JLR No.: 31681-001
Revision: 01

April 18, 2024

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Schedule B Municipal Class Environmental Assessment for a New Treated Water Storage Facility in the Village of Lansdowne

Phase 1 Report

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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1.0 Introduction

1.1 Background

The Village of Lansdowne (Village) is the largest village in the Township of Leeds and the Thousand Islands (Township) and is located at the intersection of County Roads 3 and 34, just north of County Road 2, around 50 kilometres northeast of the City of Kingston. The Village has a population of approximately 550 and is serviced by two municipal wells, a filtration and disinfection system, one standpipe, and a dedicated distribution system comprised of approximately six kilometres of water piping that is owned by the Township and operated by the Ontario Clean Water Agency (OCWA). Refer to Figure 1 for a Location Plan map.

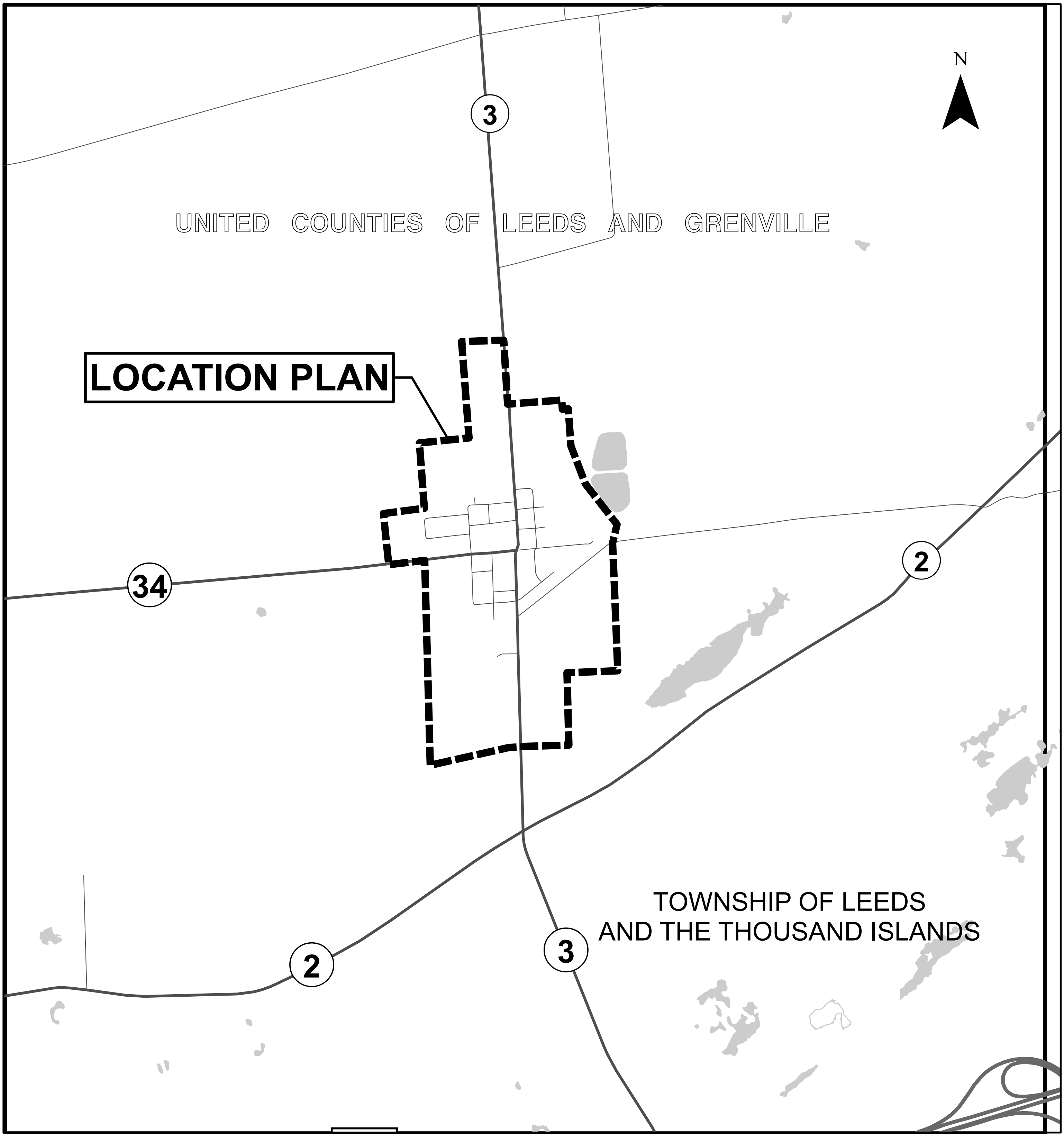
A Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study, completed by JLR in 2022, identified the Village's standpipe did not have adequate storage for the current population and it has insufficient capacity to service projected growth over the next 25 years and beyond. The study identified that the hydraulic grade line (HGL) in the water distribution system did not provide adequate flow. Thus, the Township is considering options for additional potable water storage capacity in the Village to ensure continued provision of safe drinking water well into the future.

The standpipe was last recoated in 2019. A recent inspection revealed that the standpipe is general good condition. There is an active mixer in the standpipe that provides mixing. However, OCWA had indicated that there is ice formation in the standpipe during cold weather. It should also be noted that the standpipe is not currently used for disinfection CT and the first user of the system is the splashpad in front of the standpipe.

In September 2022, the Township retained J.L. Richards & Associates Limited (JLR) to undertake a Schedule 'B' Municipal Class Environmental Assessment (Class EA) for the Village's potable water storage system to evaluate alternate potable water storage solutions that will service the community for the next 25 years.

The objectives of this Phase 1 Report are:

- To provide an overview of the Class EA process
- To summarize background information related to the Village's potable water system.
- To review historical water demands.
- To summarize growth projections and expected water demands for the 25-year planning horizons based on existing demands.
- To identify system constraints associated with the existing potable water storage system.
- To identify possible alternative solutions for the potable water storage system that can be considered as part of Phase 2 of the Class EA.



PROJECT:

VILLAGE OF LANSDOWNE, TREATED WATER STORAGE
FACILITY SCHEDULE B MUNICIPAL CLASS EA

DRAWING:

LANSDOWNE LOCATION PLAN

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DESIGN: CK
DRAWN: CK
CHECKED: AG
JLR #: 31681-001

DRAWING #:
FIGURE 1

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1.2 Class Environmental Assessment Process

The Ontario Environmental Assessment Act (Act) sets out a planning and decision-making process to consider potential environmental effects before a project begins. The purpose of the Act is to provide for the protection and conservation of the natural environment (R.S.O. 1990, c.E.18, s.2).

The Municipal Class EA (MCEA) process is followed for common types of projects to streamline the review process while ensuring that the project meets the requirements of the Act. In 1987, the first Class EA document prepared by the Municipal Engineers Association (MEA) on behalf of Ontario Municipalities was approved under the Act. Amendments were subsequently made in 1993, 2000, 2007, 2011, 2015, and 2023.

The MCEA process includes the following stages:

- Phase 1: Problem and/or opportunity identification.
- Phase 2: Identification and evaluation of alternative solutions.
- Phase 3: Preparation of alternative design concepts to support a preferred solution.
- Phase 4: Preparation of an Environmental Study Report (ESR) for posting and review on the public record.
- Phase 5: Project implementation and monitoring.

Since projects may vary in their environmental impact, they are now classified in terms of the following schedules, pursuant to the most recent amendment to the MCEA process in 2023:

- ‘Exempt’ projects, most of which were formerly classified as 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 environmental effects. While these projects are exempt from the MCEA process, proponents should consider whether notice about the project should be given or consultation on the project should be carried out. Furthermore, proponents are also responsible for obtaining any other applicable permits, approvals, and authorizations for the project.
- ‘Eligible for Screening to Exempt’ projects may be eligible for exemption based on the results of a screening process. Proponents may choose to complete the applicable screening process to determine whether the project is eligible for exemption or proceed with the applicable Schedule ‘B’ or Schedule ‘C’ process, as noted below.
- Schedule ‘B’ projects have the potential for some adverse environmental impacts and therefore, the proponent is required to undertake the first two phases of the MCEA process. This includes mandatory consultation with Indigenous Communities, the public and other affected stakeholders as well as relevant review agencies; and the preparation of a Project File which documents the Class EA process and is placed on the public record for review and comment. If there are no outstanding concerns and the regulatory process has been completed, then the proponent may proceed to implement the project. Generally, these projects include improvements and minor expansions to existing facilities or smaller new projects.

- Schedule ‘C’ projects have the potential for greater environmental impacts and are subject to the full MCEA process. This includes mandatory consultation with Indigenous Communities, the public and other affected stakeholders as well as relevant review agencies; identifying, assessing, and refining alternative solutions to determine a preferred solution; and preparing the ESR which documents the Class EA process and is placed on the public record for review and comment. If there are no outstanding concerns and the regulatory process has been completed, then the proponent may proceed to implement the project. Generally, these projects include the construction of new facilities and major expansions to existing facilities.

Based on the following excerpt from the MEA Guidelines, this project is being undertaken as a Schedule ‘B’ Class EA that is eligible for screening:

“6c. Establish new water storage facilities where the facility is not located in or adjacent to an environmental sensitive natural area, residential or other sensitive land use, or on lands with cultural heritage or archaeological potential”.

2.0 Phase 1 Methodology

2.1 Project Initiation Meeting

A project initiation meeting was held on October 4, 2022, with representatives from the Township and OCWA to confirm roles and responsibilities and to establish a basis for this Class EA.

2.2 Compilation and Review of Existing Documentation

To establish a baseline for reference on this project, the Township provided available related documentation to JLR for review. Refer to Appendix A for a list of the available documentation. As part of Phase 1, GIS mapping from the United Counties of Leeds and Grenville and PDF base maps of infrastructure and parcel fabric were used to develop base maps of the distribution system and study area; available reports were reviewed to determine the related history, existing conditions, and planning projections for the study area; and operations data for the water system from 2018 to 2022 were summarized and analyzed.

2.3 Hydraulic Water Model Update for Existing Conditions

The hydraulic water model developed as part of the *Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study Update* (JLR, May 24, 2022) was updated to reflect existing conditions.

Since the previous water model had user defined pipe lengths imported from EPANET, the model network was updated to allow for properly scaled pipe lengths. Junction node elevations were carried over from the previous model. Pipe diameters were updated to reflect inner diameters of ductile iron pipe in the model, with 155 mm modelled for 6” diameter pipe and 204 mm modelled for 8” diameter pipe. The Village of Lansdowne’s operating authority, Ontario Clean Water Agency (OCWA) confirmed that the pipe layout and diameters are accurately represented in the model per the Figure shown in Appendix B. Frederick Street and Jessie Street areas were revised in the model in accordance with the *As-Constructed General Plan – Watermains* (Maksymec & Associates Ltd., January 18, 1977) and OCWA’s comments. Both streets have a 150 mm diameter watermain which terminates in a dead end.

OCWA noted that currently there is only a watermain linking the water source to the system, which leaves the system vulnerable to a pipe break. Constructing a watermain connection between Church Street and Jessie Street to address this concern will be reviewed as part of Phase 2.

To distribute the existing water demands throughout the water model, each existing dwelling unit, as identified from satellite imagery was assigned to the nearest model junction node. To calculate the water demands assigned to each junction node in the model, the existing demands identified in Table 5 were divided by the total number of units (269 units) to obtain a water consumption rate per unit. This consumption rate was applied to each junction node based on the number of units. This methodology determined the average day, maximum day, and peak hour demands, which were then input into the water model accordingly. The detailed water demand calculations are in Appendix B.

2.4 Public Consultation

Taking into consideration mandatory requirements and objectives of effective consultation with the public and other potential stakeholders, as outlined in the MEA Class EA document, consultation for this project includes a minimum of one project notification to the public and potential stakeholders, and one Public Information Centre.

A Project Initiation Notice was issued on December 6, 2022, and published on the Township's website as well as mailed directly to potential stakeholders. Refer to Appendix C for the current stakeholder list and the Notice.

2.5 Problem and Opportunity Identification

A Problem and Opportunity statement was generated from this Class EA Phase 1 stage and is included in Section 4.0 of this Report.

2.6 Phase 1 Report

This Phase 1 Report is the culmination of the first phase of the Class EA process. The Report will be used as a background document for Phase 2 and can be made available to stakeholders upon request.

3.0 Planning Projections and Future Design Basis

The existing service population in the Village of Lansdowne is approximately 550 persons. JLR completed the Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study Update in May 2022, which reviewed the short and long-term growth within the Village.

Subsequently, JLR completed a Lansdowne Water Supply, Water and Wastewater Infrastructure Capacity Review in September 2023, which confirmed the two future growth scenarios as presented in Tables 1 and 2.

124 units or 313 persons are allocated for Short-Term Growth. 486 units or 1,215 persons are allocated for Long-Term Growth.

Refer to Figure 2 for a map of future growth areas.

Table 1: Short-Term Growth Summary

Property	Land Use	Status	Residential Dwelling Units	Equivalent Population (1)
Church Street	Residential	Approved – Construction starts in early 2023	6	15
Miller Street	Residential	Part Lot Application Submitted	1	3
Lansdowne Mixed Used Development (East) Phase 1	Residential	Requested	91	228
Infill	Residential	Pending	9	23
Bill 23 Allowance (Existing) (3)	Residential	Pending	12	30
Bill 23 Allowance (Short-Term Growth) (3)	Residential	Pending	5	14
		Short-Term Residential Total	**124**	**313**

Table Notes:

(1) A density of 2.5 people per unit was used to determine the equivalent population.
(2) Equivalent population based on Table 3 in Lansdowne Wastewater Infrastructure Capacity and Phasing Review (January 31, 2023, JLR).
(3) Township requested additional units be allocated to accommodate Bill 23. It has been assumed that 5% of the existing residential lots (241x5% = 12) and short-term lots (107x5% = 5) be allocated, assuming one additional unit will be built on each lot because of Bill 23.

Table 2: Long-Term Residential Growth Summary

Property	Land Use	Gross Land Area (ha)	Status	Residential Dwelling Units	Equivalent Population
Lansdowne Mixed Use Development (East) Phase 2	Residential	11.09	Requested	223	558 (1)
	Multi-Unit Residential	1.5	Requested	60 (2 Towers x 30 Units)	150 (1)
Church Street	Residential			6	15
East Lansdowne Lands	Residential	6.4	For Sale	23	58 (2)
4 Garden Street	Residential	22.7	Privately Owned	82	204 (2)
1254 Outlet Road & North Parcel	Residential	7.2	Privately Owned	26	65 (2)
Bill 23 Allowance (Existing) (3)	Residential	n/a	Pending	24	60
Bill 23 Allowance (Long-Term Growth) (3)	Residential	n/a	Pending	42	105
			Long-Term Residential Total	**486**	**1,215**

Table Notes:

(1) A density of 2.5 people per unit was used to determine the equivalent population. Number of units obtained from Lansdowne Development Preliminary Servicing Report (October 22, 2022, ForeFront Engineering)

(2) A density of 9 people per hectare was used to determine the equivalent population where units are not available. Equivalent population based on Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study Update (May 24, 2022, JLR)

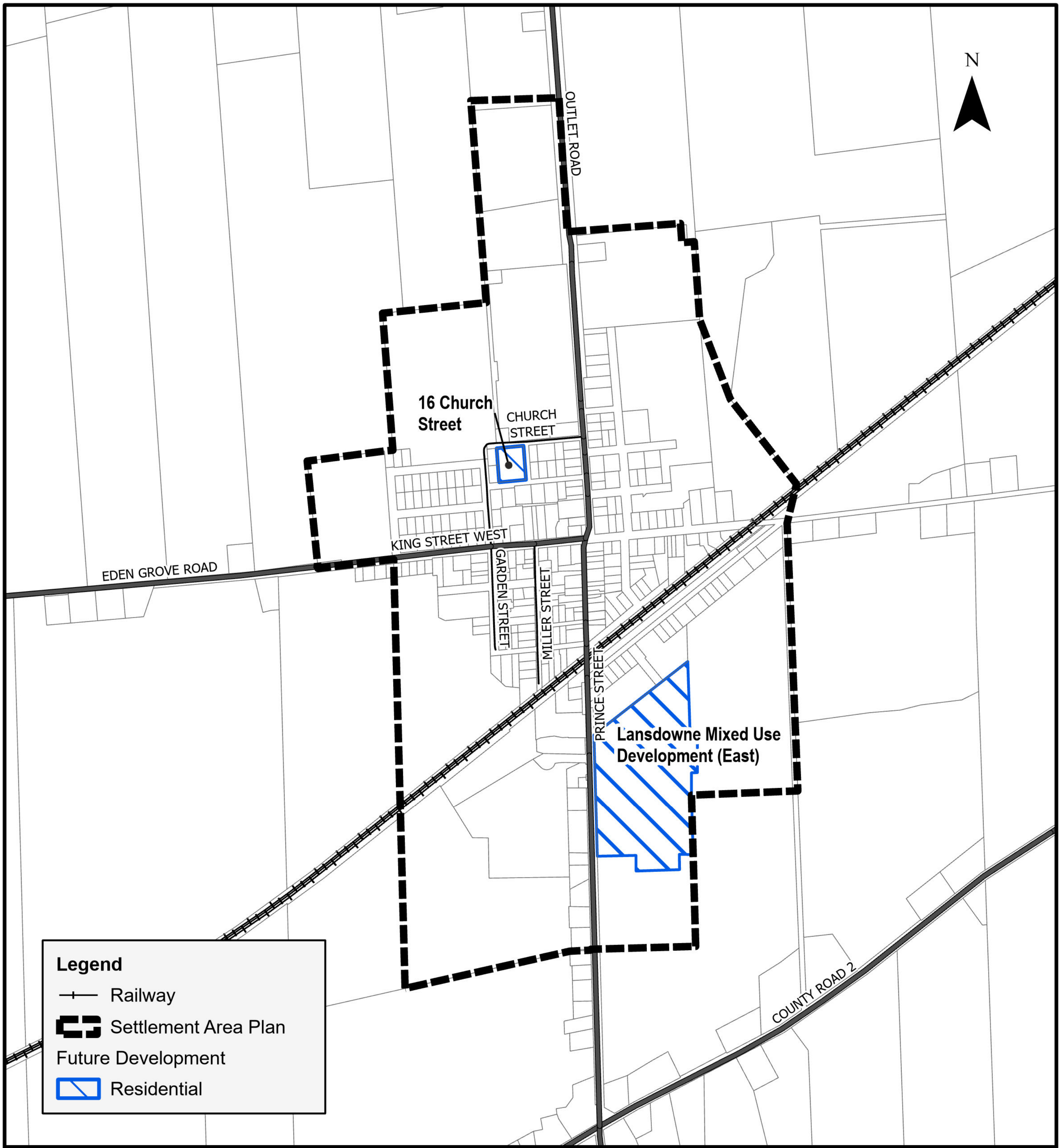
(3) Township requested additional units be allocated to accommodate Bill 23. It has been assumed that 10% of existing residential lots (241x10% = 24) and long-term lots (420x10% = 42) be allocated, assuming one additional unit will be built on each lot because of Bill 23.

Table 3: Long-Term Industrial and Commercial Growth Summary

Property	Land Use	Gross Land Area (ha) (1)
Lansdowne Mixed Use Development (East) Phase 1	Commercial	1.72
Lansdowne Mixed Use Development (East) Phase 2	Commercial	2.18
Lansdowne Mixed Use Development (West)	5 Light Industrial Blocks with complementary Commercial, including a recreational centre (600 seats), a restaurant (115 seats) and an adventure park (300 seats)	15.25
Lansdowne Mixed Use Development (West)	Future Development (Assumed Commercial)	5.93
	TOTAL (Long-Term Industrial and Commercial)	**21.18**

Note:

(1) Land area based on Lansdowne Development Preliminary Servicing Report (October 22, 2022, ForeFront Engineering)



PROJECT:

VILLAGE OF LANSDOWNE, TREATED WATER STORAGE FACILITY SCHEDULE B MUNICIPAL CLASS EA

DRAWING:

SHORT TERM FUTURE GROWTH AREAS

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DESIGN: CK
DRAWN: CK
CHECKED: AG
JLR #: 31681-001

DRAWING #:

FIGURE 2

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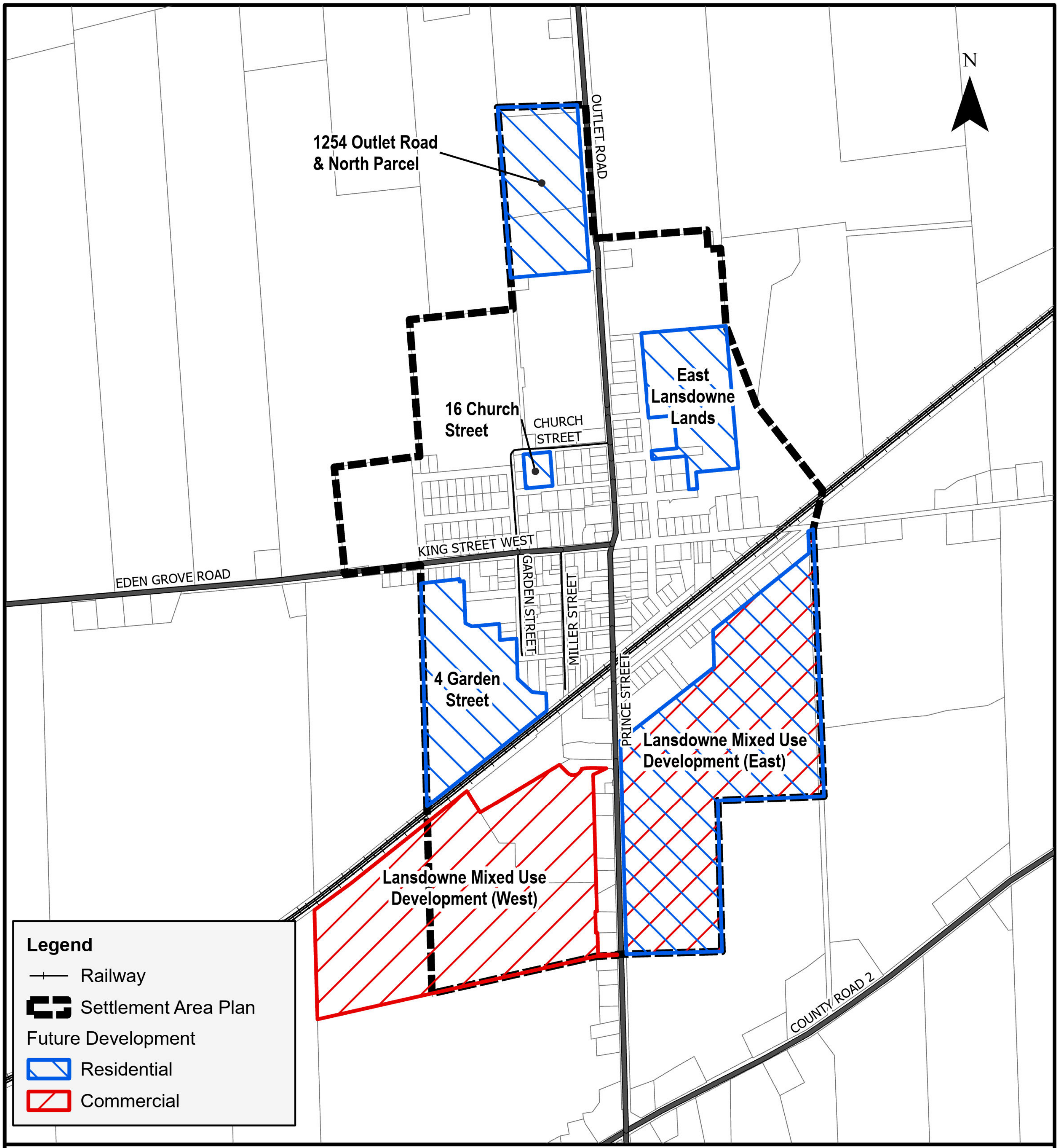

PROJECT:

VILLAGE OF LANSDOWNE, TREATED WATER STORAGE FACILITY SCHEDULE B MUNICIPAL CLASS EA

DRAWING:

LONG TERM FUTURE GROWTH AREAS

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CHECKED: AG
JLR #: 31681-001

DRAWING #:
FIGURE 3

File Location: P:\31000\31681-001 - Lansdowne Standpipe EA and Design\3-Production\7-Plan\31681_EA_Figures\31681_EA_Figures.aprx

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4.0 Description of Existing Conditions

4.1 Existing Drinking Water System Infrastructure

The Lansdowne Drinking Water System includes two municipal groundwater wells identified as No. 1 and No. 2, a filtration and disinfection treatment system, one municipal standpipe, and approximately six kilometers of water pipes.

The wells, treatment system, and standpipe operate in accordance with a Permit to Take Water (PTTW) No. P-300-7152129863, dated March 1, 2022, a Municipal Drinking Water License (DWL) No. 262-101, Issue No. 3, dated April 20, 2021, and a Drinking Water Works Permit (DWWP) No. 262-201, Issue No. 4, dated April 20, 2021. Refer to Figure 4 for an overview of the study area and identification of key infrastructure.

Well No. 1 and Well No. 2 are located 150 m apart and in separate buildings. Both wells were constructed in 1975. They draw raw groundwater under the direct influence (GUDI) of surface water.

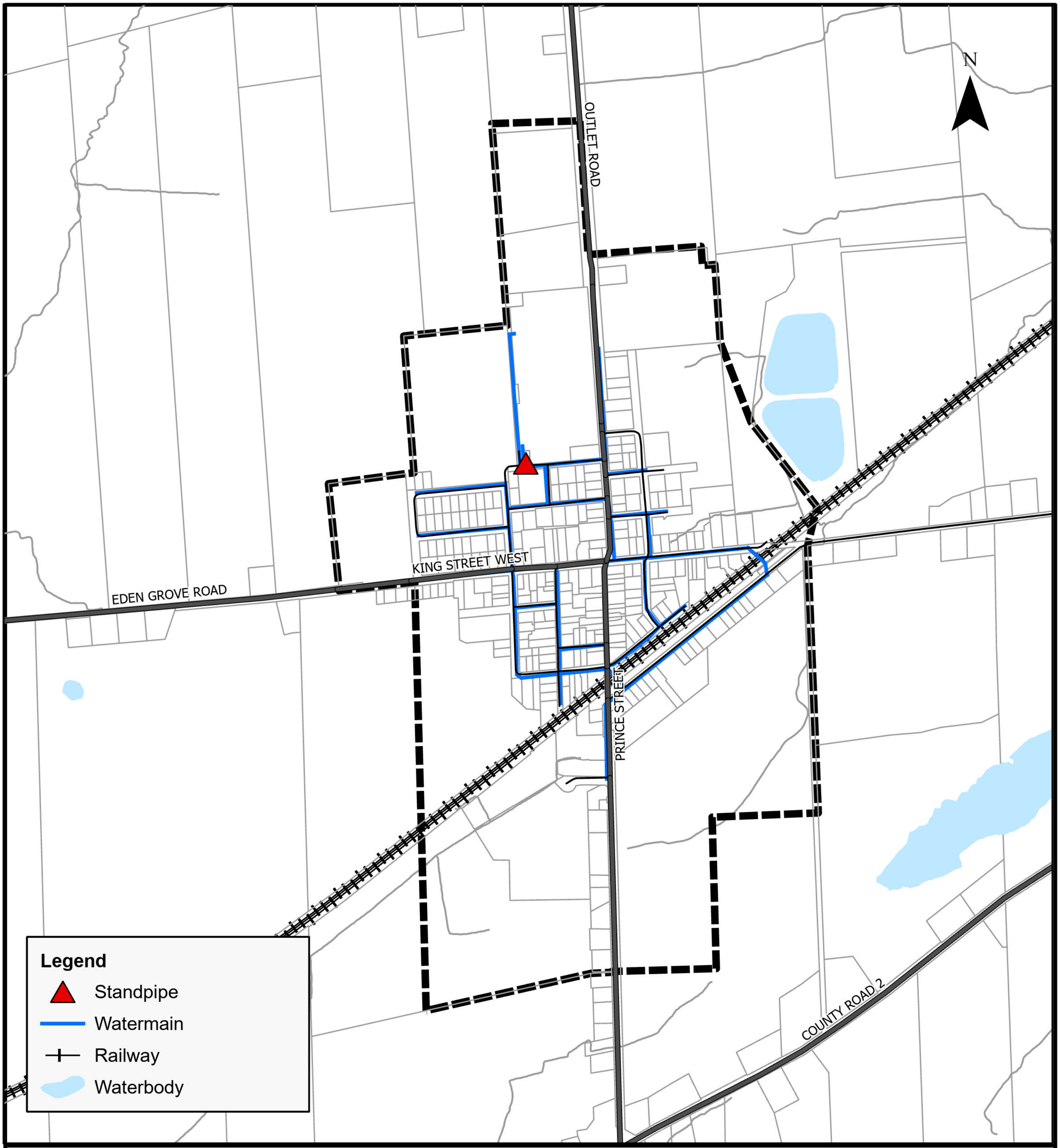
The water treatment plant (WTP), also named Well building No. 1, houses the treatment and control facilities for the system. Treatment includes filtration and disinfection. The filtration system consists of three parallel trains, consisting of a coarse, medium, and fine filter. Two trains are on duty, and one remains on standby. The filtered water is then treated by a UV reactor for primary disinfection. Secondary disinfection is provided by liquid sodium hypochlorite injections. A 149.25 m long and 200 mm diameter watermain provides chlorine contact time.

Potable water storage is provided by the Lansdowne Water Tower. This standpipe has a total storage volume of 2273 m^3 and a useable volume of 500 m^3, as listed in the First Engineers' Report (2001) and the DWWP. The total storage volume is different from what is listed in the DWWP. This volume was determined through consultation with the Township/OCWA, and calculations based on the as built drawings. The standpipe is located adjacent to the WTP and wells. The tank currently provides all the treated water storage in the Village for peak hourly demands and fire flows.

The Lansdowne standpipe was recoated in 2019. It underwent inspections during application and in 2021. The 2021 coating and linings warranty assessment was conduced by PW Makar Coatings Inspection Ltd. Isolated pinhole rusting was found on the roof weld seams and tank shell. Rust was also found on the weld seams for the ground level manway hatches. Sediment on the tank floor, including minor debris, impacted the ability to evaluate the floor lining system. The PW Makar report recommended a new manway hatch be installed for easier access and a warranty repair to the interior lining system.

OCWA indicated that ice continues to be an issue in the top metres of the standpipe during the winter, and this ice has repeatedly damaged the standpipe mixer's power supply. The mixer has been replaced multiple times. This issue will have to be addressed when the new manway hatch is installed, with the power supply installed through the side of the standpipe.

Table 4 summarizes key characteristics of the Township's existing potable water system infrastructure.



PROJECT:

VILLAGE OF LANSDOWNE, TREATED WATER STORAGE FACILITY SCHEDULE B MUNICIPAL CLASS EA

DRAWING:

OVERVIEW OF STUDY AREA AND KEY INFRASTRUCTURE

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DESIGN:	CK
DRAWN:	CK
CHECKED:	AG
JLR #:	31681-001

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FIGURE 4

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Plot Date: February 28, 2024 11:28 AM

Table 4: Lansdowne's Potable Water System Infrastructure

Parameter	Value (1)
Permit to Take Water (P-300-7152129863)	720 m^3/day (both wells combined) (2)
Proposed Amended Permit to Take Water	1,000 m^3/day (2)
Municipal Drinking Water License (262-101, Issue No.3)	1,224 m^3/day (2)
Drinking Water Works Permit (262-201, Issue No. 4)	
Water Supply	
Well 1 (constructed 1975(3), well pump and motor replaced 2022 (3))	44 m (4) deep; 200 mm diameter 8.3 L/s (717 m^3/day) @ TDH 84.2 m 720 m^3/day (PTTW)
Well 2 (constructed 1975(3), well pump replaced 1992(4))	50 m (4) deep; 200 mm diameter 8.3 L/s (717 m^3/day) @ TDH 84.2 m 720 m^3/day (PTTW)
Water Treatment Plant	
Type	UV and Sodium Hypochlorite Disinfection with Filtration
Contact Time	149.25 m long 200 mm diameter feeder watermain from Well Building No. 1
Water Storage	
Type	Standpipe
Size (5)	9.14 m (30') diameter x 34.41 m (112'10.75") height
Base Elevation	114.3 m (4)
Nominal Volume	2,273 m^3 (4)
Usable Volume (5)	500 m^3
SCADA setpoints (6)	34.21 m high level alarm 34.11 m plant stop level. 30.91 m plant start level. 30.21 m low level alarm

Table Notes:

1. (1) All information from Drinking Water Works Permit (DWWP) unless otherwise specified.
2. (2) PTTW value is the maximum flow for one well. MDWL value is close to the sum of the maximum values for both wells. This indicates different assumptions were made about whether the second well was on duty or standby. The Township recently completed a desktop hydrogeological study to verify the permit to take water capacity for both wells. Based on recent consultation meetings with MECP and Cataraqui Region Conservation Authority, the MECP has agreed to increase the PTTW to between 900 and 1,000 m^3/d. The amendment to PTTW is forthcoming.
3. (3) Original well construction year from the Annual Report. Note the Annual Report lists both well depths as 50 metres.
4. (4) First Engineers' Report, 2001.
5. (5) The DWWP and the First Engineer's report list a usable volume of 500 m^3, assuming the usable volume starts at 139.90 m and to meet 40 psi system pressure.
6. (6) SCADA setpoints provided by OCWA.

4.2 Current Water Demands

Table 5 summarizes historical potable water demands for the Lansdowne Drinking Water System, as calculated from operating data provided by the Township for 2018 through to 2022.

Table 5: Historic Potable Water Demands (2018-2022)

Year	Average Day Demand (m^3/day) (1)	Maximum Day Demand (m^3/day) (2)	Maximum Day Peaking Factor (3)
2018	181	410	2.27
2019	169	361	2.13
2020	198	407	2.06
2021	191	518	2.71
2022	172	395	2.30
Average	**185**	**424**	**2.29**
Average (L/s)	**2.14**	**4.91** (4)	

Table Notes:

(1) The Lansdowne Water Treatment Plant (WTP) Treated Daily Flow data over the past five years was used to determine the existing averaged day demands (ADD) for the water distribution system. This excluded data from July 2019 from high flows during the period the tower was refilled after rehabilitation work. The total existing average day demand used was the average water demand over the five years, which is 185 m^3/day or 2.1 L/s.

(2) The WTP data provided the maximum day demand (MDD) for each of the past five years. This data excludes peak flows from the July 2019 refilling of the tower, in addition to high flows during distribution flushing maintenance in May 2018 and October 2019.

(3) The peaking factor for the maximum day was calculated for each year using the annual MDD and ADD. The average of the five peaking factors was 2.29.

(4) The average of the five peaking factors was applied to the average day demand stated above to give an overall maximum day demand of 424 m^3/day or 4.91 L/s.

(5) Although there was no peak hourly data specifically recorded, the peak hour demand was estimated using a theoretical peaking factor of 1.5 times the maximum day demand, as recommended in the MECP Design Guidelines for Drinking Water Systems (2008) for a community of any size. Thus, the peak hour demand is 636 m^3/day or 7.36 L/s.

The Village operates at an average day demand of 185 m^3/day, a maximum day demand of 424 m^3/day, and a peak hourly demand of 636 m^3/day. This is equivalent to an average daily per capita consumption rate of 276 L/d per capita based on a serviced population of 670, determined using a population density of 2.5 persons per unit and 268 users of the system (Township), which includes industrial, commercial, and institutional users. This rate is comparable to the MECP Design Guidelines (2008) that identifies typical values between 270 and 450 L/c/d.

This flow rate of 276 L/d per capita will be used for existing flow calculations. A rounded flow rate of 280 L/d per capita will be used for future flow calculations as it falls within the MECP range of values, is the same design value used by the City of Ottawa and is more conservative than the existing flow rate, as it accounts for increased water use per capita.

4.3 Water Treatment Plant and Well Pump Capacity

The capacity of a treatment system should be equal to or greater than the maximum day demand on the system (MECP, 2008), assuming sufficient treated water storage exists to meet peak hour demands and fire protection. Table 6 provides a summary of related parameters.

Table 6: Existing Water Treatment and Pumping Capacity

Parameter	Existing (m^3/day)
WTP Rated Capacity	1,224
Well Pump Capacity	1,440 (720 per pump)
Maximum Day Water Demand	424

4.4 Current Water Storage Requirements

The 2008 MECP Design Guidelines for Drinking-Water Systems state that total treated water storage within the system should at least amount to the sum of the required equalization storage (B), fire storage (A) and emergency storage (C) allowances, as depicted in Figure 5.

Based on these Guidelines, Table 7 provides a summary of the estimated current total storage requirements for the Township.

The current flow rate of 276 L/day per person was used for the existing requirements.

The fire flow was determined using the Fire Underwriters Survey (FUS) Guide to Recommended Practice, which is consistent with previous studies.

The fire flow duration follows the more stringent MECP Design Guidelines (2008) as per the client’s request to move forward with the most conservative forecast for storage requirements.

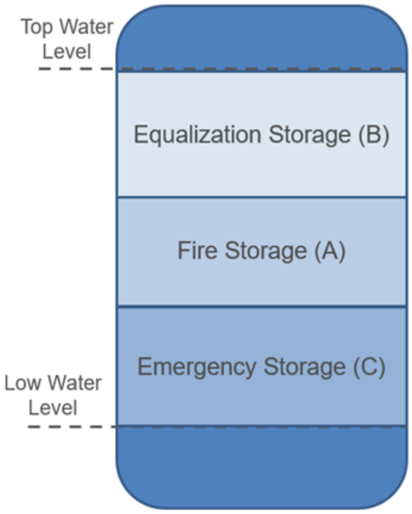


Figure 5: Water Storage

Table 7: Current Potable Water Storage Requirements

Parameter	**Existing (2023) Storage Requirement**
Equivalent Population (1)	670
Fire Flow (2) (L/min)	4000
Duration (3) (Hours)	2
A – Fire Storage (4) (m^3)	480
B – Equalization Storage (5) (m^3)	106
C – Emergency Storage (6) (m^3)	147
TOTAL STORAGE REQUIREMENT (m^3)	**733**
EXISTING STORAGE (7) (m^3)	500
DEFICIT (m^3)	**233**

Table Notes:

(1) Determined from a population density of 2.5 persons per unit and 268 users of the system, which includes industrial, commercial, and institutional users. Equal to a per capital average day demand of 276 L/d.

(2) Value from Tables 7 and 8 of the Water Supply for Public Fire Protection: A Guide to Recommended Practice in Canada (Fire Underwriters Survey, 2020).

(3) Value from Table 8-1 of MECP Drinking Water Design Guidelines (2008) based on equivalent service population (duration is the amount of time fire flow must be sustained).

(4) Largest expected fire volume = fire flow x duration

(5) 25% of Maximum Day Demand

(6) 25% of the sum of ‘A’ and ‘B’

(7) Section 8.42 of the MECP Design Guidelines states that the Equalization Volume ‘B’ should be located between the top water level (147.5 m) and the elevation needed to produce a minimum pressure of 40 psi during peak hourly flow (143.5 m). The fire and emergency volumes of A and C should be located between the elevation needed to produce 40 psi under peak hourly flow and the elevation needed to produce a minimum pressure of 20 psi under maximum day plus fire flow conditions (129.6 m). Upon discussion with the Township, it is determined to continue carrying the 500 m^3 useable volume per DWWP and First Engineers’ Report.

Based on the information available, the existing treated water storage volume is insufficient for current demand, relative to the MECP requirements.

Notably, a recent fire event on July 4, 2023 resulted in the standpipe losing approximately 6.7 m of water when the fire trucks were being filled. Even though the fire occurred outside of the urban boundary, the demand from firefighting resulted in the water treatment plant running close to capacity, the standpipe losing storage volume, and a recovery period of two days to refill the standpipe to its normal levels.

4.5 Water Distribution System Design Criteria and Operating Parameters

According to the MECP Design Guidelines, under the average day, maximum day and peak hour scenarios, the design criteria states:

- The maximum pressure at any point in the distribution system in unoccupied areas shall not exceed 689 kPa (100 psi), and while in occupied areas, shall not exceed 552 kPa (80 psi).

- Average Day: Pressures shall be within the range of approximately 350 kPa (50 psi) to 480 kPa (70 psi) and not less than 276 kPa (40 psi).
- Maximum Day + Fire Flow: Residual pressures at any point in the distribution system shall not be less than 140 kPa (20 psi).
- Peak Hour: Pressures shall be a minimum of 276 kPa (40 psi).

The Township operates the standpipe located on Church Street in the north portion of the Village. Based on the as-built information provided by the Township, the existing standpipe has a base elevation of 114.3 m. The water model was configured to simulate steady-state operation of the water distribution system under the average day, peak hour, and maximum day plus fire flow scenarios. To conservatively assess system pressure and expected fire flow availability, the High Lift Pumps (HLP) were turned off at the WTP and the Hydraulic Grade Level (HGL) in the standpipe was set to 145.21 m, the normal low operating water level (elevated storage tank (90% full). When the normal low operating water level is reached the HLPs are called on and begin to refill the standpipe. OCWA confirmed that the HLP start water level is set to 30.91 m above the standpipe base elevation, which corresponds to an HGL of 145.21 m.

4.6 Updated Existing Water Distribution System Model Simulation Results

The overall model schematic is included in Appendix B. The results of the model simulations are summarized in Table 8 and Table 9, where the percentage of junction nodes within each applicable range is reported.

Table 8: Existing Pressures under Average Day Demand and Peak Hour Demand

Pressure Range (kPa)			Percentage of Junctions	
			Existing Average Day Demand	Existing Peak Hour Demand
	Less than	276	0.0%	0.0%
276	up to	350	65.3%	65.3%
350	up to	400	10.2%	10.2%
400	up to	450	24.5%	24.5%
450	up to	500	0.0%	0.0%
500	up to and incl.	552	0.0%	0.0%
	Greater than	552	0.0%	0.0%

Under the existing average day and peak hour demand conditions with a standpipe HGL of 145.21 m, the table above shows that all the junction nodes exceed the minimum pressure of 276 kPa (40 psi) as recommended in the MECP Design Guidelines. However, the system pressure under average day demand is sometimes lower than the recommended normal operating pressure range of 350 kPa to 480 kPa., but this is not concerning as the system pressure consistently exceeds the minimum recommended pressure of 276 kPa.

Table 9: Existing Available Fire Flows under Maximum Day Demand

Fire Flow Range Under Maximum Day Demand (L/s)			Percentage of Junctions
	Less than	30	0.0%
30	up to	45	2.0%
45	up to	60	2.0%
60	up to	75	10.2%
75	up to	90	16.3%
90	up to	105	38.8%
105	up to	150	22.4%
150	up to	200	2.0%
200	up to and incl.	300	0.0%
	Greater than	300	6.1%

The fire flow simulations were carried out by allowing the model to calculate the maximum fire flow able to be drawn from each junction node while maintaining the minimum system pressures of 140 kPa (20 psi) at all junction nodes in the water distribution system. Based on the Ontario Building Code (OBC), the absolute minimum flow rate for fire protection is 30 L/s for a one-storey residential dwelling less than 600 m^2 in area. A typical two-storey residential dwelling typically requires a minimum water supply flow rate of 45 L/s. Under the existing maximum day plus fire flow conditions, the table above shows that only 2.0% of the junction nodes are expected to deliver between 30 L/s and 45 L/s of fire flow. This area is located along the dead end 150 mm diameter watermain supplying the residential units on Frederick Street. Dead end watermains at the extremities of a water distribution system typically have the lowest fire flow availability in a system. From the simulated results, it is expected the remainder of the system can deliver fire flows exceeding 45 L/s.

The model schematic results for the existing pressures and available fire flows are in Appendix B.

4.7 Water Quality

A review of Annual Reports and MECP Inspection Reports for the Lansdowne Drinking Water System for the past five years was completed. Treated water and distribution samples are tested for microbiology (total coliforms, E Coli.), chlorine residual, sodium, turbidity, phosphorus, lead, and a variety of other organic and inorganic compounds. The following incidents were reported:

- Sodium noted as an exceedance on January 11, 2017, and January 17, 2022. There is no Maximum Allowable Concentration for sodium defined in O. Reg. 169/03. OCWA is required to report sodium sample levels over 20 mg/L to the Ministry of Health, but the elevated sodium levels in the raw water source do not present operational challenges.

- Total coliform detected (July 27, 2020), resolved. OCWA determined the coliform source was human error or external contamination as the follow up samples in the distribution system were clean.

Watermain breaks in the past five years were also noted and repaired, including:

- Main break on Church Street in November 2017

OCWA has concerns relating to the raw water quality becoming more of an issue as demands increase, particularly related to increased suspended solids (i.e., hardness) and GUDI hits. The existing water treatment system would be able to manage increased bacteria in raw water, but it cannot currently treat elevated suspended solids. This issue will need to be reviewed in a future Class EA for water supply and treatment.

4.8 Other Considerations

4.8.1 Reliability

This standpipe provides all the treated water storage in the Village. In the event of an emergency or planned shutdown of the standpipe (ex. during interior rehabilitation), the wells would be relied on to supply domestic system demand on a continuous basis. Additionally, fire protection from the communal water distribution system would not be available and primary disinfection contact time would be limited during the duration of the shut-down.

A major impact to the reliability of the existing water system is that there is only one watermain that connects the standpipe to the entire system. If this watermain along Church Street were to cease function or require maintenance, the residents of Lansdowne would not have potable water for the duration of the repair. This issue was also identified in conversation with OCWA, and it was recommended that the dead end watermains along Church and Garden Streets be connected to increase the reliability of the system. This connection would continue to convey treated water to the Village in the event the Church Street watermain was not available.

There are several dead end watermains in the existing water system, such as those at the west ends of Jessie and Fredrick streets. Connecting these watermains through looping would increase the reliability of the system. It would also improve the available fire flows and water quality in these areas. Phase 2 of this project will evaluate these options in detail, to maximize the benefits to both existing and future development.

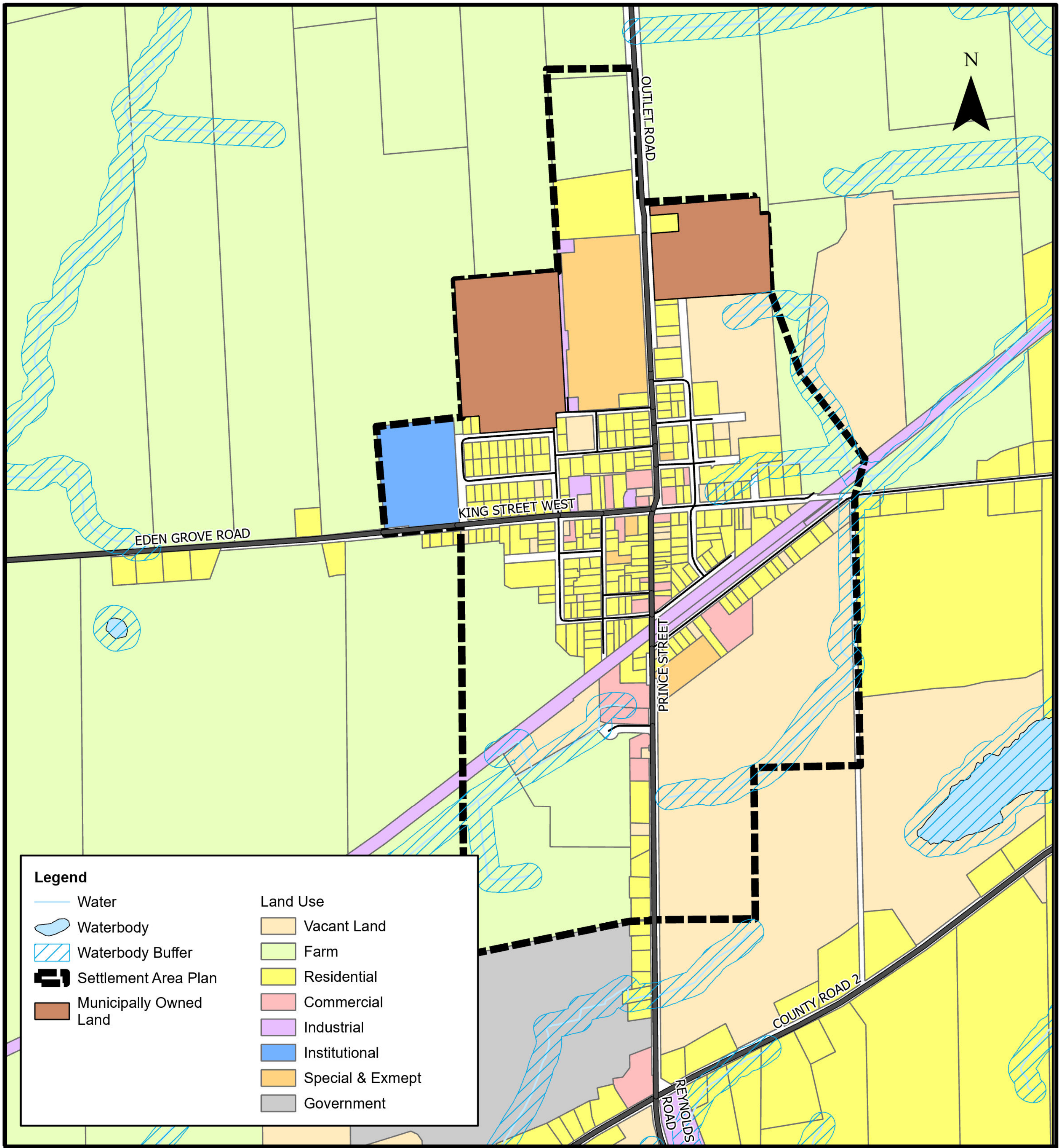
4.8.2 Land Use and Planning

The Official Plan for the United Counties of Leeds and Grenville was approved by the Ministry in February 2016 (consolidated September 2022). It provides direction for County growth management and land use decisions through upper-tier land use planning guidelines.

The Township of Leeds and the Thousand Islands adopted its Official Plan prepared by WSP in September 2018. It was approved by the United Counties of Leeds and Grenville in September 2018. The plan guides and directs future growth and development within the municipality to the year 2031. The Township's Zoning By-Law No. 07-079 (consolidated August 2011) outlines specific development requirements and setbacks for zones throughout the Township.

Any future development for future water storage will need to consider the requirements of these documents.

Refer to Figure 6 for mapping related to current land use constraints for the study area identified in the Official Plan.



PROJECT:

VILLAGE OF LANSDOWNE, TREATED WATER STORAGE FACILITY SCHEDULE B MUNICIPAL CLASS EA

DRAWING:

LAND USE CONSTRAINTS

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN:	CK
DRAWN:	CK
CHECKED:	AG
JLR #:	31681-001

DRAWING #:

FIGURE 6

File Location: P:\31000\31681-001 - Lansdowne Standpipe EA and Design\3-Production\7-Plan\31681_EA_Figures\31681_EA_Figures.aprx

Plot Date: February 28, 2024 11:47 AM

5.0 Future Water Storage Requirements

5.1 Future Water Demand

The design parameters used to calculate the future water demands of the water distribution system are in Table 10.

The Industrial, Commercial, and Institutional (ICI) demand was determined using a per-hectare demand allowance of 9.83 m^3/day for commercial lands and 35 m^3/day for light industry. These values are 75% of the allowances recommended by the MECP which maintains the assumptions made by the 2022 memo prepared by JLR and the Forefront report regarding the small community size and type of development.

The average flow rate of 276 L/d per capita determined in Table 5 from existing demands was used for existing flow calculations. A rounded flow rate of 280 L/d per capita will be used for future flow calculations. This rate falls within the MECP range of values, is the same design value used by the City of Ottawa and is more conservative than the existing flow rate as it accounts for increased water use per capita.

Table 10: Future Water Demand Projection Design Parameters

Parameter	Residential	Industrial, Commercial, and Institutional (ICI)
Average Day Flow	280 L/cap/day	9.83 m^3/day (Commercial) 35 m^3/day (Light Industrial)
Maximum Day Flow (1)	2.29 x Average Day	2.29 x Average Day
Peak Hour Flow (2)	1.5 x Maximum Day	1.5 x Maximum Day

Table Notes:
(1) Peak factor determined from average and maximum day demand data, as listed in Table 5.
(2) MECP Design Guidelines for Drinking Water Systems Table 3-1.

To establish future potable water storage requirements, the MECP recommends using an ‘equivalent service population’; a service population that represents residential and industrial, commercial, and institutional (ICI) usage (MECP, 2008). An average daily per capita consumption rate of 280 L/day and the per-hectare demand allowances listed in Table 10 were used to determine the equivalent ICI service population.

In addition to these future demands, it was determined through recent consultation with the MECP that the PTTW will likely be increased to a maximum daily flow of 1,000 m^3/day. This maximum flow rate was considered as a “Mid-term” scenario to determine the associated storage capacity. Based on a linear interpolation of the short term (2028) and long term (2048) maximum day demands, it is expected this maximum daily flow will be reached in 2031. Similar linear interpolation between the short term and long term known total service population was used to determine the estimated total service population in this year.

Table 11: Future Water Demands

Parameter	Existing Conditions	Short-Term (2028)	Mid-Term (2031) (1)	Long-Term (2048)
Residential Population Growth	N/A	313	N/A	1,215
ICI Equivalent Population		N/A		2,167
Total Equivalent Serviced Population	670	983	1,490	4,365
Average Day Demand (m^3/day)	185	275	437	1,222
Maximum Day Demand (m^3/day)	424	630	1,000	2,799
Peak Hour Demand (m^3/day)	635	945	1,500	4,198

Table Note:

(1) The mid-term scenario is an estimated scenario based on the potentially allowed 1,000 m^3/day PTTW ceiling. The year assigned to this scenario is representative of a linear interpolation of water demands between short-term and long-term.

The design flow rate of 280 L/day per person was also used to determine the future equalization and emergency storage requirements. The remaining values were calculated with the same methodology described in Section 4.4.

Table 12: Future Water Storage Requirements

Parameter	Existing (2023)	Short-term (2028)	Mid-term (2031)	Long-term (2048)
Equivalent Population	670	983	1,560	4,365
Fire Flow (1) (L/min)	4,000	4,000	8,000 (7)	12,000
Duration (2) (Hours)	2	2	3 (8)	3
A – Fire Storage (3) (m^3)	480	480	1,440	2,160
B – Equalization Storage (4) (m^3)	106	158	250 (9)	700
C – Emergency Storage (5) (m^3)	147	159	423	715
TOTAL STORAGE REQUIREMENT (m^3)	**733**	**797**	**2,113**	**3,575**
EXISTING STORAGE (6) (m^3)	500	500	500	500
DEFICIT (m^3)	**232**	**297**	**1,613**	**3,075**

Table Notes:

(1) Value from Tables 7 and 8 of the Water Supply for Public Fire Protection: A Guide to Recommended Practice in Canada (Fire Underwriters Survey, 2020).
(2) Value from Table 8-1 of the MECP Design Guidelines (2008) based on equivalent service population (duration is length of time fire flow shall be sustained).
(3) Largest expected fire volume = fire flow x duration
(4) 25% of Maximum Day Demand
(5) 25% of the sum of 'A' and 'B'
(6) Section 8.42 of the MECP Design Guidelines states that the Equalization Volume 'B' should be located between the top water level (147.5 m) and the elevation needed to produce a minimum pressure of 40 psi during peak hourly flow (143.5 m). The fire and emergency volumes of A and C should be located between the elevation needed to produce 40 psi under peak hourly flow and the elevation needed to produce a minimum pressure of 20 psi under maximum day plus fire flow conditions (129.6 m).
(7) Assumed to be midway between the short- and long-term requirements.
(8) Assumed to be the same as the long-term requirements.
(9) From the potential future PTTW Maximum Day Demand of 1,000 m^3/d.

Based on the information available, the existing treated water storage volume is insufficient for long-term future growth. An additional 3,075 m^3 in water storage is needed to support this long-term growth.

6.0 Problem and Opportunity Statement

The following Problem and Opportunity Statement will be used as the basis for proceeding to Phase 2 of this Class EA:

The drinking water system in the Village of Lansdowne is facing problems such as water quality issues, fire flow constraints, and dead ends in the distribution network. The proposed new development will trigger an expansion to the existing treated water storage capacity.

There is an opportunity to ensure that the Township has a solution that will address existing and future constraints on the drinking water storage and distribution system.

7.0 References

Design Guidelines for Drinking-Water Systems (Ministry of the Environment, Conservation, and Parks; 2008)
Official Plan for the United Counties of Leeds and Grenville (MMM Group, 2022)
Township of Leeds and The Thousand Islands Official Plan (WSP, 2018)

8.0 Limitations

This report has been prepared by J.L. Richards & Associates Limited for Township of Leeds and The Thousand Islands' exclusive use. Its discussions and conclusions are summary in nature and cannot properly be used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report is based on information, drawings, data, or reports provided by the named client, its agents, and certain other suppliers or third parties, as applicable, and relies upon the accuracy and completeness of such information. Any inaccuracy or omissions in information provided, or changes to applications, designs, or materials may have a significant impact on the accuracy, reliability, findings, or conclusions of this report.

This report was prepared for the sole benefit and use of the named client and may not be used or relied on by any other party without the express written consent of J.L. Richards & Associates Limited, and anyone intending to rely upon this report is advised to contact J.L. Richards & Associates Limited in order to obtain permission and to ensure that the report is suitable for their purpose.

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:	Reviewed by:
	Susan Shi
Ahrani Gnananayakan, EIT, M.Eng. Environmental Engineering Intern	Susan Jingmiao Shi, P.Eng., M.Eng. Associate, Senior Environmental Engineer Practice Lead, Regional Market

Appendix A

List of Documents Provided by the Township

TOWNSHIP OF LEEDS AND THE THOUSAND ISLANDS
Lansdowne Standpipe EA and Design

LIST OF REQUIRED DOCUMENTATION – PHASE 1

No.	Description	Action / Status
1.0 GENERAL		
1.1	GIS Mapping of the Parcel fabric	Received
1.2	Other County GIS data including aerial images, base maps, 0.5 m contour data	Received
1.3	Township's Current Stakeholder List	*Sent*
2.0 STUDIES		
2.1	Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study Update (2022)	Retrieved (JLR)
2.2	Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study (2020)	Received
2.3	*First Engineers' Report (2001)*	*Received*
3.0 WATER DISTRIBUTION AND TREATMENT		
3.1	Water System DWWP, License and PTTW	Received
3.2	Water System Annual Reports (Last 4 Years)	Retrieved (Online)
3.3	MECP Inspection Reports (Last 5 Years)	Received
3.4	Tank Coating Inspection Reports	Received
3.5	As-Constructed Drawings of Water Infrastructure	Received
3.6	GIS Mapping data for Water Distribution System	Received
3.7	Available data for WTP, Water Storage and Distribution System including high and low SCADA setpoints for standpipe (2018-2022)	Received
3.8	List of watermain breaks or maintenance records	Received
3.9	Record of Complaints (Water), e.g., taste, noise, odour	Received
3.10	Well Pump curves, make, and model	Received
3.11	Fire hydrant testing data if available	Received
3.12	CT calculations	Received
3.13	*Hydrogeological Study to Examine Groundwater Sources Potentially Under Direct Influence of Surface Water*	*Received*
3.14	*Lansdowne Extraneous Flow (Precipitation) Data (2020)*	*Received*
4.0 PLANNING		
4.1	Township's Official Plan	Retrieved (Online)
4.2	Zoning By-Law	Retrieved (Online)
4.3	Future Growth Forecasts	Retrieved
4.4	*Lansdowne Development Preliminary Servicing Report (2022)*	*Received*

Appendix B

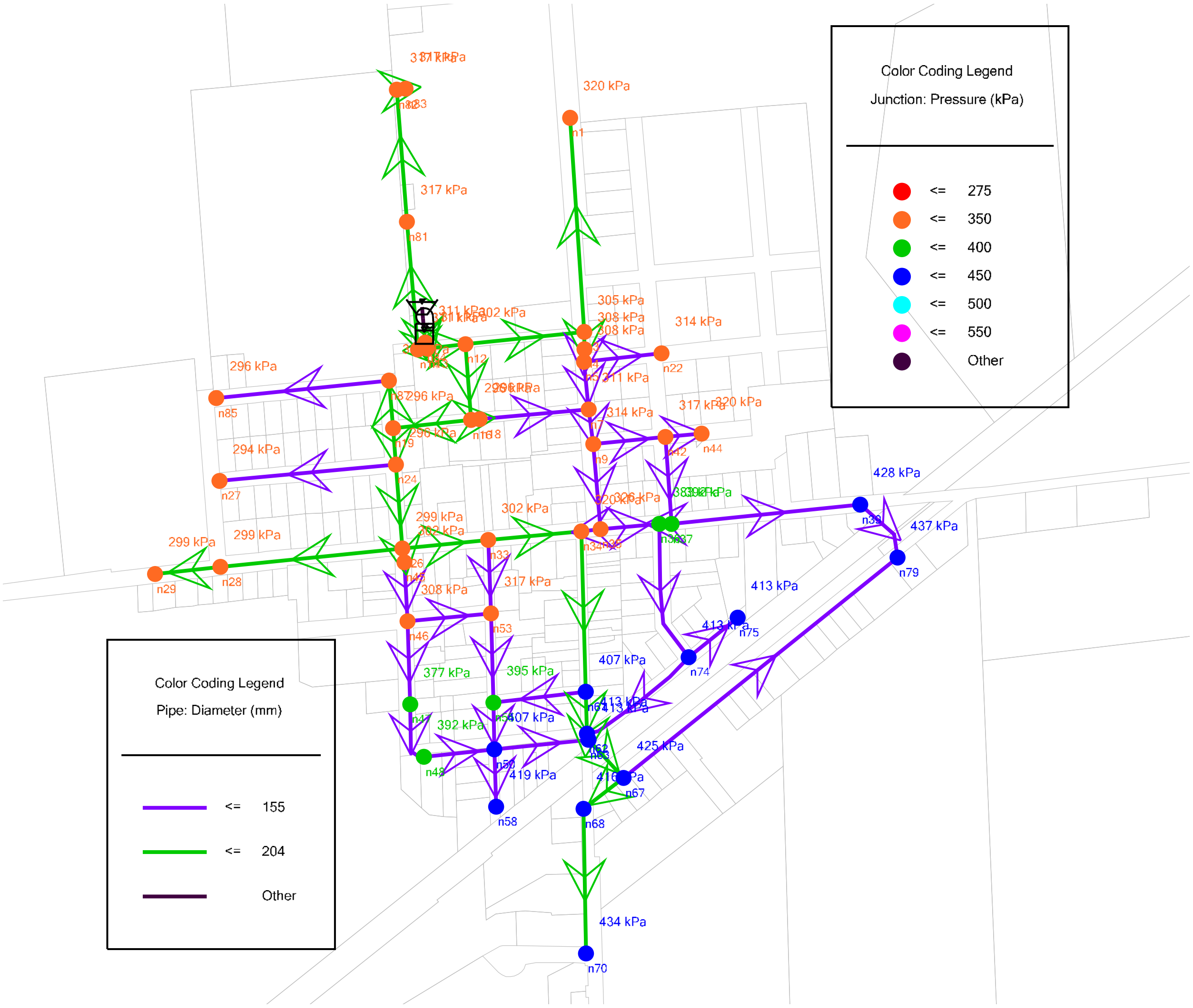
Water Model Inputs and Results


N
OUTLET ROAD
n82
n83
n1
n81
BEATTY STREET
CHURCH STREET
n3
n4
YONGE STREET
n5
n22
n84
n14
n13
n12
WEDGEWOOD STREET
JESSIE STREET
n85
n87
JOHNSTON STREET
n16
n18
n19
n7
CLIFF STREET
n9
n42
n44
IVAN STREET
FREDERICK STREET
n24
n27
GARDEN STREET
CENTRE STREET
KING STREET EAST
n39
n36
n37
n34
n35
KING STREET WEST
n33
n26
n45
n28
n29
EDEN GROVE ROAD
n79
RAILWAY STREET
UNION STREET
n53
n46
n75
MILLER STREET
n74
GRAND TRUNK AVENUE
JAMES STREET
n61
n47
n55
n62
n63
GILBERT STREET
n48
n50
n67
n58
n68
PRINCE STREET
MACDONALD DRIVE
n70
Legend
○ Junctions
Pump
Reservoir
Tank
150mm WM
200mm WM
Settlement Area
Meters
0
55
110
220
330
440
1:2,500

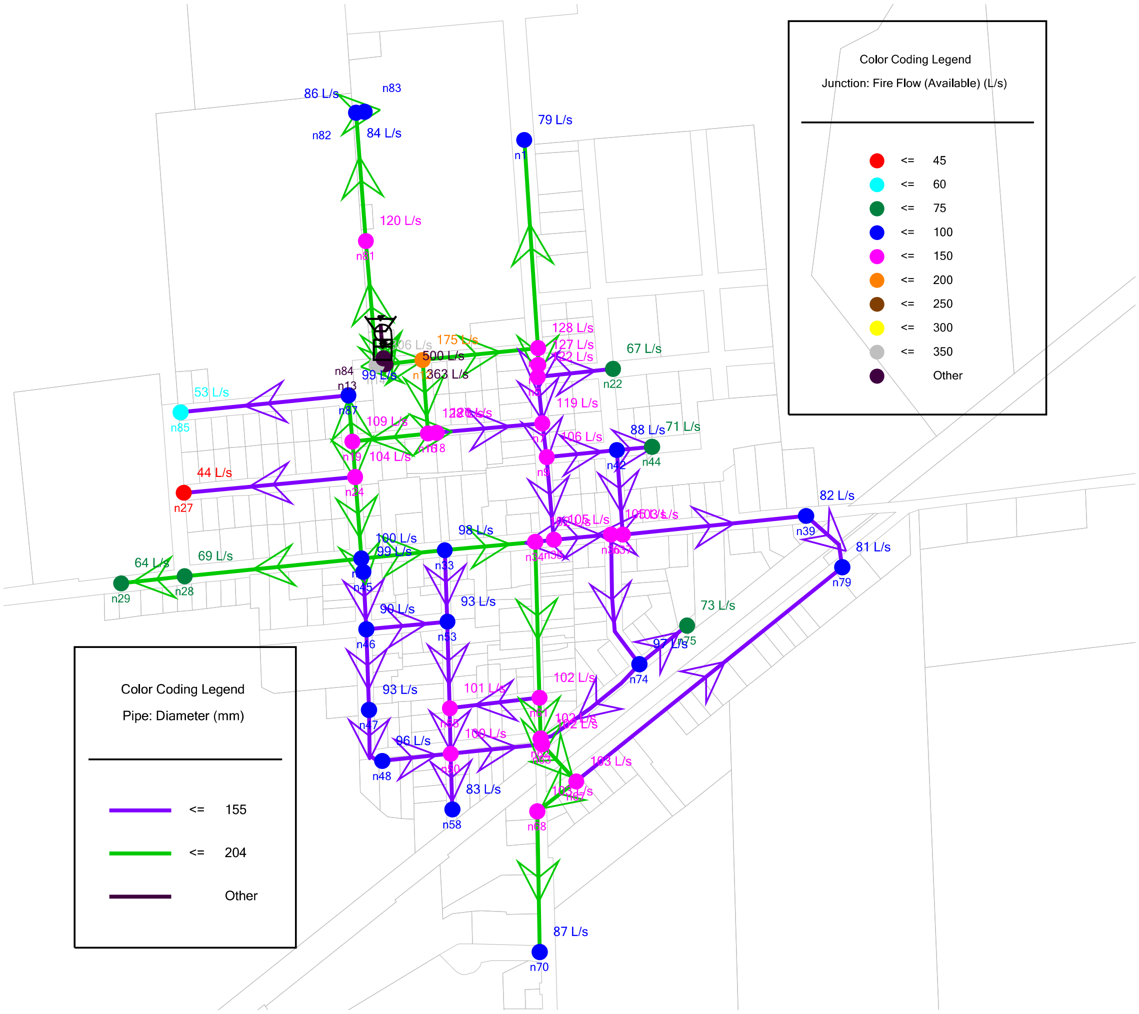
Lansdowne Water Model
Overall Schematic

Node	Residential units	Residential ADD Flow (l/s)	Residential Max Flow (l/s)	Residential Peak Flow (l/s)
n1	3	0.02	0.05	0.08
n3	5	0.04	0.09	0.14
n4	2	0.02	0.04	0.05
n5	3	0.02	0.05	0.08
n7	3	0.02	0.05	0.08
n9	3	0.02	0.05	0.08
n12	6	0.05	0.11	0.16
n13	1	0.01	0.02	0.03
n14	1	0.01	0.02	0.03
n16	4	0.03	0.07	0.11
n18	9	0.07	0.16	0.25
n19	5	0.04	0.09	0.14
n22	5	0.04	0.09	0.14
n24	2	0.02	0.04	0.05
n26	6	0.05	0.11	0.16
n27	6	0.05	0.11	0.16
n28	4	0.03	0.07	0.11
n29	3	0.02	0.05	0.08
n33	6	0.05	0.11	0.16
n34	3	0.02	0.05	0.08
n35	7	0.06	0.13	0.19
n36	5	0.04	0.09	0.14
n37	6	0.05	0.11	0.16
n39	13	0.10	0.24	0.36
n42	4	0.03	0.07	0.11
n44	4	0.03	0.07	0.11
n45	6	0.05	0.11	0.16
n46	6	0.05	0.11	0.16
n47	5	0.04	0.09	0.14
n48	8	0.06	0.15	0.22
n50	12	0.10	0.22	0.33
n53	12	0.10	0.22	0.33
n55	9	0.07	0.16	0.25
n58	2	0.02	0.04	0.05
n61	12	0.10	0.22	0.33
n62	4	0.03	0.07	0.11
n63	8	0.06	0.15	0.22
n67	14	0.11	0.26	0.38
n68	6	0.05	0.11	0.16
n70	6	0.05	0.11	0.16
n74	11	0.09	0.20	0.30
n75	4	0.03	0.07	0.11
n79	10	0.08	0.18	0.27
n81	1	0.01	0.02	0.03
n82	2	0.02	0.04	0.05
n83	3	0.02	0.05	0.08
n84	1	0.01	0.02	0.03
n85	5	0.04	0.09	0.14
n87	3	0.02	0.05	0.08
TOTAL	**269**	**2.14**	**4.91**	**7.365**

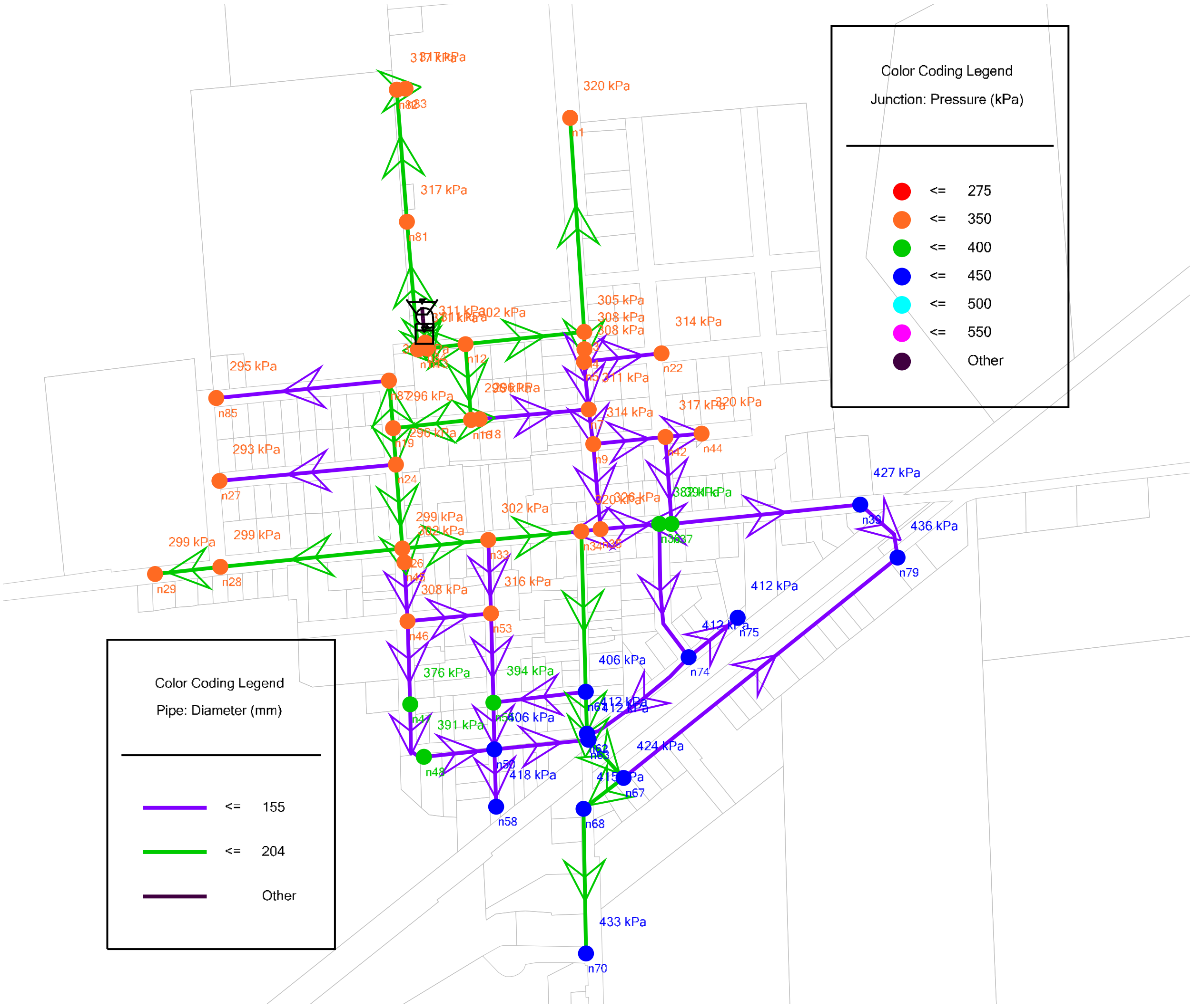
Lansdowne Water Model
Existing Average Day Demand



Lansdowne Water Model
Existing Maximum Day Demand with Fire Flow



Lansdowne Water Model
Existing Peak Hourly Demand



Appendix C

Stakeholder List and Notice of Commencement

Township of Leeds and the Thousand Islands

Stakeholder Consultation List

Schedule B Municipal Class EA for Potable Water Storage in the Village of Lansdowne

Agency	Contact	Address	Phone	Email	Date Added	Reasoning
LOCAL AUTHORITIES						
Cataraqui Region Conservation Authority	Andrew Schmidt Manager, Watershed Planning & Engineering	1641 Perth Road, Box 160, Glenburnie, ON, K0H 1S0	613-546-4228 ext.244	aschmidt@crca.ca	Sep-22	MECP List 2022
Leeds and 1000 Islands Fire Department	Mike Prior, Fire Chief	1233 Prince Street, Lansdowne, ON	613-659-2415 ext. 222		Sep-22	MECP List 2022
Leeds, Grenville and Lanark District Health Unit	Dr. Linna Li, Medical Officer of Health and Chief Executive Officer	458 Laurier Blvd, Brockville, Ontario K6V 7A3, Canada	613-256-1203	contact@healthunit.org	Oct-22	MECP List 2022
PROVINCIAL AGENCIES						
Ministry of the Environment, Conservation and Parks	General Inbox			eanotification.eregion@ontario.ca	Oct-22	MECP website
Hydro One Networks Inc.				SecondaryLandUse@HydroOne.com	Sep-22	MECP List 2022
Ministry of Citizenship and Multiculturalism	Karla Barboza Lead(A), Heritage Heritage Planning Unit Programs and Services Branch	400 University Ave. 5th Floor Toronto ON M7A 2R9	416-660-1027	karla.barboza@ontario.ca	Sep-22	MECP List 2022
Ministry of Indigenous Affairs		160 Bloor St E, 9th Floor, Toronto ON M7A 2E6	416-326-4740		Sep-22	MECP List 2022
Ministry of Municipal Affairs and Housing	Michael Elms Community Planning and Development, Eastern Municipal Services Office	8 Estate Lane, Rockwood House, Kingston ON K7M 9A8	613-545-2132	michael.elms@ontario.ca	Sep-22	MECP List 2022
Ministry of the Solicitor General	Robert Greene Director	25 Grosvenor Street, 13th Flr Toronto ON M7A 1Y6	416-277-2370	robert.greene@ontario.ca	Sep-22	MECP List 2022
Ministry of Transportation	Dawn Irish	Garden City Tower 2nd Flr., 301 St. Paul St. St. Catharines ON L2R 7R4	905-380-5196	dawn.irish@ontario.ca	Sep-22	MECP List 2022
Ministry of Sport, Recreation and Community Programs	Darja Ros Manager Sport, Recreation and Community Programs	777 Bay Street, 18th Floor Toronto ON M7A 1S5	416-212-9311	darja.ros@ontario.ca	Oct-22	MECP List 2022
Ministry of Natural Resources and Forestry	Karen Hanford Supervisor, Kemptville District Ministry of Northern Development, Mines, Natural Resources and Forestry	31 Riverside Dr. Pembroke ON K8A 6X4		karen.handford@ontario.ca	Oct-22	MECP List 2022

FEDERAL AGENCIES						
Environment and Climate Change Canada	Wes Plant Environmental Assessment Section Environmental Protection Branch – Ontario Region	4905 Dufferin St. Downsview ON M3H 5T4	416-739-4272	wesley.plant@ec.gc.ca	Sep-22	MECP List 2022
INDIGENOUS GROUPS						
Alderville First Nation						
Curve Lake First Nation						
Hiawatha First Nation						
Mississaugas of Scugog Island First Nation						
Mohawks of the Bay of Quinte						
Kawartha Nishnawbe						
DEVELOPERS						
-	Jim Zhang	865 Wildrush Place Newmarket, ON L3X1L7			Nov-22	Township provided
FOTENN	Kelsey Jones Senior Planner	The Woolen Mill 4 Cataraqui St, Suite 315 Kingston, ON K7K 1Z7	613-542-5454		Nov-22	Township provided
1000221785 Ontario Inc.		72 Hurontario St. Orangeville, ON L9W 2Z9			Nov-22	Township provided
2611179 Ontario Inc.		24 Donaldson Crt. Brockville, ON K8V 7J1			Nov-22	Township provided
2623174 Ontario Inc. O/A Upper Canada Properties	John Rose, President	113 Manitou Drive Kitchener, Ontario, N2C 1L4	519.591.4941	jrose@oakbridge.net	Jan-23	Updated after response
MUNICIPALITIES						
United Counties of Leeds and Grenville	Elaine Mallory, Director of Planning and Development	25 Central Ave. W., Suite 100, Brockville, ON, K6V 4N6		Elaine.Mallory@uclg.on.ca	Nov-22	Township provided

TOWNSHIP OF LEEDS AND THE THOUSAND ISLANDS

NOTICE OF PROJECT INITIATION

VILLAGE OF LANSDOWNE
Schedule 'B' Municipal Class Environmental Assessment

NEW TREATED WATER STORAGE FACILITY

The Township of Leeds and the Thousand Islands (the Township) has initiated a planning process to assess treated water storage solutions for the Village of Lansdowne (Village). Currently, the Village's potable water system provides water to a population of approximately 550 people. A 2022 Serviced Area Infrastructure Assessment and Growth Readiness Study identified significant growth potential in the Village over the next 20 years and beyond. As such, the Township is considering infrastructure upgrades to ensure sufficient and reliable service for the community as it grows.

The Village's existing drinking water supply system consists of two groundwater wells, a water treatment plant, one municipal water tower (standpipe) and a dedicated distribution system.

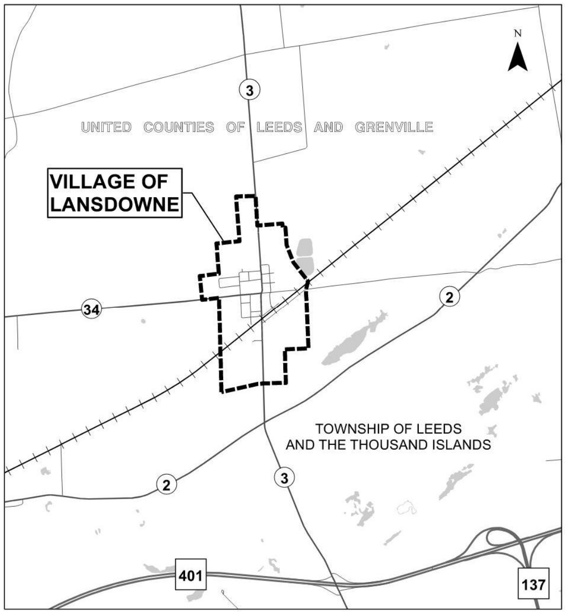
As part of the Municipal Class Environmental Assessment process for reviewing the New Treated Water Storage Facility, public comment during the evaluation of alternative solutions will be requested. This study is being conducted according to the requirements of a Schedule B project under the Municipal Class Environmental Assessment process (October 2000, as amended in 2015). The Township is planning to conduct one public information session in Summer 2023. Notice of the session will be provided in advance. Project information will be available to the public on the Township's website, www.leeds1000islands.ca.

We are interested in hearing any comments or concerns that you may have about this project. A public database of comments will be maintained and, except for personal information, included in the study documentation that will be made available for public review. Parties interested in providing input or that wish to obtain additional information at this stage of the study are asked to submit comments in writing to:

Susan Jingmiao Shi, P.Eng., M.Eng.
Senior Environmental Engineer
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
Email: sshi@jlrichards.ca

Please copy any correspondence to:

David Holliday
Director of Operations and Infrastructure
Township of Leeds and the Thousand Islands
1233 Prince St., P.O. Box 280
Lansdowne, Ontario K0E 1L0
Email: directoroperations@townshipleeds.on.ca



First Issued: December 6, 2022

Appendix D

Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study Update

MEMORANDUM

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

J.L. Richards
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203-863 Princess Street
Kingston, ON Canada
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Tel: 613 544 1424
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To: David Holliday, CET
Director of Operations and Infrastructure
Township of Leeds and the Thousand Islands
P.O. Box 280, 1233 Prince Street
Lansdowne, ON K0E 1L0

Date: May 24, 2022

JLR No.: 31681-000.1

CC: N/A

From: Matthew Morkem, P.Eng

Re: Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study Update (DRAFT)

1.0 Introduction

In October 2020, SNC-Lavalin completed a Serviced Area Infrastructure Assessment and Growth Readiness Study for the Village of Lansdowne located within the Township of Leeds and the Thousand Islands (Township). The study had the following objectives:

- Create a geo-referenced map of drinking water, wastewater and storm water infrastructure inventory; and to collect a relevant dataset to support an assessment of current hydraulic conditions;
- Analyze the modelled performance of the current water, wastewater and storm water management systems and the provision of recommendations for improvements; and
- Evaluate the existing infrastructure's ability to accommodate growth within the service area identified in the Township's current Official Plan.

J.L. Richards and Associates Ltd. was retained by the Township in November 2021 to update the evaluation of water and wastewater facilities detailed in the abovementioned study. The following memorandum is a supplemental document to be read in conjunction with SNC-Lavalin's previous report dated October 15, 2020.

2.0 Definitions

Average Daily Demand (ADD): The total volume of water delivered to the system during a calendar year divided by the number of days during which water was flowing through the distribution network that year, expressed as a volume per day.

Maximum Daily Demand (MDD): The largest volume of water delivered to the system in a single day expressed as a volume per day.

Peak Hourly Demand (PHD): The maximum volume of water delivered to the system in a single hour expressed as a volume per day.

Average Daily Flow (ADF): The average daily flow is the cumulative total sewage flow to the sewage works during a calendar year divided by the number of days during which sewage was flowing to the sewage works that year, expressed as a volume per unit time.

Maximum Daily Flow (MDF): The maximum daily flow is the largest volume of flow to be received during a one-day period expressed as a volume per unit time. This flow is also referred to as peak daily flow or maximum day flow.

Peak Instantaneous Flow (PIF): The peak instantaneous flow is the instantaneous maximum flow rate as measured by a metering device.

Environmental Compliance Approval (ECA): An environmental compliance approval, formerly known as a Certificate of Approval, is a permit issued by the Ministry of the Environment, Conservation and Parks as required by the Environmental Protection Act, R.S.O. 1990. Businesses with complex or unique types of operations, such as landfill sites or wastewater treatment plants, must apply for an Environmental Compliance Approval (ECA).

Permit to Take Water (PTTW): A permit to take water is issued by the Ministry of the Environment, Conservation and Parks as required under the Ontario Water Resources Act (OWRA) and the Water Taking Regulation (O.Reg 387/04), a regulation under the act. Permits are required for anyone taking more than a total of 50,000 litres of water in a day, with some exceptions.

3.0 Population Growth Estimates

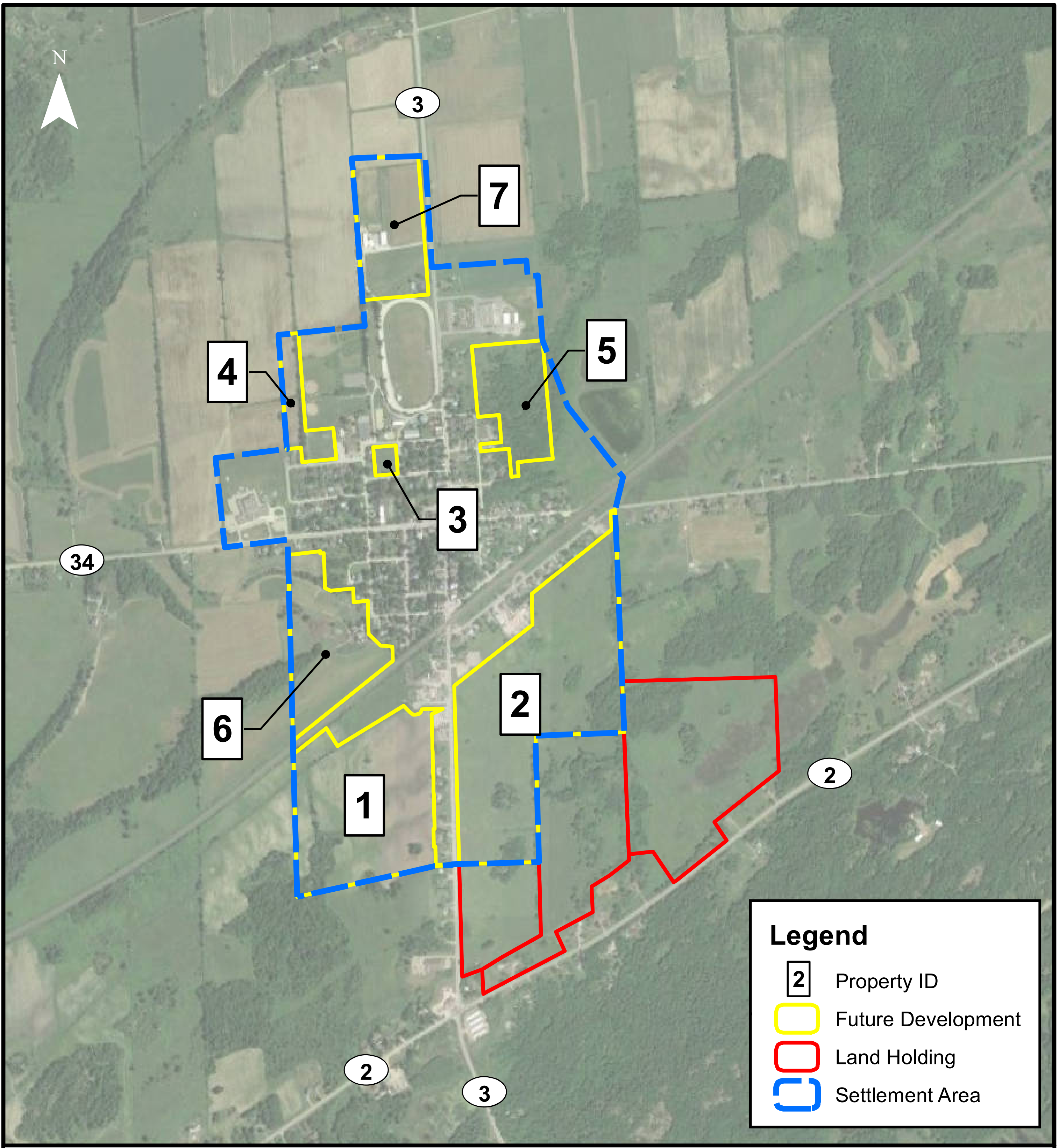
The existing serviced population for use in design calculations is 550 persons, as stated in the 2019 SNC-Lavalin Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study. Future growth projections were then based on the Township of Leeds and the Thousand Islands Staff Report No. 020-21, Subject: Lansdowne Residential Lands Summary. Based on this report, two (2) growth scenario were developed based on the status of the development: 1) Short Term Growth, which is growth that has currently been approved, under review or has a defined development plan; 2) Long Term Growth, which is growth that is not yet been detailed but is available lands for development within the urban boundary.

Table 1 - Lansdowne Development Lands Summary

Property ID #	Exhibit	Property	Land Use	Land Area (Gross)	Status	Growth Category
1	B	Lansdowne Mixed Use Development (West)	Industrial/Commercial	22.79 ha	Pending Second Submission	Short Term
2	B	Lansdowne Mixed Use Development (East)	Residential/Commercial 145 Single Detached 2x30 Unit Apartment Buildings 2 Commercial Blocks	17.9 ha	Pending Second Submission	Short Term
3	C	16 Church Street	Residential – 12 Semi-Detached Units	0.53 ha	Finalizing Approvals – Possible 2021 Construction	Short Term
4	D	1 Jessie Street	Residential Designation – Township Owned 50 Townhouse Lots (Concept Plan)	1.8 ha	No Status	Long Term
5	E	East Lansdowne Lands	Residential	6.4 ha	For Sale	Long Term
6	F	4 Garden Street	Residential	22.7 ha	Privately Owned	Long Term
7	G	1254 Outlet Road & North Parcel	Residential	7.2 ha	Privately Owned	Long Term
			Total Development Area	**79.32ha**		

Source: Township of Leeds and the Thousand Islands Staff Report No. 020-21, Subject: Lansdowne Residential Lands Summary

Figure 1 is a detailed map illustrating the location for each of the exhibits listed in Table 1.



PROJECT:

LANSDOWN ASSESSMENT

LANSDOWN, LEEDS AND THE THOUSAND ISLANDS, ONTARIO

DRAWING:

LANSDOWN GROWTH MAP

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

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DESIGN: JG
DRAWN: KTK
CHECKED: MM
JLR #: 31681

DRAWING #:
FIGURE 1

File Location: P:\31000\31681-000 - Lansdowne Assessment\5-Production\7-Plan\31681_LansdownGrowth.mxd

Plot Date: Friday, January 14, 2022 10:51:50 AM

Based on the details provided in the Staff report, the detailed Short Term residential, commercial and industrial growth for each of the properties was outlined and is summarized in Table 2.

Table 2 – Short Term Growth Summary

Property ID	Property	Land Use	Land Area (Gross)	Industrial Area	Commercial Area	Residential Dwellings (Persons[1])
2	Lansdowne Mixed Use Development (East)	Residential/Commercial	17.90 ha	0.00 ha	0.90 ha	60 (150)
3	16 Church Street	Residential	0.53 ha	0.00 ha	0.00 ha	12 (30)
-	Variety	Densification	Note 2			13 (32.5)
		TOTAL	**18.43ha**	**0ha**	**0.90ha**	**85 (212.5)**

Note 1) A density of 2.5ppl/unit was used to determine number of persons
2) Densification assumed to be within existing developed area.

Long Term growth was calculated by adding the Short-Term growth estimates to the remaining anticipated growth areas detailed in Table 1. Since there are no Short-Term residential land uses for these areas, the total number of dwellings cannot be used in projected population estimates. Instead, the Long-Term residential land area in hectares was multiplied by a population density of 9.00 persons/ha (Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study, 2019 SNC-Lavalin). A summary of the Long-Term growth requirements is provided below in Table 3.

Table 3 – Long Term Growth Summary

Property ID	Property	Land Use	Land Area (Gross)	Industrial Area	Commercial Area	Residential Dwellings (Persons[1])
1	Lansdowne Mixed Use Development (West)	Industrial/Commercial	22.79 ha	11.40 ha	11.40 ha	0 (0)
4	1 Jessie Street	Residential	1.80 ha	0.00 ha	0.00 ha	6.48 (16.2)
5	East Lansdowne Lands	Residential	6.40 ha	0.00 ha	0.00 ha	23.04 (57.6)
6	4 Garden Street	Residential	22.70 ha	0.00 ha	0.00 ha	81.72 (204.3)
7	1254 Outlet Road & North Parcel	Residential	7.20 ha	0.00 ha	0.00 ha	25.92 (64.8)
		TOTAL	**60.89ha**	**11.40ha**	**11.40ha**	**137.16 (342.9)**

Note 1) A density of 9ppl/ha was used to determine number of persons

4.0 Project Demand / Flows

Using MECP standard design values or the values indicated in the 2019 SNC-Lavalin Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study, the tables below detail the projected demands / flows based on the anticipated development:

Table 4 – Projected Additional Demand / Flow

Land Use	Unit Flow	Short Term m³/day (L/s)	Long Term m³/day (L/s)
Residential	330 L/cap/day	70.1 (0.81)	113 (1.3)
Commercial[1]	21 m3/ha/day	18.9 (0.22)	239.4 (2.8)
Industrial[1]	26.25 m3/ha/day	0 (0)	299.1 (3.5)
	Average Day	**89 (1.0)**	**652 (7.5)**
	Max Day (PF 2.63)	**234 (2.7)**	**1,714 (19.8)**
	Peak Hour (PF 3.94)	**351 (4.1)**	**2,568 (29.7)**

Note 1) As it is anticipated that development within the Lansdowne Area is anticipated to be lower water and sewer consumption, the MECP value were reduced by 25%

5.0 Water Treatment Plant

The MOECC Drinking Water Design Guidelines (MOECC, 2008) stipulates the Water Treatment Plant capacity should be greater than or equal to the maximum day demand (MDD) with an allowance for water needed for plant use. Although the Lansdowne Water Treatment Plant has a rated capacity of 1440m3/day, it is only authorized to draw a combined total of 720m3/day (720,000L/day) from two municipal supply wells authorized under Permit to Take Water No. 0262-8RRQA4. For design purposes, the plant capacity is therefore considered to be 720m3/day.

The Lansdowne Drinking Water System Annual Reports, prepared by OCWA, provide monthly MDD values which were used to determine the current system demand. The highest MDD value recorded in 2018 was 476m3/day and 444m3/day in 2019 (previous reports did not provide MDD records). OCWA MDD values for 2018 and 2019 are provided below:

Table 5: Lansdowne MDD Values

	2018 (m3/day)	2019 (m3/day)
January	361.00	251.00
February	291.00	257.00
March	223.00	275.00
April	249.00	217.00
May	476.00	180.00
June	319.00	206.00
July	410.00	444.00
August	347.00	307.00
September	239.00	361.00
October	321.00	444.00
November	256.00	306.00
December	269.00	310.00
Max	476.00	444
2yr AVG	460.00	

Source: OCWA's Lansdowne Drinking Water System Annual Report (2018, 2019)

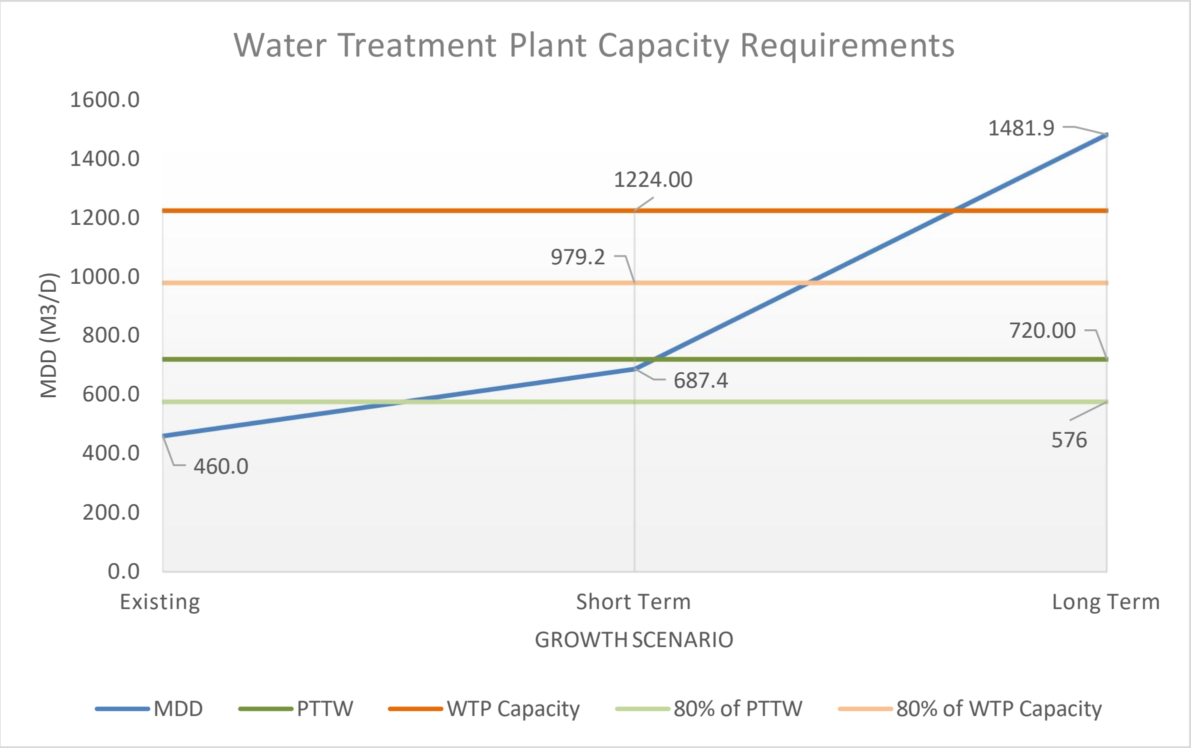
Based on the projected demand and the existing 2yr average MDD, the following table presents the MDD vs the plant capacity:

Table 6: MDD vs. WTP Capacity

	MDD	PTTW	WTP Capacity
Existing	460.00	720.00	1224.00
Short Term	687.4	720.00	1224.00
Long Term	1481.9	720.00	1224.00

Figure 2 below illustrate the representation of the Short- and Long-Term growth requirements for the Water Treatment Plant. The PTTW allowance and Water Treatment Plant capacity are also indicated.

Figure 2: WTP Capacity Requirements



Generally capacity upgrades are triggered when a system reaches approximately 80% of current functional or production capacity as there is typically a timing issue between the identification of the need and the implementation of the upgrades. Based on the above data, the existing WTP will reach 80% capacity prior to the Short-Term growth scenario or with approximately 55.5 additional residential units.

D-5-1

MOE Procedure D-5-1 is a standard calculation used by the MECP to ensure that water demand from approved development applications will not exceed the design capacity of the water treatment plant(s). In order to ensure that capacity is not exceeded it is necessary to determine what uncommitted reserve capacity is available based on historic flows and known development. In should be noted that committed development included in this calculation includes developments currently under review but not approved. This calculation has been completed for the Lansdowne WTP.

Table 7: D-5-1 Calculation

COMMITTED CAPACITY FOR GROWTH		
Current 2-Yr MDF	460	m3/d
ECA Design MDF	720	m3/d
RESIDENTIAL GROWTH REQUIREMENTS		
Existing Serviced Population	550	persons
Current MDD per person	836	L/c/d
# of Committed Dwelling Units	85	Dwellings
Population Density	2.5	Persons/Dwelling
Committed Residential Growth	212.50	persons
Committed Residential Capacity	177.65	m3/d
COMMERCIAL GROWTH REQUIREMENTS		

COMMITTED CAPACITY FOR GROWTH		
Committed Commercial Growth	0.9	ha
Committed Institutional Growth	0.0	ha
Total Committed C&I Area	0.9	ha
Unit Flow (per MOECC with 25% Reduction)	21	m3/ha/d
Committed C&I Capacity	49.7	m3/d
INDUSTRIAL GROWTH REQUIREMENTS		
Committed Industrial Growth	0.0	ha
Unit Flow (per MOECC with 25% Reduction)	26.25	m3/ha/d
Committed I Capacity	0.0	m3/d
UNCOMMITTED RESERVE CAPACITY		
Hydraulic Reserve Capacity, Cr	260	m3/d
Committed Residential Capacity	177.7	m3/d
Committed I&C Capacity	49.7	m3/d
Committed I Capacity	0.0	m3/d
Uncommitted Reserve Capacity	**32.64**	**m3/d**
Units Available	**15.62**	**Units**

As indicated in the D-5-1 calculation, the current Short-Term scenario will not exceed the available reserve capacity, however limited growth beyond this is available.

6.0 Water Storage

According to the MECP Design Guidelines for Drinking Water Systems, treated water storage facilities should be designed to maintain adequate flows and pressures in the distribution system during Peak Hour Demand (PHD), and to meet the critical water demands during fire flow and emergency conditions. To accomplish this, the total treated water storage requirement is calculated via the formula A + B + C, where: A = Fire Storage; B = Equalization Storage (25% of maximum day demand); and C = Emergency Storage (25% of A + B).

Table 8-1 of the MOECC Drinking Water Design Guidelines (MOECC, 2008) stipulates a fire flow of 38L/s for a population of 500-1000 people and 64 L/s for a population of 1000. However, the Fire Underwrites Survey (FUS) recommends a more detailed method based on building types, separation distance and a variety of other factors. Based the short method indicated in the FUS for groupings of detached one family and small two-family dwellings not exceeding 2 stories in height a value of 66.6L/s (4000L/min) should be used for storage. Based on the more detailed method that provides a better representation of the Lansdowne urban area, the FUS value has been used.

Based on the above criteria, the calculation was completed for storage for each of the different scenarios. The results are present in the table below

Table 8: Water Storage Needs

		Existing	Short Term	Long Term
Max Day Demand	m3/day	460	2396	2694
Fire Flow	L/min	4000	4000	4000
Fire Flow Duration	Hr	2.00	2.00	2.00
A = Fire Storage	m3	480	480	480
B = Equalization	m3	115	172	371
C = Emergency	m3	149	163	213
Total	**m3**	**744**	**815**	**1,064**

The Township currently has a standpipe located on Church St in the north portion of the Village. The standpipe has a total elevation of approx. 34.4m, a diameter of 9.1m and a total volume of 2252m^3. Based on the as-built information provided by the Township, the existing standpipe has a top water elevation (overflow) of 148.6m and a base elevation of 114.3 with a usable volume between 147.50m and 139.90m. This usable volume is to ensure that a minimum of 140kPa (20psi) is maintained in the system (i.e., minimum MECP pressure allowable in the system). Based on these values, the standpipe has a usable volume (as depicted in the adjacent figure) of 494m3.

Figure 3 below illustrates the Short and Long Term Development storage requirements as compared to the current stand-pipe storage capacity

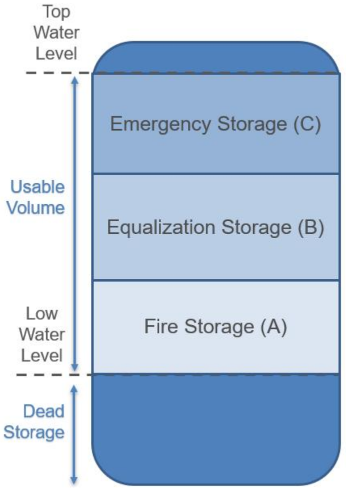
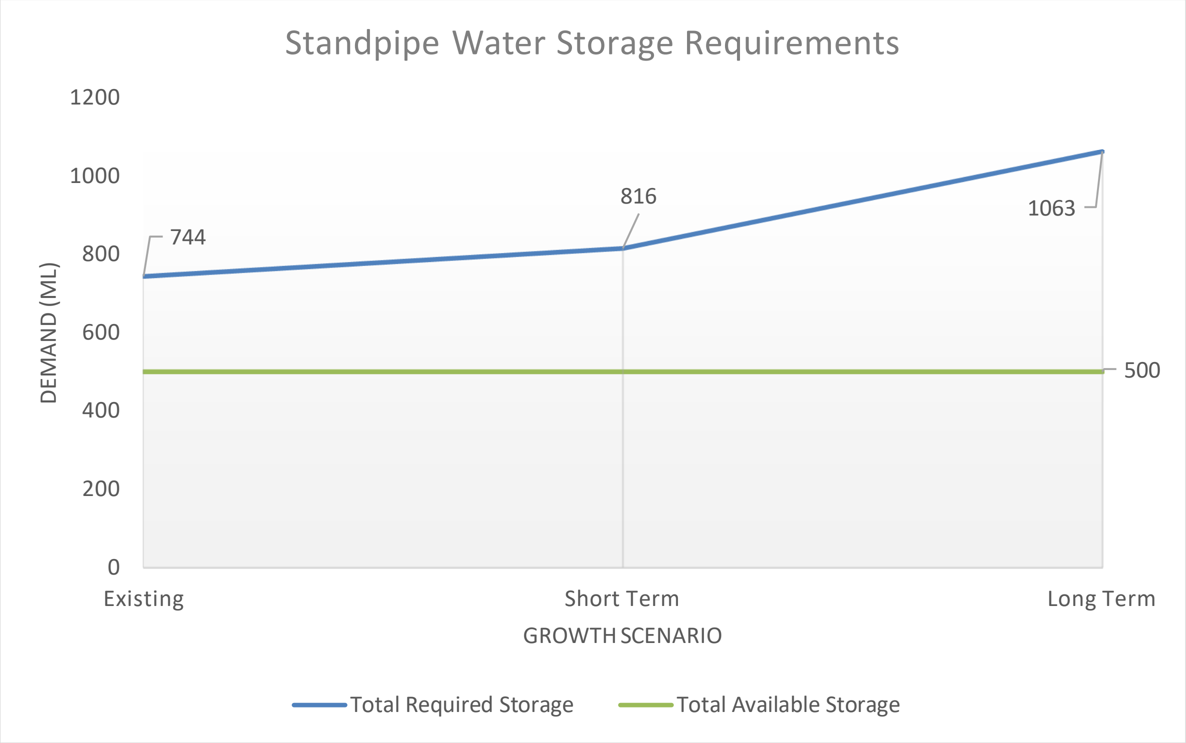


Figure 3: Standpipe Water Storage Requirements



Based on these values the existing standpipe will not have sufficient capacity for the current or future development scenarios.

7.0 Water Distribution System

Based on a review of the water model documentation that was provided within the 2019 SNC-Lavalin Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study the following conclusions were reached for the existing and future scenarios based on an additional MDD of 11.5L/s, PHD of 18.1L/s and a Future Fire Flow (FF) of 45-47L/s:

Existing Conditions

1. Confirmed that during periods of PHD, the Village municipal water system continues to meet MECP guidelines for minimum normal operating pressure of 40 psi.

2. Using a consistent maximum Fire Flow (FF) of 45 to 47 l/s during the Maximum Day Demand, the model analysis confirmed that the Village of Lansdowne municipal water system meets MECP guidelines for minimum operating pressure during Maximum Day Demand Plus Fire Flow of 20 psi.

Future Conditions

1. The Village of Lansdowne EPANET 2038 water model projected that, for the future PHD scenario, a system minimum pressure of 45.5 psi can be maintained. This result meets the minimum MECP normal operating pressure guideline of 40 psi.
2. The 2038 EPANET model confirmed that the existing Village water system is not able to meet future MDD + FF demands while maintaining a system-wide minimum pressure of 20 psi.

Based on the revised growth demands indicated in Table 4, the water distribution system was re-evaluated to determine its capacity.

Hydraulic Water Modelling

The following four (4) hydraulic modelling files developed in support of the SNC-Lavalin report were provided to JLR:

- WM_Existing_MDD+FF(School).net
- WM_Existing_Peak Hour Demand.net
- WM_Proposed_MDD+FF.net
- WM_Proposed_Peak Hour Demand.net

The model files were then opened within the EPANET software, exported as ".inp" files and imported into the WaterCAD® software platform for further analysis. The two (2) existing scenarios listed above were combined into a single WaterCAD® model which was used as the base to create the revised future scenarios.

Model Update / Assumptions

The existing pipes imported from the EPANET models had user defined lengths which were maintained for all of the scenarios. The future pipe lengths to service the future parcels were measured using aerial imagery and manually input into the water model. All of the future pipe extensions were assumed to be 200mm diameter PVC with a roughness coefficient of 110. This pipe diameter matches the largest pipes included in the existing distribution system. Junction node elevations within the future parcels were input based on satellite imagery and are expected to be approximate.

It was noted that the previous water models were developed as Extended Period Simulations (EPS) for a 2-hour duration (MDD + FF) and a 24-hour duration (peak hour). Under the MDD + FF scenario, a constant fire flow of 44.79 L/s (710 gpm) was applied at the school (node n29) while the pump was operating and the water level in the standpipe was lowered during the EPS. Under the peak hour scenario, the pump was configured to run constantly (10 L/s) which filled the standpipe water level to its maximum operating hydraulic grade line (HGL) of 147.64 m and maintained it at this maximum level for most of the EPS. It is expected that the previously modelled pump configurations produced more favourable results by maintaining the standpipe at the maximum water level. The current models are steady-state simulations which present more conservative results by assuming that the pump at the WTP is not operating and the HGL in the standpipe is set just above the minimum operating water level in either scenario. For MDD + FF the HGL is 137.78 m to maintain 138kPa (20psi) and for Peak Hour the HGL is 143.89 m to maintain 275kPa (40psi).

Both future Parcels 2 and 5 appear to contain localized areas of higher topography (hills) which could constrain the developable area within these parcels. These high elevations could range between 120.00 m and 130.00 m but would need to be confirmed. The water model did not account for these localized high points because they would severely limit the available fire flow throughout the Village. They would also experience lower pressures. During the design stage for these parcels, various options could be assessed to find serviceability solutions such as individual water booster pumps or watermain upgrades.

Water Model Demands

The total existing MDD of 5.8 L/s and PHD 8.6 L/s were maintained from the previous water models. It is noted that while the SNC-Lavalin report presents a MDD of 5.5 L/s, the model file received included a demand of 0.3 L/s on junction node n10. This additional demand found in the model was maintained for the current assessment.

The future anticipated demands presented in Table 4 were input into the water model by assigning each of the seven (7) future parcels' demands to a representative junction node. A detailed summary of the demand calculations for each parcel and the assigned model node is appended.

Water Model Results

The following existing water model scenarios were configured as steady-state simulations:

- Existing MDD + FF, Standpipe HGL 137.78 m
- Existing PHD, Standpipe HGL 143.89 m

In addition, to evaluate the system for future growth, the Long-Term growth scenario was modelled to determine the effects on the system. Typically, the approach applied to developing required upgrades is to first determine servicing requirements for the Long-Term development projections and then review the other development scenarios to determine timing of the upgrades. This ensures that upgrades scheduled for the Long-Term scenario would not need to be revised to meet shorter term scenarios.

The following future water model scenarios were configured as steady-state simulations:

- Long Term Maximum Day + Fire Flow, Standpipe HGL 137.78 m
- Long Term Peak Hour, Standpipe HGL 143.89 m

In each simulation, the pumps at the WTP were not operating and a set water level in the standpipe was assumed to pressurize the system. Under each scenario, the standpipe HGL was set just above the minimum water level as defined by the previous EPANET models.

The tables below provide a comparison of the percentage of model junction nodes which fall within the available fire flow or pressure ranges defined, under each of the scenarios listed above.

Table 9: Existing & Long-Term MDD + FF

Available Fire Flow (L/s)		Existing	Long Term
From	To		
	<=30	0%	0%
>30	<=45	5%	6%
>45	<=60	8%	65%
>60	<=75	64%	8%
>75	<=100	15%	11%
>100	<=150	4%	7%
>150		4%	3%

Table 10: Existing & Long-Term PHD

Pressure (kPa)		Existing	Long Term
From	To		
	<=276	0%	22%
>276	<=350	60%	41%
>350	<=480	40%	37%
>480	<=552	0%	0%
>552	<=700	0%	0%
>700		0%	0%

The fire flow simulations were carried out by allowing WaterCAD® to calculate the maximum fire flow that can be drawn from each junction node without allowing any part of the system to experience pressures less than 140 kPa (20 psi). Under the existing maximum day demand plus fire flow scenario, the majority of the system is able to deliver fire flows above 45 L/s, which is the minimum required Level of Service for 2-storey residential units as per the Ontario Building Code (OBC). For 1-storey residential units less than 600 m^2 in footprint area, the OBC requires 30 L/s of fire flow. Under existing conditions, there are four (4) junction nodes in the model which cannot provide 45 L/s of fire flow and they are located at the western extents of the dead-end watermains on Frederick Street and King Street West by the school. Under the future maximum day demand plus fire flow scenario, a reduction in available fire flows is seen within the system when compared to existing conditions. This reduction is attributed to the increased water demands from the future parcels.

Under the existing peak hour demand scenario, the system pressures are found to be within MECP recommended guidelines and meet the minimum MECP recommended pressure of 276 kPa (40 psi). Under the Long-Term Peak Hour demand scenario, a reduction in system pressures is seen when compared to existing conditions. This reduction is attributed to the increased water demands from the future parcels. The model predicts that 22% of the junction nodes will experience pressures below the MECP recommended minimum pressure.

Alternatives

As can be seen above, there are some areas under existing conditions that do not meet the minimum LOS for MDD+FF and there is a significant reduction in the LOS for Long Term fire flows (i.e., the model predicts 64% of existing nodes between 60-75l/s and by the Long-Term scenario are reduced to 8% with equal increase in the 30-45l/s range). There is also a significant reduction in the LOS to a point below the MECP recommended minimum pressure that will need to be addressed.

It should be noted that, save and except the areas below the minimum requirements, a reasonable and realistic plan needs to be developed to maintain or improve the LOS in the system capacity and “close the gap” between the available capacity indicated and the target capacities while allow growth.

JLR reviewed a variety of alternatives related to increasing watermain sizes to improve pressure and flows in the system; however, these upgrades had minimal effect on improving the pressure and flows in the system as there was insufficient pressure in the system. Therefore, JLR developed the alternative of increase the HGL in the system to improve pressures and flows. Under this alternative the ‘Raise HGL’ scenario, the standpipe minimum HGL was increased to be near its current maximum operating HGL of 147.64 m (as defined in the SNC-Lavalin report) and the Long-Term growth was applied. Based on this alternative, the following future water model scenarios were configured as steady-state simulations:

- Future Maximum Day + Fire Flow, Raise HGL, Standpipe HGL 147.60 m
- Future Peak Hour, Raise HGL, Standpipe HGL 147.60 m

Table 11: Alternative MDD + FF Upgrades

Available Fire Flow (L/s)		Existing	Future	
From	To		Long Term	Raise HGL
	<=30	0%	0%	0%
>30	<=45	5%	6%	0%
>45	<=60	8%	65%	2%
>60	<=75	64%	8%	4%
>75	<=100	15%	11%	62%
>100	<=150	4%	7%	22%
>150		4%	3%	10%

Table 12: Alternative PHD Upgrades

Pressure (kPa)		Existing	Future	
From	To		Long Term	Raise HGL
	<=276	0%	22%	0%
>276	<=350	60%	41%	57%
>350	<=480	40%	37%	43%
>480	<=552	0%	0%	0%
>552	<=700	0%	0%	0%
>700		0%	0%	0%

If the minimum standpipe HGL is raised to 147.60 m (near its current maximum operating level), then available fire flows are seen to improve significantly when compared to existing conditions. The system pressures during PHD are also seen to remain comparable and slightly improved when compared to existing conditions.

Based on the model results, a future low water operating HGL of 147.60 m is expected to maintain and also improve the current LOS within the Village. The model result schematics are appended. As an upgrade to the water storage tank may be considered by the Township to meet existing and future water storage requirements, there would also be an opportunity to increase the level of service by raising the tank HGL higher than 147.60 m. The location of a future storage tank and the operating water levels will directly impact the available fire flows and system pressures experienced throughout the Village. As there was identified LOS deficiency in the existing scenario, and the alternative solution is to increase the HGL in the system, modelling the Short-Term scenario was not required.

7.0 Sanitary Collection System

The MECP Design Guidelines for Sewage Works states that the design of sanitary sewers should be based on the ultimate sewage flows expected from the tributary area. The domestic sewage flow is calculated based on the design population (derived from the drainage area), area and anticipated infiltration. This will provide the peak domestic sewage flow which must be accommodated by the sanitary collection system.

Based on the above calculation and standard infiltration rates, design sheet for the Village were completed for existing and both growth scenario. The design sheets are appended. The peak domestic sewage flow rates at the downstream end of the sewer system for the existing and both growth scenarios is detailed in Table 13. Calculations for peak domestic sewage flow are appended.

Table 13: Estimated Sanitary Flow Rates

Scenario	PIF
Existing	26.39L/s
Short Term	34.66 L/s
Long Term	74.95 L/s

Based on a review of the sanitary collection system pipe capacities the existing system currently has sufficient capacity. Furthermore, under both growth scenario's the majority of collection system has sufficient capacity; save and except, the sanitary sewers along Railway St to the pumping station (approx. 680m). This capacity issue is directly related to Developments 1 & 2 that have a significant sewage generation. Based on the flows, the existing 250mm & 300mm pipe would need to be increase to 300mm and 375mm, respectively.

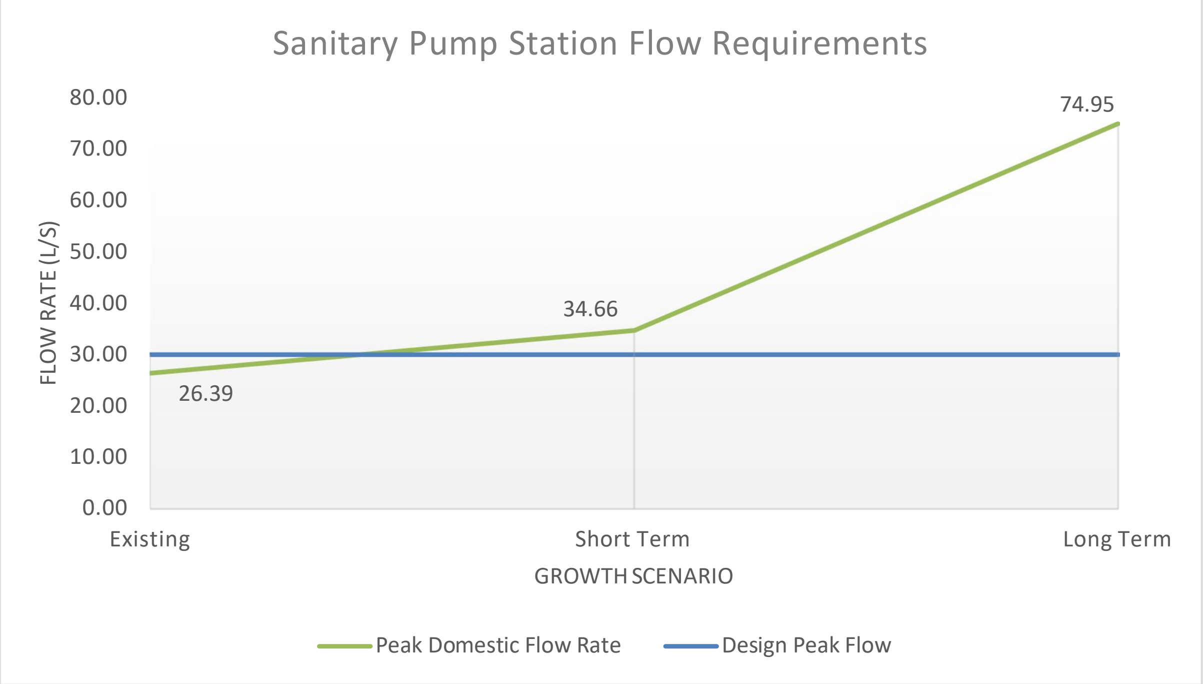
Note, the flow monitoring data that was completed during the 2019 SNC-Lavalin Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study was reviewed (Appended) to corelate the theoretical design sheets. Typically, it is expected that the theoretical values would be an order of magnitude higher to ensure all variation in flow patterns are captured. However, based on the limited data (April 2 – May 11), there did not appear to be a reasonable correlation with the data set (i.e., some location were low, some location we high in varying amounts). In addition, without rainfall data for Lansdowne over the same period, it is difficult to determine the rainfall effects on the system. It should also be noted that this data was collected during the initial COVID outbreak that could affect values (i.e., school shut down, less peaking due to morning and evening peak shifts, etc.)

8.0 Sanitary Pump Station

Sewage pumping stations serving sanitary sewer systems should be able to pump the design peak instantaneous sewage flow, as per the MECP Design Guidelines for Sewage Works. Pumping stations are rated based on their 'firm' capacity, which refers to the pumping capacity of a station with its largest pump out-of-service.

The existing Railway Street Pumping Station, located in the Village of Lansdowne, contains two pumps each with a design peak flow of 30.0L/s at 26.3 TDH. These values are compared to the peak domestic sewage flow rate for the Existing, Short Term, and Long-Term growth scenarios, illustrated below in **Figure 4**.

Figure 4: Sanitary Pumping Station Capacity Requirements



Based on the existing domestic sewage flow rates, the pumping station is currently operating within the design criteria and can accommodate PIF from the system. However, the station cannot accommodate PIF for the Short- or Long-Term development scenarios as it exceeds the pump design peak flow of 30.0L/s.

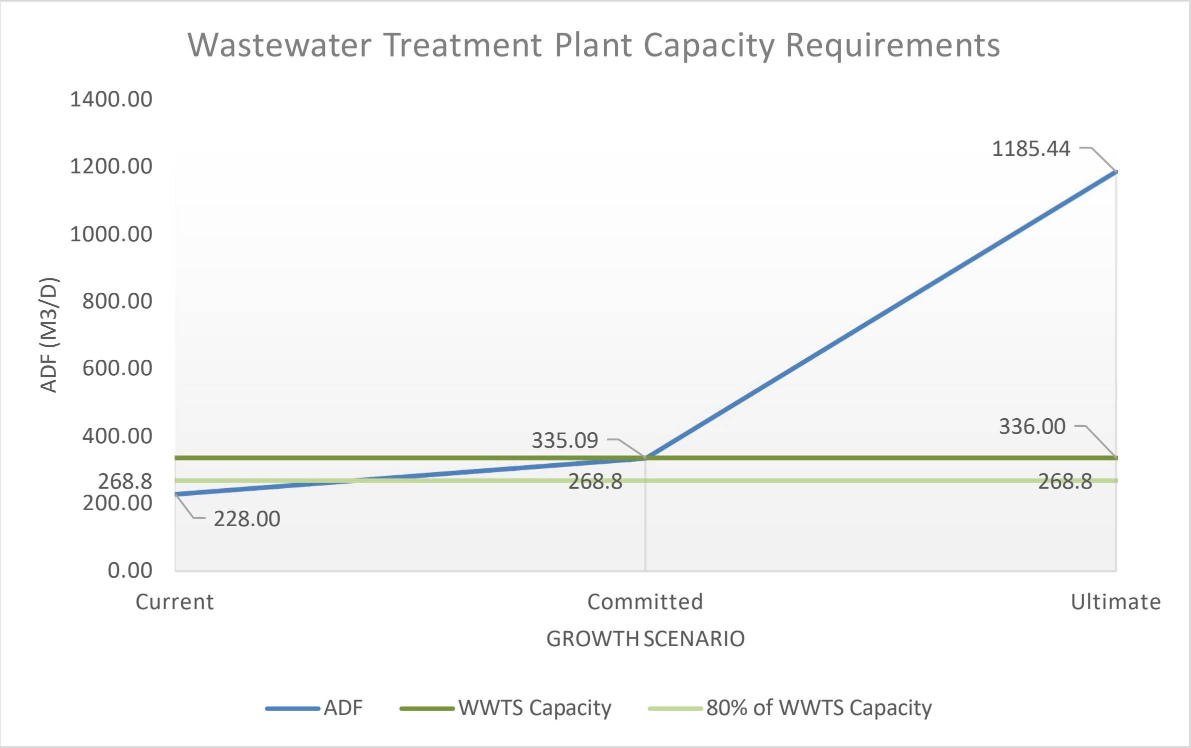
9.0 Sanitary Treatment Plant

Wastewater treatment facilities are designed based on average and peak flows depending on the treatment process (e.g., aeration tanks are sized for average day flows, whereas settling tanks are sized for peak flows). For reference, Table 8-2 of the MECP Design Guidelines for Sewage Works provides the design basis for all sanitary system areas and processes. For the purposes of this assignment, the Wastewater Treatment System (WWTS) capacity will be compared to the average daily flow (ADF) requirements. The WWTS currently has a rated capacity of the plant is 336m3/day. Based on the 2019 SNC-Lavalin Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study the 2019 ADF was 228m3/day. The table and figure below illustrate the Short- and Long-Term growth requirements for the WWTS.

Table 14: ADF vs. WWTS Capacity

	MDD (m3/day)	WWTS Capacity (m3/day)
Existing	228	336
Short Term	335	336
Long Term	1185	336

Figure 5 : Sanitary Treatment Plant Capacity Requirements



Generally capacity upgrades are triggered when a system reaches approximately 80% of current functional or production capacity as there is typically a timing issue between the identification of the need and the implementation of the upgrades. Based on the above data, the existing WTP will exceed reach 80% capacity prior to the Short-Term growth scenario or at with approximately 39 additional residential units.

D-5-1

MOE Procedure D-5-1 is a standard calculation used by the MECP to ensure that wastewater flow from development applications will not exceed the design capacity of the wastewater treatment system. In order to ensure that capacity is not exceeded it is necessary to determine what uncommitted reserve capacity is available based on historic flows and new development. It should be noted that committed development included in this calculation includes developments currently under review but not approved. This calculation has been completed for the Lansdowne WWTS.

Table 15: D-5-1 Calculation

Committed Capacity for Growth		
Current 2-Yr ADF	228	m3/d
ECA Design ADF	336	m3/d
RESIDENTIAL GROWTH REQUIREMENTS		
Existing Serviced Population	550	persons
Current MDD per person	415	L/c/d
# of Committed Dwelling Units	85	Dwellings
Population Density	2.5	Persons/Dwelling
Committed Residential Growth	212.5	persons
Committed Residential Capacity	88.19	m3/d
COMMERCIAL GROWTH REQUIREMENTS		
Committed Commercial Growth	0.90	ha
Committed Institutional Growth	0.0	ha
Total Committed C&I Area	0.90	ha
Unit Flow (per MOECC with 25% Reduction)	21	m3/ha/d
Committed C&I Capacity	18.90	m3/d
INDUSTRIAL GROWTH REQUIREMENTS		
Committed Industrial Growth	0.0	ha
Unit Flow (per MOECC with 25% Reduction)	26.25	m3/ha/d
Committed I Capacity	0.0	m3/d
UNCOMMITTED RESERVE CAPACITY		
Hydraulic Reserve Capacity, Cr	108	m3/d
Committed Residential Capacity	88.19	m3/d
Committed I&C Capacity	18.90	m3/d
Committed I Capacity	0.0	m3/d
Uncommitted Reserve Capacity	**0.91**	**m3/d**
Units Available	**0.88**	**Units**

As indicated in the D-5-1 calculation, the Short-Term Growth which was assumed to be the Committed development will almost exceed the total available reserve capacity.

10.0 Conclusion and Recommendations

The following table summarizes which components of the water and wastewater distribution network will be able to accommodate increased demand based on the Village of Lansdowne's Short and Long Term scenarios.

Table 16: Recommendations

SYSTEM UPGRADES		Priority for Development 1 = High 2 = Moderate 3 = Low	Municipal Class Environmental Requirements	OPC ($2022)
Type	**Description**			
Water System				
Water Treatment Plant	The existing WTP capacity meets the Existing and Short-Term scenario needs but in order to allow new development beyond 80% (55 Residential Units or equivalent), planning to increase PTTW will need to be started to meet the Short- and Long-Term development scenarios.	2	Schedule C[1]	$1,000,000[2]
Water Storage	The existing standpipe does not meet the Existing water storage requirements and will need upgrades / replacement to meet current and future scenarios. Note as per the recommended upgrade, the WTP pumps will need to be upgraded to meet the new HGL	1	Schedule B	$2,750,000[3]
Water Distribution System	The HGL within the system does not provide adequate flow in some areas during MDD+FF and does not provide adequate pressure during PHD. This increase should be coordinated with the required increase storage.	1	To be combined with Water Storage	See Water Storage
Wastewater System				
Sanitary Collection System	A section of the sanitary sewer along Railway St (approx. 680m) will need to be upsized to meet the Long-Term development scenario (i.e., prior to Development 1 coming online).	3	Schedule A+	$1,000,000
Sanitary Pumping Station	The existing pumping station capacity meets the Existing scenario needs but in order to meet the Short-Term development scenario, the station will need to be upgraded.	2	Schedule B[4]	$2,500,000[5]
Wastewater Treatment System	The existing WWTS capacity meets the Existing and Short-Term scenario needs but in order to allow new development beyond 80% (39 Residential Units or equivalent), planning to increase capacity will need to be started to meet the Short- and Long-Term development scenarios.	2	Schedule C	$3,000,000 to $6,000,000[6]

Note:

1. As plant capacity is more than PTTW, a review of the previous plant design and EA complete may change this requirement.
2. Assumed sufficient groundwater can be sources at current WTP site
3. Assumes a new standpipe and that the Township has available, higher elevation property within the existing water distribution system footprint.
4. Depending on the required upgrade (i.e., upgrades staying within existing structures footprint), this project could be a Schedule A/A+.
5. Assumes existing wet well and building can be reused for upgrades
6. Significant variation in costs due to a complex system and unknown expandability for lagoon system (land, current treatment issues, effluent receiving body requirements, MECP increased treatment requirements etc.). Current price certainty is low. Significant more price certain would be obtained during Environmental Assessment and required upgrade are better defined.

Regards,

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:

Matt Morkem, P. Eng
Senior Civil Engineer

LICENSED PROFESSIONAL ENGINEER
2022-05-27
M. S. MORKEM
100122955
PROVINCE OF ONTARIO

Appendix 1 – Water Distribution

Future Water Demands

				ADD	MDD	PHD	Model
Property ID	**Residential**	**Commercial**	**Industrial**	**Total**			**Node**
	L/s	**L/s**	**L/s**	**L/s**	**L/s**	**L/s**	**Label**
1	0.00	2.77	3.46	6.23	16.39	24.55	**J-12**
2	1.96	0.22	0.00	2.18	5.72	8.57	**J-17**
3	0.11	0.00	0.00	0.11	0.30	0.45	**n13**
4	0.06	0.00	0.00	0.06	0.16	0.24	**J-5**
5	0.22	0.00	0.00	0.22	0.58	0.87	**J-7**
6	0.78	0.00	0.00	0.78	2.05	3.07	**J-10**
7	0.25	0.00	0.00	0.25	0.65	0.98	**J-2**
TOTAL				**9.83**	**25.86**	**38.74**	

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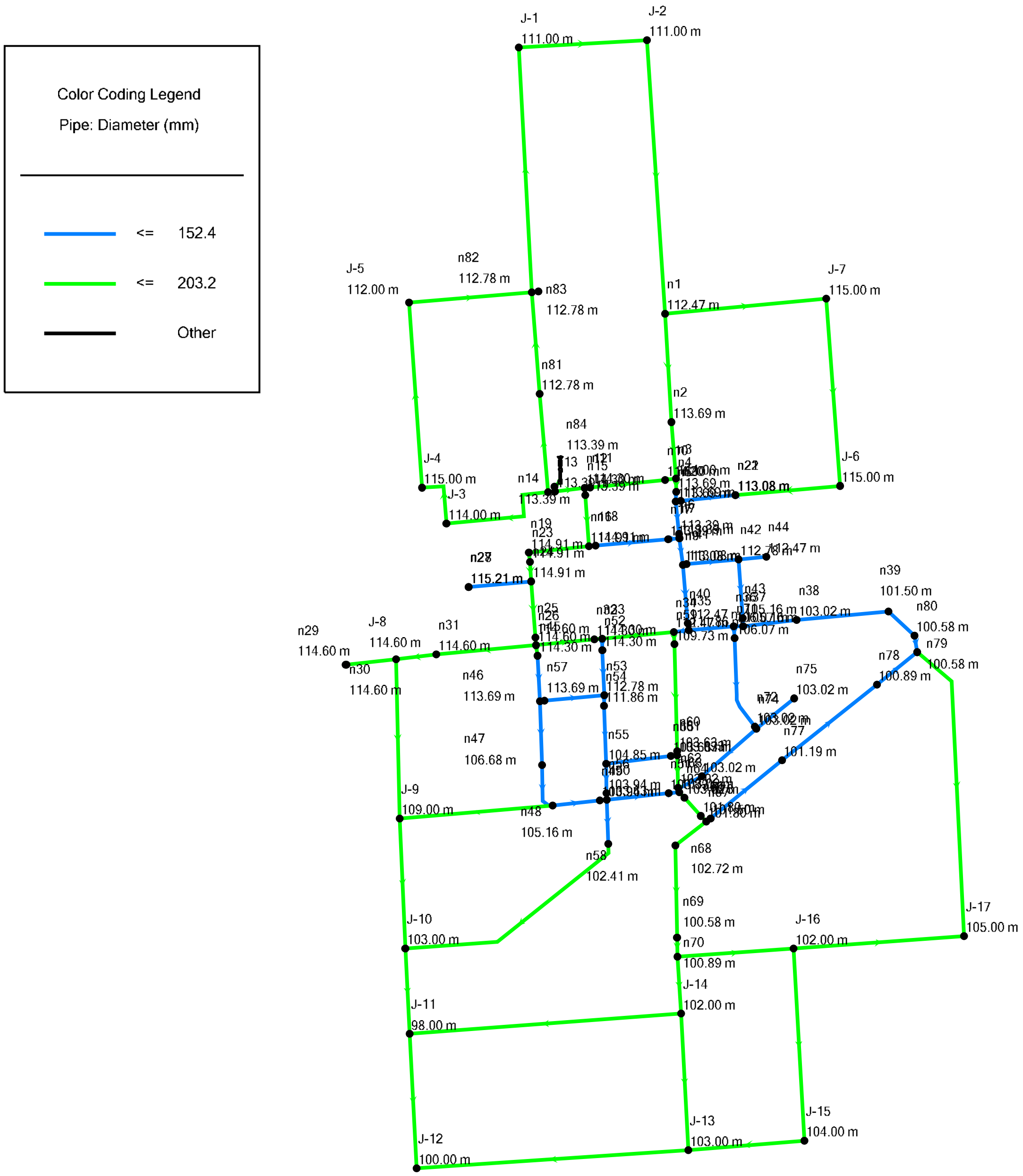
Lansdowne Water Model

Overall Schematic with Junction Labels and Elevations



Lansdowne Water Model

Junction Labels and Elevations

ID	Label	Elevation (m)
261	J-1	111.00
263	J-2	111.00
268	J-3	114.00
270	J-4	115.00
272	J-5	112.00
275	J-6	115.00
277	J-7	115.00
280	J-8	114.60
283	J-9	109.00
285	J-10	103.00
287	J-11	98.00
289	J-12	100.00
291	J-13	103.00
293	J-14	102.00
299	J-15	104.00
301	J-16	102.00
304	J-17	105.00
143	n1	112.47
142	n2	113.69
141	n3	114.00
140	n4	113.69
139	n5	113.69
138	n6	113.39
137	n7	113.39
136	n9	113.08
135	n10	114.30
134	n11	114.30
133	n12	114.30
132	n13	113.39
131	n14	113.39
130	n15	113.39
129	n16	114.91
128	n17	113.39
127	n18	114.91
126	n19	114.91
125	n20	113.69
124	n21	113.08
123	n22	113.08
122	n23	114.91
121	n24	114.91
120	n25	114.60
119	n26	114.60
118	n27	115.21
117	n28	115.21
116	n29	114.60
115	n30	114.60
114	n31	114.60
113	n32	114.30
112	n33	114.30
111	n34	112.47
110	n35	111.86
109	n36	106.07
108	n37	105.16
107	n38	103.02

Lansdowne Water Model

Junction Labels and Elevations

ID	Label	Elevation (m)
106	n39	101.50
105	n40	112.47
104	n41	113.08
103	n42	112.78
102	n43	105.16
101	n44	112.47
100	n45	114.30
99	n46	113.69
98	n47	106.68
97	n48	105.16
96	n49	103.94
95	n50	103.63
94	n51	103.33
93	n52	114.30
92	n53	112.78
91	n54	111.86
90	n55	104.85
89	n56	103.94
88	n57	113.69
87	n58	102.41
86	n59	109.73
85	n60	103.63
84	n61	103.63
83	n62	103.02
82	n63	103.02
81	n64	103.02
80	n65	103.63
79	n66	101.80
78	n67	101.80
77	n68	102.72
76	n69	100.58
75	n70	100.89
74	n71	106.07
73	n72	103.02
72	n73	103.02
71	n74	103.02
70	n75	103.02
69	n76	101.50
68	n77	101.19
67	n78	100.89
66	n79	100.58
65	n80	100.58
64	n81	112.78
63	n82	112.78
62	n83	112.78
61	n84	113.39

Lansdowne Water Model

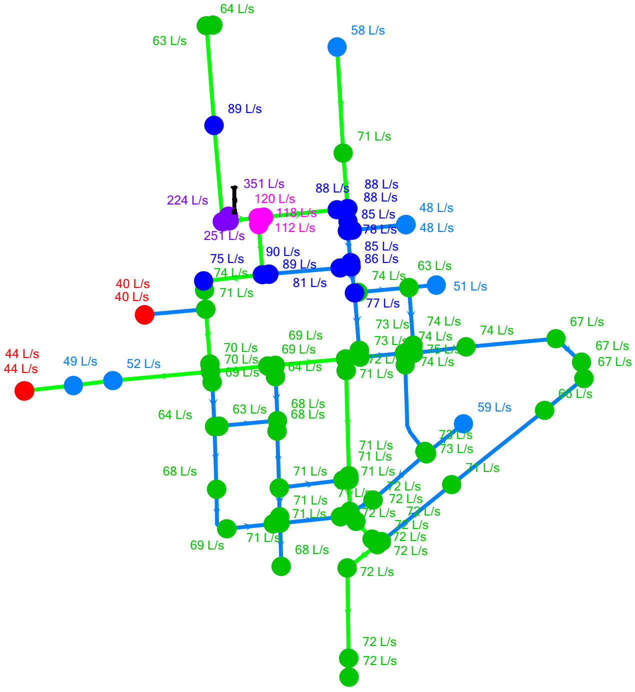
Available Fire Flows - Existing Maximum Day + Fire Flow - Standpipe HGL 137.78m

Color Coding Legend
Pipe: Diameter (mm)

—	<=	152.4
—	<=	203.2
—		Other

Color Coding Legend
Junction: Fire Flow (Available) (L/s)

●	<=	45
●	<=	60
●	<=	75
●	<=	100
●	<=	150
●		Other



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4/22/2022

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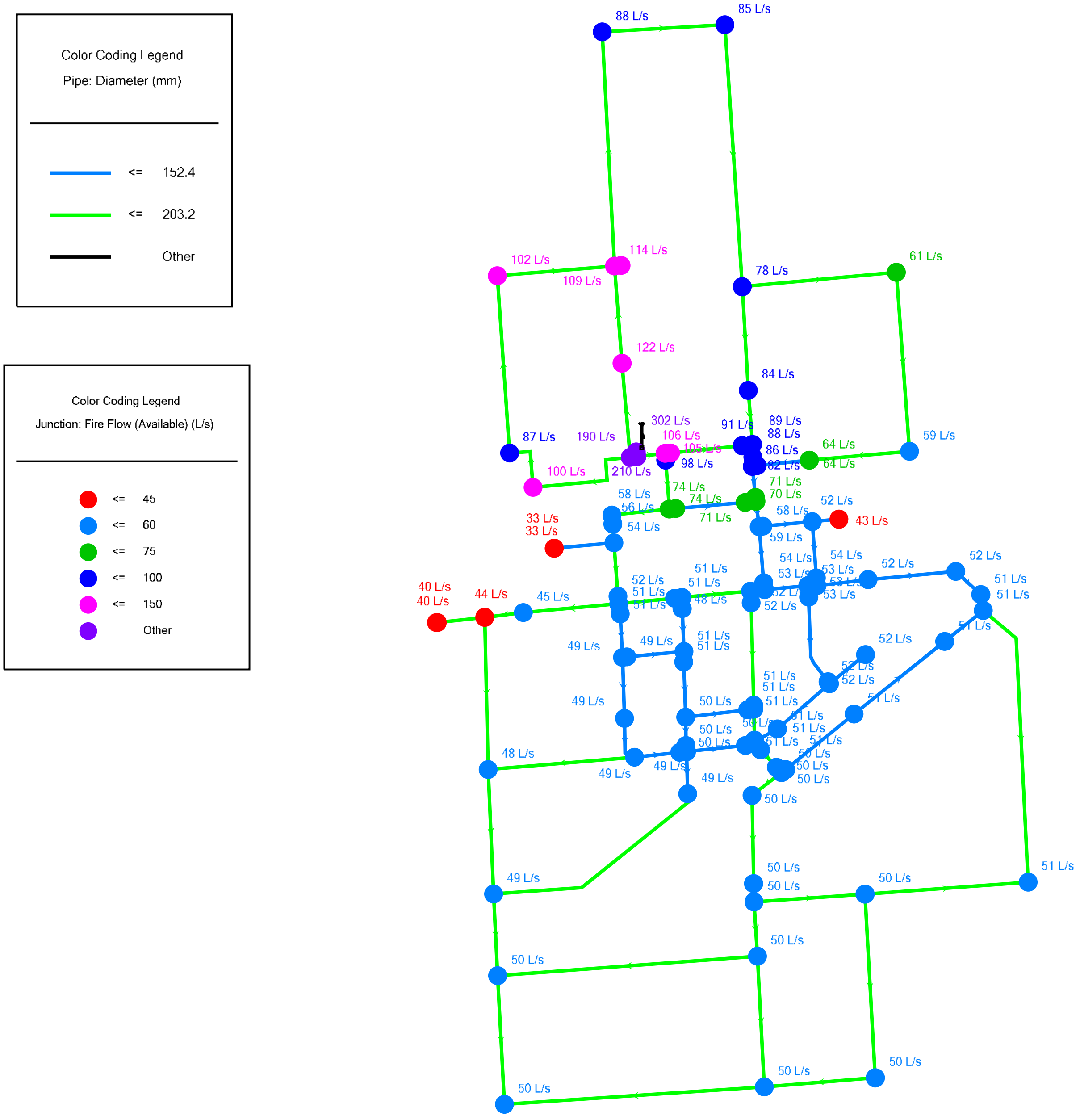
USA +1-203-755-1666

WaterCAD
[10.03.05.05]

Lansdowne Water Model

Available Fire Flows - Future Maximum Day + Fire Flow - Standpipe HGL 137.78m



Lansdowne Water Model

Available Fire Flows - Future Maximum Day + Fire Flow - Standpipe HGL 147.60m

Color Coding Legend

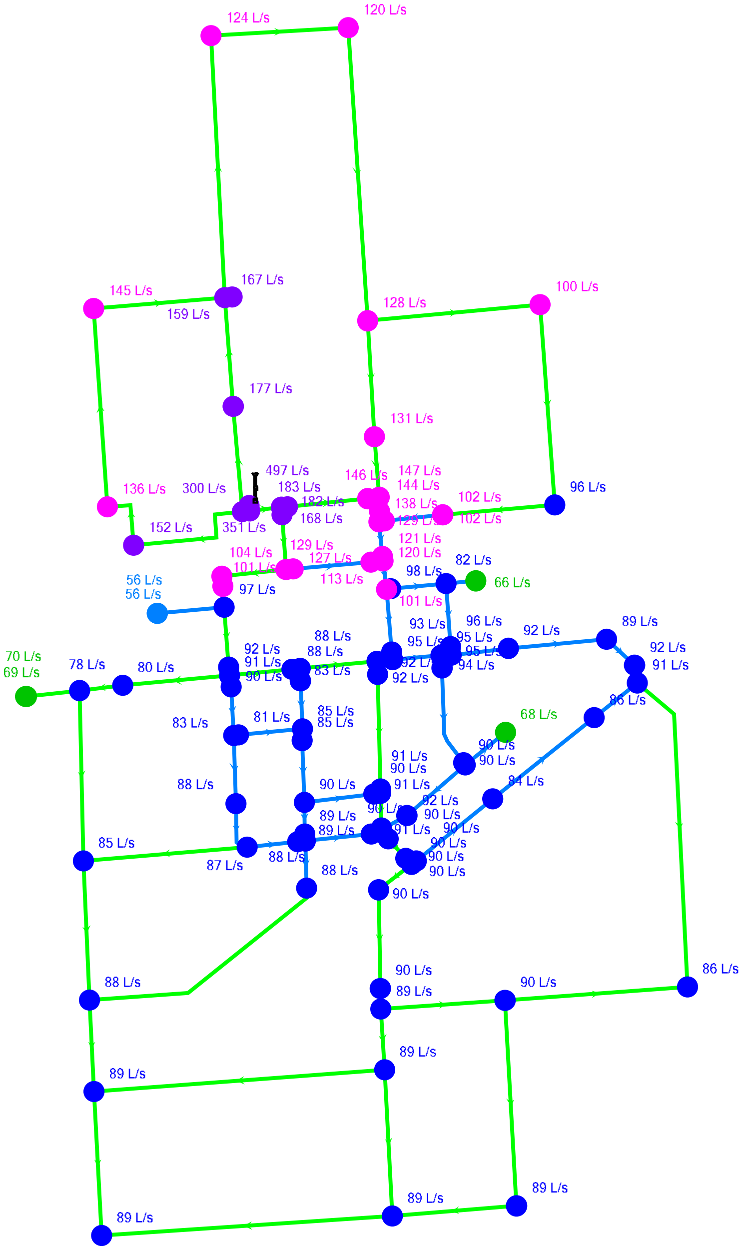
Pipe: Diameter (mm)

━	<=	152.4
━	<=	203.2
━		Other

Color Coding Legend

Junction: Fire Flow (Available) (L/s)

●	<=	45
●	<=	60
●	<=	75
●	<=	100
●	<=	150
●		Other



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WaterCAD
[10.03.05.05]

Lansdowne Water Model

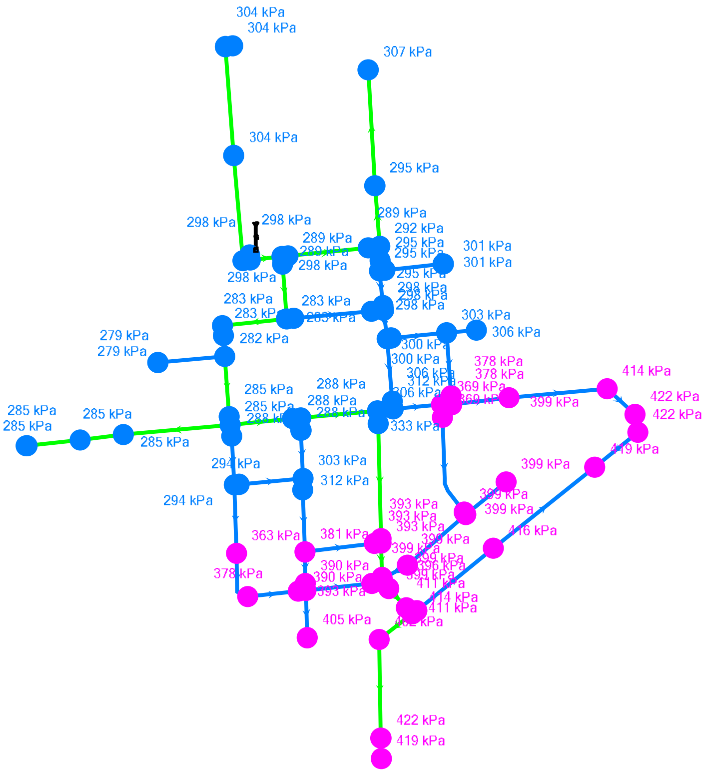
Pressures - Existing Peak Hour - Standpipe HGL 143.89m

Color Coding Legend
Pipe: Diameter (mm)

▬	<=	152.4
▬	<=	203.2
▬		Other

Color Coding Legend
Junction: Pressure (kPa)

●	<=	276
●	<=	350
●	<=	480
●	<=	552
●	<=	700
●		Other



Lansdowne Water Model

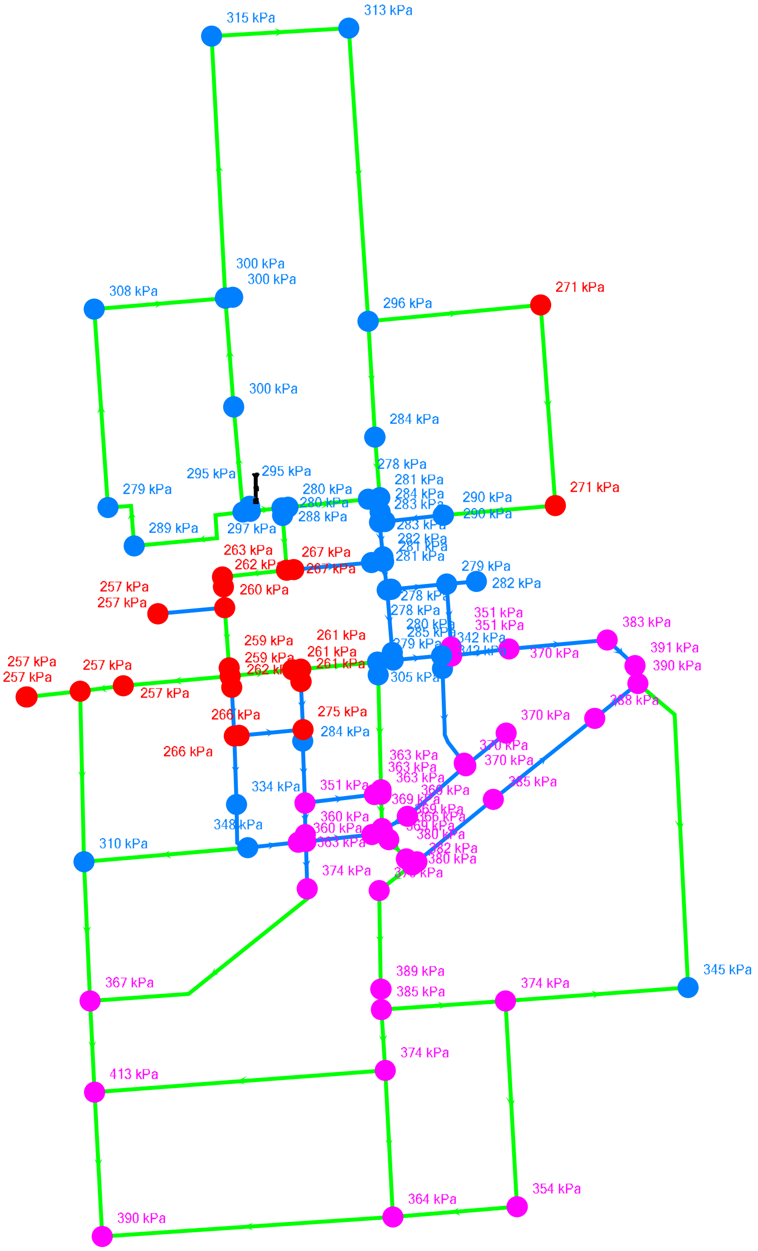
Pressures - Future Peak Hour - Standpipe HGL 143.89m

Color Coding Legend
Pipe: Diameter (mm)

━	<=	152.4
━	<=	203.2
━		Other

Color Coding Legend
Junction: Pressure (kPa)

🔴	<=	276
🔵	<=	350
🟣	<=	480
🟢	<=	552
🔵	<=	700
🟣		Other



Lansdowne Water Model

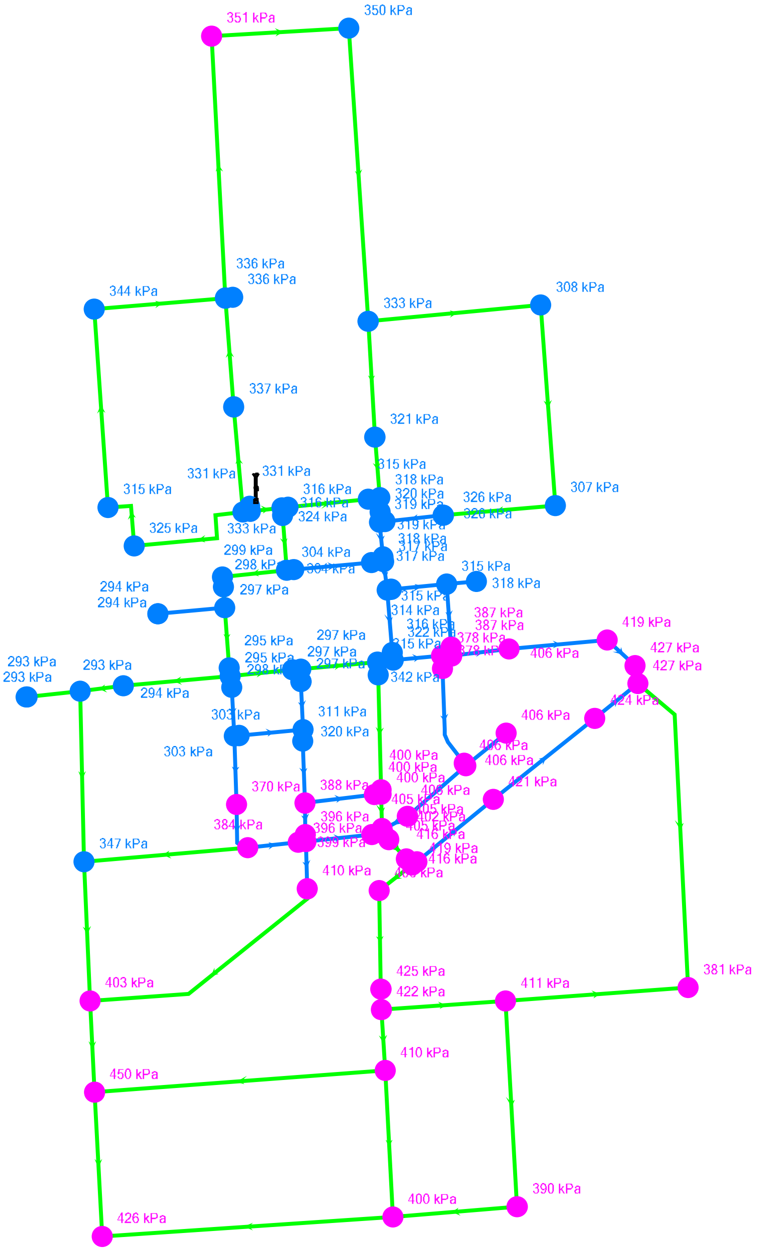
Pressures - Future Peak Hour - Standpipe HGL 147.60m

Color Coding Legend
Pipe: Diameter (mm)

━	<=	152.4
━	<=	203.2
━		Other

Color Coding Legend
Junction: Pressure (kPa)

●	<=	276
●	<=	350
●	<=	480
●	<=	552
●	<=	700
●		Other



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[10.03.05.05]

Appendix 2 – Wastewater Collection

File Location: P:\31000\31681-000 - Lansdowne Assessment\5-Production\1-Civil\31681 C SAN NETWORK.dwg

LEGEND

	EXISTING PROPERTY LINES
	SANITARY DRAINAGE BOUNDARY
	SANITARY SEWER
►	SANITARY FLOW DIRECTION
A# 0.0	DRAINAGE AREA NAME AREA IN HECTARES
●	SANITARY MAINTENANCE HOLE

No.	ISSUE / REVISION	DD/MM/YY

VERIFY SHEET SIZE AND SCALES. THE BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE: 1:2000

CLIENT:

CONSULTANT: www.jlrichards.ca

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP

PROFESSIONAL STAMP

PROJECT:

SERVICED AREA
INFRASTRUCTURE ASSESSMENT &
GROWTH READINESS STUDY
UPDATE
LANSDOWNE, ONTARIO

DRAWING:

SANITARY SEWER NETWORK

DESIGN: JG
DRAWN: JG
CHECKED: MM
JLR #: 31681-000
DRAWING #: 1

PLOT DATE: Thursday, April 28, 2022 11:26:59 PM

Sanitary Sewer Calculation Sheet - Existing Conditions

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DRAINAGE AREA DESCRIPTION																OUTLET PIPE DATA						
LOCATION	MANHOLE		AREA		CONTRIBUTING AREAS	POPULATION			Σ P(1000)	q l/cap/d)	M	Peak Flow (l/s)	Σ AREA (ha)	IA (l/s)	Q (l/s)	SIZE (mm)	Slope (%)	CAP (l/s)	Q/Qfull	VEL (m/s)	LENGTH (m)	FALL (m)
	FROM	TO	No.	Ha		Ppha	P	P(1000)														
Johnston Street	MH1	MH2	A2	0.68	A2	9	6.12	0.006	0.006	350	4.00	0.10	0.68	0.19	0.29	200	0.61%	25.62	0.01	0.82	65.27	0.398
Johnston Street	MH2	MH3	A3	0.66	A2,A3	9	5.94	0.006	0.012	350	4.00	0.20	1.34	0.38	0.57	200	0.61%	25.62	0.02	0.82	90.92	0.555
Garden Street	MH3	MH5	A4	3.00	A2-A4	9	27.00	0.027	0.039	350	4.00	0.63	4.34	1.22	1.85	200	0.61%	25.62	0.07	0.82	44.48	0.271
Frederick Street	MH4	MH5	#REF!	2.24	A5	9	20.16	0.020	0.020	350	4.00	0.33	2.24	0.63	0.95	200	0.61%	25.62	0.04	0.82	77.03	0.470
Garden Street	MH5	MH10	A6	0.36	A1-A6	9	3.24	0.003	0.062	350	4.00	1.01	6.94	1.94	2.96	200	0.61%	25.62	0.12	0.82	103.83	0.633
King Street West	MH6	MH7	A7	5.24	A6	12	62.88	0.063	0.063	350	4.00	1.02	5.24	1.47	2.49	250	0.30%	32.57	0.08	0.66	99.28	0.298
King Street West	MH7	MH8	A8	1.20	A7,A8	9	10.80	0.011	0.074	350	4.00	1.19	6.44	1.80	3.00	250	0.30%	32.57	0.09	0.66	100.54	0.302
King Street West	MH8	MH10	A9	0.65	A7-A9	9	5.85	0.006	0.080	350	4.00	1.29	7.09	1.99	3.27	250	0.30%	32.57	0.10	0.66	100.4	0.301
King Street West	MH9	MH10	A10	0.94	A10	9	8.46	0.008	0.008	350	4.00	0.14	0.94	0.26	0.40	200	0.50%	23.19	0.02	0.74	77.61	0.388
Garden Street	MH10	MH12	A11	0.57	A2-A11	9	5.13	0.005	0.156	350	4.00	2.52	15.54	4.35	6.87	250	0.30%	32.57	0.21	0.66	87.53	0.263
Union Street	MH11	MH12	A12	0.22	A12	9	1.98	0.002	0.002	350	4.00	0.03	0.22	0.06	0.09	200	1.00%	32.80	0.00	1.04	57.39	0.574
Garden Street	MH12	MH13	A13	0.98	A2-A13	9	8.82	0.009	0.166	350	4.00	2.70	16.74	4.69	7.38	250	2.00%	84.10	0.09	1.71	42.62	0.852
Garden Street	MH13	MH14	A14	0.46	A2-A14	9	4.14	0.004	0.171	350	4.00	2.76	17.20	4.82	7.58	250	7.25%	160.12	0.05	3.26	66.55	4.825
Garden Street	MH14	MH15	A15	0.09	A2-A15	9	0.81	0.001	0.171	350	4.00	2.78	17.29	4.84	7.62	250	0.40%	37.61	0.20	0.77	49.2	0.197
Gilbert Street	MH15	MH20	A16	0.57	A2-A16	9	5.13	0.005	0.176	350	4.00	2.86	17.86	5.00	7.86	250	1.50%	72.83	0.11	1.48	103.23	1.548
Miller Street	MH16	MH17	A17	0.55	A17	9	4.95	0.005	0.005	350	4.00	0.08	0.55	0.15	0.23	200	2.48%	51.65	0.00	1.64	66.01	1.637
Miller Street	MH17	MH18	A18	0.71	A17, A18	9	6.39	0.006	0.011	350	4.00	0.18	1.26	0.35	0.54	200	8.61%	96.24	0.01	3.06	77.55	6.677
Miller Street	MH18	MH20	A19	0.45	A17 - A19	9	4.05	0.004	0.015	350	4.00	0.25	1.71	0.48	0.73	200	1.88%	44.97	0.02	1.43	82.46	1.550
Miller Street	MH19	MH20	A20	0.64	A20	9	5.76	0.006	0.006	350	4.00	0.09	0.64	0.18	0.27	200	0.44%	21.76	0.01	0.69	71.37	0.314
Gilbert Street	MH20	MH30	A21	0.56	A2-A21	9	5.04	0.005	0.203	350	4.00	3.28	20.77	5.82	9.10	250	0.30%	32.57	0.28	0.66	113.62	0.341
Prince Street	MH21	MH22	A22	0.56	A22	9	5.04	0.005	0.005	350	4.00	0.08	0.56	0.16	0.24	200	5.00%	73.34	0.00	2.33	47.55	2.378
Prince Street	MH22	MH24	A23	1.04	A22,A23	9	9.36	0.009	0.014	350	4.00	0.23	1.60	0.45	0.68	200	2.50%	51.86	0.01	1.65	108.69	2.717
James Street	MH23	MH24	A24	0.61	A24	9	5.49	0.005	0.020	350	4.00	0.32	2.21	0.62	0.94	200	1.16%	35.32	0.03	1.12	93.07	1.080
Prince Street	MH24	MH30	A25	0.38	A22 - A25	9	3.42	0.003	0.038	350	4.00	0.61	4.19	1.17	1.78	200	1.00%	32.80	0.05	1.04	53.59	0.536
						9																
Centre Street	MH25	MH26	A26	0.90	A25	9	8.10	0.008	0.008	350	4.00	0.13	0.90	0.25	0.38	200	2.50%	51.86	0.01	1.65	99.07	2.477
Grand Trunk Avenue	MH26	MH28	A27	0.10	A26,A27	9	0.90	0.001	0.009	350	4.00	0.15	1.00	0.28	0.43	200	2.50%	51.86	0.01	1.65	55.38	1.385
Grand Trunk Avenue	MH27	MH28	A28	0.84	A28	9	7.56	0.008	0.008	350	4.00	0.12	0.84	0.24	0.36	200	0.44%	21.76	0.02	0.69	78.65	0.346

Sanitary Sewer Calculation Sheet - Existing Conditions

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DRAINAGE AREA DESCRIPTION																OUTLET PIPE DATA						
LOCATION	MANHOLE		AREA		CONTRIBUTING AREAS	POPULATION			Σ P(1000)	q l/cap/d)	M	Peak Flow (l/s)	Σ AREA (ha)	IA (l/s)	Q (l/s)	SIZE (mm)	Slope (%)	CAP (l/s)	Q/Qfull	VEL (m/s)	LENGTH (m)	FALL (m)
	FROM	TO	No.	Ha		Ppha	P	P(1000)														
Grand Trunk Avenue	MH28	MH29	A29	0.52	A26 - A29	9	4.68	0.005	0.021	350	4.00	0.34	2.36	0.66	1.00	200	0.44%	21.76	0.05	0.69	106.27	0.468
Grand Trunk Avenue	MH29	MH30	A30	0.10	A26 - A30	9	0.90	0.001	0.022	350	4.00	0.36	2.46	0.69	1.05	200	0.46%	22.24	0.05	0.71	49.58	0.228
Prince Street	MH30	MH34		0.00	A1 -A30	9	0.00	0.000	0.263	350	4.00	4.25	27.42	7.68	11.93	250	1.00%	59.47	0.20	1.21	65.69	0.657
Prince Street	MH31	MH32	A31	2.57	A31	9	23.13	0.023	0.023	350	4.00	0.37	2.57	0.72	1.09	250	0.30%	32.57	0.03	0.66	100.53	0.302
Prince Street	MH32	MH33	A32	0.74	A31, A32	9	6.66	0.007	0.030	350	4.00	0.48	3.31	0.93	1.41	250	0.30%	32.57	0.04	0.66	76.8	0.230
Railway Street	MH33	MH34	A33	0.30	A31 - A33	9	2.70	0.003	0.032	350	4.00	0.53	3.61	1.01	1.54	250	0.30%	32.57	0.05	0.66	50.79	0.152
Railway Street	MH34	MH35	A34	0.44	A1- A34	9	3.96	0.004	0.299	350	4.00	4.84	31.47	8.81	13.66	300	0.30%	52.97	0.26	0.75	65.9	0.198
Railway Street	MH35	MH36	A35	1.51	A1- A35	9	13.59	0.014	0.313	350	4.00	5.06	32.98	9.23	14.30	300	0.30%	52.97	0.27	0.75	98.47	0.295
Railway Street	MH36	MH37	A36	0.77	A1- A36	9	6.93	0.007	0.319	350	4.00	5.18	33.75	9.45	14.63	300	0.30%	52.97	0.28	0.75	98.81	0.296
Railway Street	MH37	MH38	A37	0.93	A1- A37	9	8.37	0.008	0.328	350	4.00	5.31	34.68	9.71	15.02	300	0.30%	52.97	0.28	0.75	96.48	0.289
Railway Street	MH38	MH39	A38	0.64	A1 - A38	9	5.76	0.006	0.334	350	4.00	5.41	35.32	9.89	15.30	300	0.30%	52.97	0.29	0.75	77.41	0.232
Railway Street	MH39	MH57	A39	0.00	A1 -A38	9	0.00	0.000	0.334	350	4.00	5.41	35.32	9.89	15.30	300	0.30%	52.97	0.29	0.75	21.71	0.065
Prince Street	MH40	MH41	A39	7.02	A40	9	63.18	0.063	0.063	350	4.00	1.02	7.02	1.97	2.99	250	0.30%	32.57	0.09	0.66	122.34	0.367
Prince Street	MH41	MH43	A40	1.19	A39, A40	9	10.71	0.011	0.074	350	4.00	1.20	8.21	2.30	3.50	250	0.30%	32.57	0.11	0.66	122.95	0.369
Church Street	MH58	MH42	A41	7.56	A41	9	68.04	0.068	0.068	350	4.00	1.10	7.56	2.12	3.22	250	0.30%	32.57	0.10	0.66	66.67	0.200
Church Street	MH42	MH43	A42	0.16	A41, A42	9	1.44	0.001	0.069	350	4.00	1.13	7.72	2.16	3.29	250	0.30%	32.57	0.10	0.66	67.46	0.202
Prince Street	MH43	MH45	A43	0.30	A39 - A43	9	2.70	0.003	0.146	350	4.00	2.37	16.23	4.54	6.91	250	0.30%	32.57	0.21	0.66	39.89	0.120
Yonge Street	MH44	MH45	A44	1.45	A44	9	13.05	0.013	0.013	350	4.00	0.21	1.45	0.41	0.62	200	0.44%	21.76	0.03	0.69	89.82	0.395
Prince Street	MH45	MH46	A45	0.25	A39 - A45	9	2.25	0.002	0.161	350	4.00	2.61	17.93	5.02	7.64	250	0.30%	32.57	0.23	0.66	53.76	0.161
Johnston Street	MH1	MH46	A46	0.36	A46	9	3.24	0.003	0.003	350	4.00	0.05	0.36	0.10	0.15	200	1.00%	32.80	0.00	1.04	83.58	0.836
Prince Street	MH46	MH49	A47	0.41	A39-A47	9	3.69	0.004	0.168	350	4.00	2.73	18.70	5.24	7.96	250	0.30%	32.57	0.24	0.66	46.63	0.140
Cliff Street	MH47	MH48	A48	0.48	A48	9	4.32	0.004	0.004	350	4.00	0.07	0.48	0.13	0.20	200	0.60%	25.41	0.01	0.81	46.64	0.280
Cliff Street	MH48	MH49	A49	0.55	A48, A49	9	4.95	0.005	0.009	350	4.00	0.15	1.03	0.29	0.44	200	0.60%	25.41	0.02	0.81	90.48	0.543
Prince Street	MH49	MH51	A50	0.92	A39 - A50	9	8.28	0.008	0.186	350	4.00	3.01	20.65	5.78	8.79	250	0.30%	32.57	0.27	0.66	101.78	0.305
King Street West	MH9	MH50	A51	1.06	A51	9	9.54	0.010	0.010	350	4.00	0.15	1.06	0.30	0.45	200	0.50%	23.19	0.02	0.74	92.16	0.461
King Street West	MH50	MH51	A52	0.39	A51, A52	9	3.51	0.004	0.013	350	4.00	0.21	1.45	0.41	0.62	200	2.40%	50.81	0.01	1.62	69.77	1.674
						9																
King Street East	MH51	MH52	A53	0.43	A39 - A53	9	3.87	0.004	0.203	350	4.00	3.29	22.53	6.31	9.59	250	6.00%	145.66	0.07	2.97	82.23	4.934

Sanitary Sewer Calculation Sheet - Existing Conditions

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ENGINEERS · ARCHITECTS · PLANNERS

DRAINAGE AREA DESCRIPTION																OUTLET PIPE DATA						
LOCATION	MANHOLE		AREA		CONTRIBUTING AREAS	POPULATION			Σ P(1000)	q l/cap/d)	M	Peak Flow (l/s)	Σ AREA (ha)	IA (l/s)	Q (l/s)	SIZE (mm)	Slope (%)	CAP (l/s)	Q/Qfull	VEL (m/s)	LENGTH (m)	FALL (m)
	FROM	TO	No.	Ha		Ppha	P	P(1000)														
Centre Street	MH56	MH52	A54	0.61	A54	9	5.49	0.005	0.005	350	4.00	0.09	0.61	0.17	0.26	200	8.50%	95.62	0.00	3.04	79.96	6.797
King Street East	MH52	MH53	A55	0.63	A39 - A55	9	5.67	0.006	0.214	350	4.00	3.47	23.77	6.66	10.12	250	2.91%	101.44	0.10	2.07	70.63	2.055
King Street East	MH53	MH54	A56	1.18	A39 - A56	9	10.62	0.011	0.225	350	4.00	3.64	24.95	6.99	10.62	250	0.90%	56.42	0.19	1.15	90.97	0.819
King Street East	MH54	MH55	A57	1.26	A39 - A57	9	11.34	0.011	0.236	350	4.00	3.82	26.21	7.34	11.16	250	0.85%	54.83	0.20	1.12	91.61	0.779
Train Tracks	MH55	MH57		0.00	A39 - A57	9	0.00	0.000	0.236	350	4.00	3.82	26.21	7.34	11.16	250	2.00%	84.10	0.13	1.71	54.18	1.084
Pumping Station	MH57	PS	A58	0.16	A2 - A58	9	1.44	0.001	0.571	350	3.94	9.12	61.69	17.27	26.39	380	1.00%	181.63	0.15	1.60		

DESIGN PARAMETER

Mannings n = 0.0130
Average Daily Flow (q)= 350 l/cap/d
Infiltration Rate (I) = 0.28 l/s/ha
New Development Infiltration rate 0.14 l/s/ha

Residential Population Density 9 per/ha

Designed By:
Josie Grady

PROJECT:
LANSDOWNE ASSESSMENT

Checked By:
Matthew Morkem, P.Eng.

LOCATION:
LANSDOWNE, ON

Dwg. Reference: 1

Project Number: 31681-000

Date: 15-May-22

Sheet Number: 1

Sanitary Sewer Calculation Sheet - Short Term Development Growth

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DRAINAGE AREA DESCRIPTION																OUTLET PIPE DATA						
LOCATION	MANHOLE		AREA		CONTRIBUTING AREAS	POPULATION			Σ P(1000)	q l/cap/d)	M	Peak Flow (l/s)	Σ AREA (ha)	IA (l/s)	Q (l/s)	SIZE (mm)	Slope (%)	CAP (l/s)	Q/Qfull	VEL (m/s)	LENGTH (m)	FALL (m)
	FROM	TO	No.	Ha		Ppha	P	P(1000)														
Johnston Street	MH1	MH2	A2	0.68	A2	9.55	6.49	0.006	0.006	330	4.00	0.10	0.68	0.19	0.29	200	0.61%	25.62	0.01	0.82	65.27	0.398
Development Area #3				0.53	DA#3	56.60	30.00	0.030														
Johnston Street	MH2	MH3	A3	0.66	A2,A3	9.55	6.30	0.006	0.043	330	4.00	0.65	1.34	0.19	0.84	200	0.61%	25.62	0.03	0.82	90.92	0.555
Garden Street	MH3	MH5	A4	3.00	A2-A4	9.55	28.65	0.029	0.071	330	4.00	1.09	4.34	1.22	2.31	200	0.61%	25.62	0.09	0.82	44.48	0.271
Frederick Street	MH4	MH5	#REF!	2.24	A5	9.55	21.39	0.021	0.021	330	4.00	0.33	2.24	0.63	0.95	200	0.61%	25.62	0.04	0.82	77.03	0.470
Garden Street	MH5	MH10	A6	0.36	A1-A6	9.55	3.44	0.003	0.096	330	4.00	1.47	6.94	1.94	3.41	200	0.61%	25.62	0.13	0.82	103.83	0.633
King Street West	MH6	MH7	A7	5.24	A6	12.55	65.76	0.066	0.066	330	4.00	1.00	5.24	1.47	2.47	250	0.30%	32.57	0.08	0.66	99.28	0.298
King Street West	MH7	MH8	A8	1.20	A7,A8	9.55	11.46	0.011	0.077	330	4.00	1.18	6.44	1.80	2.98	250	0.30%	32.57	0.09	0.66	100.54	0.302
King Street West	MH8	MH10	A9	0.65	A7-A9	9.55	6.21	0.006	0.083	330	4.00	1.27	7.09	1.99	3.26	250	0.30%	32.57	0.10	0.66	100.4	0.301
King Street West	MH9	MH10	A10	0.94	A10	9.55	8.98	0.009	0.009	330	4.00	0.14	0.94	0.26	0.40	200	0.50%	23.19	0.02	0.74	77.61	0.388
Garden Street	MH10	MH12	A11	0.57	A2-A11	9.55	5.44	0.005	0.194	330	4.00	2.97	15.54	4.35	7.32	250	0.30%	32.57	0.22	0.66	87.53	0.263
Union Street	MH11	MH12	A12	0.22	A12	9.55	2.10	0.002	0.002	330	4.00	0.03	0.22	0.06	0.09	200	1.00%	32.80	0.00	1.04	57.39	0.574
Garden Street	MH12	MH13	A13	0.98	A2-A13	9.55	9.36	0.009	0.206	330	4.00	3.14	16.74	4.69	7.83	250	2.00%	84.10	0.09	1.71	42.62	0.852
Garden Street	MH13	MH14	A14	0.46	A2-A14	9.55	4.39	0.004	0.210	330	4.00	3.21	17.20	4.82	8.02	250	7.25%	160.12	0.05	3.26	66.55	4.825
Garden Street	MH14	MH15	A15	0.09	A2-A15	9.55	0.86	0.001	0.211	330	4.00	3.22	17.29	4.84	8.06	250	0.40%	37.61	0.21	0.77	49.2	0.197
Gilbert Street	MH15	MH20	A16	0.57	A2-A16	9.55	5.44	0.005	0.216	330	4.00	3.30	17.86	5.00	8.31	250	1.50%	72.83	0.11	1.48	103.23	1.548
Miller Street	MH16	MH17	A17	0.55	A17	9.55	5.25	0.005	0.005	330	4.00	0.08	0.55	0.15	0.23	200	2.48%	51.65	0.00	1.64	66.01	1.637
Miller Street	MH17	MH18	A18	0.71	A17, A18	9.55	6.78	0.007	0.012	330	4.00	0.18	1.26	0.35	0.54	200	8.61%	96.24	0.01	3.06	77.55	6.677
Miller Street	MH18	MH20	A19	0.45	A17 - A19	9.55	4.30	0.004	0.016	330	4.00	0.25	1.71	0.48	0.73	200	1.88%	44.97	0.02	1.43	82.46	1.550
Miller Street	MH19	MH20	A20	0.64	A20	9.55	6.11	0.006	0.006	330	4.00	0.09	0.64	0.18	0.27	200	0.44%	21.76	0.01	0.69	71.37	0.314
Gilbert Street	MH20	MH30	A21	0.56	A2-A21	9.55	5.35	0.005	0.244	330	4.00	3.73	20.77	5.82	9.54	250	0.30%	32.57	0.29	0.66	113.62	0.341
Prince Street	MH21	MH22	A22	0.56	A22	9.55	5.35	0.005	0.005	330	4.00	0.08	0.56	0.16	0.24	200	5.00%	73.34	0.00	2.33	47.55	2.378
Prince Street	MH22	MH24	A23	1.04	A22,A23	9.55	9.93	0.010	0.015	330	4.00	0.23	1.60	0.45	0.68	200	2.50%	51.86	0.01	1.65	108.69	2.717
James Street	MH23	MH24	A24	0.61	A24	9.55	5.83	0.006	0.021	330	4.00	0.32	2.21	0.62	0.94	200	1.16%	35.32	0.03	1.12	93.07	1.080
Prince Street	MH24	MH30	A25	0.38	A22 - A25	9.55	3.63	0.004	0.040	330	4.00	0.61	4.19	1.17	1.78	200	1.00%	32.80	0.05	1.04	53.59	0.536
						9.55																
Centre Street	MH25	MH26	A26	0.90	A25	9.55	8.60	0.009	0.009	330	4.00	0.13	0.90	0.25	0.38	200	2.50%	51.86	0.01	1.65	99.07	2.477
Grand Trunk Avenue	MH26	MH28	A27	0.10	A26,A27	9.55	0.96	0.001	0.010	330	4.00	0.15	1.00	0.28	0.43	200	2.50%	51.86	0.01	1.65	55.38	1.385

Sanitary Sewer Calculation Sheet - Short Term Development Growth

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DRAINAGE AREA DESCRIPTION																OUTLET PIPE DATA						
LOCATION	MANHOLE FROM	TO	AREA No.	Ha	CONTRIBUTING AREAS	POPULATION Ppha	P	P(1000)	Σ P(1000)	q l/cap/d)	M	Peak Flow (l/s)	Σ AREA (ha)	IA (l/s)	Q (l/s)	SIZE (mm)	Slope (%)	CAP (l/s)	Q/Qfull	VEL (m/s)	LENGTH (m)	FALL (m)
Grand Trunk Avenue	MH27	MH28	A28	0.84	A28	9.55	8.02	0.008	0.008	330	4.00	0.12	0.84	0.24	0.36	200	0.44%	21.76	0.02	0.69	78.65	0.346
Grand Trunk Avenue	MH28	MH29	A29	0.52	A26 - A29	9.55	4.97	0.005	0.023	330	4.00	0.34	2.36	0.66	1.01	200	0.44%	21.76	0.05	0.69	106.27	0.468
Grand Trunk Avenue	MH29	MH30	A30	0.10	A26 - A30	9.55	0.96	0.001	0.023	330	4.00	0.36	2.46	0.69	1.05	200	0.46%	22.24	0.05	0.71	49.58	0.228
Prince Street	MH30	MH34		0.00	A1 -A30	9.55	0.00	0.000	0.308	330	4.00	4.70	27.42	7.68	12.38	250	1.00%	59.47	0.21	1.21	65.69	0.657
Development Area #2				17.90	DA#2	11.58	207.27	0.207														
Prince Street	MH31	MH32	A31	2.57	A31	9.55	24.54	0.025	0.232	330	4.00	3.54	20.47	2.87	6.41	250	0.30%	32.57	0.20	0.66	100.53	0.302
Prince Street	MH32	MH33	A32	0.74	A31, A32	9.55	7.07	0.007	0.239	330	4.00	3.65	21.21	5.94	9.59	250	0.30%	32.57	0.29	0.66	76.8	0.230
Railway Street	MH33	MH34	A33	0.30	A31 - A33	9.55	2.87	0.003	0.242	330	4.00	3.69	21.51	6.02	9.72	250	0.30%	32.57	0.30	0.66	50.79	0.152
Railway Street	MH34	MH35	A34	0.44	A1- A34	9.55	4.20	0.004	0.554	330	3.95	8.35	49.37	13.82	22.18	300	0.30%	52.97	0.42	0.75	65.9	0.198
Railway Street	MH35	MH36	A35	1.51	A1- A35	9.55	14.42	0.014	0.568	330	3.95	8.56	50.88	14.25	22.80	300	0.30%	52.97	0.43	0.75	98.47	0.295
Railway Street	MH36	MH37	A36	0.77	A1- A36	9.55	7.35	0.007	0.575	330	3.94	8.66	51.65	14.46	23.12	300	0.30%	52.97	0.44	0.75	98.81	0.296
Railway Street	MH37	MH38	A37	0.93	A1- A37	9.55	8.88	0.009	0.584	330	3.94	8.79	52.58	14.72	23.51	300	0.30%	52.97	0.44	0.75	96.48	0.289
Railway Street	MH38	MH39	A38	0.64	A1 - A38	9.55	6.11	0.006	0.590	330	3.94	8.87	53.22	14.90	23.78	300	0.30%	52.97	0.45	0.75	77.41	0.232
Railway Street	MH39	MH57	A39	0.00	A1 -A38	9.55	0.00	0.000	0.590	330	3.94	8.87	53.22	14.90	23.78	300	0.30%	52.97	0.45	0.75	21.71	0.065
Prince Street	MH40	MH41	A39	7.02	A40	9.55	67.04	0.067	0.067	330	4.00	1.02	7.02	1.97	2.99	250	0.30%	32.57	0.09	0.66	122.34	0.367
Prince Street	MH41	MH43	A40	1.19	A39, A40	9.55	11.36	0.011	0.078	330	4.00	1.20	8.21	2.30	3.50	250	0.30%	32.57	0.11	0.66	122.95	0.369
Church Street	MH58	MH42	A41	7.56	A41	9.55	72.20	0.072	0.072	330	4.00	1.10	7.56	2.12	3.22	250	0.30%	32.57	0.10	0.66	66.67	0.200
Church Street	MH42	MH43	A42	0.16	A41, A42	9.55	1.53	0.002	0.074	330	4.00	1.13	7.72	2.16	3.29	250	0.30%	32.57	0.10	0.66	67.46	0.202
Prince Street	MH43	MH45	A43	0.30	A39 - A43	9.55	2.87	0.003	0.155	330	4.00	2.37	16.23	4.54	6.91	250	0.30%	32.57	0.21	0.66	39.89	0.120
Yonge Street	MH44	MH45	A44	1.45	A44	9.55	13.85	0.014	0.014	330	4.00	0.21	1.45	0.41	0.62	200	0.44%	21.76	0.03	0.69	89.82	0.395
Prince Street	MH45	MH46	A45	0.25	A39 - A45	9.55	2.39	0.002	0.171	330	4.00	2.62	17.93	5.02	7.64	250	0.30%	32.57	0.23	0.66	53.76	0.161
Johnston Street	MH1	MH46	A46	0.36	A46	9.55	3.44	0.003	0.003	330	4.00	0.05	0.36	0.10	0.15	200	1.00%	32.80	0.00	1.04	83.58	0.836
Prince Street	MH46	MH49	A47	0.41	A39-A47	9.55	3.92	0.004	0.179	330	4.00	2.73	18.70	5.24	7.96	250	0.30%	32.57	0.24	0.66	46.63	0.140
Cliff Street	MH47	MH48	A48	0.48	A48	9.55	4.58	0.005	0.005	330	4.00	0.07	0.48	0.13	0.20	200	0.60%	25.41	0.01	0.81	46.64	0.280
Cliff Street	MH48	MH49	A49	0.55	A48, A49	9.55	5.25	0.005	0.010	330	4.00	0.15	1.03	0.29	0.44	200	0.60%	25.41	0.02	0.81	90.48	0.543
Prince Street	MH49	MH51	A50	0.92	A39 - A50	9.55	8.79	0.009	0.197	330	4.00	3.01	20.65	5.78	8.79	250	0.30%	32.57	0.27	0.66	101.78	0.305
King Street West	MH9	MH50	A51	1.06	A51	9.55	10.12	0.010	0.010	330	4.00	0.15	1.06	0.30	0.45	200	0.50%	23.19	0.02	0.74	92.16	0.461
King Street West	MH50	MH51	A52	0.39	A51, A52	9.55	3.72	0.004	0.014	330	4.00	0.21	1.45	0.41	0.62	200	2.40%	50.81	0.01	1.62	69.77	1.674
						9.55																

Sanitary Sewer Calculation Sheet - Short Term Development Growth

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DRAINAGE AREA DESCRIPTION																OUTLET PIPE DATA						
LOCATION	MANHOLE		AREA		CONTRIBUTING AREAS	POPULATION			Σ P(1000)	q l/cap/d)	M	Peak Flow (l/s)	Σ AREA (ha)	IA (l/s)	Q (l/s)	SIZE (mm)	Slope (%)	CAP (l/s)	Q/Qfull	VEL (m/s)	LENGTH (m)	FALL (m)
	FROM	TO	No.	Ha		Ppha	P	P(1000)														
King Street East	MH51	MH52	A53	0.43	A39 - A53	9.55	4.11	0.004	0.215	330	4.00	3.29	22.53	6.31	9.60	250	6.00%	145.66	0.07	2.97	82.23	4.934
Centre Street	MH56	MH52	A54	0.61	A54	9.55	5.83	0.006	0.006	330	4.00	0.09	0.61	0.17	0.26	200	8.50%	95.62	0.00	3.04	79.96	6.797
King Street East	MH52	MH53	A55	0.63	A39 - A55	9.55	6.02	0.006	0.227	330	4.00	3.47	23.77	6.66	10.12	250	2.91%	101.44	0.10	2.07	70.63	2.055
King Street East	MH53	MH54	A56	1.18	A39 - A56	9.55	11.27	0.011	0.238	330	4.00	3.64	24.95	6.99	10.63	250	0.90%	56.42	0.19	1.15	90.97	0.819
King Street East	MH54	MH55	A57	1.26	A39 - A57	9.55	12.03	0.012	0.250	330	4.00	3.82	26.21	7.34	11.16	250	0.85%	54.83	0.20	1.12	91.61	0.779
Train Tracks	MH55	MH57		0.00	A39 - A57	9.55	0.00	0.000	0.250	330	4.00	3.82	26.21	7.34	11.16	250	2.00%	84.10	0.13	1.71	54.18	1.084
Pumping Station	MH57	PS	A58	0.16	A2 - A58	9.55	1.53	0.002	0.842	330	3.85	12.37	79.59	22.29	34.66	380	1.00%	181.63	0.19	1.60		

DESIGN PARAMETER

Mannings n = 0.0130

Average Daily Flow (q)= 330 l/cap/d

Infiltration Rate (I) = 0.28 l/s/ha

New Development Infiltration rate 0.14 l/s/ha

Residential Population Density 9.55 per/ha Note Density increased to account for Densification growth

Designed By:
Josie Grady

PROJECT:
LANSDOWNE ASSESSMENT

Checked By:
Matthew Morkem, P.Eng.

LOCATION:
LANSDOWNE, ON

Dwg. Reference:
1

Project Number:
31681-000

Date:
15-May-22

Sheet Number:
1

Sanitary Sewer Calculation Sheet - Long Term Development Growth

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DRAINAGE AREA DESCRIPTION																OUTLET PIPE DATA						
LOCATION	MANHOLE		AREA		CONTRIBUTING AREAS	POPULATION			Σ P(1000)	q l/cap/d)	M	Peak Flow (l/s)	Σ AREA (ha)	IA (l/s)	Q (l/s)	SIZE (mm)	Slope (%)	CAP (l/s)	Q/Qfull	VEL (m/s)	LENGTH (m)	FALL (m)
	FROM	TO	No.	Ha		Ppha	P	P(1000)														
Johnston Street	MH1	MH2	A2	0.68	A2	9.55	6.49	0.006	0.006	330	4.00	0.10	0.68	0.19	0.29	200	0.61%	25.62	0.01	0.82	65.27	0.398
Development Area #3				0.53	DA#3	56.60	30.00	0.030														
Johnston Street	MH2	MH3	A3	0.66	A2,A3	9.55	6.30	0.006	0.043	330	4.00	0.65	1.87	0.26	0.92	200	0.61%	25.62	0.04	0.82	90.92	0.555
Development Area #4				1.80	DA#4	9.00	16.20	0.016														
Garden Street	MH3	MH5	A4	3.00	A2-A4	9.55	28.65	0.029	0.088	330	4.00	1.34	6.67	0.93	2.27	200	0.61%	25.62	0.09	0.82	44.48	0.271
Frederick Street	MH4	MH5	#REF!	2.24	A5	9.55	21.39	0.021	0.021	330	4.00	0.33	2.24	0.63	0.95	200	0.61%	25.62	0.04	0.82	77.03	0.470
Garden Street	MH5	MH10	A6	0.36	A1-A6	9.55	3.44	0.003	0.112	330	4.00	1.72	9.27	2.60	4.31	200	0.61%	25.62	0.17	0.82	103.83	0.633
King Street West	MH6	MH7	A7	5.24	A6	12.55	65.76	0.066	0.066	330	4.00	1.00	5.24	1.47	2.47	250	0.30%	32.57	0.08	0.66	99.28	0.298
King Street West	MH7	MH8	A8	1.20	A7,A8	9.55	11.46	0.011	0.077	330	4.00	1.18	6.44	1.80	2.98	250	0.30%	32.57	0.09	0.66	100.54	0.302
King Street West	MH8	MH10	A9	0.65	A7-A9	9.55	6.21	0.006	0.083	330	4.00	1.27	7.09	1.99	3.26	250	0.30%	32.57	0.10	0.66	100.4	0.301
King Street West	MH9	MH10	A10	0.94	A10	9.55	8.98	0.009	0.009	330	4.00	0.14	0.94	0.26	0.40	200	0.50%	23.19	0.02	0.74	77.61	0.388
Garden Street	MH10	MH12	A11	0.57	A2-A11	9.55	5.44	0.005	0.210	330	4.00	3.21	17.87	5.00	8.22	250	0.30%	32.57	0.25	0.66	87.53	0.263
Union Street	MH11	MH12	A12	0.22	A12	9.55	2.10	0.002	0.002	330	4.00	0.03	0.22	0.06	0.09	200	1.00%	32.80	0.00	1.04	57.39	0.574
Garden Street	MH12	MH13	A13	0.98	A2-A13	9.55	9.36	0.009	0.222	330	4.00	3.39	19.07	5.34	8.73	250	2.00%	84.10	0.10	1.71	42.62	0.852
Garden Street	MH13	MH14	A14	0.46	A2-A14	9.55	4.39	0.004	0.226	330	4.00	3.46	19.53	5.47	8.92	250	7.25%	160.12	0.06	3.26	66.55	4.825
Garden Street	MH14	MH15	A15	0.09	A2-A15	9.55	0.86	0.001	0.227	330	4.00	3.47	19.62	5.49	8.96	250	0.40%	37.61	0.24	0.77	49.2	0.197
Development Area #6				22.70	DA#6	9.00	204.30	0.204														
Gilbert Street	MH15	MH20	A16	0.57	A2-A16	9.55	5.44	0.005	0.437	330	4.00	6.67	42.89	6.00	12.68	250	1.50%	72.83	0.17	1.48	103.23	1.548
Miller Street	MH16	MH17	A17	0.55	A17	9.55	5.25	0.005	0.005	330	4.00	0.08	0.55	0.15	0.23	200	2.48%	51.65	0.00	1.64	66.01	1.637
Miller Street	MH17	MH18	A18	0.71	A17, A18	9.55	6.78	0.007	0.012	330	4.00	0.18	1.26	0.35	0.54	200	8.61%	96.24	0.01	3.06	77.55	6.677
Miller Street	MH18	MH20	A19	0.45	A17 - A19	9.55	4.30	0.004	0.016	330	4.00	0.25	1.71	0.48	0.73	200	1.88%	44.97	0.02	1.43	82.46	1.550
Miller Street	MH19	MH20	A20	0.64	A20	9.55	6.11	0.006	0.006	330	4.00	0.09	0.64	0.18	0.27	200	0.44%	21.76	0.01	0.69	71.37	0.314
Gilbert Street	MH20	MH30	A21	0.56	A2-A21	9.55	5.35	0.005	0.465	330	3.99	7.08	45.80	12.82	19.90	250	0.30%	32.57	0.61	0.66	113.62	0.341
Prince Street	MH21	MH22	A22	0.56	A22	9.55	5.35	0.005	0.005	330	4.00	0.08	0.56	0.16	0.24	200	5.00%	73.34	0.00	2.33	47.55	2.378
Prince Street	MH22	MH24	A23	1.04	A22,A23	9.55	9.93	0.010	0.015	330	4.00	0.23	1.60	0.45	0.68	200	2.50%	51.86	0.01	1.65	108.69	2.717
James Street	MH23	MH24	A24	0.61	A24	9.55	5.83	0.006	0.021	330	4.00	0.32	2.21	0.62	0.94	200	1.16%	35.32	0.03	1.12	93.07	1.080
Prince Street	MH24	MH30	A25	0.38	A22 - A25	9.55	3.63	0.004	0.040	330	4.00	0.61	4.19	1.17	1.78	200	1.00%	32.80	0.05	1.04	53.59	0.536
						9.55																
Centre Street	MH25	MH26	A26	0.90	A25	9.55	8.60	0.009	0.009	330	4.00	0.13	0.90	0.25	0.38	200	2.50%	51.86	0.01	1.65	99.07	2.477

Sanitary Sewer Calculation Sheet - Long Term Development Growth

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DRAINAGE AREA DESCRIPTION																OUTLET PIPE DATA						
LOCATION	MANHOLE		AREA		CONTRIBUTING	POPULATION			Σ	q	M	Peak Flow	Σ	IA	Q	SIZE	Slope	CAP	Q/Qfull	VEL	LENGTH	FALL
	FROM	TO	No.	Ha	AREAS	Ppha	P	P(1000)	P(1000)	l/cap/d)		(l/s)	AREA (ha)	(l/s)	(l/s)	(mm)	(%)	(l/s)		(m/s)	(m)	(m)
Grand Trunk Avenue	MH26	MH28	A27	0.10	A26,A27	9.55	0.96	0.001	0.010	330	4.00	0.15	1.00	0.28	0.43	200	2.50%	51.86	0.01	1.65	55.38	1.385
Grand Trunk Avenue	MH27	MH28	A28	0.84	A28	9.55	8.02	0.008	0.008	330	4.00	0.12	0.84	0.24	0.36	200	0.44%	21.76	0.02	0.69	78.65	0.346
Grand Trunk Avenue	MH28	MH29	A29	0.52	A26 - A29	9.55	4.97	0.005	0.023	330	4.00	0.34	2.36	0.66	1.01	200	0.44%	21.76	0.05	0.69	106.27	0.468
Grand Trunk Avenue	MH29	MH30	A30	0.10	A26 - A30	9.55	0.96	0.001	0.023	330	4.00	0.36	2.46	0.69	1.05	200	0.46%	22.24	0.05	0.71	49.58	0.228
Prince Street	MH30	MH34		0.00	A1 -A30	9.55	0.00	0.000	0.528	330	3.96	7.99	52.45	14.69	22.68	250	1.00%	59.47	0.38	1.21	65.69	0.657
Development Area #1				22.80	DA#1	71.54	1631.00	1.631														
Development Area #2				17.90	DA#2	11.58	207.27	0.207														
Prince Street	MH31	MH32	A31	2.57	A31	9.00	23.13	0.023	1.861	330	3.61	25.66	43.27	6.06	31.72	250	0.30%	32.57	0.97	0.66	100.53	0.302
Prince Street	MH32	MH33	A32	0.74	A31, A32	9.55	7.07	0.007	1.868	330	3.61	25.75	44.01	12.32	38.08	250	0.30%	32.57	Surcharged	0.66	76.8	0.230
Railway Street	MH33	MH34	A33	0.30	A31 - A33	9.55	2.87	0.003	1.871	330	3.61	25.79	44.31	12.41	38.20	250	0.30%	32.57	Surcharged	0.66	50.79	0.152
Railway Street	MH34	MH35	A34	0.44	A1- A34	9.55	4.20	0.004	2.404	330	3.52	32.34	97.20	27.22	59.55	300	0.30%	52.97	Surcharged	0.75	65.9	0.198
Railway Street	MH35	MH36	A35	1.51	A1- A35	9.55	14.42	0.014	2.418	330	3.52	32.51	98.71	27.64	60.15	300	0.30%	52.97	Surcharged	0.75	98.47	0.295
Railway Street	MH36	MH37	A36	0.77	A1- A36	9.55	7.35	0.007	2.425	330	3.52	32.60	99.48	27.85	60.45	300	0.30%	52.97	Surcharged	0.75	98.81	0.296
Railway Street	MH37	MH38	A37	0.93	A1- A37	9.55	8.88	0.009	2.434	330	3.52	32.71	100.41	28.11	60.82	300	0.30%	52.97	Surcharged	0.75	96.48	0.289
Railway Street	MH38	MH39	A38	0.64	A1 - A38	9.55	6.11	0.006	2.440	330	3.52	32.78	101.05	28.29	61.08	300	0.30%	52.97	Surcharged	0.75	77.41	0.232
Railway Street	MH39	MH57	A39	0.00	A1 -A38	9.55	0.00	0.000	2.440	330	3.52	32.78	101.05	28.29	61.08	300	0.30%	52.97	Surcharged	0.75	21.71	0.065
Development Area #7				7.20	DA#7	9.55	64.80	0.065														
Prince Street	MH40	MH41	A39	7.02	A40	9.55	67.04	0.067	0.132	330	4.00	2.01	14.22	1.99	4.01	250	0.30%	32.57	0.12	0.66	122.34	0.367
Prince Street	MH41	MH43	A40	1.19	A39, A40	9.55	11.36	0.011	0.143	330	4.00	2.19	15.41	4.31	6.50	250	0.30%	32.57	0.20	0.66	122.95	0.369
Church Street	MH58	MH42	A41	7.56	A41	9.55	72.20	0.072	0.072	330	4.00	1.10	7.56	2.12	3.22	250	0.30%	32.57	0.10	0.66	66.67	0.200
Church Street	MH42	MH43	A42	0.16	A41, A42	9.55	1.53	0.002	0.074	330	4.00	1.13	7.72	2.16	3.29	250	0.30%	32.57	0.10	0.66	67.46	0.202
Prince Street	MH43	MH45	A43	0.30	A39 - A43	9.55	2.87	0.003	0.220	330	4.00	3.36	23.43	6.56	9.92	250	0.30%	32.57	0.30	0.66	39.89	0.120
Development Area #5				6.40	DA#5	9.00	57.60	0.058														
Yonge Street	MH44	MH45	A44	1.45	A44	9.55	13.85	0.014	0.071	330	4.00	1.09	1.45	0.41	1.50	200	0.44%	21.76	0.07	0.69	89.82	0.395
Prince Street	MH45	MH46	A45	0.25	A39 - A45	9.55	2.39	0.002	0.294	330	4.00	4.49	25.13	7.04	11.52	250	0.30%	32.57	0.35	0.66	53.76	0.161
Johnston Street	MH1	MH46	A46	0.36	A46	9.55	3.44	0.003	0.003	330	4.00	0.05	0.36	0.10	0.15	200	1.00%	32.80	0.00	1.04	83.58	0.836
Prince Street	MH46	MH49	A47	0.41	A39-A47	9.55	3.92	0.004	0.301	330	4.00	4.60	25.90	7.25	11.85	250	0.30%	32.57	0.36	0.66	46.63	0.140
Cliff Street	MH47	MH48	A48	0.48	A48	9.55	4.58	0.005	0.005	330	4.00	0.07	0.48	0.13	0.20	200	0.60%	25.41	0.01	0.81	46.64	0.280
Cliff Street	MH48	MH49	A49	0.55	A48, A49	9.55	5.25	0.005	0.010	330	4.00	0.15	1.03	0.29	0.44	200	0.60%	25.41	0.02	0.81	90.48	0.543

Sanitary Sewer Calculation Sheet - Long Term Development Growth

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DRAINAGE AREA DESCRIPTION																OUTLET PIPE DATA						
LOCATION	MANHOLE		AREA		CONTRIBUTING AREAS	POPULATION			Σ P(1000)	q l/cap/d)	M	Peak Flow (l/s)	Σ AREA (ha)	IA (l/s)	Q (l/s)	SIZE (mm)	Slope (%)	CAP (l/s)	Q/Qfull	VEL (m/s)	LENGTH (m)	FALL (m)
	FROM	TO	No.	Ha		Ppha	P	P(1000)														
Johnston Street	MH1	MH2	A2	0.68	A2	9.55	6.49	0.006	0.006	330	4.00	0.10	0.68	0.19	0.29	200	0.61%	25.62	0.01	0.82	65.27	0.398
Development Area #3				0.53	DA#3	56.60	30.00	0.030														
Johnston Street	MH2	MH3	A3	0.66	A2,A3	9.55	6.30	0.006	0.043	330	4.00	0.65	1.87	0.26	0.92	200	0.61%	25.62	0.04	0.82	90.92	0.555
Development Area #4				1.80	DA#4	9.00	16.20	0.016														
Garden Street	MH3	MH5	A4	3.00	A2-A4	9.55	28.65	0.029	0.088	330	4.00	1.34	6.67	0.93	2.27	200	0.61%	25.62	0.09	0.82	44.48	0.271
Frederick Street	MH4	MH5	#REF!	2.24	A5	9.55	21.39	0.021	0.021	330	4.00	0.33	2.24	0.63	0.95	200	0.61%	25.62	0.04	0.82	77.03	0.470
Garden Street	MH5	MH10	A6	0.36	A1-A6	9.55	3.44	0.003	0.112	330	4.00	1.72	9.27	2.60	4.31	200	0.61%	25.62	0.17	0.82	103.83	0.633
King Street West	MH6	MH7	A7	5.24	A6	12.55	65.76	0.066	0.066	330	4.00	1.00	5.24	1.47	2.47	250	0.30%	32.57	0.08	0.66	99.28	0.298
King Street West	MH7	MH8	A8	1.20	A7,A8	9.55	11.46	0.011	0.077	330	4.00	1.18	6.44	1.80	2.98	250	0.30%	32.57	0.09	0.66	100.54	0.302
King Street West	MH8	MH10	A9	0.65	A7-A9	9.55	6.21	0.006	0.083	330	4.00	1.27	7.09	1.99	3.26	250	0.30%	32.57	0.10	0.66	100.4	0.301
King Street West	MH9	MH10	A10	0.94	A10	9.55	8.98	0.009	0.009	330	4.00	0.14	0.94	0.26	0.40	200	0.50%	23.19	0.02	0.74	77.61	0.388
Garden Street	MH10	MH12	A11	0.57	A2-A11	9.55	5.44	0.005	0.210	330	4.00	3.21	17.87	5.00	8.22	250	0.30%	32.57	0.25	0.66	87.53	0.263
Union Street	MH11	MH12	A12	0.22	A12	9.55	2.10	0.002	0.002	330	4.00	0.03	0.22	0.06	0.09	200	1.00%	32.80	0.00	1.04	57.39	0.574
Garden Street	MH12	MH13	A13	0.98	A2-A13	9.55	9.36	0.009	0.222	330	4.00	3.39	19.07	5.34	8.73	250	2.00%	84.10	0.10	1.71	42.62	0.852
Garden Street	MH13	MH14	A14	0.46	A2-A14	9.55	4.39	0.004	0.226	330	4.00	3.46	19.53	5.47	8.92	250	7.25%	160.12	0.06	3.26	66.55	4.825
Garden Street	MH14	MH15	A15	0.09	A2-A15	9.55	0.86	0.001	0.227	330	4.00	3.47	19.62	5.49	8.96	250	0.40%	37.61	0.24	0.77	49.2	0.197
Development Area #6				22.70	DA#6	9.00	204.30	0.204														
Gilbert Street	MH15	MH20	A16	0.57	A2-A16	9.55	5.44	0.005	0.437	330	4.00	6.67	42.89	6.00	12.68	250	1.50%	72.83	0.17	1.48	103.23	1.548
Miller Street	MH16	MH17	A17	0.55	A17	9.55	5.25	0.005	0.005	330	4.00	0.08	0.55	0.15	0.23	200	2.48%	51.65	0.00	1.64	66.01	1.637
Miller Street	MH17	MH18	A18	0.71	A17, A18	9.55	6.78	0.007	0.012	330	4.00	0.18	1.26	0.35	0.54	200	8.61%	96.24	0.01	3.06	77.55	6.677
Miller Street	MH18	MH20	A19	0.45	A17 - A19	9.55	4.30	0.004	0.016	330	4.00	0.25	1.71	0.48	0.73	200	1.88%	44.97	0.02	1.43	82.46	1.550
Miller Street	MH19	MH20	A20	0.64	A20	9.55	6.11	0.006	0.006	330	4.00	0.09	0.64	0.18	0.27	200	0.44%	21.76	0.01	0.69	71.37	0.314
Gilbert Street	MH20	MH30	A21	0.56	A2-A21	9.55	5.35	0.005	0.465	330	3.99	7.08	45.80	12.82	19.90	250	0.30%	32.57	0.61	0.66	113.62	0.341
Prince Street	MH21	MH22	A22	0.56	A22	9.55	5.35	0.005	0.005	330	4.00	0.08	0.56	0.16	0.24	200	5.00%	73.34	0.00	2.33	47.55	2.378
Prince Street	MH22	MH24	A23	1.04	A22,A23	9.55	9.93	0.010	0.015	330	4.00	0.23	1.60	0.45	0.68	200	2.50%	51.86	0.01	1.65	108.69	2.717
James Street	MH23	MH24	A24	0.61	A24	9.55	5.83	0.006	0.021	330	4.00	0.32	2.21	0.62	0.94	200	1.16%	35.32	0.03	1.12	93.07	1.080
Prince Street	MH24	MH30	A25	0.38	A22 - A25	9.55	3.63	0.004	0.040	330	4.00	0.61	4.19	1.17	1.78	200	1.00%	32.80	0.05	1.04	53.59	0.536
						9.55																
Centre Street	MH25	MH26	A26	0.90	A25	9.55	8.60	0.009	0.009	330	4.00	0.13	0.90	0.25	0.38	200	2.50%	51.86	0.01	1.65	99.07	2.477

Sanitary Sewer Calculation Sheet - Long Term Development Growth

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DRAINAGE AREA DESCRIPTION																OUTLET PIPE DATA						
LOCATION	MANHOLE		AREA		CONTRIBUTING AREAS	POPULATION			Σ P(1000)	q l/cap/d)	M	Peak Flow (l/s)	Σ AREA (ha)	IA (l/s)	Q (l/s)	SIZE (mm)	Slope (%)	CAP (l/s)	Q/Qfull	VEL (m/s)	LENGTH (m)	FALL (m)
	FROM	TO	No.	Ha		Ppha	P	P(1000)														
Grand Trunk Avenue	MH26	MH28	A27	0.10	A26,A27	9.55	0.96	0.001	0.010	330	4.00	0.15	1.00	0.28	0.43	200	2.50%	51.86	0.01	1.65	55.38	1.385
Grand Trunk Avenue	MH27	MH28	A28	0.84	A28	9.55	8.02	0.008	0.008	330	4.00	0.12	0.84	0.24	0.36	200	0.44%	21.76	0.02	0.69	78.65	0.346
Grand Trunk Avenue	MH28	MH29	A29	0.52	A26 - A29	9.55	4.97	0.005	0.023	330	4.00	0.34	2.36	0.66	1.01	200	0.44%	21.76	0.05	0.69	106.27	0.468
Grand Trunk Avenue	MH29	MH30	A30	0.10	A26 - A30	9.55	0.96	0.001	0.023	330	4.00	0.36	2.46	0.69	1.05	200	0.46%	22.24	0.05	0.71	49.58	0.228
Prince Street	MH30	MH34		0.00	A1 -A30	9.55	0.00	0.000	0.528	330	3.96	7.99	52.45	14.69	22.68	250	1.00%	59.47	0.38	1.21	65.69	0.657
Development Area #1				22.80	DA#1	71.54	1631.00	1.631														
Development Area #2				17.90	DA#2	11.58	207.27	0.207														
Prince Street	MH31	MH32	A31	2.57	A31	9.00	23.13	0.023	1.861	330	3.61	25.66	43.27	6.06	31.72	300	0.30%	52.97	0.60	0.75	100.53	0.302
Prince Street	MH32	MH33	A32	0.74	A31, A32	9.55	7.07	0.007	1.868	330	3.61	25.75	44.01	12.32	38.08	300	0.30%	52.97	0.72	0.75	76.8	0.230
Railway Street	MH33	MH34	A33	0.30	A31 - A33	9.55	2.87	0.003	1.871	330	3.61	25.79	44.31	12.41	38.20	300	0.30%	52.97	0.72	0.75	50.79	0.152
Railway Street	MH34	MH35	A34	0.44	A1- A34	9.55	4.20	0.004	2.404	330	3.52	32.34	97.20	27.22	59.55	350	0.30%	79.89	0.75	0.83	65.9	0.198
Railway Street	MH35	MH36	A35	1.51	A1- A35	9.55	14.42	0.014	2.418	330	3.52	32.51	98.71	27.64	60.15	350	0.30%	79.89	0.75	0.83	98.47	0.295
Railway Street	MH36	MH37	A36	0.77	A1- A36	9.55	7.35	0.007	2.425	330	3.52	32.60	99.48	27.85	60.45	350	0.30%	79.89	0.76	0.83	98.81	0.296
Railway Street	MH37	MH38	A37	0.93	A1- A37	9.55	8.88	0.009	2.434	330	3.52	32.71	100.41	28.11	60.82	350	0.30%	79.89	0.76	0.83	96.48	0.289
Railway Street	MH38	MH39	A38	0.64	A1 - A38	9.55	6.11	0.006	2.440	330	3.52	32.78	101.05	28.29	61.08	350	0.30%	79.89	0.76	0.83	77.41	0.232
Railway Street	MH39	MH57	A39	0.00	A1 -A38	9.55	0.00	0.000	2.440	330	3.52	32.78	101.05	28.29	61.08	350	0.30%	79.89	0.76	0.83	21.71	0.065
Development Area #7				7.20	DA#7	9.55	64.80	0.065														
Prince Street	MH40	MH41	A39	7.02	A40	9.55	67.04	0.067	0.132	330	4.00	2.01	14.22	1.99	4.01	250	0.30%	32.57	0.12	0.66	122.34	0.367
Prince Street	MH41	MH43	A40	1.19	A39, A40	9.55	11.36	0.011	0.143	330	4.00	2.19	15.41	4.31	6.50	250	0.30%	32.57	0.20	0.66	122.95	0.369
Church Street	MH58	MH42	A41	7.56	A41	9.55	72.20	0.072	0.072	330	4.00	1.10	7.56	2.12	3.22	250	0.30%	32.57	0.10	0.66	66.67	0.200
Church Street	MH42	MH43	A42	0.16	A41, A42	9.55	1.53	0.002	0.074	330	4.00	1.13	7.72	2.16	3.29	250	0.30%	32.57	0.10	0.66	67.46	0.202
Prince Street	MH43	MH45	A43	0.30	A39 - A43	9.55	2.87	0.003	0.220	330	4.00	3.36	23.43	6.56	9.92	250	0.30%	32.57	0.30	0.66	39.89	0.120
Development Area #5				6.40	DA#5	9.00	57.60	0.058														
Yonge Street	MH44	MH45	A44	1.45	A44	9.55	13.85	0.014	0.071	330	4.00	1.09	1.45	0.41	1.50	200	0.44%	21.76	0.07	0.69	89.82	0.395
Prince Street	MH45	MH46	A45	0.25	A39 - A45	9.55	2.39	0.002	0.294	330	4.00	4.49	25.13	7.04	11.52	250	0.30%	32.57	0.35	0.66	53.76	0.161
Johnston Street	MH1	MH46	A46	0.36	A46	9.55	3.44	0.003	0.003	330	4.00	0.05	0.36	0.10	0.15	200	1.00%	32.80	0.00	1.04	83.58	0.836
Prince Street	MH46	MH49	A47	0.41	A39-A47	9.55	3.92	0.004	0.301	330	4.00	4.60	25.90	7.25	11.85	250	0.30%	32.57	0.36	0.66	46.63	0.140
Cliff Street	MH47	MH48	A48	0.48	A48	9.55	4.58	0.005	0.005	330	4.00	0.07	0.48	0.13	0.20	200	0.60%	25.41	0.01	0.81	46.64	0.280
Cliff Street	MH48	MH49	A49	0.55	A48, A49	9.55	5.25	0.005	0.010	330	4.00	0.15	1.03	0.29	0.44	200	0.60%	25.41	0.02	0.81	90.48	0.543

Sanitary Sewer Calculation Sheet - Long Term Development Growth

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ENGINEERS · ARCHITECTS · PLANNERS

DRAINAGE AREA DESCRIPTION																OUTLET PIPE DATA						
LOCATION	MANHOLE		AREA		CONTRIBUTING	POPULATION			Σ	q	M	Peak Flow	Σ	IA	Q	SIZE	Slope	CAP	Q/Qfull	VEL	LENGTH	FALL
	FROM	TO	No.	Ha	AREAS	Ppha	P	P(1000)	P(1000)	l/cap/d)		(l/s)	AREA (ha)	(l/s)	(l/s)	(mm)	(%)	(l/s)		(m/s)	(m)	(m)
Prince Street	MH49	MH51	A50	0.92	A39 - A50	9.55	8.79	0.009	0.320	330	4.00	4.88	27.85	7.80	12.68	250	0.30%	32.57	0.39	0.66	101.78	0.305
King Street West	MH9	MH50	A51	1.06	A51	9.55	10.12	0.010	0.010	330	4.00	0.15	1.06	0.30	0.45	200	0.50%	23.19	0.02	0.74	92.16	0.461
King Street West	MH50	MH51	A52	0.39	A51, A52	9.55	3.72	0.004	0.014	330	4.00	0.21	1.45	0.41	0.62	200	2.40%	50.81	0.01	1.62	69.77	1.674
						9.55																
King Street East	MH51	MH52	A53	0.43	A39 - A53	9.55	4.11	0.004	0.338	330	4.00	5.16	29.73	8.32	13.48	250	6.00%	145.66	0.09	2.97	82.23	4.934
Centre Street	MH56	MH52	A54	0.61	A54	9.55	5.83	0.006	0.006	330	4.00	0.09	0.61	0.17	0.26	200	8.50%	95.62	0.00	3.04	79.96	6.797
King Street East	MH52	MH53	A55	0.63	A39 - A55	9.55	6.02	0.006	0.349	330	4.00	5.34	30.97	8.67	14.01	250	2.91%	101.44	0.14	2.07	70.63	2.055
King Street East	MH53	MH54	A56	1.18	A39 - A56	9.55	11.27	0.011	0.361	330	4.00	5.51	32.15	9.00	14.51	250	0.90%	56.42	0.26	1.15	90.97	0.819
King Street East	MH54	MH55	A57	1.26	A39 - A57	9.55	12.03	0.012	0.373	330	4.00	5.69	33.41	9.35	15.05	250	0.85%	54.83	0.27	1.12	91.61	0.779
Train Tracks	MH55	MH57		0.00	A39 - A57	9.55	0.00	0.000	0.373	330	4.00	5.69	33.41	9.35	15.05	250	2.00%	84.10	0.18	1.71	54.18	1.084
Pumping Station	MH57	PS	A58	0.16	A2 - A58	9.55	1.53	0.002	2.815	330	3.47	37.26	134.62	37.69	74.95	380	1.00%	181.63	0.41	1.60		

DESIGN PARAMETER

Mannings n = 0.0130

Average Daily Flow (q)= 330 l/cap/d

Infiltration Rate (I) = 0.28 l/s/ha

New Development Infiltration rate 0.14 l/s/ha

Residential Population Density 9.55 per/ha Note Density increased to account for Densification growth

Designed By:
Josie Grady

PROJECT:
LANSDOWNE ASSESSMENT

Checked By:
Matthew Morkem, P.Eng.

LOCATION:
LANSDOWNE, ON

Dwg. Reference:

Project Number:
31681-000

Date:
15-May-22

Sheet Number:
1

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Platinum member

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