Memo

To: Curtis Tighe, Town of Ingersoll

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Ron Shishido, Dillon
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Date: August 24, 2023

Subject: South-West Ingersoll Secondary Plan – Sanitary Servicing Strategy

Our File: 22-4365

1.0 Introduction

1.1 Background

The South West Ingersoll Secondary Plan includes approximately 630 gross hectares of land (Study Area) that was brought in from South-West Oxford into the Town of Ingersoll (Town) as part of an urban boundary adjustment in January 2021. The South West Ingersoll Secondary Plan Study has identified a preferred land use concept for the Study Area.

The Study Area, as shown on Map 1, can generally be divided into three areas:

- East of Ingersoll is proposed to be Low and Medium Density Residential development with a net area of 25.2 ha;
- South of Ingersoll is proposed to be Prime Industrial and Service Commercial Development with net area of 156.2 ha; and
- West of Ingersoll includes Prime Industrial and Industrial areas, in addition to Low and Medium Density Residential development with a net area of 165.7 ha.

This land use concept as described above has been used to develop a municipal servicing strategy for providing water, sanitary and stormwater services for the Study Area.

1.2 Scope of Work

The purpose of this technical memorandum is to focus on the sanitary servicing strategy by providing a review of the existing sanitary system within the Town of Ingersoll (Town) and potential servicing alternatives, provide recommendations for the proposed servicing strategy, including a high level cost estimate for the recommended strategy.

2.0 Existing Conditions

2.1 Ingersoll Sanitary Collection System

The existing sanitary collection system in the Town consists of the following:

- Five (5) sewage pumping systems
- 88 km of sanitary gravity sewers
- 14.3 km of sanitary forcemain
- 0.8 km of sanitary low pressure sewers

As provided in the Oxford County 2022 Asset Management Plan, Figure 1 depicts the properties within the Town of Ingersoll which have fronting sanitary sewer. The entirety of the South West Ingersoll Secondary Plan Area is currently not serviced by fronting sanitary sewer.

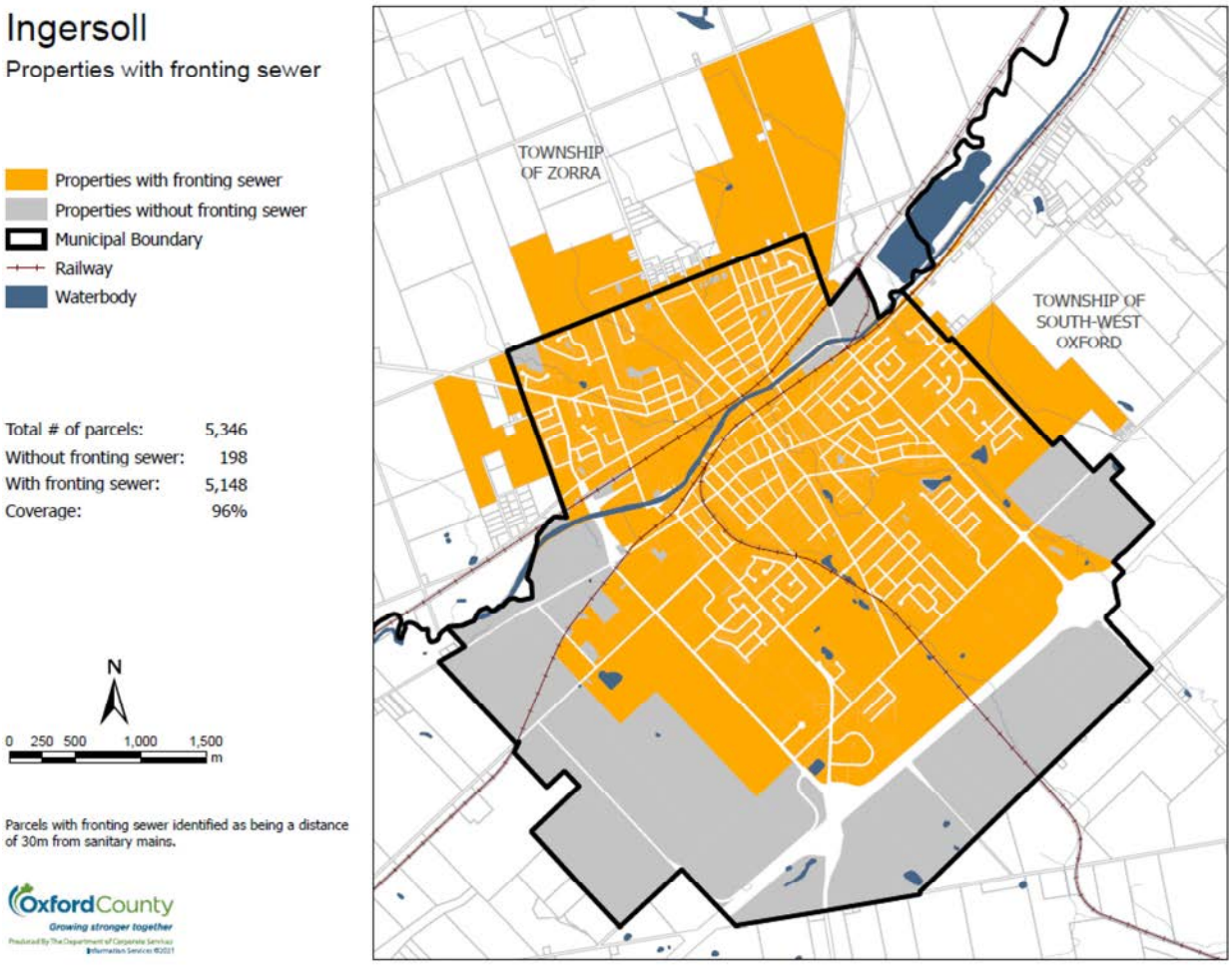

Figure 1: Ingersoll Properties with Fronting Sanitary Sewer

2.2 Ingersoll Wastewater Treatment Plant

The Ingersoll Wastewater Treatment Plant (WWTP), which is located at 56 McKeand Street in Ingersoll, provides wastewater treatment for residential, commercial and industrial users in the Town. An upgrade of the WWTP was completed in 2018, increasing the treatment capacity to 12,945 m^3/d. Based on the 2022 Annual Wastewater Report for the Ingersoll WWTP, the following information in Table 1 is provided related to daily flow rates:

Table 1: Ingersoll WWTP 2022 Flow Rates

Description	Flow Rate
Design Capacity	12,945 m^3/d
2022 Average Daily Flow	6,992 m^3/d
2022 Maximum Daily Flow	13,670 m^3/d

Figure 2 shows the Ingersoll WWTP monthly average daily flows for 2022, which is also referenced in the 2022 Annual Wastewater Report for the Ingersoll WWTP.

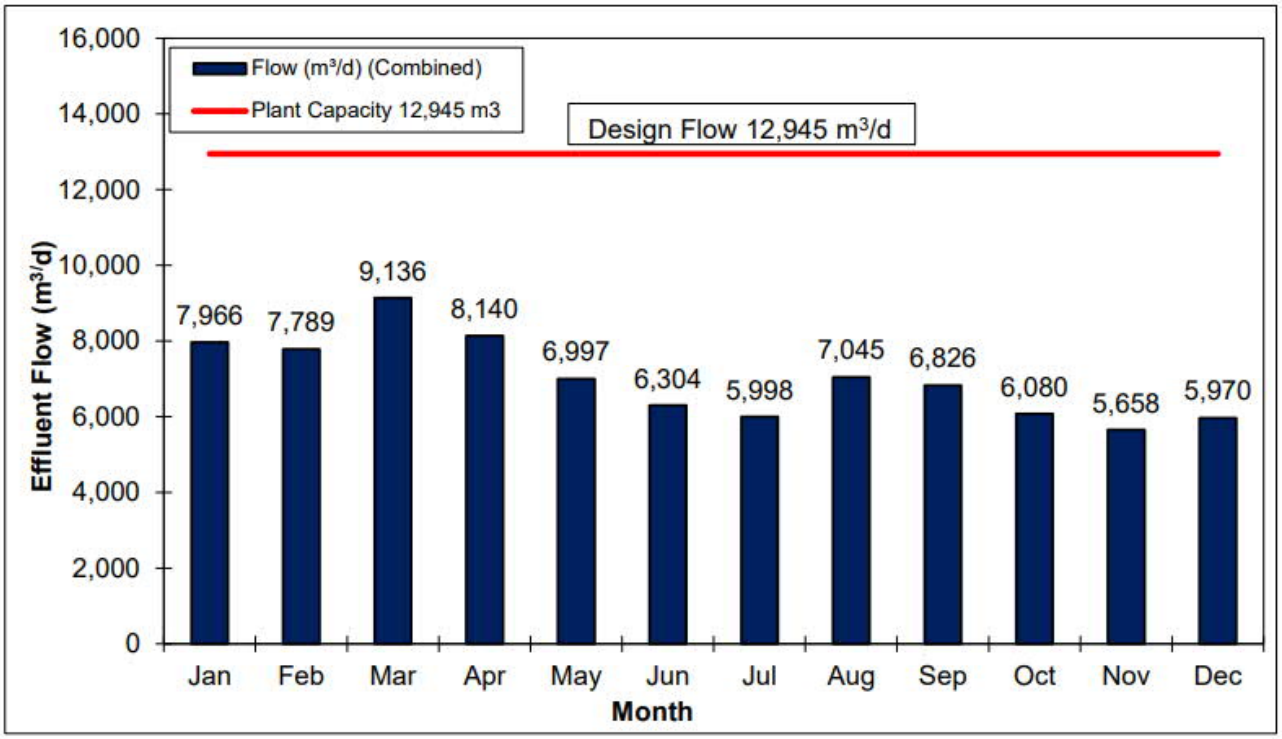

Figure 2: Ingersoll WWTP 2022 Monthly Average Daily Flows

Based on the 2022 monthly average daily flows, the Ingersoll WWTP is operating on average at approximately 54% of the design capacity, with 5,953 m^3/d of capacity remaining.

3.0 Methodology

A high level review of the existing sanitary collection system in Ingersoll was completed based on available information provided by Oxford County (County). This background information included an overall map of the sanitary collection system, associated GIS files of the pipe network and a selection of as-built drawings. The County was not able to provide any sanitary drainage area plans for the collection system. A Water and Wastewater Master Plan (Master Plan) is also concurrently being undertaken by the County which is evaluating the long-term water and wastewater servicing strategies to support existing needs as well as future growth in the County.

As such, it was agreed that the scope of this project analysis would not include a downstream capacity assessment as insufficient information was available to assess available capacity within the existing collection system. Projected flows are estimated for the proposed development based on anticipated land uses and densities. Future analysis will need to be completed to determine if upgrades of downstream existing infrastructure is required to increase capacity and support the proposed developments.

4.0 Future Conditions

4.1 Proposed Development

As mentioned previously, the Study Area generally consists of three geographic areas, which include East, West, and South of Ingersoll. The proposed land uses include a mix of low and medium density residential, prime industrial/industrial and service commercial. Table 2 outlines the proposed populations for the residential areas and areas for the industrial and commercial areas. Population estimates for low density residential is based on 3 people per unit and medium density residential is based on 2.4 people per unit. The Planning Justification Report, prepared as part of the Secondary Plan, further details the rationale for these projections and how the net areas were calculated, accounting for natural heritage buffers and an average of the minimum and maximum densities referenced in the Official Plan.

Table 2: Proposed Build Out by Land Use

Area	Land Use	Net Area (ha)	Number of Residential Units	Residential Population
East of Ingersoll	Low Density Residential	9	200	600
	Medium Density Residential	16	760	1,824
South of Ingersoll	Prime Industrial	148	-	-
	Service Commercial	9	-	-
West of Ingersoll	Low Density Residential	11	250	750
	Medium Density Residential	2	90	216
	Prime Industrial and Industrial	153	-	-

4.2 Projected Sanitary Flows

An average day residential sewage generation rate of 183 L/cap/day is proposed for the Secondary Plan area. This is equivalent to the residential water demand as established in the County's Water Wastewater Master Plan, currently being finalized by R.V. Anderson. The Master Plan also recommends an inflow and infiltration allowance of 0.072 L/s/ha for residential areas and established a peak factor of 2.8 using the Harmon Formula for sizing infrastructure.

Similarly, to align with the water servicing analysis for the Secondary Plan, a consistent assumption has been made related to projected sanitary flows for industrial areas based on the fact that water consumed is approximately equivalent to sewage generated. An average value of 35 m^3/d/ha for sewage generation has been considered for future industrial development within the Study Area. This is in alignment with the Design Guidelines for Drinking-Water Systems by the Ministry of the Environment, Conservation and Parks (MECP) which recommends an industrial water demand in the range of 35 m^3/ha/day to 55 m^3/ha/day. Industrial facilities sewage generation varies largely depending on the type of industry and the number of users per facility. Further analysis on a case by case basis should be done for heavy industrial water users that may have a significantly larger sewage generation rate. The Master Plan recommends an inflow and infiltration allowance of 0.078 L/s/ha for industrial lands.

For commercial areas, an average day sanitary flow of 28 m^3/ha/day has been considered in accordance with MECP guidelines. The Master Plan recommends an inflow and infiltration allowance of 0.078 L/s/ha for service commercial.

Based on the above, Table 3 outlines the proposed average day sanitary flow rates by area within the Study Area, as well as peak flow including a Harman peaking factor of 2.8 and an allowance for inflow and infiltration.

Table 3: Proposed Average Day Sanitary Flow Rates by Area

Area	Land Use	Area (ha)	Residential Population	Average Unit Projections	Inflow and Infiltration Allowance	Average Day Flow (m^3/d)	Peak Flow incl. I/I (m^3/d)
East of Ingersoll	Low Density Residential	9	600	183 L/cap.d	0.072 L/s/ha	110	363
	Medium Density Residential	16	1,824	183 L/cap.d	0.072 L/s/ha	334	1,034
					Total Average Day Flow (East of Ingersoll)	444	1,397
South of Ingersoll	Prime Industrial	147.6	-	35 $m^3/d/ha$	0.078 L/s/ha	5,166	15,460
	Service Commercial	8.6	-	28 $m^3/d/ha$	0.23 L/s/ha	241	732
					Total Average Day Flow (South of Ingersoll)	5,407	16,192
West of Ingersoll	Low Density Residential	11	750	183 L/cap.d	0.072 L/s/ha	137	453
	Medium Density Residential	2	216	183 L/cap.d	0.072 L/s/ha	39	123
	Prime Industrial and Industrial	152.7	-	35 $m^3/d/ha$	0.078 L/s/ha	5,344	15,994
					Total Average Day Flow (West of Ingersoll)	5,521	16,570
Total Average Day Flow (South-West Ingersoll Secondary Plan Study Area)						11,372	34,159

5.0 Recommended Sanitary Servicing Strategy

The conceptual layout of the recommended sanitary servicing strategy for the Study Area is shown in Figure 3. Additionally, Figure 4 conveys the proposed overall drainage area plan and proposed outlet locations to the existing collection system.

5.1 Proposed Connections and Alignment

The recommended sanitary servicing strategy for the Study Area includes three (3) connections to the existing sanitary collection system as shown on Figure 3. These connections are located at the following locations:

1. Existing gravity sewer directly east of the Ingersoll Street and King Street intersection;
2. Existing gravity sewer at intersection of Cash Crescent and Whiting Street; and
3. Existing gravity sewer at intersection of Winders Trail and Walker Road.

Additionally, the recommended servicing strategy includes one (1) crossing of Highway 401:

1. Unopened road allowance which would be an extension of Whiting Street.

In consultation with the Ministry of Transportation (MTO), the proposed crossing location was deemed acceptable, but formal approval would need to be obtained from MTO prior to detailed design and construction. MTO provided the following requirements for any crossings of the Highway 401 corridor:

- Any pipe crossings under pressure would need to be in a casing;
- Trenchless pipe crossings need to be 5 m below the lowest portion of the ditch and elevation must be maintained;
- An encroachment permit would be required for each service type (i.e. water and sanitary);

The following sections describe in more detail the scope of the proposed servicing strategy for each geographic area within the Study Area.

5.1.1 East of Ingersoll

The proposed residential development East of Ingersoll is proposed to be serviced via a local gravity sewer collection system which outlets to the existing collection system at the intersection of Winders Trail and Walker Road.

5.1.2 West of Ingersoll

The proposed residential and industrial development West of Ingersoll is proposed to be serviced by a gravity sewer following the alignment of Wallace Line, draining from Highway 401, north towards Hamilton Road. The proposed gravity sewer would then convey flows east along Hamilton Road/King Street W, outleting to the existing 675 mm diameter gravity sanitary sewer east of the intersection of King Street W and Ingersoll Street. An easement would be required to cross one property in close proximity to the tie-in location in order to outlet into the 675 mm diameter at an adequate depth. It is assumed that no basement service will be provided for industrial use lands.

This strategy would also allow for existing properties on Hamilton Road/King Street W to be tied into the proposed gravity sanitary sewer, however it is anticipated that basement service will not be feasible for homes on Hamilton Road, west of Oakwood Street. The County has indicated that this is acceptable and these homes could implement a basement pump, if necessary. Where depth of cover of the pipe is insufficient to meet the County's design standards, insulation of the sanitary sewer would also be required in this area.

5.1.3 South of Ingersoll

The proposed prime industrial and service commercial development South of Ingersoll is proposed to be serviced by a local gravity sewer collection system, draining to a proposed pumping station, located

along Curry Road, west of the Canadian Pacific (CP) railway. Based on available topographic information, it is assumed that a gravity sewer can be installed via trenchless technologies under the existing watercourse and railway to convey flows from the lands on the east side to the proposed pumping station on the west side of the railway. It is also assumed that basement service will not be provided to industrial use lands. As part of the detailed design of the development of this area, the depth of bury of the proposed sewers may be able to be reduced in some locations through final grading design.

The pumping station would convey flows via a proposed forcemain along the proposed new road right-of-way and then following the alignment of the unopened road allowance (an extension of Whiting Street) to cross Highway 401. The closest physically located outlet for these flows to the existing sanitary collection system would be to the 200 mm diameter gravity sewer at the intersection of Cash Crescent and Whiting Street. Pending the outcome of the downstream capacity analysis, an alternative outlet could be the existing 600 mm diameter gravity sewer along Clark Road, east of the CP railway. This outlet would also be subject to downstream capacity analysis and would require an additional crossing of the CP railway.

It is also understood that there is potential for proposed development of the Ingersoll Golf Club. If this development were to proceed and the 600 mm diameter gravity sewer outlet was deemed to have sufficient downstream capacity, the alignment of the proposed forcemain from Highway 401 to the top end of the 600 mm sewer could be run through this development.

5.2 Proposed Phasing

The proposed residential developments in the East and West sides of Ingersoll, in addition to some industrial lands on the West side on the north side of Highway 401 represent a more feasible initial option for servicing, as these areas are close to existing infrastructure and can be serviced without the requirement to construct utility crossings across Highway 401. If phasing were to be considered, these would be the recommended areas to proceed first based on ease of extending existing servicing.

Additionally, the total projected average day sanitary flow rates for the entire Study Area of 11,372 m^3/d exceeds the approximate available capacity of 5,953 m^3/d remaining at the Ingersoll WWTP. As phases of development within the Study Area are developed, consideration for available capacity at the WWTP needs to be made based on currently available capacity.

5.3 Opinion of Probable Cost

Table 4 shows the anticipated capital costs of the proposed sanitary collection system based on the recommended servicing strategy. Approximate size ranges of the proposed linear infrastructure is included, but would need to be confirmed through detailed design once detailed topographic information is collected and proposed pipe grades established.

Table 4: Sanitary Collection System Estimate of Capital Costs

Area	Item	Quantity	Unit Cost	Total Cost (including 30% Contingency)
East of Ingersoll	Gravity Sanitary Sewer (200 mm diameter)	2,960 m	$600/m	$2,309,000
South of Ingersoll	Gravity Sanitary Sewer (200 – 375 mm diameter)	5,230 m	$700/m	$4,760,000
	Forcemain (300 mm diameter)	1,650 m	$650/m	$1,395,000
	Pumping Station	1	$1,700,000	$2,210,000
	Highway 401 Crossing	1	$175,000	$228,000
West of Ingersoll	Gravity Sanitary Sewer on Wallace Line (200 – 375 mm diameter)	3,320 m	$700/m	$3,022,000
	Gravity Sanitary Sewer On Hamilton Road/King Street (375-600 mm diameter)	1,515 m	$850/m	$1,675,000
			Total	$15,599,000

Map/Figures

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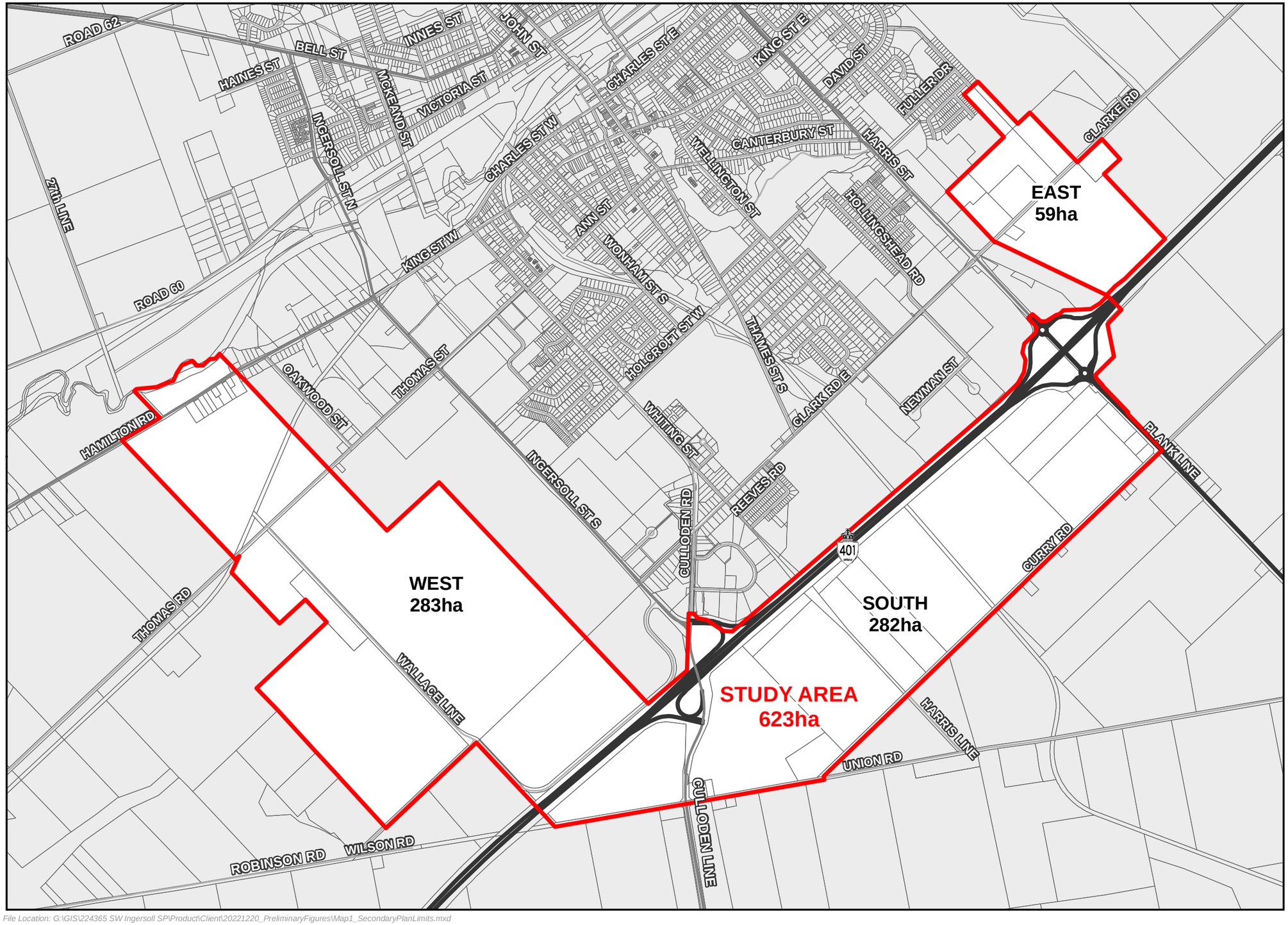
SOUTH WEST INGERSOLL 2021 AREA SECONDARY/SERVICING PLAN

MAP 1: SECONDARY PLAN AREA LIMITS



Legend

- Study Area
- Property Parcels
- Provincial Road
- County Road
- Municipal Road

NORTH

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Map Prepared by: PFM/ZJB
Dillon Consulting Limited
Map Checked by: KM
Dillon Consulting Limited

March 02, 2023

Scale 1:20,000

Meters

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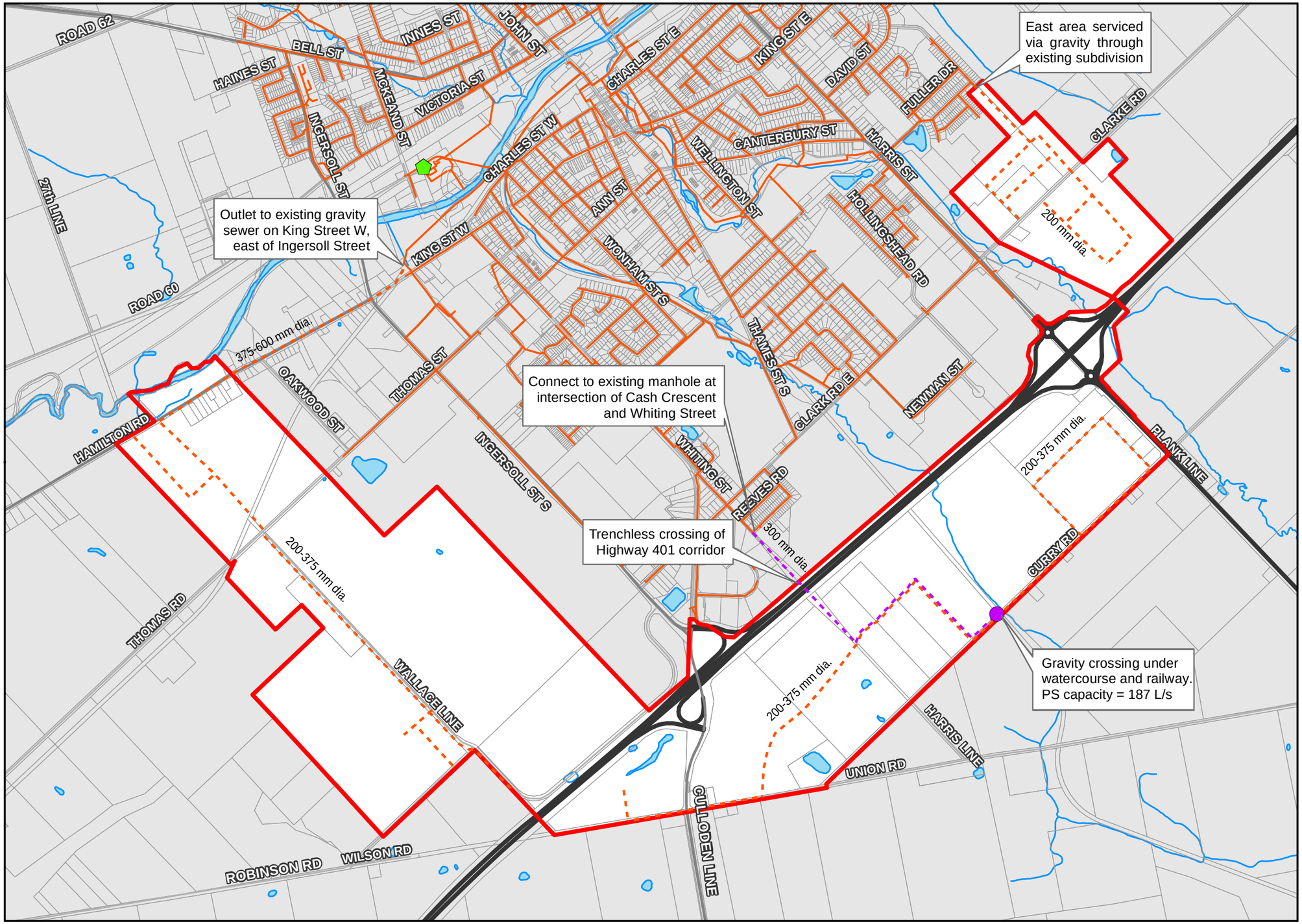
SOUTH WEST INGERSOLL 2021 AREA SECONDARY/SERVICING PLAN

FIGURE 3: CONCEPTUAL SANITARY SERVICING STRATEGY



Legend

- Study Area
- Proposed Sanitary Pump Station
- Proposed Sanitary Forcemain
- Proposed Gravity Sanitary Sewer

Oxford County

- Ingersoll Wastewater Treatment Plant
- Watercourse
- Waterbody

NORTH

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Map Prepared by: PFM/ZJB
Dillon Consulting Limited
Map Checked by: KM
Dillon Consulting Limited

August 24, 2023

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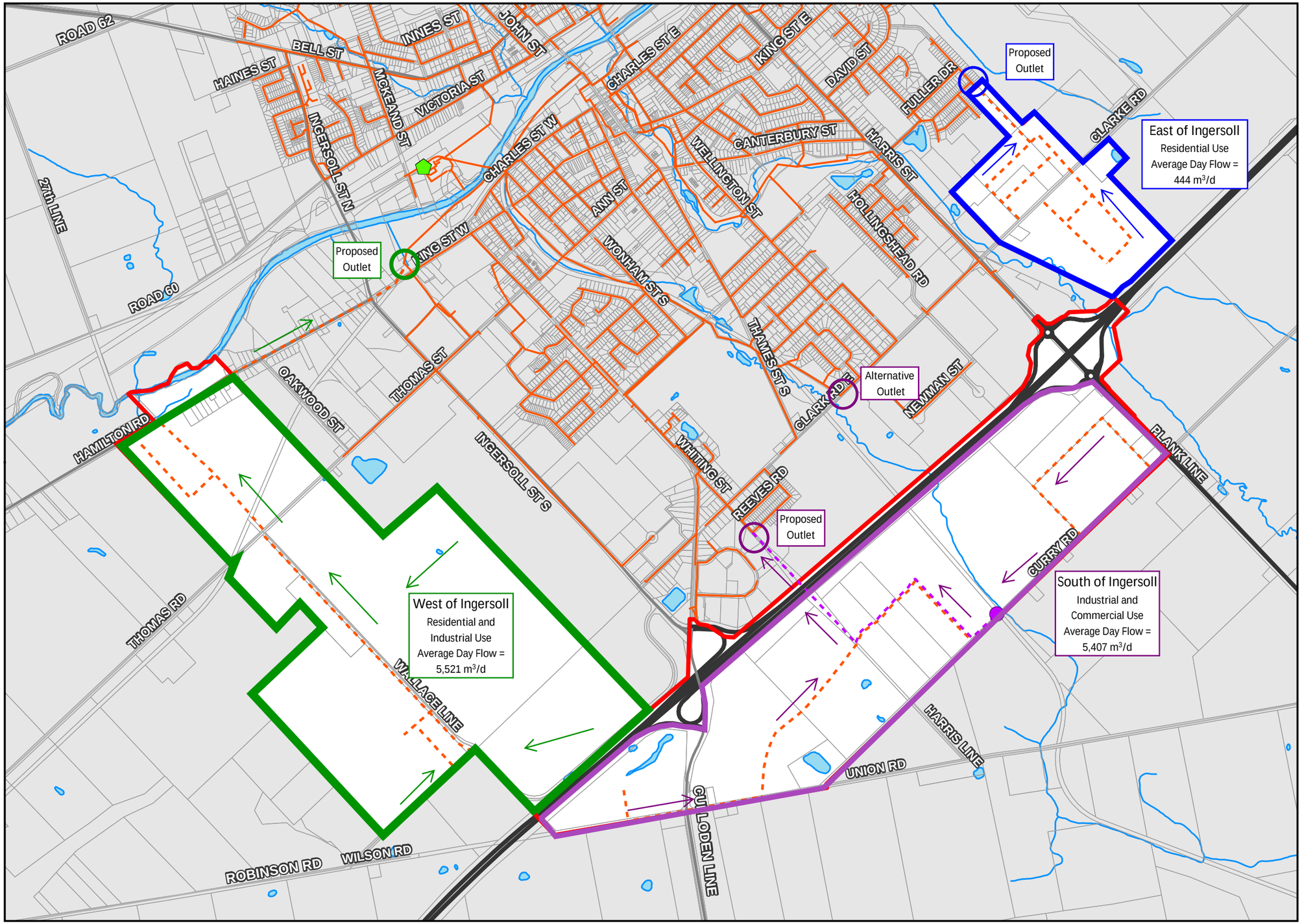
SOUTH WEST INGERSOLL 2021 AREA SECONDARY/SERVICING PLAN

FIGURE 4: SANITARY DRAINAGE AREA PLAN



Legend

- Study Area
- Proposed Sanitary Pump Station
- Proposed Sanitary Forcemain
- Proposed Gravity Sanitary Sewer

Oxford County

- Ingersoll Wastewater Treatment Plant
- Watercourse
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