

Memo

To: Curtis Tighe, Town of Ingersoll

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Mina Yacoub, P.Eng., Dillon

cc: Justine Giancola, Dillon
Ron Shishido, Dillon
Ron Versteegen, Oxford County

Date: August 18, 2023

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

Our File: 22-4365

1.0

Methodology

1.1

Water Servicing

Oxford County provided the current version of their InfoWater water model for the Ingersoll Water Distribution System.

The provided model has been updated as of 2019 where the total recorded average and maximum day demands are larger compared to recent years water demands. This model was converted to Bentley WaterGEMS software to analyze the proposed developments within the South-West Ingersoll Secondary Plan and recommend an appropriate strategy for providing water servicing to the proposed developments.

The Oxford County Annual Drinking Water System Summary Reports for the years 2020 to 2022, and recent water consumption information for the three largest water users in the Town of Ingersoll have also been used to update the average day water consumption in the model to 2022 consumption values.

The analysis of the water servicing for the Secondary Plan lands included potential connections to existing watermains, additional wells and water treatment facilities, pipe sizing and potential impacts to the operating pressure.

2.0

Water Servicing Findings

2.1

Existing Conditions

2.1.1

Existing Water Distribution System

The Town of Ingersoll has a current population of approximately 14,065 people serviced by potable water via a system of seven ground water wells, of which five are currently operational.

Each well is connected to a water treatment facility comprising of an in-ground reservoir, automated chlorine injection system, monitoring/alarm equipment and supplies water directly to the distribution system. The whole Town operates as one pressure zone. Storage capacity of the system is provided by a 2,840 m³ water tower on Wonham Street South and a 3,290 m³ reservoir at the Merritt Street water treatment facility. The Municipal Drinking Water License and Permit to Take Water issued by the Ministry of the Environment, Conservation and Parks (MECP) regulates the amount of water that can be utilized over a given time period. The Permit to Take Water Limit is 26,367 m³/day.

A summary of the 2022 drinking water flows is provided in **Table 1** below.

Table 1: 2022 Water Flow Quantities

Flow Summary	Quantity
Municipal Drinking Water License Limit	26,367 m ³ /d
Current Water system Firm Capacity	10,454 m ³ /d
2022 Average Daily Flow	4,160 m ³ /d
2022 Maximum Daily Flow	5,944 m ³ /d
2022 Average Monthly Flow	126,532 m ³
2022 Total Amount of Water Supplied	1,58,378 m ³

As the system is currently limited to 5 operational wells out of 7 wells, the current systems firm capacity, defined as the wells capacity without the highest producing well in case of an emergency or maintenance situation is rated at 10, 454 m³/day. It is anticipated that the system firm capacity would increase to around 19,500 to 20, 000 m³/day when the 2 inactive wells (West Street Well and Wallace Line Well) are reactivated and their treatment and pumping facilities are upgraded.

The existing watermain (excluding services) range in size from 40 mm to 400 mm consisting of a variety of materials including cast iron, copper, ductile iron, HDPE and PVC.

Future Conditions

Future Development

The Secondary Plan includes approximately 630 gross hectares of land that was brought in from South-West Oxford into the Town of Ingersoll as part of an urban boundary adjustment in January 2021 and designated them for urban serviced uses i.e. residential, commercial, prime industrial and industrial.

There are generally three areas that make up the South-West Ingersoll Secondary Plan Area (“Plan Area”), which include the east-, west-, and south-side of Ingersoll (see **Map 1**). The East side of Ingersoll includes Low and Medium Density Residential development with a net area of 19.2 ha. The South side of Ingersoll will be Prime Industrial and Service Commercial Development with a net area of 156.2 ha while the West side 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.

Water Demand

A residential water demand of 183 Liters/capita/day was used for the Secondary Plan residential modelling based on the established value for domestic water demands in the Water/Waste Water Master Servicing Plan currently being finalized by R.V. Anderson Associates Limited for Oxford County.

For the purpose of the Secondary Plan water servicing analysis, an average value of 35 m³/ha/day has been considered in accordance 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 m³/ha/day to 55 m³/ha/day. For commercial areas, an allowance of 28 m³/ha/day has been considered in accordance with MECP guidelines.

Table 2 below presents the estimated average day demands for the different sections of the Study Area.

Table 2: Average Day Demand (ADD) for Ingersoll Secondary Plan

	Land Use	Area/Population/Units*	Average Unit Demands	ADD (m ³ /d)
East side of Ingersoll	Low Density Residential	600 people	183 L/cap.d	110
	Medium Density Residential	1824 people	183 L/cap.d	334
Total ADD Demand (East of Ingersoll) =				444
South side of Ingersoll	Prime Industrial	147.6 ha	35 m ³ /h·d	5,168
	Service Commercial	8.6 ha	28 m ³ /h·d	240
Total ADD Demand (South of Ingersoll) =				5,408
West side of Ingersoll	Low Density Residential	751 people	183 L/cap·d	137
	Medium Density Residential	216 people	183 L/cap·d	40
	Prime Industrial and Industrial	152.7 ha	35 m ³ / h·d	5,344
Total ADD Demand (West of Ingersoll) =				5,520
Total ADD Demand (Ingersoll Secondary Plan) =				11,372
Total ADD Demand (Town of Ingersoll including Secondary Plan) =				15,532

* Net developable areas are provided by Watson using an average between minimum and maximum densities from Oxford County official plan and discussion with the county.

3.3 Proposed Water Servicing Strategy

In order to provide water servicing to the Secondary Plan areas, it is recommended that a minimum of two connections be made from each designated area to the existing water distribution system network for redundancy, fire flow availability and improvement of water quality.

For the east side of Ingersoll, two 300 mm connections to the existing 200 mm on Walker Road and to the existing 300 mm on Clarke Road are recommended.

For the south side of Ingersoll, a 400 mm trunk line is recommended to be installed along Curry Road and Union Road to be connected across Highway 401 at the extension on Union Road to the south portion of Wallace Line in addition to a 300 mm connection along the extension of Harris Line across Highway 401 to connect with the existing 300 mm watermain on Ingersoll Street.

Two 300 mm connections are recommended for the west side of Ingersoll to the existing 300 mm watermain on Wallace Line and to the existing 300 mm watermain on Thomas Street.

The developed WaterGEMS model was used to model the potential connections to evaluate available capacity assuming the full build out of all areas.

Based on the outcomes of the modelled scenarios, a conceptual water servicing plan of the recommended potential water servicing strategy is presented in **Figure 1**. Local distribution mains on individual streets within the potential developments would be fed off this looped trunk watermain.

As the estimated additional demands account for about 2.75 times the current daily consumption of the entire Town, the available five active wells would not be able to supply the required quantities at peak hour demands with the available active pumping systems.

A scenario was examined where Wallace Line and West Road wells and reservoirs would be reactivated and fitted with upgraded booster pumping stations including upgrading the Thompson booster pumps, while keeping the maximum daily allowed water discharge within the municipal drinking water license limits. However, this scenario did not satisfy the MECP requirements for a minimum of 40 psi (275 kPa) at peak hour demands at the considered demands for industrial and commercial developments. This future condition scenario estimates that the whole Town's maximum day demand is exceeding the wells firm capacity after activating the two inactive wells and the peak hour demand is exceeding the municipal drinking water license daily limit. Running a 48-hour extended period simulation indicated low pressures at different times of the day where various reservoirs will become empty at the same time due to the wells' production not keeping up with the required demands during peak hours.

An additional scenario was further examined considering adding an extra well across from the Thompson Well, south of Highway 401 including a reservoir and pumping station similarly sized as the Thompson Well. This scenario satisfies the required minimum pressures at peak hour demands, without any added factor of safety or extended storage for emergency situations or fire flows. Further analysis is recommended to study adding one or two elevated water tanks south of Highway 401 for storage and pressure maintenance.

Fire flows were considered only for the proposed residential areas. In general, the proposed watermains can provide sufficient fire flows for a very short duration of time in the industrial areas; however, heavy water users should consider having dedicated, on-site fire storage depending on the required fire flows calculated on a case-by-case basis.

The proposed residential developments on the East and West sides of Ingersoll in addition to some industrial lands on the west side (north of Highway 401) represent an easier option for servicing, as these areas are close to existing infrastructure and can be serviced without the requirement to construct utility crossings across the 401 highway. If phasing were to be considered, these would be the recommended areas to proceed first based on ease of extending existing servicing. At this time, it is understood that the Town would like to proceed with the servicing of Wallace Line as the initial phase.

The timing of the wells' activation and addition of one or more well including a water treatment facility south of Highway 401 and sizing of the proposed booster stations upgrades is subject to further analysis, depending on a more accurate estimate of the projected water demands for the developable areas and the Town's approach in introducing different phases for development.

Conclusions

The physical configuration of the proposed water distribution system to service the developments is based on the proposed extensions and connections described above and constructing a looped water system in the Secondary Plan areas connected to the Town's main distribution system. The watermain would be installed within the proposed ROW's.

The recommended water servicing strategy does not introduce new dead ends to the distribution system which is considered desirable for reducing water quality issues, while at the same time providing supply redundancy. Based on the high-level modelling that was conducted, the proposed trunk mains are recommended to be 300 mm and 400 mm in diameter with the addition of a new well and water treatment facility south of the 401 and reactivating the two inactive wells in Town with upgraded booster stations, in addition to upgrading one or two of the existing wells booster stations.

More advanced modelling is recommended to be completed during preliminary and detailed design phases to verify required pipe sizes while incorporating more accurate water demand information.

Table 3 shows the construction costs of the proposed trunk watermain and proposed upgrades within the Study Area.

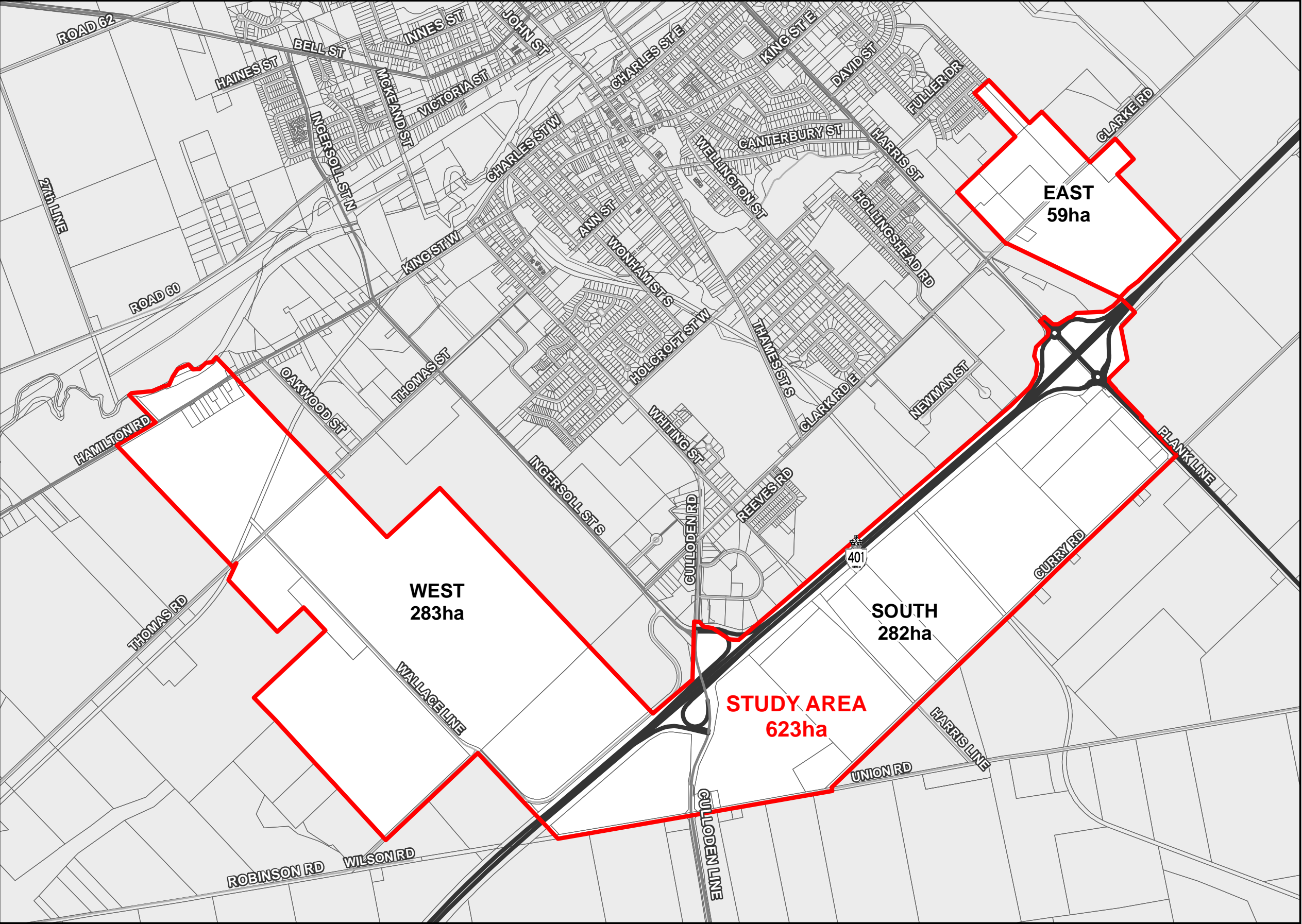
Table 3: Water Supply System Estimate of Construction Cost

Area	Trunk size Mm	Assumed Length	Price per Meter	Total Price + 30% Contingency
Ingersoll East	300	2600	\$600	\$2,028,000
Ingersoll West Industrial	300	2150	\$600	\$1,677,000
Ingersoll South	300	1000	\$600	\$780,000
Ingersoll South	400	3800	\$800	\$3,952,000
Subtotal				\$8,437,000
Other Elements	Number	Lump sum Cost	Total Price	Total Price + 30% Contingency
Hwy 401 Crossings	2	\$175,000	\$350,000	\$455,500
Upgrade Pumping Stations	3	\$750,000	\$1,500,000	\$1,950,000
New Water Treatment Facility	1	\$1,200,000	\$1,200,000	\$1,560,000
Subtotal				\$4,940,000
Totals				\$13,377,000

Map/Figure

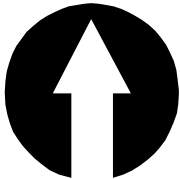
SOUTH WEST INGERSOLL 2021 AREA SECONDARY/SERVICING PLAN

MAP 1: SECONDARY PLAN AREA LIMITS

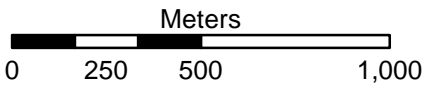


Legend

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



NORTH



Map Prepared by: PFM/ZJB
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Dillon Consulting Limited

March 02, 2023

Scale 1:20,000

SOUTH WEST INGERSOLL AREA SECONDARY PLAN

FIGURE 1: CONCEPTUAL WATER SERVICING FOR INGERSOLL SECONDARY PLAN

