PROPOSED 4 STOREY RESIDENTIAL DEVELOPMENT
12 GARDEN ST, LANSDOWNE, ONTARIO

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT ADDENDUM

July 2027

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EXECUTIVE SUMMARY

Luban Ltd. was retained by North Ridge Homes to prepare a Functional Servicing Report in support of the proposed residential development at 12 Garden Street, Lansdowne, Ontario. The proposed development consists of a new 39-unit, four-storey residential condominium building, while retaining the existing 10-unit residential condominium building, resulting in a total of 49 residential units on the property.

The proposed development will be serviced by the existing municipal water and sanitary sewer systems located within Garden Street. The calculated Maximum Day water demand is approximately 1.64 L/s and the Peak Hour demand is approximately 2.46 L/s. The required fire flow was calculated in accordance with the Fire Underwriters Survey (FUS) methodology as 8,000 L/min (133.33 L/s), resulting in a governing Maximum Day plus Fire Flow demand of approximately 134.97 L/s. A site-specific hydrant flow test completed on July 27, 2026 recorded a static pressure of 46 psi and a two-port residual pressure of 34 psi at an observed flow of 1,500 US gpm (5,679 L/min), with a projected available flow of 2,277 US gpm (8,619 L/min) at 20 psi. Using the measured 34 psi residual pressure as the starting pressure for the fire-main sizing assessment, the proposed 250 mm PVC fire main is calculated to provide approximately 22 psi residual pressure at the proposed on-site hydrant under the governing design flow. The Township of Leeds and the Thousand Islands has confirmed that municipal servicing capacity is available for the proposed development, subject to the servicing capacity allocation requirements of By-law No. 23-054 and final Township review of the detailed water servicing design.

The proposed development will discharge sanitary sewage to the existing 250 mm municipal sanitary sewer within Garden Street. The estimated average daily sanitary flow is approximately 51.45 m^3/day, and the total peak sanitary design flow, including infiltration, is approximately 2.54 L/s. The proposed 200 mm private sanitary sewer has sufficient hydraulic capacity to convey the anticipated sanitary flows. The Township has also confirmed that sanitary servicing capacity is available for the proposed development, subject to the applicable servicing capacity allocation process.

The proposed grading design generally follows the existing site topography and maintains the major existing drainage directions where practical. Runoff from the eastern portion of the site will be directed toward a front-yard depressed storage/ponding area and subsequently toward the existing Garden Street roadside ditch. Runoff from the western portion of the site will be conveyed through the proposed side-yard and rear-yard bio-swales toward the existing southwest low-point area.

Stormwater management will be provided through a combination of a front-yard depressed storage area, parking-lot pavement-edge clear-stone filter strips, and side-yard/rear-yard bio-swales with subsurface clear-stone storage. The proposed system provides approximately 108.9 m^3 of total storage, exceeding the calculated 100-year quantity-control requirement of 105.8 m^3. The proposed LID measures also provide approximately 89.6 m^3 of water quality storage, exceeding the required 24.3 m^3, and approximately 65.3 m^3 of storage for water balance purposes, exceeding the required 34.7 m^3 corresponding to the first 5 mm of rainfall.

Based on the assessments presented in this report, the proposed development is considered feasible from a municipal servicing, grading, drainage, and stormwater management perspective, subject to final detailed design, servicing capacity allocation, and approval by the Township of Leeds and the Thousand Islands and other applicable review agencies.

1. INTRODUCE

1.1. Background

Luban Limited was retained by North Ridge Homes to provide civil engineering services for the proposed residential development at 12 Garden Street, Lansdowne, Ontario. The subject property is located at 12 Garden Street within the serviced area of the Village of Lansdowne, Township of Leeds and the Thousand Islands. The proposed development consists of a new 39-unit residential condominium building, while retaining the existing 10-unit residential condominium on the property. The development also includes surface parking areas, an internal private driveway, landscaped areas, and supporting municipal servicing infrastructure (see

Appendix A – Site Plan).

The proposed development will be serviced by the existing municipal water and sanitary sewer systems located within Garden Street. Stormwater runoff will be managed on-site through a combination of site grading, storm sewer infrastructure, and Low Impact Development (LID) measures designed to satisfy the Township's stormwater quantity, quality, and water balance requirements.

1.2. Purpose

This Functional Servicing Report (FSR) has been prepared by Luban Engineering Inc. in support of the proposed Site Plan Approval application for a residential condominium development at 12 Garden Street, Lansdowne, Ontario.

The purpose of this report is to demonstrate that adequate municipal services are available to support the proposed development, including sanitary servicing, water servicing, grading, stormwater management, and erosion and sediment control.

1.3. Reference

- Township of Leeds and the Thousand Islands Engineering Standards;
- By-law 23-054 - Servicing Capacity Allocation Policy
- The Lansdowne Serviced Area Infrastructure Assessment & Growth Readiness Study Update (J.L. Richards, 2022) (**Appendix B**)
- MECP Design Guidelines for Drinking Water Systems;
- MECP Design Guidelines for Sewage Works;
- Stormwater Management Planning and Design Manual (March 2003)
- Low Impact Development Stormwater Management Planning and Design Guide
- Erosion & Sediment Control Guidelines for Urban Construction
- Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection;
- Greater Golden Horseshoe Area Conservation Authorities Erosion & Sediment Control Guidelines for Urban Construction

2. EXISTING CONDITIONS

2.1. Existing Site

The subject property is located at 12 Garden Street, within the Village of Lansdowne, Township of Leeds and the Thousand Islands.

The property is currently occupied by an existing 10-unit residential condominium building, with the remainder of the site consisting of open landscaped areas and vacant land available for redevelopment. Vehicular access to the property is provided from Garden Street via an existing driveway.

Existing surface drainage generally follows the natural site topography and conveys runoff toward the municipal drainage system within Garden Street. The existing site conditions are illustrated on **Appendix C** – Topo Survey Plan.

2.2. Existing Municipal Services

Municipal services are available adjacent to the subject property within the Garden Street right-of-way. The existing municipal infrastructure (refer to **Appendix D** – As-Built drawings, Garden Street Road Plan & Profile) includes:

- 150mm watermain on Garden Street; and
- 250mm sanitary sewer on Garden Street

The proposed development will connect to the existing municipal water and sanitary sewer systems in accordance with Township requirements.

2.3. Existing Topography

The site generally slopes away from the central portion of the property. The eastern half of the site drains toward Garden Street, while the western half drains toward the southwest corner of the property.

Garden Street slopes generally from north to south, with an average grade of approximately 1.5% along the northern portion of the roadway, increasing to approximately 10% toward the southern portion.

Existing topography and drainage patterns were established based on the topographic survey completed for the site and are illustrated on **Appendix C** – Topo Survey Plan.

The proposed grading design has been developed to maintain positive drainage, minimize earthworks where practical, and provide appropriate drainage toward the proposed stormwater management system.

2.4. Geotechnical Conditions

A geotechnical investigation was completed for the proposed development by Cambium Inc. in July 2026 (**Appendix E**). Based on the investigation, the subsurface conditions generally consist of surficial topsoil or fill materials underlain predominantly by gravelly silty sand, with localized sandy silt to sandy clayey silt. Practical refusal was encountered in all six boreholes at depths ranging from approximately 0.5 m to 0.9 m below existing ground surface and was inferred to represent bedrock.

Groundwater was not encountered within the boreholes during the field investigation, and standing water was not observed upon completion of drilling. The geotechnical report notes, however, that groundwater levels may fluctuate seasonally and that perched water may occur above the shallow bedrock during seasonally wet conditions.

From a geotechnical perspective, the site is generally suitable for the proposed development, subject to the recommendations of the geotechnical report. The proposed stormwater management strategy incorporates a bio-swale with approximately 300 mm of topsoil overlying a 1.2 m wide by 0.4 m deep clear stone reservoir. This shallow storage system is intended to provide temporary stormwater storage and controlled drainage while minimizing excavation into the shallow bedrock. Given the relatively shallow inferred bedrock encountered across the site, the proposed bio-swale and clear stone reservoir will be designed and constructed in coordination with the geotechnical recommendations, with appropriate drainage provisions to avoid prolonged water accumulation above the bedrock surface.

3. WATERMAIN

3.1. Existing Watermains

An existing 150 mm watermain along Graden Street will serve as the supply line for the development. Currently, the property at 12 Garden Street is connected to this watermain via a 50 mm service connection. This connection will be decommissioned and removed after the new service connection is constructed.

3.2. Design Criteria

The proposed development will be serviced by the existing municipal water distribution system located within Garden Street. The water servicing design has been completed to satisfy both domestic water demand and fire protection requirements.

Domestic water demand was estimated in accordance with the MECP Design Guidelines for Drinking Water Systems, while the required fire flow was determined using the Fire Underwriters Survey (FUS) – Water Supply for Public Fire Protection methodology.

The proposed water servicing design has been developed to provide adequate capacity for domestic consumption and fire protection while maintaining acceptable operating conditions within the municipal water distribution system.

3.3. Domestic Water Demand

The proposed development consists of 39 new residential condominium units together with the existing 10-unit residential condominium. The water supply scheme is in accordance with MECP Design Guidelines for Drinking Water Systems as follows:

- The system shall be designed to provide sufficient flow and pressure to meet the greater of the Maximum Day Demand plus Fire Flow, or the Peak Hourly Demand;
- Average Daily Demand of 350 litres/capita/day;
- Minimum Hourly Demand = 0.4 for Residential;
- Maximum Daily Demand Peaking Factor = 2.75;
- Peak Hour Factor = 4.13;
- Maximum recommended static pressure is 550 KPa (80 psi);
- Minimum pressure for peak hour demand is 275 KPa (40 psi), and
- Minimum pressure for Maximum Day and Fire Flow demand is 140 KPa (20 psi)
- Population Rate: 3.0 persons /Unit
- Estimates Total Population : 147

The calculated domestic water demands are summarized in Table 4-1.

Table 4-1 – Domestic Water Demand

Development type	Population	Peaking factor[2]			Water demand (L/cap.d)[3]	Average Demand (L/min)	Minimum Hour Demand (L/min)	Maximum day Demand (L/min)	Peak Hour Demand (L/min)
		Minimum Hour	Maximum Day	Peak hour Factor					
Apartment	147	0.40	2.75	4.13	350	35.7	14.3	98.3	147.6

- Minimum Hour Demand 14.3 L/min
- Maximum Day Demand 98.3 L/min
- Peak Hour demand 147.6 L/min

3.4. Fire Flow Requirements

The required fire flow for the proposed development was determined in accordance with the Fire Underwriters Survey (FUS) – Water Supply for Public Fire Protection methodology. The FUS calculation considers the effective floor area, construction type, occupancy, sprinkler protection, and exposure charges applicable to the proposed building. The calculated base fire flow is approximately 7,968 L/min, which is rounded to the nearest 1,000 L/min in accordance with the FUS methodology. No occupancy, sprinkler, or exposure adjustment has been applied in the calculation. The resulting required fire flow is therefore 8,000 L/min (133.33 L/s or approximately 2,114 US gpm). The detailed FUS calculation is provided in Appendix I.

The required fire flow is summarized in Table 4-2.

Table 4-2 – Fire Flow Requirements

Parameter	Value
Required Fire Flow	8,000 L/min 133 L/s 2,114 GPM

The proposed water servicing has been designed to accommodate the required fire flow demand.

3.5. Design Flow

The municipal water distribution system has been assessed using the governing design flow, consisting of the required fire flow in combination with the maximum day domestic demand.

The design flows are summarized in Table 4-3.

Table 4-3 – Water Design Flow Summary

Flow Component	Flow (L/s)
Maximum Day Demand	1.64
Peak Hour Demand	2.46
Required Fire Flow	133.33
Maximum Day + Fire Flow	134.97

3.6. Proposed Water Servicing

The proposed development will be serviced from the existing 150 mm diameter municipal watermain located within Garden Street. Separate domestic water services and a dedicated private fire service main are proposed to satisfy the domestic and fire-protection demands.

The proposed water servicing includes:

- 50 mm Type K copper domestic water service to provide potable water for the existing residential building;

- 75 mm PVC domestic water service to provide potable water for the new residential building;
- 250 mm PVC fire service main to provide fire protection;
- New fire hydrants, where required, in accordance with Township standards;
- Gate valves and associated appurtenances to permit isolation and maintenance of the proposed watermain.

The proposed water servicing layout is shown on the **Appendix F** - Site Servicing Plan.

3.7. Water System Assessment

The proposed development will be serviced from the existing 150 mm diameter municipal watermain located within Garden Street. The water system assessment considers the domestic water demands, FUS fire-flow requirement, the site-specific hydrant flow test, and hydraulic losses through the existing and proposed fire-main segments.

3.7.1. Design Water Demands.

The calculated Maximum Day Demand is 1.64 L/s, the Peak Hour Demand is 2.46 L/s, and the required FUS fire flow is 133.33 L/s (8,000 L/min). The governing hydraulic design condition is Maximum Day Demand plus Fire Flow, equal to approximately 134.97 L/s (0.135 m^3/s).

3.7.2. Hydrant Flow Test.

A site-specific fire hydrant flow test was completed by LHS Inc. on July 27, 2026 (Appendix H). The test recorded a static pressure of 46 psi. Under the two-port test condition, an observed flow of 1,500 US gpm (5,679 L/min) was recorded at a residual pressure of 34 psi. The test report projects an available flow of approximately 2,277 US gpm (8,619 L/min) at a residual pressure of 20 psi. For the on-site fire-main sizing calculation, the measured two-port residual pressure of 34 psi has been adopted as the starting pressure at the existing hydrant.

3.7.3. Fire Main Hydraulic Assessment.

The proposed on-site fire main was assessed using the Hazen-Williams equation with a coefficient C = 150 under the governing design flow of approximately 0.135 m^3/s. The hydraulic assessment considers the existing 150 mm municipal watermain segment between the existing hydrant and the proposed connection point, together with the proposed private fire main from the connection point to the new on-site hydrant. Elevation differences and minor losses through valves, tees, bends, and the reducer are included in the calculation.

A 250 mm diameter PVC fire main is proposed from the Garden Street connection point to the new proposed condo building and with a on-site hydrant.

Based on the adopted starting residual pressure of 34 psi at the existing hydrant, the calculated pipe and fitting losses, and the applicable elevation changes, the residual pressure at the proposed on-site hydrant is approximately 22 psi under the governing Maximum Day plus Fire Flow condition. This exceeds the minimum design residual pressure of 20 psi. Accordingly, the proposed 250 mm diameter fire main is considered hydraulically adequate for the required 8,000 L/min fire flow. The detailed fire-main sizing calculation is provided in Appendix I.

3.7.4. Municipal Water System Capacity.

The Lansdowne Serviced Area Infrastructure Assessment & Growth Readiness Study Update, prepared by J.L. Richards & Associates Limited (2022) (Appendix B), was reviewed to assess the overall capacity and hydraulic characteristics of the Lansdowne municipal water system. The study identified an ECA design maximum-day capacity of 720 m^3/day for the Lansdowne Water Treatment Plant and calculated an uncommitted reserve capacity of approximately 32.64 m^3/day, equivalent at that time to approximately 15.62 residential units. The study concluded that the identified short-term growth could be accommodated within the available water treatment reserve capacity, although limited additional capacity remained beyond the identified short-term development scenario.

The J.L. Richards hydraulic assessment also evaluated the performance of the municipal distribution system under Peak Hour Demand and Maximum Day Demand plus Fire Flow conditions. Under existing Peak Hour Demand conditions, the modelled system pressures were reported to meet the MECP recommended minimum pressure of 276 kPa (40 psi). Under Maximum Day Demand plus Fire Flow conditions, the majority of the existing system was capable of delivering fire flows greater than 45 L/s while maintaining a minimum system pressure of 140 kPa (20 psi); however, localized areas of the system were identified as having lower available fire flows.

Subsequent to the 2022 assessment, the Township of Leeds and the Thousand Islands was contacted to confirm whether the servicing-capacity information remained applicable to the proposed development. In correspondence dated June 22, 2026, Township staff advised that there had been limited development in Lansdowne since publication of the J.L. Richards report and confirmed that the reported capacity figures remained applicable. The Township further confirmed that servicing capacity is available for the proposed development at 12 Garden Street (see Appendix G – Email Exchange, Civil Engineering For 12 Garden St).

Servicing capacity is administered in accordance with Township By-law No. 23-054 – Servicing Capacity Allocation Policy. Under the Policy, capacity is expressed in Equivalent Residential Units (ERUs), with an apartment unit assigned an ERU equivalent of 0.59. The Policy requires developments of this nature to submit an Application for Capacity Allocation identifying the type and number of ERUs requested, the anticipated Planning Act approval timeline, and the proposed staging of development. Provisional and Final Capacity Allocation remain subject to the approval process established by the Township.

Accordingly, based on the 2022 infrastructure assessment, the Township's June 22, 2026 capacity confirmation, the July 27, 2026 hydrant flow test, and the fire-main hydraulic sizing assessment, the proposed water servicing arrangement is considered feasible. The proposed 250 mm fire main provides a calculated residual pressure of approximately 22 psi at the proposed on-site hydrant under the governing design flow, exceeding the 20 psi minimum criterion. Final water servicing approval remains subject to the Township's review and approval of the detailed servicing design and the required servicing capacity allocation under By-law No. 23-054.

4. SANITARY SERVICING

4.1. Existing Sanitary Infrastructure

There is an existing 250mm diameter sanitary sewer that is located within the right-of-way of Garden Street (refer to **Appendix D**), fronting the subject property and slopes from north to south at approximately 7.23%.

4.2. Design Criteria

The proposed development will be serviced by the existing municipal sanitary sewer system located within Garden Street. Sanitary sewage flows were estimated based on the total residential population, the applicable per-capita sewage generation rate, and an allowance for extraneous infiltration.

The sanitary servicing design criteria are summarized below:

- Total Design Population 147 persons
- Per-Capita Sewage Flow 350 L/person/day
- Infiltration Allowance 0.14 L/s/ha
- Proposed Sanitary Sewer 200 mm diameter PVC
- Minimum Sewer Slope 0.5%
- Minimum Cover 2.7 m
- Harmon Peaking Factor formula for combined Land Use:

$$M = K_{av} * \left(1 + \frac{14}{4+\sqrt{P_e}}\right)$$

Where,

$$K_{av} = \left(\frac{A_R+(0.8*(A_I+A_C)}{A_R+A_I+A_C}\right)$$

And:

$M = ratio\ of\ peak\ flow\ to\ average\ flow$

$P_e = equivalent\ tributary\ population\ in\ thousands$

$A_R = residential\ land\ use\ area\ (ha)$

The proposed sanitary sewer system will be designed in accordance with applicable Township standards and accepted municipal engineering practice.

4.3. Population Projection

The sanitary flow estimate is based on the proposed 39-unit residential condominium building and the existing 10-unit residential condominium building to be retained on the property.

A residential occupancy rate of 3.0 persons per unit was adopted for servicing purposes. The resulting design population is calculated as follows:

$$\mathbf{49}\text{ units} \times \mathbf{3.0}\text{ persons/unit} = \mathbf{147}\text{ persons}$$

The calculated population was rounded to 147 persons for the sanitary servicing assessment.

Table 5-1 – Design Population

Development Component	Units	Population Rate	Design Population
Existing condominium	10	3.0 persons/unit	30 persons
Proposed condominium	39	3.0 persons/unit	117 persons
Total	49	—	147 persons

4.4. Average Daily Sanitary Flow

The average daily sanitary sewage flow was calculated using a per-capita generation rate of 350 L/person/day.

$$\boldsymbol{Q}_{\textbf{avg}} = \mathbf{147} \text{ persons} \times \mathbf{350} \text{ L/person/day}$$
$$\boldsymbol{Q}_{\textbf{avg}} = \mathbf{51,450} \text{ L/day}$$

Therefore, the average daily sanitary flow is:

$$\boxed{\boldsymbol{Q}_{\textbf{avg}} = \mathbf{51.45} \text{ m}^{\mathbf{3}}/\text{day}}$$

This is equivalent to:

$$\boldsymbol{Q}_{\textbf{avg}} = \frac{\mathbf{51,450}}{\mathbf{86,400}} = \mathbf{0.60} \text{ L/s}$$

Table 5-2 – Average Daily Sanitary Flow

Parameter	Value
Design Population	147 persons
Per-Capita Sewage Flow	350 L/person/day
Average Daily Flow	51.45 m³/day
Average Flow Rate	0.60 L/s

4.5. Peak Sanitary Flow

The peak sanitary flow consists of the peaked residential sewage flow together with an allowance for infiltration into the sanitary sewer system.

The average sanitary flow is 0.60 L/s. The peak residential flow should be determined using the sanitary peaking factor required by the Township. Where the Harmon peaking equation is accepted, the peak factor for a population of 147 persons is approximately 4.19.

The resulting peak residential flow is:

$$\boldsymbol{Q}_{\textbf{peak}} = \mathbf{0.60} \text{ L/s} \times \mathbf{4.19} = \mathbf{2.52} \text{ L/s}$$

An infiltration allowance of 0.14 L/s/ha is added based on the tributary site area:

$$\boldsymbol{Q}_{\textbf{design}} = \boldsymbol{Q}_{\textbf{peak}} + \boldsymbol{Q}_{\textbf{infiltration}}$$

Based on

Appendix – Sanitary Sewer Drainage Area Plan, the total sanitary drainage area is approximately 0.14 ha. Therefore, the infiltration allowance is calculated as follows:

$$\boldsymbol{Q}_{\textbf{infiltration}} = \mathbf{0.14}\ \text{L/s/ha} \times \mathbf{0.14}\ \text{ha} = \mathbf{0.02}\ \text{L/s}$$

The estimated total peak sanitary design flow is therefore approximately:

$$\boxed{\boldsymbol{Q}_{\textbf{design}} = \mathbf{2.54}\ \text{L/s}}$$

Table 5-3 – Sanitary Flow Summary

Flow Component	Flow
Average Daily Flow	51.45 m³/day
Average Flow Rate	0.60 L/s
Maximum-Day Flow	To be confirmed based on the Township-approved factor
Harmon Peaking Factor	4.19
Peak Residential Flow	2.52 L/s
Infiltration Allowance	0.02 L/s
Total Peak Design Flow	2.54 L/s

A separate maximum-day sewage flow is not normally the governing criterion for gravity sanitary sewer sizing. The peak instantaneous sanitary flow, including infiltration, governs the proposed sewer capacity assessment.

4.6. Proposed Sanitary Sewer

The proposed and existing condominium buildings will be serviced by a new private sanitary sewer system connected to the existing municipal sanitary sewer within Garden Street.

The proposed sanitary servicing system will generally consist of:

- A 200 mm diameter PVC sanitary sewer;
- A minimum design slope of 0.5%;
- A minimum cover of approximately 2.7 m, where practical;
- Sanitary maintenance holes at changes in alignment, grade and pipe connection locations;
- Maintenance-hole spacing in accordance with Township standards; and
- A connection to the existing municipal sanitary sewer within Garden Street.

The final connection location, sewer invert elevations, maintenance-hole locations and service arrangements will be confirmed through detailed design and coordination with the Township.

The proposed sanitary servicing layout is illustrated on the **Appendix F** - Site Servicing Plan, and **Appendix** - Sanitary Sewer Design Sheet.

4.7. Sanitary System Assessment

The proposed development will discharge to the existing 250 mm diameter municipal sanitary sewer located within Garden Street and ultimately to the Lansdowne municipal wastewater collection and treatment system.

As summarized in Sections 5.4 and 5.5, the calculated sanitary sewage flows for the proposed development are as follows:

- Average Daily Flow: 51.45 m^3/day (0.60 L/s);
- Peak Residential Flow: 2.52 L/s;
- Infiltration Allowance: 0.02 L/s; and
- Total Peak Design Flow: 2.54 L/s.

The proposed private sanitary sewer consists of a 200 mm diameter PVC sewer at a minimum design slope of 0.5%. Based on the hydraulic calculations presented in this report, the proposed sewer has a full-flow capacity of approximately 23.2 L/s, which is substantially greater than the estimated total peak design flow of 2.54 L/s. Accordingly, the proposed on-site sanitary sewer is considered hydraulically adequate to convey the anticipated sanitary flows from the development.

The Lansdowne Serviced Area Infrastructure Assessment & Growth Readiness Study Update, prepared by J.L. Richards & Associates Limited in 2022, was reviewed to assess the broader municipal sanitary servicing system. The study concluded that the existing sanitary collection system generally had sufficient capacity, although approximately 680 m of sanitary sewer along Railway Street leading to the pumping station was identified as a potential constraint under the future growth scenarios. The report attributed this constraint primarily to the significant sewage generation associated with Developments 1 and 2 identified in the study.

The J.L. Richards study also assessed the Railway Street Sanitary Pumping Station. The pumping station has a design peak flow capacity of approximately 30.0 L/s. The study estimated system-wide peak instantaneous flows of approximately 26.39 L/s under existing conditions, 34.66 L/s under the Short-Term growth scenario, and 74.95 L/s under the Long-Term growth scenario. The pumping station was therefore considered adequate for existing conditions but was identified as requiring upgrading to accommodate the full Short-Term and Long-Term growth scenarios.

The Lansdowne Wastewater Treatment System was also assessed in the 2022 study. The treatment system has a rated average daily capacity of approximately 336 m^3/day. The reported existing average daily flow was approximately 228 m^3/day, increasing to approximately 335 m^3/day under the Short-Term growth scenario. The study noted that wastewater treatment capacity would approach its rated capacity under the Short-Term development scenario and that planning for future expansion should be initiated as the system approaches approximately 80% of its rated capacity.

The above findings represent the system conditions and committed development assumptions available at the time of the 2022 assessment. Importantly, the Township subsequently established By-law No. 23-054 – Servicing Capacity Allocation Policy, under which municipal water and wastewater servicing capacity is formally administered through Equivalent Residential Units (ERUs). For apartment developments, the Policy assigns an ERU equivalent of 0.59 per apartment unit and requires development proponents to obtain servicing capacity allocation through the Township's prescribed allocation process.

The Policy further establishes that servicing capacity is not automatically granted through Planning Act approval. An Application for Capacity Allocation is required, identifying the type and number of ERUs requested, the anticipated Planning Act approval timeline, and the proposed development staging. Final capacity allocation is subject to the Township's approval process and a Final Capacity Allocation Agreement.

Subsequent to the 2022 infrastructure assessment, the Township was specifically contacted regarding the current servicing capacity available for the proposed development at 12 Garden Street. In correspondence dated June 22, 2026, Township staff advised that there had been limited development in Lansdowne since publication of the 2022 assessment and that the capacity figures presented in that assessment remained applicable. The Township further confirmed that servicing capacity is available for the proposed development at 12 Garden Street, subject to submission of the required servicing capacity allocation request in accordance with the Township's policy.

Accordingly, while the 2022 J.L. Richards assessment identified future capacity constraints within portions of the Lansdowne wastewater collection, pumping and treatment systems, the Township has subsequently confirmed that servicing capacity is presently available for the proposed development at 12 Garden Street. The proposed on-site sanitary sewer is hydraulically adequate to convey the estimated peak design flow of 2.54 L/s, and the proposed sanitary servicing arrangement is therefore considered feasible, subject to the Township's approval of the detailed sanitary servicing design and the required servicing capacity allocation under By-law No. 23-054.

5. GRADING DESIGN

The proposed grading design has been developed to provide positive surface drainage throughout the site while minimizing changes to the existing topography where practical. The grading design has been coordinated with the proposed building layout, parking areas, internal driveways, LID stormwater management facilities, and municipal servicing infrastructure.

The site will be graded to direct surface runoff away from all buildings and toward the proposed LID stormwater management system and designated drainage outlets. Surface grading has been designed to prevent uncontrolled ponding adjacent to building foundations and to maintain safe and accessible pedestrian and vehicular circulation throughout the development.

Hard surfaces, including parking areas and internal driveways, will generally be provided with a minimum grade of 1.0% to promote positive drainage and minimize the potential for standing water.

At the proposed southeast entrance, the existing longitudinal grade of Garden Street is approximately 11.0%. The proposed entrance ties into the existing pavement at approximately Elevation 112.60 m at the north tie-in point and Elevation 110.38 m at the south tie-in point, resulting in an elevation difference of approximately 2.22 m across the entrance frontage. In addition, the elevation difference between the existing building FFE of 113.40 m and the south pavement tie-in point is approximately 3.02 m. Given these existing topographic constraints, the driveway entrance has been designed with a maximum longitudinal grade of 10%, consistent with OPSD 303.020 – Urban Private Driveway Entrance, which permits a maximum driveway slope of 10%.

As part of the proposed LID stormwater management system, the bio-swales have been designed with varying longitudinal slopes ranging from approximately 0.5% to 2.9%. A 100 mm diameter perforated subdrain will be provided along the bottom of the bio-swales to facilitate drainage and minimize prolonged water accumulation within the system.

The proposed grading generally follows the existing site topography and drainage pattern. Surface runoff from the eastern portion of the site will be directed toward the depressed stormwater storage/ponding area within the front yard, and will subsequently discharge toward the existing roadside ditch along Garden Street. Runoff from the western portion of the site will be conveyed toward the proposed rear-yard and side-yard bio-swales, which will ultimately discharge toward the existing low-point area at the southwest corner of the property.

This grading approach generally maintains the existing drainage directions while providing positive drainage throughout the developed site and minimizing adverse drainage impacts on adjacent properties.

The proposed grading design is illustrated in **Appendix F** – Proposed Grading Plan.

Table 6-1 – Grading Design Criteria

Design Item	Criteria
Building Drainage	Positive drainage away from buildings
Minimum Parking Lot Grade	1.0%
Minimum Driveway Grade	1.0%
Maximum Southeast Entrance Grade	10.0%
Bio-swale Longitudinal Grade	0.5% to 2.9%
Bio-swale Subdrain	100 mm diameter perforated subdrain
East Drainage Outlet	Garden Street roadside ditch
West Drainage Outlet	Existing southwest low-point area
Ponding Adjacent to Buildings	Not permitted
Off-Site Drainage Impacts	None anticipated
Design Basis	Township standards and accepted engineering practice

6. STORMWATER MANAGEMENT

6.1. Existing Drainage

Under existing conditions, the site generally drains in two directions in accordance with the existing topography. The eastern portion of the site drains toward Garden Street and the existing roadside ditch, while the western portion of the site generally drains toward the existing low-point area at the southwest corner of the property.

The existing site has a total drainage area of approximately 0.693 ha and a weighted runoff coefficient of approximately 0.30. The Existing Drainage Plan is provided in **Appendix** – Existing Drainage Plan. Existing drainage patterns will be maintained where practical as part of the proposed grading and stormwater management design.

The calculated pre-development peak runoff rates are summarized in Table 7-1.

Table 7-1 – Pre-Development Peak Runoff Rates

Design Storm	Runoff Coefficient	Rainfall Intensity (mm/hr)	Area (ha)	Peak Flow (m^3/s)
2-Year	0.30	67.6	0.693	0.0394
5-Year	0.30	89.3	0.693	0.0521
10-Year	0.30	105.5	0.693	0.0615
25-Year	0.30	123.4	0.693	0.0792
50-Year	0.30	137.7	0.693	0.0964
100-Year	0.30	151.9	0.693	0.0886

The above pre-development peak runoff rates have been used as the basis for establishing the allowable post-development discharge rates.

6.2. Stormwater Management Design Parameters

The stormwater management design for the proposed development has been prepared based on the applicable municipal design criteria, accepted stormwater management practice, and the design parameters summarized below.

- **Allowable Site Discharge Rate**

  Post-development peak discharge from the site will be controlled such that the total site discharge does not exceed the corresponding pre-development peak runoff rate for design storms up to and including the 100-year storm event.

  A minimum Time of Concentration (Tc) of 10 minutes has been adopted for the Rational Method calculations.

- **Water Quality Control**

  Stormwater quality control will be designed to provide Enhanced Level Protection, corresponding to a long-term average removal of approximately 80% of Total Suspended Solids (TSS).

- **Water Balance**

  The stormwater management system will provide retention of the first 5 mm of rainfall over the development site for water balance purposes. Retained runoff will be managed through the proposed depressed storage area, clear-stone storage reservoirs, bio-swales, infiltration where feasible, evapotranspiration, and controlled drainage.

- **Rainfall Intensity-Duration-Frequency (IDF) Parameters**

  Rainfall intensities used for the stormwater management calculations are based on the MTO Drainage Management Manual (1997), East of Kingston IDF parameters.

  Rainfall intensity is determined using the following IDF relationship:

  $$I = a / (Tc + b)^c$$

  where:

  - I = rainfall intensity (mm/hr);
  - Tc = time of concentration (minutes); and
  - a, b, c = IDF parameters.

  The adopted IDF parameters are summarized in Table 7-2.

Table 7-2 – IDF Curve Parameters – East of Kingston

Return Period	a	b	c
2-Year	476	3.0	0.761
5-Year	705	4.0	0.783
10-Year	844	4.0	0.788
25-Year	1086	5.0	0.803
50-Year	1252	5.0	0.815
100-Year	1377	5.0	0.814

For design storms with return periods greater than 10 years, the calculated rainfall intensities are adjusted in accordance with the adopted MTO criteria as follows:

- 25-Year Storm: increase calculated intensity by 10%;
- 50-Year Storm: increase calculated intensity by 20%; and
- 100-Year Storm: increase calculated intensity by 25%.

These rainfall intensities are used in the Rational Method calculations for both the existing and proposed drainage conditions.

6.3. Proposed Drainage and Stormwater Management Strategy

The proposed development will increase the overall imperviousness of the site. The post-development weighted runoff coefficient is approximately 0.69.

The proposed stormwater management strategy has been developed to generally maintain the existing drainage directions while providing on-site quantity control, water quality treatment, and water balance through a combination of surface storage and Low Impact Development (LID) measures.

The Proposed Stormwater Drainage Plan is provided in **Appendix** .

The proposed stormwater management system consists primarily of:

- a front-yard **depressed storage/ponding area;**

  Surface runoff from the eastern portion of the site will be conveyed toward the proposed front-yard depressed storage/ponding area. Controlled overflow from this area will discharge to the existing Garden Street roadside ditch through a riprap spillway.

- **clear-stone riprap filter strips** along selected parking-lot pavement edges; and

- **bio-swales** within the side yard and rear yard, incorporating subsurface clear-stone storage reservoirs and perforated subdrains.

  Runoff from the western portion of the site will be directed toward the proposed side-yard and rear-yard bio-swales. The bio-swales will provide surface conveyance, filtration, and subsurface storage before ultimately discharging toward the existing low-point area at the southwest corner of the property.

  The proposed bio-swales have longitudinal slopes ranging from approximately 0.5% to 2.9%. A 100 mm diameter perforated subdrain will be provided along the bottom of the bio-swales to facilitate drainage of the clear-stone storage reservoir and minimize prolonged water accumulation.

6.4. Stormwater Quantity Control

Stormwater quantity control has been designed to limit post-development discharge rates to the corresponding pre-development runoff rates.

A small portion of the proposed site, approximately 275.6 m² (0.028 ha), will remain uncontrolled. This area consists of approximately:

- Driveway: 182.2 m²; and
- Landscaped area: 93.4 m².

  The weighted runoff coefficient for the uncontrolled area is approximately 0.66.

The calculated uncontrolled flows are summarized below.

Table 7-3 – Uncontrolled Area Peak Flows

Design Storm	Runoff Coefficient	Rainfall Intensity (mm/hr)	Area (ha)	Peak Flow (m³/s)
2-Year	0.66	67.6	0.028	0.0034
5-Year	0.66	89.3	0.028	0.0045
10-Year	0.66	105.5	0.028	0.0054
25-Year	0.66	123.4	0.028	0.0069
50-Year	0.66	137.7	0.028	0.0084
100-Year	0.66	151.9	0.028	0.0096

After accounting for the uncontrolled runoff, the maximum allowable discharge rates from the controlled portion of the site are approximately:

Table 7-4 – Allowable Controlled Discharge Rates

Design Storm	Allowable Controlled Flow (m³/s)
2-Year	0.0360
5-Year	0.0475
10-Year	0.0562
25-Year	0.0723
50-Year	0.0880
100-Year	0.1011

Detailed SWM Required Storage Calculation see **Appendix** . For the 100-year design storm, the calculated required on-site stormwater storage volume is approximately 89.8 m³.

The required quantity-control storage will be provided through the following facilities.

6.4.1. Front-Yard Depressed Storage/Ponding Area

A depressed storage area will be provided within the front yard. The proposed facility has an approximate top surface area of 207 m², a bottom area of approximately 180 m², and a maximum ponding depth of approximately 0.10 m, providing approximately:

19.4 m³ of surface storage.

The 100-year ponding elevation is approximately 112.90 m. An overflow/spillway will be provided at approximately Elevation 112.90 m, allowing emergency overflow toward the existing Garden Street roadside ditch. The spillway will be protected with riprap to minimize erosion.

6.4.2. Parking-Lot Pavement-Edge Clear-Stone Filter Strips

Clear-stone riprap filter strips will be provided along selected edges of the proposed parking areas. The filter strips have a total plan area of approximately 181.9 m², a clear-stone depth of approximately 0.60 m, and an assumed effective storage porosity of 40%.

The resulting available storage volume is approximately:

43.7 m³.

6.4.3. Side-Yard and Rear-Yard Bio-Swales

Approximately 159.5 m of bio-swale will be provided within the side and rear yards. The bio-swales will generally consist of approximately 300 mm of topsoil overlying a subsurface clear-stone storage reservoir approximately 1.2 m wide and 0.40 m deep.

Based on an effective clear-stone storage porosity of approximately 40%, the bio-swale system provides approximately:

30.6 m³ of storage.

6.4.4. The total quantity-control storage provided by the proposed stormwater management system is summarized below.

Table 7-5 – Stormwater Quantity Storage

SWM Facility	Storage Volume (m³)
Front-Yard Depressed Storage/Ponding Area	19.4
Pavement-Edge Clear-Stone Filter Strips	43.7
Side/Rear-Yard Bio-Swales	30.6
Total Storage Provided	93.6
Required 100-Year Storage	89.8

Accordingly, the proposed stormwater management system provides approximately 93.6 m³ of storage, exceeding the calculated 100-year quantity-control requirement of approximately 89.8 m³.

6.5. Water Quality Control

Stormwater quality control has been designed to achieve Enhanced Level Protection, corresponding to a long-term average removal of approximately 80% of Total Suspended Solids (TSS).

Based on the proposed site imperviousness of approximately 69%, an infiltration-type treatment system requires approximately 35 m³/ha of water quality storage. For the total site area of approximately 0.693 ha, the required water quality treatment volume is approximately:

24.3 m³.

Water quality treatment will primarily be provided by the proposed parking-lot pavement-edge clear-stone filter strips and the side-yard and rear-yard bio-swales.

Runoff entering these facilities will pass through vegetated and/or clear-stone filtering media prior to discharge. These facilities will assist in sediment filtration, temporary storage, and treatment of stormwater runoff prior to release from the site.

The available storage associated with these LID treatment facilities is summarized below.

Table 7-5 – Water Quality Storage

LID Facility	Available Storage (m^3)
Pavement-Edge Clear-Stone Filter Strips	43.7
Side/Rear-Yard Bio-Swales	30.6
Total LID Storage Provided	74.3
Required Water Quality Storage	24.3

The proposed LID system therefore provides substantially more storage than the calculated 24.3 m^3 water quality storage requirement and is considered adequate to provide the required Enhanced Level water quality control.

6.6. Water Balance

The proposed stormwater management system has also been designed to provide retention of the first 5 mm of rainfall over the site for water balance purposes.

Based on a total site area of approximately 6,933 m^2, the required 5 mm water balance volume is:

$$34.7\ m^3.$$

The proposed front-yard depressed storage/ponding area and the side-yard/rear-yard bio-swale system provide a combined storage volume of approximately:

$$19.4\ m^3 + 30.6\ m^3 = 50.0\ m^3.$$

This available storage exceeds the required water balance volume of 34.7 m^3.

The retained runoff will be temporarily stored within the depressed area and bio-swale/clear-stone reservoir system and released through infiltration, evapotranspiration, and the proposed subdrain/outlet system, as applicable to site and subsurface conditions.

Accordingly, the proposed stormwater management system provides sufficient storage to accommodate the required 5 mm water balance volume.

6.7. Stormwater Management Summary

The proposed stormwater management strategy maintains the existing general drainage directions and provides quantity control, water quality treatment, and water balance through a combination of surface and subsurface LID storage facilities.

The system provides approximately 93.6 m^3 of total stormwater storage, compared with a calculated 100-year quantity-control requirement of approximately 89.8 m^3. The proposed clear-stone filter strips and bio-swales provide approximately 74.3m^3 of LID storage, exceeding the required 24.3 m^3 water quality storage volume. In addition, the front-yard depressed storage area and bio-swales provide approximately 50.0 m^3 of storage for water balance purposes, exceeding the required 34.7 m^3 corresponding to the first 5 mm of rainfall.

The proposed stormwater management system is therefore considered capable of satisfying the applicable quantity control, Enhanced Level water quality treatment, and water balance objectives, subject to final detailed design and approval by the Township and other applicable review agencies.

6.8. Operation and Maintenance

The proposed Low Impact Development (LID) stormwater management facilities, including the parking-lot pavement-edge riprap filter strips and the side-yard/rear-yard bio-swales, will require routine inspection and maintenance to ensure long-term hydraulic performance, water quality treatment, and storage capacity.

6.8.1. Riprap Filter Strip Maintenance

The riprap filter strips located along the selected pavement edges will receive runoff from adjacent paved areas and provide filtration and temporary subsurface storage prior to discharge.

Routine maintenance requirements will include:

- inspection of the filter strip at least twice per year, preferably in the spring and fall, and following major storm events;
- removal of accumulated sediment, debris, leaves, litter, and other materials from the surface of the riprap;
- inspection of the pavement edge and inlet area to ensure that runoff can freely enter the filter strip without obstruction;
- removal of excessive sediment accumulation where it reduces the permeability or effective storage capacity of the clear-stone system;
- replacement or regrading of displaced riprap where settlement, erosion, rutting, or migration of stone has occurred;
- inspection of any geotextile, outlet, underdrain, or cleanout components, where provided, to confirm that they remain functional and free of blockage; and
- restoration of damaged or disturbed areas following snow-clearing, landscaping, or other site maintenance activities.

Accumulated sediment should be removed before it substantially reduces the void space or infiltration/filtration capacity of the clear-stone system. The use of excessive winter sand adjacent to the filter strips should be minimized, where practical, to reduce clogging potential.

6.8.2. Bio-Swale Maintenance

The proposed side-yard and rear-yard bio-swales will provide stormwater conveyance, filtration, temporary storage, and controlled drainage through the underlying clear-stone reservoir and perforated subdrain system.

Routine maintenance requirements will include:

- inspection at least twice per year, preferably in the spring and fall, and following significant rainfall or snowmelt events;

- removal of accumulated sediment, debris, litter, and leaves from the swale surface and inlet locations;
- maintenance of vegetation, including mowing, trimming, reseeding, or replanting of bare or damaged areas as required;
- removal of invasive vegetation and replacement of dead or unhealthy plant material where applicable;
- inspection for erosion, channelization, scour, settlement, or standing water within the swale;
- repair and stabilization of eroded or settled areas to maintain the intended longitudinal grade and drainage pattern;
- inspection of the 100 mm diameter perforated subdrain, cleanouts, and outlet locations to ensure they remain free-flowing and unobstructed;
- flushing or cleaning of the subdrain system where sediment accumulation or blockage is identified;
- removal and replacement of clogged surface soil, filter media, or clear stone where reduced drainage performance is observed; and
- inspection following winter snow-clearing operations to identify damage caused by snow storage, plowing, salt accumulation, or displaced material.

The bio-swales should not exhibit prolonged standing water following normal rainfall events. Where ponding persists beyond the intended drawdown period, the vegetation, soil/filter media, clear-stone reservoir, subdrain, and outlet system should be inspected and cleaned or repaired as required.

6.8.3. Long-Term Operation

The Owner or condominium corporation will be responsible for the long-term inspection and maintenance of the private stormwater management facilities. Maintenance records should be retained, including inspection dates, observed deficiencies, corrective actions, and any repairs or replacement of stormwater management components.

Proper implementation of the above inspection and maintenance program will help maintain the intended stormwater quantity control, water quality treatment, water balance, and drainage performance of the proposed LID system over its service life.

7. EROSION AND SEDIMENT CONTROL

An effective Erosion and Sediment Control (ESC) Plan (**Appendix F**) is crucial for minimizing the potential environmental impacts of a construction site. A multi-barrier approach should be considered to address these effects, including preventing erosion during construction, managing suspended sediment at the source, and minimizing sediment transport off-site. The following measures will be implemented on-site during construction to reduce sediment transport downstream, in accordance with the Greater Golden Horseshoe Area Conservation Authorities Erosion & Sediment Control Guidelines for Urban Construction:

- Temporary silt fencing will be installed along the site boundary prior to any construction or grading activities, as illustrated on drawing C4 and in accordance with OPSD 219.130 standard.
- Construction access mud mats will be installed, as illustrated on C4 and per detail on C4.
- filter sock will be installed for manhole protection as illustrated on C4 and per detail on C4.
- All future grassed areas will be seeded as soon as possible.
- All erosion and sediment control measures shall be installed before the commencement of site construction and will remain in place throughout the duration of construction.
- Inspections of all erosion and sediment control measures will be conducted after significant rainfall and snowmelt events.

The contractor must ensure that all on-site personnel are familiar with ESC practices and trained in the ESC Plan, including its implementation, inspections, maintenance, and repairs. During construction, the site inspector will monitor the ESC measures, which will be maintained by the contractor.

8. CONCLUSION

Based on the servicing, grading, stormwater management, and erosion and sediment control assessments presented in this report, the proposed residential development at 12 Garden Street, Lansdowne, Ontario is considered feasible from a civil engineering servicing perspective, subject to final approval by the Township of Leeds and the Thousand Islands and other applicable review agencies.

The proposed development consists of a new 39-unit residential condominium building, while retaining the existing 10-unit residential condominium building, for a total of 49 residential units.

The principal conclusions of this Functional Servicing Report are summarized as follows:

- **Water Servicing:**

  The proposed development will be serviced from the existing 150 mm municipal watermain within Garden Street. The calculated Maximum Day Demand is approximately 1.64 L/s, the Peak Hour Demand is approximately 2.46 L/s, and the required FUS fire flow is approximately 133.33 L/s (8,000 L/min). The governing Maximum Day plus Fire Flow demand is approximately 134.97 L/s. A site-specific hydrant flow test completed on July 27, 2026 recorded a static pressure of 46 psi and a two-port residual pressure of 34 psi at an observed flow of 1,500 US gpm (5,679 L/min), with a projected available flow of 2,277 US gpm (8,619 L/min) at 20 psi. Using the measured 34 psi residual pressure as the starting pressure for the fire-main sizing calculation, the proposed 250 mm PVC fire main provides a calculated residual pressure of approximately 22 psi at the proposed on-site hydrant under the governing design condition. The proposed water servicing arrangement is therefore considered hydraulically adequate, subject to final Township review and servicing capacity allocation under By-law No. 23-054.

- **Sanitary Servicing:**

  The proposed development will connect to the existing 250 mm municipal sanitary sewer within Garden Street. The estimated average daily sanitary flow is approximately 51.45 m^3/day (0.60 L/s), and the total peak sanitary design flow, including infiltration, is approximately 2.54 L/s. The proposed 200 mm diameter private sanitary sewer at a minimum slope of 0.5% has an estimated full-flow capacity of approximately 23.2 L/s, which is substantially greater than the anticipated peak design flow. The Township has confirmed that servicing capacity is available for the proposed development, subject to the required servicing capacity allocation under By-law No. 23-054.

- **Grading and Drainage:**

  The proposed grading design generally follows the existing site topography and maintains the existing major drainage directions where practical. Runoff from the eastern portion of the site will be directed toward the front-yard depressed storage/ponding area and ultimately toward the existing Garden Street roadside ditch, while runoff from the western portion of the site will be conveyed through the side-yard and rear-yard bio-swales toward the existing southwest low-point area. Positive drainage will be maintained away from all buildings, and adverse drainage impacts on adjacent properties are not anticipated.

- **Stormwater Quantity Control:**

  The proposed stormwater management system consists of a front-yard depressed storage area, parking-lot pavement-edge clear-stone filter strips, and side-yard/rear-yard bio-swales with subsurface clear-stone storage. The calculated 100-year required storage volume is approximately 89.8 m^3, while the proposed system provides approximately 93.6 m^3 of total storage. Accordingly, the proposed system provides sufficient quantity-control storage for the 100-year design storm.

- **Stormwater Quality Control:**

  The proposed development is designed to achieve Enhanced Level Protection, corresponding to approximately 80% long-term TSS removal. The required water quality storage volume is approximately 24.3 m^3, while the proposed clear-stone filter strips and bio-swales provide approximately 74.3 m^3 of LID storage. The proposed system therefore provides sufficient storage to satisfy the water quality objective.

- **Water Balance:**

  The water balance criterion requires retention of the first 5 mm of rainfall, corresponding to approximately 34.7 m^3 of storage over the site. The proposed front-yard depressed storage area and bio-swales provide approximately 50.0 m^3 of available storage, exceeding the required water balance volume.

- **Erosion and Sediment Control:**

  Erosion and sediment control measures, including silt fencing, stabilized construction access, filter socks, and progressive site stabilization, will be implemented and maintained throughout construction in accordance with the Erosion and Sediment Control Plan and applicable guidelines.

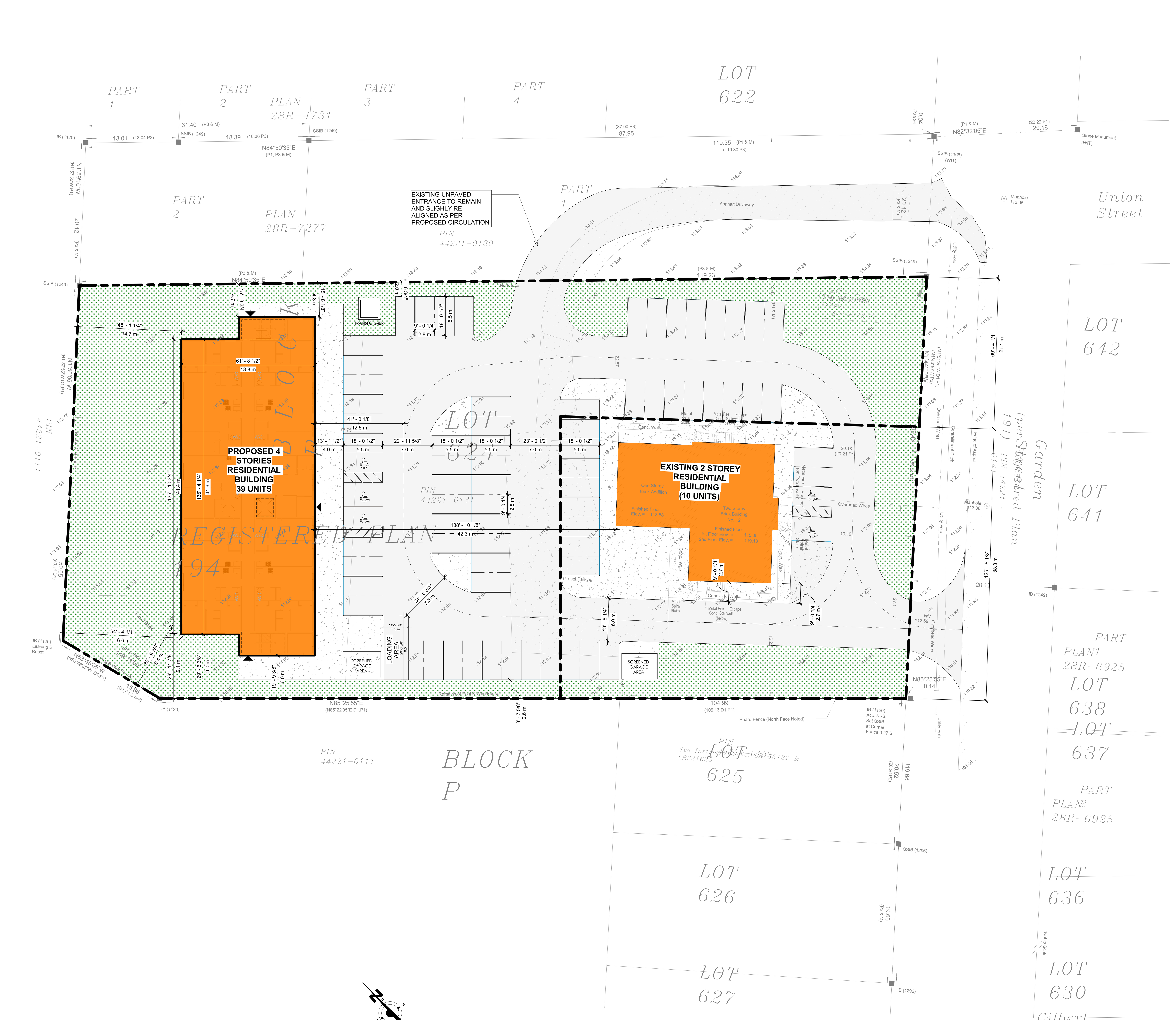
Based on the foregoing, the proposed development can be adequately serviced by the existing municipal water and sanitary infrastructure. The site-specific hydrant flow test and fire-main hydraulic assessment support the proposed 250 mm private fire main, with a calculated residual pressure of approximately 22 psi at the proposed on-site hydrant under the governing Maximum Day plus Fire Flow condition. The proposed grading and stormwater management systems are capable of satisfying the applicable quantity control, water quality, water balance, and drainage objectives. Final servicing connections, watermain details, stormwater management details, and construction requirements will be subject to review and approval by the Township of Leeds and the Thousand Islands and other applicable agencies.

Yours truly,

LICENSED PROFESSIONAL ENGINEER
F. SHI
100065602
PROVINCE OF ONTARIO

Feng Shi, P.Eng
Principal Engineer

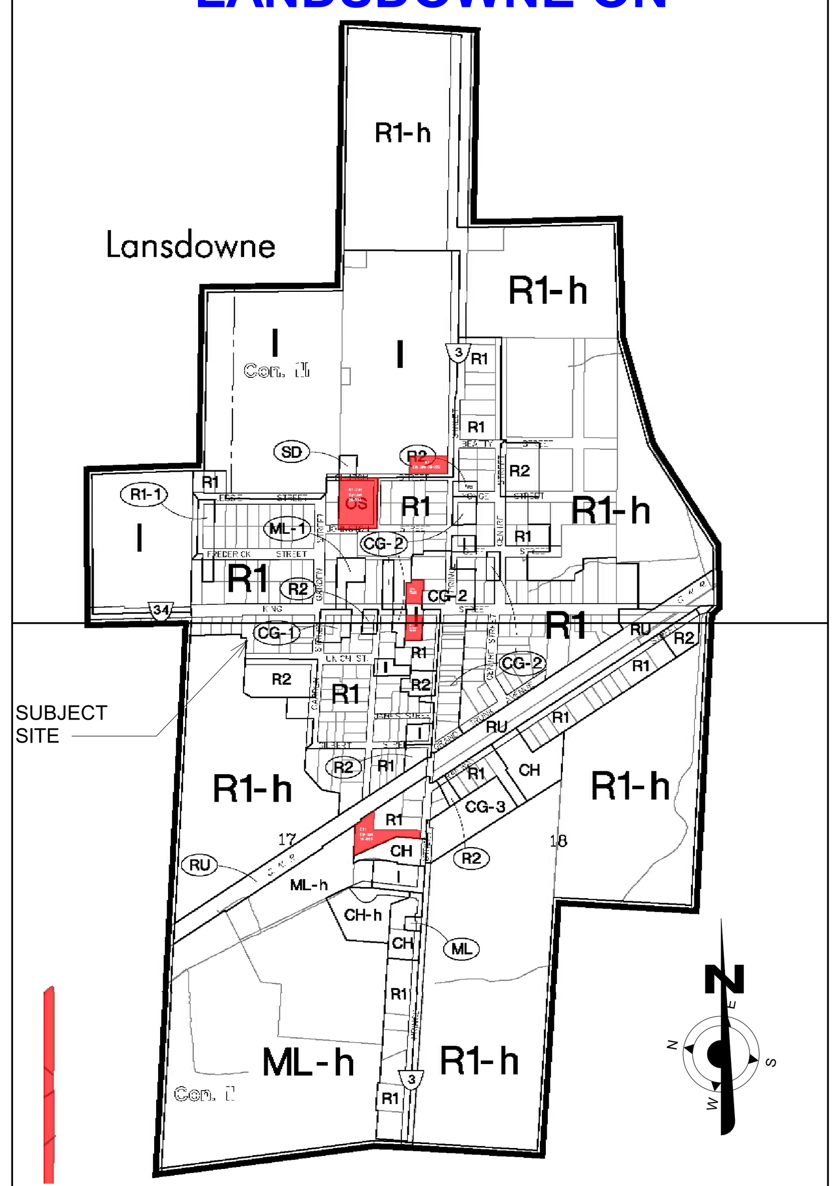
Appendix A Site Plan



1 Site Plan
A-100 3/64" = 1'-0"

0m 10m 20m 30m

SITE PLAN
12 GARDEN ST.
LANDSDOWNE ON



SITE STATSTICS		
R2 ZONE - SECOND DENSITY RESIDENTIAL - LANSDOWNE ZONE		
	BY LAW	PROPOSED
LOT AREA	200.0 m2 (2152.78 sq. ft.) per unit for each of the first four units plus 150.0 m2 (1614.59 sq. ft.) for each additional unit.	6933.35 m² 1.71 acres
LOT FRONTAGE	18.0 m	292.36 m
FRONT YARD	N/A	39.54 m
EXTERIOR SIDE YARD	7.5 m	N/A
SIDE YARD	3.0 m	4.7 m
REAR YARD	7.5 m	14.7 m
BUILDING HEIGHT	12.0 m	15 m
LOT COVERAGE	35%	17.3%
EXISTING		352.42 m²
PROPOSED		846.0 m²
DENSITY (MAXIMUM)	75 units per hectare	
LANDSCAPE OPEN SPACE	35%	30.7% (2131.08 m²)

PARKING COUNT:
PROPOSED
EXISTING RESIDENTIAL BLDG. = 15 SPACES NEW
RESIDENTIAL BLDG. = 57 SPACES

TOTAL = 72 SPACES

REQUIRED:
EXISTING RESIDENTIAL BLDG. (10 UNITS x 1.5) = 15 SPACES
NEW RESIDENTIAL BLDG. (39 UNITS x 1.5) = 59 SPACES
TOTAL = 74 SPACES

PROJECT NAME

RESIDENTIAL DEVELPOMENT

PROJECT ADDRESS

12 GARDEN ST.
LANDSDOWNE ON

CLIENT

NORTHRIDGE HOMES LTD.

ARCHITECT

KHALSA DESIGN INC.

KHALSA

BRAMPTON, ON

TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

Project number	250XX
Date	05/13/2026
Drawn by	ASB
Checked by	KDI
Scale	As indicated

REVISIONS

No.	Description	Date

SITE PLAN

A-100

RESIDENTIAL DEVELPOMENT

Appendix B The Lansdowne Serviced Area Infrastructure Assessment & Growth Readiness Study Update (J.L. Richards, 2022)

Appendix C Topo Survey Plan

PLAN of SURVEY of
ALL of LOT 624 And PART of BLOCK P, REGISTERED PLAN No. 194
Geographic Township of Lansdowne
TOWNSHIP OF LEEDS AND THE THOUSAND ISLANDS
COUNTY of LEEDS

SCALE = 1:300

10m 0 10 20 30m

HOPKINS CHITTY LAND SURVEYORS INC.
-2026-

ELEVATION NOTE:

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE HT2_0 GEOID MODEL BEING A PRODUCT OF THE GEODETIC SURVEY DIVISION (GSD) OF NATURAL RESOURCES CANADA, DERIVED FROM RTN OBSERVATIONS. THE ELEVATIONS ARE REFERRED TO A SITE BENCHMARK BEING THE TOP OF SSIB (1249) AT THE SOUTHEAST CORNER OF PART 1, PLAN 28R-7277 HAVING AN ELEVATION OF 113.27m.

BEARING NOTE:

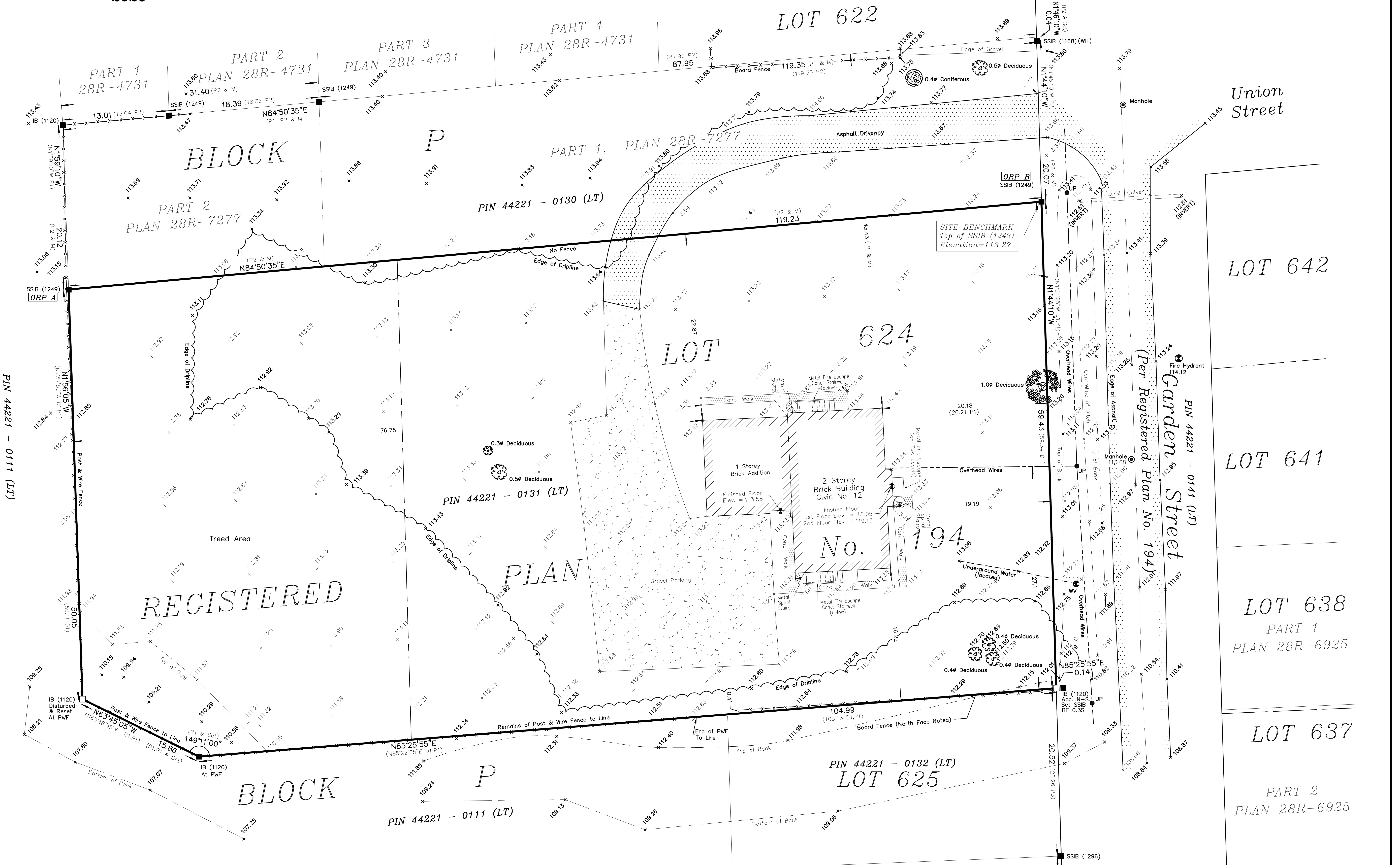
BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS A AND B BY REAL TIME NETWORK (RTN) OBSERVATIONS, UTM ZONE 18, NAD83 (CSRS) (2010).

FOR BEARING COMPARISONS, A ROTATION OF 0°43'05" CLOCKWISE WAS APPLIED TO BEARINGS ON (D1) & (P1).

FOR BEARING COMPARISONS, A ROTATION OF 0°44'50" CLOCKWISE WAS APPLIED TO BEARINGS ON PLAN (P2).

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996688

DISTANCES AND ELEVATIONS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.



SURVEYOR'S CERTIFICATE:

I CERTIFY THAT:

1. This Survey and Plan are correct and in accordance with the SURVEYS ACT, the SURVEYORS ACT and the REGULATIONS made under them.
2. This Survey was completed on the 28th day of July, 2026.

HOPKINS CHITTY LAND SURVEYORS INC.

DATE: JANUARY 25, 2023
UPDATED: JULY 28, 2026

JURGEN ISMAILI - O.L.S.

LEGEND:

SSIB'S PLANTED DUE TO INSUFFICIENT OVERBURDEN

□	denotes	Planted Survey Monument
■	"	Found Survey Monument
SSIB	"	Short Standard Iron Bar
IB	"	Iron Bar
Acc.	"	Accepted
Conc.	"	Concrete
N.	"	North
S.	"	South
WV	"	Water Valve
(WIT)	"	Witness
(M)	"	Measured
(783)	"	Ken Wiseman-O.L.S.
(1120)	"	James A. Minnes-O.L.S.
(1168)	"	W.J. Salter-O.L.S.
(1249)	"	Martin H. Kaldeway-O.L.S.
(P1)	"	Plan by (1120) dated March 24, 1964
(P2)	"	Reference Plan 28R-7277
(P3)	"	Plan by (1296) dated June 15, 1987
D1	"	Instrument No. LR321625
× xxx.xx	"	Elevations measured January 20th, 2023
× xxx.xx	"	Elevations meaured June 26th, 2026
UP	"	Utility Pole
BF	"	Board Fence
PWF	"	Post and Wire Fence
ø	"	Diametre

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER V-43519.

Party Chief: BK/TJ	Instrument: PK/CC	Checked By: PdJ/J.I	Plan By: FF

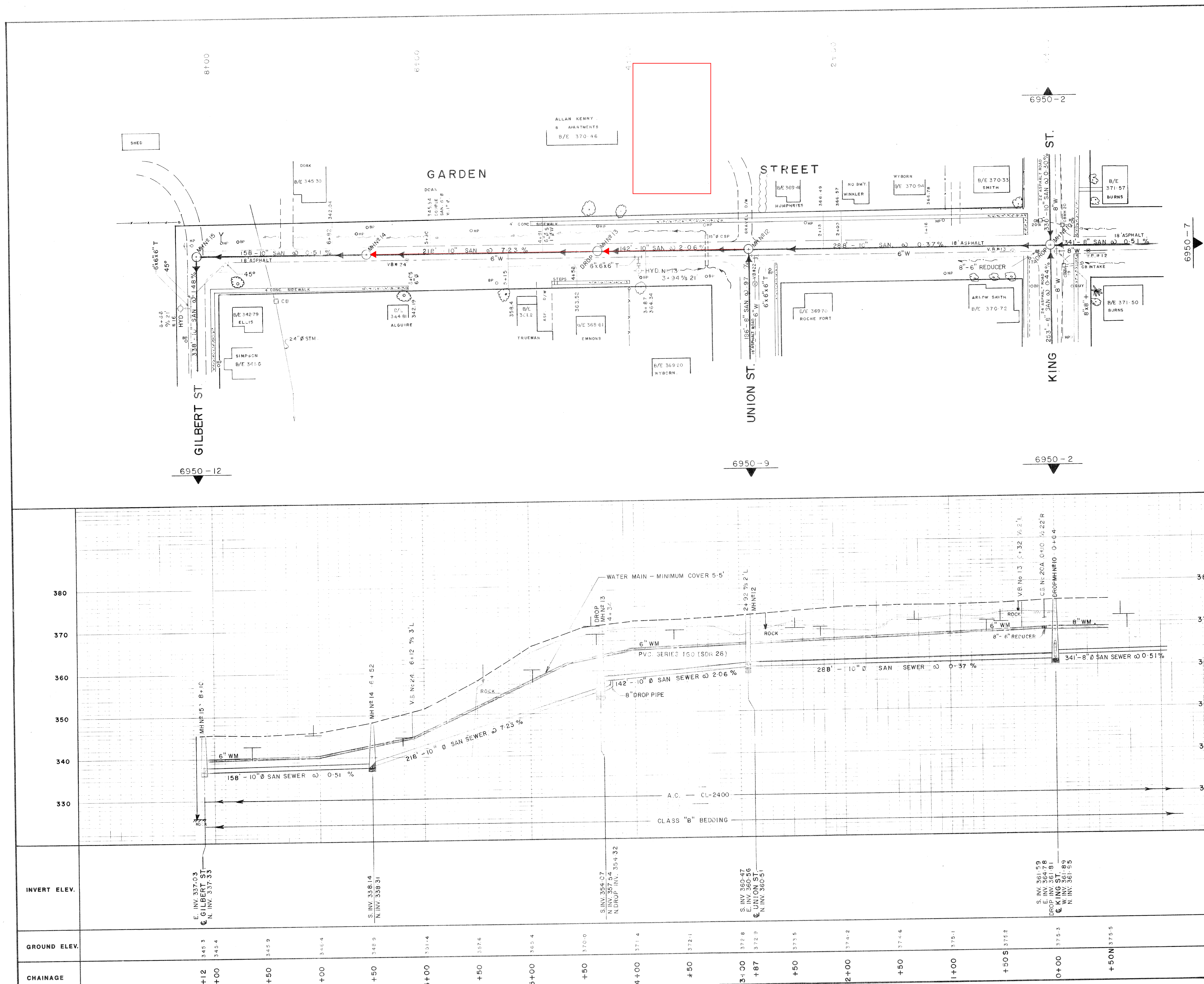
HOPKINS CHITTY LAND SURVEYORS INC.
Ontario Land Surveyors
www.hopkinschitty.com

HCLS

1224 GARDINERS ROAD, SUITE 102
KINGSTON, ONTARIO K7P-0G2
Tel (613) 384-9266
Fax (613) 384-3513

PROJECT No. H-00371
LOT 624 & BLOCK P, RP 194
TOWNSHIP OF LANSDOWNE

Appendix D Garden Street Road Plan & Profile as-built drawings



-GENERAL NOTES-

1. ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN THE FIELD.
2. ALL CHAINAGES ARE MEASURED ALONG ℄ OF RIGHT OF WAY NOT ℄ OF PIPE.
3. All sanitary sewer connections are single 5"ø AC unless noted otherwise.
4. All watermain connections are single 3/4"ø copper unless noted otherwise.

REVISIONS

DATE	DETAILS	No.	BY
APR. 1977	AS CONSTRUCTED	1	Y.H.C.

MINISTRY OF THE ENVIRONMENT

TOWNSHIP OF THE FRONT OF LEEDS AND LANSDOWNE

WATER AND SEWAGE WORKS PROGRAMME

PROJECT No. 1-0194-69 & 5-0107-69

GARDEN STREET

STA. 0+00 TO STA. 8+12 S

PLAN & PROFILE

DBW PER

DESIGNED BY

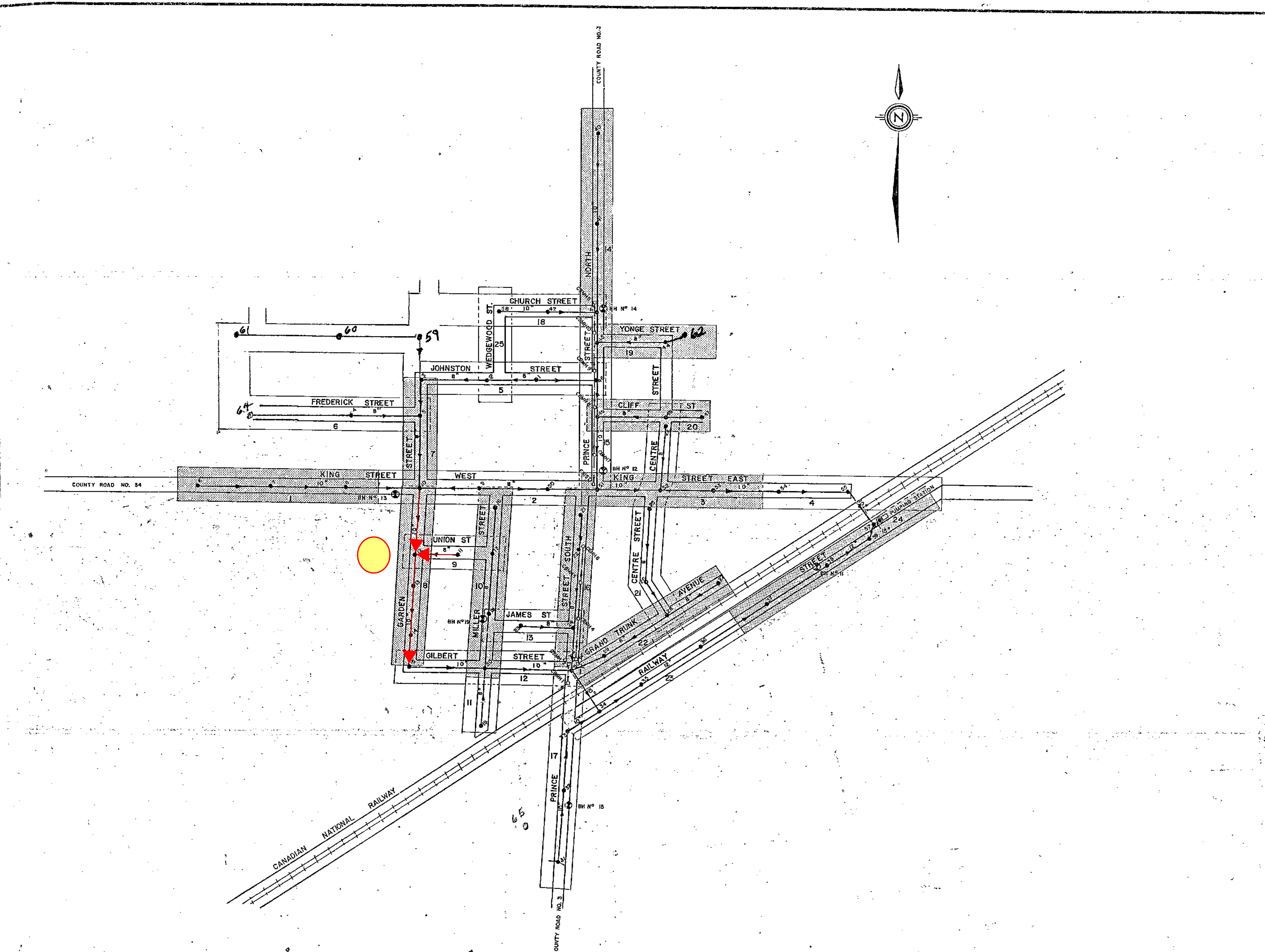
APPROVED BY

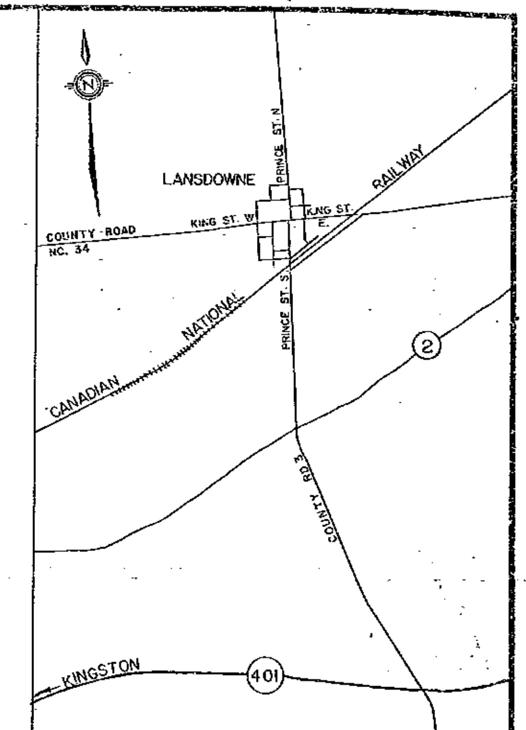
MAKSYMEC & ASSOCIATES LTD.

CONSULTING PROFESSIONAL ENGINEERS

TORONTO SUDBURY

DRAWN BY	A.H. & D.W.	DATE	January, 1974
CHECKED BY	Williamson	SHEET	10 OF 28
SCALE	HOR. = 1"=40' VERT. = 1"=10'		6950 - 8
PROJECT No.	6950(a)	REV.	1





KEY PLAN

SCALE: 1" = 2500'

LEGEND

SANITARY SEWERS	
MANHOLES (SAN.)	
PUMPING STATION	P.S.
DRAWING SHEET NUMBER	19
BOREHOLE LOCATION	BH Nº 13
BENCHMARK ELEVATION:	375·65'
DESCRIPTION:	FRONT OF SOUTH WALL OF FIRE HALL BOLT SET IN STONE 18" FROM SOUTH-WEST CORNER 12" ABOVE GROUND.
STORM SEWERS	

REVISIONS

DATE	DETAILS	No.	BY
12 JAN-77	AS CONSTRUCTED	1	W J

MINISTRY OF THE ENVIRONMENT

TOWNSHIP OF THE FRONT OF LEEDS AND LANSDOWNE

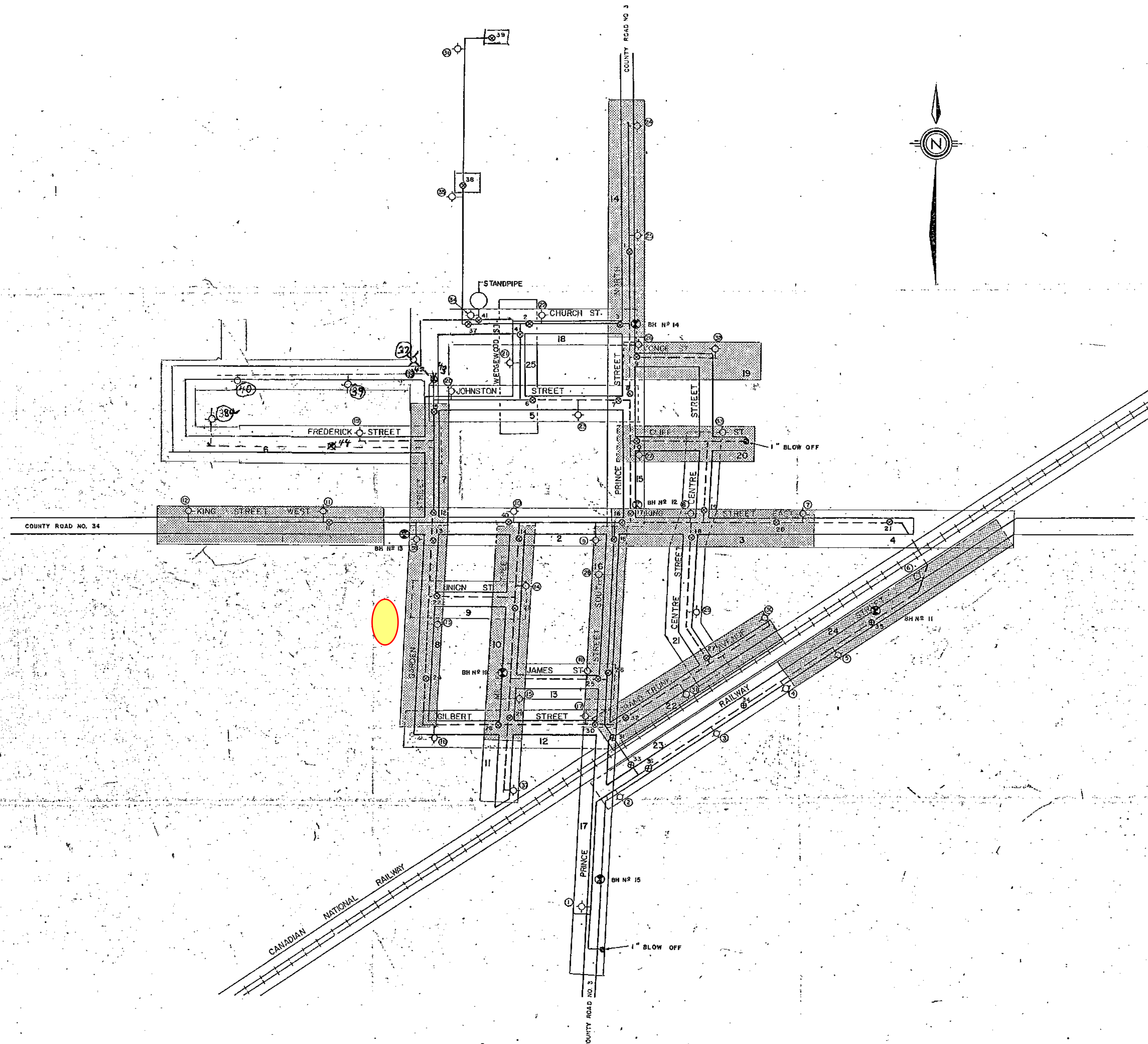
WATER AND SEWAGE WORKS PROGRAMME

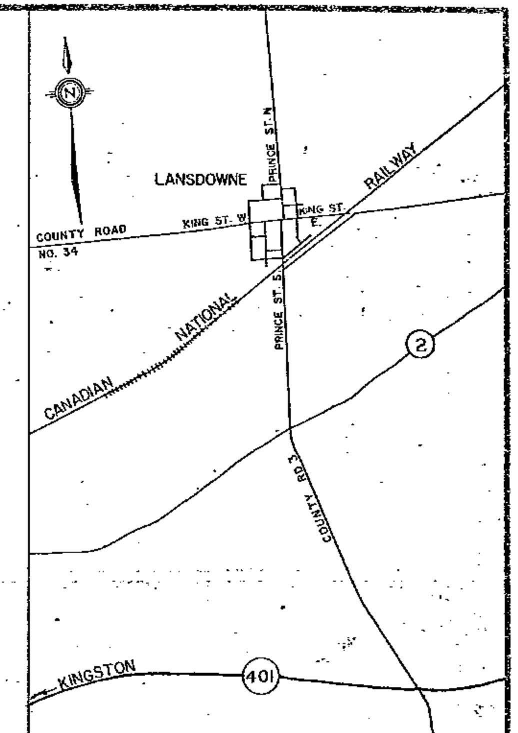
PROJECT No. 1-0194-69 & 5-0107-69

GENERAL PLAN
SANITARY SEWERS
DRAWING SHEET INDEX

REGISTERED PROFESSIONAL ENGINEER D. B. WILLIAMSON PROVINCE OF ONTARIO

D.B.W. PER





KEY PLAN
SCALE: 1" = 2500'

LEGEND

8" WATERMAIN	
6" WATERMAIN	
HYDRANT	
1" BLOWOFF	
VALVE	
DRAWING SHEET NUMBER	19
BOREHOLE LOCATION	BH Nº 13
BENCHMARK ELEVATION	375·65'
DESCRIPTION	FRONT OF SOUTH WALL OF FIRE HALL BOLT SET IN STONE 18" FROM SOUTH-WEST CORNER 12" ABOVE GROUND.

REVISIONS

DATE	DETAILS	NO.	BY
JAN 18, 77	AS CONSTRUCTED	1	WJ

MINISTRY OF THE ENVIRONMENT

TOWNSHIP OF THE FRONT OF LEEDS AND LANSDOWNE

WATER AND SEWAGE WORKS PROGRAMME
PROJECT No. 1-0194-69 & 5-0107-69

GENERAL PLAN
WATERMAINS
DRAWING SHEET INDEX

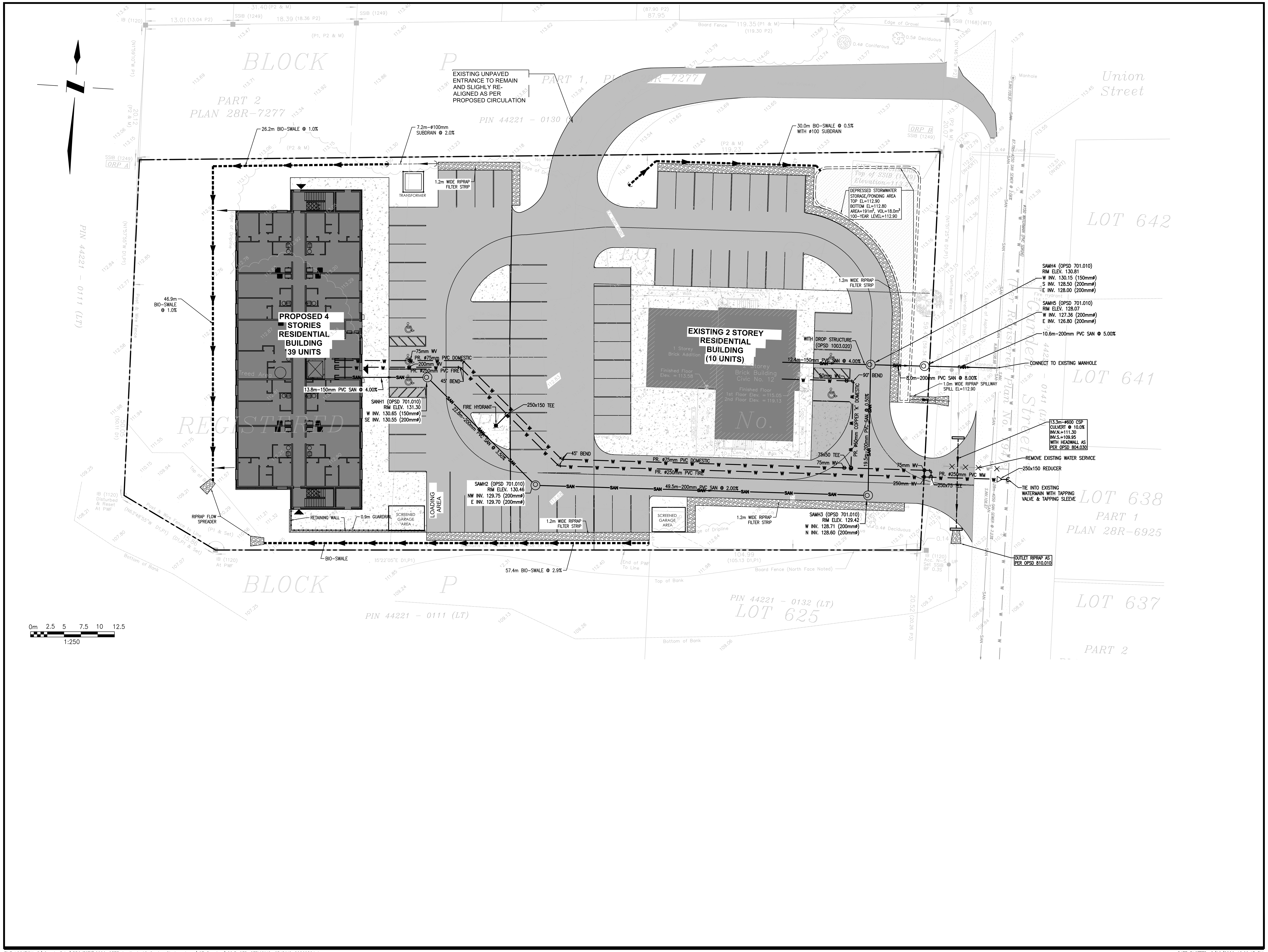
REGISTERED PROFESSIONAL ENGINEER D. B. WILLIAMSON PROVINCE OF ONTARIO

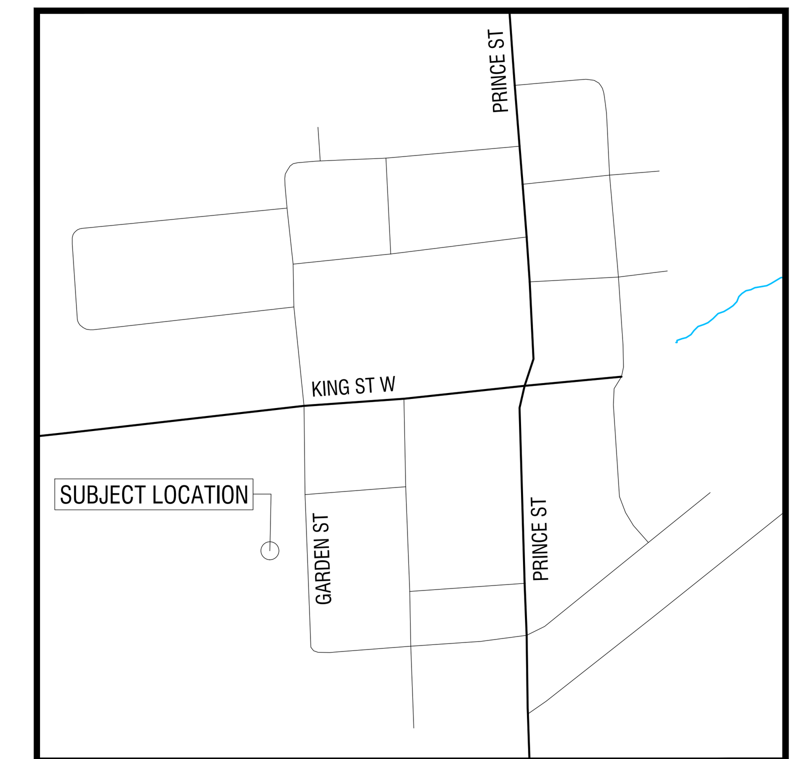
DBW PER

DESIGNED BY APPROVED BY

Appendix E Geotechnical investigation (Cambium Inc. July 2026)

Appendix F Site Servicing Plan, Site Grading Plan, Erosion Control Plan (Luban Ltd.)





KEYPLAN

ELEVATION NOTE

- ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE HT2_0 GEOID MODEL BEING A PRODUCT OF THE GEODETIC SURVEY DIVISION (GSD) OF NATURAL RESOURCES CANADA, DERIVED FROM RTN OBSERVATIONS. THE ELEVATIONS ARE REFERRED TO A SITE BENCHMARK BEING THE TOP OF SSIB (1249) AT THE SOUTHEAST CORNER OF PART 1, 28R-7277 HAVING AN ELEVATION OF 113.27m.

BEARING NOTE:

- BEARINGS ARE UTM GRID, DERIVED FROM A PORTION OF THE SOUTHERLY LIMIT OF PARTS 1 & 2, (P2) HAVING A BEARING OF N84°50'35"E UTM ZONE 18 (75° WEST LONGITUDE) NAD83 (CSRS) (2010) AND BEING DESIGNATED HEREON AS 'REFERENCE BEARING".
- FOR BEARING COMPARISONS, A ROTATION OF 0°43'05" CLOCKWISE WAS APPLIED TO BEARINGS ON (D1) & (P1).
- FOR BEARING COMPARISONS, A ROTATION OF 0°44'50" CLOCKWISE WAS APPLIED TO BEARINGS ON PLAN (P2).
- DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996688
- DISTANCES AND ELEVATIONS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

REV.	DATE	DESCRIPTION	BY
6			
5			
4			
3			
2			
1			
0	2026/08/10	FOR BUILDING PERMIT	FS

MUNICIPALITY: Township of Leeds and the Thousand Islands

ENGINEER'S STAMP: LICENSED PROFESSIONAL ENGINEER F. SHI 100065602 2026/08/10 PROVINCE OF ONTARIO

CIVIL ENGINEER: LUBAN
7373 LIONSHEAD AVENUE, NIAGARA FALLS, ONTARIO, L2G7S4
TEL. 226-688-7928, EMAIL: FENG.SHI@LUBAN.CA

CLIENT: NORTHRIDGE HOMES LTD.

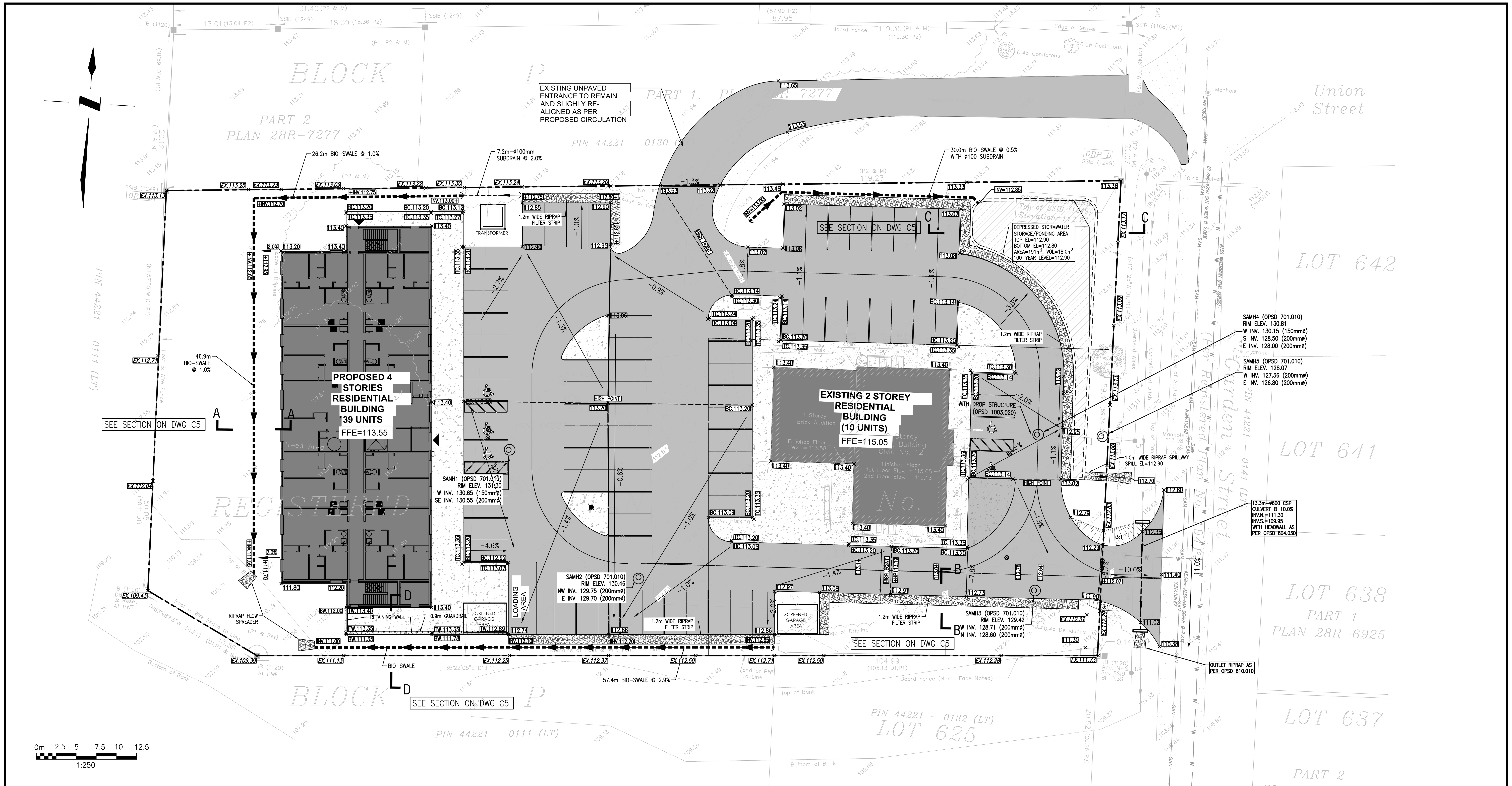
ARCHITECT:

SERVICING PLAN
RESIDENTIAL DEVELOPMENT
12 GARDEN ST, LANSDOWNE, ON K0E 1L0

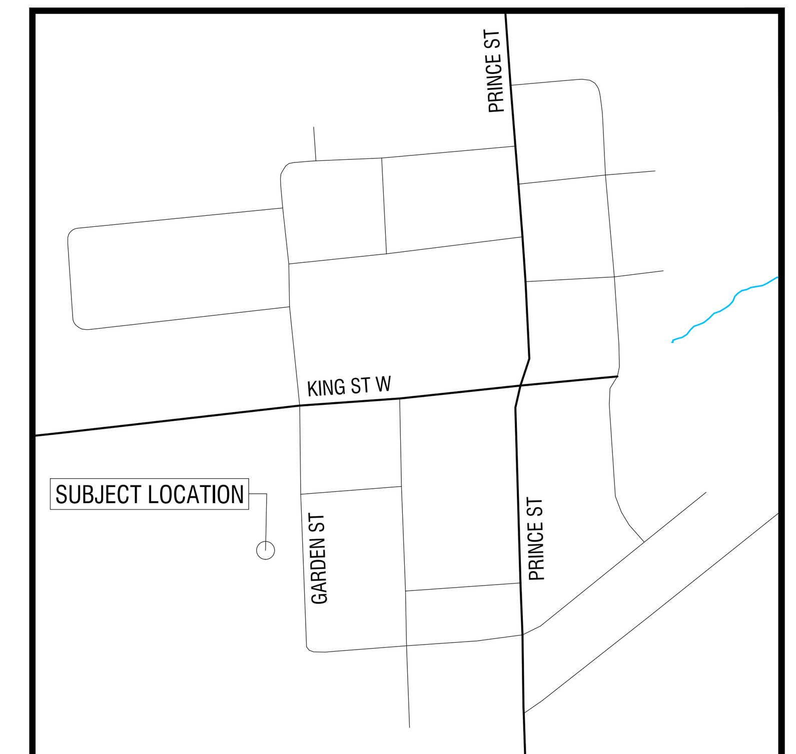
DESIGNED BY: MG	SCALE:		CONTRACT No.
CHECKED BY: FS	HORIZONTAL: 1:250		SHEET No 2 OF 6
DRAWN BY: MG	VERTICAL:		C2 DRAWING No.
DATE: 2026/08/10			

FILE LOCATION: D:\Google Drive\PROJECTS\2026-S575 Amritpal, 12 Garden St, Lansdowne\07 Drawings\C2,3_C3D_SERVICING, GRADING_20260804.dwg

DATE PLOTTED: 8/10/2026 12:00:13 PM



Recommended Minimum Pavement Structure		
Pavement Layer	Light Duty	Heavy Duty
Surface Course Asphalt	40 mm HL3 / HL4	50 mm HL3 / HL4
Binder Course Asphalt	50 mm HL8	60 mm HL8
Granular Base	150 mm OPSS 1010 Granular A	150 mm OPSS 1010 Granular A
Granular Subbase	300 mm OPSS 1010 Granular B	450 mm OPSS 1010 Granular B



KEYPLAN

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REV.	DATE	DESCRIPTION	BY
6			
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1			
0	2026/08/10	FOR BUILDING PERMIT	FS

MUNICIPALITY: Township of Leeds and the Thousand Islands

ENGINEER'S STAMP: LICENSED PROFESSIONAL ENGINEER F. SHI 100065602 2026/08/10 PROVINCE OF ONTARIO

CIVIL ENGINEER: LUBAN
7373 LIONSHEAD AVENUE, NIAGARA FALLS, ONTARIO, L2G7S4
TEL. 226-688-7928, EMAIL: FENG.SHI@LUBAN.CA

CLIENT: NORTHRIDGE HOMES LTD.

ARCHITECT:

GRADING PLAN
RESIDENTIAL DEVELOPMENT
12 GARDEN ST, LANSDOWNE, ON K0E 1L0

DESIGNED BY: MG	SCALE:		CONTRACT No.
CHECKED BY: FS	HORIZONTAL: 1:250		SHEET No 3 OF 6
DRAWN BY: MG	VERTICAL:		C3 DRAWING No.
DATE: 2026/08/10			

FILE LOCATION: D:\Google Drive\PROJECTS\2026-S575 Amritpal, 12 Garden St, Lansdowne\07 Drawings\C2,3_C3D_SERVICING, GRADING_20260804.dwg

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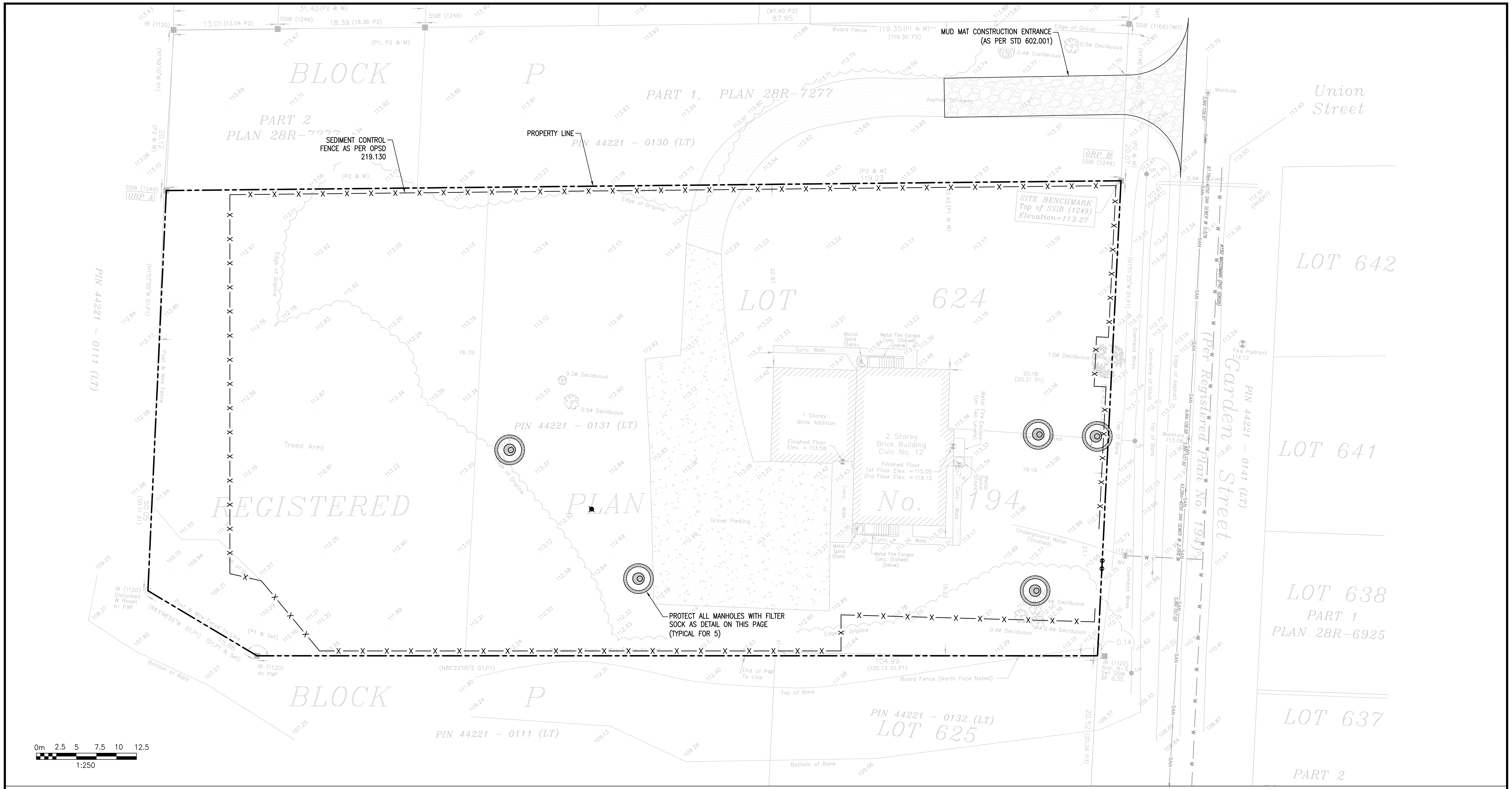
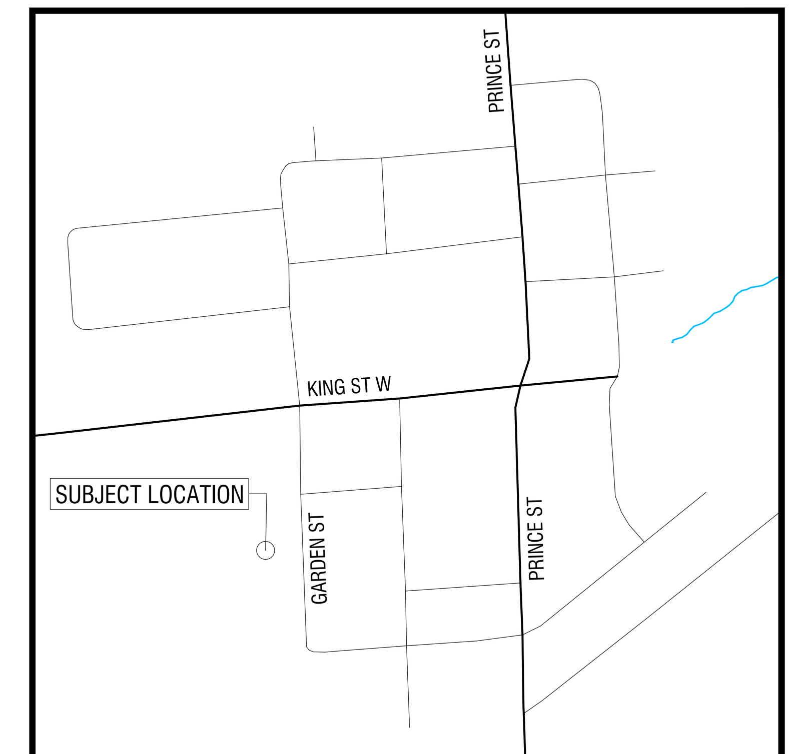
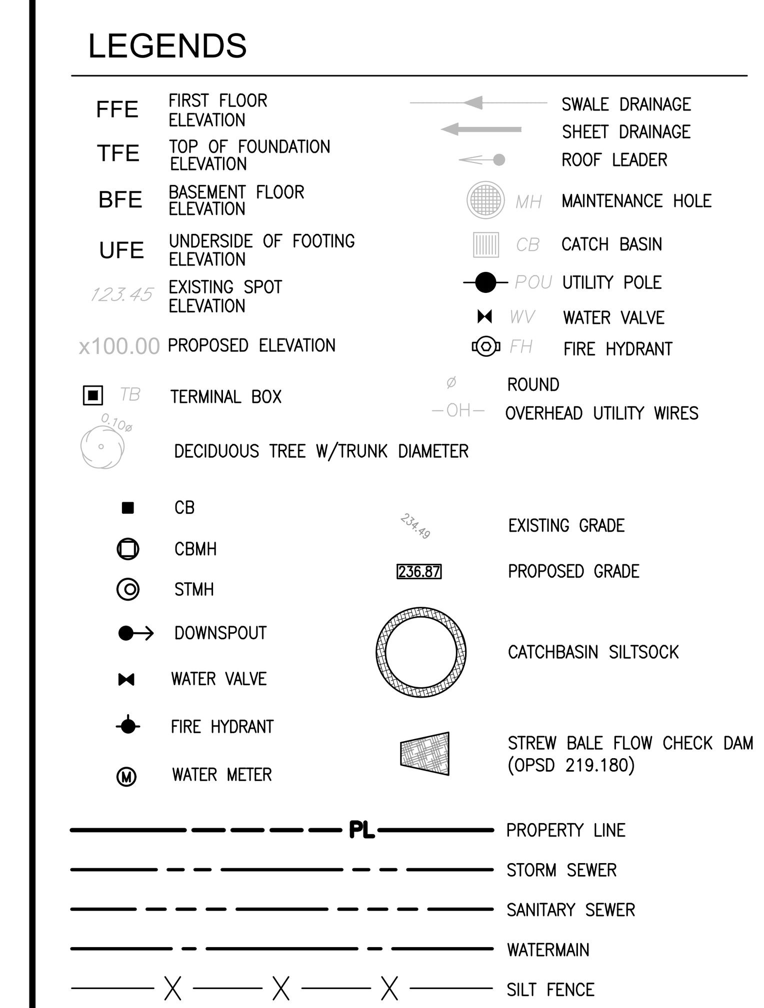




KEYPLAN



REV.	DATE	DESCRIPTION	BY
6			
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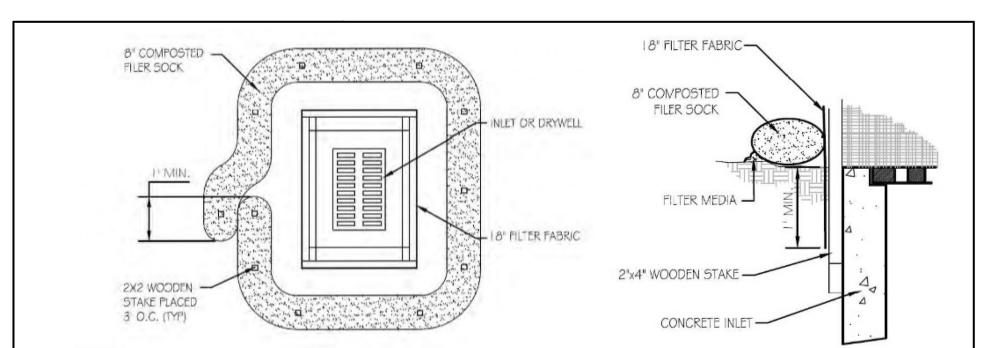
0	2026/08/10	FOR BUILDING PERMIT	FS

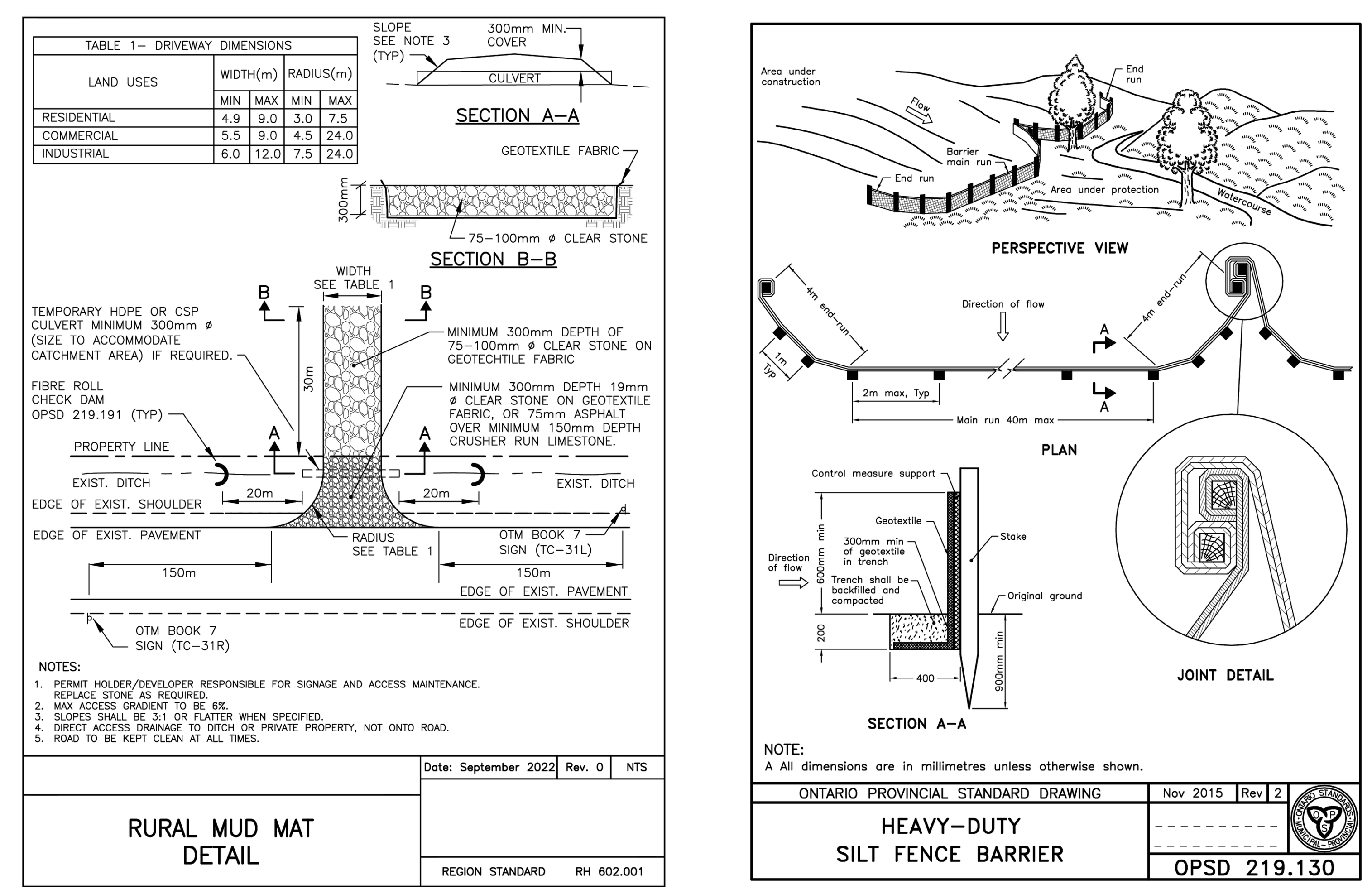
EROSION ON AND SEDIMENT CONTROL NOTES

1. PRIOR TO COMMENCEMENT OF ANY ON-SITE WORK OR SOIL STRIPPING, ALL EROSION AND SEDIMENT CONTROL (ESC) MEASURES SHOWN ON THE ACCEPTED PLANS SHALL BE INSTALLED AND APPROVED BY THE DEVELOPER' S ENGINEER. ADDITIONAL ESC MEASURES SHALL BE INSTALLED AS REQUIRED OR DIRECTED BY THE DEVELOPER' S ENGINEER.
2. DISTURBED AREAS SHALL BE MINIMIZED TO THE EXTENT PRACTICABLE AND SHALL BE TEMPORARILY OR PERMANENTLY STABILIZED AS CONSTRUCTION PROGRESSES.
3. THE ESC MEASURES SHOWN ON THE PLANS MAY REQUIRE MODIFICATION OR UPGRADING AS SITE CONDITIONS CHANGE. WHERE EXISTING MEASURES ARE INEFFECTIVE IN PREVENTING SEDIMENT-LADEN RUNOFF FROM LEAVING THE SITE, ADDITIONAL OR ALTERNATIVE MEASURES SHALL BE IMPLEMENTED IMMEDIATELY.
4. THE CONTRACTOR SHALL MAINTAIN ALL ESC MEASURES IN EFFECTIVE WORKING CONDITION THROUGHOUT CONSTRUCTION. ESC MEASURES SHALL BE INSPECTED AT LEAST ONCE WEEKLY AND FOLLOWING SIGNIFICANT RAINFALL OR SNOWMELT EVENTS. DAMAGED OR INEFFECTIVE MEASURES SHALL BE REPAIRED OR REPLACED PROMPTLY.
5. NO CONSTRUCTION ACTIVITIES, EQUIPMENT, MATERIAL STORAGE, OR MACHINERY SHALL BE PERMITTED BEYOND THE APPROVED LIMITS OF DISTURBANCE, SILT FENCE, OR PROPERTY LIMITS.
6. ALL CONSTRUCTION VEHICLES SHALL ENTER AND EXIT THE SITE ONLY THROUGH THE APPROVED CONSTRUCTION ACCESS ROUTE(S) SHOWN ON THE ACCEPTED ESC PLAN.
7. THE CONTRACTOR SHALL IMPLEMENT APPROPRIATE DUST CONTROL MEASURES THROUGHOUT CONSTRUCTION.
8. ALL DISTURBED AREAS LEFT INACTIVE FOR MORE THAN 30 DAYS SHALL, SUBJECT TO WEATHER CONDITIONS, BE TEMPORARILY STABILIZED BY SEEDING, MULCHING, OR OTHER APPROVED METHODS.
9. EXISTING STREETS AND RIGHTS-OF-WAY SHALL BE KEPT FREE OF MUD, SEDIMENT, AND CONSTRUCTION DEBRIS. ANY MATERIAL TRACKED OR DEPOSITED ONTO THE PUBLIC RIGHT-OF-WAY SHALL BE REMOVED PROMPTLY AT THE CONTRACTOR' S EXPENSE.
10. ALL CONSTRUCTION AND MAINTENANCE ACTIVITIES SHALL BE CARRIED OUT TO PREVENT PETROLEUM PRODUCTS, CONCRETE, DEBRIS, SEDIMENT, OR OTHER DELETERIOUS SUBSTANCES FROM ENTERING THE MUNICIPAL DRAINAGE SYSTEM OR ADJACENT WATERCOURSES. REFUELLING AND MAINTENANCE ACTIVITIES SHALL BE CONDUCTED AWAY FROM DRAINAGE FEATURES AND WATERCOURSES.
11. ESC MEASURES SHALL REMAIN IN PLACE UNTIL THE CONTRIBUTING DISTURBED AREAS HAVE BEEN ADEQUATELY STABILIZED AND THEIR REMOVAL HAS BEEN AUTHORIZED BY THE DEVELOPER' S ENGINEER.



NOTES:
1. COMPOST FILTER SOCK FABRIC SHALL BE A MINIMUMOF 5 MI HOPE, PHOTODEGRADABLE MATERIAL.
2. STAKE MATERIALS WILL BE STANDARD 2" X 4 " WOOD OR EQUIVALENT METAL WITH A MINIMUM LENGTH Of 3 FEET.
3. MAXIMUM DRAINAGE AREA 15 I ACRE.

FILTER SOCK FOR MANHOLE PROTECTION



MUNICIPALITY: Township of Leeds and the Thousand Islands

ENGINEER'S STAMP: LICENSED PROFESSIONAL ENGINEER F. SHI 100065602 PROVINCE OF ONTARIO

CIVIL ENGINEER: LUBAN
7373 LIONSHEAD AVENUE, NIAGARA FALLS, ONTARIO, L2G7S4
TEL. 226-688-7928, EMAIL: FENG.SHI@LUBAN.CA

CLIENT: NORTHRIDGE HOMES LTD.

ARCHITECT:

SEDIMENT & EROSION PLAN
RESIDENTIAL DEVELOPMENT
12 GARDEN ST, LANSDOWNE, ON K0E 1L0

DESIGNED BY:	MG	SCALE:		CONTRACT No.	
CHECKED BY:	FS	HORIZONTAL:	1:250	SHEET	No 4 OF 6
DRAWN BY:	MG	VERTICAL:		C4 DRAWING No.	
DATE:	2026/08/10				

FILE LOCATION: D:\Google Drive\PROJECTS\2026-S575 Amritpal, 12 Garden St, Lansdowne\07 Drawings\C4_EROSION.dwg

DATE PLOTTED: 8/9/2026 10:15:21 PM

Appendix G Email Exchange, Civil Engineering For 12 Garden St

feng.shi@hotmail.ca

From: Kyle Peel <Planner@townshipleeds.on.ca>
Sent: Monday, June 22, 2026 4:39 PM
To: FENG SHI
Cc: Dave Rai; Marnie Venditti
Subject: RE: Civil engineering for 12 Garden St
Attachments: 23-054 - Servicing Capacity Allocation Policy.pdf

Hi Feng,

There has been limited development in Lansdowne since the publishing of that report, so those numbers would remain applicable. As such, we would have capacity for the proposed development at 12 Garden St.

The Township does have a servicing capacity allocation policy (attached), which requires applicants submit an application/letter detailing their request. This should include:

- The type and number of ERUs being requested
- Summary of the timeline for any approvals under the Planning Act
- Staging of development.

This can be submitted in the form of a letter, which we will review concurrently with any other application materials.

Best,

Kyle Peel, MCIP RPP
Planner
Township of Leeds and the Thousand Islands

P.O. Box 280, 1233 Prince Street
Lansdowne, ON K0E 1L0

613.659.2415 ext. 205 or 1.866.220.2327
Fax: 613.659.3619
After Hours Emergency: 1.855.961.7018

Stay up to Date by Subscribing to TLTI News

From: FENG SHI <feng.shi@hotmail.ca>
Sent: June 22, 2026 12:15 PM

To: Kyle Peel <Planner@townshipleeds.on.ca>
Cc: Dave Rai <dave@northridgehomes.ca>; Marnie Venditti <directorplanning@townshipleeds.on.ca>
Subject: RE: Civil engineering for 12 Garden St

External sender <feng.shi@hotmail.ca>
Make sure you trust this sender before taking any actions.

Kyle,

Thank you for sharing the Lansdowne Assessment Update Memorandum. I have reviewed the report.

Based on the 2022 assessment, the wastewater treatment plant and sanitary servicing system were identified as having very limited remaining reserve capacity at that time. As the report is now several years old, could you please advise on the current uncommitted reserve capacity and sanitary allocation status of the Lansdowne Wastewater Treatment System?

In addition, could you confirm whether any wastewater treatment capacity or sanitary allocation has been reserved or allocated for the 4 Garden Street property?

Thank you for your assistance.

Feng Shi, P.Eng. I Principal Engineer
LUBAN
Luban Engineering Ltd.
Land Development, Civil Engineering
M.226-688-7928

From: Kyle Peel <Planner@townshipleeds.on.ca>
Sent: Monday, June 22, 2026 10:02 AM
To: FENG SHI <feng.shi@hotmail.ca>; Marnie Venditti <directorplanning@townshipleeds.on.ca>
Cc: Dave Rai <dave@northridgehomes.ca>
Subject: RE: Civil engineering for 12 Garden St

Morning Feng,

Please find attached some additional information for your consideration.

Best,

Kyle Peel, MCIP RPP
Planner
Township of Leeds and the Thousand Islands

P.O. Box 280, 1233 Prince Street
Lansdowne, ON K0E 1L0

613.659.2415 ext. 205 or 1.866.220.2327
Fax: 613.659.3619
After Hours Emergency: 1.855.961.7018

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From: FENG SHI <feng.shi@hotmail.ca>
Sent: June 12, 2026 5:11 PM
To: Marnie Venditti <directorplanning@townshipleeds.on.ca>
Cc: Dave Rai <dave@northridgehomes.ca>; Kyle Peel <Planner@townshipleeds.on.ca>
Subject: RE: Civil engineering for 12 Garden St

Marnie,

I have reviewed the as-built drawings you provided. I am not sure whether the Town will require a downstream sanitary sewer capacity analysis for the proposed 4-storey, 39-unit condominium development.

If such an analysis is required, the Lansdowne sewage drawings alone may not provide sufficient information. The drawings show the sewer sizes, but they do not include pipe slopes, design flows, contributing population, or other data needed to assess the downstream sanitary sewer capacity.

Could you please help obtain this information from the Town? A sanitary sewer design sheet, sewer profile drawings, or any available sewer design records would be very helpful for completing the capacity assessment.

Best Regards!

Feng Shi, P.Eng. I Principal Engineer
LUBAN
Luban Engineering Ltd.
Land Development, Civil Engineering

M.226-688-7928

From: Marnie Venditti <directorplanning@townshipleeds.on.ca>
Sent: Friday, June 12, 2026 12:15 PM
To: FENG SHI <feng.shi@hotmail.ca>
Cc: Dave Rai <dave@northridgehomes.ca>; Kyle Peel <Planner@townshipleeds.on.ca>
Subject: RE: Civil engineering for 12 Garden St

Good Afternoon Feng,

Please find attached the drawings for Lansdowne water and sanitary. These are existing drawings. I have not been able to get the proposed upgrades from JL Richards but wanted to get this information to you to start. I have also included links below to our site plan control guidelines and municipal design criteria.

If you require any additional information please let us know.

marnie

Microsoft Word - Site Plan Guidelines and Application - December 2021
Microsoft Word - Municipal Design Criteria and Standards -December 2021

Marnie Venditti
Acting Chief Administrative Officer
Township of Leeds and the Thousand Islands

P.O. Box 280, 1233 Prince Street
Lansdowne, ON K0E 1L0

613.659.2415 ext. 212 or 1.866.220.2327
Fax: 613.659.3619
After Hours Emergency: 1.855.961.7018

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Appendix H Fire Hydrant Flow Test

LHS INC.

P.O. Box 712 Cobourg ON K9A 4R5
905-377-0715 / 1-866-622-4022
Email: info@lhsinc.com

Client	Lucan Engineering Ltd. 7373 Lionshead Avenue Niagara Falls	**Site**	12 Garden St, Lansdowne
		Site Contact **Phone**	

FIRE FLOW TEST

Fire Flow Date **July 27, 2026 - 3:11 pm**
Site **12 Garden St, Lansdowne**
Static Hydrant **12 Garden St**
Flow Hydrant **Corner of king St**

Hydrant Colours

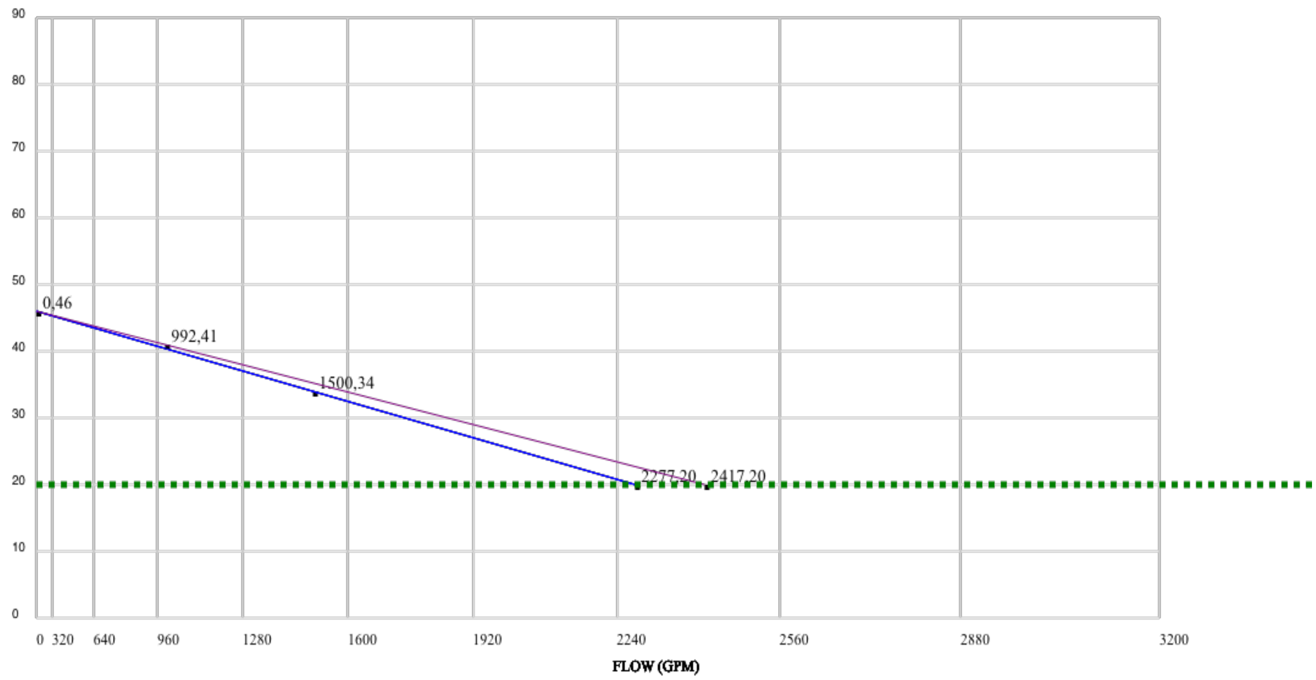
RED - C	0-500
ORANGE - B	500-1000
GREEN - A	1000-1500
BLUE - AA	>1500

Single Port

Static	46 psi
Residual 1	41 psi
Flow	35 psi
Observed	**992 US GPM** 826 IMP GPM 3756 L / MIN
Projected @ 20psi	**2417 US GPM** 2013 IMP GPM 9149 l/min.

Two Port

Static	46 psi
Residual 2	34 psi
Flow 2 (x2)	20 psi
Observed	**1500 US GPM** 1249IMP GPM 5679 L / MIN
Projected @ 20psi	**2277 US GPM** 1896 IMP GPM 8619 l/min.



Appendix I Fire Demand and Fire Main Hydraulic Calculations

Fire Flow Calculation based on Fire Underwriters Survey

(*) Plug data only on the yellow cells

Location: 12 Garden Street, Lansdowne, Ontario

1	Total Floor Area (m^2)	583	m²
	Storeys	2	
	The height of storey	7.00	m

Construction Coefficient

Type	Coefficient	
Type V	1.5	check building type

$$F = 220C\sqrt{A}$$ 7,968 L/min

Round to nearest 1,000 L/min: 8,000 L/min

ConstructionType: Type V, Type IV-A, Type IV-B, Type IV-C, Type IV-D, Type III, Type II, Type I

2 Occupancy factor

Type		Factor
Combustible	0	0%

Non-Combustible, Limited Combustible, Combustible, Free Burning, Rapid Burning

NFF adjusted for occupancy: 8,000 L/min

3	Sprinkler adjustment	-	0% (max. 30%)	A maximum of 30% credit if complete automatic sprinkler
	Sprinkler flow credit	-	0%	Additional credit of up to 10% may be granted if the water supply is standard for both the system and fire department hose lines required.
		-	0%	Additional 10% credit for fully supervised system

4 Exposure Charge

	Separation (m)	Charge	L/H ratio	Unprotected Openings
N	100.0	0%		
S	100.0	0%		
E	42.0	0%		
W	100.0	0%		

L/H Ratio : 81.2 Exterior wall is 1hr Rating (no unprotected opening) - North Can be Type III-IV(no openings)
L/H Ratio : 81.2 Exterior wall is 1hr Rating (no unprotected opening) - South Can be Type III-IV(with openings)
over 30m separation so according to table 5 the Max charge is 0%
L/H Ratio: 38 Exterior wall is 1hr Rating (with unprotected openings) - West can be Type III-IV(with openings)

Separation: 0-3m, 3.1-10m, 10.1-20m, 20.1-30m, >30m

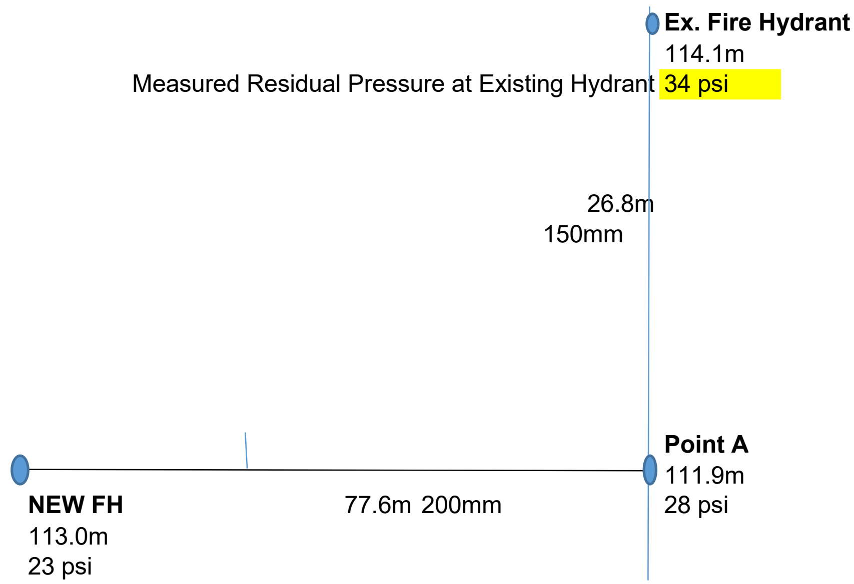
Exposure adjustment: 0% — Total percentage shall be the sum of the percentage for all sides, but shall not exceed 75%

Exposure flow debit: - L/min

5	NFF	8,000	L/min
	NFF check	8,000	The fire flow shall not exceed 45,000 L/min, nor less than 2,000 L/min
	Round to nearest 1,000 L/min	8,000	L/min
	or	133	L/s
	or	2,114	GPM
	Available FF of resid.@20psi	3,136 GPM	198 L/s

Pressure pipe calcualtion $Q = C(\frac{HD^{4.87}}{10.675L})^{\frac{1}{1.852}}$

Design Flow Q 0.1350 m³/s



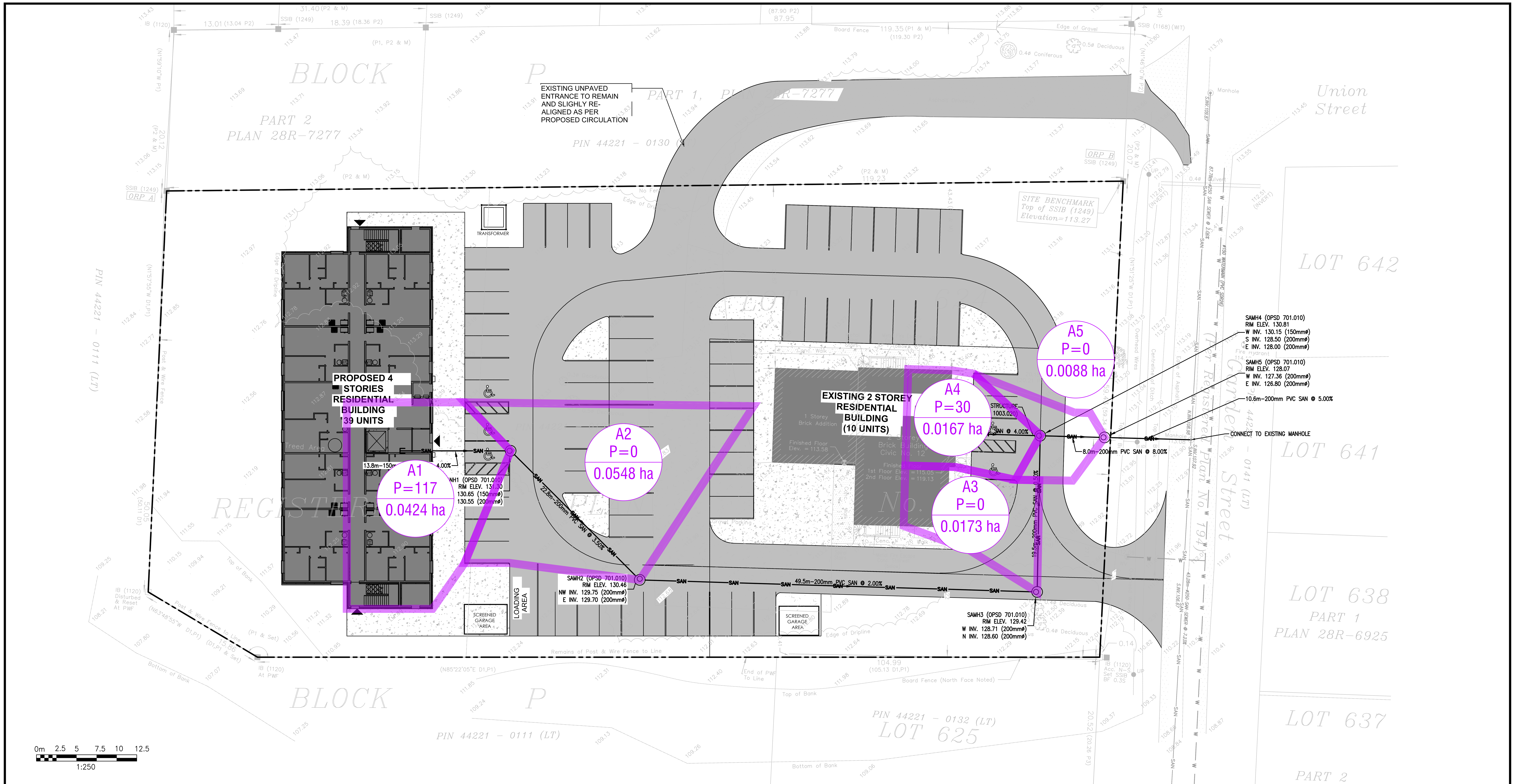
Point A

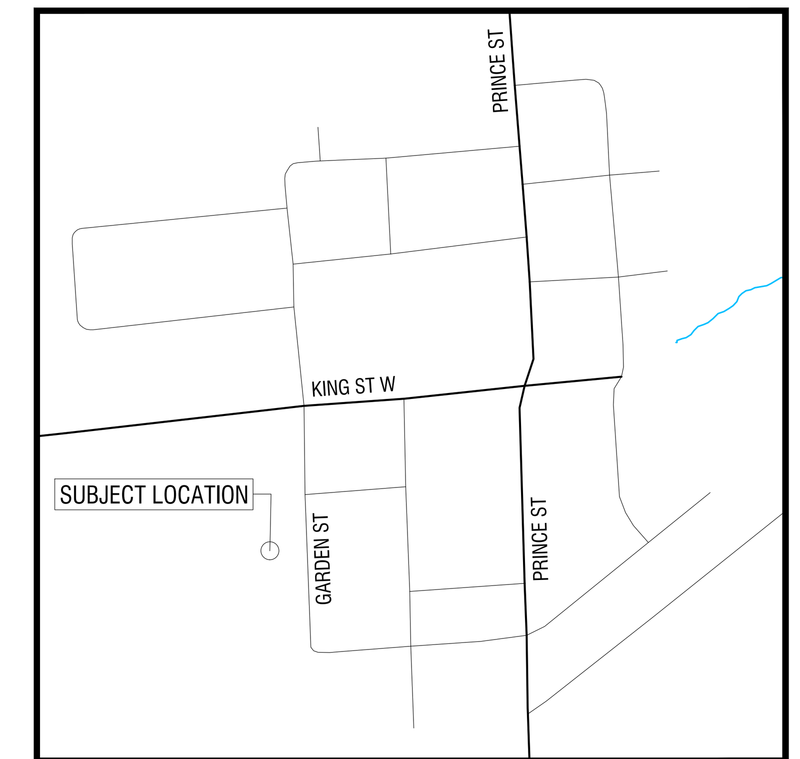
Design Flow	0.135	m³/s	
C	150		
Head loss	6.73	m	
Pipe diameter	0.15	m	
Distance	26.8m	m	
Velosity	7.64	m/s	
		k	head loss
Tee	0	0.4	0.00m
Valves	0	0.17	0.00m
45 bends	0	0.35	0.00m
90 bends	0	0.75	0.00m
total head loss			6.73m

Point B

Design Flow	0.135	m³/s	
C	150		
Head loss	1.62	m	
Pipe diameter	0.25	m	
Distance	77.6m	m	
Velosity	2.75	m/s	
		k	head loss
Tee	2	0.4	0.31m
Valves	2	0.17	0.13m
45 bends	1	0.35	0.14m
Reducer	1	0.2	0.08m
total head loss			2.27m

Appendix J Sanitary Sewer Drainage Area Plan





KEYPLAN

ELEVATION NOTE

- ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE HT2_0 GEOID MODEL BEING A PRODUCT OF THE GEODETIC SURVEY DIVISION (GSD) OF NATURAL RESOURCES CANADA, DERIVED FROM RTN OBSERVATIONS. THE ELEVATIONS ARE REFERRED TO A SITE BENCHMARK BEING THE TOP OF SSIB (1249) AT THE SOUTHEAST CORNER OF PART 1, 28R-7277 HAVING AN ELEVATION OF 113.27m.

BEARING NOTE:

- BEARINGS ARE UTM GRID, DERIVED FROM A PORTION OF THE SOUTHERLY LIMIT OF PARTS 1 & 2, (P2) HAVING A BEARING OF N84°50'35"E UTM ZONE 18 (75' WEST LONGITUDE) NAD83 (CSRS) (2010) AND BEING DESIGNATED HEREON AS "REFERENCE BEARING".
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- DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996688
- DISTANCES AND ELEVATIONS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

REV.	DATE	DESCRIPTION	BY
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0	2026/08/10	FOR BUILDING PERMIT	FS

MUNICIPALITY: Township of Leeds and the Thousand Islands

ENGINEER'S STAMP: LICENSED PROFESSIONAL ENGINEER F. SHI 100065602 PROVINCE OF ONTARIO

CIVIL ENGINEER: LUBAN
7373 LIONSHEAD AVENUE, NIAGARA FALLS, ONTARIO, L2G7S4
TEL. 226-688-7928, EMAIL: FENG.SHI@LUBAN.CA

CLIENT: NORTHRIDGE HOMES LTD.

ARCHITECT:

SAN SEWER DRAINAGE AREA PLAN

RESIDENTIAL DEVELOPMENT

12 GARDEN ST, LANSDOWNE, ON K0E 1L0

DESIGNED BY: MG	SCALE:	CONTRACT No.	
CHECKED BY: FS	HORIZONTAL: 1:250	SHEET No - OF -	
DRAWN BY: MG	VERTICAL:	C7 DRAWING No.	
DATE: 2026/08/10			

FILE LOCATION: D:\Google Drive\PROJECTS\2026-S575 Amritpal, 12 Garden St, Lansdowne\07 Drawings\C2,3_C3D_SERVICING, GRADING_20260804.dwg

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Appendix K Sanitary Sewer Design Sheet

SANITARY SEWER DESIGN SHEET(METRIC)
12 GARDEN ST, LANSDOWNE, ON K0E 1L0

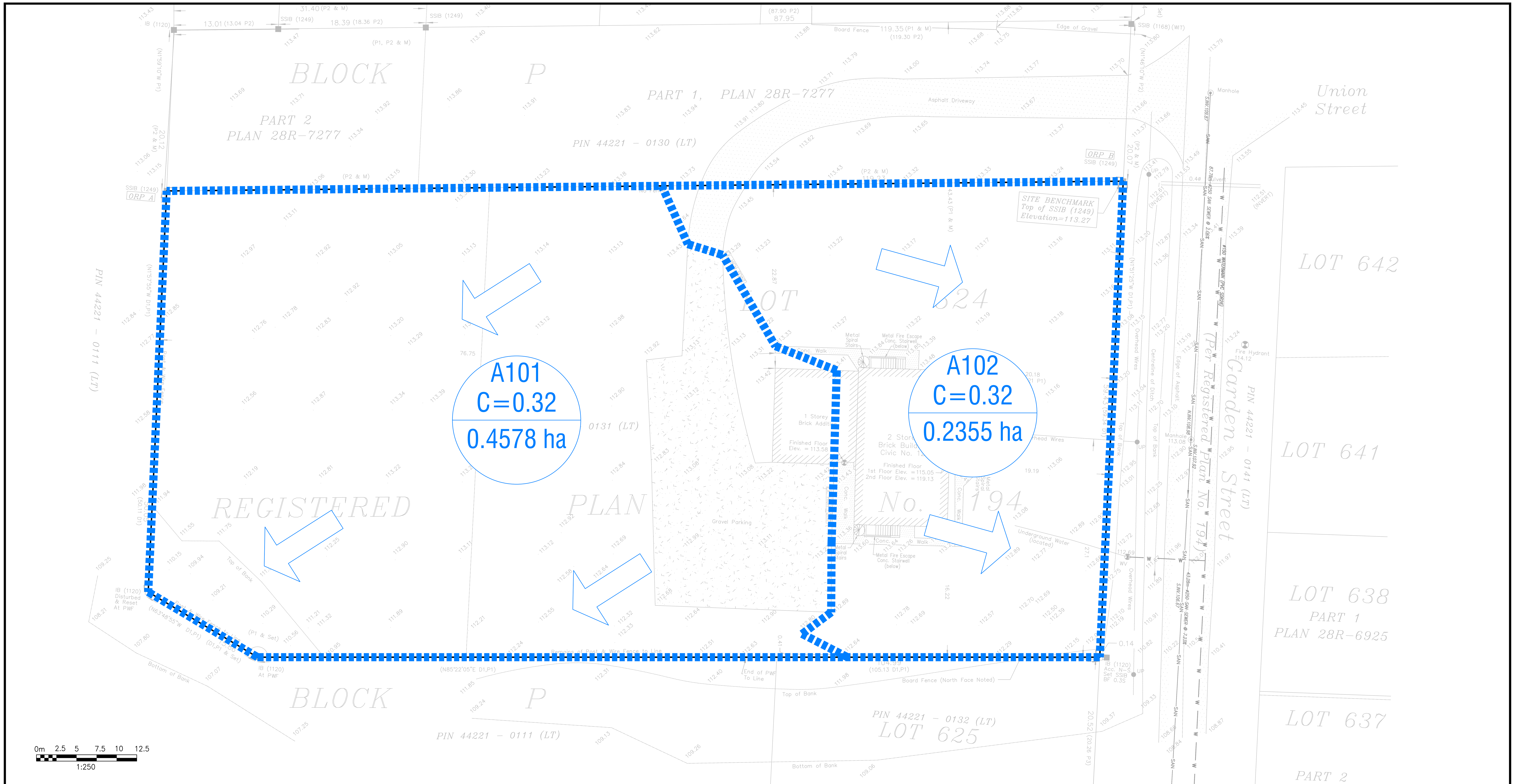
Infiltration Factor (l/s/ha): 0.14
Under Development Factor: 1.1
Litres/Person/Day: 350

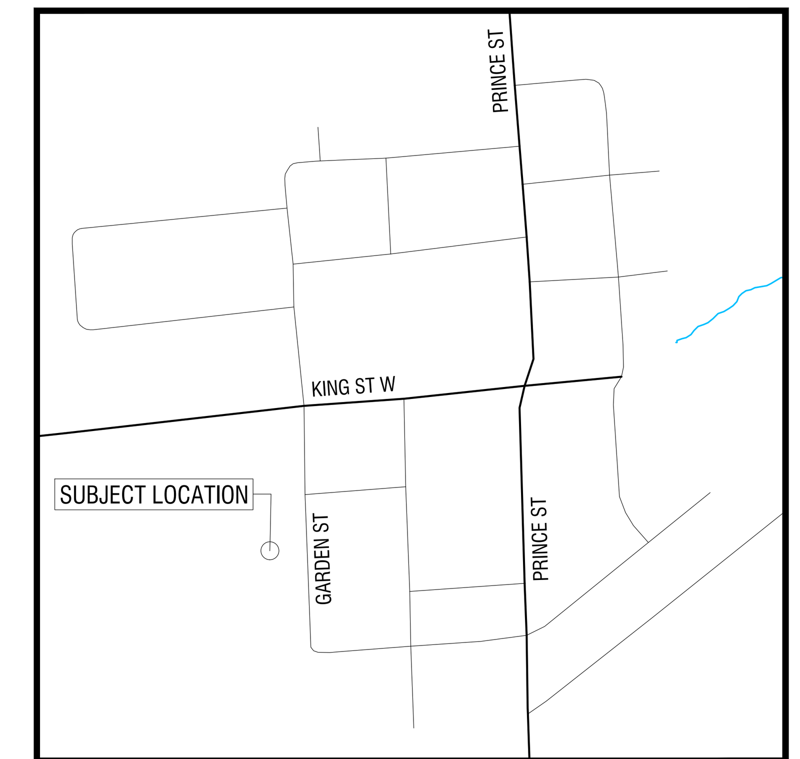
Maximum Velocity 0.60 m/s
Minimum Velocity 3.00 m/s

LOCATION			COMMERCIAL		POPULATION		DESIGN FLOW				PIPE DATA								PROFILE	
AREA ID.	MANHOLES		AREA	POP. PER Ha	INCRES. POP.	ACCUM. POP.	PEAKING FACTOR	POP. FLOW	PEAK Infiltration FLOW	PEAK FLOW	DIA.	SLOPE	n	VEL.	CAPACITY	LENGTH	FALL IN SEWER	MH DROP	UPSTREAM INVERT	DOWNSTREAM INVERT
	FROM	TO	(ha)				(Harmon)	(l/s)	(l/s)	(l/s)	(mm)	(%)		(m/s)	(l/s)	(m)	(m)		(m)	(m)
PROPOSEI	New Building	SAMH1	0.0424			117	4.22	2.00	0.0059	2.01	200	4.00%	0.013	2.09	65.6	13.80	0.55		131.20	130.65
	SAMH1	SAMH2	0.0548						0.0077	2.02	200	3.50%	0.013	1.95	61.4	22.80	0.80	0.10	130.55	129.75
	SAMH2	SAMH3	0.0173						0.0024	2.02	200	2.00%	0.013	1.48	46.4	49.50	0.99	0.05	129.70	128.71
	SAMH3	SAMH4							0.0000	2.02	200	0.50%	0.013	0.74	23.2	19.50	0.10	0.11	128.60	128.50
EXISTING	Existing Building	SAMH4	0.0167			30	4.35	0.53	0.0023	0.53	150	4.00%	0.013	1.72	30.5	12.40	0.50		130.65	130.15
PROPOSEI	SAMH4	SAMH5	0.0088						0.0012	2.55	200	8.00%	0.013	2.95	92.8	8.00	0.64	2.15	128.00	127.36
	SAMH5	EX SAMH								2.55	200	5.00%	0.013	2.33	73.3	10.60	0.53	0.56	126.80	126.27

Printing: 8/9/2026,12:42 AM

Appendix L Existing Stormwater Drainage Plan





KEYPLAN

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0	2026/08/10	FOR BUILDING PERMIT	FS

MUNICIPALITY: Township of Leeds and the Thousand Islands

ENGINEER'S STAMP: LICENSED PROFESSIONAL ENGINEER F. SHI 100065602 PROVINCE OF ONTARIO

CIVIL ENGINEER: LUBAN
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TEL. 226-688-7928, EMAIL: FENG.SHI@LUBAN.CA

CLIENT: NORTHRIDGE HOMES LTD.

ARCHITECT:

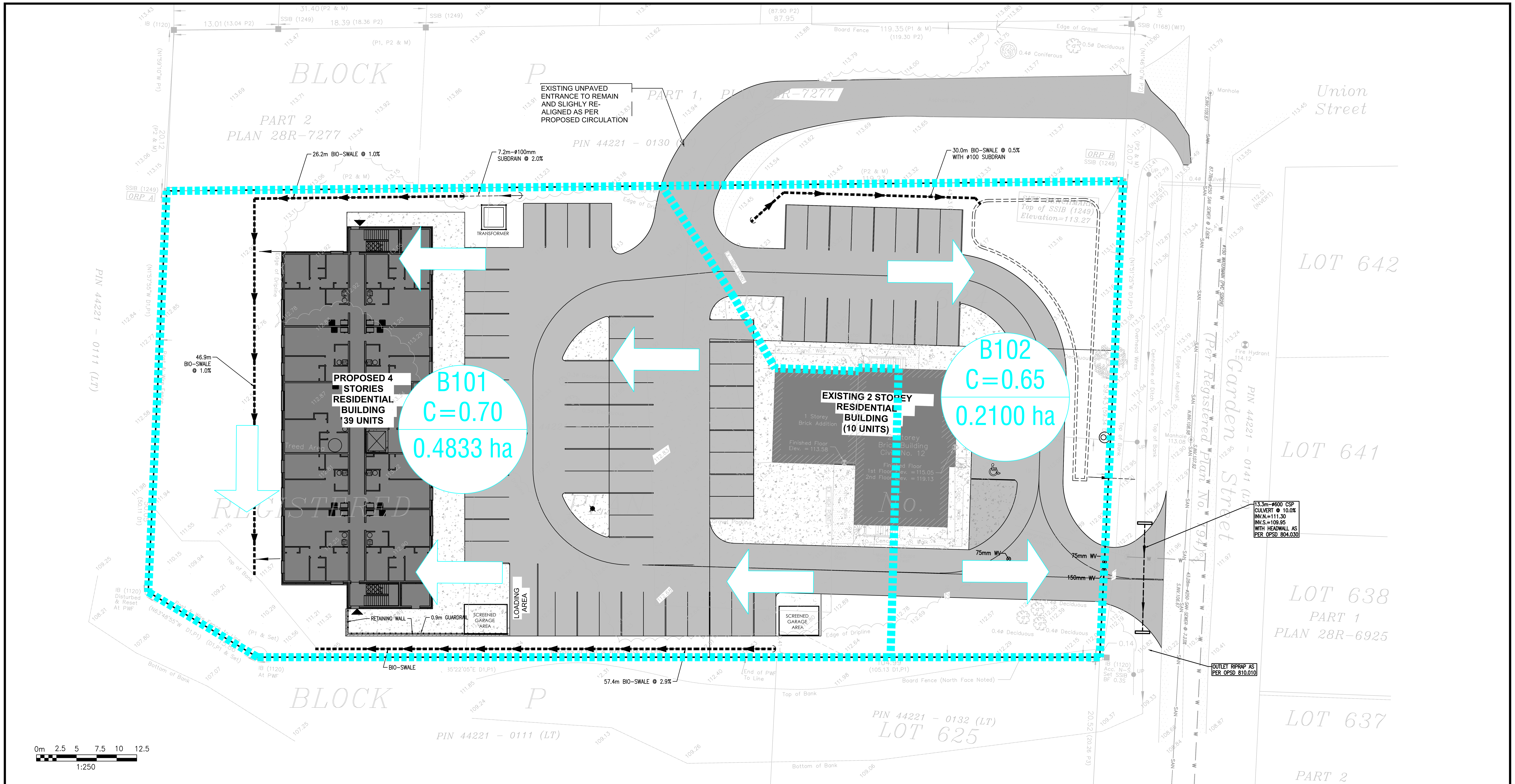
PRE-DEVELOPMENT DRAINAGE PLAN
RESIDENTIAL DEVELOPMENT
12 GARDEN ST, LANSDOWNE, ON K0E 1L0

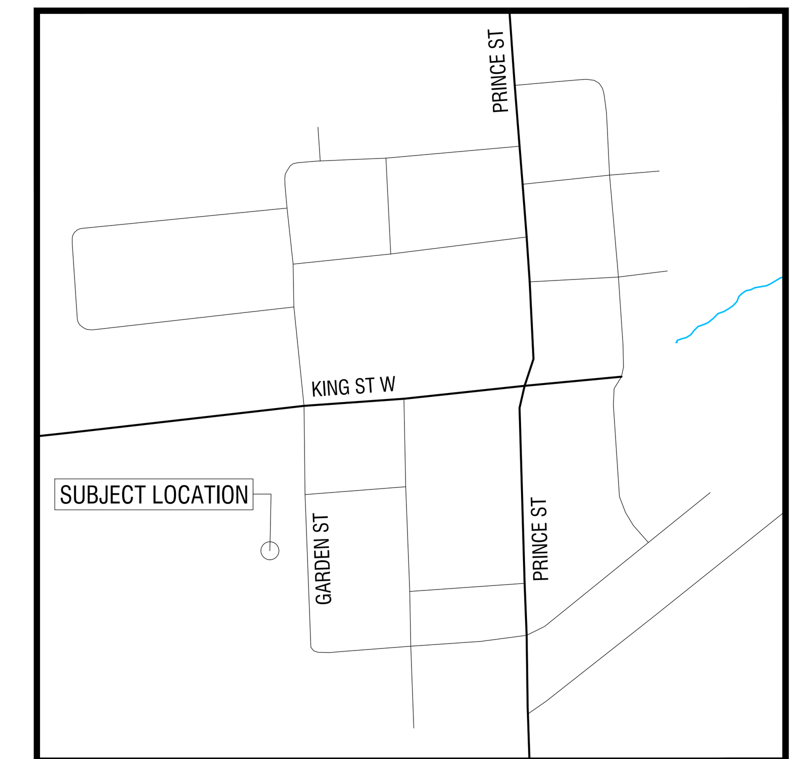
DESIGNED BY: MG	SCALE:	CONTRACT No.	
CHECKED BY: FS	HORIZONTAL: 1:250	SHEET No - OF -	
DRAWN BY: MG	VERTICAL:	C8	
DATE: 2026/08/10		DRAWING No.	

FILE LOCATION: D:\Google Drive\PROJECTS\2026-S575 Amritpal, 12 Garden St, Lansdowne\07 Drawings\C2,3_C3D_SERVICING, GRADING_20260804.dwg

DATE PLOTTED: 8/9/2026 9:44:37 PM

Appendix M Proposed Stormwater Drainage Plan





KEYPLAN

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CLIENT: NORTHRIDGE HOMES LTD.

ARCHITECT:

POST-DEVELOPMENT DRAINAGE PLAN

RESIDENTIAL DEVELOPMENT

12 GARDEN ST, LANSDOWNE, ON K0E 1L0

DESIGNED BY: MG	SCALE:		CONTRACT No.	
CHECKED BY: FS	HORIZONTAL: 1:250		SHEET No - OF -	
DRAWN BY: MG	VERTICAL:		C9	
DATE: 2026/08/10			DRAWING No.	

FILE LOCATION: D:\Google Drive\PROJECTS\2026-S575 Amritpal, 12 Garden St, Lansdowne\07 Drawings\C2,3_C3D_SERVICING, GRADING_20260804.dwg

DATE PLOTTED: 8/9/2026 10:00:28 PM

Appendix N SWM Required Storage Calculation

TIME minutes	2 Year INTENSITY mm/hr	Q 2 Year m^3/s	Control Q (pre) m^3/s	Q Stored m^3/s	STORAGE m^3
Tc => 5.0	97.8	0.129	0.101	0.028	**8.4**
10.0	67.6	0.089	0.101	-0.012	-7.1
15.0	52.8	0.070	0.101	-0.031	-28.3
20.0	43.8	0.058	0.101	-0.043	-51.9
25.0	37.7	0.050	0.101	-0.051	-77.0
30.0	33.3	0.044	0.101	-0.057	-102.9
35.0	29.9	0.039	0.101	-0.062	-129.4
40.0	27.2	0.036	0.101	-0.065	-156.4
45.0	25.0	0.033	0.101	-0.068	-183.8
50.0	23.2	0.031	0.101	-0.070	-211.4
55.0	21.7	0.029	0.101	-0.072	-239.2
60.0	20.3	0.027	0.101	-0.074	-267.3
65.0	19.2	0.025	0.101	-0.076	-295.4

12 GARDEN ST, LANSDOWNE

Site - Controlled

Area (ha)	0.693

Pre-Development

Area (ha)	0.693
$C_{composite}$	0.30
Tc (min)	10.00
Intensity mm/hr	67.6
Qp (m^3/s)	0.039
Qc	0.101

Post-Development

C	0.69
Time Incr.	5.0

Pre-development

Return Period	2 Year
Intensity	
i = a / (b + T)^b	(mm/hr)
where,	
a =	476
b =	3
c =	0.761
Q =	0.039

Post-Development

Return Period	2 Year
Intensity	
i = a / (b + T)^b	(mm/hr)
where,	
a =	476
b =	3
c =	0.761
Q =	0.089

DO NOT ERASE
Max.Storage
8.4

12 GARDEN ST, LANSDOWNE

Site - Controlled

	TIME minutes	5 Year INTENSITY mm/hr	Q 5 Year m^3/s	Control Q (pre) m^3/s	Q Stored m^3/s	STORAGE m^3
Tc =>	5.0	126.2	0.167	0.048	0.119	35.7
	10.0	89.3	0.118	0.048	0.070	**42.2**
	15.0	70.3	0.093	0.048	0.045	40.8
	20.0	58.5	0.077	0.048	0.030	35.7
	25.0	50.5	0.067	0.048	0.019	28.7
	30.0	44.6	0.059	0.048	0.011	20.4
	35.0	40.0	0.053	0.048	0.005	11.2
	40.0	36.4	0.048	0.048	0.001	1.3
	45.0	33.5	0.044	0.048	-0.003	-9.0
	50.0	31.0	0.041	0.048	-0.007	-19.7
	55.0	28.9	0.038	0.048	-0.009	-30.7
	60.0	27.2	0.036	0.048	-0.012	-42.0
	65.0	25.6	0.034	0.048	-0.014	-53.5

Area (ha)	0.693

Pre-Development

Area (ha)	0.693
$C_{composite}$	0.30
Tc (min)	10.00
Intensity mm/hr	89.3
Qp (m^3/s)	0.052
Uncontroled Flow	0.0045301
Qc	0.048

Post-Development

C	0.69
Time Incr.	5.0

Pre-development

Return Period	5 Year
Intensity	
i = a / (b + T)^b	(mm/hr)
where,	
a =	705
b =	4
c =	0.783
Q =	0.052

Post-Development

Return Period	5 Year
Intensity	
i = a / (b + T)^b	(mm/hr)
where,	
a =	705
b =	4
c =	0.783
Q =	0.118

DO NOT ERASE
Max.Storage
42.2

	TIME minutes	10 Year INTENSITY mm/hr	Q 10 Year m^3/s	Control Q (pre) m^3/s	Q Stored m^3/s	STORAGE m^3
Tc =>	5.0	149.4	0.197	0.056	0.141	42.3
	10.0	105.5	0.139	0.056	0.083	**49.9**
	15.0	82.9	0.109	0.056	0.053	48.0
	20.0	69.0	0.091	0.056	0.035	41.9
	25.0	59.4	0.078	0.056	0.022	33.5
	30.0	52.4	0.069	0.056	0.013	23.5
	35.0	47.1	0.062	0.056	0.006	12.5
	40.0	42.8	0.056	0.056	0.000	0.8
	45.0	39.3	0.052	0.056	-0.004	-11.5
	50.0	36.4	0.048	0.056	-0.008	-24.2
	55.0	34.0	0.045	0.056	-0.011	-37.4
	60.0	31.8	0.042	0.056	-0.014	-50.8
	65.0	30.0	0.040	0.056	-0.017	-64.5

12 GARDEN ST, LANSDOWNE

Site - Controlled

Area (ha)	0.693

Pre-Development

Area (ha)	0.693
$C_{composite}$	0.30
Tc (min)	10.00
Intensity mm/hr	105.5
Qp (m^3/s)	0.062
Uncontroled Flow	0.0045301
Qc	0.056

Post-Development

C	0.69
Time Incr.	5.0

Pre-development

Return Period	10 Year
Intensity	
i = a / (b + T)^b	(mm/hr)
where,	
a =	844
b =	4
c =	0.788
Q =	0.062

Post-Development

Return Period	10 Year
Intensity	
i = a / (b + T)^b	(mm/hr)
where,	
a =	844
b =	4
c =	0.788
Q =	0.139

DO NOT ERASE
Max.Storage
49.9

	TIME minutes	25 Year INTENSITY mm/hr	Q 25 Year m^3/s	Control Q (pre) m^3/s	Q Stored m^3/s	STORAGE m^3
Tc =>	5.0	170.9	0.248	0.072	0.176	52.8
	10.0	123.4	0.179	0.072	0.107	**64.2**
	15.0	98.0	0.142	0.072	0.070	63.0
	20.0	81.9	0.119	0.072	0.047	56.0
	25.0	70.7	0.103	0.072	0.030	45.7
	30.0	62.5	0.091	0.072	0.019	33.3
	35.0	56.2	0.082	0.072	0.009	19.5
	40.0	51.1	0.074	0.072	0.002	4.6
	45.0	46.9	0.068	0.072	-0.004	-11.1
	50.0	43.5	0.063	0.072	-0.009	-27.4
	55.0	40.5	0.059	0.072	-0.013	-44.2
	60.0	38.0	0.055	0.072	-0.017	-61.4
	65.0	35.8	0.052	0.072	-0.020	-79.0

12 GARDEN ST, LANSDOWNE

Site - Controlled

Area (ha)	0.693

Pre-Development

Area (ha)	0.693
$C_{composite}$	0.30
Tc (min)	10.00
Intensity mm/hr	123.4
Qp (m^3/s)	0.072
Uncontroled Flow	0.0045301
Qc	0.072

Post-Development

C	0.69
Time Incr.	5.0

Pre-development

Return Period	25 Year
Intensity	
i = a / (b + T)^b	(mm/hr)
where,	
a =	1086
b =	5
c =	0.803
Q =	0.072

Post-Development

Return Period	25 Year
Intensity	
i = a / (b + T)^b	(mm/hr)
where,	
a =	1086
b =	5
c =	0.803
Q =	0.163

DO NOT ERASE
Max.Storage
64.2

	TIME minutes	50 Year INTENSITY mm/hr	Q 50 Year m^3/s	Control Q (pre) m^3/s	Q Stored m^3/s	STORAGE m^3
Tc =>	5.0	191.7	0.304	0.088	0.216	64.7
	10.0	137.7	0.218	0.088	0.130	**78.2**
	15.0	109.0	0.173	0.088	0.085	76.2
	20.0	90.8	0.144	0.088	0.056	67.1
	25.0	78.3	0.124	0.088	0.036	54.1
	30.0	69.1	0.109	0.088	0.021	38.5
	35.0	61.9	0.098	0.088	0.010	21.3
	40.0	56.3	0.089	0.088	0.001	2.8
	45.0	51.6	0.082	0.088	-0.006	-16.7
	50.0	47.8	0.076	0.088	-0.012	-36.9
	55.0	44.5	0.071	0.088	-0.017	-57.7
	60.0	41.7	0.066	0.088	-0.022	-79.0
	65.0	39.3	0.062	0.088	-0.026	-100.7

12 GARDEN ST, LANSDOWNE

Site - Controlled

Area (ha)	0.693
Pre-Development	
Area (ha)	0.693
$C_{composite}$	0.30
Tc (min)	10.00
Intensity mm/hr	137.7
Qp (m^3/s)	0.080
Uncontroled Flow	0.0045301
Qc	0.088
Post-Development	
C	0.69
Time Incr.	5.0

Pre-development

Return Period	50 Year
Intensity	
i = a / (b + T)^b	(mm/hr)
where,	
a =	1252
b =	5
c =	0.815
Q =	0.080

Post-Development

Return Period	50 Year
Intensity	
i = a / (b + T)^b	(mm/hr)
where,	
a =	1252
b =	5
c =	0.815
Q =	0.182

DO NOT ERASE
Max.Storage
78.2

	TIME minutes	100 Year INTENSITY mm/hr	Q 100 Year m^3/s	Control Q (pre) m^3/s	Q Stored m^3/s	STORAGE m^3
Tc =>	5.0	211.3	0.349	0.101	0.248	74.3
	10.0	151.9	0.251	0.101	0.150	**89.8**
	15.0	120.2	0.198	0.101	0.097	87.6
	20.0	100.2	0.165	0.101	0.064	77.2
	25.0	86.4	0.143	0.101	0.042	62.3
	30.0	76.2	0.126	0.101	0.025	44.5
	35.0	68.4	0.113	0.101	0.012	24.7
	40.0	62.1	0.103	0.101	0.001	3.4
	45.0	57.0	0.094	0.101	-0.007	-18.9
	50.0	52.8	0.087	0.101	-0.014	-42.1
	55.0	49.1	0.081	0.101	-0.020	-65.9
	60.0	46.0	0.076	0.101	-0.025	-90.3
	65.0	43.4	0.072	0.101	-0.030	-115.2

12 GARDEN ST, LANSDOWNE

Site - Controlled

Area (ha)	0.693

Pre-Development

Area (ha)	0.693
$C_{composite}$	0.30
Tc (min)	10.00
Intensity mm/hr	151.9
Qp (m^3/s)	0.089
Qc	0.101

Post-Development

C	0.69
Time Incr.	5.0

Pre-development

Return Period	100 Year
Intensity	
i = a / (b + T)^b	(mm/hr)
where,	
a =	1377
b =	5
c =	0.814
Q =	0.089

Post-Development

Return Period	100 Year
Intensity	
i = a / (b + T)^b	(mm/hr)
where,	
a =	1377
b =	5
c =	0.814
Q =	0.201

DO NOT ERASE
Max.Storage
89.8

J.L. Richards
& Associates Limited
203-863 Princess Street
Kingston, ON Canada
K7L 5N4
Tel: 613 544 1424
Fax: 613 728 6012

MEMORANDUM

[redacted]

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 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 <u>Population Growth Estimates</u>

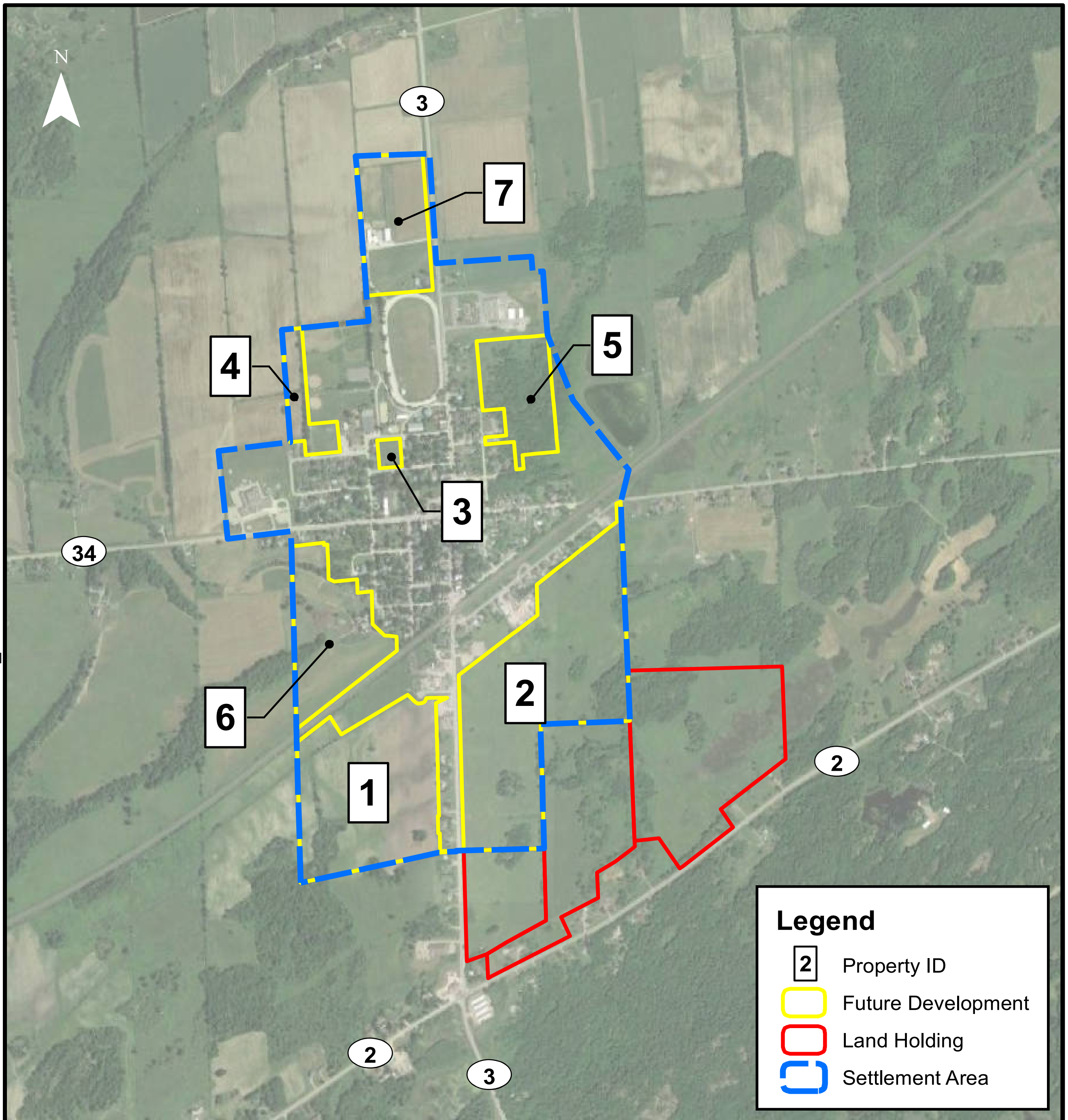
The existing serviced population for use in design calculations is 550 persons, as stated in the 2019 SNC-Lavalin Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study. Future growth projections were then based on the Township of Leeds and the Thousand Islands Staff Report No. 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

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 m^3/day (L/s)	Long Term m^3/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)

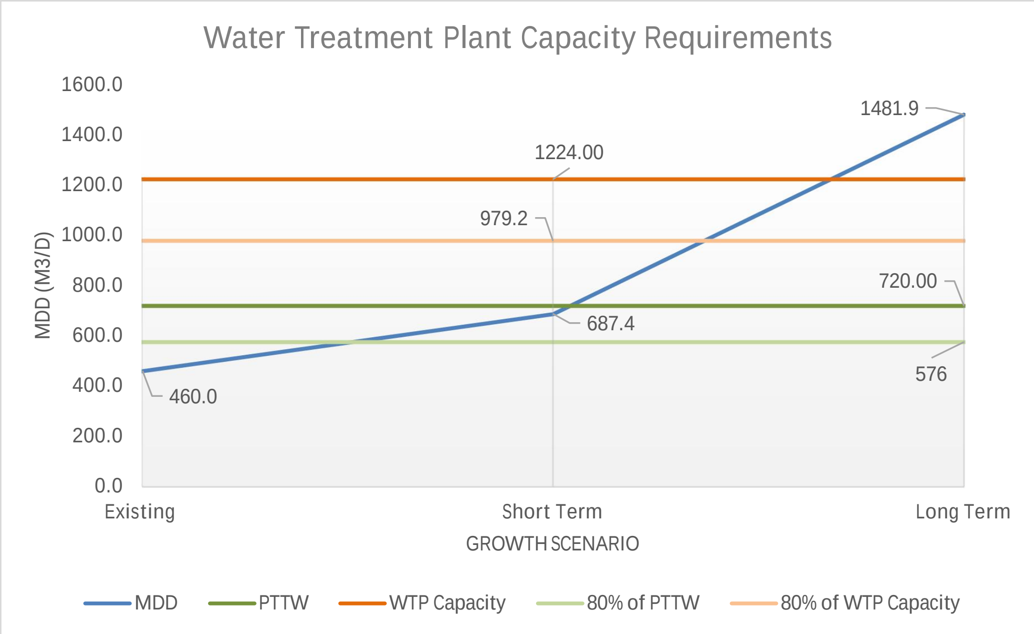
Based on the projected demand and the existing 2yr average MDD, the following table presents the MDD vs the plant capacity:

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

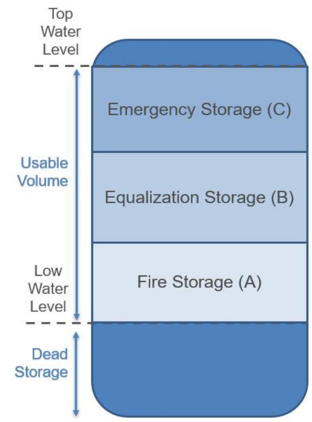
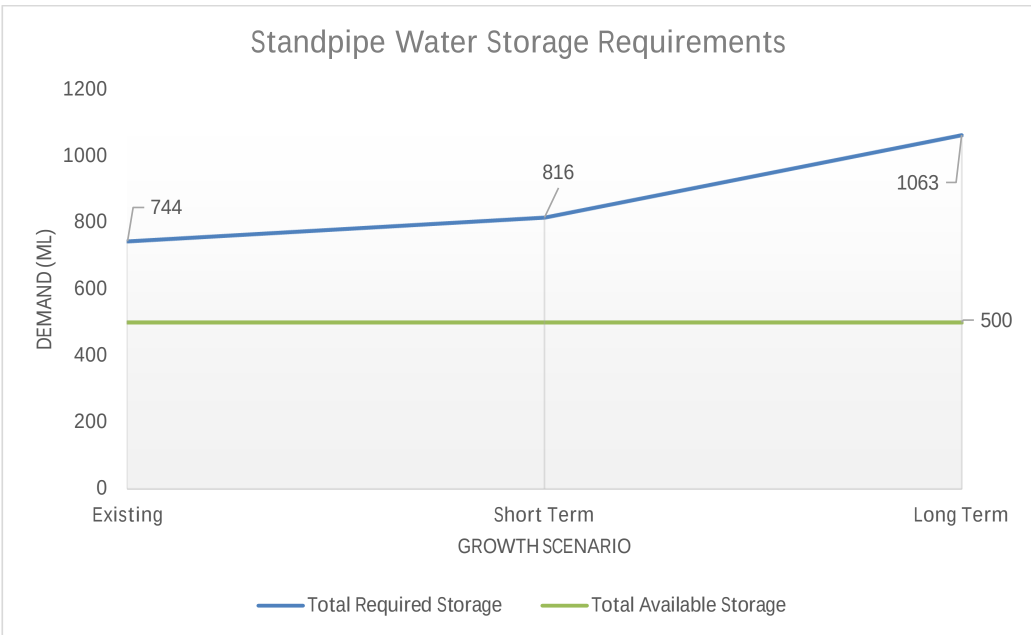


Figure 3: Standpipe Water Storage Requirements



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.

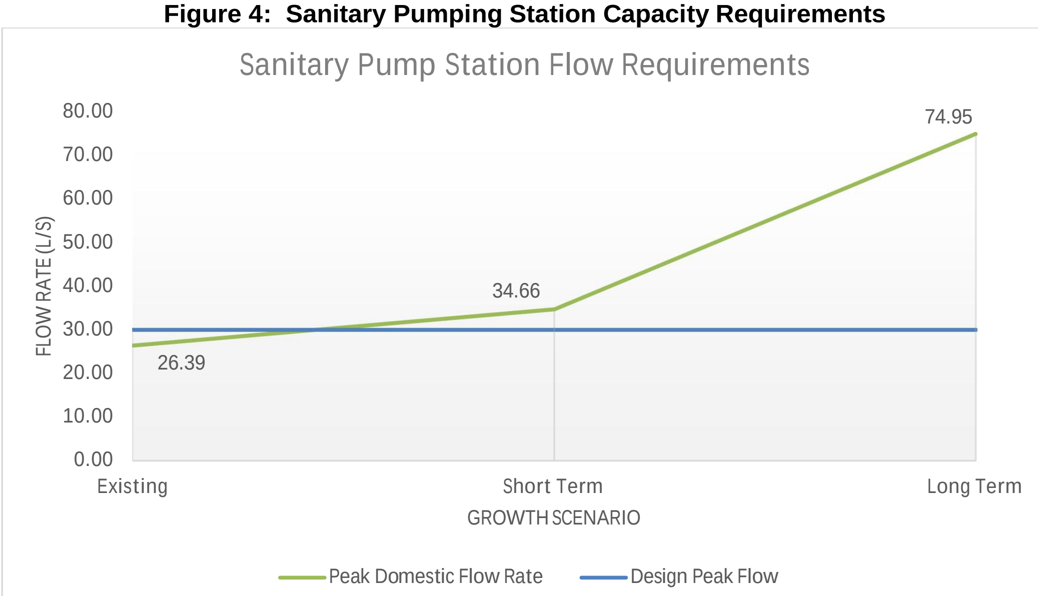
Note, the flow monitoring data that was completed during the 2019 SNC-Lavalin Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study was reviewed (Appended) to corelate the theoretical design sheets. Typically, it is expected that the theoretical values would be an order of magnitude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

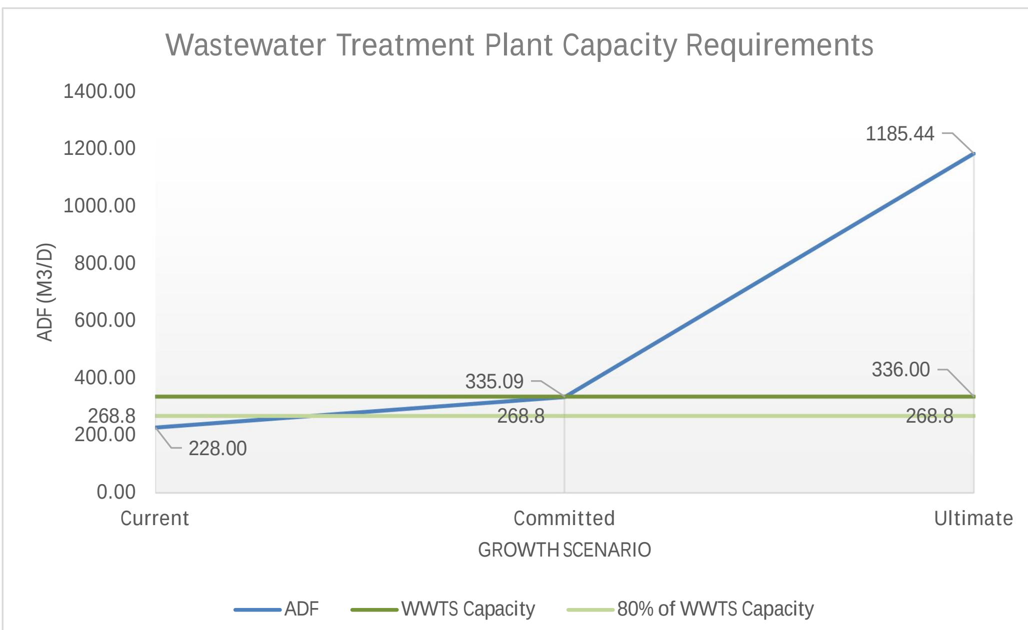
9.0 Sanitary Treatment Plant

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:

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

Matt Morkem, P. Eng
Senior Civil Engineer

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**	

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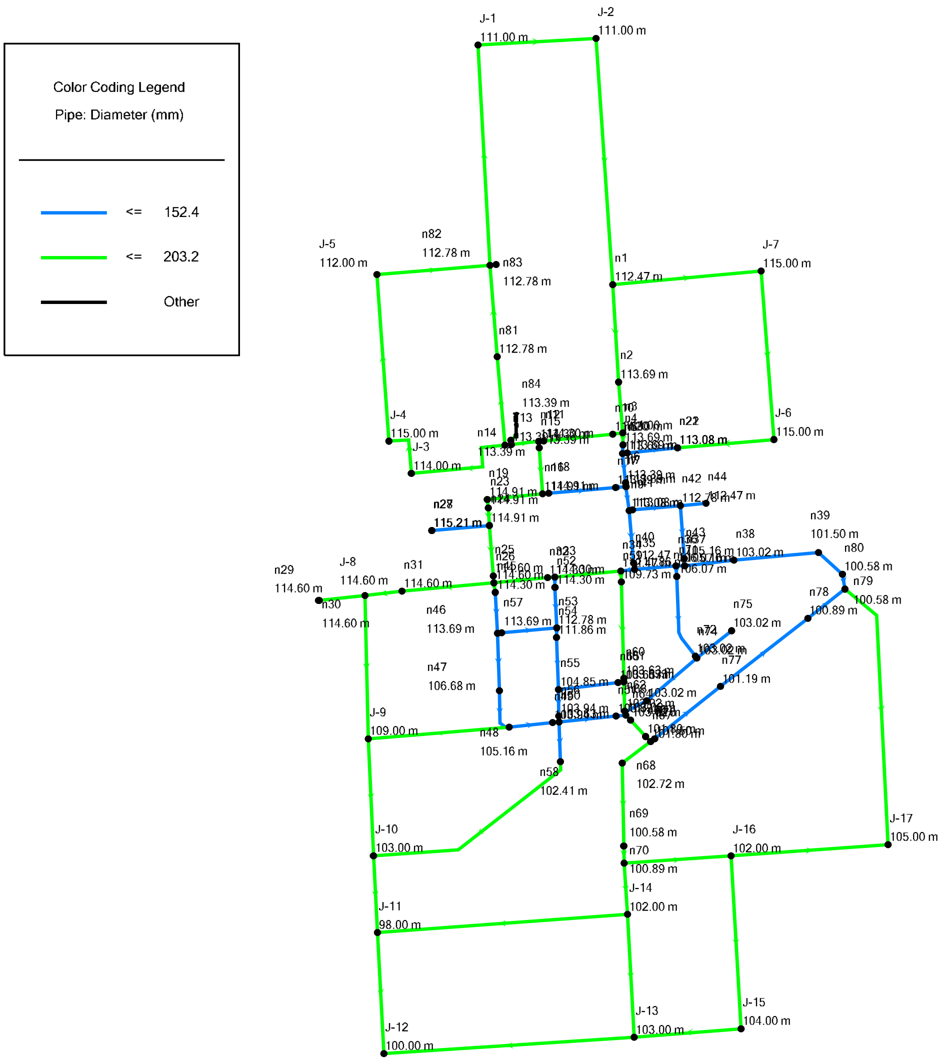
Lansdowne Water Model

Overall Schematic with Junction Labels and Elevations



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Lansdowne Water Model
Junction Labels and Elevations

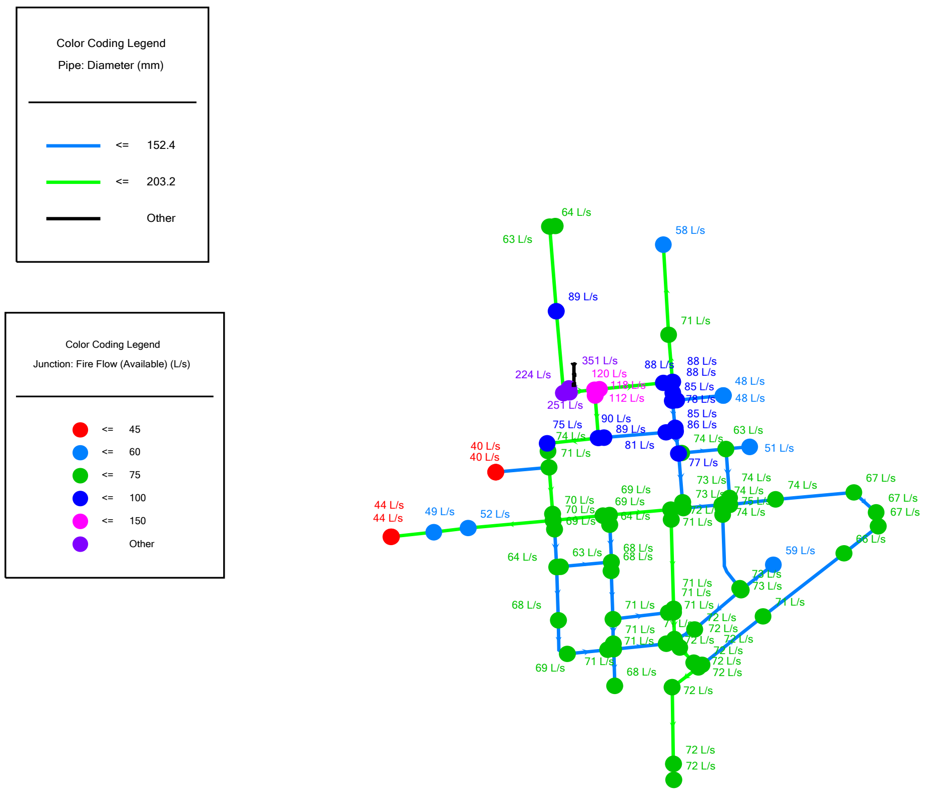
ID	Label	Elevation (m)
261	J-1	111.00
263	J-2	111.00
268	J-3	114.00
270	J-4	115.00
272	J-5	112.00
275	J-6	115.00
277	J-7	115.00
280	J-8	114.60
283	J-9	109.00
285	J-10	103.00
287	J-11	98.00
289	J-12	100.00
291	J-13	103.00
293	J-14	102.00
299	J-15	104.00
301	J-16	102.00
304	J-17	105.00
143	n1	112.47
142	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



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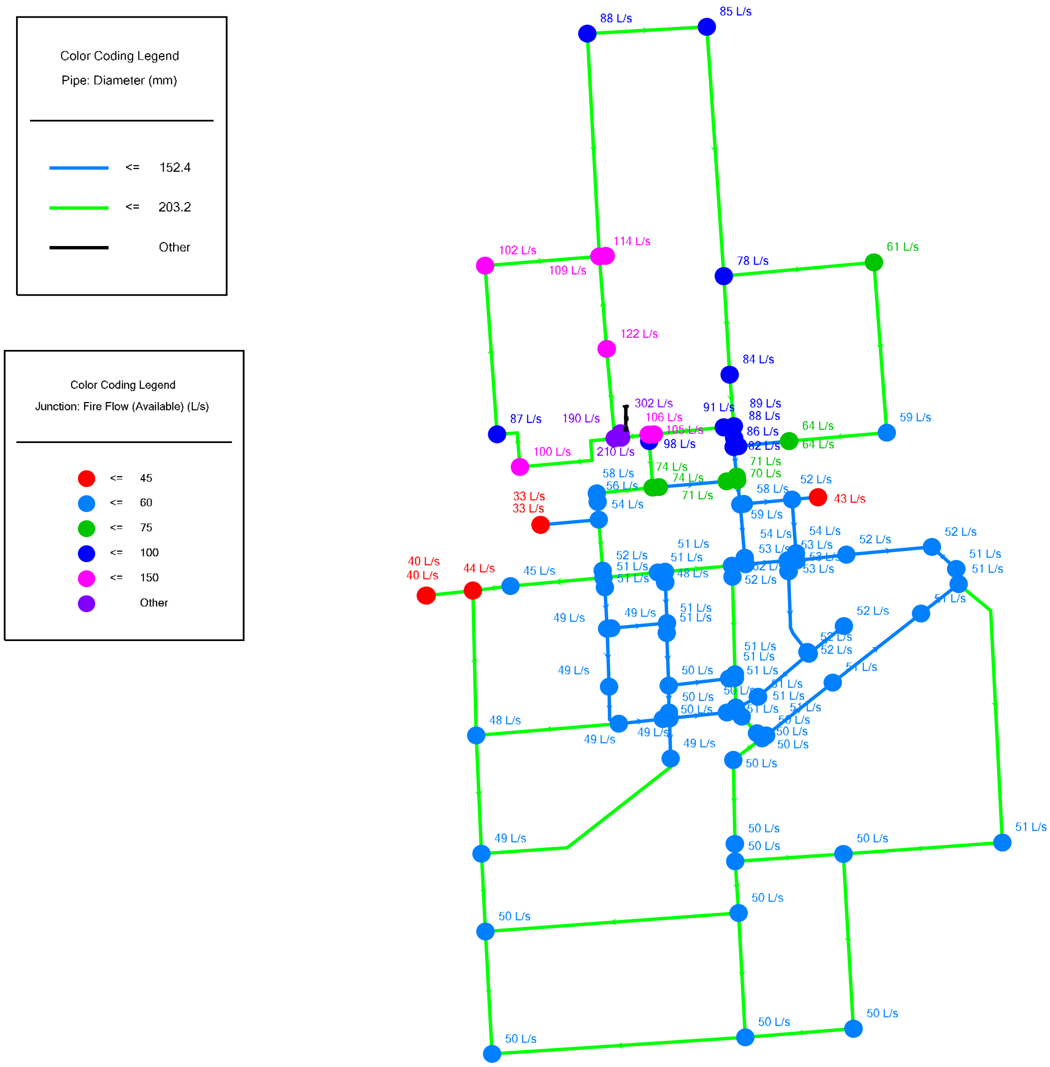
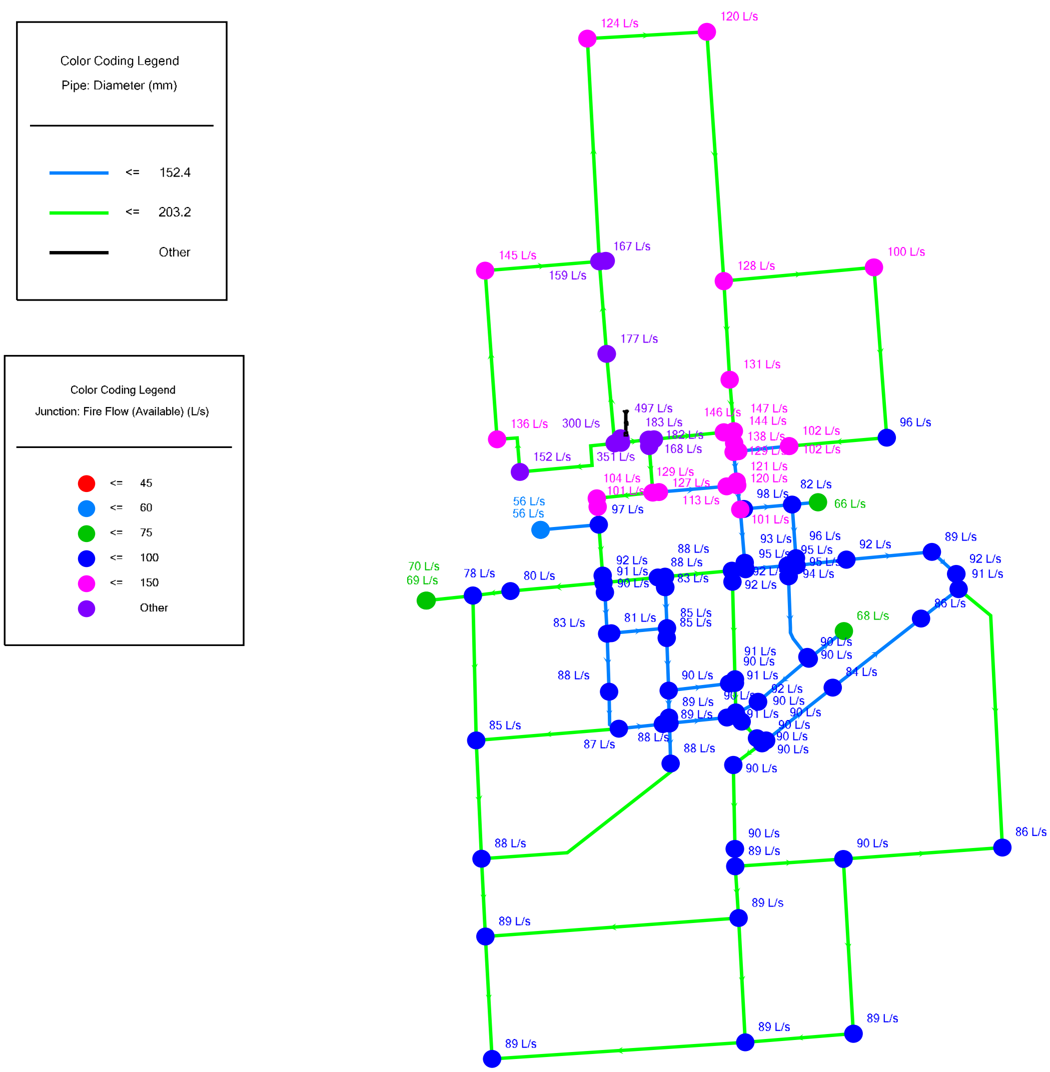
Lansdowne Water Model

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

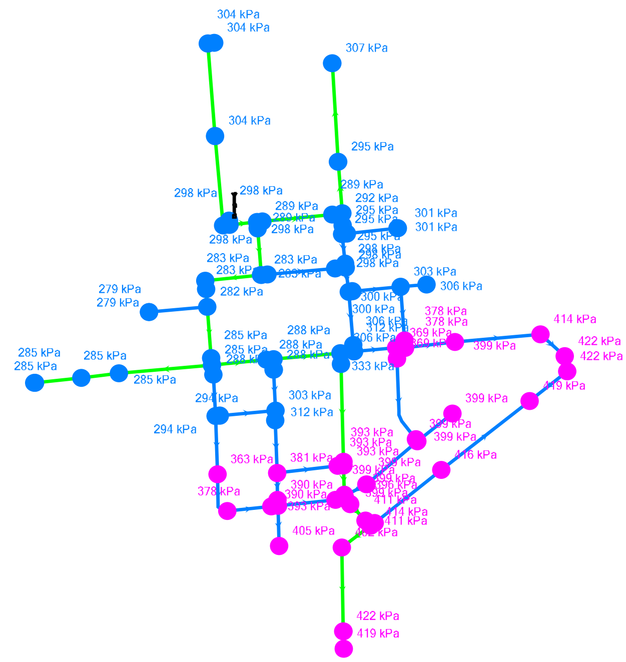
Pressures - Existing Peak Hour - Standpipe HGL 143.89m

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
(light blue)	<=	350
(magenta)	<=	480
(green)	<=	552
(blue)	<=	700
(purple)		Other



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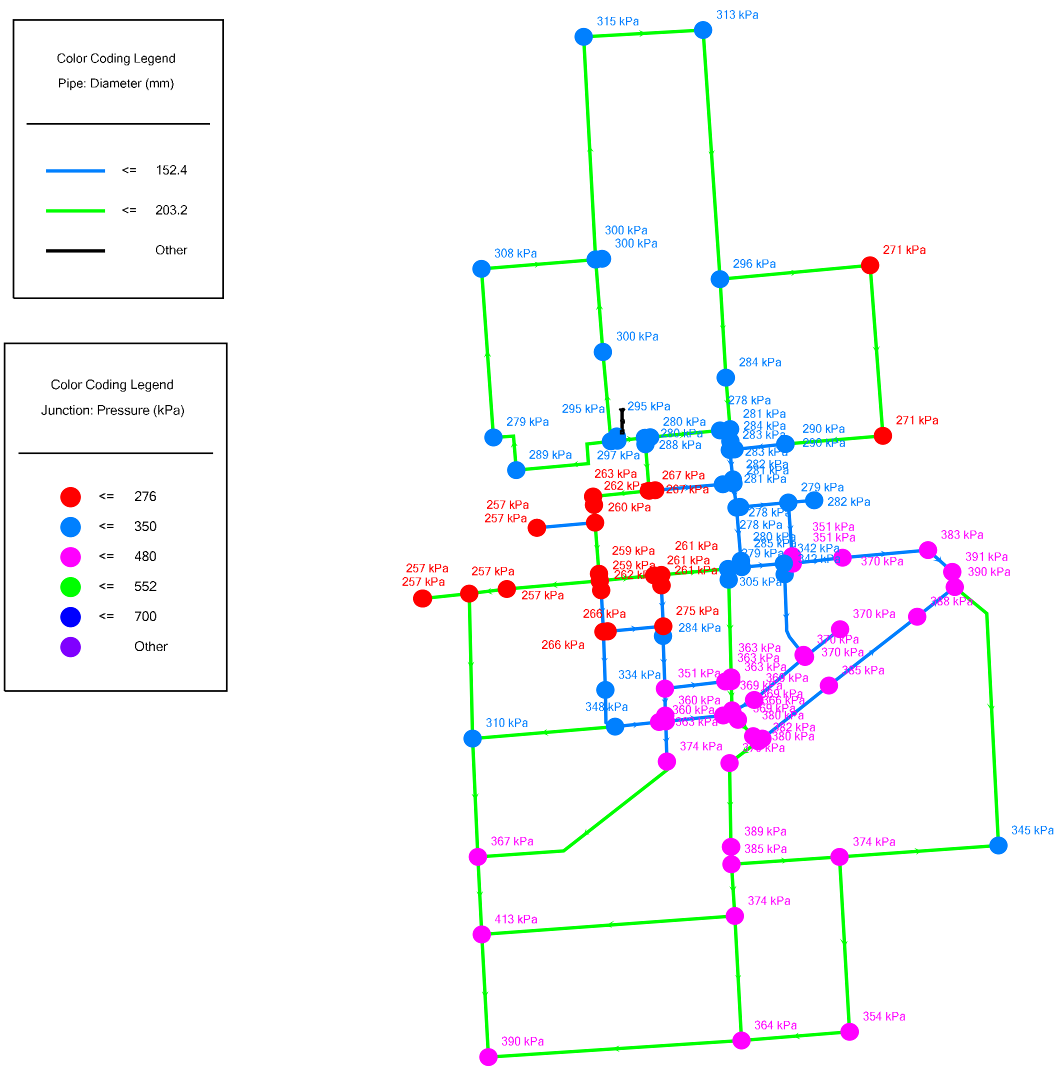
Lansdowne Water Model

Pressures - Future Peak Hour - Standpipe HGL 143.89m



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Lansdowne Water Model

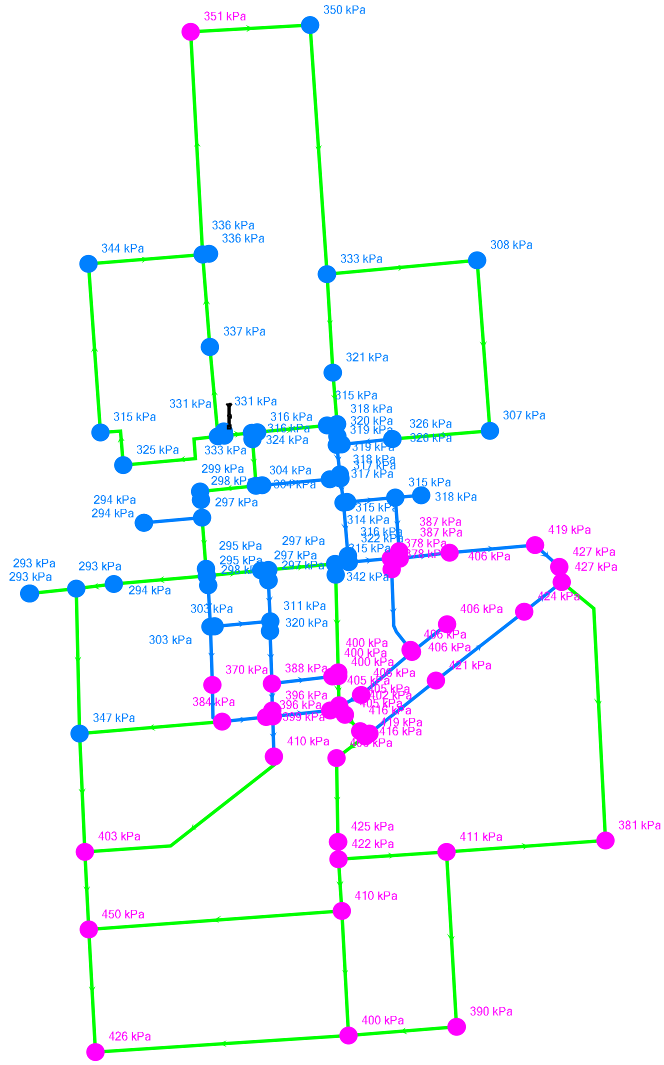
Pressures - Future Peak Hour - Standpipe HGL 147.60m

Color Coding Legend
Pipe: Diameter (mm)

<=	152.4
<=	203.2
	Other

Color Coding Legend
Junction: Pressure (kPa)

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



Appendix 2 – Wastewater Collection

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 FROM	MANHOLE TO	AREA No.	AREA Ha	CONTRIBUTING AREAS	POPULATION Ppha	POPULATION P	POPULATION 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)
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: 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	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

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DRAINAGE AREA DESCRIPTION																OUTLET PIPE DATA						
LOCATION	MANHOLE FROM	MANHOLE TO	AREA No.	AREA Ha	CONTRIBUTING AREAS	POPULATION Ppha	POPULATION P	POPULATION 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	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)
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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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

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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)
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
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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

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)
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