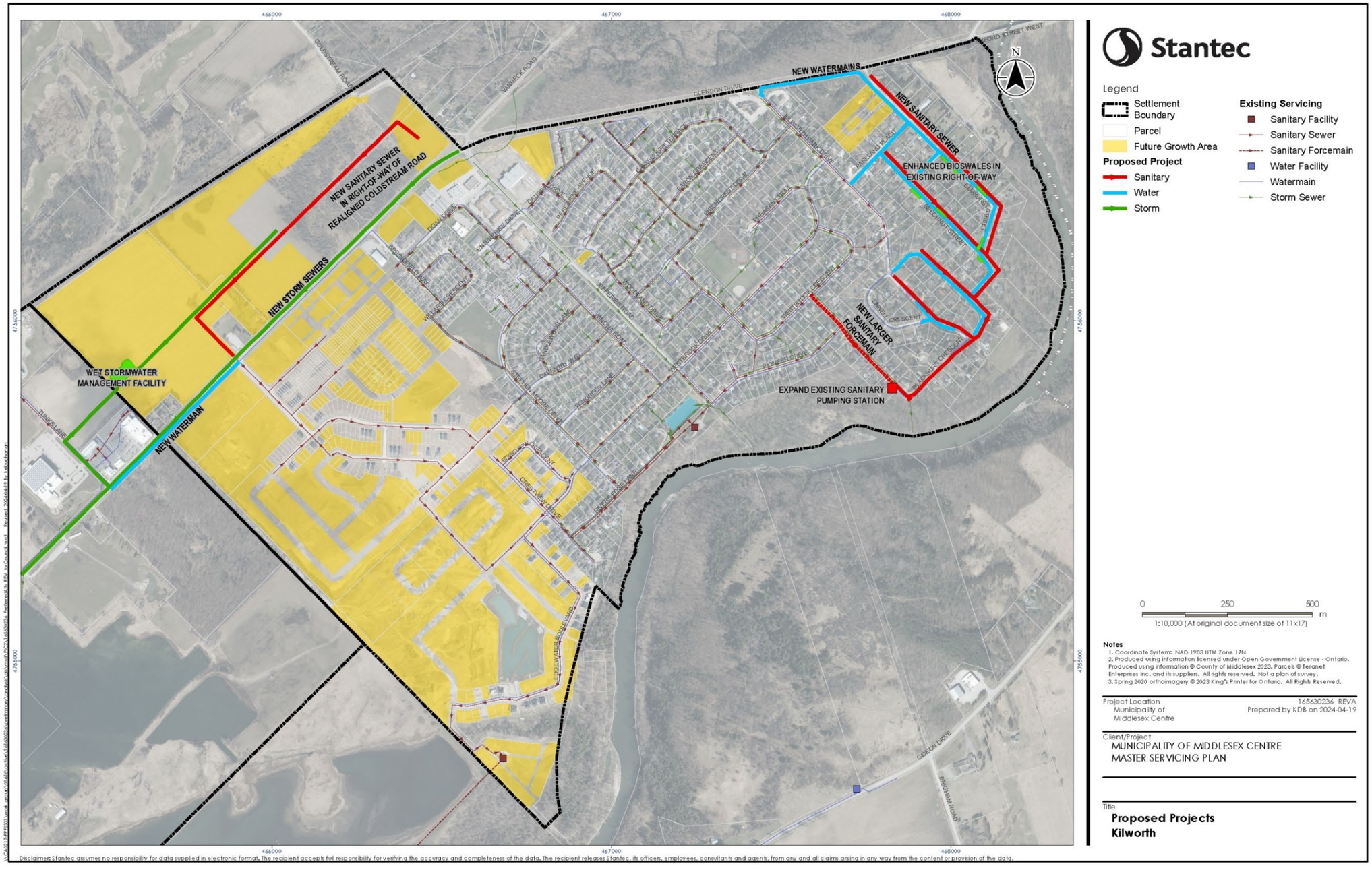

Figure ES- 3: Kilworth Proposed Projects

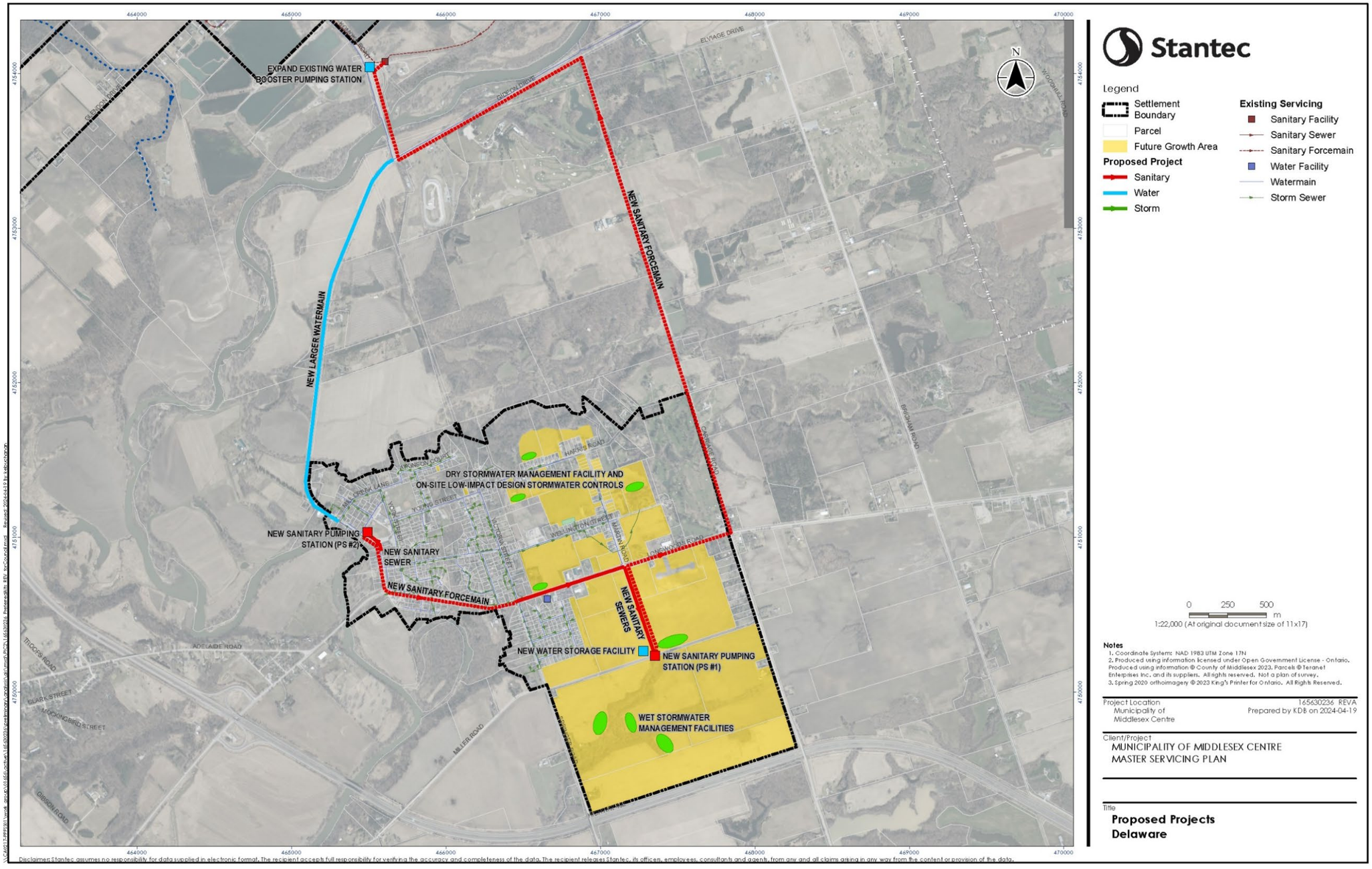

Figure ES- 4: Delaware Proposed Projects

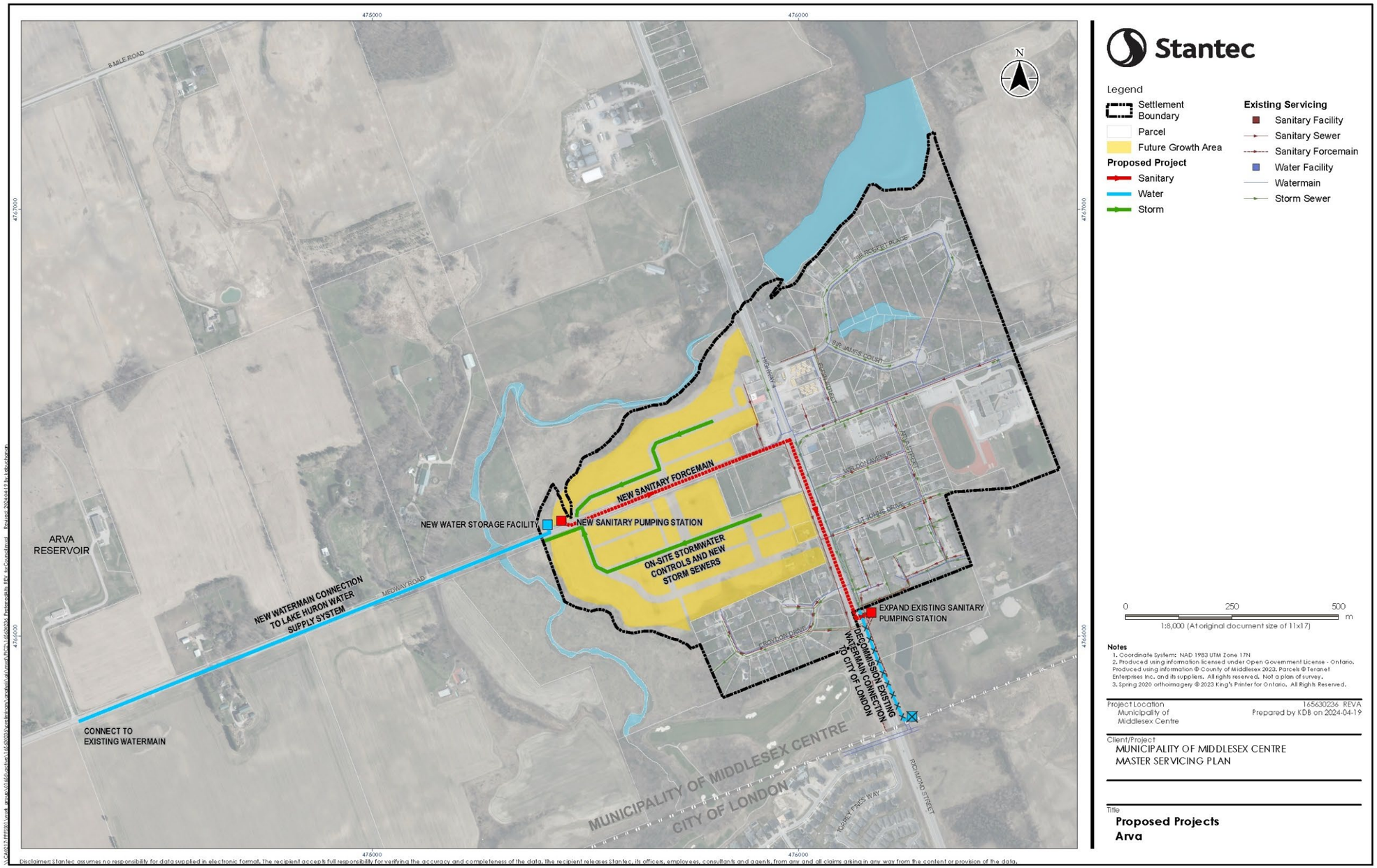

Figure ES- 5: Arva Proposed Projects

Closing

This Master Plan summarizes Phase 1 and Phase 2 of the MCEA planning process, as outlined in the 2015 MCEA Document. Provided that no Section 16 Order requests are received, the Municipality may proceed 30 days following the completion of the public review period.

ACRONYMS / ABBREVIATIONS

ABCA	Ausable Bayfield Conservation Authority
ANSI	Area of Natural and Scientific Interest
BHR	Built Heritage Resource
BPS	Booster Pumping Station
BRA	Bluewater Recycling Association
CAA	Conservation Authorities Act
CHL	Cultural Heritage Landscape
CHVI	Cultural Heritage Value or Interest
CLI	Consolidated Linear Infrastructure
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
EAA	Environmental Assessment Act of Ontario
EPR	Extended Producer Responsibility
ESA	Endangered Species Act, 2007 (Ontario)
ET	Elevated Tank / Elevated Tower
FM	Forcemain
IPS	Intermediate Pumping Station
LHPWSS	Lake Huron Primary Water Supply System
LID	Low Impact Development
LIO	Land Information Ontario
LTVCA	Lower Thames Valley Conservation Authority
MCEA	Municipal Class Environmental Assessment
MCM	Ministry of Citizenship and Multiculturalism
MECP	Ministry of the Environment, Conservation and Parks
MNRF	Ontario Ministry of Natural Resources and Forestry
MOMC	Municipality of Middlesex Centre
MSP	Master Servicing Plan
NHIC	Natural Heritage Information Centre
OBBA	Ontario Breeding Bird Atlas
OBA	Ontario Butterfly Atlas
OGS	Oil-Grit Separators
OMA	Ontario Moth Atlas

OMAFRA	Ministry of Agriculture, Food and Rural Affairs
ORAA	Ontario Reptile and Amphibian Atlas
PIC	Public Information Centre
PS	Pumping Station
PSW	Provincially Significant Wetland
ROW	Right-of-way
SAR	Species at Risk
SARA	Species at Risk Act
SARO	Species at Risk in Ontario
SCRCA	St. Clair Region Conservation Authority
SMP	Servicing Master Plan
SOCC	Species of Conservation Concern
SPA	Special Policy Area
SWM	Stormwater Management
UTRCA	Upper Thames River Conservation Authority
WWTF	Wastewater Treatment Facility
WWTP	Wastewater Treatment Plant

1 INTRODUCTION

The Municipality of Middlesex Centre retained Stantec Consulting Ltd. (Stantec) to complete the Middlesex Centre Servicing Master Plan (SMP). The purpose of the Master Plan was to update the strategy previously developed in 2010. Since the completion of the 2010 Master Servicing Plan, the Municipality has experienced growth in settlement areas which has prompted servicing extensions and infrastructure upgrades not captured in the previous study. As such, the SMP examines the servicing system by:

- Reviewing new planning policies
- Considering population and development growth projections
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1.2 STUDY AREA

The study area for this SMP includes the following Settlement Areas, and Hamlet Areas within Middlesex Centre.

Settlement Areas:

- Ilderton
- Komoka – Kilworth
- Arva
- Delaware

Hamlet Areas:

- Ballymote
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The Settlement Areas and Hamlet Areas are displayed on Figure 1.

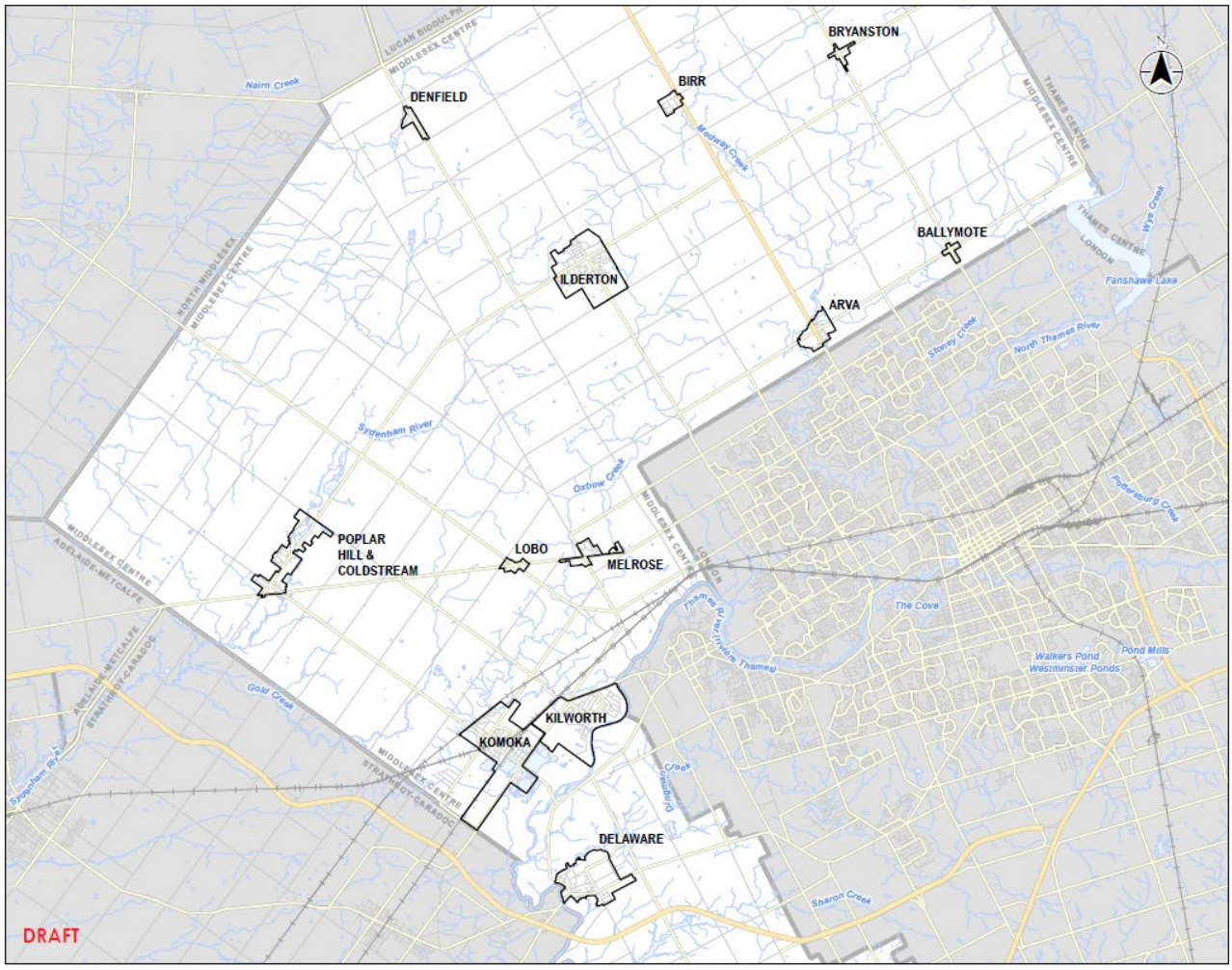

Figure 1: Study Area

1.3 MUNICIPAL CLASS EA PROCESS

The Environmental Assessment Act of Ontario (EAA) provides for the protection, conservation, and management of the environment in Ontario. Activities with common characteristics and common potential effects may be assessed as part of a "class" and are therefore approved subject to compliance with the pre-approved Class EA process. The Ministry of the Environment, Conservation and Parks (MECP) is responsible for administration of the EA Act.

The Municipal Class Environmental Assessment (MCEA) is an approved Class EA process that applies to municipal infrastructure projects including roads, water, and wastewater. This process provides a comprehensive planning approach to consider alternative solutions and evaluate their impacts on a set of criteria (e.g., environmental, social, technical, and economic considerations) and determine mitigating measures to arrive at a preferred alternative for addressing the problem (or opportunity). The Class EA process involves a rigorous public consultation component that includes various provincial and municipal agencies, Indigenous Nations, and the public, at each of the project stages.

The MCEA process is undertaken prior to modifications or additions to municipal infrastructure, to ensure that potential impacts associated with all project aspects are considered. Figure 2 illustrates the Class EA planning process and identifies the steps considered mandatory for compliance with the requirements of the EA Act. The following provides an overview of the five-phase planning process:

- Phase 1 – Identify the Problem and Opportunity statement
- Phase 2 – Identify and evaluate alternative solutions
- Phase 3 – Identify and evaluate alternative design concepts for the preferred solution
- Phase 4 – Prepare design plans and an Environmental Study Report (ESR) for a minimum 30-day public review period
- Phase 5 –This phase involves detailed design and the preparation of contract/tender documents followed by construction, operation, and monitoring.

The EA process adhered to for this study and shown in Figure 2 follows the MCEA document amended in 2015, as the study was initiated prior to the 2023 MCEA process update.

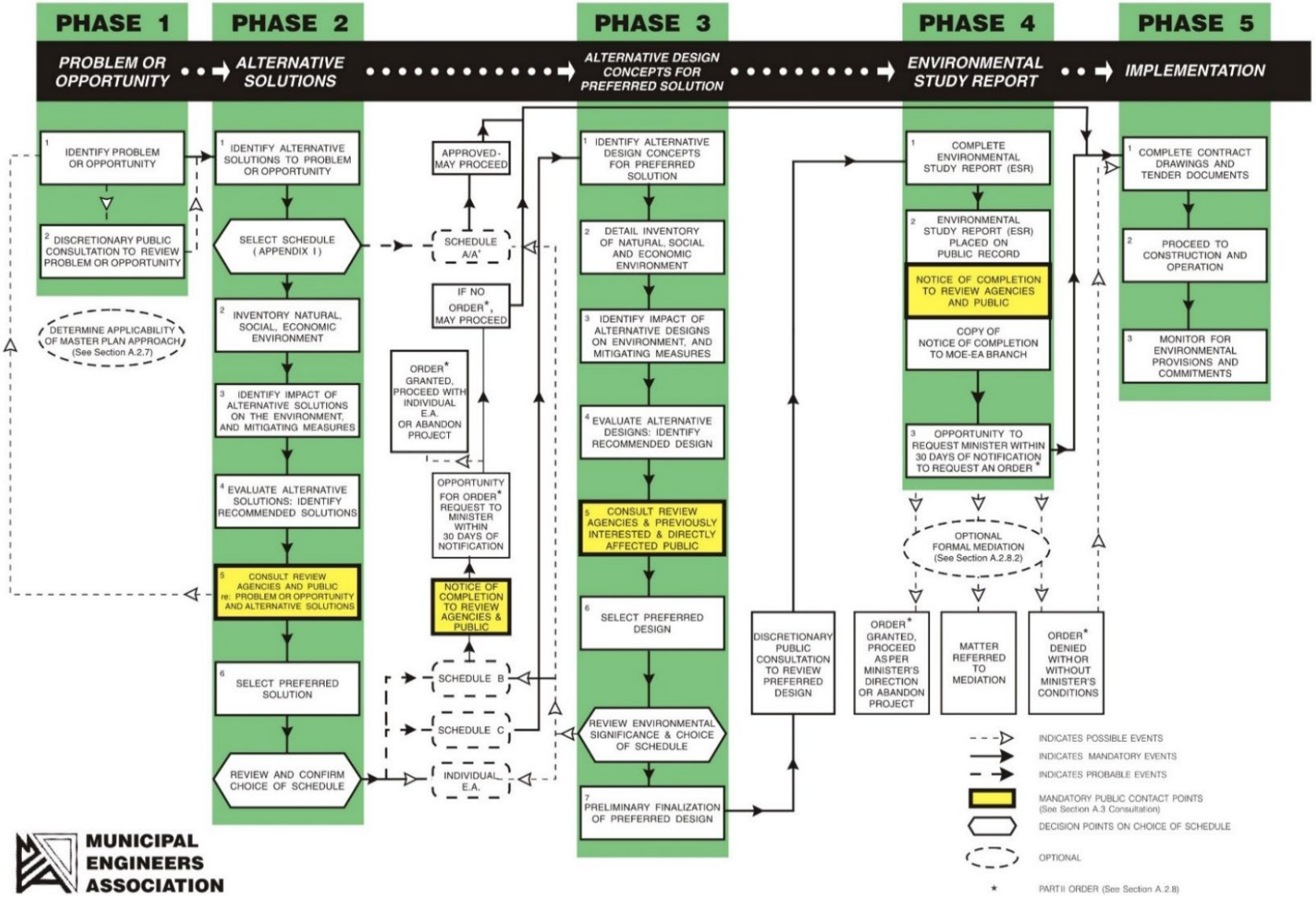

Figure 2: Municipal Class Environmental Assessment Process

Based on the nature and extent of the project, as well as its anticipated impacts to the surrounding environment, the MCEA document specifies different schedules under which projects may be planned, and the assessment process required for each:

Schedule A/A+ projects are pre-approved under the MCEA and can proceed directly to Phase 5 (implementation). Schedule A and A+ projects, include various municipal maintenance, operational activities, rehabilitation works, minor reconstruction or replacement of existing facilities, and new facilities that are limited in scale and have minimal adverse effects on the environment. These projects are exempt from the requirements of the *Environmental Assessment Act*.

Schedule B projects have potential for some adverse environmental impacts. These projects are required to proceed through the first two phases of the MCEA process, involving mandatory contact with directly affected public and relevant review agencies, to ensure that they are aware of the project and that their concerns are identified and considered. A Project File Report must be prepared and made available for review (30-day public review period) by any interested person or party. If there are no outstanding concerns or Section 16 Orders, then the proponent may proceed to implementation/detailed design (i.e., Phase 5) once the regulatory process has been completed. Schedule B projects generally include improvements and minor expansions to existing facilities or smaller new projects.

Schedule C projects have the potential for more significant environmental impacts. These projects are required to proceed through all five stages of the MCEA process. Schedule C projects require an Environmental Study Report be completed and filed for a 30-day public review period. If there are no outstanding concerns, the proponent may proceed to implementation once the regulatory process has been completed. These projects generally include the construction of new facilities, or major expansions to existing facilities.

The selection of the appropriate project schedule to be followed is dependent on the anticipated level of environmental impact, and at times the estimated construction costs.

The MEA Class EA document also identifies different approaches to completing Master Plans corresponding to different levels of assessment. Regardless of the approach selected, Master Plans must follow at least the first two phases of the MCEA process.

Approach 1 is undertaken with a broad scope and level of assessment. This process follows Phases 1 and 2 as defined above, then uses the Master Plan as a basis for future investigations of site-specific Schedule ‘B’ and ‘C’ projects. Any Schedule ‘B’ and ‘C’ projects that need specific Phase 2 work and Phases 3 and 4 work, usually have this Phase 2, 3, and 4 deferred until the actual project is implemented.

Approach 2 is undertaken to complete all work necessary for Schedule ‘B’ site-specific projects at the time they are identified. Using this approach, a municipality would identify everything it needed in the first five years and would complete all the site-specific work required, including public consultation to meet Class EA requirements.

The Master Plan in such cases must be completed with sufficient detail so that the public can be reasonably informed, and so that the approving government Agencies (Conservation Authorities, MECP,

Ministry of Citizenship and Multiculturism, etc.) can be satisfied, in principle, that their concerns will be addressed before construction commences.

Approach 3 is to complete the requirements of Schedule 'B' and Schedule 'C' at the Master Plan stage. The Master Plan would document Phases 1 to 4 of the Class EA process.

1.3.1 Class EA Project Classification

This Master Plan is being undertaken in accordance with Approach #2 of the Master Planning Process, as outlined in Appendix 4 of the Municipal Class EA document (2015). Master plans are long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. These plans examine an infrastructure system(s) or group of related projects to outline a framework for planning for subsequent projects and/or developments. This report is intended to fulfill the requirements of Schedule B projects which may be identified through the Master Planning process.

1.3.2 Section 16 Order Process

Interested persons may provide written comments to the Municipality of Middlesex Centre for a response using the following contact information:

Rob Cascaden
Director of Public Works and Engineering
Municipality of Middlesex Centre
cascaden@middlesexcentre.ca
519-666-0190 ext. 5245

In addition, a request may be made to the Minister of the Environment, Conservation and Parks under Section 16 of the *Environmental Assessment Act* requiring a higher level of study (i.e., requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g., require further studies), only on the grounds that the requested order may prevent, mitigate, or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. Requests should include the full name and contact information of the person(s) making the request for the ministry.

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

The request should be sent in writing by mail or by email to:

Minister of the Environment, Conservation and Parks
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor.
Toronto ON M7A 2J3

minister.mecp@ontario.ca

and

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

Requests should also be sent to the Municipality.

1.4 CONSULTATION

Consultation is a vital part of the Class EA process. Active engagement with all potentially affected parties including government agencies, community members, special interest groups, and Indigenous Nations ensures a transparent and responsible planning process.

1.4.1 Project Contact List

A project contact list was created which includes multi-level government agencies and officials, Municipality of Middlesex Centre staff, committees, emergency service contacts, potentially interested Indigenous communities, members of the public, utility services, and special interest groups. The list was regularly updated to include those who expressed interest in the study. A copy of the contact list is provided in Appendix A.

1.4.2 Project Notices

Notices were sent via email (where requested) to property owners within the study area, the project contact list, and Indigenous communities. Notices were published in the Middlesex Banner newspaper and posted on the Municipality of Middlesex Centre's website (https://www.middlesexcentre.ca/articles/servicing-master-plan). The study notifications are provided in Appendix A, and include:

- Notice of Study Commencement & Public Information Centre 1 – published in the Middlesex Banner newspaper December 28, 2022. Posted on the Municipality's website on December 12, 2022. Emailed to the project contact list and Indigenous communities on January 5, 2023.
- Notice of Public Information Centre 2 – published in the Middlesex Centre newspaper on September 27, 2023. Posted on the Municipality's website on September 15, 2023. Emailed to Indigenous communities on September 19, 2023, and to the project contact list on October 5, 2023.
- Notice of Study Completion – published in the Middlesex Centre newspaper on September 25, 2024. Posted on the Municipality's website on September 20, 2024.

1.4.3 Public Consultation

Two Public Information Centres (PICs) were held throughout the study, to provide the public with an opportunity to ask questions, share feedback, and express concerns throughout the study process, while assisting the development of a preferred strategy.

1.4.3.1 Online Public Information Centre 1

The first PIC was hosted online on the Municipality's website. A joint information session and discussion was held together with the Municipality's Transportation Master Plan on January 11, 2023, from 6:00 to 8:00pm. The purpose of the presentation was to identify issues, needs and opportunities relating to the Municipality's water, wastewater, stormwater and solid waste servicing systems. A copy of the PIC presentation was made available for review and download on the project website on January 11, 2023.

Interested persons were invited to submit comments through to the project team. Project team emails were provided on the Municipality's website. No comments were received following PIC 1. A copy of the PIC 1 materials are provided in Appendix A.

1.4.3.2 Public Information Centre 2

The second PIC was hosted as an in-person joint information session and discussion with the Municipality's Transportation Master Plan on Thursday, October 19, 2023, from 4:00 to 7:00pm. The PIC was held at the Komoka Community Centre, 133 Queen Street, Komoka. The second PIC provided a study update, and presented the recommendations of the SMP. The PIC presentation was made available for review and download on the project website on October 18, 2023.

Interested persons to invited to submit comments through to the project team until November 16, 2023. Project team emails were provided on the Municipality's website. Six comments were received from agencies, and one comment from a member of the public. A copy of the PIC 2 materials are provided in Appendix A.

1.4.4 Agency and Stakeholder Consultation

The notices were sent to relevant agencies and stakeholders to solicit feedback on the project. a list of the agencies and stakeholders is provided below:

Provincial

- Ministry of Environment, Conservation and Parks
- Ministry of Citizenship and Multiculturalism

Municipal

- Municipality of Middlesex Centre
- City of London
- Upper Thames River Conservation Authority
- Lower Thames Valley Conservation Authority
- Middlesex-London Health Unit

- Thames-Sydenham Source Protection
- County of Middlesex

Agencies

- Friends of Medway Creek
- AOL
- York Developments
- Old Oak Properties
- Heath Street Realty Advisors Inc.
- Murphy Bus Lines
- Development Engineering
- EngPlus
- Strik Baldinelli Moniz
- MTE
- Sco-Terra
- Dillon Consulting Ltd.
- Segway Group
- Litera Investments
- Auburn Developments
- Tridon
- Southside Group
- Sifton
- DeveloPro Land Services
- Corlon Properties Inc.
- Sunningdale Golf & Country Club Ltd.
- Prospect Farms
- Monteith Brown Planning Consultants
- WSP

A copy of agency correspondence is provided in Appendix A.

1.4.5 Indigenous Consultation

The following Indigenous communities and organizations were notified as part of this study:

- Aamjiwnaang First Nation
- Bkejwanong Territory (Walpole Island First Nation)
- Caldwell First Nation
- Chippewas of Kettle and Stony Point First Nation
- Delaware Nation (Moravian of the Thames)
- Deshkan Ziibiing First Nation
- Munsee-Delaware Nation
- Oneida Nation of the Thames

Letters were sent by email to notify the Indigenous communities of the Notice of Study Commencement & PIC 1 on January 5, 2023, and Notice of PIC 2 on September 19, 2023. Of the Indigenous communities that were contacted, only Deshkan Ziibiing First Nation responded to the project notification. Correspondence with Indigenous communities is provided in Appendix A.

1.5 EXISTING POPULATION AND GROWTH PROJECTIONS

Existing and future populations were established for the SMP. Residential and employment populations are used to calculate the water and wastewater demands used in the water and wastewater systems.

Stantec established a methodology to estimate total existing populations and future residential and employment growth by using the 2020 Growth Management Study prepared by Watson and Associates which was then supplemented with 2021 census data. The methodology was used to obtain total existing and future populations as follows:

- **Residential**: 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. Residential growth was projected for each settlement area up to 2046 using annual growth rates provided by the Growth Management Study (Watson and Associates, 2020).

- **Employment**: The employment population of each settlement area 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 ICI activities were taken into consideration. Specifically, employment data for occupations that were either work from home or for “no fixed place of work” were removed from the analysis as the demand was either counted in the residential population or was transient in nature. The employment numbers were distributed by settlement according to the distribution of employment established in the Growth Management Study (Watson and Associates, 2020) and added to the current employment populations for each settlement area.

The total existing and future residential and employment populations are used to calculate the demands used in the water and wastewater systems. The total populations are presented in **Table 2.**

Table 2: 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%)

2.0 PLANNING AND POLICY CONTEXT

2.1 FEDERAL POLICIES

2.1.1 Canadian Environmental Assessment Act

The Canadian Environmental Assessment Act (2012) outlines the federal government's requirements for projects that have the potential to cause significant adverse environmental effects in areas of federal jurisdiction. Proposed projects that are designated under the "Regulations Designating Physical Activities" and specifically listed in the "Schedule for Physical Activities" are subject to the requirements of the Act.

The proposed work for this MCEA does not include physical activity listed under the Schedule for Physical Activities. Therefore, it will not be subject to meeting the requirements of the Canadian Environmental Assessment Act for this project. It should be noted that although this project is not required to follow the Canadian Environmental Assessment Act, the MCEA aligns with the Acts principles of assessing environmental impacts and alternative solutions.

2.1.2 Fisheries Act

The federal Fisheries Act (1985) is the primary legislation governing fish and fish habitat in Canada. The Fisheries Act defines fish habitat as "…waters frequented by fish and any other areas on which fish depend directly or indirectly in order to carry out their life processes including spawning grounds and nursery, rearing, food supply and migration areas." The fish and fish habitat protection provisions of the Fisheries Act apply to all fish and fish habitat in Canada. The Act prohibits activities that result in the death of fish or the harmful alteration, disruption, or destruction (HADD) of fish habitat unless authorized by the Minister of Fisheries, Oceans, and the Canadian Coast Guard. If it is determined that the death of fish or HADD of fish habitat is unavoidable as part of the Project, an authorization under the Fisheries Act may be required.

2.1.3 Species At Risk Act

The Species at Risk Act (SARA) identifies wildlife species considered to be at risk in Canada and designates them as threatened, endangered, extirpated or of special concern. Species at Risk (SAR) are identified and assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), which is an independent committee of wildlife experts and scientists that makes recommendations to the federal government regarding the status of wildlife species in Canada.

The purpose of SARA is to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered, or threatened because of human activity and to manage species of special concern to prevent them from becoming endangered or threatened.

The protection and conservation measures afforded by SARA apply to those species identified on Schedule 1 of the Act. Other species identified by COSEWIC as SAR that required further assessment in accordance with current assessment criteria are identified on Schedule 2 (Endangered and Threatened) and Schedule 3 (Special Concern) of the Act. All listed (Schedule 1) aquatic species and migratory birds in Canada are protected by SARA. Remaining listed species (plants, mammals, reptiles, amphibians) are only protected where they occur on federal lands (i.e., National Parks, First Nations Reserves).

Any activity affecting a listed species, or its critical habitat requires the prior issuance of a permit from the applicable agency, either Environment and Climate Change Canada or Fisheries and Oceans Canada (DFO). Permits may only be issued for scientific research relating to the conservation of the species, where activities are required to benefit a species or to enhance its chances of survival or for incidental impacts. Efforts to avoid, reduce, or minimize impacts must first be employed and activities will not be permitted if they would jeopardize the survival or recovery of the species.

2.2 PROVINCIAL POLICIES

2.2.1 The Planning Act

The Planning Act, R.S.O. 1990, c.P13 establishes the framework for land use planning in Ontario. According to the provisions of the Act, the Province of Ontario can delegate some planning authority to upper-tier municipalities (i.e. counties and regional/district municipalities, and planning boards) while retaining primary authority and control over the approval process for planning matters in Ontario. Under the Act, municipalities must conform to approved provincial policies as outlined in the Provincial Policy Statement (PPS 2020). Provincial ministries, municipal councils, planners, and other stakeholders implement the Act when they undertake certain actions, including:

- Preparing Official Plans and planning policies that guide future development considering provincial interests, such as protecting and managing natural resources;
- Regulating and controlling land uses through zoning by-laws and minor variances; and
- Dividing land into separate lots for sale or development through Plans of Subdivision or a Land Severance.

The upper-tier County of Middlesex has been delegated the authority of approving lower-tier Official Plans, Official Plan amendments, and plans of subdivision and condominium by the Province. The Municipality of Middlesex Centre is identified a lower-tier municipality under the County of Middlesex and is therefore subject to the approval by the County for plans submitted under the Planning Act.

This plan considers development applications approved under the Planning Act and associated conditions of approval along with lands designated for future development within the Municipality of Middlesex Centre.

2.2.2 Provincial Policy Statement

The Provincial Policy Statement (PPS 2020) is issued under the *Planning Act, R.S.O. 1990, c.P.13* and supports the planning of land uses across the Province. The PPS 2020 provides policy direction for the use and management of land, public health and safety, and the quality of the natural and built environment. Sections of the PPS 2020 that are applicable to the planning for sewage, water, and stormwater management are included below.

According to Section 1.6.6: *Sewage, Water and Stormwater* of the PPS, planning for sewage and water services shall:

- accommodate expected growth or development in a manner that promotes the efficient use and optimization of existing municipal sewage or water services;
- ensure that these systems can be sustained, prepare for climate change impacts, and are feasible and financially viable for the long term;

Furthermore, according to Section 1.6.6, planning for stormwater management shall:

- be integrated with planning for sewage and water services, as described above;
- minimize, or where possible, prevent contaminant load increases, erosion and changes in water balance through effective stormwater management, including the use of green infrastructure;
- mitigate risks to human health, safety, property, and the environment;
- maximize the extent and function of vegetative and pervious surfaces
- promote best practices, including stormwater attenuation and re-use, water conservation and efficiency, and low impact development.

Section 2: *Wise Use and Management of Resources*, specifically Section 2.2: *Water* outlines the policies for preserving biodiversity and protecting natural heritage, water, agriculture, mineral, cultural heritage, and archaeological resources, of their economic, environmental, and social benefits. Under these policies, planning authorities shall protect, improve or restore the quality and quantity of water by implementing necessary restrictions on development and site alteration in or near sensitive water features. Mitigative measures and or alternative development approaches may be required to meet the policies outlined to protect sensitive water features and their hydrologic functions.

The Province recognizes the unique role Indigenous communities have in land use planning and development and recognizes the importance of consulting Indigenous communities on planning matters that may affect their section 35 Aboriginal or treaty rights. The PPS 2020 encourages Planning authorities to engage with Indigenous communities to facilitate knowledge-sharing in land use planning to help develop healthy communities that protect important resources, maintain or improve the quality of the natural environment, and are resilient to climate change.

Through the PPS 2020, the Province seeks to ensure that its resources are managed in a sustainable manner to protect essential ecological processes and public health and safety, minimizing environmental and social impacts to meet long terms needs.

This SMP meets the objectives of the PPS 2020 by adhering to the MCEA process, local, provincial, and federal land use considerations through an assessment of the existing servicing system, natural environment, cultural heritage, archaeological potential and socio-economic environment of the settlement and hamlet areas within this study.

2.2.3 Endangered Species Act

The Endangered Species Act (ESA) (2007) identifies wildlife species considered to be at risk in Ontario and designates them as threatened, endangered, extirpated or of special concern. Provincial species at risk are identified and assessed by the Committee on the Status of Species at Risk in Ontario (COSSARO) which is a committee of wildlife experts and scientists, as well as those who provide Indigenous traditional knowledge, that classify species according to their degree of risk based on the best available scientific information, community knowledge and Indigenous traditional knowledge. When COSSARO classifies a species at risk, that classification applies throughout Ontario, unless otherwise noted.

The ESA protects species at risk and their habitats by prohibiting anyone from killing, harming, harassing, or possessing protected species, as well as prohibiting any damage or destruction to the habitat of species identified on the Species at Risk in Ontario (SARO) list. Species listed as threatened or endangered on the SARO list are provided with general habitat protections under the ESA, which protect areas that species depend on to carry out their life processes, such as reproduction, rearing, hibernation, migration, or feeding. For some species protected habit may be identified by regulation. Some species have had detailed habitat regulations passed that go beyond the general habitat protection to define specifically the extent and character of protected habitats. Regulated habitat provides a more precise definition of a species‟ habitat and may describe features, geographic boundaries or other unique characteristics.

Any activity that may impact a protected species or its habitat requires the prior issuance of a permit from the MECP. Such permits may only be issued under certain circumstances, which are limited to activities required to protect human health and safety, activities that will assist in the protection or recovery of the species, activities that will result in an overall benefit to the species or activities that may provide significant social or economic benefit without jeopardizing the survival or recovery of the species in Ontario.

A permit may be issued under Section 17(2) of the ESA or eligible activities can be registered under Ontario Regulation 242/08 to authorize work that is otherwise prohibited.

Consultation with the ministry is recommended early in detailed design and prior to the works starting to ensure compliance with the ESA.

2.2.4 Climate Change

The MECP's guide, Consideration of Climate Change in the Environmental Assessment Process, outlines two approaches for considering and addressing climate change in project planning, including:

- Reducing a project's impact on climate change (climate change mitigation measures).
- Increasing the project's and local ecosystem's resilience to climate change (climate change adaptation).

As part of this study, the objectives of the climate change document have been considered and incorporated into the generation and evaluation of alternatives and mitigation measures.

2.2.5 Drainage Act

Municipal drains are created under the authority of the *Drainage Act*. Once a municipal drain has been constructed under the authority of a by-law, it becomes part of the municipality's infrastructure. The local municipality is responsible for repairing and maintaining the drain.

2.2.6 Conservation Authorities Act

The Conservation Authorities Act (CAA) was created with the purpose of conservation, restoration, development, and management of natural resources in watersheds in Ontario. The Act supports the collaboration between municipalities and local conservation authorities to develop and manage natural resource programs and services. The CAA is now administered by the Ministry of the Environment, Conservation and Parks (MECP). Some legislative provisions, including those related to natural hazard management, are the responsibility of the Ministry of Natural Resources and Forestry (MNRF).

As of April 1, 2024, the new Ontario Regulation 41/24: *Prohibited Activities, Exemptions and Permit*, came into effect and replaced the previous Ontario Regulation 157/06: *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*. All permit applications submitted before April 1, 2024 will continue to follow Ontario Regulation 157/06, and applications submitted on or after will follow the process outlined in Section 28 of the *Act*.

As directed by the legislation and regulations of the CAA, Conservation Authorities are granted regulatory responsibility within their respective jurisdictions to achieve the following under the CAA:

- Prevent the loss of life and property due to flooding and erosion.
- Prevent pollution.
- Conserve and enhance natural resources.

For this MCEA, four local Conservation Authorities hold jurisdiction over the study area.

2.2.6.1 Upper Thames River Conservation Authority

The Upper Thames River Conservation Authority (UTRCA) is the first of four CAA regulatory agencies with jurisdiction over the study area. For this MCEA, the UTRCA holds the most jurisdiction of the local Conservation Authorities. The UTRCA covers the Komoka-Kilworth, Arva, and part of the Ilderton and Delaware Settlement Areas, as well as Ballymote, Birr, Bryanston, and Melrose Hamlet Areas.

2.2.6.2 St. Clair Region Conservation Authority

The St. Clair Region Conservation Authority (SCRCA) is another regulatory agency with jurisdiction over the study area. For this MCEA, the SCRCA covers part of the Ilderton Settlement Area, as well as the Lobo and Poplar Hill & Coldstream Hamlet Areas.

2.2.6.3 Ausable Bayfield Conservation Authority

The Ausable Bayfield Conservation Authority (ABCA) is the third regulatory agency with jurisdiction over the study area, covering the Hamlet Area of Denfield.

2.2.6.4 Lower Thames Valley Conservation Authority

The Lower Thames Valley Conservation Authority (LTVCA) is the final CAA regulatory agency with jurisdiction for the study area, sharing jurisdiction of the Delaware Settlement Area with the UTRCA.

2.3 MUNICIPAL POLICIES

2.3.1 Middlesex Centre Official Plan

The Municipality of Middlesex Official Plan (MCOP) was approved by council on April 19, 2000 with the latest amendments being adopted by the Municipality of Middlesex and approved by the County of Middlesex on May 18, 2022.

The Official Plan provides long-term guidance for growth and change within the municipality through to the year 2046. The Official Plan follows a community-oriented approach that focuses on protecting agricultural areas for agricultural and resource use through the establishment of clear settlement area boundaries and land use policies. A hierarchy of settlement areas has been established to manage growth and development within the municipality. The majority of growth and development shall be directed to the Urban Settlement Areas and include full municipal services such as water supply, sewage disposal, and storm water management. Growth and development within Community Settlement Areas and Hamlets will be limited and are subject to issues of servicing availability. Under the current planning horizon, Hamlet areas are not expected to expand.

It is within the policies of the Official Plan that settlement areas are to proceed on the basis of full municipal services, with partial services potentially being permitted on an interim basis where proper justification is provided.

The Municipality of Middlesex Centre is a lower-tier municipal government, and includes the Urban Settlement Areas of Ilderton, Komoka-Kilworth, the Community Settlement Areas of Arva, and Delaware, and the Hamlet areas of Ballymote, Birr, Bryanston, Denfield, Lobo, Melrose, and Poplar Hill-Coldstream.

2.3.2 Master Servicing Plan

The previous Master Servicing Plan (MSP) provided an outline of priority and strategic projects which would allow the servicing systems to continue to operate efficiently and effectively, accounting for increases in population to the year 2030. As the 2010 MSP has exceeded the 10 year validity period for a Municipal Class EA Master Plan, this SMP update study will review and expand upon the preferred solution(s) and policies identified within the previous MSP.

2.3.3 Middlesex Centre Settlement Area Stormwater Master Plan

The Municipality of Middlesex Centre Settlement Area Stormwater Master Plan (2020) provides the municipality with a stormwater servicing strategy to accommodate future growth within the settlement areas. This plan aims to provide adequate stormwater management facilities to the existing and proposed development areas while protecting the natural environment, reducing negative impacts on affected properties, and minimizing stormwater servicing costs.

The Stormwater Master Plan assessed the settlement areas of Arva, Ballymote, Birr, Bryanston, Denfield, Ilderton, Komoka, Kilworth, Lobo and Melrose. In some cases, these settlement areas were further broken down into catchment areas based on existing storm drainage infrastructure. For each of the Settlement/Catchment areas, a recommended solution was provided to manage stormwater services alongside the proposed development needs.

This MCEA follows the recommendations outlined in the Stormwater Master Plan to address the servicing needs of development in the identified settlement areas.

The Stormwater Master Plan excludes the Delaware Settlement Area, which was assessed through the Delaware Community Settlement Area Stormwater Master Plan.

Given that the Stormwater Master Plan was recently completed, the recommendations of this study have been reviewed and have been carried forward into this SMP as they are still valid.

2.3.4 Middlesex Centre Community Stormwater Master Plan Update

Following the Stormwater Master Plan in 2020, the Municipality of Middlesex Centre completed an update to address issues identified within the Komoka-Kilworth area of the original plan. These issues included concerns about additional flow volume and water level fluctuations in the Komoka Provincial Park pond, poor condition of the outlet leading to the Thames River, and the potential for Species at Risk in the Komoka Provincial Park that may be impacted by the recommended solutions.

The Middlesex Centre Community Stormwater Master Plan Update identified a revised Alternative 3 from the Stormwater Master Plan 2020 to address the concerns identified at the Komoka Drain.

This MCEA aligns with the revised recommendations of the Middlesex Centre Community Stormwater Master Plan Update 2023.

2.3.5 Delaware Community Settlement Area Stormwater Master Plan

The Community of Delaware completed a Stormwater Master Plan in 2015 to identify improvements needed for the existing stormwater management system to better accommodate the existing community needs, and to support future growth and development.

Improvements for the drainage areas identified within the community include:

- Improving roadside ditches;
- Providing a 100-Year Storm Outlet;
- Abandoning municipal drains;
- Providing on-site stormwater management controls and ditch-inlet catch basins to address rear-year flooding;
- Including Stormwater Management facilities such as dry and wet ponds in future development

This MCEA considers the outlined recommendations in the Delaware Community Settlement Area Stormwater Master Plan to address the servicing needs of the Delaware Settlement Area.

The recommendations of this study have been reviewed and have been carried forward into this SMP as they are still considered valid.

3.0 PROBLEM AND OPPORTUNITY STATEMENT

A problem and opportunity statement was developed at the onset of the study.

The Municipality of Middlesex Centre has water, wastewater, stormwater and solid waste infrastructure which needs to be managed throughout the Municipality. The infrastructure provides full or partial-servicing to several settlement areas and hamlets throughout the Municipality.

The growing population within the Municipality, as identified in the Official Plan Update, may require additional servicing to accommodate the proposed growth.

The Servicing Master Plan will assess the current state of the Municipality's infrastructure. Where issues may be identified, the Municipality will identify potential solutions that will maintain servicing to homes and businesses as well as provide the ability to service the identified growth areas.

4.0 SERVICING ASSESSMENT BY COMMUNITY

A detailed analysis of the water, wastewater and stormwater systems were undertaken for each of the hamlets and settlement areas within Middlesex Centre. Servicing for rural areas outside of the settlement boundaries were not studied. A detailed analysis of the methodology applied and methods of analysis are contained in Appendix B, C and D. For each community the following steps were completed:

- Review of background studies and available data
- Preparation of modelling tools
- Identification of any constraints in the existing system under existing conditions
- Application of growth projections as outlined in Section 1.5
- Identification of any constraints in the existing system under growth projections
- Identification of alternative solutions to each servicing system constraint identified.
- Evaluation of the alternatives and selection of a preferred solution
- Preparation of Opinions of Probable Costs for each preferred solution or project recommended and identification of the trigger for the project.

The following sections are intended to summarize the existing water, wastewater and stormwater services within the hamlets and settlement areas within Middlesex Centre. The solid waste assessment was completed for the entire Municipality, and is provided in Section 5.0.

As noted in previous sections, the findings of the Municipality of Middlesex Centre Settlement Area Stormwater Master Plan (2020) and the Delaware Community Settlement Area Stormwater Master Plan (2015) have been carried forward into the SMP. The recommendations of those studies have been supplemented for areas that were not previously studied in either of these previous studies.

The text below provides a summary of the findings of the detailed servicing analysis completed for the SMP. More detailed reports relating to wastewater, water, stormwater and solid waste are contained in Appendix B, C, D and E.

4.1 ARVA

Arva is situated north of the City of London, near Richmond Street and Medway Road. The Official Plan designates Arva as a Community Settlement Area.

4.1.1 Water

4.1.1.1 Existing Water Services

Arva is supplied by a direct connection from the City of London distribution system, through a 1,050 mm diameter watermain. Water flows through a small pump station equipped with an inline fire pump, which operates only in the event of a fire demand (rated capacity: 4,500 L/min).

As part of the SMP, a stand-along hydraulic model of Arva's water distribution system was developed, and is used to assess current and future infrastructure needs in Arva.

4.1.1.2 Water System Constraints

Issues and opportunities identified in the water system are summarized as follows:

- While the water supply is provided by the Lake Huron Water Supply System, it is routed through the City of London and thus the Municipality pays a higher rate for water usage than if they were to connected directly to the Lake Huron System.
- Arva is currently supplied by a single connection to the City of London and thus the supply is vulnerable to interruptions in that supply in the event of a watermain break or planned maintenance.

4.1.1.3 Alternative Solutions

Alternative solutions were developed to resolve water related deficiencies within the existing system, and are outlined below. Recommended Alternative Solutions were selected. Additional information regarding the selection process is available in Appendix B.

Water Supply Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Connect to Lake Huron Primary Water Supply System (LHWPSS)
- Alt 3: Service growth from private wells
- Alt 4: Service growth from new communal well system(s)

Recommended Water Supply Alternative Solution

The recommended alternative solution is Alt 2: Connect to LHWPSS. Under this recommendation, existing and future demands in Arva would be supplied by the LHWPSS, with the implementation of a new connection to the LHWPSS infrastructure at a new Arva Reservoir & BPS. This solution would require new infrastructure and capital costs, however operational costs currently associated with water consumption billing from the City of London and rehabilitating the existing infrastructure (Richmond St watermain) could be transferred to obtaining supply from the LHWPSS.

Reliability (Storage/Watermains) Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Build new storage (reservoir or ET)
- Alt 3: Upgrade or loop existing watermains

Recommended Reliability (Storage/Watermains) Alternative Solution

The recommended alternative solution is Alt 2: Build new storage. Under this recommendation, a new storage facility would be built within Arva, with the associated additional infrastructure capital and operational costs. A new storage facility would provide reliability, should there be a break in supply from the City of London. Additionally, considering the potential for the implementation of water supply from the LHWPSS), storage within Arva could help offset peak demands, leading to a reduction in the new watermain sizing from the LHWPSS.

4.1.2 Wastewater

4.1.2.1 Existing Wastewater Services

Arva's wastewater infrastructure 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 m3/d.
- One pump station is located in Arva. The maximum flow does not exceed the design capacity, and there is capacity to accommodate limited future growth.

4.1.2.2 Wastewater System Constraints

Issues and opportunities identified in the wastewater system are summarized as follows:

- The north-east section of Arva is currently serviced by private septic systems. Connecting these homes to the municipal sewers was reviewed and 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..
- New development in Arva will require wastewater servicing.

4.1.2.3 Alternative Solutions

Alternative solutions were developed to resolve wastewater related deficiencies within the existing system, and are outlined below. Recommended Alternative Solutions were selected. Additional information regarding the selection process is available in Appendix C.

Wastewater Treatment Alternative Solutions

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 m3/day. While there is reserve capacity for growth in this agreement, projected growth is anticipated to exceed this amount.

- Alt 1 - Do Nothing
- Alt 2 - Renegotiate Agreement With the City to Raise Maximum Flow
- Alt 3 - Construct a New Wastewater Treatment Plant in Arva
- Alt 4 - Construct a New Sanitary Pumping Station and Forcemain

Recommended Alternative Solution

Given these constraints, the preferred solution is alternative 2 which is to renegotiate the agreement with the City of London. 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.

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.

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

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

- Alt 1 - Do Nothing
- Alt 2 - Decommission Existing Arva PS & Redirect Flows through Easement
- Alt 3 - Decommission Existing Arva PS & Redirect Flows on Richmond Street

- Alt 4 - Decommission Existing Arva PS & Redirect Flows Along Croydon Drive
- Alt 5 - Maintain Existing Arva PS & Construct New PS

Recommended Alternative Solution

Alternative 5 was selected as the preferred alternative. 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. This alternative 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.

4.1.3 Stormwater

4.1.3.1 Existing Stormwater Services

Stormwater management for the Arva future development area was identified and evaluated in the Middlesex Centre Settlement Area Stormwater Master Plan (2020). Stormwater management measures within Arva must provide the following treatment:

- Provide Enhanced Protection Level water quality control to remove 80% of Total Suspended Solids (TSS) from stormwater. This treatment level is consistent with existing downstream SWM facilities that discharge to Medway Creek; and
- Attenuate the peak discharges from all design events up to and including the 100-year storm to predevelopment magnitudes.

4.1.3.2 Middlesex Centre Settlement Area Stormwater Master Plan Recommended Solutions

Recommended Solutions were identified in the Middlesex Centre Settlement Area Stormwater Master Plan (2020), and are summarized below.

Local SWM Controls

All stormwater treatment is provided to the runoff from future development in the Arva Development Area by local SWM controls. The proposed local SWM controls provide at-source water quality, water quantity, and erosion control treatment to the runoff from all future development and may include:

- Soakaway pits and/or bioswales to capture and infiltrate rooftop runoff;
- Underground storage to provide peak flow attenuation;
- Permeable pavement on private roadways; and
- Dry SWM ponds to provide peak flow attenuation during severe design events.

The developer's engineer will be responsible for selecting the at-source SWM control measures to treat the runoff from the future development concept. The measures must be designed to meet the post development SWM control requirements and must be accepted by MOMC. Construction of the proposed local SWM controls will be the responsibility of the developer.

4.1.4 Summary

The following table summarizes the recommended solutions established for each settlement. The proposed projects are displayed in Figure 3.

Table 3: Summary of Arva Recommended Alternative Solutions

Servicing Type	Issues / Project	Recommended Alternative Solution	MCEA Project Schedule
Water	Increase in water supply needed with growth	Connect to LHWPSS: Build a new 1.25 km long 200 mm diameter feedermain on Medway Rd, from PS #4 at the Arva Reservoir to the proposed new water storage facility within Arva.	A+
Water	Increase reliability of supply (through watermain twinning or storage) with growth	Build new storage (reservoir or ET): Build a new 875 m3 storage facility and 14.7 L/s BPS at the west end of Arva, on Medway Rd, adjacent to the proposed sanitary PS.	B
Wastewater	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.	B
Wastewater	Upgrade existing Arva Pumping Station	Upgrade the existing Arva SPS1 to Capacity of 3,915 m3/day (45.3 L/s).	A
Stormwater	On-Site SWM Controls	SWM treatment to limit the post-development peak discharges. Implement on single-family residential properties.	MCEA Project Schedules Not Applicable Completed as part of the 2020 Master Plan

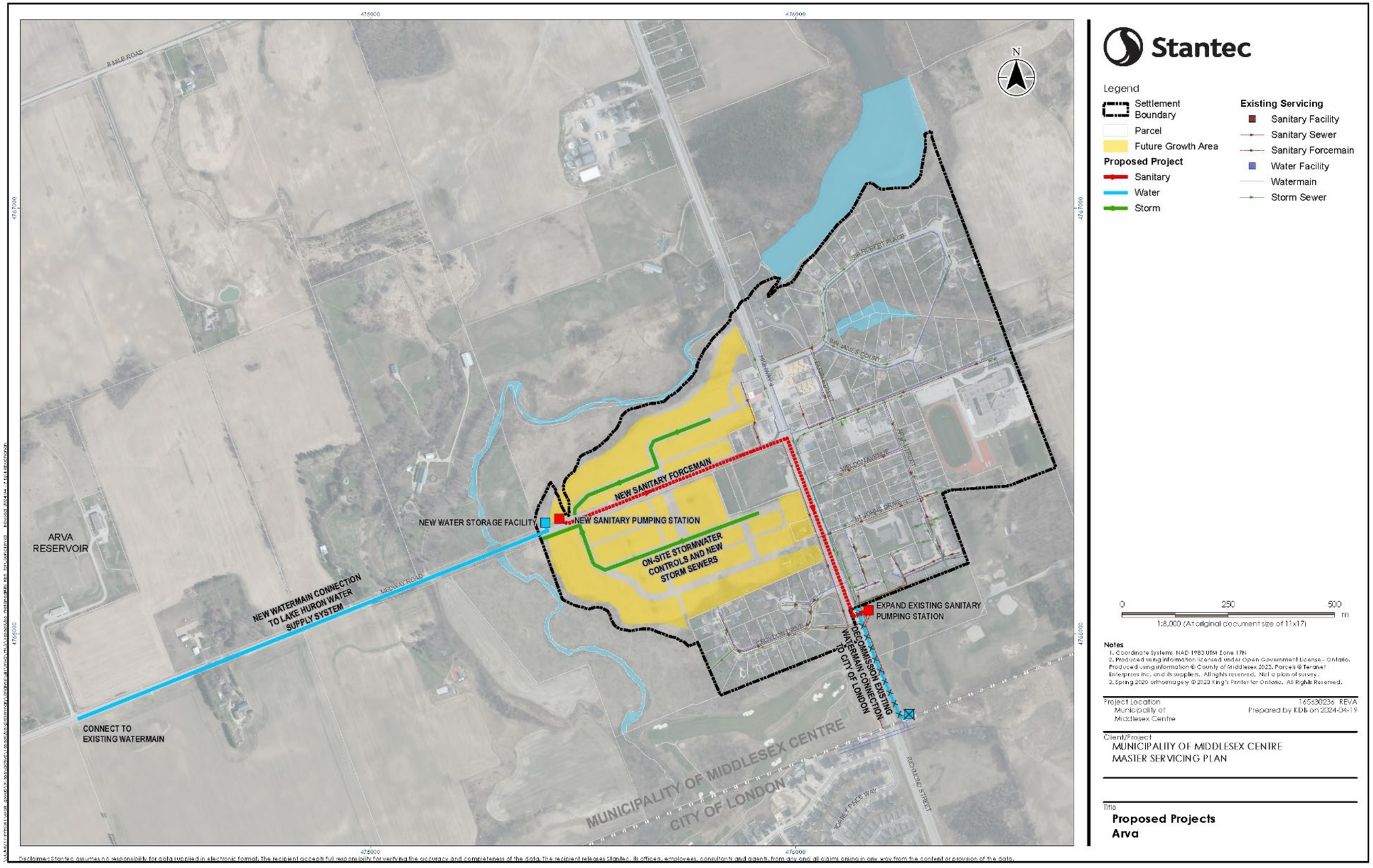

Figure 3: Arva Proposed Projects

4.2 DELAWARE

Delaware is situated west of the City of London, near Longwoods Road and Gideon Drive. The Official Plan designates Delaware as a Community Settlement Area.

4.2.1 Water

4.2.1.1 Existing Water Services

Delaware was previously supplied by a direct connection from the City of London. This supply connection was decommissioned in 2022, and replaced by a supply connection from Komoka, with water being boosted at the Delaware booster pumping station. Water is stored in the Delaware standpipe.

As part of the 2010 Master Servicing Plan, a hydraulic model of the Komoka-Kilworth water distribution system was developed. A separate model for the Delaware water distribution system was merged with this model. As part of this 2023 SMP, this model is updated and used to assess current and future infrastructure needs in Komoka-Kilworth-Delaware.

4.2.1.2 Water System Constraints

Issues and opportunities identified in the water system are summarized as follows:

- Growth in Delaware will require additional water storage volume and water pumping volume.
- The existing watermain on Gideon Drive which provides water to Delaware is undersized to supply sufficient water for the projected growth.

4.2.1.3 Alternative Solutions

Alternative solutions were developed to resolve water related deficiencies within the existing system, and are outlined below. Recommended Alternative Solutions were selected. Additional information regarding the selection process is available in Appendix B.

Delaware – Storage Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Expand existing storage (standpipe)
- Alt 3: Build new storage (reservoir or ET) on existing site
- Alt 4: Build new storage (reservoir or ET) on new site

Delaware – Recommended Storage Alternative Solution

The recommended alternative solution is Alt 4: Build new storage (reservoir or ET) on new site. Under this alternative solution, the additional storage capacity needed to supply growth in Delaware would be

provided at a new storage facility. This solution would require new infrastructure and capital and operational costs. However, it would provide additional reliability and be beneficial in terms of hydraulics.

Delaware – Pumping Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Expand Delaware BPS
- Alt 3: Build new BPS

Delaware – Recommended Pumping Alternative Solution

The recommended pumping alternative solution for Delaware is Alt 2: Expand Delaware BPS. Under this alternative solution, the additional pumping capacity needed to supply growth in Delaware would be provided at the existing Delaware BPS. Existing pumps would be replaced and/or new pumps would be added, and the existing PS superstructure would be expanded as needed. This solution would make optimized use of existing infrastructure recently built and land available, and would be efficient in terms of operational costs since only a single facility would be operated. The need for a new BPS was not identified based on hydraulics, however, there is the potential to implement a new BPS in conjunction with a new storage facility, should the new storage facility consist of an at-grade reservoir. These can be explored as part of design alternatives for specific development areas. A new BPS could also be implemented as part of the development of specific areas, in conjunction with new at-grade reservoirs. These can be explored as part of design alternatives.

Delaware - Gideon Dr Watermain Constraints Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Upgrade existing watermains
- Alt 3: Build new watermains

Delaware (Gideon Dr Watermain Constraints) – Recommended Watermain Alternative Solutions

The recommended alternative solution is Alt 2: Upgrade existing watermains. Under this alternative solution, the existing watermain along Gideon Dr would be decommissioned and replaced within the same alignment, or twinned within the same alignment.

4.2.2 Wastewater

4.2.2.1 Existing Wastewater Services

Delaware does not currently receive municipal wastewater services. Wastewater servicing is the responsibility of private property owners through private septic systems.

4.2.2.2 Wastewater System Constraints

Issues and opportunities identified in the wastewater system are summarized as follows:

- Substantial growth is planned for Delaware, particularly in the employment lands. This growth can only proceed based on full municipal services.
- Provision of full municipal services could be considered for the existing development in Delaware.

4.2.2.3 Alternative Solutions

Alternative solutions were developed to resolve wastewater related deficiencies within the existing system, and are outlined below. Recommended Alternative Solutions were selected. Additional information regarding the selection process is available in Appendix C.

Delaware Wastewater Treatment

- Alt 1 - Do Nothing
- Alt 2 - Construct a new sewage treatment plant in Delaware.
- Alt 3 - Pump flows to the City of London
- Alt 4 - Pump Flows to Komoka

Recommended Alternative Solution

Alternative 4, pump flows to the Komoka Wastewater Treatment Facility for treatment, 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.

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.

- Alt 1 - Do Nothing.
- Alt 2 - Construct a new pumping station (Delaware PS #1)
- Alt 3 - Construct a new pumping station (Delaware PS #2)

Recommended Alternative Solution

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 recommendation involves the construction of a new pumping station (Delaware PS #1) within the employment lands south of Longwoods Road and construction of 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.

Construction of a new pumping station (Delaware PS #2) on municipal lands at 2652 Gideon Drive and construction of a sanitary sewer network to service all unserviced development west of Victoria Street could be considered to provide servicing for the existing areas of Delaware. 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. 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.

4.2.3 Stormwater

4.2.3.1 Existing Stormwater Services

Existing storm drainage in Delaware was designed and constructed on a site-by-site basis as development occurred, without the benefit of an overall stormwater management strategy. This has resulted in a fragmented drainage system that does not efficiently service the existing community, and which has limited capacity for future growth. Recommendations were developed for the various areas, and considered the recommended strategy identified in the Delaware Community Settlement Area Stormwater Master Plan.

4.2.3.2 Alternative Solutions

Alternative solutions were developed to resolve stormwater related deficiencies within the existing system, and are outlined below. Recommended Alternative Solutions were selected. Additional information regarding the selection process is available in Appendix D.

Delaware Employment Lands

- Alternative 1 – Do Nothing
- Alternative 2 –LID Controls and Dry End-of-Pipe Facilities
- Alternative 3 – Service Proposed Development with Single Online Wet SWM Facility
- Alternative 4 – Service Proposed Development with Phased Wet SWM Facilities

Recommended Alternative Solution

The preferred alternative is Alternative 2 –LID Controls and Dry End-of-Pipe Facilities. This alternative includes a treatment train approach using distributed or lot-level controls that would be applied upstream of four (4) dry SWM facilities to achieve water quality criteria. The treatment train may consist of bio-retention areas (bio-swales), vegetated conveyance systems such as grassed swales, vegetated buffer strips and enhanced grass swales. Infiltration measures such as infiltration trenches or porous pavements

provide additional water quality and water quantity benefits while also contributing to groundwater recharge.

Following pre-treatment from the LIDs, future developed runoff would be conveyed to end-of-pipe dry SWM facilities. Based on the existing topography of the future development area, existing natural watercourse pathways, and the overall drainage area, four (4) individual dry SWM facilities will be required. The dry SWM facilities would be designed to provide the necessary stormwater quantity control for the future employment lands prior to discharging to the on-site watercourses.

East Delaware

- Alternative 1 – Do Nothing
- Alternative 2 – Service Proposed Development with a single SWM Wet Facility
- Alternative 3 – LID Controls and a single Dry End-of-Pipe Facility

Recommended Alternative Solution

The recommended alternative solution is Alternative 3 - LID Controls and a single Dry End-of-Pipe Facility. This alternative would include a treatment train approach using LID controls and a single dry SWM facility. LID controls would be applied upstream of the dry facility to reduce suspended sediment loading and achieve water quality criteria by retaining the 25mm storm event. A semi-urban road cross-section would be implemented and allow LID controls within the road right-of-way.

The dry SWM facility would be designed to provide the necessary quantity control for the future employment lands prior to discharging to the on-site watercourse adjacent to the development. The proposed dry SWM facility will outlet to Cummings Municipal Drain through an outfall. A portion of Cummings Municipal Drain would be abandoned under the provisions of the Drainage Act.

This involves encompassing Allison / Cummings Municipal Drain's, is LID controls with a dry SWM facility downstream. The land use designation for this area is Residential and is contained within Special Policy Area #29 in the *Official Plan* (march, 2023).

4.2.3.3 Delaware Community Settlement Area Stormwater Master Plan Recommended Solutions

Recommended Solutions were identified in the Delaware Community Settlement Area Stormwater Master Plan (2016), and are summarized below.

Prior Municipal Drain
Improve Major System and Abandon Municipal Drain

This alternative addresses existing capacity issues by improving roadside ditches in order to convey all flows that exceed the capacity of the minor system. The roadside ditches will also provide water quality treatment which would not be provided by minor system improvements. A storm sewer with sufficient capacity to convey the 100-year peak flows is constructed from the Millcreek Lane/Yorkdale Street

intersection to the existing outlet in order to provide a major system outlet (a portion of the outlet was recently replaced as a result of failure). Although there may be minor disruption to fronting properties during implementation of ditch improvements and the new storm sewer, this option can be implemented at a lower cost with less impact to affected roads.

Mill Street Development Storm Sewer
Improve Major System

This alternative addresses existing ponding issues at the east end of Atkinson Court by regrading the overland flow route to improve drainage. Capacity issues caused by future development are addressed by providing on-site SWM controls (quality and quantity), and a ditch-inlet catchbasin is installed to address rear-yard flooding. Minor ponding may still occur at the eastern end of Atkinson Court, but it will be below Municipal standards and unlikely to threaten safety or property.

Hog Back Close Storm Sewer
Do Nothing

Although the existing storm sewer is over capacity to convey peak flows, the system is functioning sufficiently, and any ponding likely to occur will be below Municipal standards and unlikely to threaten safety or property. The existing conditions do not warrant the construction impacts and cost associated with the other alternatives.

Tower Heights Storm Sewer
Do Nothing

Although the existing storm sewer is over capacity to convey peak flows, the existing conditions do not warrant the construction impacts and cost associated with replacement. Concerns have been received from residents regarding excessive reliance on sump pumps, however, these issues are primarily related to high groundwater levels, and may not be sufficiently addressed by SWM improvements.

Springer Road Municipal Drain
Abandon Municipal Drain and Negotiate Drainage Easement

Although the existing storm sewer is over capacity, ponding is not likely to cause risk to safety or property. Ensuring that the existing overland flow route does not become obstructed further mitigates the potential for ponding during storm events. The existing conditions do not warrant the construction impacts and costs associated with replacement of the storm sewer.

Cummings Municipal Drain
Urban Right of Way within Future Development Areas and Dry SWM Pond

The existing drain south of Wellington Road is decommissioned, and the south roadside ditch profile is modified to convey major flows from the low point westward to the Longwoods Road Culvert. Future development areas (excluding approved Draft-Plans along Martin Road) will incorporate urban right-of-way (ROW) to convey minor and major flows. Flows from the future development areas will be conveyed by proposed storm sewers along Wellington Street and Martin Road to a regional dry SWM pond located

on development lands east of Martin Road prior to discharge to the ravine. The proposed SWM pond, in conjunction with oil-grit separators (OGSs) located at each of the development lands, provides the required stormwater treatment and quantity control. The proposed storm sewer along Wellington Street would be extended to address existing surface ponding at the Wellington Street low point.

Longwoods Road Culvert
Urban Right of Ways within Future Development Areas and Dry SWM Pond

Urban ROW within the future development area incorporates SWM control measures to allow for development to proceed with minimal impact to the ravine or existing properties. A proposed dry SWM pond and OGS provides the required stormwater treatment and quantity control. The existing concrete box culvert beneath Longwoods Road is replaced with a new outlet which must be lowered to accommodate the proposed upstream sewers. Improvements to the Longwoods Road north roadside ditch will mitigate flooding on commercial property.

Longwoods Commercial Lands
Dry SWM Pond

Flows from the Longwoods Road roadside ditches are conveyed through the development lands through a drainage easement. Quality and Quantity controls are provided by proposed OGSs within the future development area, and a dry SWM pond located within the development lands or potentially within the existing buffer lands (Special Policy Area #8) subject to approval/acquisition of land from the current landowner and municipal approval to address current SPA designation/development constraints. Flows are conveyed from the dry SWM pond to the Springer Road Drain outfall location by a proposed pipe located within a drainage easement south of the Tower Heights Subdivision.

Harris Road Culvert
Urban Right of Way & Dry SWM Ponds within Future Development Areas

Urban ROW within the future development areas incorporate SWM control measures to allow for development to proceed with minimal impact to the ravine or existing properties. Proposed dry SWM ponds and oil/grit separators provide the required stormwater treatment and quantity control. Flows will be directed to the existing ravine outlet via proposed storm sewers constructed within drainage easements.

Thompson Municipal Drain
Proposed Storm Sewer

The proposed storm sewer provides an outlet for the existing roadside ditches along Wellington Street to limit ponding depths in front of Our Lady of Lourdes school property. The storm sewer along Victoria Street is replaced with a new storm sewer within the right of way, and a portion of sewer currently draining to the Davis Street system is connected to proposed Victoria Street sewer to alleviate impacts on the adjacent Forsythe System

Forsythe Municipal Drain
Improve Minor System

A new storm sewer with sufficient capacity to convey the 100-year peak discharge would be constructed from the York Street low point south of Wellington Street to a new outfall to the Thames River. Segments of pipe located on private property are decommissioned, and the identified sections are replaced.

4.2.4 Summary

The following table summarizes the recommended solutions established for each settlement. The proposed projects are displayed in Figure 4.

Table 4: Summary of Delaware Recommended Alternative Solutions

Servicing Type	Issues / Project	Recommended Alternative Solution	MCEA Project Schedule
Water	Increase in storage capacity in Delaware needed with growth	Build new storage (reservoir or ET) on new site: Build a new 1,300 m3 storage facility in the employment development lands in the south of Delaware, adjacent to the proposed sanitary PS #1. The design alternatives are: - Build a new reservoir and BPS - Build a new standpipe. Water consumption in employment areas can be highly variable depending on the type of industry, therefore a new reservoir and BPS may be preferred, as there is flexibility in the sizing (incremental implementation). The preferred design alternative should be reviewed at the preliminary design stage.	B
Water	Increase in pumping capacity in Delaware needed with growth	Add +20 L/s of pumping capacity to the existing Delaware BPS. This upgrade can be accommodated within the existing Delaware BPS building.	A
Water	Twinning/looping/ upgrade of Gideon Dr watermain from Delaware BPS to Delaware needed for reliability, existing watermain performance and growth	Upgrade the existing watermain on Gideon Dr (from Komoka Rd to Millcreek Ln) to 2.6 km of 300 mm diameter watermain.	A+
Wastewater	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.	B
Wastewater	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.	B
Stormwater	LID Controls and Dry End-of-pipe Facilities	Water quality objectives may be achieved through a combination of bio-retention areas (bio-swales), vegetated conveyance systems such as grassed swales, vegetated buffer strips and enhanced grass swales. Infiltration measures such as infiltration chamber systems or porous pavements provide additional water quality and water quantity benefits while also contributing to groundwater recharge. Runoff from the proposed development will collectively be conveyed to four end-of-pipe dry SWM facilities adjacent to the watercourses that bisects the site. The SWM facilities will be located on private land such that the landowner will be responsible for the ongoing operation and maintenance and the municipality will not assume the facilities.	A
Stormwater	LID Controls and a single Dry End of Pipe Facility	Encompassing Allison / Cummings Municipal Drain's, use LID controls with a dry SWM facility downstream. The land use designation for this area is Residential and is contained within Special Policy Area #29 in the Official Plan (march, 2023). Runoff above the 25mm storm event will be conveyed to a dry SWM facility positioned adjacent to the existing Cummings Municipal Drain alignment. The SWM facility will be located on private land such that the landowner(s) will be responsible for the ongoing operation and maintenance and the municipality will not assume the facilities. The dry SWM facilities will provide sufficient extended detention and release rates to attenuate the peak flows to pre-development conditions up to and including the 100-year storm event.	A
Stormwater	Improve Major System and Abandon Municipal Drain	Improve roadside ditches to convey all flows that exceed capacity of the minor system. Roadside ditches provide water quality treatment through minor system improvements. Provides sufficient capacity for 100-year peak flows.	A Completed as part of the Delaware Community Settlement Area Stormwater Master Plan
Stormwater	Improve Major System	Regrading overland flow route to improve drainage. Future developments to provide on-site SWM controls, and a ditch-inlet catchbasin installed to address rear-yard flooding.	A Completed as part of the Delaware Community Settlement Area Stormwater Master Plan

Servicing Type	Issues / Project	Recommended Alternative Solution	MCEA Project Schedule
Stormwater	Abandon Municipal Drain and Negotiate Drainage Easement	Ensure existing overland flow route does not become obstructed further to mitigate potential for ponding during storm events.	B Completed as part of the Delaware Community Settlement Area Stormwater Master Plan
Stormwater	Urban Right of Way within Future Development Areas and Dry SWM Pond	Existing drain south of Wellington Road is decommissioned and the south roadside ditch profile is modified to convey major flows from the low point westward to the Longwoods Road Culvert. Future development areas will incorporate urban right-of-way to convey minor and major flows. Future development will convey flows to a regional dry SWM pond east of Martin Road prior to discharge to the ravine.	A Completed as part of the Delaware Community Settlement Area Stormwater Master Plan
Stormwater	Urban Right of Way within Future Development Areas and Dry SWM Pond	Urban right-of-way within future development will incorporate SWM control measures to allow for development to proceed with minimal impact to the ravine or existing properties.	A Completed as part of the Delaware Community Settlement Area Stormwater Master Plan
Stormwater	Dry SWM Pond	Dry SWM pond located within development lands or within existing buffer lands. Flows conveyed from the dry SWM pond to the Springer Road Drain outfall location by a proposed pipe.	A Completed as part of the Delaware Community Settlement Area Stormwater Master Plan
Stormwater	Urban Right of Way & Dry SWM Ponds within Future Development Areas	Urban right-of-way within future development will incorporate SWM control measures to allow for development to proceed with minimal impact to the ravine or existing properties. Flows will be directed to the existing ravine outlet via proposed storm sewers.	B Completed as part of the Delaware Community Settlement Area Stormwater Master Plan
Stormwater	Proposed Storm Sewer	Proposed storm sewer provides an outlet for the existing roadside ditches along Wellington Street to limit ponding in front of Our Lady of Lourdes school property. The storm sewer along Victoria Street is replaced with a new storm sewer within the right—of-way, and a portion of the sewer currently draining to the Davis Street system is connected to proposed Victoria Street sewer to alleviate impacts on the adjacent Forsythe System.	B Completed as part of the Delaware Community Settlement Area Stormwater Master Plan
Stormwater	Improve Minor System	New storm sewer with sufficient capacity to convey the 100-year peak discharge. Constructed from York Street low point south of Wellington Street to a new outfall to the Thames River.	B Completed as part of the Delaware Community Settlement Area Stormwater Master Plan

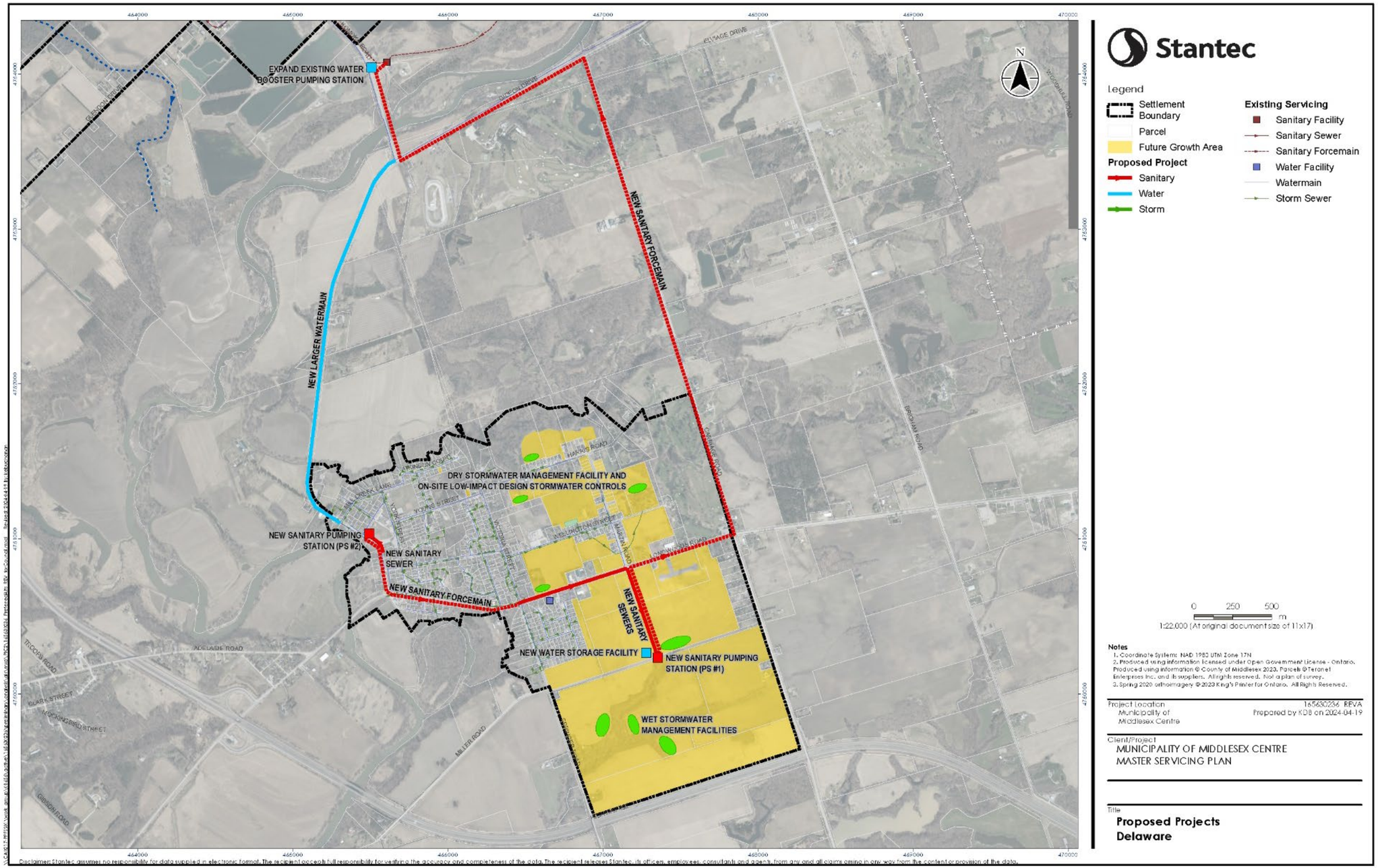

Figure 4: Delaware Proposed Projects

4.3 ILDERTON

Ilderton is situated to the northwest of the City of London, near Ilderton Road and Hyde Park Road. The Official Plan designates Ilderton as an Urban Settlement Area.

4.3.1 Water

4.3.1.1 Existing Water Services

Water is supplied to the Ilderton reservoir by a 300 mm diameter pipe directly connected to the 1200 mm diameter Lake Huron Primary Water Supply System (LHPWSS) transmission main. Water is then distributed into the network at the Ilderton booster pumping station, and stored in the Ilderton elevated tank.

As part of the 2010 Master Servicing Plan, a hydraulic model of Ilderton's water distribution system was developed. As part of this SMP, this model is updated and used to assess current and future infrastructure needs in Ilderton.

4.3.1.2 Water System Constraints

Issues and opportunities identified in the water system are summarized as follows:

- Growth in Ilderton will require additional water supply.
- Growth in Ilderton will require additional water storage
- Growth in Ilderton will require additional water pumping capacity

4.3.1.3 Alternative Solutions

Alternative solutions were developed to resolve water related deficiencies within the existing system, and are outlined below. Recommended Alternative Solutions were selected. Additional information regarding the selection process is available in Appendix B.

Water Supply Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Expand supply capacity from LHWPSS
- Alt 3: Service growth from private wells
- Alt 4: Service growth from new communal well system(s)

Recommended Water Supply Alternative Solution

The recommended water supply alternative solution for Ilderton is Alt 2: Expand supply capacity from LHWPSS. Under this alternative solution, existing and future demands in Ilderton are supplied by the

LHWPSS, via the Ilderton Reservoir & BPS. Future water demands in Ilderton would be considered in LHWPSS master-planning initiatives and future infrastructure sizing. This solution would make optimized use of the existing infrastructure to supply growth.

Storage Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Expand existing storage (in-ground reservoir or ET)
- Alt 3: Build new storage (reservoir or ET) on existing site
- Alt 4: Build new storage (reservoir or ET) on new site

Recommended Storage Alternative Solution

The recommended alternative solution is Alt 4: Build new storage on new site. Under this solution, the additional storage capacity needed to supply growth in Ilderton would be provided at a new storage facility. This solution would require new infrastructure and capital and operational costs. However, it would provide additional reliability and redundancy to the water system and be beneficial in terms of hydraulics.

Pumping Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Expand Ilderton BPS
- Alt 3: Build new BPS

Recommended Pumping Alternative Solution

The recommended pumping alternative solution for Ilderton is Alt 2: Expand Ilderton BPS. Under this solution, the additional pumping capacity needed to supply growth in Ilderton would be provided at the existing Ilderton BPS. Existing pumps would be replaced and/or new pumps would be added, and the existing BPS superstructure would be expanded as needed. This solution would make optimized use of existing infrastructure, and would be efficient in terms of operational costs since only a single facility would be operated. The need for a new BPS was not identified based on hydraulics.

4.3.2 Wastewater

4.3.2.1 Existing Wastewater Services

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.

Ilderton's wastewater infrastructure 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.

4.3.2.2 Wastewater System Constraints

Issues and opportunities identified in the wastewater system are summarized as follows:

- Growth in Ilderton will require additional wastewater treatment capacity.
- Growth in Ilderton will require additional biosolids storage capacity.
- Growth in Ilderton will require extensions to the sanitary sewer collection system.
- Opportunities to decommission existing sanitary pumping stations should be reviewed.

4.3.2.3 Alternative Solutions

Alternative solutions were developed to resolve wastewater related deficiencies within the existing system, and are outlined below. Recommended Alternative Solutions were selected. Additional information regarding the selection process is available in Appendix C.

Treatment

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

- Alt 1 - Do Nothing
- Alt 2 - Expand Existing Ilderton WWTP
- Alt 3 - Convey flows to the Komoka WWTP
- Alt 4 - Convey flows to London

Recommended Alternative Solution

The preferred alternative is Alternative 2, to expand the existing Ilderton WWTP. This would involve the expansion of the existing Ilderton WWTP from its current capacity of 1,300 m^3/d to 1,800 m^3/d.

Biosolids Management

Planned growth in Ilderton will require additional biosolids capacity of 500 m3/d. Long list alternatives considered are as follows:

- Alt 1 - Do Nothing.
- Alt 2 - Expand existing liquid biosolids storage facilities at the Ilderton WWTP
- Alt 3 - Provide biosolids management by dewatering with disposal by landfilling

Recommended Alternative Solution

Alternative 2, expand the existing liquid biosolids storage facility at the Ilderton WWTP is recommended as the preferred alternative. This will require the Municipality to continue hauling liquid sludge for disposal by farmland application.

Sanitary Conveyance System

Recommended Solution

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.

Existing Pump Station Assessment

Ilderton has a disproportionate 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

- Alt 1 - Do Nothing
- Alt 2 – Decommission PS #3 and construct new sewers on Hyde Park Road and Meadowcreek Drive
- Alt 3 – Decommission PS #3 and construct new sewers on Hyde Park within an easement

Recommended Alternative Solution

It was determined that Alternative 3 was the preferred option. 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. While this option has additional impacts on the local residents, it was significantly more cost effective than Alternative 2.

Pumping Station #4

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

Pumping Station #5

- Alt 1 - Do Nothing
- Alt 2 – Decommission PS #5 and construct new sewers within an easement

Recommended Alternative Solution

It was determined that Alternative 1 – Do Nothing is the preferred option. This option has the least impact to residents and the environment, 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.

4.3.3 Stormwater

4.3.3.1 Existing Stormwater Services

Ilderton Drain No. 2

The Hyde Park Road right-of-way south of Ilderton Road is serviced by fragmented municipal drains located in residential rear yards, which present the following challenges:

- The municipal drain alignments make access for future maintenance problematic, as the drains cross multiple private properties and obstructions such as fences and trees may need to be removed;
- While the MOMC has the authority to enter properties to perform municipal drain maintenance, landowners may be unaware of the presence of a municipal drain on their properties and could

construct obstructions on top of drainage systems that may cause damage or prevent access for future maintenance; and

- The drains were originally designed to provide agricultural drainage. As the service area is now fully urbanized, the capacities of these drains are likely insufficient to provide adequate conveyance during significant storm events.

Furthermore, there are opportunities to improve the performance of the Van Bussell Agreement Drain and to mitigate asphalt deterioration in the Meadowcreek Subdivision caused by sump pump discharges to the ground surface.

South Ilderton Development Area

The Official Plan shows that future development in this catchment will be comprised of commercial and employment lands. Stormwater from future development within the South Ilderton Development Area must be managed to mitigate downstream flooding, erosion, and water quality impacts. SWM measures within this catchment area must provide the following treatment:

- Provide Enhanced Protection Level water quality control to remove 80% of TSS from stormwater. This treatment level is consistent with the Clear Skies Subdivision SWM pond, which also discharges to Oxbow Creek; and
- Attenuate the peak discharges from all design events up to and including the 100-year storm to predevelopment magnitudes.

MOMC staff report that the Hughes Charlton Drain capacity is limited. Standing water is frequently observed south of 10 Mile Road for prolonged periods following heavy rain. Similarly, the capacity of the Oxbow Creek Drain is reportedly limited, with high water levels persisting after rainfall events. Consequently, the Hughes Charlton Drain is not a viable outlet for future development in the South Ilderton Development Area. Instead, all runoff should be discharged directly to the Oxbow Creek Drain, and the future drainage system must be designed to operate under high tailwater conditions.

4.3.3.2 Middlesex Centre Settlement Area Stormwater Master Plan Recommended Solutions

Recommended Solutions were identified in the Middlesex Centre Settlement Area Stormwater Master Plan (2020), and are summarized below.

Ilderton Drain No. 2

Drain Improvements

In accordance with the design drawings prepared by IBI, the existing 400 mm diameter concrete pipe that conveys runoff from Hyde Park Road and the upstream drainage area should be replaced with a 600 mm diameter PVC pipe to provide additional conveyance from the Hyde Park Road low point and to mitigate local flooding. While this solution does not provide drainage servicing that meets Municipal standards, it can be completed within the municipal drain working limits and does not require land expropriation. It is

noted that these upgrades to the Van Bussell municipal drain were completed in September 2019, prior to the finalization of this Master Plan. The Municipality should monitor the performance of the proposed drain improvements and over the longterm, should develop a plan to acquire the lands necessary to implement SWM pond and drownstream sewer improvements.

South Ilderton Development Area

Two SWM Facilities

Two proposed regional SWM facilities are recommended to provide all necessary stormwater treatment to the runoff from the South Ilderton Development Area. Both facilities are anticipated to be designed as wet ponds. This servicing option provides flexibility for development phasing, reduces the size of conveyance infrastructure required to carry stormwater from the west side of Hyde Park Road to the proposed outlet, and manages major flows crossing Hyde Park Road.

SWM 1 is located west of Hyde Park Road and provides all necessary treatment to the runoff from proposed development. The proposed pond will also be designed to accommodate the runoff from the external undeveloped drainage area located beyond the settlement boundary. The proposed SWM pond discharges to a proposed trunk storm sewer that conveys the treated stormwater across Hyde Park Road to the Oxbow Creek Drain.

Similarly, SWM 2 provides all necessary treatment to the runoff from the east side of Hyde Park Road and discharges via the proposed outlet to the Oxbow Creek Drain. The portion of the Hughes Charlton Drain located within the Settlement Area is anticipated to be abandoned concurrent with future development.

4.3.4 Summary

The following table summarizes the recommended solutions established for each settlement. The proposed projects are displayed in Figure 5.

Table 5: Summary of Ilderton Recommended Alternative Solutions

Servicing Type	Issues / Project	Recommended Alternative Solution	MCEA Project Schedule
Water	Increase in water supply needed with growth	Expand supply capacity from LHWPSS	A
Water	Increase in storage capacity needed with growth	Build new storage (reservoir or ET) on new site: Build a new 2,000 m3 storage facility on Hyde Park Rd, at the south end of Ilderton on proposed development lands.	B
Water	Increase in pumping capacity needed with growth	Expand Ilderton BPS: Add +9 L/s of pumping capacity at 59 m TDH to the existing Ilderton BPS. This upgrade can be accommodated within the existing Ilderton BPS building.	A+
Wastewater	Upgrade Ilderton Wastewater Treatment Plant	Upgrade Ilderton WWTP from 1,300 m3/day to 1,800 m3/day including expansion of biosolids storage from 1500 m3 to 1900 m3	C (completed in 2015 study)
Wastewater	Decommission Sanitary pumping station #3	New gravity sewer transporting flow from PS3 to Ilderton WWTP. Decommission existing FM and pump station.	B
Wastewater	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	A+
Stormwater	Drain Improvements	Replace existing 400mm diameter concrete pipe with 600mm diameter PVC pipe to provide additional conveyance.	MCEA Project Schedule Not Applicable Completed as part of the 2020 Master Plan
Stormwater	Two SWM Facilities	Two wet ponds to provide flexibility for development phasing, reduce the side of conveyance infrastructure required, and manage major flows crossing Hyde Park Road.	A Completed as part of the 2020 Master Plan

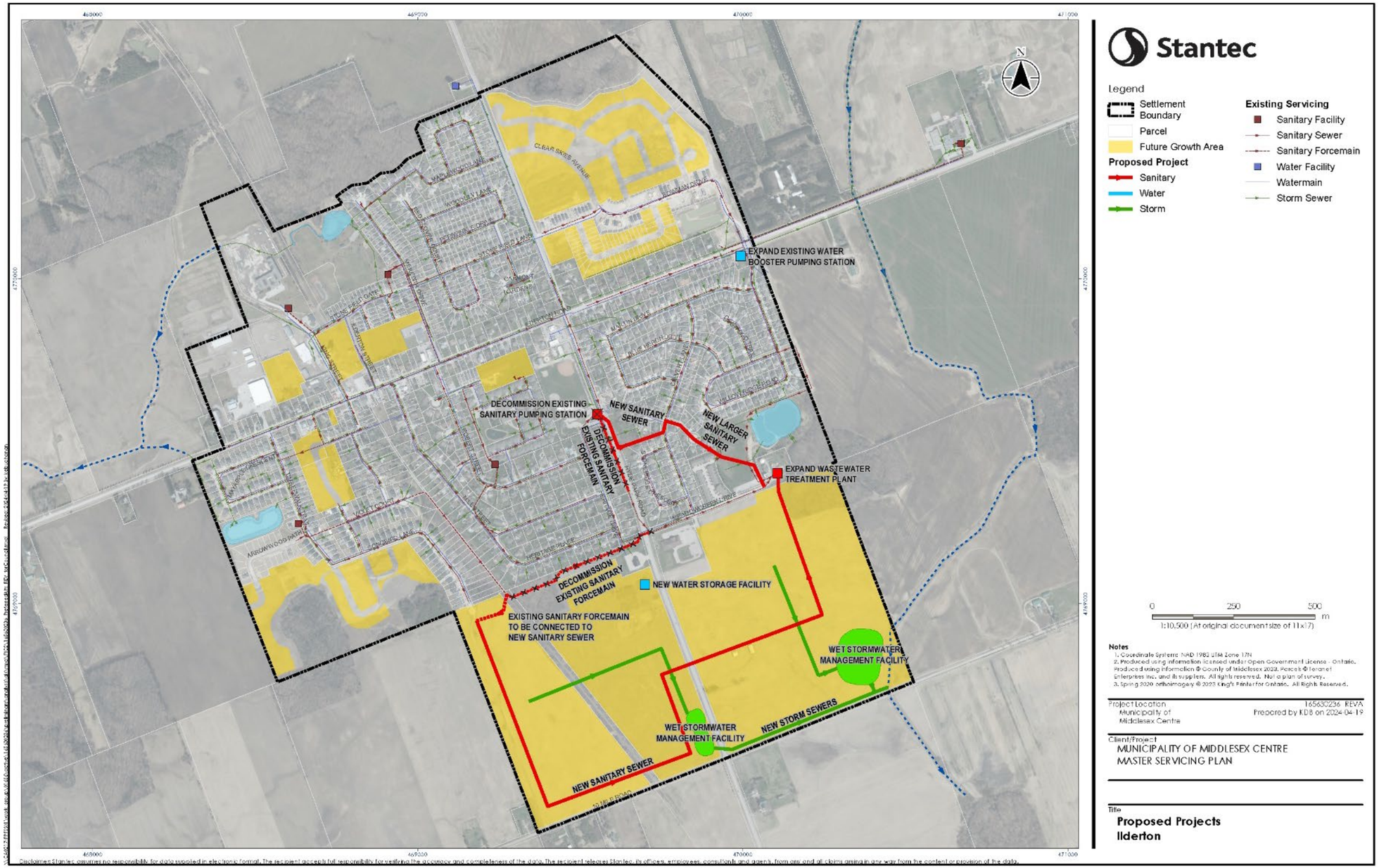

Figure 5: Ilderton Proposed Projects

4.4 KILWORTH

Kilworth is situated west of the City of London, near Glendon Road and Coldstream Road. The Official Plan designates Kilworth as an Urban Settlement Area.

4.4.1 Water

4.4.1.1 Existing Water Services

Water is supplied to Kilworth through the water system infrastructure in Komoka. Water from the LHPWSS to the Komoka Reservoir by the Komoka-Mt. Brydges booster pumping station. Water is then distributed into the network at the Komoka booster pumping station, and stored in the Komoka elevated tank. An intermediate booster pumping station is used during high demand periods in Kilworth. Since 2022, water is boosted into the Delaware distribution network at the Delaware booster pumping station.

As part of the 2010 Master Servicing Plan, a hydraulic model of the Komoka-Kilworth water distribution system was developed. A separate model for the Delaware water distribution system was merged with this model. As part of this 2023 SMP, this model is updated and used to assess current and future infrastructure needs in Komoka-Kilworth-Delaware.

4.4.1.2 Water System Constraints

Issues and opportunities identified in the water system are summarized as follows:

- Growth in Kilworth will require additional supply, pumping and water storage in the system. As the water system is currently serviced through Komoka, these constraints are considered under the Komoka alternatives.
- The old Kilworth area is currently serviced by private wells and the potential for municipal servicing should be considered.

4.4.1.3 Alternative Solutions

Alternative solutions were developed to resolve water related deficiencies within the existing system, and are outlined below. Recommended Alternative Solutions were selected. Additional information regarding the selection process is available in Appendix B.

Kilworth - Old Kilworth Servicing Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Build new watermains

Kilworth (Old Kilworth Servicing) – Recommended Watermain Alternative Solution

The recommended watermain solution for Kilworth to service Old Kilworth is Alt 2: Build new watermains. Under this alternative solution, new watermains would be built along the existing ROWs in Old Kilworth, to service the existing properties.

4.4.2 Wastewater

4.4.2.1 Existing Wastewater Services

Kilworth's wastewater infrastructure 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.

4.4.2.2 Wastewater System Constraints

Issues and opportunities identified in the wastewater system are summarized as follows:

- Growth in Kilworth requires additional wastewater treatment capacity. As Kilworth is currently serviced by the Komoka WWTP, this is considered in the Komoka alternatives.
- Growth in Kilworth will require additional pumping station capacity.
- Growth in Kilworth will require extensions of the sanitary sewer system.
- Opportunities to service the Old Kilworth area which is currently serviced by septic systems should be considered.

4.4.2.3 Alternative Solutions

Alternative solutions were developed to resolve wastewater related deficiencies within the existing system, and are outlined below. Recommended Alternative Solutions were selected. Additional information regarding the selection process is available in Appendix C.

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.

Growth in Kilworth is projected to exceed the current capacity of Kilworth sanitary pumping station #2 and this station will require an upgrade in future. The station was originally constructed based on interim flows with the ability to upgrade in future to ultimate flows. As planned, the pumping station will exceed the interim flow but the projected future flows are well below the planned ultimate flows.

4.4.3 Stormwater

4.4.3.1 Existing Stormwater Services

A SWM strategy is required to improve the existing drainage conditions along Elmhurst St. and Beechnut St. The Old Kilworth drainage area was included in the Kilworth East catchment area presented in the Settlement Area Stormwater Master Plan; however, the solutions presented have been reviewed and updated in this report to alleviate the drainage issues noted from residents.

The SWM measures proposed within this catchment area are required to mitigate drainage issues from initial conditions to a reasonable extent as there are no existing SWM controls present. No original development plans nor as-built information is available for the Old Kilworth development.

Residents indicate the existing drainage system is inadequate. Review of available imagery indicates this may be a result of:

- Shallow slope of roadside ditching and lack of a formal outlet;
- Blockage of culverts at driveways;
- Low gradient system including insufficient lot grading;
- Potential high groundwater table during saturated conditions; and
- Landscaping adjustments blocking and/or filling roadside ditches and culverts

The Middlesex Soils Survey suggests that the local soils are primarily comprised of Caledon fine sandy loam. The high permeability potential of this soil may provide opportunities to treat stormwater using infiltration methods provided that local groundwater levels are sufficiently low.

Landowner education should be considered to advise the landowners that filling ditches and blocking culverts in their lot frontage will exacerbate the drainage issues

4.4.3.2 Alternative Solutions

Alternative solutions were developed to resolve stormwater related deficiencies within the existing system, and are outlined below. Recommended Alternative Solutions were selected. Additional information regarding the selection process is available in Appendix D.

Old Kilworth

- Alternative 1 – Do Nothing
- Alternative 2 - Enhanced ditching
- Alternative 3 - Bioswales
- Alternative 4 – Urbanized Road Cross-section with a Formal Outlet

Recommended Alternative Solution

Alternative 3 – Bioswales is the recommended alternative solution. Under this alternative, bioswales would be implemented where feasible within the road rights-of-way. The bioswales would be designed to collect runoff from minor storm events within the adjacent lots and road rights-of-way to be infiltrated. Overflows would be implemented to bypass the filter bed media and be conveyed downstream during a large storm event. Ultimately the bioswales would provide water quality treatment and quantity control for frequent storm events.

Through the *Settlement Area Stormwater Master Plan* public consultation process, residents of the Old Kilworth Development Area have indicated drainage issues beginning at the midpoint of Elmhurst St. and Beechnut St. Through a review of the local topography and the properties abutting the roads, it was determined that the subdivision was built with insufficient minor and major overland flow routes and is lacking a formal outlet. To mitigate the insufficient drainage within the Old Kilworth development area, a number of bioswales within the existing roadside ditches is proposed to capture and treat runoff during frequent storm events.

4.4.3.3 Middlesex Centre Settlement Area Stormwater Master Plan Recommended Solutions

Recommended Solutions were identified in the Middlesex Centre Settlement Area Stormwater Master Plan (2020), and are summarized below.

Kilworth Glendon Drive Area
Discharge to Glendon Drive Trunk Storm Sewer

The proposed Glendon Drive streetscape improvements include a proposed trunk storm sewer to collect and convey minor flows from the proposed right-of-way westward to a future outlet. This proposed trunk storm sewer will provide the outlet from future development located north of Glendon Drive. Major flows from the portion of the proposed Glendon Drive streetscape improvements located in this catchment are conveyed to Oxbow Creek by the existing overland drainage route.

A proposed regional SWM pond will provide all necessary stormwater treatment to the runoff from future development located north of Glendon Drive. Minor flows will be conveyed to SWM 1 by proposed local storm sewers and major flows are conveyed by the future rights-of-way. Given the local sandy soils, LID measures to capture and retain runoff near its source are likely a feasible strategy for reducing the peak minor system flows and the SWM1 design storage volumes.

The treated flows from SWM1 are discharged to a proposed storm sewer on Tunks Lane, that discharges to the future Glendon Drive trunk storm sewer. Given the recent development activity in the Tunks Lake Area, the Municipality should develop a plan to secure a drainage corridor from this catchment area to Tunks Lane to prevent obstruction of this drainage route by future development. Major flows within the Tunks Lane area will continue to follow the existing surface drainage route and future development proposals must accommodate external major flows.

Kilworth East (Kilworth Park Drive)
SWM Strategy per Glendon Drive EA

In accordance with the recommendations of the Glendon Drive Streetscape EA, all runoff from this portion of the Glendon Drive improvements will be collected and treated by a proposed enhanced grass swale located on the north side of the Glendon Drive right-of-way. The proposed enhanced grassed swale will be designed in accordance with MECP guidelines to provide water quality treatment and will incorporate check dams to provide peak flow control. The proposed enhanced grassed swale will discharge to the Thames River. Given the significant anticipated street and property impacts, replacement of the existing concrete lined ditches in the Kilworth Subdivision is not recommended at this time, though they should be maintained and repaired as needed. The Municipality could consider replacing driveway culverts that are prone to debris accumulation with improved inlets to reduce maintenance requirements.

4.4.4 Summary

The following table summarizes the recommended solutions established for each settlement. The proposed projects are displayed in Figure 6.

Table 6: Summary of Kilworth Recommended Alternative Solutions

Servicing Type	Issues / Project	Recommended Alternative Solution	MCEA Project Schedule
Water	Extend existing watermain network to supply Old Kilworth	Build new watermains: Build 2.6 km of new 150 mm diameter watermain within the existing ROWs in Old Kilworth to service existing properties.	A+
Wastewater	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.	A+
Wastewater	Upgrade Kilworth sanitary pumping station	Upgrade the new Kilworth SPS2's capacity to 12,737 m3/d (147 L/s), Pump to Komoka WWTP.	A
Stormwater	Bioswales	Bioswales will be designed in accordance with the *LID Manual*. Infiltration testing is recommended to be completed on the native soil to determine the design infiltration rate of the bioswales. In addition, an investigation into the groundwater levels within the study is required to determine the spatial suitability of the bioswales. Regrading of the roadside ditching may be required to provide positive drainage to the bioswales. Overflow from the bioswales will be conveyed to the existing road right-of way.	B
Stormwater	Discharge to Glendon Drive Trunk Storm Sewer	Trunk storm sewer to collect and convey minor flows from the right-of-way westward to a future outlet. Will provide outlet from future development located north of Glendon Drive.	B Completed as part of the 2020 Master Plan
Stormwater	SWM Strategy per Glendon Drive EA	Runoff from this portion of Glendon Drive will be collected and treated by a proposed enhanced grassed swale located on the north side of the Glendon Drive right-of-way.	A Completed as part of the 2020 Master Plan

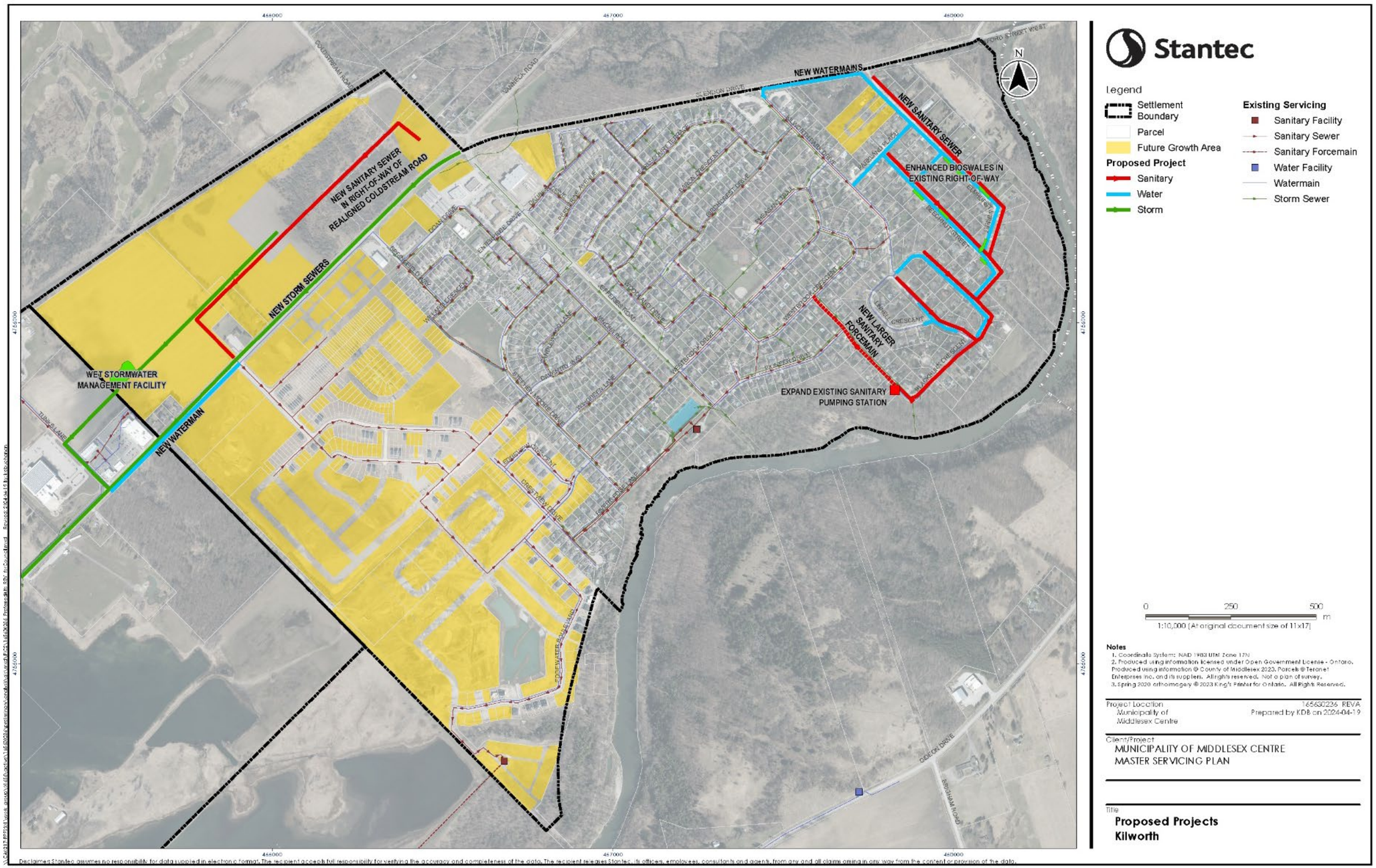

Figure 6: Kilworth Proposed Projects

4.5 KOMOKA

Komoka is situated west of Kilworth, near Glendon Drive and Komoka Road. The Official Plan designates Komoka as an Urban Settlement Area.

4.5.1 Water

4.5.1.1 Existing Water Services

As noted in Section 4.4.1.1, water from the LHPWSS is supplied to the Komoka Reservoir by the Komoka-Mt. Brydges booster pumping station. Water is then distributed into the network at the Komoka booster pumping station, and stored in the Komoka elevated tank.

As part of the 2010 Master Servicing Plan, a hydraulic model of the Komoka-Kilworth water distribution system was developed. A separate model for the Delaware water distribution system was merged with this model. As part of this 2023 SMP, this model is updated and used to assess current and future infrastructure needs in Komoka-Kilworth-Delaware.

4.5.1.2 Water System Constraints

Issues and opportunities identified in the water system are summarized as follows:

- Growth in Komoka, Kilworth and Delaware will require additional water supply.
- Growth in Komoka, Kilworth and Delaware will require additional water storage.
- Growth in Komoka, Kilworth and Delaware will require additional water pumping capacity.
- Growth in Kilworth will create low water pressure issues in some areas of Kilworth in the future.

4.5.1.3 Alternative Solutions

Alternative solutions were developed to resolve water related deficiencies within the existing system, and are outlined below. Recommended Alternative Solutions were selected. Additional information regarding the selection process is available in Appendix B.

Komoka-Kilworth-Delaware – Water Supply Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Expand supply capacity from LHWPSS
- Alt 3: Service growth from private wells
- Alt 4: Service growth from new communal well system(s)

Komoka-Kilworth-Delaware Recommended Water Supply Alternative Solution

The recommended water supply alternative solution for Komoka-Kilworth-Delaware is Alt 2: Expand supply capacity from LHWPSS. Under this alternative solution, existing and future demands in Komoka, Kilworth and Delaware are supplied by the LHWPSS, via the Komoka Reservoir & BPS. Future water demands in Komoka, Kilworth and Delaware would be considered in LHWPSS master-planning initiatives and future infrastructure sizing. This solution would make optimized use of the existing infrastructure to supply growth.

Komoka-Kilworth-Delaware – Storage Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Expand existing storage (in-ground reservoir or ET)
- Alt 3: Build new storage (reservoir or ET)

Komoka-Kilworth-Delaware – Recommended Storage Alternative Solution

The recommended pumping alternative solution for Komoka-Kilworth-Delaware is Alt 2: Expand existing storage. Under this alternative solution, the additional storage capacity needed to supply growth in Komoka-Kilworth-Delaware would be provided at the existing storage facilities, i.e., the in-ground reservoir at the Komoka BPS and/or the Komoka ET. The expansion of the Delaware Standpipe is mainly considered with respect to Delaware's storage needs. Storage cells would be added at the Komoka Reservoir, or the existing Komoka ET replaced in its current location. In the case of adding storage cells to an in-ground reservoir, this solution would make optimized use of existing infrastructure and available land, and would be efficient in terms of operational costs since only the existing facilities would be operated. Hydraulically, it was determined that replacing the aging Komoka ET would be beneficial to improve pressure issues in Kilworth. The current Komoka ET site remains the recommended location for the new ET, based on topography.

Komoka-Kilworth-Delaware – Pumping Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Expand Komoka BPS & Komoka IPS
- Alt 3: Build new BPS

Komoka-Kilworth – Recommended Pumping Alternative Solution

The recommended pumping alternative solution for Komoka-Kilworth-Delaware is Alt 2: Expand Komoka BPS & Komoka IPS. Under this alternative solution, the additional pumping capacity needed to supply growth in Komoka-Kilworth-Delaware would be provided at the existing Komoka BPS and Komoka IPS. The expansion of the Delaware BPS is mainly considered with respect to Delaware's pumping needs. Existing pumps would be replaced and/or new pumps would be added, and the existing PS superstructure would be expanded as needed. This solution would make optimized use of existing

infrastructure and land available, and would be efficient in terms of operational costs since only a single facility would be operated. The need for a new BPS was not identified based on hydraulics.

Komoka-Kilworth - Pressure Deficiencies & Supply Reliability in Kilworth Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Upgrade existing watermains
- Alt 3: Provide new storage within Kilworth
- Alt 4: Upgrade existing watermains, storage and pumping in Komoka

Komoka-Kilworth (Pressure Deficiencies in Kilworth) – Recommended Alternative Solution

The recommended alternative solution is Alt 4: Upgrade existing watermains, storage and pumping in Komoka. Under this alternative solution, addressing pressure deficiencies in Kilworth would be achieved by a combination of existing upstream infrastructure upgrades in Komoka. The existing Komoka ET and Komoka-Kilworth IPS would be upgraded, which would also contribute to meeting the overall storage and pumping needs for the settlements. Given the Komoka ET upgrades (and potential to increase operating pressures), watermain upgrades would be needed to accommodate the increased flows. The extent of the watermain upgrades, however, would be less than under Alternative Solution 2.

4.5.2 Wastewater

4.5.2.1 Existing Wastewater Services

The present settlement area is serviced by the Komoka WWTP. Komoka's wastewater infrastructure 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.

4.5.2.2 Wastewater System Constraints

Issues and opportunities identified in the wastewater system are summarized as follows:

- Growth in Komoka, Kilworth and Delaware will require additional wastewater treatment and biosolids management.

- Growth in Komoka will require the extension of services to several new development areas. Consideration of the extension of services may require the construction of new pumping stations. Where this is considered, the consolidation of existing pumping facilities should be considered.

4.5.2.3 Alternative Solutions

Alternative solutions were developed to resolve wastewater related deficiencies within the existing system, and are outlined below. Recommended Alternative Solutions were selected. Additional information regarding the selection process is available in Appendix C.

Treatment

Growth in Komoka/Kilworth will require an additional treatment capacity of 1,800 m3/d. Long list alternatives considered are as follows:

- Alt 1 - Do Nothing
- Alt 2 – Expand existing Komoka WWTP
- Alt 3 – Convey flows to London

Recommended Alternative Solution

The preferred alternative is Alternative 2, expand the existing Komoka WWTP. Komoka has a functioning wastewater treatment facility which has the capacity to expand to treat the future growth flows.

Biosolids Management

Planned growth in Komoka / Kilworth will require additional biosolids capacity of 600 m3/d. Long list alternatives considered are as follows:

- Alt 1 - Do Nothing.
- Alt 2 – Expand existing liquid biosolids storage facilities
- Alt 3 – Provide biosolids management by dewatering with disposal by landfilling

Recommended Alternative Solution

Alternative 2, expand the existing liquid biosolids storage facility at the Komoka WWTP is the preferred alternative.

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.

4.5.3 Stormwater

4.5.3.1 Existing Stormwater Services

Runoff from the future West Komoka development area will generally travel as overland flow to Komoka Creek, which was classified as a sensitive coldwater fishery. A SWM strategy is required to treat the runoff from future development in accordance with the following SWM criteria:

- Provide Enhanced water quality control to remove 80% of TSS from stormwater runoff;
- Attenuate the peak discharges from all design events up to and including the 100-year storm to predevelopment conditions; and
- Incorporate temperature mitigation measures to reduce future potential for impacts to the Komoka Creek coldwater fishery.

The SWM criteria are subject to change following pre-consultation with UTRCA, municipality of Middlesex Centre, MECP and other stakeholders.

There is an opportunity to provide stormwater treatment to the runoff from both the future Glendon Drive improvements and existing development conveyed by Komoka Drain No. 2, which currently discharges untreated runoff to Komoka Creek.

The existing outlet for the western portion of the catchment is the existing Glendon Drive culvert, and the upstream topography is relatively flat. Using the Drainage Act to construct a new outlet to convey stormwater from the downstream side of the Glendon Drive culvert to Komoka Creek was considered. However, the UTRCA noted that this outlet strategy could exacerbate existing erosion concerns on the downstream properties. Key issues associated with West Komoka include:

- A SWM strategy is required to convey and treat the runoff from the proposed development area and proposed Glendon Drive Improvements.
- Future development has the potential to provide opportunities to treat runoff from Komoka Drain No. 2.
- The sensitivity of the cold-water species in Komoka Creek must be considered in SWM strategy.
- The municipal drains within the settlement area are recommended to be abandoned in accordance with the provisions of Section 84 of the Drainage Act. It is assumed that the drains within the settlement area will be abandoned during future development activities.

- The Middlesex Soils Survey suggests that the local soils are primarily comprised of Caledon and Plainfield fine sandy loams. Since the permeability of these soils tends to be high, SWM treatment using infiltration methods may be feasible in this area, provided that local groundwater levels are sufficiently low.
- This area is designated as Settlement Employment area in the Official Plan.

Under existing conditions, runoff from the future South Komoka development areas drain to the on-site private ponds and south to the Komoka Provincial Park Pond. It is understood that the previous land use of the study area was an aggregate pit / quarry. A SWM strategy is required to treat runoff from future development in accordance with the following SWM criteria:

- Provide Enhanced water quality control to remove 80% of TSS from stormwater; and
- Attenuate the peak discharges from all design events up to and including the 100-year storm to predevelopment rates

The SWM criteria are subject to change following pre-consultation with UTRCA, the municipality of Middlesex Centre, MECP and other stakeholders. Due to the presence of the PSW, it is anticipated that an Environmental Impact Study (EIS) will be required for the study area prior to development. For areas discharging to Komoka Park Provincial Park, a Provincial Parks and Conservation Reserves Class Environmental Assessment may be required.

Key issues associated with South Komoka include:

- A SWM strategy is required to convey and treat the runoff from the proposed development area and proposed.
- The south portion of the study area is designated as residential area in the Official Plan.
- The Middlesex Soils Survey suggests that the local soils are identified as not mapped, thus the soils are assumed to be similar to adjacent developments. The adjacent Edgewater Development suggests that the subsurface soils consist of sandy silt which correspond to hydrologic soil groups A to B (LDS, 2016). Since the permeability of these soils tends to be high, SWM treatment using infiltration methods may be feasible in this area, provided that local groundwater levels are sufficiently low.

4.5.3.2 Alternative Solutions

Alternative solutions were developed to resolve stormwater related deficiencies within the existing system, and are outlined below. Recommended Alternative Solutions were selected. Additional information regarding the selection process is available in Appendix D., and in the Middlesex Centre Settlement Area Stormwater Master Plan (2020), and Community Stormwater Master Plan Update (2023).

West Komoka

- Alternative 1 – Do Nothing
- Alternative 2 –SWM Wet Facilities – Control Runoff from Komoka Drain No. 2
- Alternative 3 –SWM Wet Facilities – Komoka Drain No. 2 Remains Untreated
- Alternative 4 – LID Controls and Dry End-of-Pipe Facilities

Recommended Alternative Solution

Alternative 3 – SWM Wet Facilities – Komoka Drain No. 2 Remains Untreated is the recommended alternative solution. The developments would be constructed with an urban / semi-urban cross-section and two end of pipe Wet SWM facilities. Under this alternative the east SWM Facility (1) will be located adjacent to, and outlet directly to, the Komoka Creek valley via an outfall. Runoff from Komoka Drain No. 2 will continue to drain directly to Komoka Creek. The west SWM Facility (2) will outlet to a proposed storm sewer located on Glendon Dr. and subsequently to Komoka Creek.

Salt management plans are required to reduce the possibility of road salt entering the proposed infiltration facilities to prevent groundwater contamination. The proposed dry SWM facilities ultimately outlet to Komoka Creek.

The preferred solution includes servicing the stormwater runoff from the proposed development and contributing lands with two SWM Wet Ponds. SWM Facility (1) would be located on the east side of Komoka Creek and SWM Facility (2) on the west.

South Komoka

- Alternative 1 – Do Nothing
- Alternative 2 – On-site LID Controls
- Alternative 3 – Wet SWM Facilities

Recommended Alternative Solution

Alternative 2 – On-site LID Controls is the preferred alternative for the South Komoka development area. The land use designation for this area is Residential. Under this alternative, the future development lands will be serviced primarily with on-site LID controls. The LID controls would provide all the necessary SWM control to achieve water quantity, water quantity, and potential water balance requirements. Should the development's require additional water quality control, upstream engineered controls such as oil-grit-separators or catchbasin can be integrated into the treatment train.

As water quantity will primarily be controlled via infiltration measures, a provisional outlet is recommended to be provided in the event of LID control fail and to accommodate runoff generated during infrequent storm events. Per the Community Stormwater Master Plan Update, there is potential to integrate the

future development provisional outlets to the proposed storm sewers as part of the Glendon Drive improvements and the proposed storm sewer outlet to the Thames River.

4.5.3.3 Middlesex Centre Settlement Area Stormwater Master Plan Recommended Solutions

Recommended Solutions were identified in the Middlesex Centre Settlement Area Stormwater Master Plan (2020), and Community Stormwater Master Plan Update and are summarized below.

Komoka Drain No. 1 Recommended Alternative Solution
Pond Location with Komoka Road Outlet

The recommended solution for the Komoka Drain No. 1 is outlined below:

- Construct a storm sewer along Glendon Drive
- Install a stormwater management pond at Location 1
- Construct a storm sewer on Komoka Road from stormwater management pond to outfall to the Thames River
- Construct a new outfall at the Thames River.

Komoka Drain No. 3 Recommended Alternative Solution
Service Only Proposed Development

A proposed stormwater management facility located on the north side of Oxbow Drive and east of the CN railway line will provide all necessary stormwater treatment to the runoff from the proposed development located west of Komoka Road. Runoff from more frequent storm events will be attenuated in the facility and discharged to Komoka Drain No. 3, based on the available municipal drain capacity. Runoff from severe storm events may be discharged to the existing overland flow route that conveys surface flows to the downstream CP Rail culvert.

West Komoka Development Area
Service Only Proposed Development

The future land use identified in the Official Plan in this catchment area is Settlement Employment. Runoff from this future development is treated by two proposed SWM facilities.

SWM 1, located west of Komoka Creek, provides both water quality treatment and peak flow control to the proposed development runoff. The available soils information and the lack of a defined channel downstream of the culvert suggest that the site soils are extremely permeable. Consequently, SWM 1 will be designed primarily as an infiltration facility, with overflows directed to a proposed piped outlet that conveys them eastward to Komoka Creek. Additionally, future developments within the proposed SWM 1 service area should be designed with on-site infiltration measures to retain the runoff from small frequent storm events and infiltrate the captured runoff over a larger area.

SWM 2, located west of Komoka Creek, provides both water quality treatment and peak flow control to the proposed development runoff. The proposed pond will be designed as a dry facility. Since Komoka Creek supports a coldwater fishery, the proposed facility will mitigate potential temperature impacts by discharging the water quality control volume via infiltration. Runoff from more significant storm events will be attenuated in the facility and discharged to Komoka Creek via a proposed pipe outlet

Northeast Komoka Development Area
Two SWM Facilities

Runoff from future development in the Northeast Komoka Development Area will be treated by two proposed SWM facilities. Stormwater from the eastern portion of the catchment is treated by SWM 1, which provides water quality treatment and peak flow control prior to discharging to Oxbow Creek. The proposed pond will be designed as a dry facility to mitigate potential temperature impacts on Oxbow Creek. Pretreatment will be provided upstream of the facility to verify that the proposed SWM measures provide Enhanced Protection Level water quality treatment.

The western portion of this catchment is a former gravel pit that currently drains exclusively via infiltration and evaporation. Runoff from future development in this area will be treated by SWM 2, which will detain all runoff from the future residential development and release it via infiltration, similar to existing conditions. Pretreatment will be required to remove suspended sediment from the post-development runoff prior to discharging to SWM 2.

4.5.4 Summary

The following table summarizes the recommended solutions established for each settlement. The proposed projects are displayed in Figure 7.

Table 7: Summary of Komoka Recommended Alternative Solutions

Servicing Type	Issues / Project	Recommended Alternative Solution	MCEA Project Schedule
Water	Increase in water supply in Komoka-Kilworth-Delaware needed with growth	Expand supply capacity from LHWPSS: Extend the existing water distribution system to service employment development lands southwest of Komoka, along Glendon Dr, with 1.8 km of 200 mm diameter watermain (extend existing watermain to Amiens Rd).	A+
Water	Increase in storage capacity in Komoka-Kilworth needed with growth	Expand existing storage (reservoir or ET): - Expand the existing at-grade storage reservoir at the Komoka BPS; add a total volume of 3,334 m3 when combined with the Komoka ET replacement - Decommission the existing Komoka ET and replace with a higher and larger ET; add a total volume of 3,334 m3 when combined with the Komoka BPS reservoir expansion	B
Water	Increase in pumping capacity in Komoka-Kilworth needed with growth	Expand Komoka BPS & Komoka IPS: - Add +58.9 L/s of pumping capacity at 34.3 m TDH to the existing Komoka BPS. This upgrade can be accommodated within the existing Komoka BPS building. - Upgrade the Komoka IPS (increase rated capacity to 90 L/s at 45 m TDH). A new (larger) PS building may be required to accommodate this upgrade.	B
Water	Address future pressure deficiencies and provide supply redundancy in Kilworth	Upgrade existing watermains, storage and pumping in Komoka - Twin existing watermain on Queen St (from Oxbow Dr to Railway Ave) and on Railway Ave (from Queen St to Tunks Ln) with 1.1 km of 300 mm diameter watermain. - Twin the existing watermain on Glendon Dr from Tunks Ln to Crestview Dr, to increase reliability of supply to Kilworth.	A+

Servicing Type	Issues / Project	Recommended Alternative Solution	MCEA Project Schedule
Wastewater	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 m3	C
Wastewater	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 m3	C
Wastewater	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 m3	C
Wastewater	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.	A+
Wastewater	Upgrade sanitary sewer on Komoka Road	Gravity sewer on Komoka road from pumping station to Huron Ave.	A+
Wastewater	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.	B
Wastewater	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)	A+
Stormwater	SWM Wet Facilities – Komoka Drain No. 2 Remains Untreated	SWM Facility (1) would be located on the east side of Komoka Creek and SWM Facility (2) on the west. SWM Facility 2 will collect runoff from the proposed development west of Komoka Creek and discharge to a proposed storm sewer within the Glendon Drive right-of-way and outlet to Komoka Creek. SWM Facility (1) will collect runoff from the proposed development east of Komoka Creek. SWM Facility (1) will outlet to Komoka Creek through an outfall.	A

Servicing Type	Issues / Project	Recommended Alternative Solution	MCEA Project Schedule
Stormwater	On-site LID Controls	LID features such as bio-swales, grassed swales, vegetated buffer strips and enhanced grass swales can be incorporated within the road right-of-way. Infiltration measures such as infiltration chamber systems, lot-level infiltration galleries, and porous pavements could provide additional water quality and water quantity benefits while also contributing to groundwater recharge. Engineered pre-treatment measures such as oil-grit-separators or catchbasin inserts provide pre-treatment for the LID features and are recommended for the development. A provisional outlet is recommended to be provided for water quantity controls in the event of LID control failure and to accommodate runoff generated during infrequent storm events	A
Stormwater	New storm sewer	Construct a storm sewer along Glendon Drive	A/A+ Completed as part of the 2020 Master Plan
Stormwater	Install SWM Pond	Install a stormwater management pond at Location 1	B Completed as part of the 2020 Master Plan

Servicing Type	Issues / Project	Recommended Alternative Solution	MCEA Project Schedule
Stormwater	New storm sewer	Construct a storm sewer on Komoka Road from stormwater management pond to outfall to the Thames River	A/A+ Completed as part of the 2020 Master Plan
Stormwater	New outfall	Construct a new outfall at the Thames River.	B Completed as part of the 2020 Master Plan
Stormwater	Service only proposed development	Stormwater management facility on the north side of Oxbow Drive and east of the CN Railway to provide stormwater treatment from proposed development west of Komoka Road.	A Completed as part of the 2020 Master Plan
Stormwater	Service only proposed development	SWM 1, located west of Komoka Creek, provides both water quality treatment and peak flow control to the proposed development runoff. SWM 2, located west of Komoka Creek, provides both water quality treatment and peak flow control to the proposed development runoff.	A Completed as part of the 2020 Master Plan
Stormwater	Two SWM Facilities	Runoff from future development in the Northeast Komoka Development Area treated by two SWM facilities. Stormwater from eastern portion is treated by dry facility SWM 1, and discharging to Oxbow Creek. Former gravel pit area runoff treated by SWM 2, which will detain runoff and release via infiltration.	A Completed as part of the 2020 Master Plan

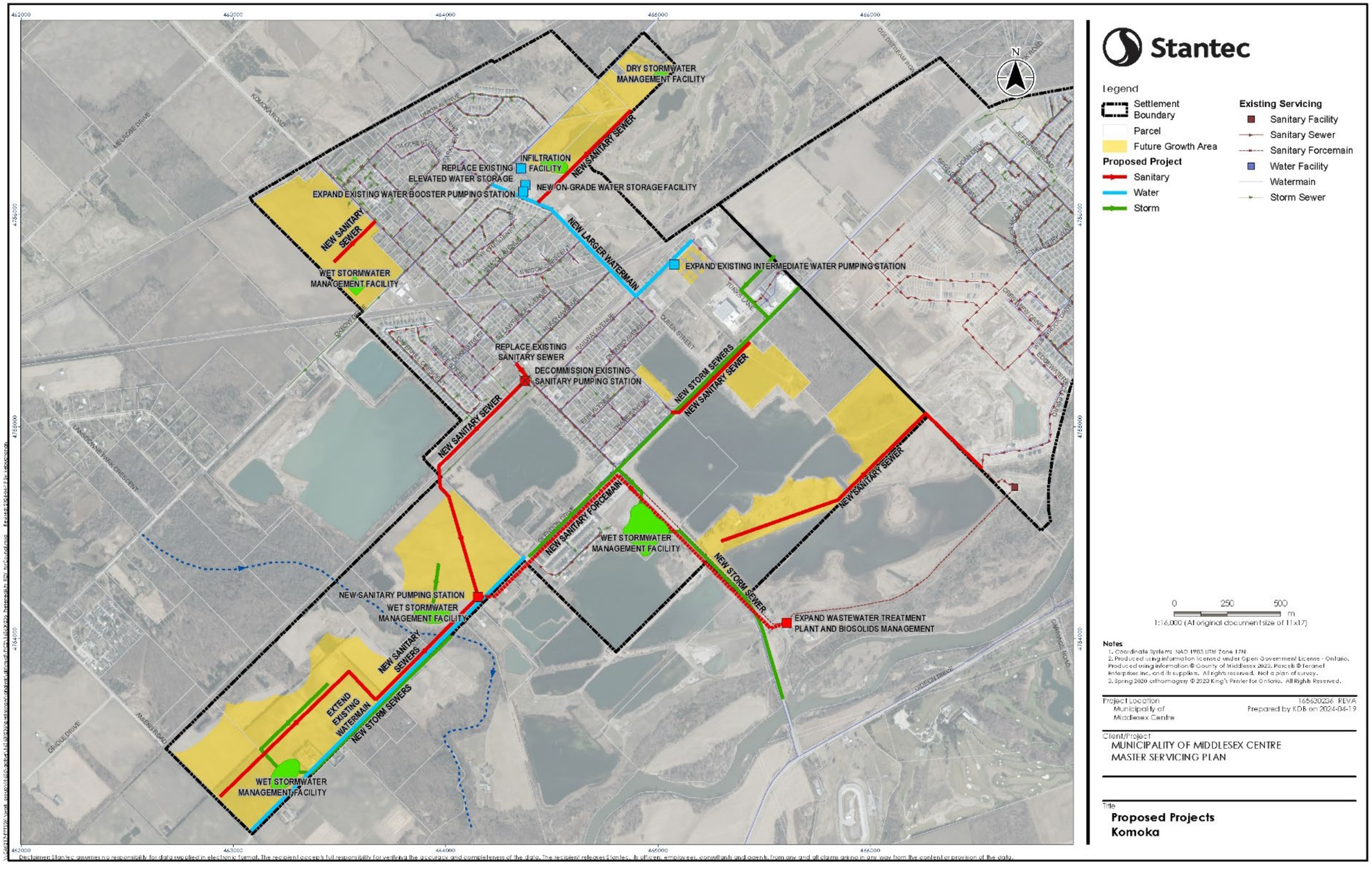

Figure 7: Komoka Proposed Projects

4.6 HAMLET AREAS

4.6.1 Ballymote

Ballymote is situated northeast of the City of London, near Highbury Avenue North and Medway Road. The Official Plan designates Ballymote as a Hamlet. Some growth is anticipated within the current settlement boundary although this growth potential is limited.

4.6.1.1 Water

Existing Water Services

Ballymote receives water from the City of London through a connection into a 300 mm diameter watermain.

Alternative Solutions

Water Supply Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Expand City of London water service agreement area
- Alt 3: Expand supply capacity from LHWPSS
- Alt 4: Service growth from private wells
- Alt 5: Service growth from new communal well system(s)

Recommended Water Supply Alternative Solution

The recommended water supply alternative solution for Ballymote is Alt 2: Expand City of London water service agreement area. Under this alternative solution, existing supply infrastructure from the City of London would be maintained, however, the boundaries of the water service area as defined in the agreement with the City would be expanded as needed based on future growth areas. This solution would make optimized use of the existing infrastructure to supply growth.

4.6.1.2 Wastewater

Existing Wastewater Services

Ballymote is currently serviced by individual private septic systems.

Recommended Wastewater Projects

Ballymote has a small population and limited potential growth. Accordingly, providing communal sanitary collection and treatment is not considered cost effective and no changes are proposed to the current method of sanitary servicing.

4.6.1.3 Stormwater

Existing Stormwater Services

Future development within this Settlement Area will likely be limited to a few single-family residential lots fronting on the existing Highbury Avenue and Medway Road rights-of-way. The most significant drainage concerns are that:

- The existing Ballymote East Drain does not have sufficient capacity to provide a sufficient level of service to both existing and future development; and
- Portions of the Highbury Armitage Drain bisect the future development area located on the western side of the Ballymote Settlement Area.

Recommended Stormwater Projects

Recommended Solutions were identified in the Middlesex Centre Settlement Area Stormwater Master Plan (2020), and are summarized below.

On-Site SWM Controls

Stormwater treatment is provided to the runoff from all proposed development in the Ballymote Settlement Area by proposed on-site SWM controls that limit the post-development peak discharges to pre-development magnitudes. On single family residential properties, the proposed lot level controls should be located in the front yards to reduce the risk of future home improvements such as patios, decks, and pools interfering with their operation. Construction of the proposed on-site SWM controls will be the responsibility of the development proponents.

4.6.1.4 Summary

The following table summarizes the recommended solutions established for each settlement.

Table 8: Summary of Ballymote Recommended Alternative Solutions

Servicing Type	Issues / Project	Recommended Alternative Solution	MCEA Project Schedule
Water	Increase in water supply needed with growth	Expand City of London water service agreement area	
Stormwater	On-Site SWM Controls	SWM treatment to limit the post-development peak discharges. Implement on single-family residential properties.	MCEA Project Schedule Not Applicable Completed as part of the 2020 Master Plan

4.6.2 Denfield

Denfield is situated northwest of the City of London, near Denfield Road and 16th Mile Road. The Official Plan designates Denfield as a Hamlet. Some growth is anticipated within the current settlement boundary although this growth potential is limited.

4.6.2.1 Water

Existing Water Services

Denfield currently receives water via a tapped connection to the LHPWSS's 1200 mm diameter transmission main. Water is stored in an on-ground storage tank, and boosted into the distribution system at the Denfield booster pumping station.

Alternative Solutions

Water Supply Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Expand supply capacity from LHWPSS
- Alt 3: Service growth from private wells
- Alt 4: Service growth from new communal well system(s)

Recommended Water Supply Alternative Solution

The recommended water supply alternative solution for Denfield is Alt 2: Expand supply capacity from LHWPSS. Under this alternative solution, existing and future demands in Denfield are supplied by the LHWPSS, via the Denfield BPS & Rechlorination Facility. Future water demands in Denfield would be considered in LHWPSS master-planning initiatives and future infrastructure sizing. This solution would make optimized use of the existing infrastructure to supply growth.

4.6.2.2 Wastewater

Existing Wastewater Services

Denfield is currently serviced by individual private septic systems.

Recommended Wastewater Projects

Denfield has a small population and limited potential growth. Accordingly, providing communal sanitary collection and treatment is not considered cost effective and no changes are proposed to the current method of sanitary servicing.

4.6.2.3 Stormwater

Existing Stormwater Services

Drainage servicing on Denfield Road is provided by existing roadside ditches and a shallow local storm sewer. Two outlets discharge the runoff from Brookfield Street to the Stanley Creek Drainage Works/Nairn Creek. Flooding noted by municipal staff at the ditch inlet catchbasin that conveys stormwater to the northern outlet is likely caused by vegetation growing in the channel at the downstream headwall. The existing storm sewers that drain to the southern Brookfield Street outlet are not designed in accordance with the current MOMC standards. An accepted SWM strategy has been prepared by the developer's engineer for future single-family residential development on Denfield Road.

Recommended Stormwater Projects

Channel maintenance should be performed on the outlet channel from the Brookfield Street storm sewer to reduce the possibility of flooding and the Brookfield Street ditch inlet catchbasion.

4.6.2.4 Summary

The following table summarizes the recommended solutions established for each settlement.

Table 9: Summary of Denfield Recommended Alternative Solutions

Servicing Type	Issues / Project	Recommended Alternative Solution	MCEA Project Schedule
Water	Increase in water supply needed with growth	Expand supply capacity from LHWPSS	Not Applicable

4.6.3 Birr

Birr is situated north of the City of London, near Richmond Street and 13 Mile Road. The Official Plan designates Birr as a Hamlet. Some growth is anticipated within the current settlement boundary although this growth potential is limited.

4.6.3.1 Water

Existing Water Services

Birr is serviced by a combination of private wells and a municipal well. the municipal well services 18 lots along Gwendolyn Street. This system has capacity only to service this area and is not intended to be expanded. The remaining households are serviced by private wells.

Alternative Solutions

Water Supply Alternative Solutions

- Alt 1: Do Nothing
- Alt 2: Connect to LHWPSS
- Alt 3: Service growth from private wells or a new communal well system

Recommended Water Supply Alternative Solution

The recommended water supply alternative solution for Birr is Alt 3: Service growth from private wells or a new communal well system. Under this alternative solution, private wells would be implemented in the new growth area within Birr. Should multiple properties be developed on that parcel, each property would be supplied by an individual well, or a new communal well system would be implemented. Since this area is not adjacent to the existing communal well system within Birr, this could be a viable solution to allow development to proceed. Other adjacent existing properties within Birr are also already supplied by private wells, and could be serviced by a new communal well system, should there be interest. Whether individual wells or a communal well system is to be implemented will depend on the type of development planned on this parcel (i.e., single property vs multiple properties), and should be reviewed once more information on the planned development is known.

4.6.3.2 Wastewater

Birr is currently serviced by individual private septic systems.

Recommended Wastewater Projects

Birr has a small population and limited potential growth. Accordingly, providing communal sanitary collection and treatment is not considered cost effective and no changes are proposed to the current method of sanitary servicing.

4.6.3.3 Stormwater

Existing Stormwater Services

Minor flows from most of the Birr Settlement Area are collected by an existing storm sewer network that discharges to Medway Creek. The existing storm sewers cross private property south of the Birr Settlement Area. Major flows are generally conveyed southward by the existing rights-of-way. However, significant temporary surface ponding may occur at the southern limits of Gwendolyn Street and Salisbury Drive, as there are no significant overland flow routes to convey surface water during severe storm events that exceed the minor system capacity. The future development area located in the northwest portion of the Settlement Area is currently active agricultural land. Runoff from this area is conveyed westward by the 13 Mile Road roadside ditch to the Bilyea-Corsaut Municipal Drain.

Recommended Stormwater Projects

The Municipality should complete periodic inspection of all catchbasins located at low points, particularly during autumn, to verify that grates are free of debris. Runoff from the future development area located north of Thirteen Mile Road will be controlled by on-site SWM controls in accordance with the following criteria:

- Provide Enhanced Protection Level water quality control to remove 80% of Total Suspended Solids (TSS) from stormwater; and
- Attenuate the peak discharges from all design events up to and including the 100-year storm to predevelopment magnitudes.

The existing Salisbury Drive storm sewer should be considered as a minor system outlet for the proposed development, provided peak discharges can be attenuated to the available storm sewer capacity.

4.6.3.4 Summary

No changes are proposed to the existing and future servicing of Birr.

4.6.4 Bryanston

Bryanston is situated northeast of the City of London, near Highbury Avenue North and 12 Mile Road. The Official Plan designates Bryanston as a Hamlet. Some growth is anticipated within the current settlement boundary although this growth potential is limited.

4.6.4.1 Water

Existing Water Services

Bryanston has no municipal water infrastructure. Water demand is met through individual private wells and/or treatment systems.

Alternative Solutions

Water Supply Alternative Solutions

- STL-SUP-1: Do Nothing
- STL-SUP-2: Expand supply capacity from LHWPSS
- STL-SUP-3: Service growth from private wells or new communal well systems

Recommended Water Supply Alternative Solution

The recommended water supply alternative solution for Bryanston is Alt 3: Service growth from private wells or new communal well system. Under this alternative solution, private wells would be implemented in each new growth area within each small settlement. Should multiple properties be developed in those areas, each property would be supplied by an individual well, or a new communal well system would be

implemented. Since existing properties in these small settlements are currently serviced by private wells only, this could be a viable solution to allow development to proceed. Other adjacent existing properties within each settlement already supplied by private wells could be serviced by the new communal well systems, should there be interest. Whether individual wells or a communal well system is to be implemented will depend on the type of development planned in each growth area (i.e., single property vs multiple properties), and should be reviewed once more information on the planned developments is known.

4.6.4.2 Wastewater

Existing Wastewater Services

Bryanston is currently serviced by individual private septic systems.

Recommended Wastewater Projects

Bryanston has a small population and limited potential growth. Accordingly, providing communal sanitary collection and treatment is not considered cost effective and no changes are proposed to the current method of sanitary servicing.

4.6.4.3 Stormwater

Existing Stormwater Services

Drainage within the Bryanston Settlement Area is provided by roadside ditches that convey stormwater to the Smith Drain, Williams Drain, Bryanston Drain, and Pattyn Drainage Works. Surface ponding was observed on the west side of Highbury Avenue south of 12 Mile Road during the April 18, 2018 site visit. Furthermore, the perched Highbury Avenue culvert located approximately 200 m north of Plover Mills Road causes surface ponding on the east side of the road.

Recommended Stormwater Projects

The grades of future development on the west side of Highbury Avenue will need to be sufficiently high to mitigate the risk of flooding caused by local ponding. However, care will be required to verify that the proposed grading does not negatively affect drainage on neighboring properties. The Municipality should work with Middlesex County to develop a plan to address the existing roadside ponding caused by the county-owned culverts.

4.6.4.4 Summary

No changes are proposed for the existing and future servicing for Bryanston.

4.6.5 Lobo

Lobo is situated northwest of the City of London, near Egremont Drive and Nairn Road. The Official Plan designates Lobo as a Hamlet. There is no identified growth potential in Lobo, however, some redevelopment of properties in the settlement boundary may occur.

4.6.5.1 Water

Existing Water Services

Lobo has no municipal water infrastructure. Water demand is met through individual private wells and/or treatment systems.

Alternative Solutions

No changes to the current water servicing are proposed.

4.6.5.2 Wastewater

Existing Wastewater Services

Lobo is currently serviced by individual private septic systems.

Recommended Wastewater Projects

Lobo has a small population and limited potential growth. Accordingly, providing communal sanitary collection and treatment is not considered cost effective and no changes are proposed to the current method of sanitary servicing.

4.6.5.3 Stormwater

Existing Stormwater Services

Drainage within the Lobo Settlement Area is provided by roadside ditches that convey surface flows to the upstream branches of the McKellar Drain, at the headwaters of Gold Creek. The portions of the drain within the Settlement Area are closed.

4.6.5.4 Summary

No changes are proposed for the existing and future servicing for Lobo.

4.6.6 Melrose

Melrose is situated northwest of the City of London, near Egremont Drive and Vanneck Road. The Official Plan designates Melrose as a Hamlet. There is no identified growth potential in Lobo, however, some redevelopment of properties in the settlement boundary may occur.

4.6.6.1 Water

Existing Water Services

Water in Melrose is supplied by private well systems. The Wynfield Estates subdivision, situated in Melrose, is serviced by two municipal wells. This well-based system was note designed to be expanded. As a result of declining system conditions, high operating costs, increased lifecycle cost and replacement

estimates, and ongoing water quality, regulatory and policy impacts, a Municipal Class EA was conducted to identify a long-term water servicing solution. the Melrose Water Supply Class EA (Stantec, 2017) identified an interconnection to the LHWPSS transmission as the preferred servicing solutions, with retrofits to the water treatment plant to convert the facility to a pumping station.

4.6.6.2 Wastewater

Existing Wastewater Services

Melrose is currently serviced by individual private septic systems.

Recommended Wastewater Projects

Melrose has a small population and limited potential growth. Accordingly, providing communal sanitary collection and treatment is not considered cost effective and no changes are proposed to the current method of sanitary servicing.

4.6.6.3 Stormwater

Existing Stormwater Services

Existing municipal drains within the Melrose Settlement Area collect and convey runoff from rear yards across neighboring properties to the local outfalls. The portions of the municipal drains within the urban area present the following challenges: • The municipal drain alignments make access for future maintenance problematic, as the drains cross multiple private properties. Obstructions such as fences and trees may need to be removed;

- While the drains are located within working easements, landowners may be unaware of the easement limits and could construct obstructions on top of the municipal drains that may damage the drainage system or prevent access for future maintenance. The available aerial photography suggests that portions of the municipal drains may be located under existing structures; and
- Damage to the municipal drains could affect all upstream properties. The Municipality noted that there have been previous rear yard drainage problems caused by the poor condition of the pipes located in the rear yards.

Runoff from the Wynfield Subdivision located northeast of the Egremont Road/Vanneck Road intersection is collected and conveyed by local storm sewers that discharge to the D. Campbell Drainage Works. The existing storm sewers include several rear yard catchbasins to collect runoff from external drainage areas. Significant portions of the D. Campbell Drainage Works are located within single family residential lots, which may limit access for future maintenance.

An existing dry SWM pond provides peak flow control to the runoff from the existing Wynfield Subdivision. Based on the information presented in the available excerpts from the Wynfield Subdivision Design Brief, the existing pond is designed to attenuate the post-development 5-year peak discharge to the 2-year predevelopment peak discharge. The available topographic information suggests that overflows from the

pond are conveyed across downstream properties as shallow surface flow. Runoff from properties that front on Vanneck Road and Egremont Road is generally conveyed to the downstream receivers by the existing roadside ditches.

Middlesex Centre Settlement Area Stormwater Master Plan Recommended Solutions *Relocate Drainage System*

It is recommended that the existing municipal drains located in the residential rear yards be abandoned and replaced with rear yard catchbasins with leads that connect to the local storm sewers located in the municipal rights-of-way. The proposed leads will be located in proposed drainage easements offset from existing property lines to mitigate the risk of damage caused by future home improvements. Easements may be registered on title. Where feasible, trenchless installation should be considered to reduce construction disruption on affected homeowners.

4.6.6.4 Summary

The following table summarizes the recommended solutions established for each settlement.

Table 10: Summary of Melrose Recommended Alternative Solutions

Servicing Type	Issues / Project	Recommended Alternative Solution	MCEA Project Schedule
Stormwater	Relocate Drainage System	Existing municipal drains in residential rear yards should be abandoned and replaced with rear yard catchbasins that lead to connect to the local storm sewers in the municipal rights-of-way.	B Completed as part of the 2020 Master Plan

4.6.7 Poplar Hill – Coldstream

Poplar Hill-Coldstream is situated northwest of the City of London, along Ilderton Road, between Poplar Hill Road and Coldstream Road. The Official Plan designates Poplar Hill-Coldstream as a Hamlet. Some growth is anticipated within the current settlement boundary although this growth potential is limited.

4.6.7.1 Water

Existing Water Services

Both Poplar Hill and Coldstream have no municipal water infrastructure. Water demand is met through individual private wells and/or treatment systems.

Alternative Solutions

No changes to the current water servicing are proposed.

4.6.7.2 Wastewater

Existing Wastewater Services

Poplar Hill-Coldstream is currently serviced by individual private septic systems.

Recommended Wastewater Projects

Poplar Hill-Coldstream has a small population and limited potential growth. Accordingly, providing communal sanitary collection and treatment is not considered cost effective and no changes are proposed to the current method of sanitary servicing.

4.6.7.3 Stormwater

Existing Stormwater Services

The Sydenham River runs through the Poplar Hill/Coldstream Settlement Area and is the ultimate stormwater receiver. The Campbell Crescent/Sydenham Drive subdivision and Ashely Lane are the only portions of the Settlement Area that are serviced by storm sewers. The northwest portion of Poplar Hill is serviced by the Poplar Hill Villa Drain and the Luyten Barclay Drain. Runoff from the rest of the settlement area is conveyed as surface flow by shallow roadside ditches. Site visit observations suggest that significant temporary surface ponding may occur at the low point on Ashley Lane and major flows from Currie Lane are conveyed across downstream private properties. Furthermore, temporary surface ponding on the south side of Ilderton Road west of Valleyview Elementary School has been observed by residents. Several parcels within the Settlement Area may be developed in the future. These lands are currently agricultural and runoff is conveyed to the Sydenham River as shallow surface flow.

Recommended Stormwater Projects

The Municipality should secure a drainage easement on the property that conveys major flows from Currie Court to protect the flow path and prevent construction of structures that could be damaged by surface flows. Runoff from the future development areas should be controlled by on-site SWM controls in accordance with the following criteria:

- Provide Enhanced Protection Level water quality control to remove 80% of Total Suspended Solids (TSS) from stormwater; and
- Attenuate the peak discharges from all design events up to and including the 100-year storm to predevelopment magnitudes. Local surface ponding at Valleyview Elementary School should be addressed by installing a culvert under Ilderton Road that discharges to the Coldstream reservoir.

4.6.7.4 Summary

No changes are proposed to the existing and future servicing of Poplar Hill - Coldstream.

5.0 SOLID WASTE ASSESSMENT

The following section provides a summary of the solid waste assessment for the SMP. More detailed information is contained in Appendix E.

EXISTING SERVICES

Middlesex Centre Public Works oversees the waste management services for the Municipality. The department's responsibilities and assets include:

- Recommending tax rates for Waste Management services to Council to pay for the collection and disposal of solid waste and to partially subsidize collection and processing of recyclables.
- Overseeing contractors for the automated collection system where solid waste and recyclables are picked up once a week with one pass by the same truck (co-collection).
- Owning two Enviro Depots located in the Municipality of Middlesex Centre, namely the Denfield Road Enviro Depo and the Longwoods Road Enviro Depot.
- Owning and sharing one tandem truck with Public Works for collection of bulky items.
- Owning 3 roll-off bins for use at enviro depots.

Bluewater Recycling Association (BRA)

BRA provides the following services to Middlesex Centre until contracts expire as required under the transition period:

- Co-collecting solid waste and recycling using an automated cart system for the Municipality as part of a collection fleet of 43 trucks (6 front end, 1 hook lift, 36 dual stream side load trucks).
- Collecting, processing and disposal of residential garbage, recyclable materials, organics, leaf and yard waste.
- Operating two Enviro depots.
- Working with Mars Environmental to provide front end and roll off bin service for waste and recyclables.
- Owning and Operating the Materials Recovery Facility (MRF) located in Huron Park.

BRA is responsible for providing solid waste management services to all residents in the municipalities that are members. The services provided by BRA include providing service to small businesses in Business Improvement Areas (BIAs) along residential collection routes, to municipal and regional facilities, and to schools (recycling collection only).

BRA does not own or operate any landfill site or transfer station.

5.1.2 Solid Waste and Recycling Collection

Middlesex Centre oversees an automated co-collection system where solid waste and recyclables are picked up once a week.

The Blue Box Program was launched in the mid-1980s as a partnership between industry, and provincial and municipal governments. Today nearly 99% of the Ontario population has access to recycling. The framework of the Waste Diversion Act financially supported the Blue Box program. The net costs of the program were previously shared on a 50/50 basis between producers whose packaging is collected in the program, and the municipalities that have a Blue Box Program (i.e., all municipalities with a population greater than 5,000, including Middlesex Centre). Currently, the Blue Box program in Ontario is shifting to a waste management approach where producers are responsible for the waste generated from their products and packaging. Further details on the transition are provided in Appendix E.

Additional information on the acceptable waste and recycling items (i.e., household hazardous waste, bulky appliances and furniture, yard waste, etc.) is provided in Appendix E.

5.2 WASTE GENERATION

5.2.1 Current Waste Generation

For households, the co-collection of municipal household waste and recyclables is carried out by the BRA. The overall waste generation volumes are slightly higher than other BRA municipalities, which can be attributed to the substantial urban commuter population in the community. Current diversion rates for the industrial, commercial and institutional (IC&I) sector are typically lower than the household sector, although this sector is responsible for approximately two thirds of the waste generated in Ontario per year. The type and numbers of wastes generated by the IC&I sector make this sector difficult to target and therefore it is the IC&I waste generators, rather than the product manufacturers who tend to pay directly for costs associated with waste diversion.

To determine the current waste generation rate, Stantec used the growth plan from the Growth Management Strategy in combination with household count provided by BRA which does underestimate total volumes since a portion of the waste collected at the two eco depots are not recorded in BRA's records.

Based on a summary of the records provided by BRA, the recycling has not increased since the elimination of the bag-tag program in 2015. This has resulted in an increase in the volume of waste slightly above the population growth rate. The most likely cause has been that it is easier for the customer to throw all waste into one bin rather than separate out the recyclable and compostable materials.

5.2.2 Future Waste Generation

Future waste generation is based, in large part, on projected future populations. This is combined with an estimate of kg/person per year of waste to calculate future waste quantities. Based on historical growth rates of waste volumes obtained from BRA, previous generation rates based on the 24-year historical average household growth rate for the Municipality, and the population growth assumptions from the Watson & Associates Growth Management Strategic Plan, February 2022, (Watson Report), the future waste generation rates were derived.

The household growth in the municipality from 1999 to 2022, obtained from the average growth rate, was 1.2%. The Watson Report for the Municipality of Middlesex Centre had a historic growth rate of 1.2% as well. The Watson report states the most likely growth scenario is the high growth scenario which predicts an average growth rate of 2.3% in population and 2.4% in employment growth. The 2.3% rate was used for predicting future waste volumes.

To further break down the waste generated by recycling, the BRA measured recycling rate was used. In 2021 was measured at 35%. With EPR coming into place in 2023, this value is very likely to increase. This assumption is consistent with literature expectations on the effects of implemented EPR. Institutes such as the Recycling Partnership for Circularity, reviewed jurisdictions worldwide that have implemented EPR confirmed that EPR programs have resulted in driving recycling rates up to as high as 75%. For the purposes of this technical memo, a more conservative estimate of 50% of the waste generated is assumed to be recycled from 2023 forward. This assumption should be verified in the next couple of years after the EPR initiative becomes more predictable as to its impact.

The residential population and the employment population growth estimates from the Watson Report were used along with the historical waste volumes obtained from BRA to produce a blended generation rate of 238 kg per person per year for all wastes. The generation rate is somewhat lower than what is typically is used to estimate generation rates, but the weight collected are substantiated by the actual BRA measurements.

The BRA waste numbers reported were actuals but did not include the volume generated by the Municipal run two Eco-Stations. To account for this volume, 5% was added to the 2021 total volume of 5,918,310 to obtain a new total volume estimate in 2021 of 6,209,115 with 35% of this being recycling. From this, the future waste growth numbers generated are summarized in Table 11.

Table 11: Future Waste Generation

	Residential Population Growth Rate	Employment Population Growth Rate	Total Population	Total Waste Collected (kg/yr)	Total Recycling (kg/yr)	Remaining Waste* (kg/yr)
2021	19,458	6600	26058	6,208,115	2,172,840	4,035,274
2026	21,577	7600	29177	6,951,192	3,475,596	3,475,596
2031	24,089	8700	32789	7,811,723	3,905,861	3,905,861
2036	27,075	9900	36975	8,809,004	4,404,502	4,404,502
2041	30,631	10900	41531	9,894,436	4,947,218	4,947,218
2046	34,875	11700	46575	11,096,129	5,548,065	5,548,065
* Includes all other waste, including composting, anerobic digestion, landfilling, etc.						
**Estimated at 5% of total volume						

How much of the waste generated by future populations will be destined for landfilling is, in part, based on future waste diversion programs and initiatives. With the introduction of governmental recycling and waste diversion programs the total amount of waste destined for landfilling will likely decrease, depending on the success of the program(s).

5.3 RECOMMENDED SOLID WASTE SOLUTIONS

The following are recommendations for the Municipality to consider implementing for solid waste solutions:

- Future predictions of waste volumes and diversion rates for the Municipality are best revisited in about 3-5 years once the transition has occurred. At the Municipality's convenience, regular assessments of the systems function could be completed.
- Continue with the status quo as the transition to EPR occurs and monitor changes. This includes continuing using the services offered by BRA.
- Evaluate using savings from the blue bin program to evaluate the effectiveness of a source separated organics program. It will be important to have either a compost or an anerobic digestor facility willing to enter into a long-term contract prior to implementing SSO. This could be accomplished by using a third-party.
- Continue to monitor both the landfill and biogas capacities that could be used and develop strategies to be able to effectively use these facilities.
- Continue to monitor the effect of new landfill standards in Ontario with respect to siting new facilities and/or expanding existing facilities. If these continue to be extremely difficult to achieve, consider sending some of the waste stream to other regions willing to accept the waste (i.e. United States).
- Determine the effectiveness of a waste transfer facility for multiple streams.

6.0 EXISTING CONDITIONS

6.1 NATURAL ENVIRONMENT

A Natural Heritage Assessment was completed for the areas proposed for infrastructure development. The study was conducted for the proposed infrastructure plus 120m, and included a desktop review of background data and field investigations to inventory the existing environment.

6.1.1 Background Information Sources

Background documents and information sources were consulted to obtain natural heritage designations for the study area. The following information sources were reviewed:

- Natural Heritage Information Centre (NHIC) (MNRF 2024a)
- Land Information Ontario (LIO) (MNRF 2024b)
- Middlesex Natural Heritage Systems Study (MNHSS) (Middlesex County 2014)
- Middlesex Centre Official Plan (Middlesex Centre 2023)
- Middlesex County Middlesex Maps (Middlesex County 2024)

Online natural heritage databases, wildlife atlases and SAR mapping were reviewed to identify flora and fauna records for the study area. Records of SAR and SOCC, occurrences of amphibians, reptiles, birds and mammals, Provincially Significant Wetlands (PSWs), Areas of Natural and Scientific Interest (ANSIs), and fish and fish habitat data were obtained from the following sources:

- Natural Heritage Information Centre (NHIC) (MNRF 2024a)
- Ontario GeoHub Land Information Ontario (LIO) (MNRF 2024b)
- Species at Risk in Ontario (SARO) List (MECP 2024)
- Species List on Schedule 1 of the Species at Risk Act (SARA) (Government of Canada 2024)
- Fisheries and Oceans Canada (DFO) Aquatic Species at Risk Map (DFO 2024)
- Ontario Reptile and Amphibian Atlas (ORAA) (Ontario Nature 2019)
- Ontario Breeding Bird Atlas (OBBA) (Cadman et al. 2007)
- Ontario Butterfly Atlas (OBA) (Toronto Entomologists' Association [TEA] 2024a)
- Ontario Moth Atlas (OMA) (TEA 2024b)
- eBird Online Database (eBird 2024)

- iNaturalist Online Observations (iNaturalist 2024)

Many of the above-listed resources do not provide the exact locations of a species occurrence, with accuracy ranging from 1-km² (e.g., NHIC) to 10-km² (wildlife atlases). As such they are used as an indicator of potential occurrence in the study area.

The study areas are in the Township of Middlesex Centre and are within Ecoregion 6 E (Ecodistrict 6E-1) and Ecoregion 7E (Ecodistrict 7E-2 and 7E-6). These Ecoregions are part of the Mixedwood Plains Ecozone. The westerly boundary for Ecoregion 6E is positioned through the town of Ilderton. The surrounding landscape of Ilderton is like the landscape described for Ecoregion 7E. Ecoregion 7E is dominated by agriculture (~90%). Natural areas such as deciduous forested woodlots occupy a small portion of the land. Ecoregion 7E has the most diverse flora and fauna in Canada which includes many of Ontario's SAR.

6.1.2 Existing Natural Heritage Features

Species of Conservation Concern

Species of Conservation Concern (SOCC) are those species that are provincially rare (S1-S3 ranked species), listed as special concern (SC) on the SARO list, or are listed as special concern, threatened, or endangered on Schedule 1 of the *Species at Risk Act, 2002*. While these species are considered rare or at risk, they are not protected under the *Endangered Species Act, 2007* (ESA). Species that are protected by the ESA are not SOCC; they are considered SAR. Additionally, bat species which are not S1-S3 but have been recently assessed as endangered by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) and COSSARO (Committee on the Status of Species at Risk in Ontario) have been included as SOCC.

Status rankings (S-ranks) for wildlife are based on the number of occurrences in Ontario and have the following meanings (OMNR 2000):

- S1: extremely rare; usually 5 or fewer occurrences in the province
- S2: very rare; usually between 5 and 20 occurrences in the province
- S3: rare to uncommon; usually between 20 and 100 occurrences in the province
- S4: common; usually more than 100 occurrences in the province
- S#B: breeding status rank
- S#N: Non-breeding status rank

SOCC identified in the background review as having potential to be present in each study area are provided in Appendix F. All the identified SOCC were carried forward to the habitat suitability assessment.

Species at Risk

SAR are those species that are listed as endangered (END) or threatened (THR) under the provincial ESA.

The ESA was created to protect SAR and their habitats. Endangered, threatened, and extirpated species listed on the SARO automatically receive legal protection from harm or harassment. The habitat of a given species is classified as either general habitat protection or regulated habitat protection (i.e., defined under regulation).

SAR identified in the background review as having potential to be present in each study area are provided in Appendix F. All the identified SAR were carried forward to the habitat suitability assessment.

6.1.2.2 Natural Heritage by Settlement Area

A summary of the natural heritage features identified in each Settlement Area is provided below. A full report including information about the existing natural environment is available in Appendix F.

Arva

The project area is adjacent to Wooded Areas associated with Medway Creek which are identified as Significant Woodland on the Middlesex Centre Official Plan Schedule B. There are no Provincially Significant Wetlands (PSWs) or Areas of Natural and Scientific Interest (ANSIs) in the Arva study area. The Arva study area is within the Upper Thames River Conservation Authority (UTRCA) jurisdiction.

A summary of the natural heritage features identified in Arva is provided below:

Natural Heritage Designations

- Significant Woodland associated with Medway Creek

Significant Wildlife Habitat

- Candidate: Bat Maternity Colonies
- Candidate: Turtle Wintering Areas
- Candidate: Bald Eagle and Osprey nesting, Foraging, and Perching Habitat
- Candidate: Amphibian Breeding Habitat (Woodland)
- Candidate: Habitat for Terrestrial Crayfish
- Candidate: Habitat for 17 SOCC

Species at Risk Habitat

- Candidate: Habitat for 12 SAR

Ilderton

A portion of the project area associated with the wastewater treatment (middle east side of the study area) plant overlays a Wooded Area identified as Significant Woodland. There are no PSWs or ANSIs in the Ilderton study area. The Ilderton study area is within the UTRCA and the St. Clair Region Conservation Authority (SCRCA) jurisdiction.

A summary of the natural heritage features identified in Ilderton is provided below:

Natural Heritage Designations

- Significant Woodland to the east of the wastewater treatment plant

Significant Wildlife Habitat

- Candidate: Bat Maternity Colonies
- Candidate: Seeps and Springs habitat
- Candidate: Amphibian Breeding Habitat (Woodland)
- Candidate: Habitat for 7 SOCC

Species at Risk Habitat

- Confirmed: Butternut trees
- Candidate: Habitat for 8 SAR

Fish Habitat

- Candidate: Ilderton #2 Drain

Kilworth

At the south end of the study area, a portion of the project area overlays the Komoka Park Reserve. The Komoka Park Reserve is designated an ANSI and a Significant Woodland. At the northern end of the study area, the project area is adjacent to the Komoka Park Reserve. The Kilworth study area is within the UTRCA jurisdiction.

A summary of the natural heritage features identified in Kilworth is provided below:

Natural Heritage Designations

- Komoka Park Reserve ANSI
- Significant Woodland

Significant Wildlife Habitat

- Candidate: Bat Maternity Colonies
- Candidate: Turtle Wintering Areas
- Candidate: Bald Eagle and Osprey nesting, Foraging, and Perching Habitat
- Candidate: Amphibian Breeding Habitat (Woodland)
- Candidate: Turtle Nesting Area
- Candidate: Habitat for 36 SOCC

Species at Risk Habitat

- Candidate: Habitat for 24 SAR

Fish Habitat

- Confirmed: Thames River and Oxbow Creek

6.1.2.3 Komoka

On the western end of the study area, the project area is adjacent to a PSW known as the Komoka/South Strathroy Creek Wetland. Other features within the study area include the Komoka Park Wetland Complex (a PSW), Komoka Provincial Park, a rare vegetation community (Tallgrass Prairie), and Wooded Areas which are identified as Significant Woodland by Middlesex Centre [2023]). The Komoka study area is within the UTRCA jurisdiction.

A summary of the natural heritage features identified in Komoka is provided below:

Natural Heritage Designations

- Komoka/South Strathroy Creek Wetland PSW
- Komoka Park Wetland Complex PSW
- Tallgrass Prairie
- Significant Woodland

Significant Wildlife Habitat

- Candidate: Waterfowl Stopover and Staging Area (Aquatic)
- Candidate: Bat Maternity Colonies
- Candidate: Turtle Wintering Areas
- Candidate: Tall-grass Prairie
- Candidate: Bald Eagle and Osprey nesting, Foraging, and Perching Habitat
- Candidate: Seeps and Springs
- Candidate: Amphibian Breeding Habitat (Woodland)
- Candidate: Amphibian Breeding Habitat (Wetland)
- Candidate: Marsh Bird Breeding Habitat
- Candidate: Habitat for 48 SOCC
- Candidate: Animal Movement Corridors

Species at Risk Habitat

- Candidate: Habitat for 29 SAR

Fish Habitat

- Confirmed: Crow Creek Drain
- Candidate: Komoka Drainage Works Drain Number 2

6.1.2.4 Delaware

On the northern end of the study area, the project area intersects with the Komoka Park Reserve (an ANSI), and the Komoka/South Strathroy Creek Wetland PSW, and is adjacent to the Komoka Park

Wetland Complex PSW, and the Komoka Provincial Park. The project area associated with the wastewater treatment plant is also adjacent to these features. On the southwestern end of the study area, the project area intersects the Delaware Woodlot (an ANSI, PSW, and Significant Woodland). On the east end of the study area, the project area intersects the Circle R Ranch PSW and associated Dingman Creek corridor. The project area also intersects with other Wooded Areas (Significant Woodland as identified by Middlesex Centre [2023]). A rare wildlife habitat has been identified in the study area, a Mixed Wader Nesting Colony (colonial wading bird colony). This habitat is located on a historical oxbow of the Thames River in the Delaware Woodlot ANSI/PSW. The Delaware study area is within the UTRCA and the Lower Thames Valley Conservation Authority (LTVCA) jurisdiction.

A summary of the natural heritage features identified in Delaware is provided below:

Natural Heritage Designations

- Komoka Park Reserve ANSI
- Komoka/South Strathroy Creek Wetland PSW
- Komoka Park Wetland Complex PSW
- Komoka Provincial Park
- Rare wildlife habitat: Mixed Wader Nesting Colony

Significant Wildlife Habitat

- Candidate: Waterfowl Stopover and Staging Area (Aquatic)
- Candidate: Bat Maternity Colonies
- Candidate: Turtle Wintering Areas
- Candidate: Colonial-Nesting Bird Breeding Habitat (Bank and Cliff)
- Confirmed: Colonial-Nesting Bird Breeding Habitat (Tree/Shrubs)
- Candidate: Tall-grass Prairies
- Candidate: Other Rare Vegetation Communities
- Candidate: Bald Eagle and Osprey nesting, Foraging, and Perching Habitat
- Candidate: Turtle Nesting Area
- Candidate: Seeps and Springs
- Candidate: Amphibian Breeding Habitat (Woodland)
- Candidate: Amphibian Breeding Habitat (Wetland)
- Candidate: Marsh Bird Breeding Habitat
- Candidate: Habitat for 36 SOCC
- Candidate: Animal Movement Corridor

Species at Risk Habitat

- Candidate: Habitat for 27 SAR

Fish Habitat

- Confirmed: Thames River, Dingman Creek, Allison Drain
- Candidate: WC-02, WC-03, WC-05, WC-08, WC-09, WC-11, WC-12, WC-16, WC-18, WC-19

6.1.3 Mitigation Measures

As the design progresses, the following mitigation measures should be considered to reduce the risk of impacts to natural heritage.

Fish and Fish Habitat

- Design the project to avoid the need for in-water work where fish habitat has been identified.
- Design and plan activities and works such that loss of fish habitat or disturbance to fish habitat is reduced to the extent possible.
- Consider construction strategies to avoid in-water work, such as the use of directional drilling for pipeline watercourse crossings.
- If applicable, apply natural channel design principles to design channel relocation.
- Design drainage system to reduce changes in drainage to watercourses that provide fish habitat.
- Design stormwater management measures to reduce effects on watercourses that provide fish habitat to the extent possible.
- Design a rehabilitation/re-vegetation plan for long-term stability of areas disturbed during construction.
- For rock reinforcement below the normal high-water level (if required), use appropriately sized material and install at a similar slope to the existing, maintain a uniform bank/shoreline and maintain a natural bank/shoreline alignment such that it does not interfere with fish passage or alter the bankfull channel profile.

Wildlife and Terrestrial Habitat

- Limit infrastructure in woodland and wetland areas to the extent possible. Setback infrastructure and work areas from woodlands and wetlands to reduce edge effects.
- Plan to rehabilitate temporary disturbance areas with a native seed mix that is suited to the site conditions.

Additional mitigation measures recommended to reduce impacts during construction, and permitting considerations are provided in Appendix F.

6.1.4 Survey Recommendations

Since most of the project area is within the road ROW, impacts to SWH and SOC and SAR habitat are anticipated to be low. However, there are locations of the project area which are adjacent to or intersect

natural heritage features or candidate SAR and fish habitat. The following surveys are recommended during detailed design for each study area:

6.1.4.1 Arva

- **Birds**: If the project construction is to occur during the primary nesting period (April 1 - August 31) in areas adjacent to potential SAR bird habitat, it is recommended to conduct a breeding bird survey to determine potential impacts to bird SAR, and identify nests that receive year-round protection by the Migratory Birds Regulation (MBR) (2022).
- **Bats**: If tree removal is required a bat maternity roost assessment is recommended for those trees. Bat acoustic monitoring may also be required for tree removals.
- **Vegetation**: If the project area will encroach upon the MEMM3 ecosite on the north side of Medway Road, a plant inventory of this feature is recommended.
- **Fish**: If the project requires in-water work in Medway Creek or McClary Drain, additional fish habitat and fish community assessment (only McClary Drain) is recommended so that data are available for submission of a Request for Review to the DFO.

6.1.4.2 Ilderton

- **Birds**: A breeding bird survey is recommended in the MEGM3/WOD ecosite if development is to occur in this ecosite, and to determine presence/absence of nests that receive year-round protection by the MBR (2022).
- **Bats**: If tree removal is required a bat maternity roost assessment is recommended for those trees. Bat acoustic monitoring may also be required for tree removals.
- **Vegetation**: If impacts to the Butternut trees are proposed, a Butternut assessment including genetic analysis will be required of these trees. A plant inventory is recommended in FOD10-1 or FODM7/SA if modifications may occur in this feature.
- **Fish**: A fish habitat and fish community survey will be required in the Ilderton #2 Drain if modifications to this feature are proposed.
- **Feature Encroachment**: If the project area (associated with the wastewater treatment plan) requires modification of the FODM10-1 or FODM7/SA (Significant Woodland), a subsequent vegetation inventory, wildlife habitat assessment, bat surveys, and breeding bird surveys are recommended to determine sensitivity of the feature.

6.1.4.3 Kilworth

- **Bats**: If tree removal is required a bat maternity roost assessment is recommended for those trees. Bat acoustic monitoring may also be required for tree removals.
- **Vegetation**: A plant inventory is recommended if impacts to any natural ecosites in the Study Area are proposed.
- **Feature Encroachment**: If the project area (south end of Study Area) requires modification of the FODM7 (Komoka Park Reserve ANSI), a subsequent vegetation inventory, wildlife habitat

assessment, bat surveys, and breeding bird surveys are recommended to determine sensitivity of the feature.

6.1.4.4 Komoka

- **Bats**: If tree removal is required a bat maternity roost assessment is recommended for those trees. Bat acoustic monitoring may also be required for tree removals.
- **Birds**: If the project construction is to occur during the primary nesting period (April 1 - August 31) in areas adjacent to potential SAR bird habitat, it is recommended to conduct a breeding bird survey to determine potential impacts to bird SAR.
- **Vegetation**: A plant inventory is recommended if impacts to any natural ecosites in the Study Area are proposed.
- **Fish**: If the project requires in-water work in Crow Creek Drain, an additional fish habitat assessment is recommended so that data are available for submission of a Request for Review to the DFO.

6.1.4.5 Delaware

- **Bats**: If tree removal is required a bat maternity roost assessment is recommended for those trees. Bat acoustic monitoring may also be required for tree removals.
- **Birds**: If the project construction is to occur during the primary nesting period (April 1 - August 31) in areas adjacent to potential SAR bird habitat, it is recommended to conduct a breeding bird survey to determine potential impacts to bird SAR.
- **Vegetation**: A plant inventory is recommended if impacts to any natural ecosites in the study area are proposed.
- **Fish**: If the project requires in-water work in any watercourse identified as Confirmed or Candidate fish habitat or if modification of a watercourse mapped by the DFO as providing aquatic SAR habitat, additional fish habitat assessment is recommended so that data are available for submission of a Request for Review to the DFO.
- **Feature Encroachment**: If the project area (south end of study area, Figure 3-5.3) requires development within 50 m of the FODM9-5/SA ecosite, a subsequent vegetation inventory, wildlife habitat assessment, bat surveys, and breeding bird surveys are recommended to determine sensitivity of the feature.

  If the project construction is to encroach upon the Delaware Woodlot ANSI (Figure 1-5.5), the Komoka Park Reserve ANSI (Figure 1-5.8), or Significant Woodlands an Environmental Impact Study may be required (full suite of ecological surveys), as per the Middlesex Centre Official Plan.

6.2 CULTURAL ENVIRONMENT

6.2.1 Archaeological Assessment

Archaeological Assessments were undertaken as part of this study. As the designs for the study recommendations are currently conceptual, some of the required Archaeological Screening and/or Stage 1 Archaeological Assessment work has been deferred, and will be undertaken during detail design. The areas that will be subject to future Archaeological Screening and/or Stage 1 Archaeological Assessments has been identified on mapping available in Appendix G. As the design of the recommended solutions progresses, the Municipality will be required to undertake the necessary Archaeological works for the project areas.

Some of the projects, and portions of the overall study area were identified as requiring a Stage 1 Archaeological Assessment.

In compliance with the provincial standards and guidelines set out in the Ministry of Citizenship and Multiculturalism's (MCM's) 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011), the objectives of the Stage 1 archaeological assessment are to:

- Provide information about the study area's geography, history, previous archaeological fieldwork, and current land conditions.
- Evaluate the study area's archaeological potential, which will support recommendations for Stage 2 survey for all or parts of the property.
- Recommend appropriate strategies for Stage 2 survey.

The results of the Stage 1 Archaeological Assessments completed are summarized below.

6.2.1.1 Delaware Sanitary Pumping Station #2

The Master Plan identified the need to construct a new sanitary pumping station, the Delaware Sanitary Pumping Station #2. The study area for the project is located in part of Lot 4, Concession D, Geographic Township of Delaware, now Municipality of Middlesex Centre, Middlesex County, Ontario. The study area comprises municipal parkland, encompassing an area of approximately 0.1 hectares.

The Stage 1 archaeological assessment was completed under Project Information Form number P256-0801-2024. The Stage 1 archaeological assessment of the study area for the project determined that the entire study area (100.0%) retains archaeological potential. In accordance with Section 1.3.1 and Section 7.7.4 of the MCM's 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011), **Stage 2 archaeological assessment is required for any portion of the Project's anticipated construction activities which impact an area of archaeological potential.**

A copy of the Delaware Sanitary Pumping Station #2 Stage 1 Archaeological Assessment is available in Appendix H.

6.2.1.2 Ilderton Pumping Station #3 Replacement Sewer

The Master Plan identified the need to upgrade and replace existing infrastructure in Ilderton, the Ilderton Pumping Station #3 Replacement Sewer. The study area for the project is located in part of Lot 24 and Lot 25, Concession 10, Geographic Township of London, now Municipality of Middlesex Centre, Middlesex County, Ontario. The study area comprises municipal road rights-of-way (ROW), residential properties, public park, and existing infrastructure including sewer lines, encompassing an area of approximately 1.7 hectares.

The Stage 1 archaeological assessment was completed under Project Information Form number P256-0802-2024.

The Stage 1 archaeological assessment of the study area for the project determined that approximately 19.3% (0.33 hectares) of the study area retains archaeological potential. In accordance with Section 1.3.1 and Section 7.7.4 of the MCM's 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011), **Stage 2 archaeological assessment is required for any portion of the Project's anticipated construction activities which impact an area of archaeological potential.**

The Stage 1 archaeological assessment determined that the remaining portions of the study area, approximately 80.7% (1.38 hectares), retain low to no archaeological potential due to deep and extensive modern disturbances such as municipal road ROW, gravel shoulders, drainage ditches, gravel and asphalt laneways, residential buildings, and subsurface municipal infrastructure. In accordance with Section 1.3.2 and Section 7.74 of the MCM's 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011), **Stage 2 archaeological assessment is not required for any portion of the Project's anticipated construction activities which impact an area of low to no archaeological potential.**

A copy of the Ilderton Pumping Station #3 Replacement Sewer Stage 1 Archaeological Assessment is available in Appendix I.

6.2.1.3 Komoka Pump Station

The Master Plan identified the need to upgrade and expand the Komoka Pump Station. The study area for the project is located in part of Lot 4, Concession 2, Geographic Township of Lobo, now Municipality of Middlesex Centre, Middlesex County, Ontario. The study area comprises grassland, scrubland, a walking trail, and existing infrastructure, encompassing an area of approximately 3.0 hectares.

The Stage 1 archaeological assessment was completed under Project Information Form number P256-0803-2024. The Stage 1 archaeological assessment of the study area for the project determined that approximately 60.0% (1.8 hectares) of the study area retains archaeological potential. In accordance with Section 1.3.1 and Section 7.7.4 of the MCM's 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011), **Stage 2 archaeological assessment is required for any portion of the Project's anticipated construction activities which impact an area of archaeological potential.**

The Stage 1 archaeological assessment determined that the remaining portions of the study area, approximately 40.0% (1.2 hectares), retain low to no archaeological potential due to areas subject to deep and extensive modern disturbances such as walking trails, artificial berms, and existing municipal infrastructure. In accordance with Section 1.3.2 and Section 7.7.4 of the MCM's 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011), **Stage 2 archaeological assessment is not required for any portion of the Project's anticipated construction activities which impact an area of low to no archaeological potential.**

A copy of the Komoka Pump Station Stage 1 Archaeological Assessment is available in Appendix J.

6.2.2 Built Heritage Resources and Cultural Heritage Landscapes

A Cultural Heritage Screening Report (CHSR) was completed as part of this study and is provided in Appendix K. As the designs for the study recommendations are currently conceptual, the Cultural Heritage Checklist Study Area consisted of a 50 metre buffer around the potential sanitary, water, and storm infrastructure routes, plus an additional 50 metre buffer (for a total of 100 metres) to account for potential shifts in the location of project components as design progresses.

The CHSR follows the Ministry of Citizenship and Multiculturalism's (MCM) *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* (2022). The CHSR aims to identify known and potential built heritage resources or cultural heritage landscapes within the study area. The CHSR also includes recommendations for further cultural heritage reporting, if required, such as a Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment (CHR) or site-specific Cultural Heritage Evaluation Reports (CHERs) or Heritage Impact Assessments (HIAs).

To complete the MCM Checklist, the following tasks were undertaken:

- **Task 1:** Review available desktop sources for applicable aerial imagery, historical maps, and municipal, provincial and federal registers, inventories or databases.
- **Task 2:** Consultation with planners or heritage officers from the Municipality of Middlesex Centre, the Ontario Heritage Trust (OHT), and the Ministry of Citizenship and Multiculturalism (MCM) was undertaken to identify known or potential properties of cultural heritage value or interest (CHVI) within the study area.
- **Task 3:** Identify and map known (i.e., designated, listed, inventoried) and potential built heritage resources and cultural heritage landscapes in the study area, and recommend further studies, if required.

Agency consultation included both provincial and municipal consultation. Consultation occurred via email and included mapping of the study area. The Ontario Heritage Trust (OHT) confirmed there are no OHT easement sites in the vicinity of the study area. MCM confirmed there are no provincial heritage properties in the study area. The Municipality of Middlesex Centre confirmed that there are no municipality designated properties within the 100m buffer of the study area.

6.2.2.1 Overview of CHSR Results

An overview of the study results by Settlement is provided below.

Arva

Tasks 1 to 3 identified the following within or adjacent to the study area:

- No protected heritage properties designated under Part IV of the Ontario Heritage Act
- No protected heritage properties designated under Part V of the Ontario Heritage Act
- No listed properties on the Middlesex Centre heritage register
- One known burial site and/or cemetery
    - 21557 Richmond St, St John's Cemetery
- Buildings or structures 40 or more years old of potential CHVI
- No known potential cultural heritage landscape

Delaware

Tasks 1 to 3 identified the following within or adjacent to the study area:

- No protected heritage properties designated under Part IV of the Ontario Heritage Act
- No protected heritage properties designated under Part V of the Ontario Heritage Act
- No listed properties on the Middlesex Centre heritage register
- Two known burial sites and/or cemeteries
    - 2637 Gideon Drive, Delaware Village Burial Grounds/Tiffany Cemetery
    - 2732 Gideon Drive, Ebenezer Allan Burial Site
- Buildings or structures 40 or more years old of potential CHVI
- Two potential cultural heritage landscapes
    - The Thames River (https://apca.maps.arcgis.com/apps/MapSeries/index.html?appid=712fbe16125044929d0b87cc595b7cc1)
    - Delaware Conservation Area Trail (https://www.ontariotrails.on.ca/trail/delaware-conservationarea-trail)

Ilderton

Tasks 1 to 3 identified the following within or adjacent to the study area:

- No protected heritage properties designated under Part IV of the Ontario Heritage Act
- No protected heritage properties designated under Part V of the Ontario Heritage Act
- No listed properties on the Middlesex Centre heritage register
- No known burial sites and/or cemeteries
- Buildings or structures 40 or more years old of potential CHVI
- One potential cultural heritage landscape
    - The Ilderton Rail Trail (https://www.ontariotrails.on.ca/trail/ilderton-rail-trail)

Kilworth

Tasks 1 to 3 identified the following within or adjacent to the study area:

- No protected heritage properties designated under Part IV of the Ontario Heritage Act
- No protected heritage properties designated under Part V of the Ontario Heritage Act
- No listed properties on the Middlesex Centre heritage register
- No known burial sites and/or cemeteries
- Buildings or structures 40 or more years old of potential CHVI

- One potential cultural heritage landscape
    - The Thames River (https://apca.maps.arcgis.com/apps/MapSeries/index.html?appid=712fbe16125044929d0b87cc595b7cc1)

Komoka

Tasks 1 to 3 identified the following within or adjacent to the study area):

- No protected heritage properties designated under Part IV of the Ontario Heritage Act
- No protected heritage properties designated under Part V of the Ontario Heritage Act
- No listed properties on the Middlesex Centre heritage register
- No known burial sites and/or cemeteries
- Buildings or structures 40 or more years old of potential CHVI
- One known potential cultural heritage landscapes
    - Great Western Railway, built in 1854. Currently operating as CN Chatham Subdivision

6.2.2.2 Recommendations

Based on a review of applicable background data, historical mapping, and consultation with regulatory bodies, no listed properties, multiple properties over 40 years of age with potential CHVI, and no potential Cultural Heritage Landscapes (CHLs) were identified in the study area. Based on the results of this CHSR, it is recommended that the Municipality undertake the following prior to progressing the design of the study recommendations:

- Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment (CHR) to assess potential Project impacts on known and potential built heritage resources and cultural heritage landscapes be prepared.

The CHR should be undertaken for these locations as early as possible in the planning process. The CHR, which should be prepared by a Heritage Consultant with membership in the Canadian Association of Heritage Professionals, will use background research and field investigations to compile an inventory of potential and previously identified BHRs and CHLs, conduct a preliminary impact assessment, and provide recommendations for mitigation measures and/or identify areas of further work. The CHR should address the following within each Settlement Area:

Arva

- One known burial site and/or cemetery
    - 21557 Richmond St, St John's Cemetery

- Buildings or structures 40 or more years old of potential CHVI
- No known potential cultural heritage landscape

Delaware

- Two known burial sites and/or cemeteries
    - 2637 Gideon Drive, Delaware Village Burial Grounds/Tiffany Cemetery
    - 2732 Gideon Drive, Ebenezer Allan Burial Site
- Buildings or structures 40 or more years old of potential CHVI
- Two potential cultural heritage landscapes
    - The Thames River (https://apca.maps.arcgis.com/apps/MapSeries/index.html?appid=712fbe16125044929d0b87cc595b7cc1)
    - Delaware Conservation Area Trail (https://www.ontariotrails.on.ca/trail/delaware-conservationarea-trail)

Ilderton

- Buildings or structures 40 or more years old of potential CHVI
- One potential cultural heritage landscape
    - The Ilderton Rail Trail (https://www.ontariotrails.on.ca/trail/ilderton-rail-trail)

Kilworth

- Buildings or structures 40 or more years old of potential CHVI
- One potential cultural heritage landscape
    - The Thames River (https://apca.maps.arcgis.com/apps/MapSeries/index.html?appid=712fbe16125044929d0b87cc595b7cc1)

Komoka

- Buildings or structures 40 or more years old of potential CHVI
- One known potential cultural heritage landscapes
    - Great Western Railway, built in 1854. Currently operating as CN Chatham Subdivision

7.0 PROJECT IMPLEMENTATION

Implementation of the individual projects noted in this Master Plan are based on a number of factors. Implementation is categorized as follows:

- Some of the projects are directly related to the development of specific areas within the Municipality. Implementation of these projects are noted as “Dependent on Development” and are thus tied to those specific developments.
- Some of the projects are related to providing a higher level of service to the Municipality. These projects are typically where the recommended solution is replacing existing infrastructure where there is an overall benefit but the existing solution is still considered adequate. These projects are noted as “Discretion of the Municipality” and the implementation is therefore left to the Municipality as to when or whether they wish to proceed with these projects.
- Many of the projects listed have specific timing by year of implementation which are based on the population projections noted in previous sections. It should be noted that population projections used for this study assume linear growth in each of the settlement areas. In reality, while growth across the Municipality is likely to be nearly linear, growth in specific communities will experience periods of little to no growth and periods of significant growth. Accordingly, the timing of these works will need to be adjusted as growth occurs. For these projects, a project trigger has been identified and should be used as a more accurate measure to determine the precise timing of the proposed project.

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 infrastructure 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 wastewater pumping stations and forcemain sizing.

7.1 CONSOLIDATED PROJECT LIST

A list of the projects recommended as part of this Master Plan is provided in Table 12. All cost estimates noted are Class D estimates and are program or feasibility level estimates. The level of accuracy is estimated 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. Projects listed in Table 12 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.

Table 12: Recommended Projects

Settlement	Description	Scope	Project Trigger	Approximate Timeline	Total OPC (incl. Contingency & Engineering) [2023$]	Class EA Schedule
Ilderton	Upgrade Ilderton Wastewater Treatment Plant	Upgrade Ilderton Wastewater Treatment Plant from 1,300 m3/day to 1,800 m3/day.	Flow exceeds 85% of Wastewater Treatment Plant 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 pumping station 3 to Ilderton Wastewater Treatment Plant. Decommission existing forcemain 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 Wastewater Treatment Plant. Easement to be included in draft plan for future development.	Dependent on Development	$ 0.1M	A+
	Expand Ilderton water booster pumping station	Add +9 L/s of pumping capacity at 59 m TDH to the existing Ilderton booster pumping station.	Maximum Day Demand = 34 L/s in Ilderton Or Population (Future Residential + Employment) = 6,124 persons	2035	$ 0.9M	A+
	Build water new storage facility	Build a new 2,000 m^3 storage facility on Hyde Park Rd, at the south end of Ilderton on proposed development lands.	Maximum Day Demand = 30 L/s in Ilderton Or Population (Future Residential + Employment) = 5,488 persons	2030	$ 7.0M	B
	Construct stormwater facilities to service growth lands in South Ilderton	Construct two wet stormwater facilities to service growth lands in South Ilderton	Dependent on Development	Dependent on Development	Developer Cost	A
Komoka	Expansion of the Komoka Wastewater Treatment Plant – phase 1	Upgrade Phase 1: Upgrade Komoka Wastewater Treatment Plant from 2,250 m3/day to 3,500 m3/day	Flow exceeds 85% of Wastewater Treatment Plant Rated Capacity of 2250 m3/d	2028	$ 22.8M	C
	Expansion of the Komoka Wastewater Treatment Plant – phase 2	Upgrade Phase 2: Upgrade Komoka Wastewater Treatment Plant from 3,500 m3/day to 4,750 m3/day	Flow exceeds 85% of Wastewater Treatment Plant Rated Capacity of 3500 m3/d	2033	$ 22.8M	C
	Expansion of the Komoka Wastewater Treatment Plant – phase 3	Upgrade Phase 3: Upgrade Komoka Wastewater Treatment Plant from 4,750 m3/day to 6,000 m3/day	Flow exceeds 85% of Wastewater Treatment Plant 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 sanitary pumping station 1 on Komoka and Railway Ave. New Gravity servicing to take flows to pumping station 2.	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 North West and North East Komoka. Triggered at 25% buildout of combined development population.	Dependent on Development	$ 1.4M	A+
	Expand Komoka water booster pumping station	Add +59 L/s of pumping capacity at 34.3 m TDH to the existing Komoka booster pumping station.	Maximum Day Demand = 53.7 L/s in Komoka-Kilworth-Delaware Or Population (Future Residential + Employment) = 11,948 persons	2027	$ 1.1M	A
	New Komoka sanitary pumping station	Construct a new Komoka sanitary pumping station 2 with Capacity of 88.4 L/s, Pump to Komoka Wastewater Treatment Plant. New forcemain from new Pumping Station on Glendon Drive to the Komoka Wastewater Treatment Plant.	Dependent on Development	Dependent on Development	$ 6.1M	B
	Expand Komoka intermediate water pumping station	Upgrade the Komoka intermediate pumping station (increase rated capacity to 90 L/s at 45 m TDH).	Short-term (to address existing minimum pressure issues in Kilworth)	2026	$ 1.1M	B
	Expand existing water storage (in-ground reservoir)	Expand the existing at-grade storage reservoir at the Komoka booster pumping station; add a total volume	Maximum Day Demand = 71 L/s in Komoka-Kilworth-Delaware	2034	$ 3.0M	B

Settlement	Description	Scope	Project Trigger	Approximate Timeline	Total OPC (incl. Contingency & Engineering) [2023$]	Class EA Schedule
		of 3,334 m^3 when combined with the Komoka elevated tank/ elevated tower replacement (KKD-ST-2B).	Or Population (Future Residential + Employment) = 15,645 persons			
	Replace existing Komoka elevated tower	Decommission the existing Komoka elevated tank/ elevated tower and replace with a higher and larger elevated tank/ elevated tower; add a total volume of 3,334 m^3 when combined with the Komoka booster pumping station reservoir expansion (KKD-ST-2A).	Earliest of: Medium-term to address future minimum pressure issues in Kilworth, observed when Peak Hour Demand = ~1.6 x existing Peak Hour Demand, i.e., 2036 under current projections Needed to meet overall storage needs for Komoka-Kilworth-Delaware when combined with KKD-ST-A Maximum Day Demand = 71 L/s in Komoka-Kilworth-Delaware Or Population (Future Residential + Employment) = 15,645 person	2034	$ 10.8M	B
	Upgrade existing watermains on Queen Street and Railway Ave	Twin existing watermain on Queen St (from Oxbow Dr to Railway Ave) and on Railway Ave (from Queen St to Tunks Ln) with 1.1 km of 300 mm diameter watermain.	Once Komoka elevated tank/ elevated tower has been replaced (see KKD-ST-2B), i.e., Medium-term to address future minimum pressure issues in Kilworth, observed when Peak Hour Demand = ~1.6 x existing Peak Hour Demand	2036	$ 3.8M	A+
	Construct new watermain on Glendon Drive	Build 1.8 km of 200 mm diameter watermain along Glendon Dr (extend existing watermain to Amiens Rd), to service employment development lands southwest of Komoka.	Dependent on Development	Dependent on Development	$ 5.8M	A+
	Construct stormwater facilities to service growth lands in West Komoka	Construct two wet stormwater facilities to service growth lands in West Komoka	Dependent on Development	Dependent on Development	Developer Cost	A
	Construct stormwater facilities to service growth lands in in South Komoka	Construct on-site low impact development controls to service growth lands in South Komoka	Dependent on Development	Dependent on Development	Developer Cost	A
	Construct stormwater facilities to service growth lands in in North East Komoka	Construct two stormwater facilities (infiltration facility and dry pond) to service growth in North East Komoka	Dependent on Development	Dependent on Development	Developer Cost	A
	Construct stormwater facilities to service growth lands in North West Komoka	Construct wet stormwater facility to service growth in North West Komoka	Dependent on Development	Dependent on Development	Developer Cost	A
	Construct stormwater facilities to service growth lands in central Komoka	Construct a wet stormwater management facility to service existing lands and growth in central Komoka	Dependent on Development	2025	$ 6.0M	B
Kilworth	Provide sanitary servicing for Old Kilworth	Gravity servicing for the Old Kilworth area. New forcemain from Blackburn pumping station (pumping station 1) along Blackburn Crest. Upgrade the existing Backburn sanitary pumping station's capacity to 1459 m3/d (16.9 L/s), Pump to Ex. Kilworth sanitary pumping station 2.	Municipality/Old Kilworth residents' decision to proceed with connecting to the existing sewer system	Discretion of Municipality	$ 14.2M	A+
	Water distribution system to supply Old Kilworth	Build 2.6 km of new 150 mm diameter watermain within the existing rights-of-way in Old Kilworth to service existing properties.	Municipality/Old Kilworth residents' decision to proceed with connecting to the existing distribution system	Discretion of Municipality	$ 8.3M	A+
	Construct bioswales for Old Kilworth	Bioswales would be designed to collect runoff from minor storm events within the adjacent lots and road rights-of-way to be infiltrated. Overflows would be	Implementation at the discretion of the Municipality, however, this project is recommended to be completed in the near term as this is an existing drainage issue.	Discretion of Municipality	$ 0.5M	B

Settlement	Description	Scope	Project Trigger	Approximate Timeline	Total OPC (incl. Contingency & Engineering) [2023$]	Class EA Schedule
		implemented to bypass the filter bed media, and be conveyed downstream during a large storm event.				
	Upgrade Kilworth sanitary pumping station	Upgrade the new Kilworth sanitary pumping station 2's capacity to 12,737 m3/d (147 L/s), Pump to Komoka Wastewater Treatment Plant.	Required when pumping station reaches capacity of 114 l/s which equates to an approximate population of 10,000.	2040	$ 0.8M	A
	New watermain looping between Komoka and Kilworth	Developer-driven project – alignment and sizing to be determined in detailed design.	Earliest of: Short-term (for reliability) Coincident with development	Dependent on Development	Developer Cost	A
	Construct stormwater facilities to service growth lands in North Kilworth.	Construct on-site low impact development controls and a wet stormwater facility to service growth in North Kilworth.	Dependent on Development	Dependent on Development	Developer Cost	A
Delaware	New Delaware sanitary pumping station to service employment lands	Construct a new Delaware sanitary pumping station 1 with Capacity of 134 L/s, Pump to Komoka Wastewater Treatment Plant. New forcemain from new pumping station 1 to Komoka Wastewater Treatment Plant.	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 sanitary pumping station 2 with Capacity of 67 L/s, Pump to Delaware sanitary pumping station 1. New forcemain from pumping station 2 to gravity sewer (discharges to pumping station 1). Incl 7.5 km of local sewers.	Discretion of Municipality	Discretion of Municipality	$ 48.0M ($ 36.3M local sewer construction + $ 2.7M Pumping Station and $9.0M Forcemain and sewer to connect to Sanitary Pumping Station 1)	B
	Expand Delaware water booster pumping station	Add +20 L/s of pumping capacity to the existing Delaware booster pumping station.	Maximum Day Demand = 13 L/s in Delaware Or Population (Future Residential + Employment) = 2,770 persons	Dependent on Development	$ 0.7M	A
	Build new water storage	Build a new 1,300 m^3 storage facility in the employment development lands in the south of Delaware, adjacent to the proposed sanitary pumping station #1.	Coincident with employment lands' development.	Dependent on Development	$ 4.4M	B
	Upgrade existing watermains	Upgrade the existing watermain on Gideon Dr (from Komoka Rd to Millcreek Ln) to 2.6 km of 300 mm diameter watermain.	Coincident with upstream Delaware booster pumping station upgrade, i.e., Maximum Day Demand = 13 L/s in Delaware Or Population (Future Residential + Employment) = 2,770 persons	Dependent on Development	$ 4.6M	A+
	Construct stormwater facilities to service employment lands.	Construct on-site low impact development controls and dry end of pipe stormwater facilities to service employment lands.	Dependent on Development	Dependent on Development	Developer Cost	A
	Construct stormwater facilities to service growth lands in Delaware.	Construct on-site low impact development controls and dry end of pipe stormwater facilities to service infill growth in Delaware.	Dependent on Development	Dependent on Development	Developer Cost	A
Arva	New Arva Sanitary Pumping Station and Forcemain	Construct a new Arva sanitary pumping station 2 with Capacity of 1,129 m3/day (13.1 L/s), Pump to Existing Arva sanitary pumping station 1.	Dependent on Development	Dependent on Development	$ 3.8M	B
	Upgrade existing Arva Pumping Station	Upgrade the existing Arva sanitary pumping station #1 to Capacity of 3,915 m3/day (45.3 L/s).	Dependent on Development	Dependent on Development	$ 1.4M	A
	Connect water system to Lake Huron system	Build a new 1.25 km long 200 mm diameter feedermain on Medway Rd, from pumping station #4 at the Arva Reservoir to the proposed new water storage facility within Arva (see ARV-REL-2).	Dependent on Development	Dependent on Development	$2.0M	A+

Settlement	Description	Scope	Project Trigger	Approximate Timeline	Total OPC (incl. Contingency & Engineering) [2023$]	Class EA Schedule
	Build water new storage and water booster pumping station	Build a new 900 m^3 storage facility with a 14.8 L/s BPS at the west end of Arva, on Medway Rd, adjacent to the proposed sanitary pumping station.	Dependent on Development	Dependent on Development	$4.0M	B
	Construct stormwater facilities to service growth.	Construct on-site low impact development controls and dry end of pipe stormwater facilities to service growth.	Dependent on Development	Dependent on Development	Developer Cost	A

7.2 NEXT STEPS

All projects noted as having a Class EA Schedule of A, A+ or B are considered to have been studied under this plan and can proceed to the detailed design and construction phases. The projects noted having a Class EA Schedule of C, require further study which includes the expansion of the Ilderton and Komoka wastewater treatment facilities.

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 SMP are intended to service the Municipality to 2046 and consider only development within the current settlement boundaries. As projects identified in this SMP are advanced to implementation, consideration should be given to logical expansions of the settlement boundaries in future. As the projects are implemented, where feasible, minor oversizing of infrastructure should be considered to service lands which are currently outside of the settlement boundary but are logical extensions of those boundaries.

8.0 CLOSING

This Master Plan summarizes Phase 1 and Phase 2 of the MCEA planning process, as outlined in the 2015 MCEA Document. Provided that no Section 16 Order requests are received, the Municipality may proceed 30 days following the completion of the public review period.