



## **Strewn Winery Redevelopment 1339 Lakeshore Road, Niagara-on-the-Lake, Ontario**

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Functional Servicing & Stormwater Management Brief

Initial Submission: May 15, 2026

Prepared for: 1724600 Ontario Limited  
Prepared by: R.V. Anderson Associates Limited



**Strewn Winery Redevelopment  
1339 Lakeshore Road  
Niagara-on-the-Lake, Ontario**

**Functional Servicing & Stormwater  
Management Brief**

**1724600 Ontario Limited**

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**RVA 268426**

**May 15, 2026**



**STREWN WINERY REDEVELOPMENT**  
**FUNCTIONAL SERVICING & STORMWATER MANAGEMENT BRIEF**  
**TABLE OF CONTENTS**

<b>1.0</b>	<b>INTRODUCTION</b> .....	<b>4</b>
<b>2.0</b>	<b>WATER SERVICING</b> .....	<b>6</b>
<b>3.0</b>	<b>SANITARY SERVICING</b> .....	<b>8</b>
<b>4.0</b>	<b>STORM SERVICING &amp; STORMWATER MANAGEMENT</b> .....	<b>9</b>
	<b>4.1</b> <b>Water Quantity</b> .....	10
	<b>4.2</b> <b>Water Quality</b> .....	11
	<b>4.3</b> <b>Environmental Regulatory Constraints</b> .....	13
<b>5.0</b>	<b>UTILITIES</b> .....	<b>14</b>
<b>6.0</b>	<b>CONCLUSION</b> .....	<b>14</b>
	<b>6.1</b> <b>Water</b> .....	14
	<b>6.2</b> <b>Sanitary</b> .....	15
	<b>6.3</b> <b>Storm</b> .....	15

**LIST OF TABLES**

Table 1.1 – Proposed Water Demand Summary
Table 3.1 – Sanitary Demand Summary
Table 4.1 – Runoff Coefficient
Table 4.2 – IDF Curve Equations
Table 4.3 – Peak Flow Rates

**APPENDICES**

APPENDIX A – Background Data and Information
APPENDIX B – Water Servicing
APPENDIX C – Sanitary Servicing
APPENDIX D – Storm Servicing and Stormwater Management
APPENDIX E – Civil Drawings

## 1.0 INTRODUCTION

1724600 Ontario Limited (the Owner) is proposing the redevelopment of a portion of the property located at the southwest corner of Lakeshore Road and Four Mile Creek Road in the Town of Niagara-on-the-Lake (the Town), with a municipal address of 1339 Lakeshore Road. The 3.95-hectare site is currently occupied by Strewn Winery. More than 50% of the property is presently occupied by vineyards, with the remainder consisting of landscaped areas, three (3) building structures, and asphalt/compacted granular parking and driveway areas. Refer to Figure 1.1 below for a site plan of the property dated January 31, 1997.

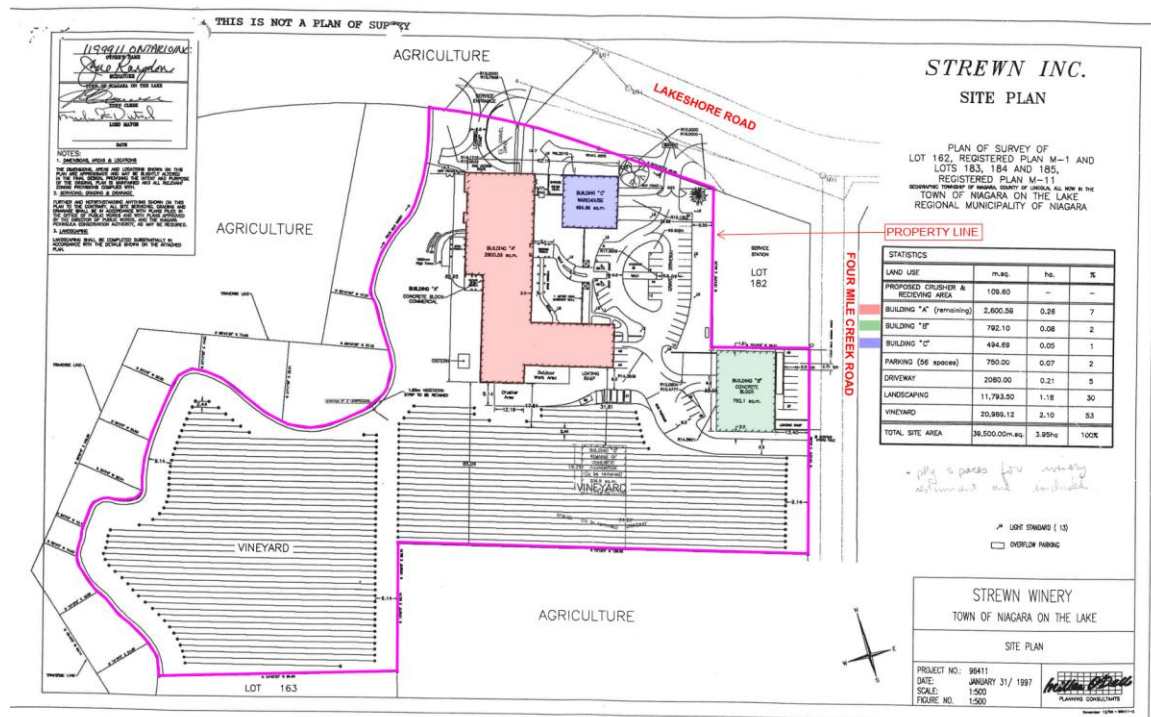


Figure 1.1 - Site Plan, dated January 31, 1997

Based on the preliminary site plan prepared by ATA Architects (ATA), the proposed development consists of a three (3)-storey hotel that will be physically connected to the existing main building on the property. Renovations to the existing main building are also proposed to occur concurrently with the new development, as well as additional gravel parking areas to meet planning requirements. A preliminary site plan illustrating the proposed redevelopment is provided in Figure 1.2.

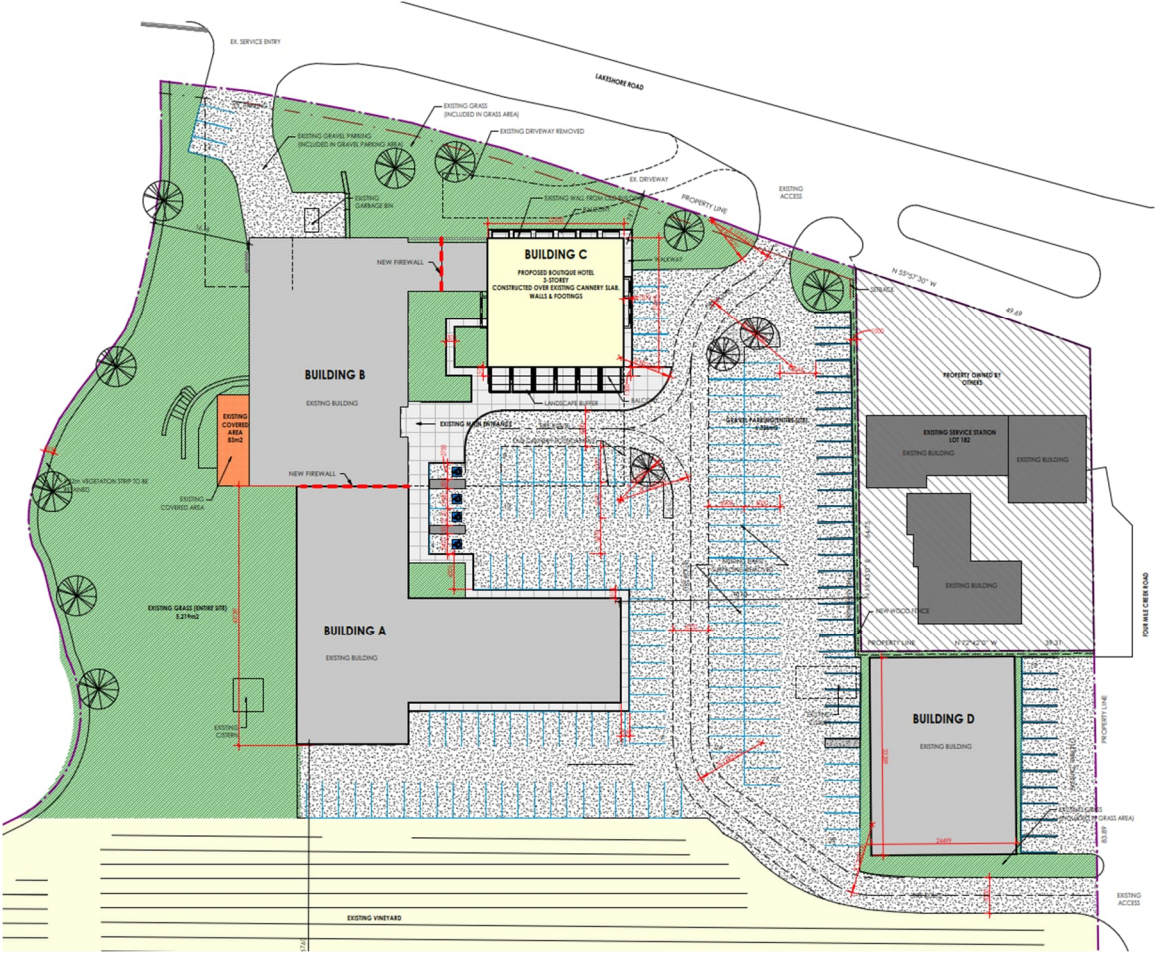


Figure 1.2 – Preliminary Site Plan

RVA has been retained by the Owner to prepare a Functional Servicing and Stormwater Management Brief (the brief) in support of the Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) applications for the site.

This brief outlines the servicing and stormwater management requirements identified during the pre-consultation meeting with the Town held on April 16, 2026, and describes how these requirements, together with applicable Town standards and other regulatory authority criteria, can be addressed from a functional servicing perspective.

## 2.0 WATER SERVICING

Based on record drawings obtained from the Town (refer to Appendix A), there is a 200mm $\varnothing$  asbestos cement watermain located along Four Mile Creek Road. At the intersection of Lakeshore Road and Four Mile Creek Road, there is an interconnecting 150mm $\varnothing$  PVC watermain which continues west along Lakeshore Road. This watermain terminates at a hydrant located south of the Lakeshore Sanitary Pumping Station (SPS) which is located opposite of the site's municipal frontage. There is a 38mm $\varnothing$  water service to the subject site serviced from the 150mm Lakeshore Road watermain located adjacent to this hydrant.

The site currently has a private hydrant located within the landscaping area east of the main building's front entrance. Based on discussion with the maintenance staff at Strewn Winery, this hydrant is supplied by a 100,000 L cistern located in the existing landscaped area west of Building 'D'.

Hydrant testing and inspection reports of three municipal hydrants were obtained from the Town (refer to Appendix B), including:

- The dead-end hydrant connected to the 150mm $\varnothing$  main on Lakeshore Road;
- A hydrant connected to the 200mm $\varnothing$  main located at the south-east corner of the Four Mile Creek Road and Lakeshore Road intersection;
- A hydrant in front of 2289 Four Mile Creek Road residence, approximately 50m south of the subject site.

As per the Town's design criteria, under conditions of simultaneous maximum day and fire flow demands, the water pressure shall not drop below 20psi (140kPa). The theoretical available flow at 20psi for each hydrant is 123 L/s, 87 L/s, and 105 L/s, respectively.

Preliminary domestic water demand was estimated in accordance with the Town's Municipal Engineering Standards, while fire flow requirements were determined based on the Fire Underwriters Survey (FUS) methodology. Calculations were based on the preliminary architectural site plan provided in Appendix A. The plan incorporates two firewalls within the main building. In accordance with FUS guidelines, each area separated by firewalls was considered a separate building for the purposes of fire flow calculations. The existing wine production and storage building was treated as an independent structure and analyzed separately. A markup illustrating the delineation of these areas is provided in Appendix B.

Using preliminary architectural plans, the site’s governing water demand (fire and domestic) for each fire zone is estimated to be 202.3 L/s. The results of the governing calculation are included in Table 1.1 below. Refer to Appendix B for detailed calculations.

**Table 1.1 – Proposed Water Demand Summary**

<b>Peak Hour Demand (PHD) (L/s)</b>	<b>Maximum Day Demand (MDD) (L/s)</b>	<b>Fire Flow Demand (L/s)</b>	<b>Total (L/s)</b>
3.44	2.29	200.00	202.3 (rounded)

Based on Table 1.1 above, the municipal watermain has insufficient pressure and flow to support the estimated peak water demand (MDD + FF) of the proposed development.

It is noted that the fire flow and domestic water demands cited in the above scenarios are estimates based on preliminary architectural plans and assumed construction methods comparable to developments of similar type and scale within the area. The actual water demand will be further refined during detailed design through continued coordination with the Architect, Mechanical Engineer, Code Consultant, and the Town’s Engineering and Fire Department.

An opportunity to meet the development’s estimated fire flow demands would be to assess the existing dry hydrant and cistern’s capacity to supplement the available flow from the municipal watermain. NFPA 1142 – *Standard on Water Supplies for Suburban and Rural Fire Fighting* provides a recognized framework for utilizing on-site water storage as a fire-fighting supply source where municipal fire flow capacity is limited or insufficient. The standard allows for the use of static water sources, such as cisterns, tanks, reservoirs, or ponds, accessed via dry hydrants, provided that sufficient storage volume and various other design parameters are addressed.

Based on the existing cistern capacity of 100,000 L and using the water supply calculation outlined in Section 4.3.1 of NFPA 1142, the maximum building volume that can be supported by the existing cistern without requiring additional cistern volume or building segmentation is approximately 3,000 m<sup>3</sup>.

The feasibility of re-utilizing the existing dry hydrant and cistern, including site review of storage capacity, condition, connectivity, and compliance with current standards, will be evaluated during detailed design. This approach will be reviewed further with both the Town and local Fire Department.

The proposed development will trigger the existing on-site hydrant to be relocated. In accordance with OBC, the new hydrant location will need to be within 90m horizontally of the portion of building required to face a street. If the proposed building is sprinklered, the proposed hydrant location will need to be located within 45m of the building Fire Department Connection (FDC). The final location of the private hydrant and the FDC (if required) will need to be coordinated during detailed design to comply with the OBC and NFPA standards.

As previously noted, the site is currently serviced by an existing 38mm $\varnothing$  water service connection. A new fire service connections to the Lakeshore Road watermain may be required to support the proposed firefighting provisions for the site. Furthermore, a separate domestic water service to the Lakeshore watermain may also be required for the proposed hotel, pending further consultation with the Project Mechanical Engineer.

### 3.0 SANITARY SERVICING

Based on record drawings obtained from the Town (refer to Appendix A), there is a 600mm $\varnothing$  concrete sanitary sewer owned by the Niagara Region located along Four Mile Creek Road that outlets to the Lakeshore SPS on Lakeshore Road just across the site.

An existing 200mm $\varnothing$  concrete sanitary service connection and maintenance hole is located along the Lakeshore Road frontage of the subject property. Existing and proposed peak sanitary flows for the site were calculated using the methodology outlined in Niagara Region’s 2021 Water and Wastewater Master Servicing Plan (WWMSPP), updated in 2023. The results of the calculations are included in Table 3.1 below. Refer to Appendix C for detailed calculations.

**Table 3.1 – Sanitary Demand Summary**

Existing Peak Flow (L/s)	Proposed Peak Flow (L/s)	Proposed Increase in Sanitary Flow (L/s)
2.49	4.46	1.97

Given the relatively low peak sanitary flow rates, the existing 200mm $\varnothing$  sanitary service is anticipated to have sufficient hydraulic capacity to accommodate the proposed development. Alternatively, a separate sanitary service connection may be pursued for the proposed hotel building, depending on the preferred plumbing configuration and whether the new building is intended to connect into the existing on-site sanitary system or be serviced independently.

RVA undertook a review of the Niagara Region 2021 WWMSP (updated 2023), which identifies surplus capacity within the downstream 600mmØ regional sanitary sewer under the 2051 projected growth conditions. As such, the sewer system is expected to be able to accommodate the relatively minor increase in proposed peak flows from the development. Refer to Figure 3.1 below for the identified available capacity within the regional sanitary sewer system. A larger version of Figure 3.1 is located in Appendix [X].

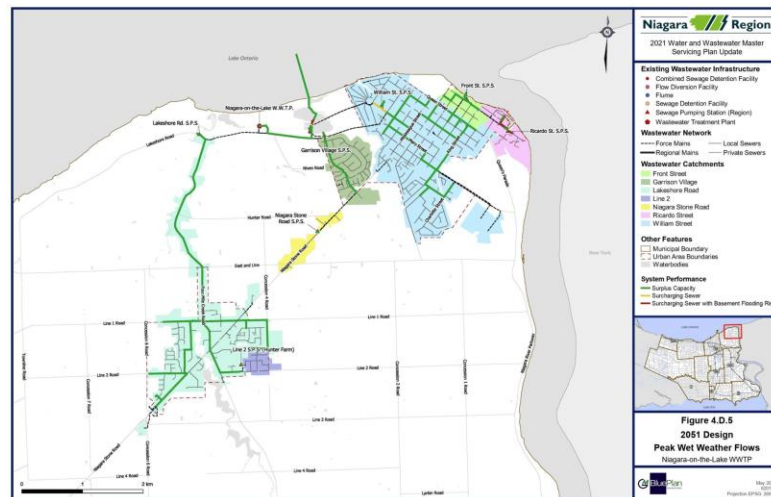


Figure 3.1 – Capacity of sewers based on 2051 Design Peak Wet Weather Flows

Based on WWMSP, the Lakeshore SPS has an operational firm capacity of approximately 86.0 L/s. The recorded peak dry-weather flow in 2021 was approximately 22.6 L/s, while the forecasted peak dry-weather flow under 2051 conditions is approximately 44.1 L/s. Based on these values, the SPS is projected to operate below its firm capacity under the long-term planning horizon, with residual capacity available to receive the relatively minor increase in flows from the proposed redevelopment.

At this time, the proposed building is currently assumed to be constructed without a basement and is therefore not anticipated to require a foundation drainage system; however, this assumption should be confirmed during detailed design. Groundwater conditions, and the specifics of any existing or proposed foundation drainage infrastructure, should be reviewed during detailed design to confirm drainage requirements.

## 4.0 STORM SERVICING & STORMWATER MANAGEMENT

As mentioned in Section 1.0, more than 50% of the property is presently occupied by vineyards, with the remainder consisting of landscaped areas, three (3) building structures, and asphalt/compacted granular parking and driveway areas. A detailed topographic survey of the subject property is currently being undertaken. In the absence of a topographic survey

and record drawings of the on-site servicing, RVA has studied the available mapping, aerial imagery, and GIS contour data. Based on our review and observation, it is assumed that runoff from the site ultimately drains west toward Four Mile Creek, which is located adjacent to the property.

Through discussion with the maintenance staff at Strewn Winery, storm runoff is currently captured by a network of catch-basins and drains that discharge collected runoff into Four Mile Creek. SUE investigation and topographical survey should be undertaken to locate the storm network during detailed design.

Based on the pre-consultation meeting held on April 16, 2026 and relevant Town/NPCA standards/policies, the following stormwater management criteria will apply to the site.

- **Water Quantity:** Post-development peak flow rates during the 2-year to 100-year design storms must not exceed pre-development peak flow rates for the same storm event. The City of St. Catharines intensity-duration-frequency (IDF) curves (per Town guidelines) shall be used to calculate peak flow rates. The minor system shall be designed for the 5-year storm event. The major system shall be designed for the 100-year storm event.
- **Water Quality:** Provide a long-term removal of 80% of total suspended solids (TSS) which corresponds to an ‘Enhanced’ level of protection.

### 4.1 Water Quantity

Recommended relevant runoff coefficients were provided in the Town’s Municipal Engineering Guidelines and are listed in Table 4.1.

**Table 4.1 – Runoff Coefficient**

Surface Type or Recommended Land Use	Coefficient
Parks (Grass/Vegetation)	0.25
Compacted Gravel	0.50
Paved Area	0.90

Weighted runoff coefficients were calculated for both the pre-development and post-development site. Refer to Appendix D for detailed calculations.

Both pre-development and post-development peak flow rates were estimated using the Rational Method. In the absence of a detailed topographic survey, the site was assessed as

a single catchment at this preliminary stage, with all runoff from the site ultimately outletting into Four Mile Creek.

Rainfall events were selected in accordance with the City of St. Catharines (per Town’s guidelines) IDF curve information. A time of concentration of 10 minutes was used per the Town’s guidelines. Table 4.2 outlines the IDF curve information used in the analysis.

$$i = \frac{A}{(T_c + B)^C}$$

i = intensity, mm/hr

A, B, C = IDF equation constants

T<sub>c</sub> = Time of concentration, minutes

**Table 4.2 – IDF Curve Equations**

Return Period	A	B	C	i (mm/hr)
2	567	5.2	0.746	74.5
5	664	4.7	0.744	89.9
10	724	4.3	0.739	101.4
25	821	4.0	0.735	118.0
50	900	3.8	0.734	131.1
100	980	3.7	0.732	144.3

A comparison between the pre-development and post-development peak flow rates is demonstrated in Table 4.3. Refer to Appendix D for peak flow calculations.

**Table 4.3 – Peak Flow Rates**

Return Period	Pre-development Peak Flow (L/s)	Post-development Peak Flow (L/s)	Δ (L/s)
2	318.16	235.57	-82.59
5	383.93	284.26	-99.66
10	433.04	320.63	-112.41
25	503.93	373.12	-130.81
50	559.87	414.54	-145.34
100	616.25	456.28	-159.97

The results presented in Table 4.3 indicate that the proposed development will result in a reduction in post-development peak flow rates relative to pre-development conditions for all design storm events. Although the proposed development increases the overall impervious

area, the associated increase in runoff is offset by the lower runoff coefficient resulting from the proposed use of compacted gravel parking surfaces in place of existing asphalt. Based on MTO Hydrotechnical Design Chart 1.07, compacted gravel surfaces typically have a runoff coefficient ranging from 0.40 to 0.60; therefore, a value of 0.50 was assumed for the purposes of this analysis. Existing asphalt surfaces were assigned a runoff coefficient of 0.90.

As the post-development peak flow rates are less than the corresponding pre-development peak flow rates for all design storm events, stormwater quantity control measure is not proposed.

## **4.2 Water Quality**

Stormwater quality control for the proposed development will be designed to meet an 'Enhanced' level of protection, defined as the long-term removal of 80% of total suspended solids (TSS), in accordance with applicable municipal and conservation authority criteria.

The proposed approach to achieving enhanced water quality protection will be based on a 'treatment train' methodology, which combines multiple stormwater management practices to collectively provide the required level of pollutant removal. Given that a significant portion of the site will remain in its existing, undeveloped condition, existing pervious and vegetated areas inherently provide a high level of water quality treatment through natural filtration, sedimentation, and infiltration processes. In addition, rooftop runoff from the proposed development is considered a clean source and does not typically require water quality treatment. As such, water quality controls will be primarily focused on runoff generated from parking surfaces and localized hardscape features.

Preliminary water quality measures under consideration include the use of compacted gravel or permeable pavement systems in appropriate parking or low-traffic areas, which provide source control by filtering runoff through the pavement structure and underlying aggregate layers. Runoff may then be directed through vegetated grass swales or landscaped conveyance features, which further enhance sediment removal and promote pollutant attenuation. The cumulative pollutant removal provided by these distributed low impact development (LID) measures is expected to achieve or exceed the 80% TSS removal requirement when implemented as part of a treatment train.

Where site constraints or drainage patterns limit the effectiveness of surface-based measures alone, supplemental treatment such as oil-grit separators (OGS) may be incorporated to provide pretreatment for runoff from parking areas.

The ultimate water quality control strategy, including confirmation of applicable treatment credits and long-term maintenance requirements, will be developed and refined during the detailed design stage.

### **4.3 Environmental Regulatory Features**

Based on correspondence received from the NPCA, the subject property is impacted by the following NPCA-regulated features:

- Valleyland Slope
- 1-in-100-Year Floodplain
- Potential Unevaluated Wetlands
- Watercourse

These regulated features may impact the site plan layout and the development application process. An environmental consultant in combination with a planning consultant may provide further guidance on how to navigate these regulatory features. The following is an introductory summary with respect to these issues.

#### **Valleyland Slope:**

The NPCA regulates all development and site alterations within 15 metres of a riverine valley (i.e. 15 meters from stable top of slope) for slope stability purposes. In accordance with the NPCA Policy Document, new buildings and structures, accessory buildings and additions to existing buildings and structures must provide a minimum 7.5-metre setback from the stable top of slope to ensure the long-term stability of the valley slope and safety of buildings or structures.

Based on Regulated Feature Mapping provided by the NPCA (refer to Appendix D), a portion of the existing building appears to be located within the minimum 7.5m setback from the stable top of slope. NPCA was invited to attend a site meeting on May 5, 2026 to stake the top of slope, which will be captured in the forthcoming topographical survey. Based on visual observations from the staking, the existing building appears to be outside of the 7.5m setback.

#### **1-in-100-Year Floodplain:**

According to NPCA, a portion of this property may be subject to the current Floodplain Management Policies of the NPCA. Based on the Regulated Feature Mapping provided by

the NPCA (refer to Appendix D), both the existing and proposed buildings are located outside the approximate floodplain. Per correspondence with the NPCA, *the regulated 1-in-100-Year floodplain elevation on the property fluctuates from 76.28m on the north side of the creek (at Lakeshore Road) to 76.80m (CGVD28:78) on the south side of the creek*. Notwithstanding what is illustrated on the mapping, consultation with NPCA will be undertaken during detailed design to confirm whether it is required to complete a survey to accurately delineate the limits of the floodplain within the context of the existing site. The results of this survey may confirm that the development is located within the floodplain limits, and as such, the development may be subject to Section 6.2 of the NPCA Policy Document – *Flooding and Erosion*.

#### **Watercourse:**

According to NPCA, any works proposed within 15 metres of a regulated watercourse (i.e. 15m from stable top of slope) will require NPCA approval. Reductions to standard watercourse setbacks may require justification through an Environmental Impact Study or similar assessment undertaken by an environmental consultant.

## **5.0 UTILITIES**

Based on the record drawings provided in Appendix A, gas, hydro and communications infrastructure are present within the Lakeshore Road and Four Mile Creek Road ROWs. As part of subsequent stages of detailed design, SUE shall be completed to confirm the location, depth, alignment, and extent of existing underground utilities within the municipal ROWs and on the subject property. Coordination with the applicable utility providers will also be required to identify potential conflicts, confirm servicing constraints, and review that appropriate clearances, protection measures, and relocation requirements, if any, are considered into the final design.

## **6.0 CONCLUSION**

### **6.1 Water**

Based on hydrant flow test results provided by the Town, the municipal watermain has an available capacity of approximately 123 L/s at 20 psi. Preliminary water demand calculations exceed the available municipal supply; therefore, further review of incorporating Architectural design measures such as additional firewalls to reduce the estimated water demand from the Development will be required during detailed design.

In addition to the municipal water supply, an existing 100,000 L on-site cistern supplies a dry hydrant and may be used to supplement fire protection requirements. In accordance with

NFPA 1142, and based on information provided by on-site maintenance staff, the on-site cistern storage volume is sufficient to support fire protection for a maximum building volume of approximately 3,000 m<sup>3</sup>. This will be reviewed further during detailed design.

Considering both available fire-fighting water sources, the proposed building will be divided into smaller fire-separated areas by employing firewalls to reduce the required fire flow demand to a level that can be supported by either the municipal watermain or in combination with the existing on-site cistern and dry hydrant assembly.

## **6.2 Sanitary**

The proposed development is expected to result in a minor increase in peak sanitary flow from approximately 2.49 L/s to 4.46 L/s. The existing 200mm $\varnothing$  sanitary service is anticipated to have sufficient capacity, subject to confirmation of pipe condition, slope, invert elevations, and connection configuration.

Available Regional planning information indicates that the downstream sanitary sewer and Lakeshore SPS have residual capacity to accommodate the increase in flows due to the proposed redevelopment.

## **6.3 Storm**

As the post-development peak flow rates are less than the corresponding pre-development peak flow rates for all design storm events, stormwater quantity control measure is not proposed.

Stormwater quality control can be achieved through a combination of detention, flow control, LID, and treatment measures. The final strategy will be developed during detailed design based on topographic survey, SUE investigation, grading, geotechnical conditions, and confirmation of existing drainage infrastructure and outlet routing to Four Mile Creek. Enhanced water quality protection, corresponding to 80% long-term TSS removal, will be provided for runoff requiring treatment.

Based on the assessment completed herein, the proposed redevelopment at 1339 Lakeshore Road, Niagara-on-the-Lake is considered feasible from a functional servicing and stormwater management perspective, provided the identified limitations are addressed during detailed design.

Should you have any questions, please do not hesitate to contact the undersigned.

R. V. ANDERSON ASSOCIATES LIMITED

**Arbaz Hasan**

Prepared by:

Arbaz Hasan  
Project Designer



Reviewed by:

Alex Wong, P.Eng.  
Associate, Project Manager

**APPENDIX A**  
**BACKGROUND DATA AND INFORMATION**



THIS IS NOT A PLAN OF SURVEY

AGRICULTURE

**STREWN INC.**

**SITE PLAN**

1199911 ONTARIO INC.  
 CIVIL ENGINEER  
*Joe Kardon*  
 SIGNATURE  
 TOWN OF NIAGARA ON THE LAKE  
 CIVIL ENGINEER  
*Michael J. D'Amico*  
 LORD MAYOR  
 DATE

NOTES:  
 1. DIMENSIONS, AREAS & LOCATIONS  
 THE DIMENSIONS, AREAS AND LOCATIONS SHOWN ON THIS PLAN ARE APPROXIMATE AND MAY BE SLIGHTLY ALTERED IN THE FINAL DESIGN, PROVIDED THE INTENT AND PURPOSE OF THE ORIGINAL PLAN IS MAINTAINED AND ALL RELEVANT ZONING PROVISIONS COMPLIED WITH.  
 2. SERVICING, GRADING & DRAINAGE  
 FURTHER AND NOTWITHSTANDING ANYTHING SHOWN ON THIS PLAN TO THE CONTRARY, ALL SITE SERVICING, GRADING AND DRAINAGE SHALL BE IN ACCORDANCE WITH PLANS FILED IN THE OFFICE OF PUBLIC WORKS AND WITH PLANS APPROVED BY THE DIRECTOR OF PUBLIC WORKS, AND THE NIAGARA PENINSULA CONSERVATION AUTHORITY, AS MAY BE REQUIRED.  
 3. LANDSCAPING  
 LANDSCAPING SHALL BE COMPLETED SUBSTANTIALLY IN ACCORDANCE WITH THE DETAILS SHOWN ON THE ATTACHED PLAN.

PLAN OF SURVEY OF  
 LOT 162, REGISTERED PLAN M-1 AND  
 LOTS 183, 184 AND 185,  
 REGISTERED PLAN M-11  
 GEOGRAPHIC TOWNSHIP OF NIAGARA, COUNTY OF LINCOLN, ALL NOW IN THE  
 TOWN OF NIAGARA ON THE LAKE  
 REGIONAL MUNICIPALITY OF NIAGARA

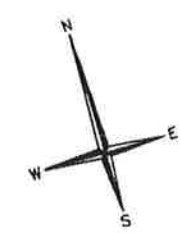
AGRICULTURE

PROPERTY LINE

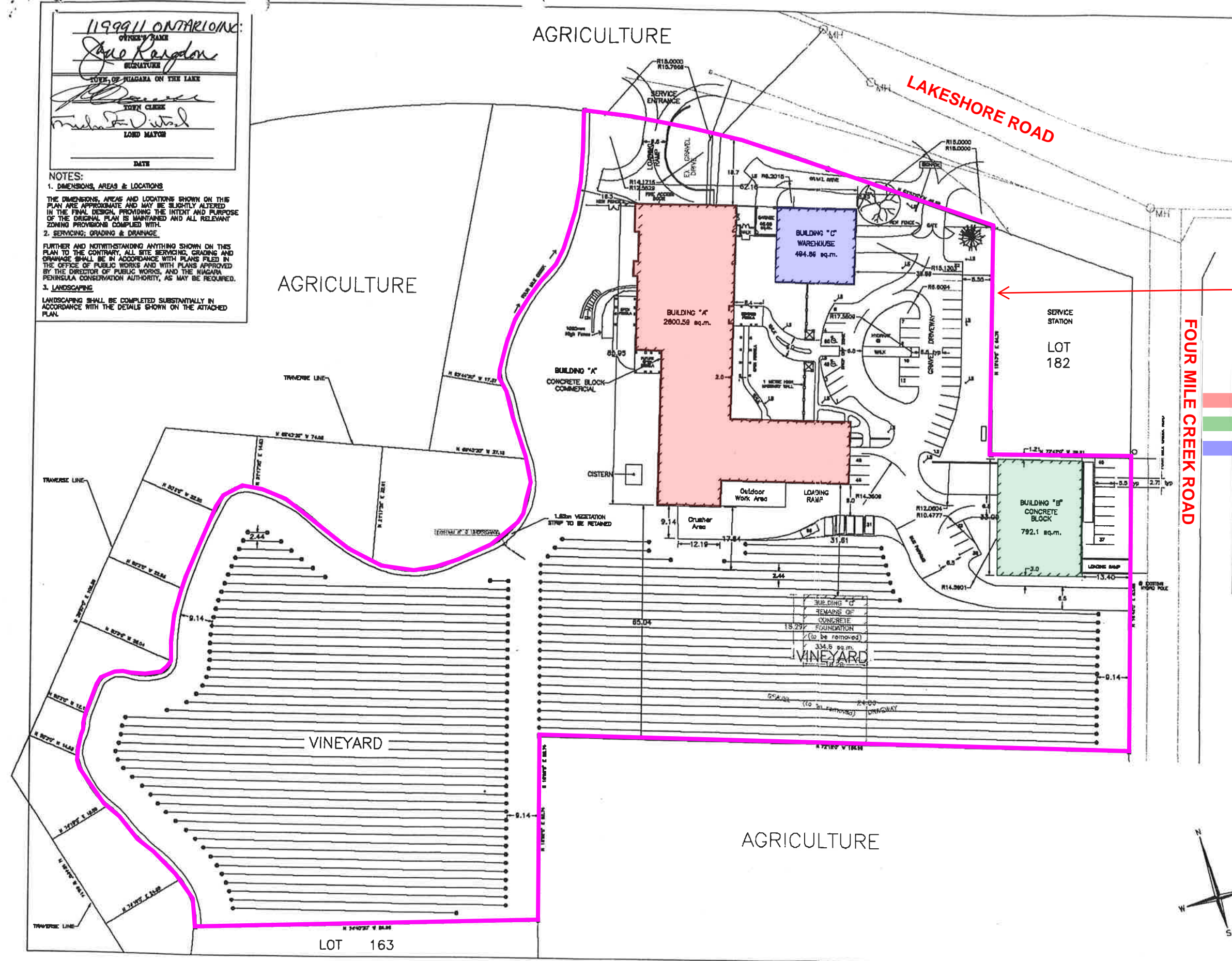
STATISTICS			
LAND USE	m.sq.	ha.	%
PROPOSED CRUSHER & RECEIVING AREA	109.60	-	-
BUILDING "A" (remaining)	2,600.59	0.26	7
BUILDING "B"	792.10	0.08	2
BUILDING "C"	494.69	0.05	1
PARKING (56 spaces)	750.00	0.07	2
DRIVEWAY	2080.00	0.21	5
LANDSCAPING	11,793.50	1.18	30
VINEYARD	20,989.12	2.10	53
<b>TOTAL SITE AREA</b>	<b>39,500.00m.sq.</b>	<b>3.95ha</b>	<b>100%</b>

*5 pkgs spaces for winery restaurant and included.*

⊙ LIGHT STANDARD (13)  
 □ OVERFLOW PARKING



STREWN WINERY  
 TOWN OF NIAGARA ON THE LAKE  
 SITE PLAN  
 PROJECT NO.: 96411  
 DATE: JANUARY 31/ 1997  
 SCALE: 1:500  
 FIGURE NO. 1:500  
*William D'Amico*  
 PLANNING CONSULTANTS



LOT 163

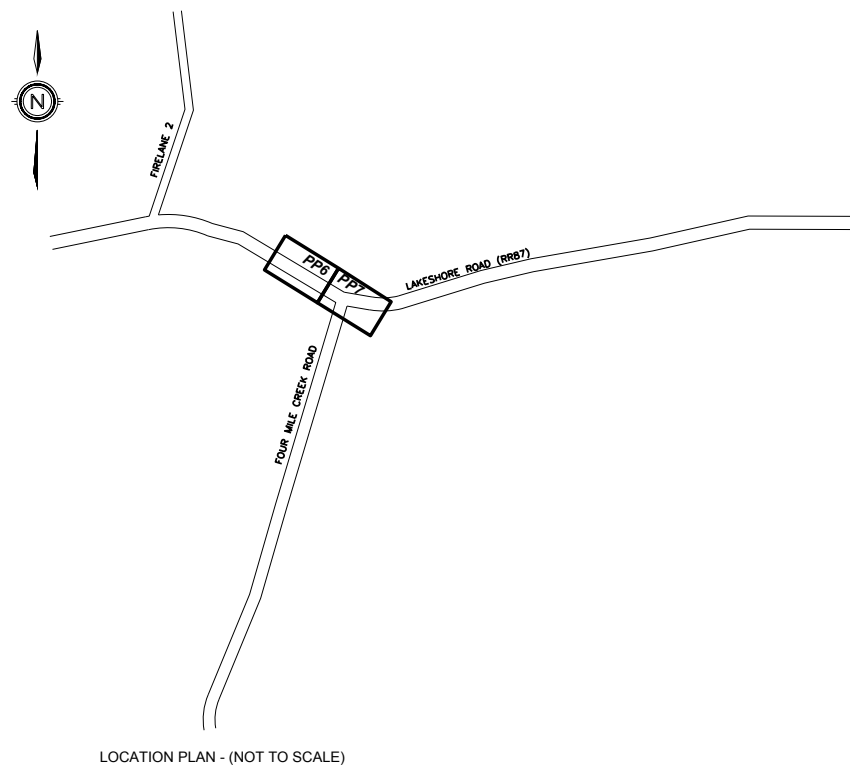
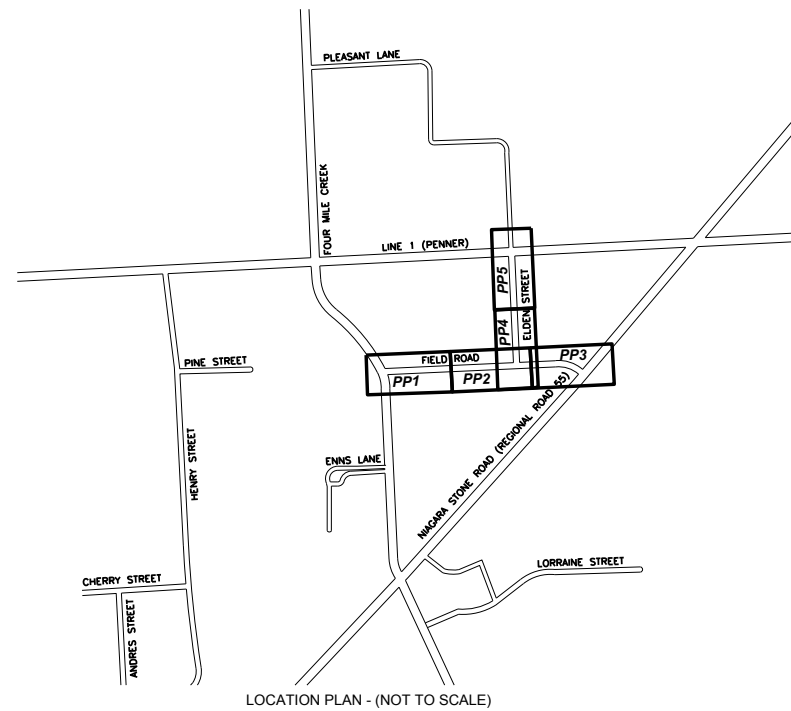
AGRICULTURE





*CONTRACT NO. 16-013*

**FIELD ROAD, ELDEN STREET  
AND LAKESHORE ROAD  
WATERMAIN REPLACEMENTS  
IN THE TOWN OF NIAGARA-ON-THE-LAKE**



DRAWING INDEX	
Cover Page	
FIELD ROAD Sta. 0+980 to Sta. 1+100	16-013-PP1
FIELD ROAD Sta. 1+100 to Sta. 1+230	16-013-PP2
FIELD ROAD Sta. 1+230 to Sta. 1+320	16-013-PP3
ELDEN STREET Sta. 2+990 to Sta. 3+110	16-013-PP4
ELDEN STREET Sta. 3+110 to Sta. 3+220	16-013-PP5
LAKESHORE ROAD Sta. 5+100 to Sta. 5+220	16-013-PP6
LAKESHORE ROAD Sta. 5+220 to Sta. 5+350	16-013-PP7

**SHELDON RANDALL**  
DIRECTOR OF OPERATIONS

**PAT DARTE**  
LORD MAYOR

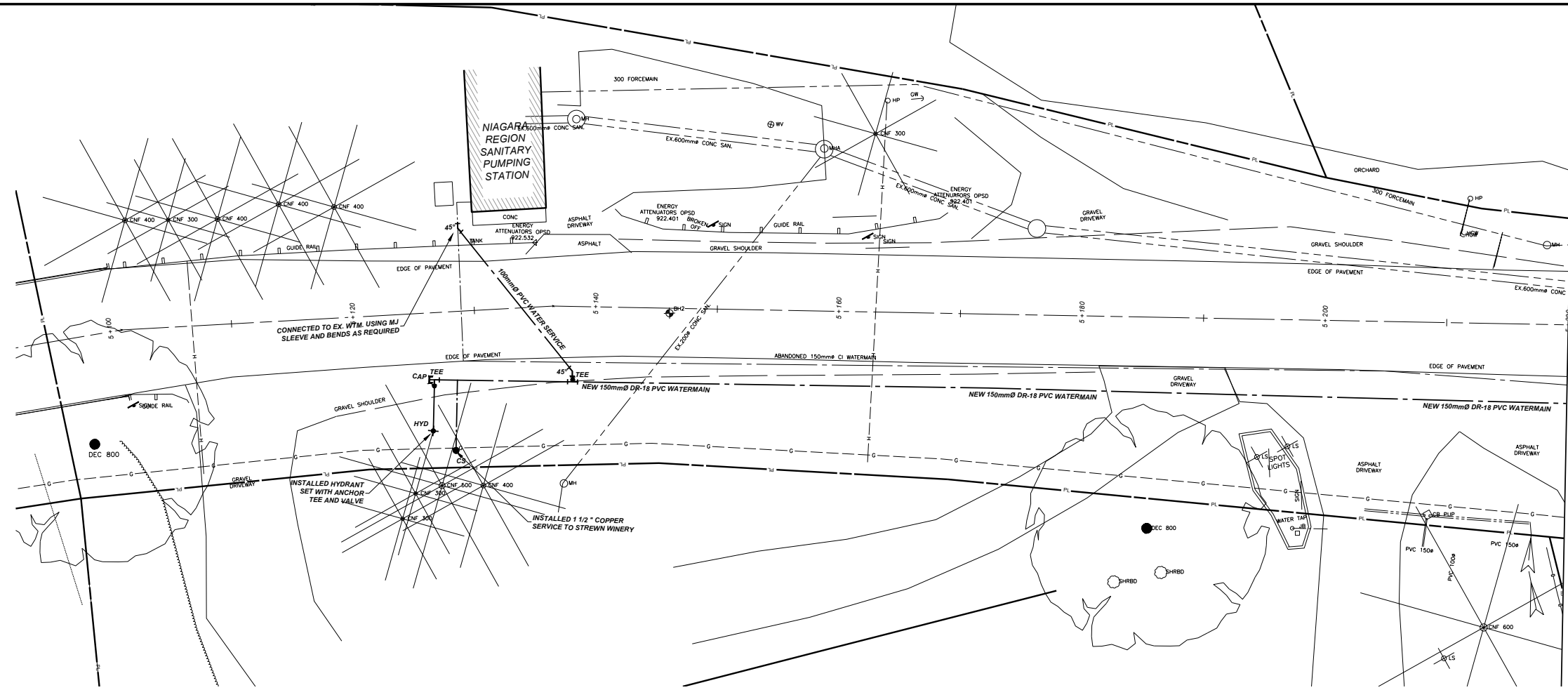
KERRY T. HOWE ENGINEERING LTD.  
CONSULTING ENGINEERS  
98 Church Street  
St. Catharines, Ontario  
(905) 688-6550



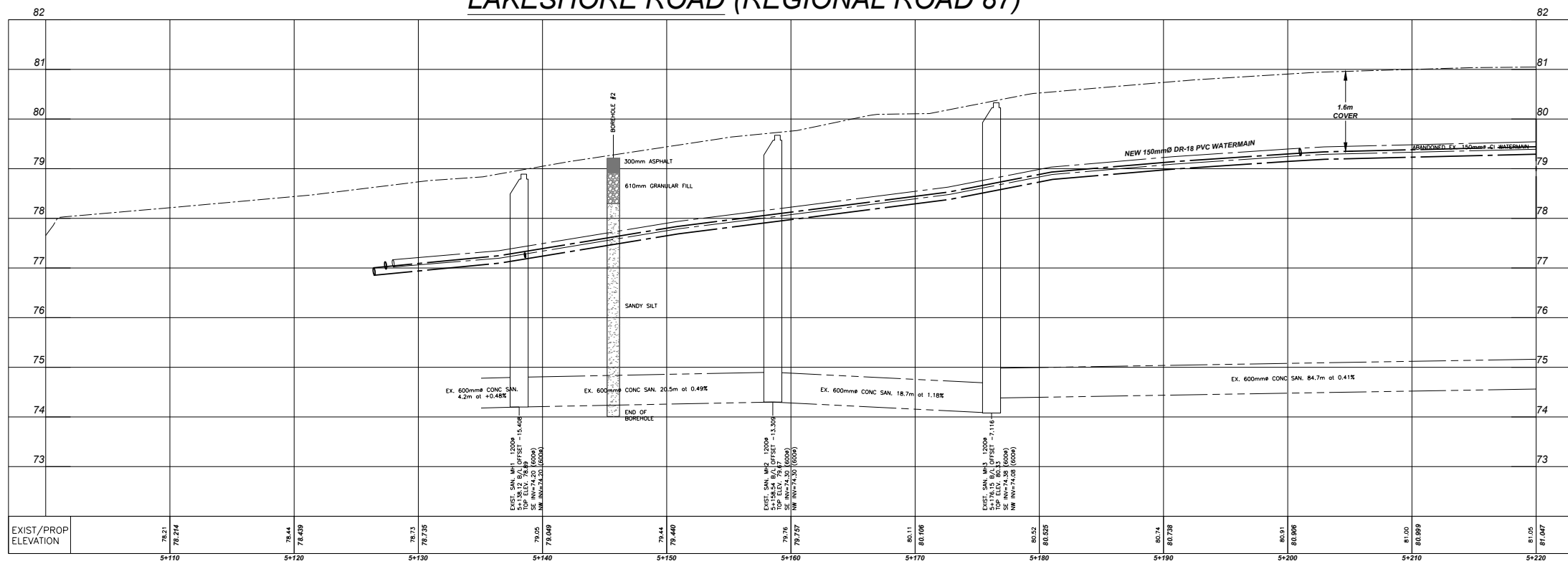
**NO. 16-013**

FIELD ROAD, ELDEN STREET  
AND LAKESHORE ROAD  
WATERMAIN REPLACEMENTS  
IN THE TOWN OF NIAGARA-ON-THE-LAKE

NO.	REVISION	DATE	INT.
3	RECORD OF CONSTRUCTION	JAN. 2018	LB
2	ISSUED FOR TENDER	NOV. 2016	TP
1	ISSUED FOR REVIEW	OCT. 2016	TP



LAKESHORE ROAD (REGIONAL ROAD 87)



NO.	REVISION	DATE	INIT.
3	RECORD OF CONSTRUCTION	JAN/18	LB
2	ISSUED FOR TENDER	NOV/16	TP
1	ISSUED FOR REVIEW	JULY/16	LB

**NOTES/LEGEND**

1 THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWER AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

2 PROPERTY LINES WERE PLOTTED USING REGISTERED PLANS AND BARS LOCATED IN THE FIELD TO VERIFY THE ACCURACY OF THESE PROPERTY LINES. A LEGAL SURVEY SHOULD BE PERFORMED PRIOR TO CONSTRUCTION.

3 BENCHMARK AND CONTROL POINTS

4 U.T.M. ZONE 18 Q UTM MONUMENT IS LOCATED ON THE NORTH SIDE OF LAKESHORE RD APPROXIMATELY 650m EAST OF FIRELANE 6 AND 1.80 kms WEST OF FOUR MILE CREEK ROAD. ELEVATION: 81.392

5 CP 47 - NL IN SHOULDER OF ROAD NORTH SIDE OF LAKESHORE RD AT FOUR MILE CREEK RD. Northing: 4790562.955 Easting: 652280.386 Elevation: 80.78

6 CP 49 - NL NORTH SIDE OF LAKESHORE ROAD IN PUMPING STATIONS ASPHALT DRIVEWAY Northing: 4790524.514 Easting: 652170.228 Elevation: 78.92

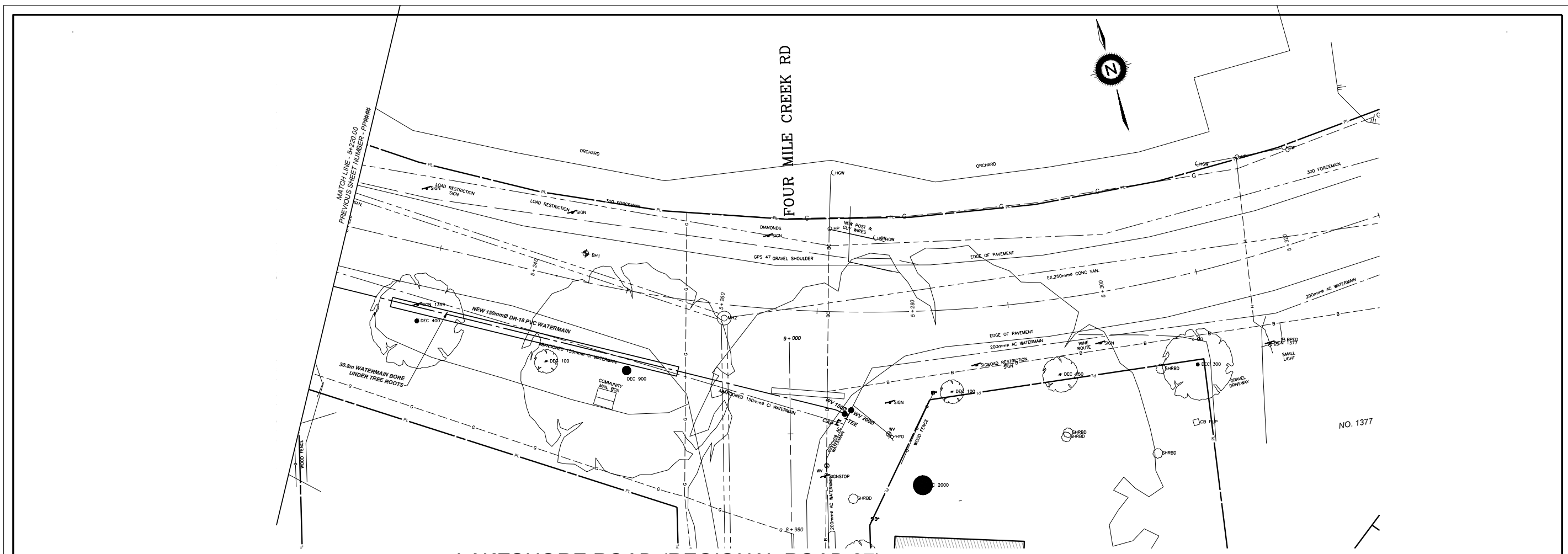
7 CP 52 - NL IN GRASS, WEST OF BRIDGE ON SOUTH SIDE OF LAKESHORE RD. Northing: 4790546.607 Easting: 652088.893 Elevation: 78.32

DRAFTING	LB/TP
DESIGN	RB
CHECKED BY	SK
APPROVED BY	

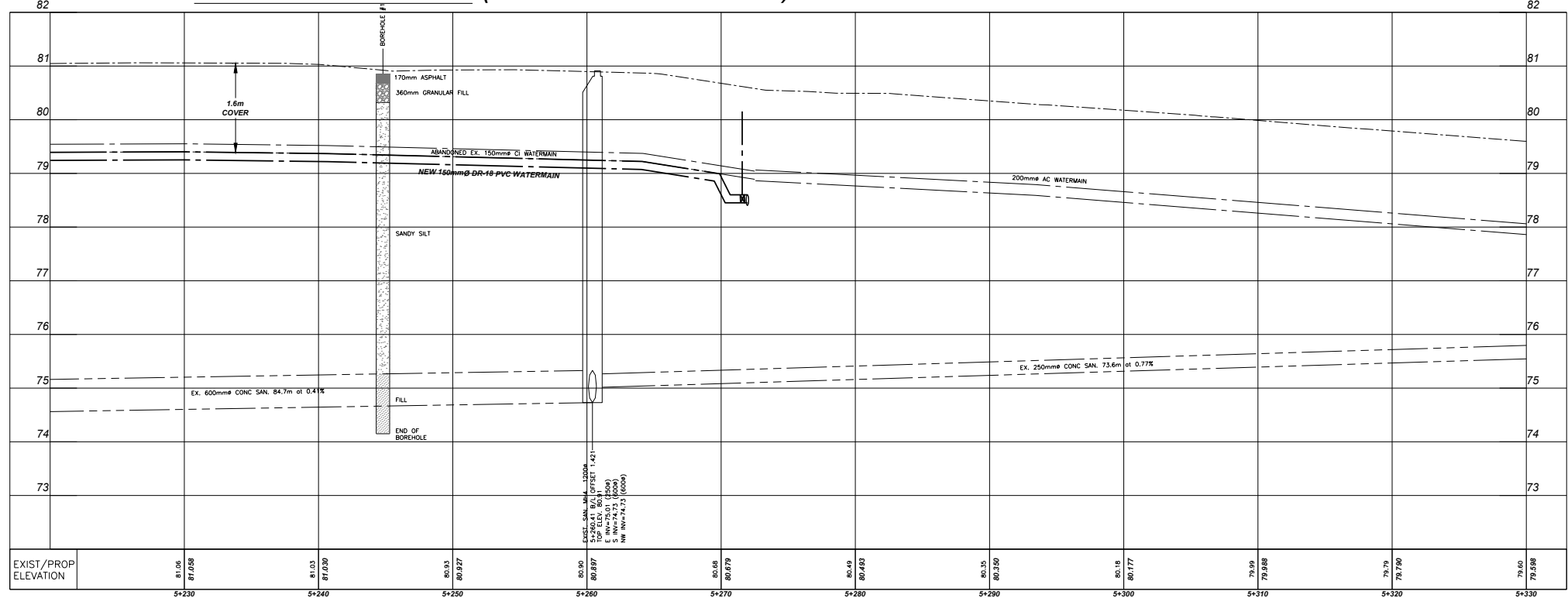
KERRY T. HOVE ENGINEERING LTD.  
CONSULTING ENGINEERS  
48 Church Street  
St. Catharines, Ontario  
(905) 688-6560

(REGIONAL ROAD 87)  
**LAKESHORE ROAD**  
WATERMAIN REPLACEMENT  
FROM FOUR MILE CREEK TO FOUR MILE CREEK RD.  
TOWN OF NIAGARA-ON-THE-LAKE  
Sta. 5+100 to Sta. 5+220

CONSULTANT FILE No. 16-013	DATE: JANUARY 9, 2018
SCALE: HOR 1:200	VER: 1:50
REF. No. REGIONAL ROAD 87	
DWG No.	REV.
16-013-PP6	3



LAKESHORE ROAD (REGIONAL ROAD 87)



NO.	REVISION	DATE	INIT.
3	RECORD OF CONSTRUCTION	JAN/18	LB
2	ISSUED FOR TENDER	NOV/16	TP
1	ISSUED FOR REVIEW	JULY/16	LB

**NOTES/LEGEND**

1 THE POSITION OF POLE LINES, CONDUITS, WATERMANS, SEWER AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

2 PROPERTY LINES WERE PLOTTED USING REGISTERED PLANS AND BARS LOCATED IN THE FIELD TO VERIFY THE ACCURACY OF THESE PROPERTY LINES. A LEGAL SURVEY SHOULD BE PERFORMED PRIOR TO CONSTRUCTION.

3 U.T.M. ZONE 18  
SW1925020074 MONUMENT IS LOCATED ON THE NORTH SIDE OF LAKESHORE RD APPROXIMATELY 650m EAST OF FIRELANE 6 AND 1.80 kms WEST OF FOUR MILE CREEK ROAD.  
ELEVATION: 81.392

CP 47 - NL IN SHOULDER OF ROAD NORTH SIDE OF LAKESHORE RD AT FOUR MILE CREEK RD. Northing: 4790562.955 Easting: 652280.386 Elevation: 80.78  
CP 49 - NL NORTH SIDE OF LAKESHORE ROAD IN PUMPING STATIONS ASPHALT DRIVEWAY Northing: 4790624.514 Easting: 652170.228 Elevation: 78.92  
CP 52 - NL IN GRASS, WEST OF BRIDGE ON SOUTH SIDE OF LAKESHORE RD. Northing: 4790646.607 Easting: 652088.893 Elevation: 78.32

**NOTE:** THIS DRAWING IS FOR ILLUSTRATIVE PURPOSE ONLY. KERRY T. HOVE ENGINEERING LTD. ASSUMES NO LIABILITY FOR USE IN ANY OTHER WAY. CAD FILES OF THIS DRAWING ARE NOT CERTIFIED BY THE ENGINEER FOR USE BY OTHERS. USERS OF THESE CAD FILES ASSUME ALL RISK AND RESPONSIBILITY FOR VERIFYING THE CORRECTNESS OF ALL INFORMATION FOR ANY USE.

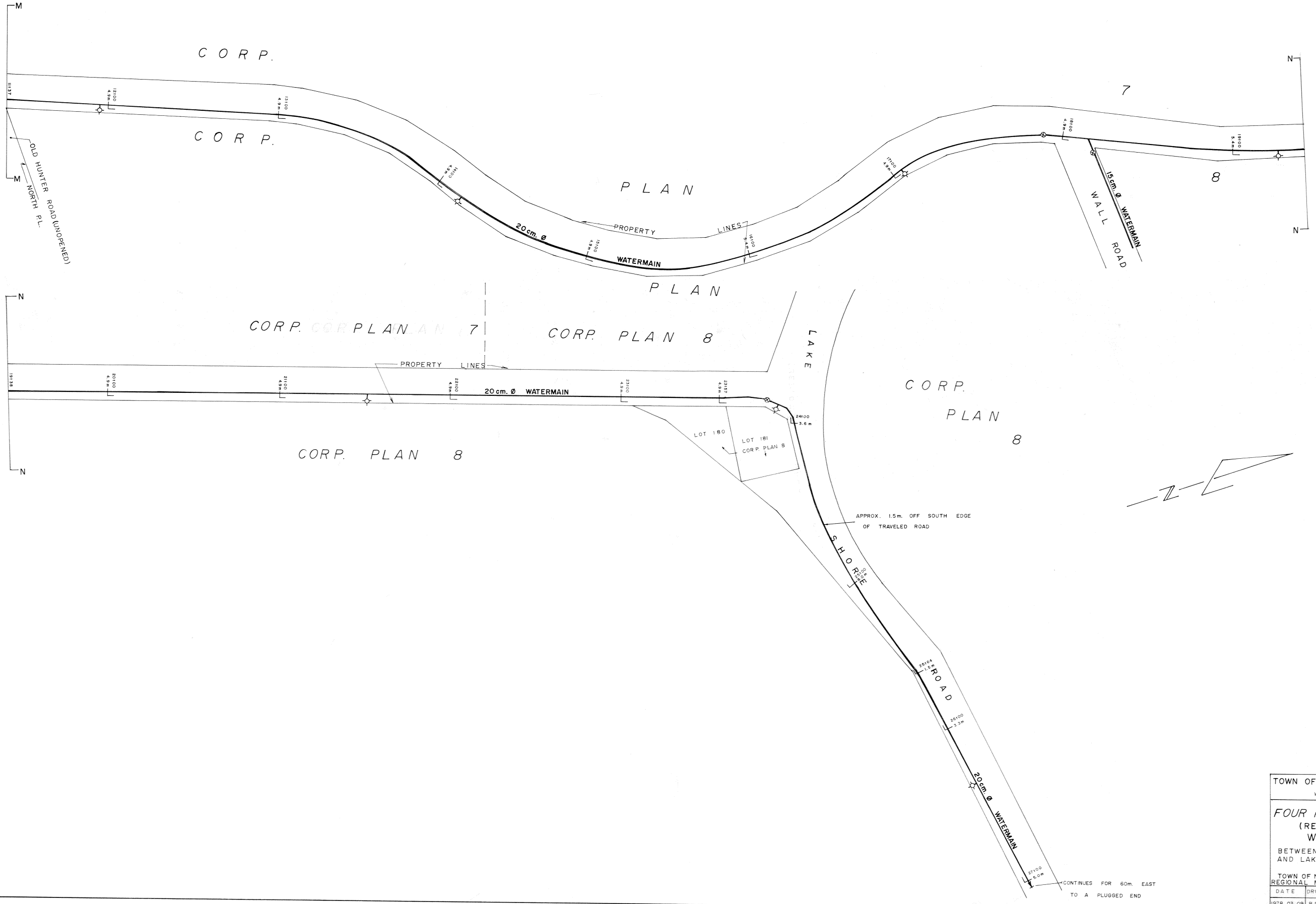
DRAFTING	LB/TP
DESIGN	RB
CHECKED BY	SK
APPROVED BY	

KERRY T. HOVE ENGINEERING LTD.  
CONSULTING ENGINEERS  
47 Church Street  
St. Catharines, Ontario  
(905) 688-6560

(REGIONAL ROAD 87)  
LAKESHORE ROAD  
WATERMAIN REPLACEMENT  
FROM FOUR MILE CREEK TO FOUR MILE CREEK RD.  
TOWN OF NIAGARA-ON-THE-LAKE  
Sta. 5+220 to Sta. 5+340

CONSULTANT FILE No. 16-013	DATE JANUARY 9, 2018
SCALE HOR 1:200	VER: 1:50
REF. No. REGIONAL ROAD 87	
DWG No. 16-013-PP7	REV. 3

WAT-9-2



TOWN OF NIAGARA-ON-THE-LAKE  
WORKS DEPARTMENT

**FOUR MILE CREEK ROAD  
(REGIONAL ROAD 100)  
WATERMAINS**

BETWEEN OLD HUNTER ROAD ALLOW.  
AND LAKE SHORE ROAD (INCL.)  
IN THE  
TOWN OF NIAGARA-ON-THE-LAKE  
REGIONAL MUNICIPALITY OF NIAGARA

DATE	DRWN. BY	SCALE	SHEET N°	FILE N°
1978 03 09	R.B./C.M.	1cm = 10m	2 OF 2	WAT-9

CONTINUES FOR 60m. EAST TO A PLUGGED END

**APPENDIX B**  
**WATER SERVICING**



**TABLE B1 - PROPOSED PEAK-HOUR & MAXIMUM-DAY DEMANDS**

		<b>Hotel</b>	<b>Hotel, Retail, Restaurant</b>	<b>Winery, Event Space</b>	<b>Winery</b>
Total Units <sup>1</sup>	units	43	15	0	0
% of One Bedroom Units	%	74%	26%	0%	0%
Persons Per Unit <sup>2</sup>	persons/unit	2.16	2.16	2.16	2.16
Total Residential Population	persons	95	35	0	0
Combined Residential Population	persons	130			
Gross Floor Area <sup>3</sup>	ft <sup>2</sup>	17244	14635	17814	8773
Employees Per 500 ft <sup>2</sup> <sup>4</sup>	persons/500ft <sup>2</sup>	1.00	1.00	1.00	1.00
Total Employee Population	persons	35	30	40	20
Combined Employee Population	persons	125			
Total Population Used for Calculation Purposes	persons	255			
Residential Per Capita Demand @ 255 L/person/day <sup>5</sup>	L/day	33,150			
Employment Per Capita Demand @ 310 L/emp./day <sup>5</sup>	L/day	38,750			
Total Demand	L/day	71,900			
Equivalent Population Demand	L/s	0.83			
Peak Hour Peaking Factor <sup>6</sup>		4.13			
Peak Hour Design Demand Rate	L/s	<b>3.44</b>			
Peak Hour Design Demand Rate	m <sup>3</sup> /day	297			
Maximum Day Peaking Factor <sup>6</sup>		2.75			
Maximum Day Design Demand Rate	L/s	<b>2.29</b>			
Maximum Day Design Demand Rate (m <sup>3</sup> /day)	m <sup>3</sup> /day	198			

\*Note: Due to the lack of detailed architectural plans and for ease of calculation at this high-level stage, it was conservatively assumed that the Hotel/Spa Expansion consists of:

<sup>1</sup>58 units per Preliminary Site Plan included in Appendix A

<sup>2</sup>Hotel was assumed as medium density which corresponds to 2.16 persons/unit per Town of Niagara-on-the-Lake Development Charges Background Study (2018).

<sup>3</sup>Gross floor areas per Option 'X' in the Preliminary Site Plan included in Appendix A (Note that the west part of the hotel is 2-storey, this extra floor area has been accounted for in this calculation)

<sup>4</sup>Employment density was assumed as 1 person/500sqft per Town of Niagara-on-the-Lake Development Charges Background Study (2018).

<sup>5</sup>Per capita demand based on 2021 Water and Wastewater Master Servicing Plan Volume 4.

<sup>6</sup>Peaking factors per Ministry of Environment Design Guidelines for Drinking-Water Systems, 2016 (Updated 2023).

**TABLE B2 - PROPOSED FIRE DEMAND - HOTEL**

			<b>TOTAL</b>
Construction Coefficient (C)			1
Height in Stories			3
Total Effective Area (A)		m <sup>2</sup>	1,602
Fire Flow Required		L/min	9,000
Reduction for Occupancy Charge	15%	L/min	-1,350
Fire Flow Required		L/min	7,650
Reduction for Automatic Sprinklers	40%	L/min	-3,060
North: Nearest Building	40	m	0%
East: Nearest Building	41	m	0%
South: Nearest Building	39	m	0%
West: Nearest Building	0	m	25%
Total Change for Building Separation	Max 75	%	25%
Change for Building Separation		L/min	1,913
Fire Flow Required		L/min	7,000
Fire Flow Required		L/s	116.7

\*Note: Fire Flow calculations are based on methodology included in Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection (2020)

**TABLE B3 - PROPOSED FIRE DEMAND - HOTEL, RETAIL, RESTAURANT**

			TOTAL
Construction Coefficient (C)			1
Height in Stories			1 to 2
Total Effective Area (A)		m <sup>2</sup>	1,360
Fire Flow Required		L/min	9,000
Reduction for Occupancy Charge	15%	L/min	-1,350
Fire Flow Required		L/min	7,650
Reduction for Automatic Sprinklers	40%	L/min	-3,060
North: Nearest Building	41	m	0%
East: Nearest Building	0	m	25%
South: Nearest Building	0	m	25%
West: Nearest Building	75	m	0%
Total Change for Building Separation	Max 75	%	50%
Change for Building Separation		L/min	3,825
Fire Flow Required		L/min	9,000
Fire Flow Required		L/s	150.0

\*Note: Fire Flow calculations are based on methodology included in Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection (2020)

**TABLE B4 - PROPOSED FIRE DEMAND - WINERY, EVENT SPACE**

			TOTAL
Construction Coefficient (C)			1
Height in Stories			1
Total Effective Area (A)		m <sup>2</sup>	1,655
Fire Flow Required		L/min	9,000
Reduction for Occupancy Charge	0%	L/min	0
Fire Flow Required		L/min	9,000
Reduction for Automatic Sprinklers	0%	L/min	0
North: Nearest Building	0	m	25%
East: Nearest Building	41	m	0%
South: Nearest Building	225	m	0%
West: Nearest Building	75	m	0%
Total Change for Building Separation	Max 75	%	25%
Change for Building Separation		L/min	2,250
Fire Flow Required		L/min	12,000
Fire Flow Required		L/s	200.0

\*Note: Fire Flow calculations are based on methodology included in Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection (2020)

**TABLE B5 - PROPOSED FIRE DEMAND - WINERY**

			TOTAL
Construction Coefficient (C)			1
Height in Stories			1
Total Effective Area (A)		m <sup>2</sup>	815.00
Fire Flow Required		L/min	7,000
Reduction for Occupancy Charge	0%	L/min	0
Fire Flow Required		L/min	7,000
Reduction for Automatic Sprinklers	0%	L/min	0
North: Nearest Building	5	m	20%
East: Nearest Building	59	m	0%
South: Nearest Building	250	m	0%
West: Nearest Building	41	m	0%
Total Change for Building Separation	Max 75	%	20%
Change for Building Separation		L/min	1,400
Fire Flow Required		L/min	9,000
Fire Flow Required		L/s	150.0

\*Note: Fire Flow calculations are based on methodology included in Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection (2020)

# FIRE HYDRANT TESTING & INSPECTION REPORT

(to be kept on site for review upon request by the Fire Chief, in accordance with subsection 1.1.2.1.)

Hydrant No. **0543** of

Service Date **04 October 2022**

Tested By Wood, D.

## Customer Information

Site Name **Niagara-on-the-Lake, Town of**

Site Contact

Address **Four Mile Creek Rd**

Phone

Ext.

## Fire Hydrant Information

Hydrant Make & Model **Canada Valve Century**

Secondary Valve Location **0.40m North**

Hydrant Location **Front of 2289 Four Mile Creek Rd**

Valve Box Type **SSL**

Opening Direction **Left**

Valve Box Height **Satisfactory**

Turns to Open **17**

Opening Direction **Left**

ATD Installed **No**

Turns to Open **14**

## Inspection Results

\* **Service Status** **In Service, No Repairs**

Barrel Assembly **Satisfactory**

Paint Quality **Satisfactory**

Main Valve Assembly **Satisfactory**

Drain Valve Assembly **Satisfactory**

Operating Assembly **Satisfactory**

Rod Assembly **Satisfactory**

Barrel Drainage **Satisfactory**

Barrel Found **Dry**

Hydrant Operation **Satisfactory**

Caps & Nozzles **Satisfactory**

Colour Coding **Satisfactory**

Barrel Nozzle Style **2 Hose**

Nozzle Orientation **Correct**

Nozzle Height **Satisfactory**

Access to Hydrant **Satisfactory**

Secondary Valve Operation **Satisfactory**

Valve Box Condition **Satisfactory**

## Maintenance Routines Completed

Barrel Dewatering **Completed**

Valve Box Locating **Completed/Found**

Valve Box Cleaning **Completed**

Sec. Valve Cycling **Completed**

Hydrant Lubrication **Completed**

Hydrant Painting **Not Necessary**

Colour Coding **Not Necessary**

Hose Cap Gasket Replacement **Not Necessary**

Pressure Testing **Completed**

Flow Testing **Completed**

## Testing Results

Static Pressure (psig) **88**

Residual Pressure (psig) **53**

Pitot Reading (psig) **48**

Water Quality **Clear**

1 Port Flow, Actual (usgpm) **1162**

## Comments



## Department of Public Works

1593 Four Mile Creek Road

P.O. Box 100, Virgil, ON L0S 1T0 905-468-3266 • Fax: 905-468-1722

### Fire Hydrant Flow Test

Hydrant ID: NOTLHYD-0543

Make & Model: Canada Valve

Inspection Date: 9/24/25, 11:15 AM

Inspection Status: Complete

### Flow Test Details

Flush Hydrant: Yes

Clear Flow Obtained?: Yes

Static Pressure: 75

Secondary Valve: Good

Valve Box: Good

### Visual Inspection

Obstruction: No

Leaking when off: No

Leaking when on: No

Hydrant Condition: Good

Thread Condition: Good

Port Height: Good

Operating Nut: Good

Cap & Gasket Condition: Good

Grease Threads & Operating Nut: Complete

Traffic Flange: Good

# FIRE HYDRANT TESTING & INSPECTION REPORT

(to be kept on site for review upon request by the Fire Chief, in accordance with subsection 1.1.2.1.)

Hydrant No. **0544** of

Service Date **04 October 2022**

Tested By Wood J

## Customer Information

Site Name **Niagara-on-the-Lake, Town of**

Site Contact

Address **Four Mile Creek Road**

Phone

Ext.

## Fire Hydrant Information

Hydrant Make & Model **Canada Valve Century**

Secondary Valve Location **2.20m Northwest**

Hydrant Location **Four Mile Creek Road**

Valve Box Type **SSL**

Opening Direction **Left**

Valve Box Height **Satisfactory**

Turns to Open **18**

Opening Direction **Left**

ATD Installed **No**

Turns to Open **20**

## Inspection Results

\* **Service Status** **In Service, No Repairs**

Barrel Assembly **Satisfactory**

Paint Quality **Satisfactory**

Main Valve Assembly **Satisfactory**

Drain Valve Assembly **Satisfactory**

Operating Assembly **Satisfactory**

Rod Assembly **Satisfactory**

Barrel Drainage **Satisfactory**

Barrel Found **Dry**

Hydrant Operation **Satisfactory**

Caps & Nozzles **Satisfactory**

Colour Coding **Satisfactory**

Barrel Nozzle Style **2 Hose**

Nozzle Orientation **Correct**

Nozzle Height **Satisfactory**

Access to Hydrant **Satisfactory**

Secondary Valve Operation **Satisfactory**

Valve Box Condition **Satisfactory**

## Maintenance Routines Completed

Barrel Dewatering **Not Necessary**

Valve Box Locating **Completed/Found**

Valve Box Cleaning **Not Necessary**

Sec. Valve Cycling **Completed**

Hydrant Lubrication **Completed**

Hydrant Painting **Not Necessary**

Colour Coding **Not Necessary**

Hose Cap Gasket Replacement **Not Necessary**

Pressure Testing **Completed**

Flow Testing **Completed**

## Testing Results

Static Pressure (psig) **80**

Residual Pressure (psig) **45**

Pitot Reading (psig) **38**

Water Quality **Clear**

1 Port Flow, Actual (usgpm) **1034**

## Comments

# FIRE HYDRANT TESTING & INSPECTION REPORT

(to be kept on site for review upon request by the Fire Chief, in accordance with subsection 1.1.2.1.)

Hydrant No. **1381** of

Service Date **04 October 2022**

Tested By Wood, D.

## Customer Information

Site Name **Niagara-on-the-Lake, Town of**

Site Contact

Address **Lake Shore Road**

Phone

Ext.

## Fire Hydrant Information

Hydrant Make & Model **Canada Valve Century**

Secondary Valve Location **Unknown**

Hydrant Location **South of # 1340 Lake Shore Rd**

Valve Box Type **Not Visible**

Opening Direction **Left**

Valve Box Height **Buried??**

Turns to Open **20**

Opening Direction **Unknown**

ATD Installed **No**

Turns to Open

## Inspection Results

\* **Service Status** **In Service, No Repairs**

Hydrant Operation **Satisfactory**

Barrel Assembly **Satisfactory**

Caps & Nozzles **Satisfactory**

Paint Quality **Satisfactory**

Colour Coding **Satisfactory**

Main Valve Assembly **Satisfactory**

Barrel Nozzle Style **2 Hose, 1 Storz**

Drain Valve Assembly **Satisfactory**

Nozzle Orientation **Correct**

Operating Assembly **Satisfactory**

Nozzle Height **Satisfactory**

Rod Assembly **Satisfactory**

Access to Hydrant **Satisfactory**

Barrel Drainage **Satisfactory**

Secondary Valve Operation **Not Inspected**

Barrel Found **Dry**

Valve Box Condition **Not Inspected**

## Maintenance Routines Completed

Barrel Dewatering **Not Necessary**

Hydrant Painting **Not Necessary**

Valve Box Locating **Completed/Not Found**

Colour Coding **Not Necessary**

Valve Box Cleaning **Not Inspected**

Hose Cap Gasket Replacement **Not Necessary**

Sec. Valve Cycling **Not Completed**

Pressure Testing **Completed**

Hydrant Lubrication **Completed**

Flow Testing **Completed**

## Testing Results

Static Pressure (psig) **86**

Residual Pressure (psig) **58**

Pitot Reading (psig) **54**

1 Port Flow, Actual (usgpm) **1233**

Water Quality **Clear**

## Comments

**APPENDIX C**  
**SANITARY SERVICING**



TABLE C1 - EXISTING TOTAL SANITARY FLOW		
		TOTAL
Total Units <sup>1</sup>	units	0
% of One Bedroom Units	%	0%
Persons Per Unit <sup>2</sup>	persons/unit	2.16
Total Residential Population	persons	0
Gross Floor Area <sup>3</sup>	ft <sup>2</sup>	45671.65
Employees Per 500 ft <sup>2</sup> <sup>4</sup>	persons/500ft <sup>2</sup>	1.00
Total Employee Population	persons	95

Total Population Used for Calculation Purposes	persons	<b>95</b>
--	---------	-----------

Residential Per Capita Demand @ 255 L/person/day <sup>5</sup>	L/day	0
Employment Per Capita Demand @ 310 L/emp./day <sup>5</sup>	L/day	29,450
Total Demand	L/day	29,450
Total Domestic Flow	L/s	0.34
Peaking Factor <sup>6</sup>		4
<b>Total Residential Peak Flow</b>	<b>L/s</b>	<b>1.36</b>
Site Area	m <sup>2</sup>	39500
Site Area	ha	3.95
Infiltration Allowance <sup>7</sup>	L/s/ha	0.286
<b>Total Infiltration Peak Flow</b>	<b>L/s</b>	<b>1.13</b>

<b>Total Peak Flow</b>	<b>L/s</b>	<b>2.49</b>
------------------------	------------	-------------

<sup>1</sup>58 units per email received from MGI on March 24, 2026

<sup>2</sup>Hotel was assumed as medium density which corresponds to 2.16 persons/unit per Town of Niagara-on-the-Lake Development Charges Background Study (2018).

<sup>3</sup>Total building footprint area (existing)

<sup>4</sup>Employment density was assumed as 1 person/500sqft per Town of Niagara-on-the-Lake Development Charges Background Study (2018).

<sup>5</sup>Per capita demand based on 2021 Water and Wastewater Master Servicing Plan Volume 4.

<sup>6</sup>Peaking factors per Harmon's Formula. Use of Harmon's Formula based on Niagara Region's 2021 Water and Wastewater Master Servicing Plan (Updated 2023).

<sup>7</sup>Infiltration Allowance based on Niagara Region's 2021 Water and Wastewater Master Servicing Plan (Updated 2023).

TABLE C2 - PROPOSED TOTAL SANITARY FLOW		
		TOTAL
Total Units <sup>1</sup>	units	58
% of One Bedroom Units	%	100%
Persons Per Unit <sup>2</sup>	persons/unit	2.16
Total Residential Population	persons	130
Gross Floor Area <sup>3</sup>	ft <sup>2</sup>	58466.00
Employees Per 500 ft <sup>2</sup> <sup>4</sup>	persons/500ft <sup>2</sup>	1.00
Total Employee Population	persons	125

Total Population Used for Calculation Purposes	persons	<b>255</b>
--	---------	------------

Residential Per Capita Demand @ 255 L/person/day <sup>5</sup>	L/day	33,150
Employment Per Capita Demand @ 310 L/emp./day <sup>5</sup>	L/day	38,750
Total Demand	L/day	71,900
Total Domestic Flow	L/s	0.83
Peaking Factor <sup>6</sup>		4
<b>Total Residential Peak Flow</b>	<b>L/s</b>	<b>3.33</b>
Site Area	m <sup>2</sup>	39500
Site Area	ha	3.95
Infiltration Allowance <sup>7</sup>	L/s/ha	0.286
<b>Total Infiltration Peak Flow</b>	<b>L/s</b>	<b>1.13</b>

<b>Total Peak Flow</b>	<b>L/s</b>	<b>4.46</b>
------------------------	------------	-------------

<sup>1</sup>58 units per email received from MGI on March 24, 2026

<sup>2</sup>Hotel was assumed as medium density which corresponds to 2.16 persons/unit per Town of Niagara-on-the-Lake Development Charges Background Study (2018).

<sup>3</sup>Total building footprint area (existing + proposed)

<sup>4</sup>Employment density was assumed as 1 person/500sqft per Town of Niagara-on-the-Lake Development Charges Background Study (2018).

<sup>5</sup>Per capita demand based on 2021 Water and Wastewater Master Servicing Plan Volume 4.

<sup>6</sup>Peaking factors per Harmon's Formula. Use of Harmon's Formula based on Niagara Region's 2021 Water and Wastewater Master Servicing Plan (Updated 2023).

<sup>7</sup>Infiltration Allowance based on Niagara Region's 2021 Water and Wastewater Master Servicing Plan (Updated 2023).

**APPENDIX D**  
**STORM SERVICING AND  
STORMWATER MANAGEMENT**



# 1339 Lakeshore Road - Regulated Features Map

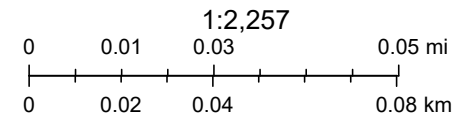


3/30/2026, 4:44:31 PM

SWOOP 2020 NPCA LIO - Wetland DRAFT

- Red: Band\_1 ■ Evaluated-Provincial
- Green: Band\_2 ■ Roads
- Blue: Band\_3 ■ NPCA APPROXIMATE REGULATION LANDS

<span style="background-color: #e0f2f1; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Wetland Allowance	Top of Slope Features
<span style="background-color: #e0f2f1; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Regulation Wetlands	<span style="border-bottom: 1px solid brown; width: 20px; display: inline-block;"></span> Stable
<span style="background: repeating-linear-gradient(45deg, transparent, transparent 2px, #ccc 2px, #ccc 4px); border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Evaluated-Provincial	<span style="border-bottom: 1px solid orange; width: 20px; display: inline-block;"></span> Unstable



NPCA, Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey,

Web AppBuilder for ArcGIS

<b>D2 - Existing Runoff Coefficient</b>				
<b>Surface</b>	<b>Runoff Coefficient</b>	<b>Area (m2)</b>	<b>% Area of Catchment</b>	<b>Weighted C Component</b>
Pervious	0.25	31059	78.6%	0.20
Impervious	0.90	8441	21.4%	0.19
		<b>39500</b>	<b>100.0%</b>	<b>0.39</b>
<b>Total</b>		<b>39500</b>		<b>0.39</b>

Areas were taken off of Google Maps due to lack of topographic survey

<b>D3 - Proposed Runoff Coefficient</b>				
<b>Surface</b>	<b>Runoff Coefficient</b>	<b>Area (m2)</b>	<b>% Area of Catchment</b>	<b>Weighted C Component</b>
Pervious	0.25	28144	71.3%	0.18
Impervious	0.90	11356	28.7%	0.26
		<b>39500</b>	<b>100.0%</b>	<b>0.44</b>
<b>Total</b>		<b>39500</b>		<b>0.44</b>

Note: Refer to Appendix D for breakdown of proposed pervious and impervious areas.

<b>D4 - Peak Flow Rates</b>			
<b>Return Period</b>	<b>Pre-development Flow (L/s)</b>	<b>Post-development Flow (L/s)</b>	<b>Δ (L/s)</b>
2	318.16	357.40	39.24
5	383.93	431.28	47.35
10	433.04	486.44	53.41
25	503.93	566.08	62.15
50	559.87	628.92	69.05
100	616.25	692.25	76.00

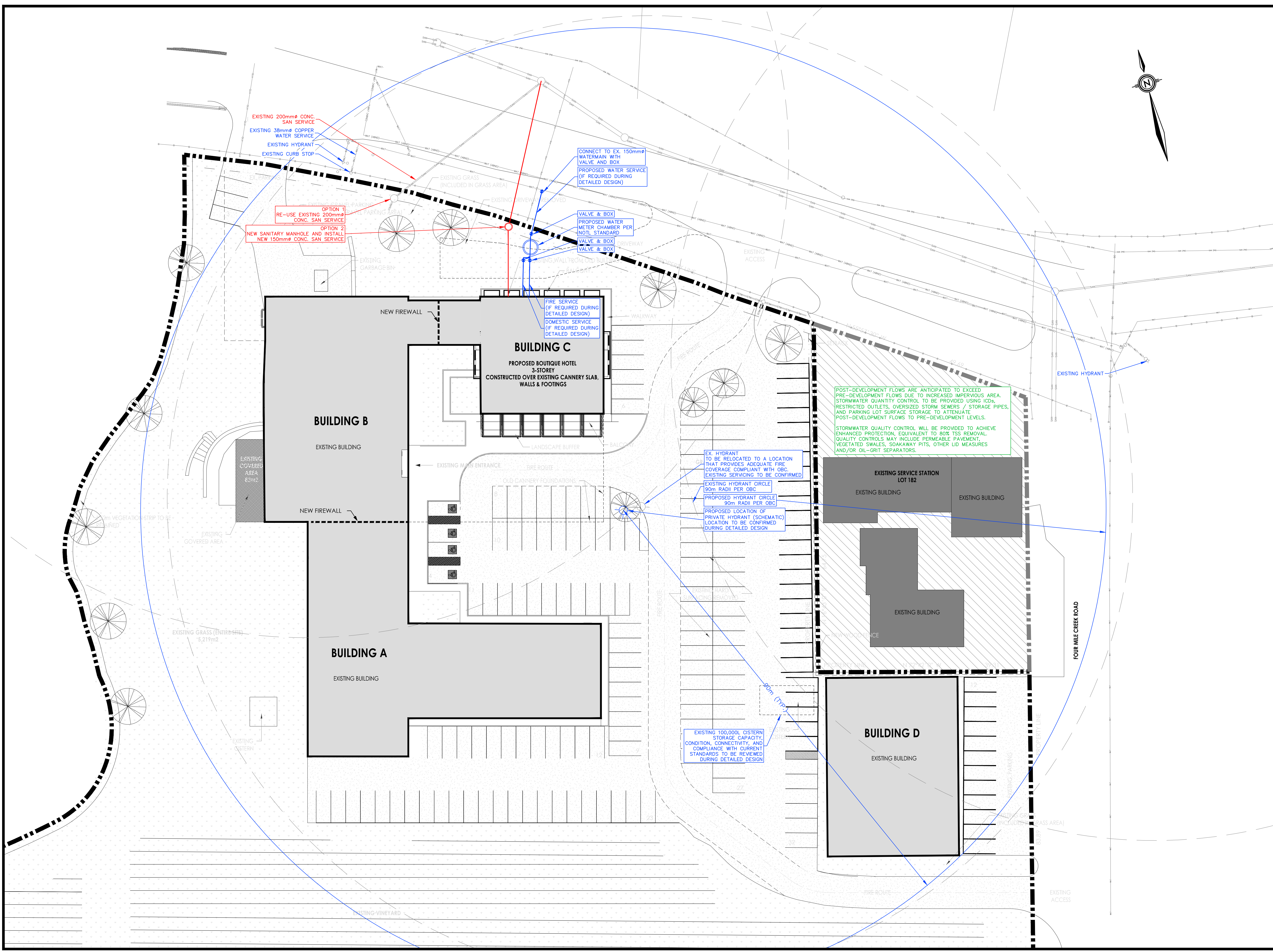
Note: Refer to Appendix D for breakdown of proposed pervious and impervious areas.



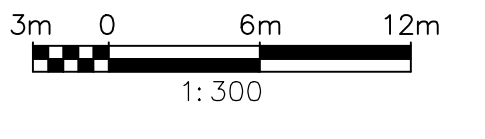


**APPENDIX E**  
**CIVIL DRAWINGS**





KEY PLAN N.T.S.	
No.	Comments
1	ISSUED IN SUPPORT OF OPA/ZBA



POST-DEVELOPMENT FLOWS ARE ANTICIPATED TO EXCEED PRE-DEVELOPMENT FLOWS DUE TO INCREASED IMPERVIOUS AREA. STORMWATER QUANTITY CONTROL TO BE PROVIDED USING ICDs, RESTRICTED OUTLETS, OVERSIZED STORM SEWERS / STORAGE PIPES, AND PARKING LOT SURFACE STORAGE TO ATTENUATE POST-DEVELOPMENT FLOWS TO PRE-DEVELOPMENT LEVELS.

STORMWATER QUALITY CONTROL WILL BE PROVIDED TO ACHIEVE ENHANCED PROTECTION, EQUIVALENT TO 80% TSS REMOVAL. QUALITY CONTROLS MAY INCLUDE PERMEABLE PAVEMENT, VEGETATED SWALES, SOAKAWAY PITS, OTHER LID MEASURES AND/OR OIL-GRIT SEPARATORS.

EX. HYDRANT TO BE RELOCATED TO A LOCATION THAT PROVIDES ADEQUATE FIRE COVERAGE COMPLIANT WITH OBC. EXISTING SERVICING TO BE CONFIRMED.

EXISTING HYDRANT CIRCLE 90m RADII PER OBC

PROPOSED HYDRANT CIRCLE 90m RADII PER OBC

PROPOSED LOCATION OF PRIVATE HYDRANT (SCHEMATIC) LOCATION TO BE CONFIRMED DURING DETAILED DESIGN

EXISTING 100,000L CISTERN STORAGE CAPACITY, CONDITION, CONNECTIVITY, AND COMPLIANCE WITH CURRENT STANDARDS TO BE REVIEWED DURING DETAILED DESIGN

EXISTING 200mm $\phi$  CONC. SAN SERVICE

EXISTING 38mm $\phi$  COPPER WATER SERVICE

EXISTING CURB STOP

EXISTING HYDRANT

OPTION 1 RE-USE EXISTING 200mm $\phi$  CONC. SAN SERVICE

OPTION 2 NEW SANITARY MANHOLE AND INSTALL NEW 150mm $\phi$  CONC. SAN SERVICE

CONNECT TO EX. 150mm $\phi$  WATERMAIN WITH VALVE AND BOX

PROPOSED WATER SERVICE (IF REQUIRED DURING DETAILED DESIGN)

VALVE & BOX

PROPOSED WATER METER CHAMBER PER NOTL STANDARD

VALVE & BOX

VALVE & BOX

FIRE SERVICE (IF REQUIRED DURING DETAILED DESIGN)

DOMESTIC SERVICE (IF REQUIRED DURING DETAILED DESIGN)

Drawing Prepared By:		
<b>RVA</b> R.V. ANDERSON ASSOCIATES LIMITED		
Client:		
MPI Group Inc.		
Project Name:		
STREW N WINERY REDEVELOPMENT 1339 LAKESHORE ROAD, NOTL		
Drawing Title:		
SERVICING		
Drawn:	Design:	Date:
AH	AH	MAY 2026
Checked:	Approved:	Scale:
AW	DAS	1:300
CADD File:	Dwg. No.:	
268426-S-SERVICING.dwg	C01	
Project No.:	268426	