Township of Leeds and the Thousand Islands

Staff Report

Report To:	Committee of the Whole
Meeting Date:	June 6, 2022
Prepared By:	David Holliday, Director of Operations Kate Tindal, Director of Finance Marnie Venditti, Director of Planning and Development
Subject:	Operations Report - SR-081-22 - Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study Update

Recommendation

THAT the Committee of the Whole recommends that Council receive the Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study Update prepared by J.L. Richards and Associates Limited;

AND THAT the Committee of the Whole recommends that Council authorize Staff to proceed with a request for proposal (RFP) to engage a firm to undertake a Municipal Class Environmental Assessment (MCEA) as required to address the recommendation regarding the standpipe and water supply approvals identified in the update provided by J.L. Richards and Associates Limited;

AND THAT the Committee of the Whole recommends that Council allocate a budget of up to $75,000 from the Water Reserve Fund to fund the MCEA.

Background

In November of 2020, Council received the Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study by SNC Lavalin ('Study'). This report provided an overview of the current and future demands of the water, sanitary, and storm water systems in the Village of Lansdowne, giving consideration to the village boundaries and the 2018 Official Plan (OP), that requires all development within the settlement area of Lansdowne to be connected to piped municipal water and sanitary sewer services.

The Study provides the guiding principles for Staff and developers to verify the available capacities for new development. Recent developments include the Church Street property and the proposed sub-division and industrial developments south of the railway tracks on County Road 3 that is currently in review.

It was through the review of the proposed subdivision south of the rail tracks in Lansdowne that some questions on methodology were identified in the Study.

The areas in question are as follows:

Water System

1) Water storage calculation of the standpipe. The Study did not provide the A+B+C calculation as defined by the Ministry of the Environment, Conservation and Parks ('MECP') for Total Treated Water Storage where A = Fire Storage; B = Equalization Storage (25% of maximum day demand); and C = Emergency Storage (25% of A + B)

2) Design flows for the water plant capacity. As per MECP guidelines, the Maximum Day Demand (MDD) is to be used. The Study applied Average Day Demand (ADD) resulting in lower requirements for the water system for short term and long term projections.

Sanitary System

1) Sanitary pumping station on Railway Street. The Study did not consider the flow calculations as per MECP guidelines but rather based the results on observed levels at the pumping station.

2) Sewage Treatment Facility (lagoons) capacity. The Study did not apply MECP Guideline *D-5-1 Calculating and Reporting Uncommitted Reserve Capacity at Sewage and Water Treatment Plants* to determine the calculated capacity of the lagoon system.

As part of the process of obtaining quotes for a peer review of the proposed development south of the railway tracks, the SNC Lavalin Study and the applicant's servicing study were provided to all firms. Through their review of the documentation to provide a quote, J.L. Richards identified some questions with the Study.

These items were discussed with the lead engineer from SNC Lavalin and Staff remained unsatisfied with the response. Staff then engaged J.L. Richards, who had provided a quote for peer review services for the applicant's servicing study.

The update to the Study is not the peer review work related to the subdivision, but was necessary work to allow for the peer review to be completed.

J. L Richards provided an update to the Study attached as Exhibit A based on their expertise in municipal water and sewer system design.

Analysis

The Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study Update ('Update') prepared by J.L. Richards applies the MECP guidelines to the areas of concern in the Study that are noted above. The Update also provides the anticipated thresholds and costing for upgrades which were not included in the Study. The Update also provides more detailed information and identifies specific capacity thresholds for the water treatment plant, the water storage facility (standpipe), the sanitary pumping station, and the sanitary treatment plant.

The most immediate concern is the standpipe capacity. When the A+B+C calculation is applied, it has been identified as not currently providing sufficient capacity to meet the Fire Underwriters Service (FUS) standard to maintain a minimum pressure for a standard duration of time. This standard is applied when the system is offline (i.e. the pumps are not in operation). In order to meet the FUS requirement, the standpipe requires more elevation to maintain the expected level of pressure for the required duration. Staff have discussed expansion of the existing standpipe with J.L. Richards. I has been was confirmed it is not possible to upgrade the current standpipe to address this matter. A new water storage facility is required at a higher elevation to achieve the appropriate head pressure to address current needs and future growth opportunities in Lansdowne.

The second immediate concern is the capacity of the water treatment plant. While the plant currently has enough capacity for the existing system, the introduction of a new water storage facility presents a challenge as the current pumps are not designed for the proposed elevation change. As the standpipe becomes higher, larger pumps are required to push the water to the operating elevation. In addition, the update identified that current Permit To Take Water (PTTW) the Township holds is limited to 720m3/day and will reach maximum capacity with the addition of 55.5 additional residential units.

The other two noted concerns are directly affected by growth, and not immediate in nature for the existing system. The first concern is the capacity of the sanitary pumping station. The introduction of the development on County Road 3 south of the railway tracks will trigger the requirement for upgrades as the pump station design peak flow will be exceeded. The lagoons currently have capacity for 39 additional residential units and will require expansion beyond this threshold.

To address the immediate needs identified in the Update regarding the standpipe and water treatment plant a Municipal Class Environmental Assessment (MCEA) is required, followed by detailed design and construction.

In addition a future MCEA will be required to review the sanitary system. This is proposed to be completed separate from the standpipe review and will be included in a future capital budget.

Based on the capacities provided in the update from JL Richards the water treatment plant current has the capacity to support 55.5 additional units. The update also notes that the waste treatment plans will reach 80% capacity with the addition of 39 additional residential units. 80% represents the threshold at which planning for the expansion including a Municipal Class Environmental Assessment should be initiated. Based on these recommendations the remaining capacity for new development within the existing municipal system is 39 additional residential units.

Financial Implications

Staff are proposing to fund the MCEA from the Water Reserve Fund. The MCEA is one step in the process to ensure upgrades are in place to meet existing and future water and sanitary sewer needs of the ratepayers. The water and sanitary systems are essential to the residents of the Village of Lansdowne.

The current balance in the Water Reserve Fund is $517,578. The following summarizes the anticipated 2022 activity in this reserve:

Dec 31, 2021 balance	$517,578
2022 budgeted contribution to reserve from operating	$79,500
2022 budgeted withdrawal for water meter replacement	($95,000)
Estimated balance	$502,078
Proposed allocation per report	($75,000)
Revised estimated balance	$427,078

Staff anticipate that the work outlined in the Study Update will require significant capital investment, quickly depleting the funds in the water and wastewater reserve funds. As additional costing information is available, Staff will provide options to Council about how to fund the required capital work for Council's consideration and direction.

Policy Alignment

This process aligns with Strategic Pillar #2 - Promoting Quality of Life and Environmental Stewardship, maintain and improve water quality by supporting responsible water and wastewater management.

Conclusion

Based on the recommendations in the Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study, and the policies of the Official Plan that require all new development in Lansdowne to connected to municipal water and sewer there are significant upgrades that need to be planned for the servicing infrastructure. It is the recommendation of staff that council accept the updated report provided by JL Richards and provide direction to staff to proceed with the required actions as outlined in the recommendation.

Approved by:	Status:
Marnie Venditti, Director of Planning and Development	Approved - 30 May 2022
Kate Tindal, Director of Finance	Approved - 30 May 2022
Stephen Donachey, CAO	Approved - 31 May 2022

Attachments:

Lansdowne Assessment Update Memorandum Final

MEMORANDUM

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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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: JLR No.: CC:	May 24, 2022 31681-000.1 N/A
From:	Matthew Morkem, P.Eng		
Re:	Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study Update (DRAFT)		

1.0 <u>Introduction</u>

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 <u>Definitions</u>

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.

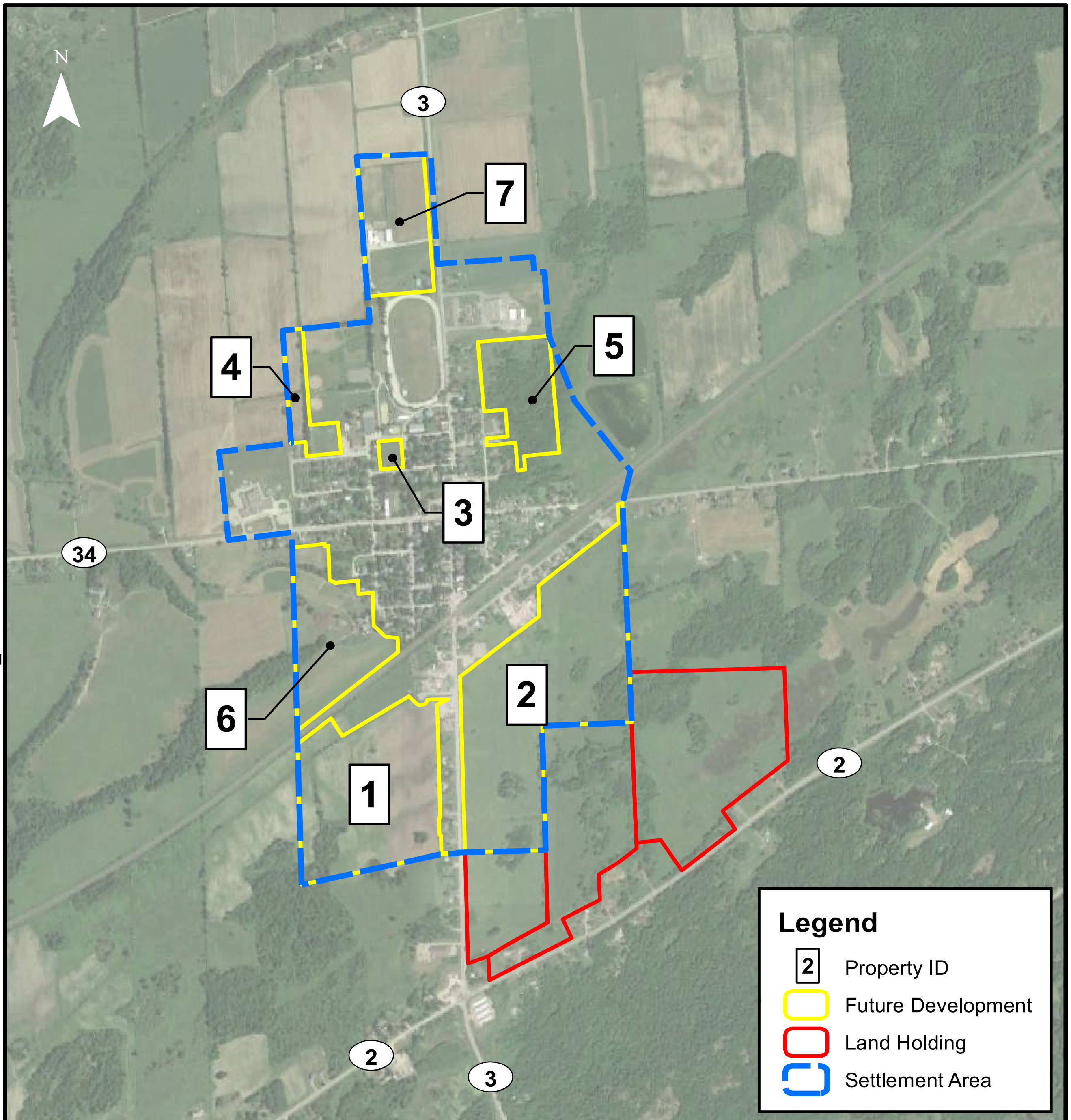
Table 1 - Lansdowne Development Lands Summary

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.

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



PROJECT:

LANSDOWN ASSESSMENT

LANSDOWN, LEEDS AND THE THOUSAND ISLANDS, ONTARIO

DRAWING:

LANSDOWN GROWTH MAP

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

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

DRAWING #:

FIGURE 1

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 <u>Project Demand / Flows</u>

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)

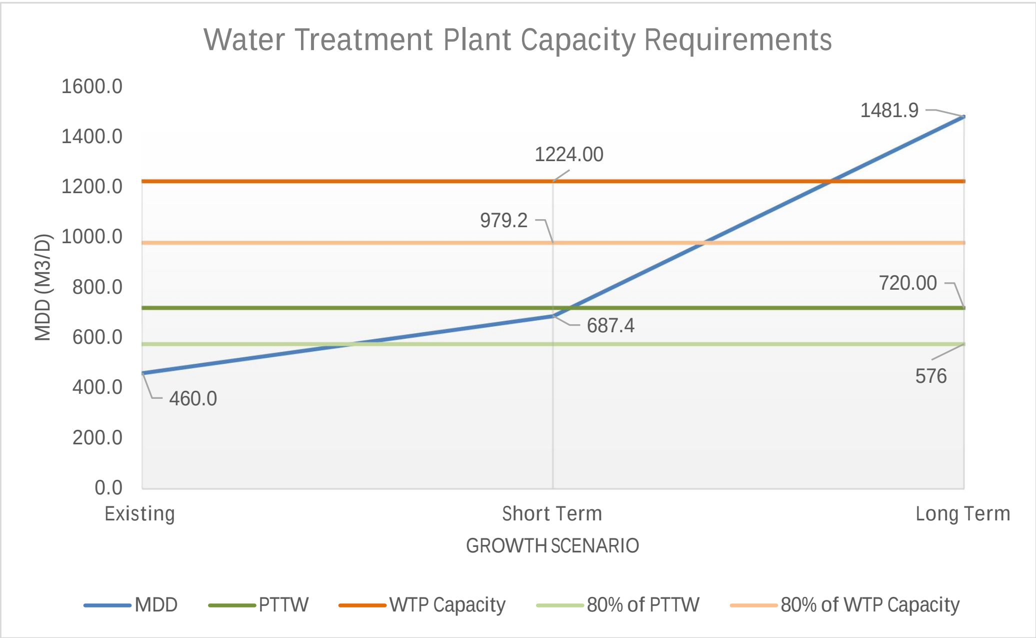
Based on the projected demand and the existing 2yr average MDD, the following table presents the MDD vs the plant capacity:

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.

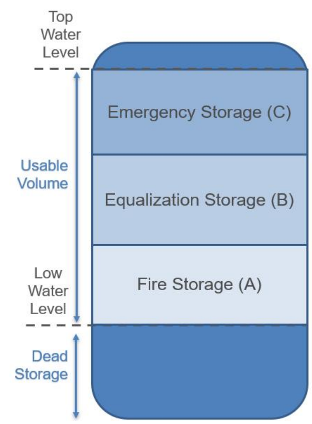
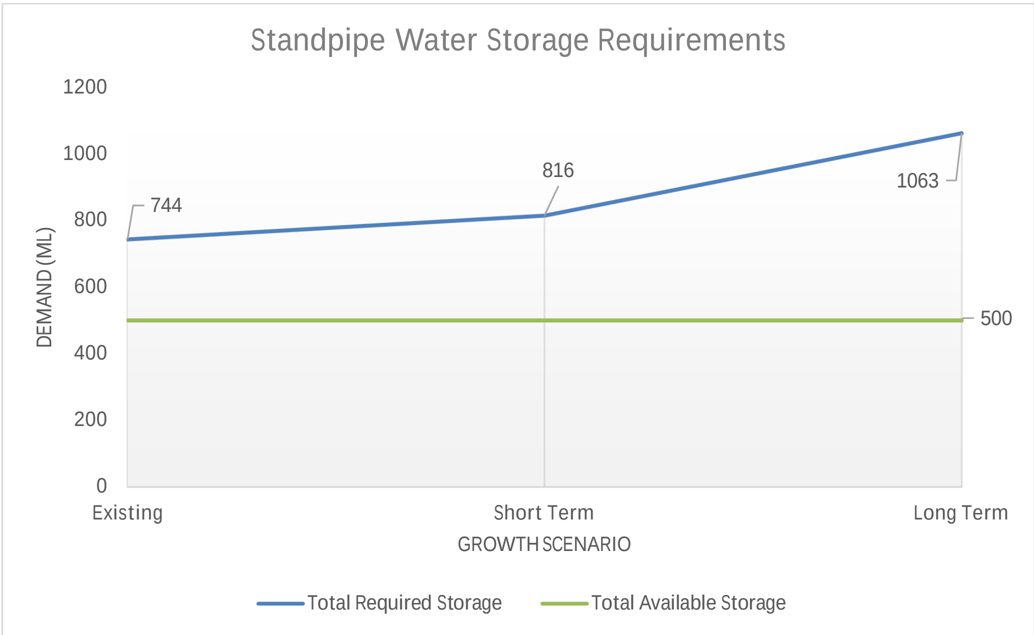


Figure 3 below illustrates the Short and Long Term Development storage requirements as compared to the current stand-pipe storage capacity

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.

<u>Alternatives</u>

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.

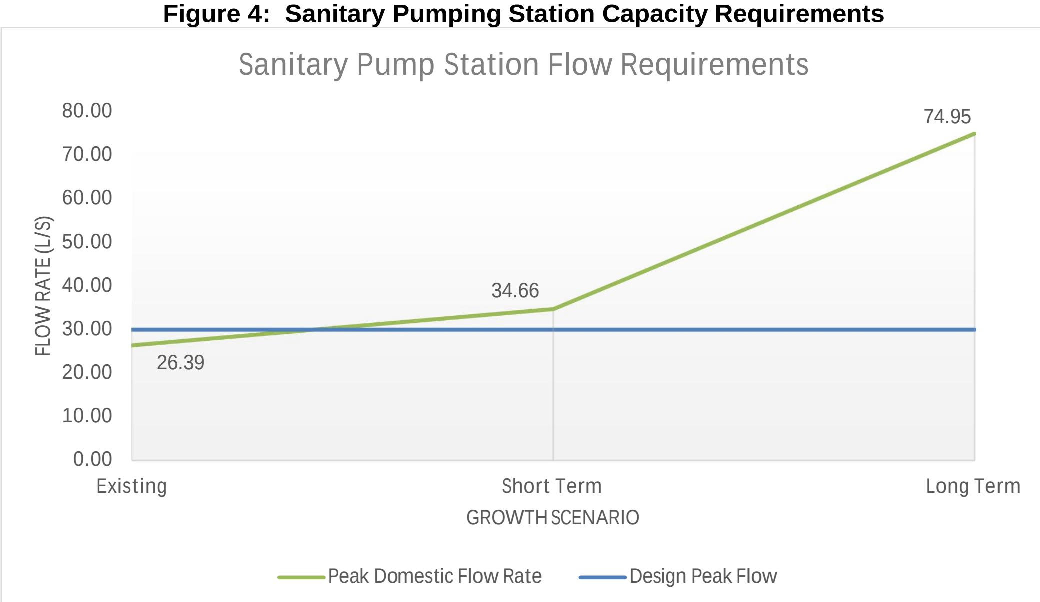
Note, the flow monitoring data that was completed during the 2019 SNC-Lavalin Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study was reviewed (Appended) to corelate the theoretical design sheets. Typically, it is expected that the theoretical values would be an order of magnitude 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.

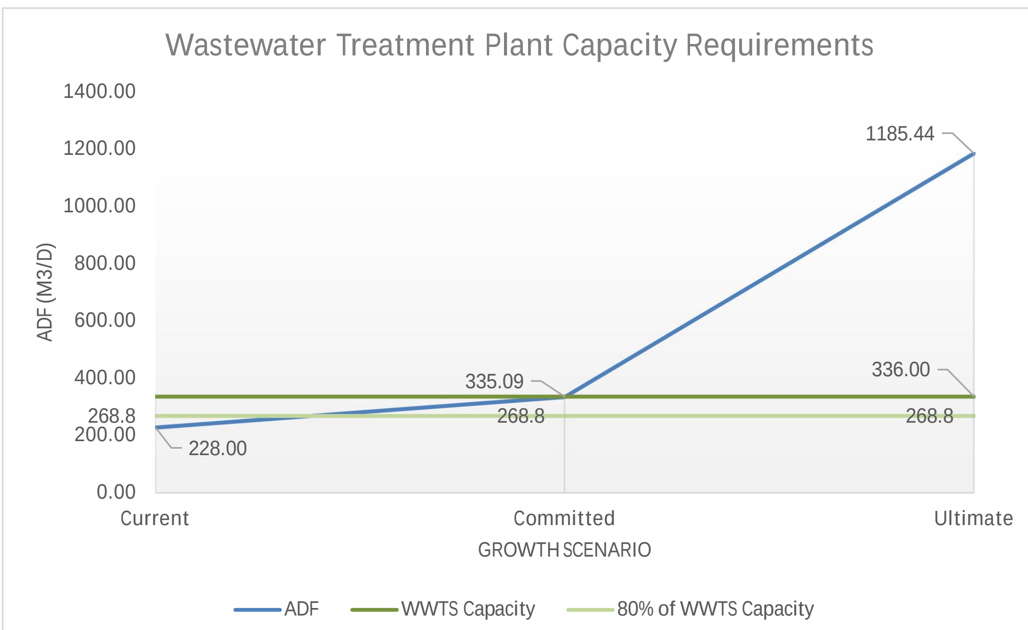
9.0 Sanitary Treatment Plant

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

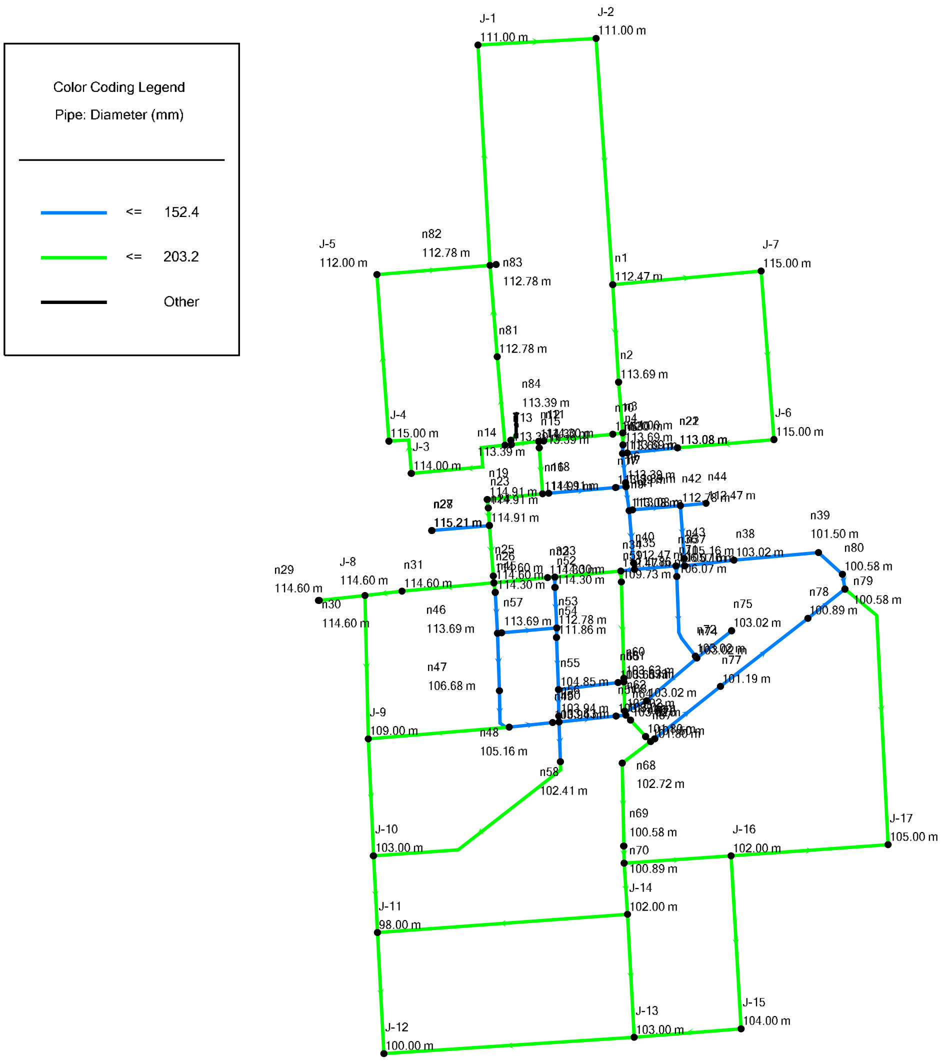
LICENSED PROFESSIONAL ENGINEER
2022-05-27
M. S. MORKEM
100122955
PROVINCE OF ONTARIO

Appendix 1 – Water Distribution

Future Water Demands

				ADD	MDD	PHD	Model
Property	**Residential**	**Commercial**	**Industrial**	**Total**			**Node**
ID	**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**	

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

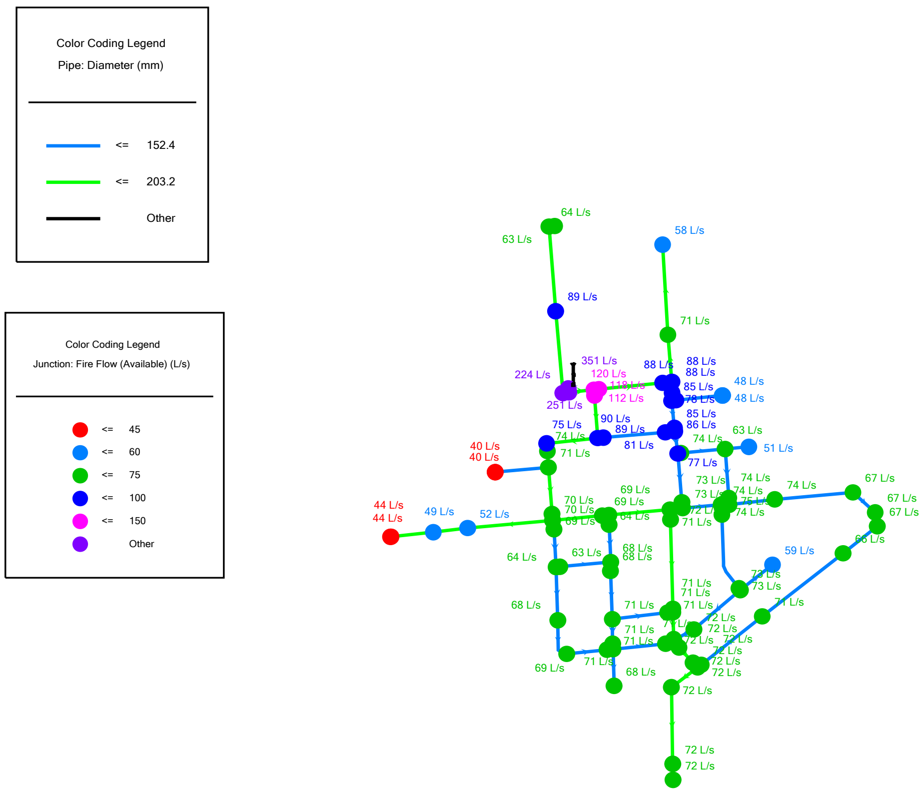
Lansdowne Water Model

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

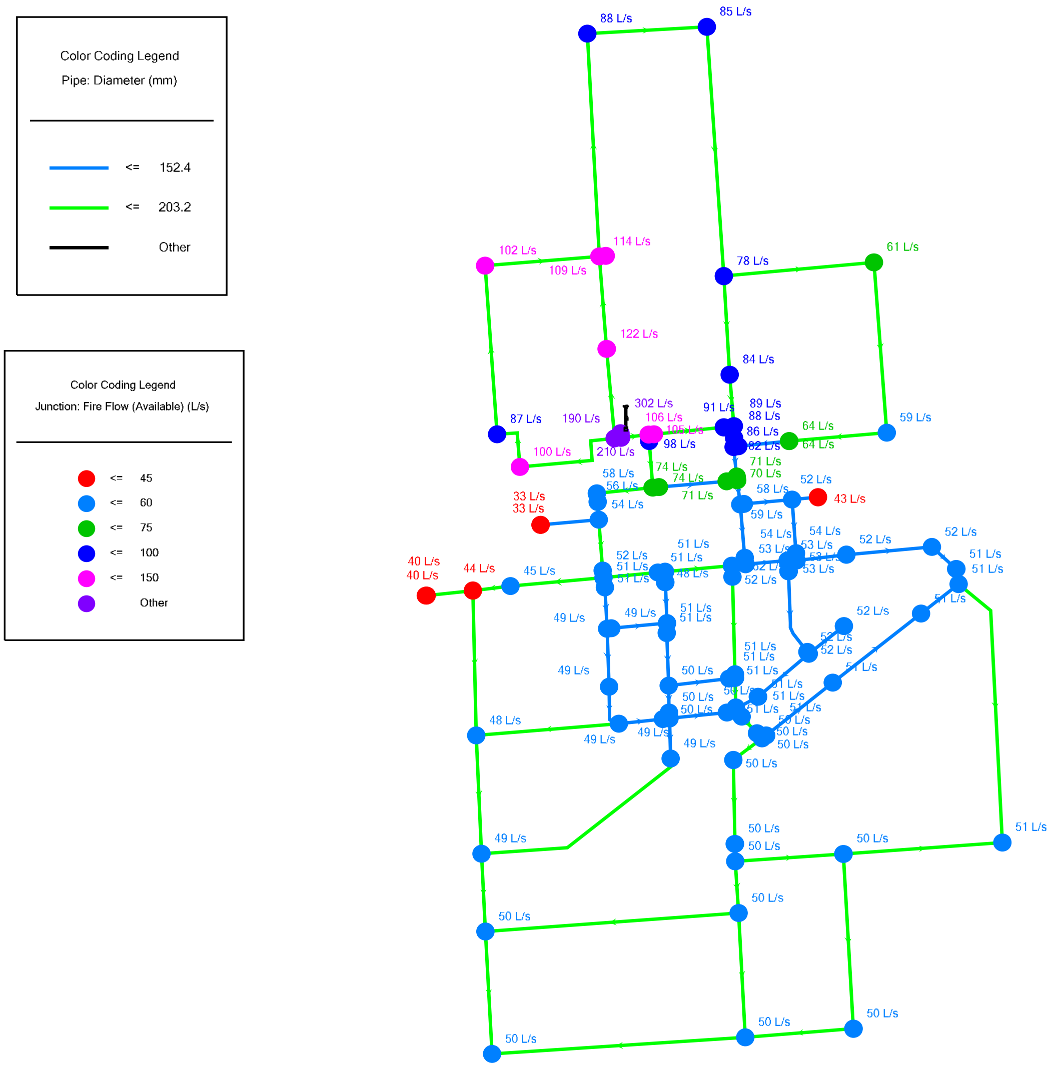
Lansdowne Water Model

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



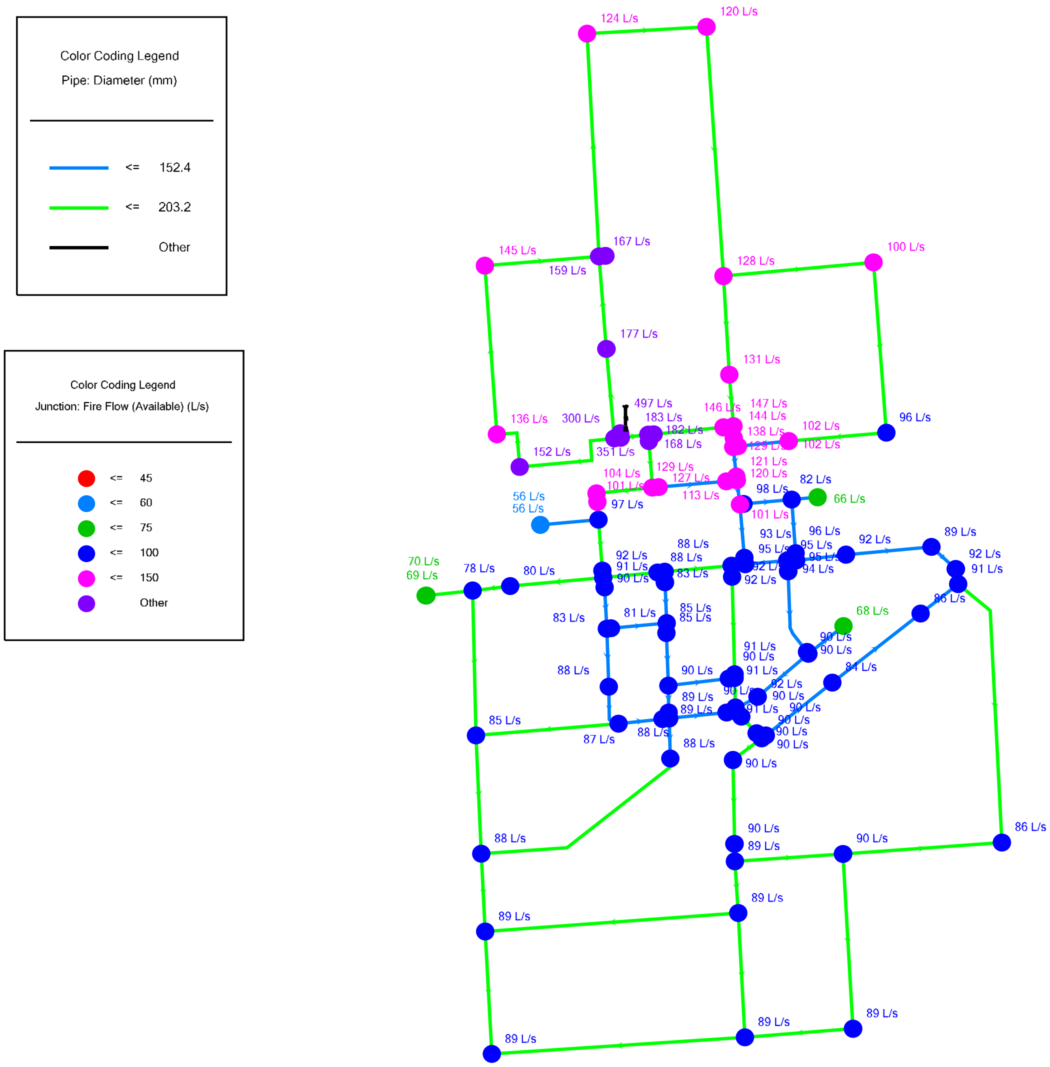
Lansdowne Water Model

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



Lansdowne Water Model

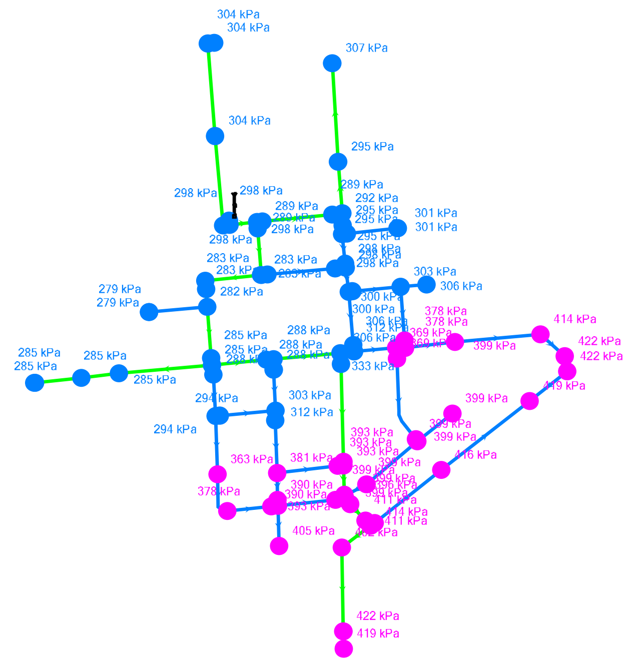
Pressures - Existing Peak Hour - Standpipe HGL 143.89m

Color Coding Legend
Pipe: Diameter (mm)

(blue line)	<=	152.4
(green line)	<=	203.2
(black line)		Other

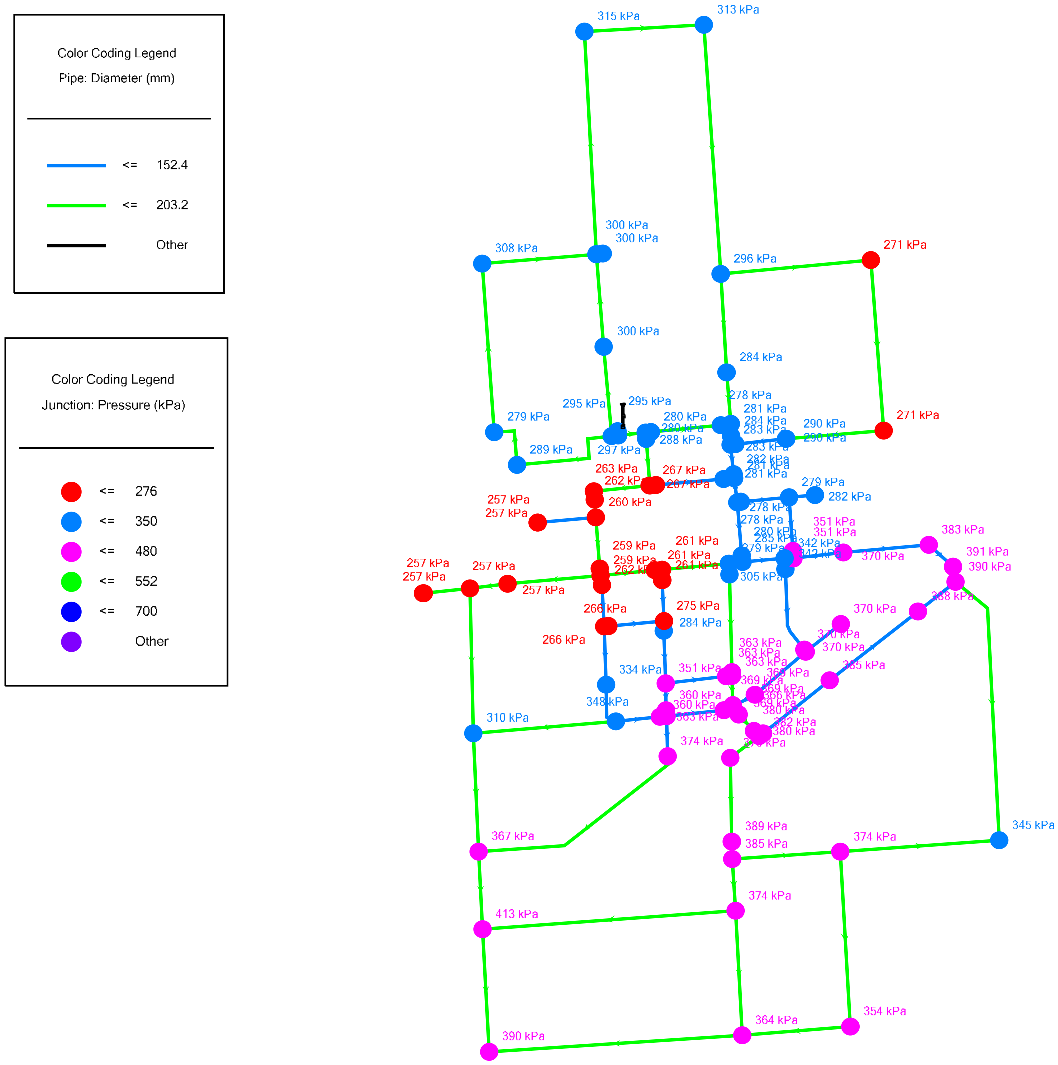
Color Coding Legend
Junction: Pressure (kPa)

(red)	<=	276
(blue)	<=	350
(magenta)	<=	480
(green)	<=	552
(dark blue)	<=	700
(purple)		Other



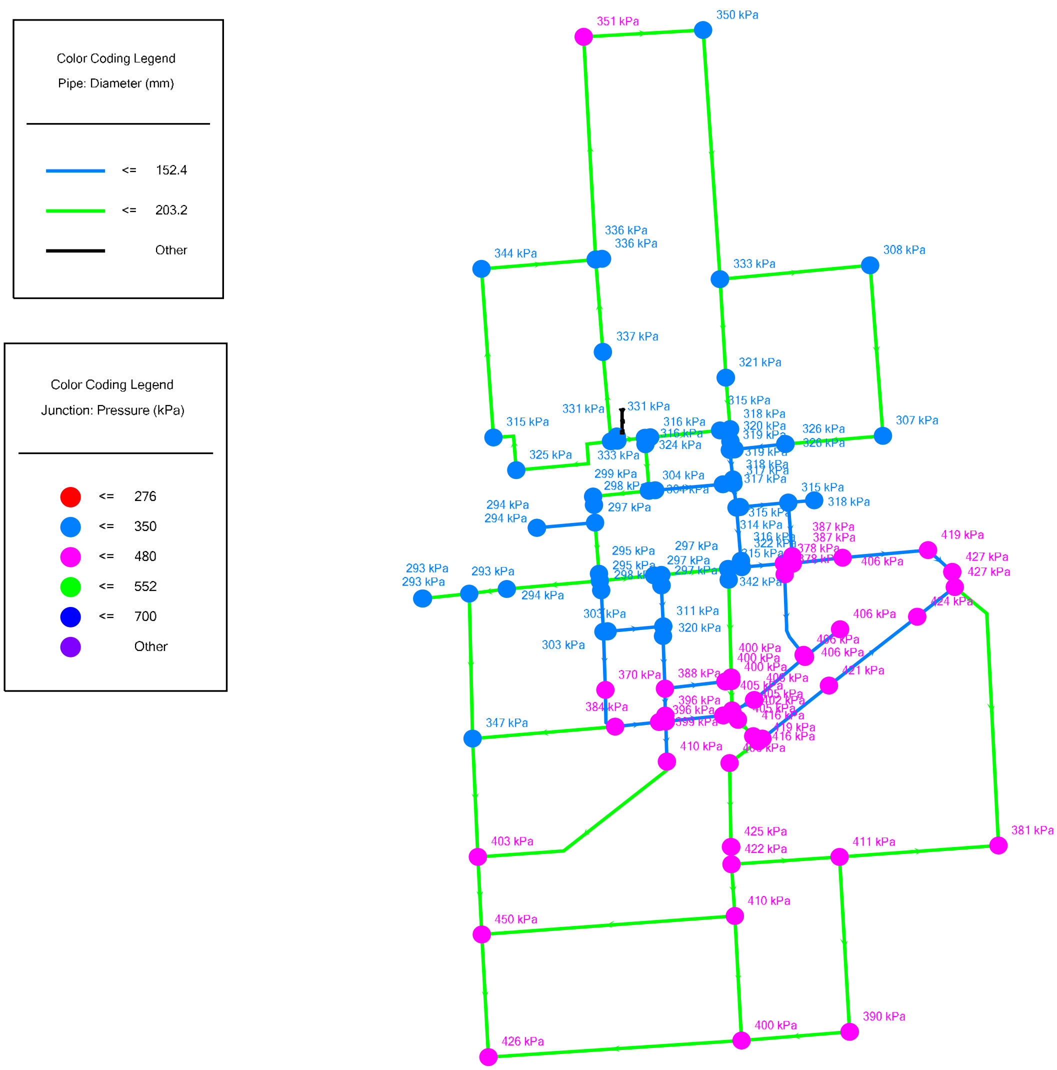
Lansdowne Water Model

Pressures - Future Peak Hour - Standpipe HGL 143.89m



Lansdowne Water Model

Pressures - Future Peak Hour - Standpipe HGL 147.60m



Appendix 2 – Wastewater Collection

PROJECT NORTH

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

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

Sanitary Sewer Calculation Sheet - Existing Conditions

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)
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	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	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

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)														
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:	Project Number:	Date:	Sheet Number:
1	31681-000	15-May-22	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	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)
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

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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	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	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)
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

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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	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)
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

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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	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

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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