VALDOR ENGINEERING INC.
Municipal • Land Development • Water Resources
Site Development • Project Management • Contract Administration
Consulting Engineers – est. 1992

571 Chrislea Road, Unit 4, 2nd Floor
Woodbridge, Ontario L4L 8A2
TEL (905) 264-0054
FAX (905) 264-0069
info@valdor-engineering.com
www.valdor-engineering.com

FUNCTIONAL SERVICING & STORMWATER MANAGEMENT REPORT

Proposed Mixed Use Development

2163 & 2169 Sixth Line
Town of Oakville
Region of Halton

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Prepared For: **Bara Group (River Oak) Inc.**

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VALDOR WATER RESOURCES

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1.0 INTRODUCTION

Valdor Engineering Inc. has been retained by the Bara Group (River Oak) Inc. to provide consulting engineering services for the proposed mixed use development on their lands located at the northwest corner of Sixth Line and River Oaks Blvd East in the Town of Oakville as indicated in **Figure 1.** The property is known municipally as 2163 & 2169 Sixth Line and is approximately 0.720 hectares in size.

1.1 Existing Conditions

The subject site is bound to the south by Sixth Line, to the east by River Oaks Blvd East, to the north by valley lands associated with Morrison Creek West and to the west by buildings for seniors residences.

The site is currently occupied by commercial buildings an associated parking lots and landscaped areas. The buildings will be demolished to accommodate the subject development.

1.2 Proposed Development

The proposed development consists of an eight store building containing apartment units with some commercial use on the ground floor. Parking will be provided at the ground surface as well as on two levels of underground parking. A copy of the preliminary architectural plans is included in **Appendix "A"**. The development statistics are summarized in **Table 1**.

Table 1. Development Statistics

	Site Area (Ha)	**Residential Units** (No.)	**Retail** (m^2)	**Dental** (m^2)
Mixed Use Development	**0.720**	**247**	**346**	**391**

1.3 Purpose of Report

This Functional Servicing & Stormwater Management Report outlines the engineering design elements for the proposed development, including water supply, sanitary sewers, grading and driveway access, as well as storm drainage and stormwater management.

This report is prepared in support of site plan application for the proposed development to demonstrate compliance with the criteria of the Town of Oakville, Region of Halton and the Conservation Halton.

2.0 WATER SUPPLY

The Region of Halton is responsible for the treatment and distribution of water to residences and businesses throughout the urban area of the Region. The Region owns, maintains and operates several water treatment and distribution systems including the South Halton Water Distribution System which services the Town of Oakville.

The Region's service areas are categorized by pressure zone and its relationship to the overall system operation. Due to the gradual rise in ground elevation northerly from the shore of Lake Ontario to the lake-based service area boundary in Milton and Halton Hills 401 Corridor, separate pressure zones have been established. Each pressure zone spans an elevation difference of approximately 30m and is identified by the local municipality that it services. Oakville is serviced by four primary pressure zones being O1, O2, O3, and O4, with sub-pressure zones fed through isolated supply points.

The subject site is located in Pressure Zone O3. Water supply to Pressure Zone O3 is pumped from the Kitchen Reservoir and Pumping Station and Eighth Line Booster Pumping Station. Pressure Zone O3 generally consists of lands in Oakville, between ground elevations of 127.6 m and 164.0 m and east of Bronte Creek. From the east system, the Eighth Line Booster Pumping Station also provides water to Zone O3 while Moore Reservoir provides storage and maintains pressure control. A plan indicating the limits of the various pressure districts in the Region is included in **Appendix "B"**.

The following is a summary of the water servicing analysis for the subject site.

2.1 Domestic Demand

The average domestic water demand for the proposed development was calculated using the following Region of Halton engineering design criteria:

Average Day Demand: 275 L/person/day
Maximum Day Demand Factor: 2.25
Peak Hour Demand Factor: 4.00
Equivalent Population:
Residential: 285 persons/ha (Apts over 6 storeys)
Commercial: 90 persons/ha

A detailed tabulation of the equivalent population and domestic water demand calculation is detailed in **Table B1** of **Appendix "B"**. The demands are summarized in **Table 2** below

Table 2. Domestic Water Demand

	Equivalent Population (Persons)	Average Day Demand (L/min)	Maximum Day Demand (L/min)	Peak Hour Demand (L/min)	Fire Flow (L/min)	Maximum Day Plus Fire Flow (L/min)	Maximum Day Plus Fire Flow (L/s)
Residential	205.2	39.2	88.2	156.8	5,000	5,088.2	84.8
Non-Residential	6.7	1.3	2.9	2.9	5,000	5,002.9	83.4
TOTAL	**211.9**	**40.5**	**91.0**	**159.6**	**5,000**	**5,091.0**	**84.9**

2.2 Watermains & Service Connections

The subject site will be serviced with a proposed water connection to the existing 300mm diameter Sixth Line watermain. The service connection will consist of a domestic waterline with a valve at the street line and a separate fire line with a valve at the street line in accordance with Halton Region standards.

The proposed domestic water service and fire line enter the meter room located on the P1 level of the parking garage. The water meter and backflow prevention device will be located in the meter room. A copy of the Region’s standard water service connection detail is included in **Appendix “B”**. The location of the existing watermains as well as the water service connections are indicated in **Figure 2**.

2.3 Fire Protection

The fire flow required for the proposed townhouse units was calculated using the criteria indicated in the *Water Supply for Public Fire Protection Manual*, 1999, by the Fire Underwriters Survey (FUS). The calculation incorporates various parameters such as coefficient for fire-resistant construction, an area reduction accounting for a fire-resistant (one hour rating) protection, a reduction for low-hazard occupancies, an adjustment for sprinkler protection system, and a factor for neighbouring building proximity.

Based on the largest floor area, the minimum fire suppression flows required is 5,000 L/min. This fire flow plus the maximum day demand must be available at the nearest hydrant with a minimum pressure of 140 KPa (20.3 psi). The calculation of the required fire flow is provided in **Table B2** which is contained in **Appendix “B”**.

Each of the proposed buildings will have a sprinkler system for fire protection with a Siamese connection. Fire hydrants are required such that the principle building entrances and the Siamese connections are within the required 90m and 45m as set out in the Ontario Building Code. Based on the location of the Siamese connections and principle entrances, there are municipal fire hydrants within the required distances for all of the building. The location of the existing municipal fire hydrants, proposed site fire hydrant and the Siamese connections are illustrated in **Figure 2**.

Pressure and flow testing was conducted by Corix Water Services Inc. on August 17th, 2021 at the closest municipal fire hydrants to obtain existing flows as well as residual and static pressure in order to determine if the existing infrastructure can provide the required fire suppression. Based on the test result, the required fire flow plus maximum demand of 5,091.0 L/min (5,000 L/min + 91.0 L/min) is available at a residual pressure of approximately 495.8 kPa (71.9 psi), which is greater than the minimum pressure of 140 kPa (20.3 psi) and therefore there is sufficient capacity to support the development. The calculation of the available pressure at the required fire flow plus maximum day demand is provided in **Table B3** which is contained in **Appendix "B"** together with the hydrant flow test results.

3.0 WASTEWATER SERVICING

Halton Region is responsible for the collection and treatment of wastewater treatment in Oakville as well as Burlington, Milton and Halton Hills. The wastewater collection systems generally consist of relatively small diameter (200 and 250mm) local gravity sewers which are connected to larger sub trunks and trunk sewers. In areas which are topographically difficult to service by gravity, the Region operates wastewater pumping stations and their forcemains. The Region operates several wastewater treatment plants (WWTPs) including Burlington Skyway, Mid-Halton, Oakville Southwest and Oakville Southeast. The subject site is located in the drainage shed of the Mid-Halton WWTP which is located on the south side of the QEW adjacent to the Fourteen Mile Creek in Oakville.

A plan indicating the various sanitary service areas are included in **Appendix "C"**. The following is a summary of the wastewater servicing analysis for the subject site.

3.1 Wastewater Loading

The wastewater analysis for the subject site was completed using the design criteria stipulated in the Region of Halton engineering design guidelines which include the following parameters:

Average Daily Flow: 275 L/person/day

Extraneous Flow: 0.286 L/s/Ha (Infiltration)

Peaking Factor: $M = 1 + \frac{14}{4 + \sqrt{P}}$

Where: M = Harmon Peaking Factor
p = Population in thousands

Equivalent Population:

Residential: 285 persons/ha (Apartments over 6 storeys)
Commercial 90 persons/ha

Based on the above criteria the sewage flow was calculated for each phase. The detailed calculations are provided in **Table C1** which is included in **Appendix "C"** and the total flow from each phase is summarized in **Table 3**.

Table 3. Wastewater Loading Summary

	Site Area (Ha)	Equivalent Population (Persons)	Harmon Peaking Factor	Average Daily Flow (L/s)	Infiltration Rate (L/s)	Total Flow (L/s)
Residential		205.2	4.14	0.65		2.71
Commercial		6.7	4.43	0.02		0.09
Infiltration	0.720				0.21	0.21
TOTAL	**0.720**	**211.9**		**0.67**	**0.21**	**3.01**

3.2 Sanitary Sewers & Service Connections

The subject site will be serviced by a proposed connection to the existing 300 mm diameter Sixth Line sanitary sewer. A control manhole will be located at the street line in accordance with Region of Halton standards. The sanitary service will then enter the underground parking garage and branch in the form of a drain to the various risers to serve the residential and non-residential uses above. The sanitary drains will be designed by the mechanical engineer at the building permit stage. The location of the existing and proposed sanitary sewers as well as the proposed sanitary service connections is illustrated in **Figure 3**. The Region's standard detail for a sanitary service connection is included in **Appendix "C"**.

3.3 Downstream Sanitary Sewer Capacity

In order to confirm that these is sufficient capacity available in the downstream sanitary sewer, an analysis was conducted from the subject site to the existing 825mm diameter trunk sewer on Upper Middle Road along the local sanitary sewer which have pipe diameters ranging in size from 300mm at the frontage of the site to 375mm at the most downstream of the study area. The analysis was conducted using the flow data and pipe data from the InfoSewer® model obtained from the Region of Halton. This data was extracted from the model using the geographic information system (GIS), ArcGIS and is summarized in **Table C2** and **Table C3** which is contained in **Appendix "C"** together with **Figure C1** which illustrates the alignment of the subject downstream sanitary sewer.

The downstream sanitary sewer alignment was confirmed using the sanitary tributary map obtained from the Region's web site and the sewer invert elevations, lengths, diameters and slopes were verified using plan & profile drawings obtained from the Region.

In order to determine the impact of the wastewater flow from the proposed development on the downstream sanitary sewer a hydraulic grade line (HGL) analysis was conducted using PCSWMM software. Based on the modelling, the downstream sanitary sewer does not surcharge under pre-development conditions as illustrated in **Figure C2.** The post-development condition was modelled by adding 3.01 L/s from the proposed development. Based on the addition of this flow there was no surcharging indicated as summarized in

Figure C3 and summarized in **Table C4.** Based on the foregoing, there is sufficient capacity in the downstream sanitary sewer.

4.0 STORM DRAINAGE

The subject site is located within the West Morrison Creek sub-watershed which has an area of 611 hectares. The Morrison – Wedgewood Diversion Channel, located north of the QEW, conveys the runoff from five branches of the Morrison and Wedgewood creek systems to Sixteen Mile Creek. The Sixteen Mile Creek watershed covers approximately 357 Km^2 of land and includes portions of Milton, Halton Hills, and Oakville. This creek drains into Lake Ontario with its outlet located west of Trafalgar Road in downtown Oakville. Conservation Halton is responsible for eight watersheds, including Sixteen Mile Creek, all of which ultimately drain into Lake Ontario. A map of the watershed is contained in **Appendix "D"**.

In accordance with Town standards, a major / minor system storm conveyance concept has been incorporated into the functional servicing design for the subject development. The following sections provide a brief summary of the storm drainage components:

4.1 Minor System Design

As per the Town engineering design criteria, the proposed development is to be serviced with a minor storm sewer system that is designed to convey runoff from the 5 year storm event. The rainfall intensity values, *I*, are calculated in accordance with the Town of Oakville standards as follows:

$$I_5 = \frac{1170}{(t+5.8)^{0.843}} = 114.2 \qquad I_{100} = \frac{2150}{(t+5.7)^{0.861}} = 220.8$$

The peak flows are calculated using the following formula:

Q = *R* x *A* x *I* x 2.778

where: *Q* = peak flow (L/s)
A = area in hectares (Ha)
I = rainfall intensity (mm/hr)
R = composite runoff coefficient
t = time of concentration (10 min)

The rainfall intensity duration frequency (IDF) curve data are included in **Appendix "D"**. A schematic design of the minor system is illustrated in **Figure 6**.

The subject site will be serviced by a proposed 250 mm diameter storm service connection to the existing 825 mm diameter storm sewer on the Sixth Line with a control manhole located at the street line. The internal storm drain system will be routed within the parking garage to capture roof drainage from the towers and podium, and to collect drainage from the driveway, walkways and landscaped areas at ground level. The internal drainage system will be designed at the building permit stage by the project mechanical engineer.

4.2 Major System Design

The major system will generally be comprised of an overland flow route along the municipal road network directing drainage to a safe outlet. This major system will convey flows which are in excess of the capacity of the minor storm sewer system. The major system flow route is illustrated in **Figure 6**.

4.3 Foundation Drainage

The proposed building will have underground parking garages that will require weeping tile at the foundation level. As is typical with this type of development, the foundations will be deeper than the municipal storm sewer and therefore sump pumps will be required. The foundation drain sump pump is to be designed by the mechanical engineer and indicated on the mechanical plans at the building permit design stage.

4.4 Roof Drainage

The proposed buildings will have flat roof designs that will require roof drains. These roof drains will be collected by the building's internal storm drain system which will discharge to the site storm sewer system. The roof drain system is to be designed by the mechanical engineer and indicated on the mechanical plans at the building permit design stage. Roof top stormwater detention is not proposed.

5.0 STORMWATER MANAGEMENT

The stormwater management design for the site is to meet the criteria of the Tow of Oakville and Conservation Halton as follows:

- Stormwater quantity control is to be provided to control discharge to the pre-development rate.
- Level 1 (Enhanced) stormwater quality treatment is to be provided to achieve 80% TSS removal.
- Water balance measures are to be implemented on-site to ensure that a minimum of 5 mm of rainfall depth is infiltrated or re-used.

Based on the foregoing, the following is a summary of the stormwater mitigation measures that are to be incorporated into the design.

5.1 Quantity Control

Stormwater quantity control is typically implemented to minimize the potential for downstream flooding, stream bank erosion and overflows of infrastructure. The impact of the proposed development has been analyzed as follows:

5.1.1 Pre-Development Flow

Pre-development surfaces consist primarily of the existing buildings and the paved driveway, parking lots and landscaped areas, which indicate that the existing site condition is relatively impervious with a composite runoff coefficient of 0.71. The pre-development surface conditions are illustrated in **Figure 4.**

The calculation of the pre-development 5 year and 100 year peak flows are provided in **Table E1** contained in **Appendix "E"** and summarized in the first row of **Table 4.**

Table 4: Storm Drainage Peak Flows

	Runoff Coefficient	**5 Year Peak Flows** (L/s)	**100 Year Peak Flows** (L/s)
Pre-Development	0.71	163.0	286.6
Post-Development: Un-Mitigated	0.77	134.6	236.6
Post-Development: Mitigated	0.77	104.8	162.4

5.1.2 Post-Development Flow: Un-mitigated

Based on a review of the architect's preliminary site plan, the post-development surface conditions for this site are illustrated in **Figure 5.** The surfaces are mainly the paved driveway, the roof of the building and the landscaped areas. Based on these surfaces, the proposed development is more impervious than the existing site condition with the composite runoff coefficient increasing from 0.71 to 0.77.

Based on the area of the proposed surfaces, the post-development hydrological condition was calculated in accordance with the equations presented in Section 4.1.1, assuming no mitigation measures will be implemented. The unmitigated 5 and 100 year peak pre-development flow rates are calculated on **Table E2** and summarized in the second row of **Table 4**. A comparison of the rates in the first and second rows of **Table 4** indicates that the un-mitigated post-development peak flows will be higher than the pre-development rate.

5.1.3 Post-Development Flow: Mitigated

Given that the runoff from the site will be captured and directed to the municipal storm sewer, the 100 year post development peak flow is to be controlled to the 5 year pre-development rate and therefore mitigation measures are necessary. In order to control discharge it is proposed to install an orifice restrictor at the outlet and provide on-site storage in the form of stormwater tank within the P1 level of the underground parking garage.

The stormwater quantity control was modelled using the modified rational method. This method calculates the storage volume using the composite runoff coefficient and the target rate. Through an iterative assessment of various orifice sizes, underground storage configurations and high water levels, a detention system was developed.

The post-development mitigated hydrologic condition for the project area was calculated using the orifice discharge equation and is summarized in **Table E3**. A comparison of the flows in the first and third rows of **Table 4** indicates that the mitigated post-development 100 year peak flow has been controlled to 162.4 L/s which is less than the 5 year pre-development rate. Based on the above and using a 171mm diameter orifice plate, a storage volume of 90.7 m^3 is will be provided in a stormwater tank contained within the underground parking garage.

The calculation of the orifice size, required storage volumes and available storage volumes are provided in **Table E4** to **Table E9** which are included in **Appendix "E"** together with a summary provided in **Table E**. The location of the stormwater detention tank and orifice restrictor is provided in **Figure 6**.

Roof top stormwater detention is not required and therefore control flow roof drains are not required.

With regards to the Town's restrictions regarding the depth of surface ponding, given that all of the detention volume will be provided underground, there will be no surface ponding for storm events up to and including the 100 year storm. In addition the first floor elevation of the buildings will be a minimum of 0.30m higher than the 100 year high water level.

5.2 Quality Control

The long term stormwater quality control goal is to achieve the federal, provincial and municipal water and sediment quality objectives in the local watercourses. In addition to the many parameters of concern, the primary water quality constituent that needs to be controlled is Total Suspended Solids (TSS). Based on the City's criteria, stormwater quality control for the subject site is to be designed to achieve "Enhanced" protection (Level 1 treatment) with a minimum total suspended solid removal efficient (TSS) of 80%.

Several on-site mitigation measures are available to treat stormwater runoff including oil / grit separators (OGS), filter systems, infiltration trenches, permeable pavement and grass swales. For this project, the site design incorporates an OGS supplemented with an infiltration trench in a treatment train approach.

In order to achieve the "Enhanced" protection level (Level 1 treatment), which entails 80% total suspended solids (TSS) removal, an oil / grit separator is proposed for the Phase 1. Separators are generally implemented on relatively small sites and are typically in the form of a pre-cast concrete maintenance hole with a deep sump with a special insert which diverts low flows to a lower chamber to capture and store oil and grit from the storm drainage discharge from the site. The insert diverts high flow away from the lower chamber to ensure that captured pollutants do not scour or re-suspend.

For this application a Storm*ceptor*® type oil / grit separators manufactured by Imbrium Systems Inc. has been selected. The separator has been sized in accordance with the manufacturer's recommendations. Based on the simulations, a Storm*ceptor*® Model EF06 has been chosen which, based on the catchment areas and imperviousness, have the capability of providing a TSS removal rate of 88%.

In order to summplement the OGS in a treatment train approach, Low Impact Development (LID) measure in the form of an infiltration trench will be located downstream of the OGS. The location of the oil / grit separator and infiltration tench is provided in **Figure 6**. The oil grit separator sizing output and a standard detail is provided in **Appendix "F"**.

5.3 Water Balance

In accordance with the requirements of the Town of Oakville and Halton Conservation, water balance is to be addressed such that a minimum of a 5 mm rainfall depth is to be retained on site and either infiltrated or re-used. The objective of this criteria is to capture and manage annual rainfall on-site to preserve the pre-development hydrology.

Low Impact Development (LID) measures such as infiltration trenches, bio-retention swales, green roof systems and permeable pavers are implemented as source and conveyance stormwater management controls to promote infiltration and pollutant removal on a local site by site basis. These measures rely on eliminating the direct connection between impervious surfaces such as roofs, roads, parking areas, and the storm drainage system, as well as the promotion of infiltration on each development or redevelopment site.

The benefits from LID stormwater management practices are generally focused on the more frequent storm events (5mm rainfall events) of lower volumes as opposed to the less frequent storm events (e.g. 100 year storm) with higher volumes. It is also recognized that the forms of LID which promote infiltration or filtration through a granular medium also provide thermal mitigation for storm runoff. LID measures can be implemented to varying degrees based upon the available area given the proposed land use and development form and the soil infiltration capacity.

A review of the architect's site plan indicates that a green roof system is proposed on part of the roof area. The green provides significant stormwater management benefits. The vegetation, growing medium and retention layer of a green roof system captures and absorbs rainwater thereby reducing runoff volumes. Given that the underground parking structure covers virtually the entire site infiltration trenches and permeable pavers are not feasible.

The runoff volume to be retained is calculated based on the site area with an adjustment for initial abstraction to reflect the retention benefits of the green roof. The stormwater runoff volume is calculated using the following formula:

$V = A \times (D - Ia)$ where: V = runoff volume (m^3)
A = site area (m^2)
D = rainfall depth (0.005m)
Ia = initial abstraction

$V = 7{,}200\ m^2 \times (0.005 - 0.00191) = 17.0\ m^3$

Based on the impervious areas on site, the required water balance volume is 17.0 m^3.
A review of the site plan indicates that there is an opportunity to incorporate an infiltration trench. For this project, the infiltration trench will be in the form of a commercially available modular storage system comprised of polypropylene top, bottom and side panels and PVC columns, all of which are assembled on site to create the storage chamber. These modular units, which have a 97% void ratio, are marketed as the StormTank™ and are manufactured by Brentwood Industries Inc. The individual StormTank™ units have a modular size of 0.914m long x 0.457m wide with a height of 0.914m.

The trench will be located at the east limit of the site and will be supplied by runoff treated by the oil / grit separator. The calculations for the sizing of the infiltration trench are provided in **Table G1** which is included in **Appendix "G"** together with details of the StormTank™ storage system. The location of the proposed infiltration trench is indicated in **Figure 6**.

6.0 VEHICULAR & PEDESTRIAN ACCESS

The site plan has been developed with consideration for efficient and safe access and circulation of both vehicular and pedestrian traffic. The following is a summary of the facilities:

6.1 Driveways & Parking Lots

Access to the development will be provided by two driveways to provide full movements to the Sixth Line. The driveways will provide access to the underground parking garage, ground level parking, and will also serve service vehicles such as garbage collection and delivery vehicles.

6.2 Sidewalks, Walkways & Trails

Internal pedestrian access will be provided by walkways to safely guide residents within the development site with connections to the municipal sidewalks for access to bus stops along the Sixth Line and the trail system in the adjacent valley lands.

7.0 GRADING

As is typical will all development, re-grading of the site is required to varying degrees to achieve the municipal design criteria. Based on a review of the topographic survey, the site can be described as relatively flat.

The grading design will be governed by the following factors:

- Provide an overland flow route to direct drainage to a safe outlet.
- Achieve the municipal grading criteria.
- Meet the Town's vertical road design parameters.
- Minimize the requirement for retaining walls.
- Match existing grades along the valley top-of-bank.

The subject site is to be graded in accordance with the municipal grading criterion which dictates that road grades are to range from 0.5% to 5.0% and that sodded yard areas are to range from 2.0% to 5.0%. For large grade differentials, a maximum slope 3H : 1V can be used for sodded embankments. In areas where space is limited, retaining walls can be utilized to accommodate grade differentials. The road boulevards are to be graded to the standard 2% cross fall. The preliminary grading design is provided on the Functional Grading Plan (Dwg FGP-1). Based on the preliminary design no significant difficulty is anticipated in achieving the municipal criteria.

8.0 EROSION & SEDIMENT CONTROL DURING CONSTRUCTION

Construction activity, especially operations involving the handling of earthen material, dramatically increases the availability of particulate matter for erosion and transport by surface drainage. In order to mitigate the adverse environmental impacts caused by the release of silt-laden stormwater runoff into receiving watercourses, measures for erosion and sediment control (ESC) are required for construction sites.

The impact of construction on the environment is recognized by the Greater Golden Horseshoe Area Conservation Authorities. In December 2006 they released their document titled "Erosion & Sediment Control Guidelines for Urban Construction". This document provides guidance for the preparation of effective erosion and sediment control plans.

Control measures must be selected that are appropriate for the erosion potential of the site and it is important that they be implemented and modified on a staged basis to reflect the site activities. Furthermore, their effectiveness decreases with sediment loading and therefore inspection and maintenance is required. The selection, implementation, inspection and maintenance of the control features are summarized as follows:

8.1 Control Measures

On moderately sized sites, measures for erosion and sediment control typically include the use of silt fencing, a mud mat and sediment traps. The following is a description of the sediment controls to be implemented on the subject site:

- **Silt Fences** are to be installed adjacent to all property limits subject to drainage from the development area prior to topsoil stripping and in other locations, such as at the bases of topsoil stockpiles.
- **Mud Mat** is to be installed at the construction entrance prior to commencing earthworks to minimize the tracking of mud onto municipal roads.

- **Sediment Traps** are to be installed at all catchbasin and area drain locations once the storm sewer system has been constructed to prevent silt laden runoff from entering the municipal storm sewer system.

8.2 Construction Sequencing

The following is the scheduling of construction activities with respect to sediment controls:

1. Install the hoarding and silt fences prior to any other activities on the site.
2. Construct temporary mud mat for construction access.
3. Install sediment traps in all street catchbasins in the vicinity of the site.
4. Install the shoring, excavate for the underground parking garage and dispose earth material off site.
5. Construct the foundation and underground parking garage.
6. Construct the superstructure of the building and complete the cladding, rough-ins and finishes.
7. Install the service connections.
8. Remove the existing municipal sidewalks and construct the new municipal sidewalks.
9. Construct the driveways.
10. Restore all disturbed areas with final landscape plantings and paving materials.
11. Upon stabilization of all disturbed areas, remove sediment controls.

8.3 ESC Inspection & Maintenance

In order to ensure that the erosion and sediment control measures operate effectively, they are to be regularly monitored and they will require periodic cleaning (e.g., removal of accumulated silt), maintenance and/or re-construction.

Inspections of all of the erosion and sediment controls on the construction site should be undertaken with the following frequency:

- On a weekly basis
- After every rainfall event
- After significant snow melt events
- Prior to forecasted rainfall events

If damaged control measures are found they should be repaired and/or replaced within 48 hours. Site inspection staff and construction managers should refer to the Erosion and Sediment Control Inspection Guide (2008) prepared by the Greater Golden Horseshoe Area Conservation Authorities. This Inspection Guide provides information related to the inspection reporting, problem response and proper installation techniques.

9.0 SUMMARY

Based on the discussions contained herein, the proposed high-rise mixed use development can be adequately serviced with full municipal services (watermain, sanitary and storm) in accordance with the standards of the Town of Oakville, Region of Halton, and Conservation Halton as follows:

Water

- The subject site is located within Pressure District O3 and will be serviced by a proposed 200mm diameter water service connection to the existing 300mm diameter watermain on the Sixth Line. The development will be serviced by a separate domestic and fireline connection as per Region of Halton standards. Since the underground parking structure will extend across the entire limit of the development site, water meters and back flow prevention devices will be installed in the meter room on the first parking level.
- The average day water consumption rate for the proposed development is 40.5 L/min. With regard to fire protection, the required fire flow plus maximum day demand of 5,091 L/min will be available at a pressure above the minimum 140 KPa based on the results of a pressure and flow test on a nearby hydrant.

Waste Water

- The subject site is located within the service area Mid-Halton Wastewater Treatment Plant. The development site will be serviced by a proposed 250mm diameter sanitary service connection to the existing 300mm diameter sanitary sewer on the Sixth Line. The total wastewater flow was calculated to be 3.01 L/s.
- An analysis of the downstream sanitary sewer has confirmed that there is sufficient capacity to accommodate the subject development.

Storm Drainage

- The lands are to be serviced with a minor system sized for the 5 year storm event in accordance with Town criteria. The development site is to have a proposed 250mm diameter storm service conection to the existing 825 mm diameter municipal storm sewer on the Sixth Line via a control manhole to be installed at the street line.
- The major system will be comprised of an overland flow route which will convey runoff from rainfall events in excess of the capacity of the municipal storm sewer to a safe outlet.

Stormwater Management

- In order to achieve the required discharge rate, a detention tank will be provided in the underground parking garage having a volume of 90.7 m^3 and a 171 mm diameter orifice plate will restrict the discharge to 162.4 L/s.
- Roof top stormwater detention is not required and therefore control flow roof drains are not required.
- With regards to the Town's restrictions regarding the depth of surface ponding, given that all of the detention volume will be provided underground, there will be no surface

ponding for storm events up to and including the 100 year storm. In addition, the first floor elevation of the buildings will be a minimum of 0.30m higher than the 100 year high water level.

- With regards to quality control, an oil / grit separator, supplemented with a Low Impact Development (LID) measure in the form of an infiltration trench in a "treatment train approach" will provide the required minimum treatment rate of 80%TSS removal.
- With respect to water balance, rainwater will be retained on site through the use of Low Impact Development (LID) measures which include a green roof system and an infiltration trench.

Vehicle & Pedestrian Access

- The subject site will be serviced by two driveways which will provide access to surface level parking, passenger drop-off areas and the underground parking structure as well as access for waste collection and service vehicles.
- Internal pedestrian access will be provided by walkways to safely guide residents within the development site with connections to the municipal sidewalks for access to bus stops along the Sixth Line and the trail system in the adjacent valley lands.

Grading

- Given that the subject site is relatively flat, no significant difficulties are anticipated in achieving the Town of Oakville grading design criteria.

Erosion & Sediment Control During Construction

- Erosion and sediment controls are to be implemented during construction to prevent silt laden runoff from leaving the site in accordance with the "Erosion & Sediment Control Guidelines for Urban Construction" (December 2006).

10.0 REFERENCES & BIBLIOGRAPHY

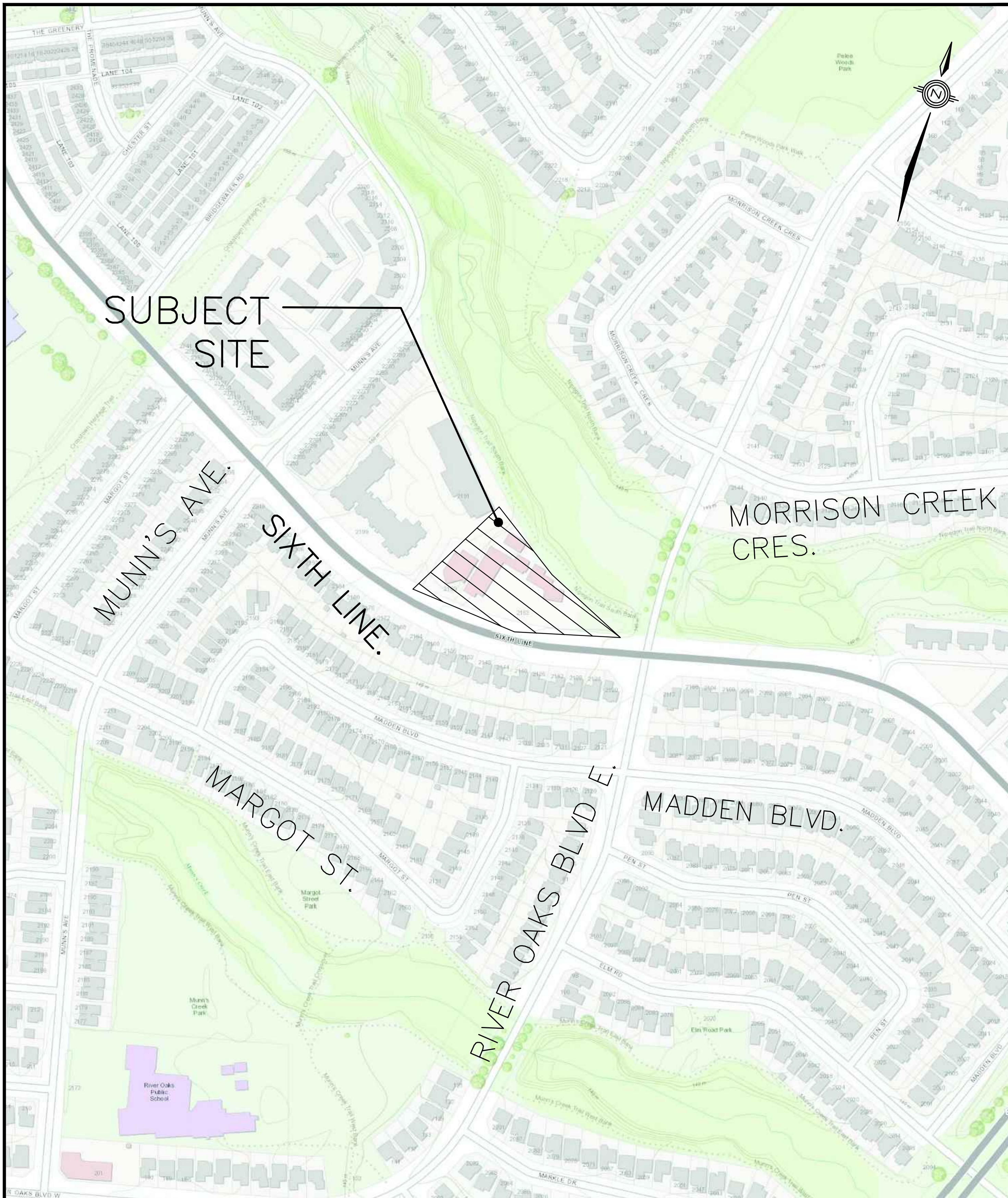
- Town of Oakville, **Development Engineering Procedures and Guidelines Manual**, January 2011.
- Town of Oakville, **Standard Detail Drawings**.
- Halton Region, **Design Criteria, Contract Specifications and Standard Drawings**, May 2014, Version 2.0.
- Ministry of Environment, **Stormwater Management Planning & Design Manual**, March 2003.
- Greater Golden Horseshoe Area Conservation Authorities, **Erosion & Sediment Control Guidelines for Urban Construction**, December 2006.
- Fire Underwriters Survey, Water Supply for Public Fire Protection, 1999.
- Ministry of Municipal Affairs & Housing, **Ontario Building Code**, 2012

Respectfully Submitted,

VALDOR ENGINEERING INC.

David Giugovaz, P.Eng., LEED® AP
Senior Project Manager

905-264-0054 x 224
dgiugovaz@valdor-engineering.com

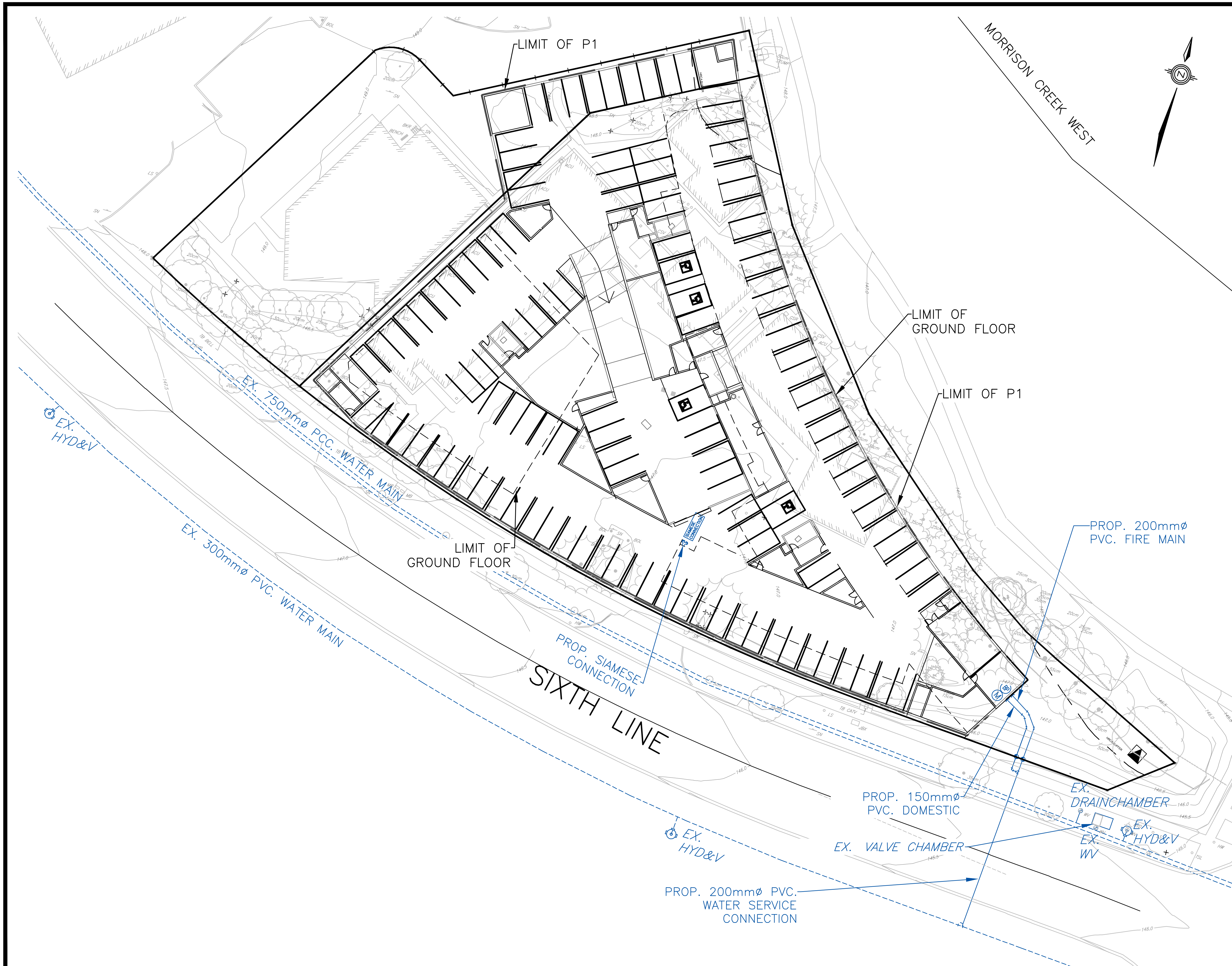


PROPOSED MIXED-USE DEVELOPMENT
TOWN OF OAKVILLE

KEY PLAN

VALDOR ENGINEERING INC.
Consulting Engineers - Project Managers
571 CHRISLEA ROAD, UNIT 4, 2ND FLOOR, VAUGHAN, ONTARIO, L4L 8A2
TEL (905) 264-0054, FAX (905) 264-0069
E-MAIL: info@valdor-engineering.com
www.valdor-engineering.com

SCALE	N.T.S.	CKD. BY	D.G.	DWG.	FIGURE 1
DATE	FEBRUARY 2022	DRAWN BY	R.M.	PROJECT	21147



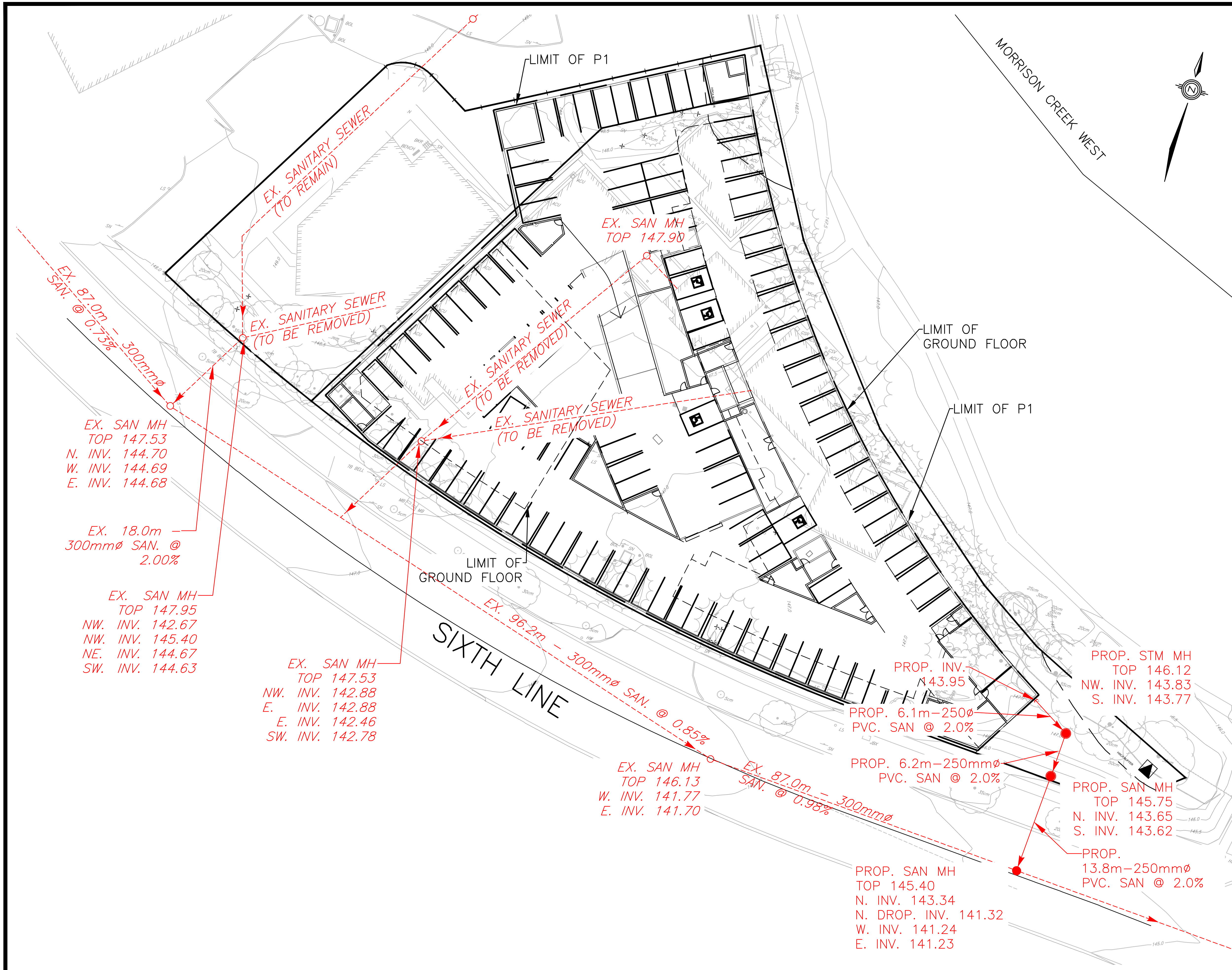
PROJECT

PROPOSED MIXED–USE DEVELOPMENT
2163 & 2169 SIXTH LINE ROAD
TOWN OF OAKVILLE

WATER SERVICE

VALDOR ENGINEERING INC.
Consulting Engineers - Project Managers
571 CHRISLEA ROAD, UNIT 4, 2ND FLOOR, VAUGHAN, ONTARIO, L4L 8A2
TEL (905) 264-0054, FAX (905) 264-0069
E-MAIL: info@valdor-engineering.com
www.valdor-engineering.com

PREPARED BY	CKD. BY
R.M.	D.G.
SCALE: N.T.S.	DATE: FEBRUARY 2022
PROJECT: 21147	DWG.: FIGURE 2



LEGEND:

- PROPOSED SANITARY
- PROPOSED MANHOLE
- EXISTING MANHOLE
- EXISTING SANITARY

PROJECT

PROPOSED MIXED–USE DEVELOPMENT
2163 & 2169 SIXTH LINE ROAD
TOWN OF OAKVILLE

SANITARY SERVICE

VALDOR ENGINEERING INC.
Consulting Engineers - Project Managers
571 CHRISLEA ROAD, UNIT 4, 2ND FLOOR, VAUGHAN, ONTARIO, L4L 8A2
TEL (905) 264-0054, FAX (905) 264-0069
E-MAIL: info@valdor-engineering.com
www.valdor-engineering.com

PREPARED BY: R.M.	CKD. BY: D.G.
SCALE: N.T.S.	DATE: FEBRUARY 2022
PROJECT: 21147	DWG.: FIGURE 3

LEGEND:

- ROOF
- PERVIOUS
- IMPERVIOUS

PRE–DEVELOPMENT SUMMARY (2163 SIXTH LINE)			
LAND USE	AREA (Ha.)	RC	COMPOSITE RC
LANDSCAPE	0.162	0.25	0.71
ROOF	0.110	0.90	
IMPERVIOUS	0.276	0.90	
TOTAL	0.548		

PRE–DEVELOPMENT SUMMARY (2169 SIXTH LINE)			
LAND USE	AREA (Ha.)	RC	COMPOSITE RC
LANDSCAPE	0.045	0.25	0.73
ROOF	0.047	0.90	
IMPERVIOUS	0.080	0.90	
TOTAL	0.172		

PROJECT

PROPOSED MIXED–USE DEVELOPMENT
2163 & 2169 SIXTH LINE ROAD
TOWN OF OAKVILLE

PRE–DEVELOPMENT DRAINAGE CONDITION

VALDOR ENGINEERING INC.
Consulting Engineers - Project Managers
571 CHRISLEA ROAD, UNIT 4, 2ND FLOOR, VAUGHAN, ONTARIO, L4L 8A2
TEL (905) 264-0054, FAX (905) 264-0069
E-MAIL: info@valdor-engineering.com
www.valdor-engineering.com

PREPARED BY R.M.	CKD. BY D.G.
SCALE N.T.S.	DATE FEBRUARY 2022
PROJECT 21147	DWG. FIGURE 4

LEGEND:

- ROOF
- PERVIOUS
- GREEN ROOF
- IMPERVIOUS

CONTROLLED POST–DEVELOPMENT AREA (2163 SIXTH LINE)

LAND USE	AREA (Ha.)	RC	COMPOSITE RC
LANDSCAPE	0.053	0.25	0.77
ROOF	0.307	0.90	
GREEN ROOF	0.070	0.40	
IMPERVIOUS	0.118	0.90	
TOTAL	0.548		

UNCONTROLLED POST–DEVELOPMENT AREA (2169 SIXTH LINE)

LAND USE	AREA (Ha.)	RC	COMPOSITE RC
LANDSCAPE	0.024	0.25	0.81
IMPERVIOUS	0.148	0.90	
TOTAL	0.172		

PROJECT

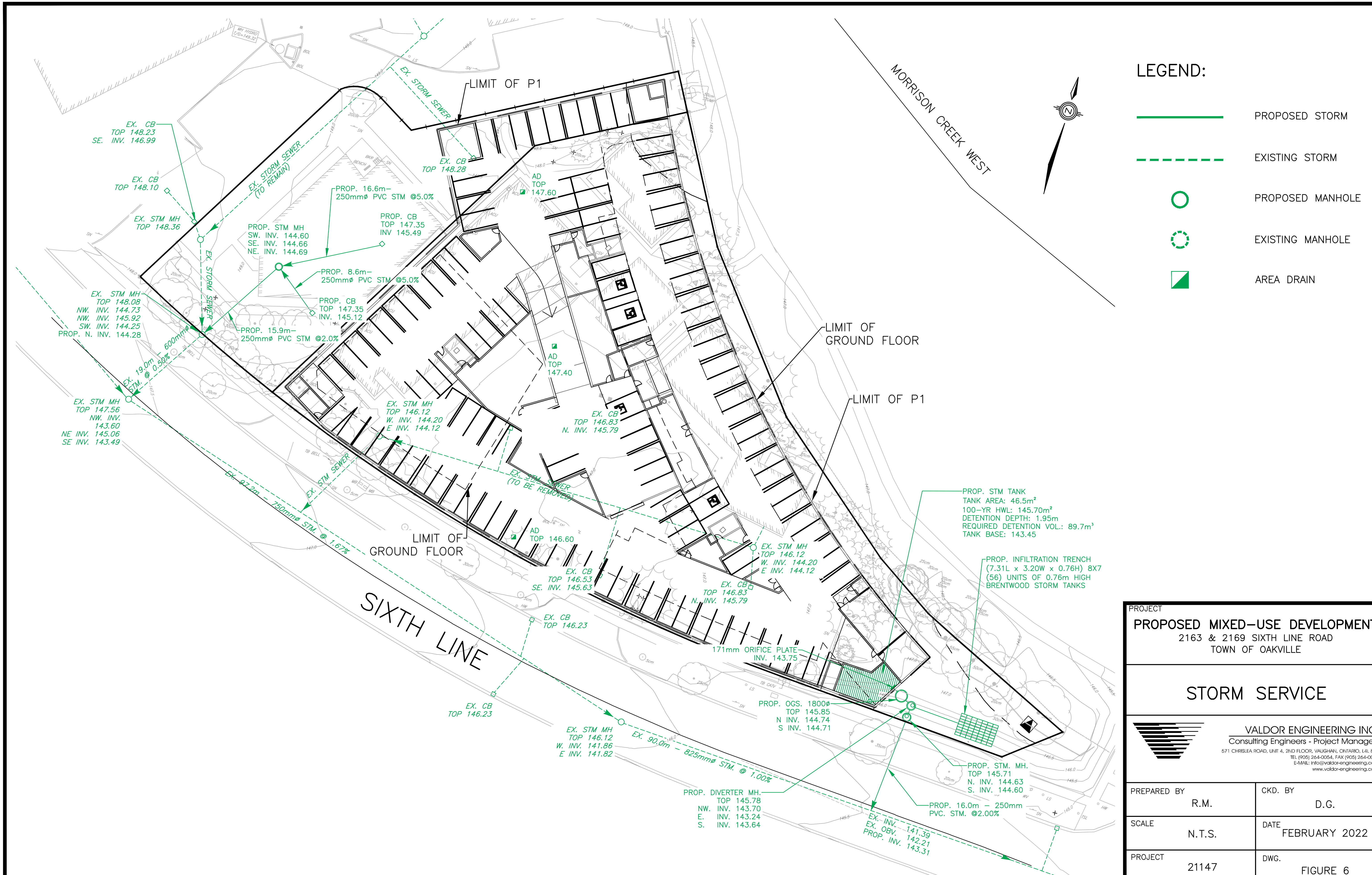
PROPOSED MIXED–USE DEVELOPMENT

2163 & 2169 SIXTH LINE ROAD
TOWN OF OAKVILLE

POST–DEVELOPMENT DRAINAGE CONDITION

VALDOR ENGINEERING INC.
Consulting Engineers - Project Managers
571 CHRISLEA ROAD, UNIT 4, 2ND FLOOR, VAUGHAN, ONTARIO, L4L 8A2
TEL (905) 264-0054, FAX (905) 264-0069
E-MAIL: info@valdor-engineering.com
www.valdor-engineering.com

PREPARED BY R.M.	CKD. BY D.G.
SCALE N.T.S.	DATE FEBRUARY 2022
PROJECT 21147	DWG. FIGURE 5



PROJECT

PROPOSED MIXED–USE DEVELOPMENT
2163 & 2169 SIXTH LINE ROAD
TOWN OF OAKVILLE

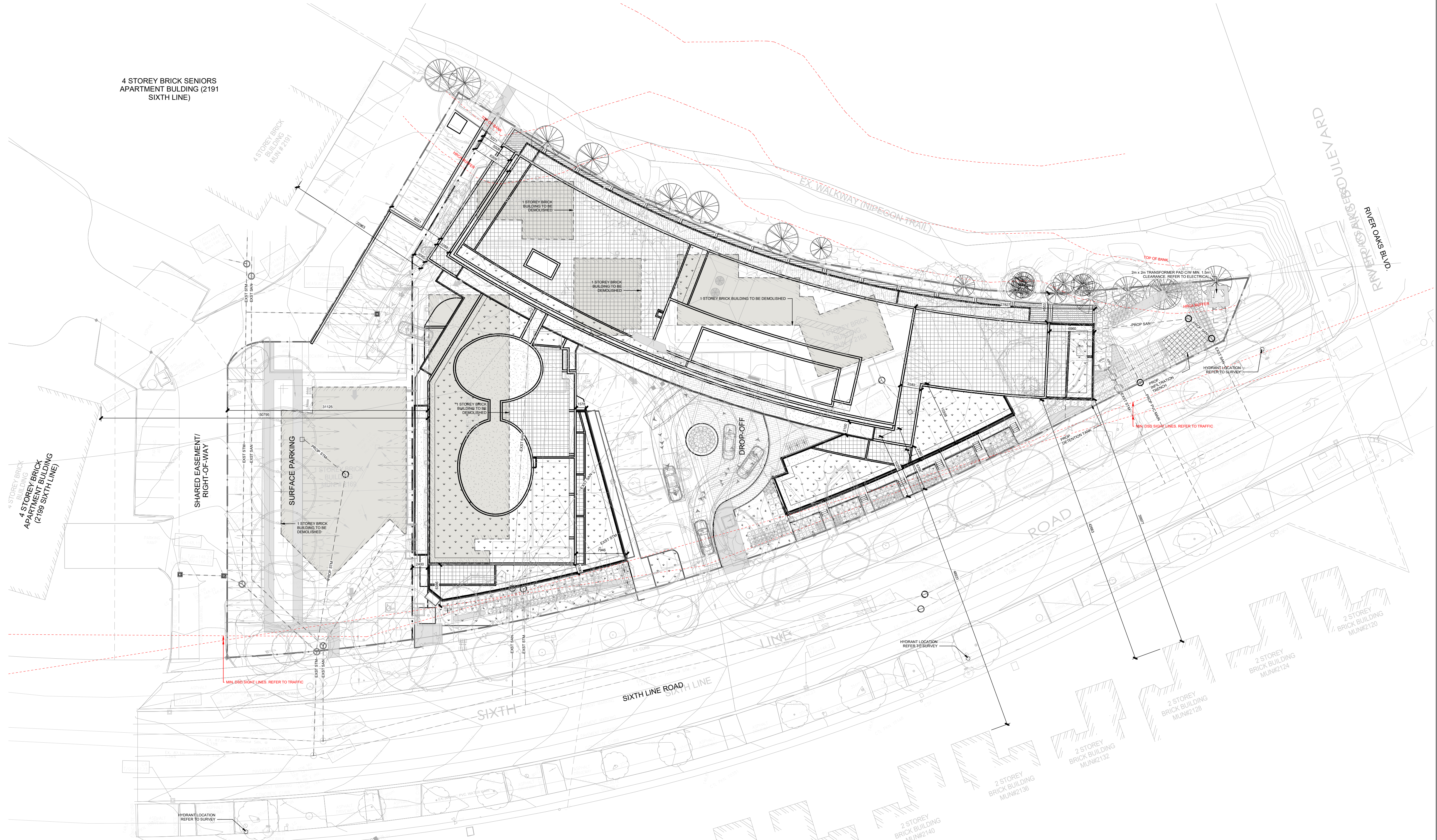
STORM SERVICE

VALDOR ENGINEERING INC.
Consulting Engineers - Project Managers
571 CHRISLEA ROAD, UNIT 4, 2ND FLOOR, VAUGHAN, ONTARIO, L4L 8A2
TEL (905) 264-0054, FAX (905) 264-0069
E-MAIL: info@valdor-engineering.com
www.valdor-engineering.com

PREPARED BY R.M.	CKD. BY D.G.
SCALE N.T.S.	DATE FEBRUARY 2022
PROJECT 21147	DWG. FIGURE 6

APPENDIX "A"

Preliminary Architectural Plans



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ISSUED RECORD

2022-03-18	ZONING BYLAW AMENDMENT

REVISION RECORD

No.	Date	Description

NORTH

RAW
405-317 ADELAIDE STREET WEST
TORONTO CANADA M5V 1P9
+1 416 599 9729
WWW.RAWDESIGN.CA

18046

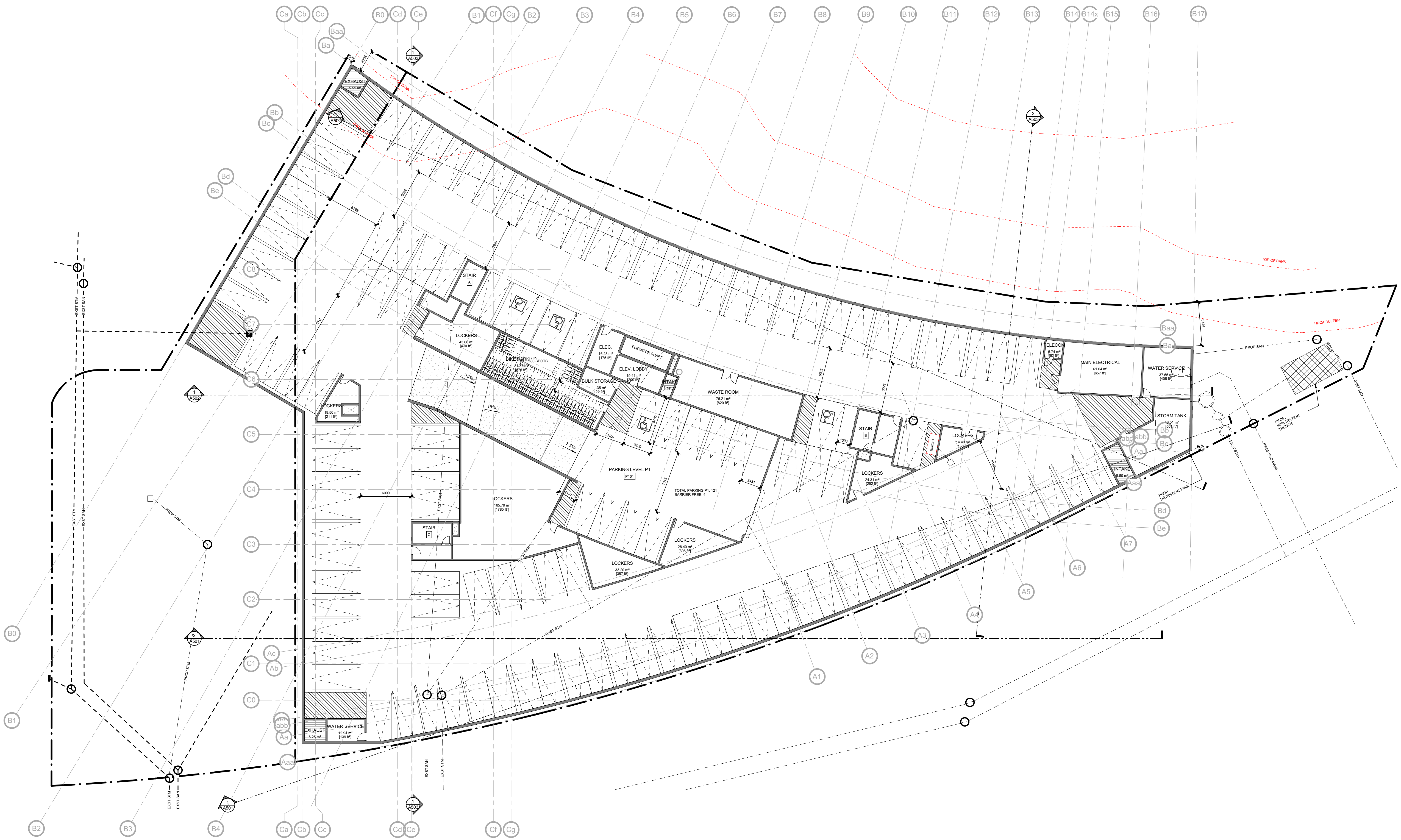
2163 & 2169 SIXTH LINE RD. OAKVILLE

BARA GROUP (RIVER OAK) INC.

SITE PLAN

SCALE: 1 : 200

A100



This drawing is the property of the Architect and may not be reproduced or used without the express consent of the Architect. The Contractor is responsible for checking and verifying all levels and dimensions and shall report all discrepancies to the Architect and obtain clarification prior to commencing work.

ISSUED RECORD

2021-04-29	ISSUED FOR PRE-CONSULTATION
2022-03-18	ZONING BYLAW AMENDMENT

REVISION RECORD

No.	Date	Description

NORTH

405-317 ADELAIDE STREET WEST
TORONTO CANADA M5V 1P9
+1 416 599 9729
WWW.RAWDESIGN.CA

18046

2163 & 2169 SIXTH LINE RD. OAKVILLE

BARA GROUP (RIVER OAK) INC.

PARKING LEVEL P1

SCALE: 1 : 150

A101

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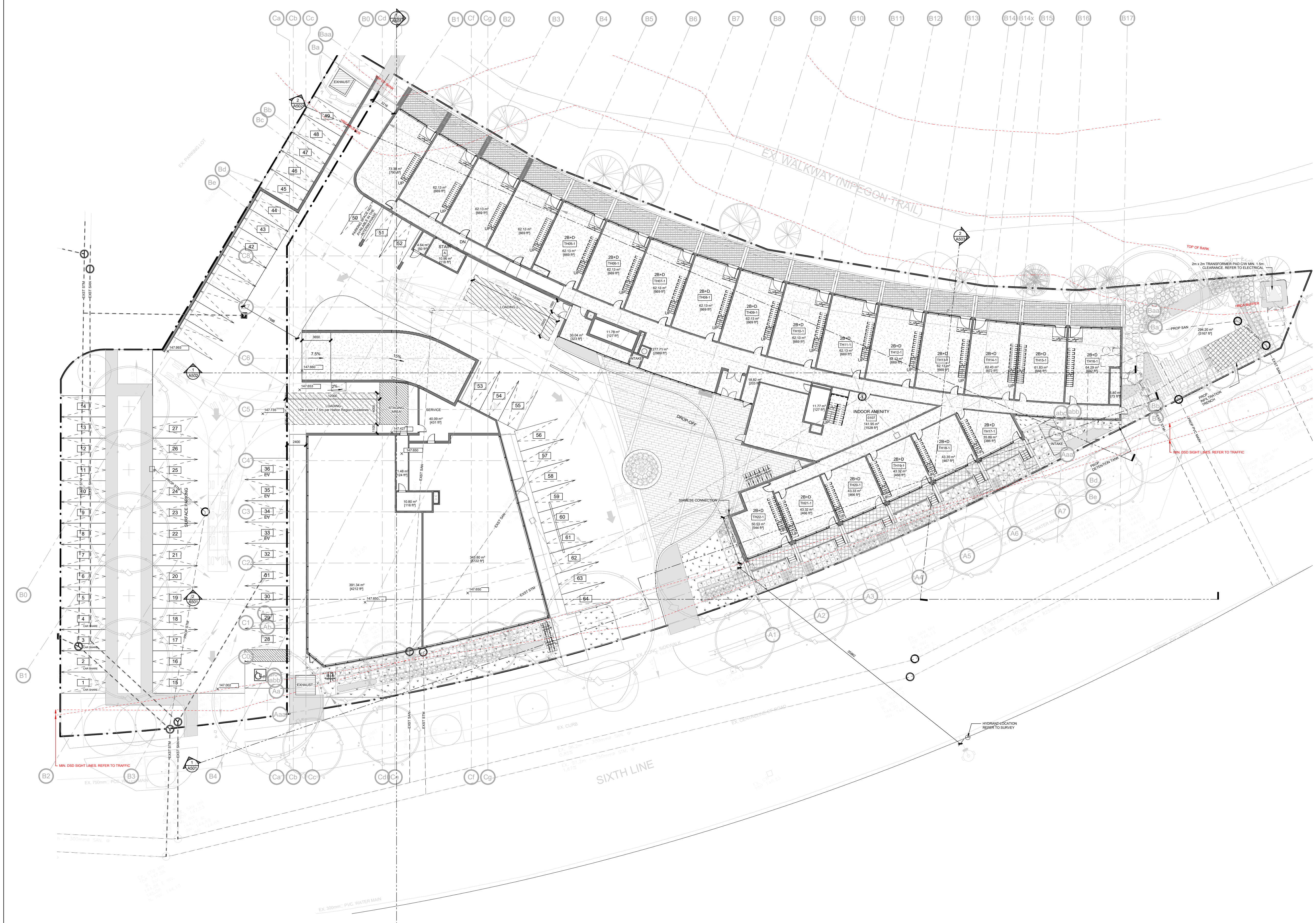

ISSUED RECORD

2022-03-18 ZONING BYLAW AMENDMENT

REVISION RECORD

No. Date Description

NORTH

RAW

405-317 ADELAIDE STREET WEST
TORONTO CANADA M5V 1P9
+1 416 599 9729
WWW.RAWDESIGN.CA

18046

2163 & 2169 SIXTH LINE RD. OAKVILLE

BARA GROUP (RIVER OAK) INC.

GROUND FLOOR PLAN

SCALE: NTS

A201

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APPENDIX "B"

Water Demand Calculations & Details

VALDOR ENGINEERING INC.
571 Chrislea Road, Unit 4, Woodbridge, ON, L4L 8A2
Tel: 905-264-0054 Fax: 905-264-0069 info@valdor-engineering.com
www.valdor-engineering.com

TABLE: B1

Project Name: **2163 & 2169 Sixth Line, Oakville**
File: 21147
Date: February 2022

DOMESTIC WATER DEMAND CALCULATION

Criteria:

Residential:

Apartments (over 6 storeys high) =	285	persons per ha.
Average Daily Demand =	0.275	cu.m per capita
Maximum Day Demand Peaking Factor =	2.25	
Maximum Hour Demand Peaking Factor =	4.00	
Site Area =	0.720	Ha

Non-Residential:

Light Commerical Areas =	90	persons per ha.
Commerical Floor Area =	0.074	Ha
Maximum Day Demand Peaking Factor =	2.25	
Maximum Hour Demand Peaking Factor =	2.25	

	Equivalent Population	Domestic Demand (L/min)	Maximum Day Demand (L/min)	Peak Hour Demand (L/min)
Apartments	205.2	39.2	88.2	156.8
Light Commerical Areas	6.7	1.3	2.9	2.9
TOTAL	**211.9**	**40.5**	**91.0**	**159.6**

VALDOR ENGINEERING INC.
571 Chrislea Road, Unit 4, Woodbridge, ON, L4L 8A2
Tel: 905-264-0054 Fax: 905-264-0069 info@valdor-engineering.com
www.valdor-engineering.com

TABLE: B2

CALCULATION OF REQUIRED FIRE FLOW

In accordance to Water Supply for Public Fire Protection, Fire Underwriters Survey 1999

Project Name: **2163 & 2169 Sixth Line, Oakville**
File: 21147
Date: February 2022

Notes: **Mixed Use Building**

Type of Construction - Non-Combustible

$C =$ 0.8

For fire-resistive buildings with 1-hour fire rating, the area shall be the total area of the largest floor plus 25% of each of the two immediately adjoining floors (assuming vertical openings and exterior vertical communications are properly protected):

Floor	Area (sq.m)	%
Largest Floor Area:	2,524	100%
Upper Adjoining Floor Area:	2,524	25%
Lower Adjoining Floor Area:	2,524	25%
$A =$	3,786	sq.m

$F = 220\,C\,\sqrt{A}$

$F =$ 10,829 L/min

$F =$ 11,000 (to nearest 1,000 Lmin)

Occupancy Factor

		Charge
Type:	Non-Combustible	-25%
	$f_1 =$	-25%

$F' = F \times (1+f_1)$

$F' =$ 8,250 L/min

Sprinkler Credit

		Charge
NFPA 13 Sprinkler Standard:	YES	-30%
Standard Water Supply:	YES	-10%
Fully Supervised System:	YES	-10%
Total Charge to Fire Flow:	$f_2 =$	-50%

Exposure Factor

		Charge
North Side - Distance to Building (m):	20 to 30m	10%
East Side - Distance to Building (m):	> 45m	0%
South Side - Distance to Building (m):	30 to 45m	5%
West Side - Distance to Building (m):	> 45m	0%
	$f_3 =$	15% (maximum of 75%)

$F'' = F' + F' \times f_2 + F' \times f_3$

$F'' =$ 5,363 L/min

REQUIRED FIRE FLOW

$F'' =$ **5,000** **L/min** (to nearest 1,000 L/min)

VALDOR ENGINEERING INC.
571 Chrislea Road, Unit 4, Woodbridge, ON, L4L 8A2
Tel: 905-264-0054 Fax: 905-264-0069 info@valdor-engineering.com
www.valdor-engineering.com

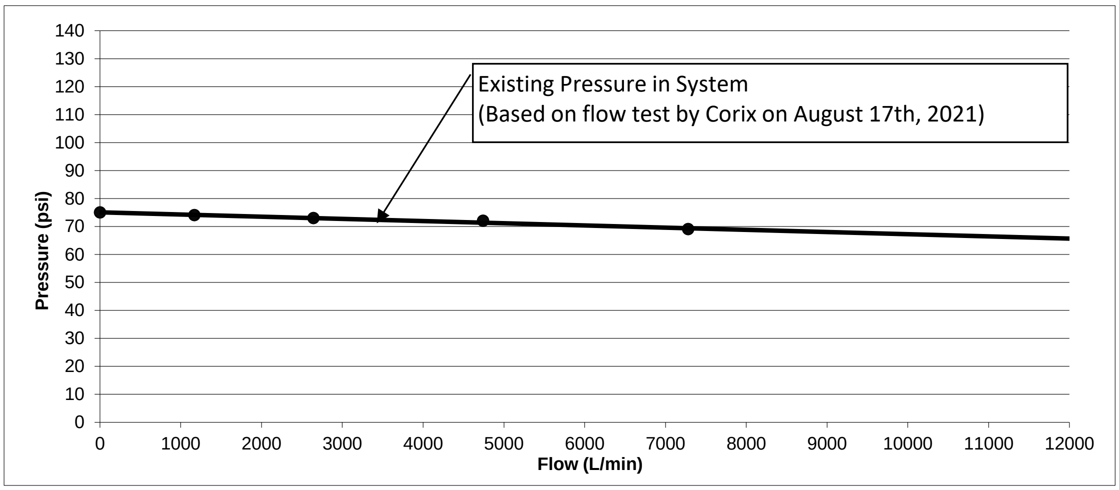
TABLE: B3

CALCULATION OF AVAILABLE FLOW & PRESSURE

Project Name: **2163 & 2169 Sixth Line, Oakville**
File: 21147
Date: February 2022

Hydrant Flow Test Results
Residual Location: At 2136 Sixth Line

Number of Outlets & Orifice Size	Flow (US GPM)	Flow (L/min)	Residual Pressure (psi)
0	0	0	75
1 1/8	309	1170	74
1 3/4	698	2642	73
2 1/2	1253	4743	72
2 x 2 1/2	1923	7279	69



$$Q_r = Q_t \times \left(\frac{P_s - Pr}{P_s - Pt}\right)^{0.54}$$

Re-arranged to: $\mathrm{P_r} = \mathrm{P_s} - (Ps - Pt)\sqrt[0.54]{Q_r/Q_t}$

Where,
Q_r= **Projected Flow Rate at the Desired Pressure**
Q_t= **Flow Rate from Flow Test**
P_s= **Static Pressure**
P_r= **Desired Residual Pressure**
P_t= **Residual Presure inTest**

Q_t= 7279 L/min
P_t= 69 psi
P_s= 75 psi

Maximum Day Domestic Demand =	91.0	L/min	(from Water Consumption Demand Calculation)
Domestic Peak Hour Flow to Satisfy (Q_{r2})=	159.6	L/min	(from Water Consumption Demand Calculation)
Fire Flow Requirement =	5,000	L/min	
Fire Flow + Max Day (Q_{r1})=	5,091	L/min	
Minimum Req. Pressure for Fire Flow =	140	kPa	
=	20.3	psi	
Available Pressure at Fire Flow + Max. Day (P_{r1})=	71.9	psi	
=	495.8	kPa	
Available Pressure at Peak Hour Flow (P_{r2})=	75.0		

corix® Water Services

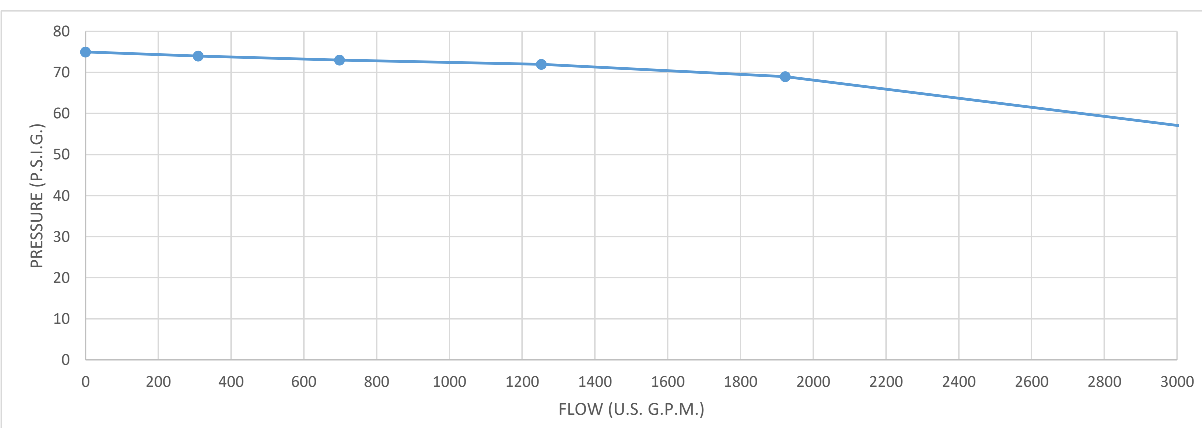
10 Estate Drive
Toronto, Ontario
Canada M1H 2Z1

T 416.282.1665
F 416.282.7702
www.corix.com

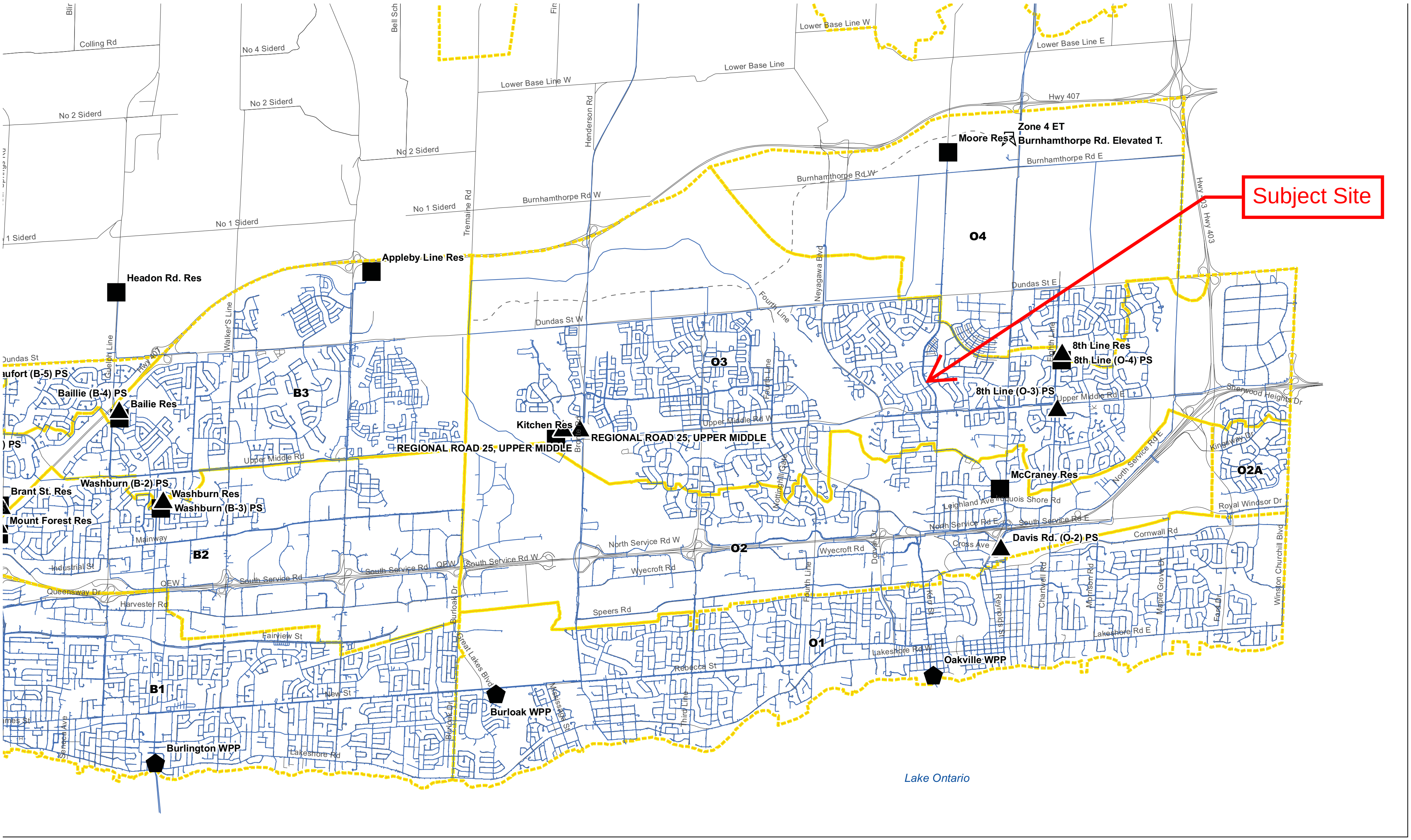
FLOW TEST REPORT

Date	AUGUST 17TH 2021
Customer	VALDOR ENGINEERING
Job Location	2163-2169 SIXTH LINE, OAKVILLE ON
Time of Test	11:00AM
Location of test (flow)	CANADA VALVE CENTURY 3PORT HYDRANT, 2168 SIXTH LINE, OAKVILLE
Location of test (residual)	CANADA VALVE CENTURY 3PORT HYDRANT, 2136 SIXTH LINE, OAKVILLE
Main Size (mm)	300
Static Pressure (psi)	75

	Number of Outlets & Orifice Size	PITOT Pressure (psi)	Flow (U.S. G.P.M.)	Residual Pressure (psi)
#1	1 x 1 1/8	68	309	74
#2	1 x 1 3/4	59	698	73
#3	1 x 2 1/2	56	1253	72
#4	2 x 2 1/2	33	1923	69
#5			6363	20
Colour code	Blue			



Comments	PERFORMED ONE COMPLETE NFPA 291 FLOW TEST AS REQUESTED.
Crew Member	TIM KIM



Halton Region
Existing Water Distribution System
Figure 12

AECOM

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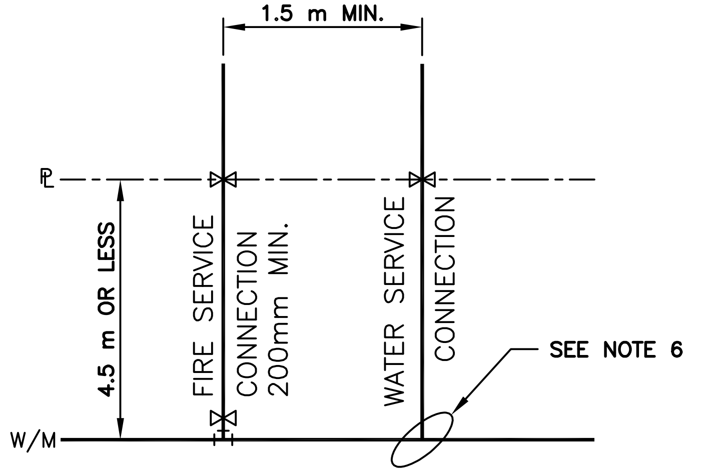
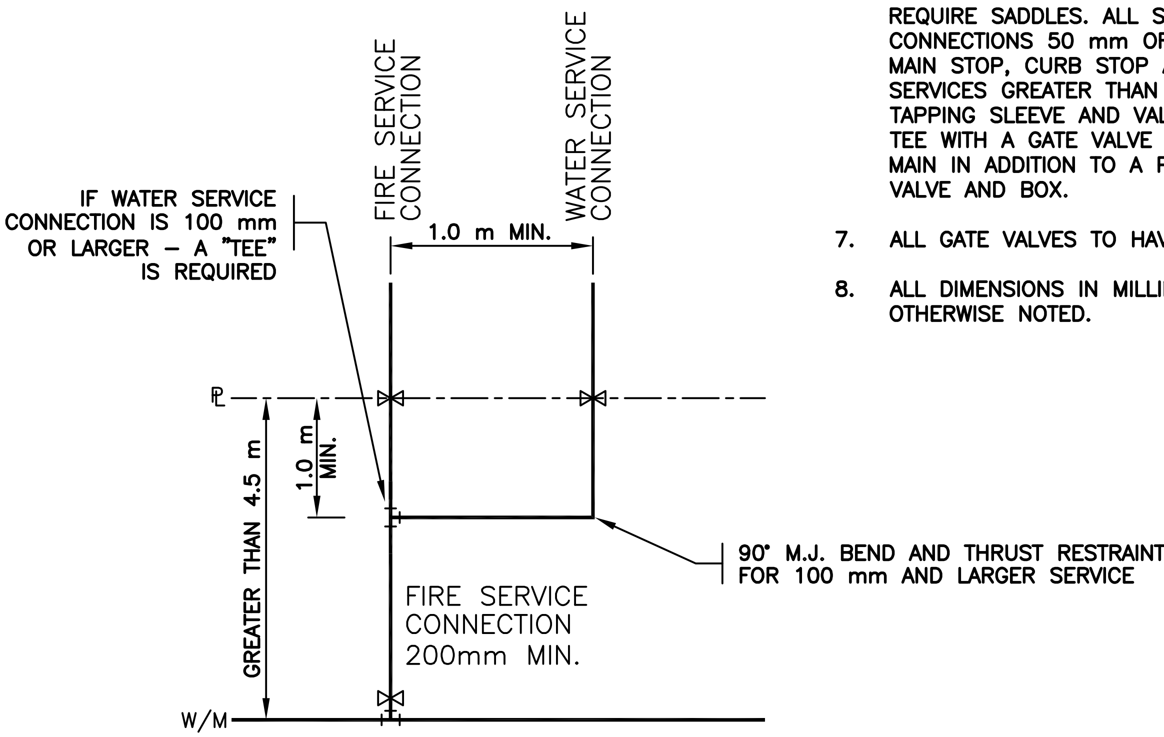


4.5 m OR SHORTER SERVICE



LONGER THAN 4.5 m

NOTES

1. COMPRESSION TYPE FITTINGS ONLY. NO SOLDERED JOINTS ARE PERMITTED BEFORE THE WATER METER.
2. WATER SERVICE CONNECTION 25, 38, 50 TO BE TYPE 'K' SOFT COPPER, 100 AND LARGER TO BE PVC OR DI.
3. FIRE SERVICE CONNECTION TO BE MIN. 200 MM.
4. IF THE WATERMAIN IS 4.5 m OR LESS FROM THE PROPERTY LINE, THEN 2 SEPARATE CONNECTIONS ARE REQUIRED.
5. TAPPING SLEEVE TO BE PRESSURE TESTED BY CONTRACTOR BEFORE MAIN IS TAPPED.
6. ALL SERVICE CONNECTIONS TO PVC PIPE REQUIRE SADDLES. ALL SERVICE CONNECTIONS 50 mm OR LESS TO HAVE A MAIN STOP, CURB STOP AND BOX. ALL SERVICES GREATER THAN 50 mm REQUIRE A TAPPING SLEEVE AND VALVE OR AN ANCHOR TEE WITH A GATE VALVE AND BOX AT THE MAIN IN ADDITION TO A PROPERTY LINE GATE VALVE AND BOX.
7. ALL GATE VALVES TO HAVE VALVE BOXES.
8. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

WATER SERVICE AND FIRE SERVICE CONNECTION INSTALLATIONS

Date: January 2014	Rev. 1	NTS
REGION STANDARD		RH 409.01

APPENDIX "C"

Wastewater Calculations & Details

VALDOR ENGINEERING INC.
571 Chrislea Road, Unit 4, Woodbridge, ON, L4L 8A2
Tel: 905-264-0054 Fax: 905-264-0069 info@valdor-engineering.com
www.valdor-engineering.com

TABLE: C1

Project Name: **2163 & 2169 Sixth Line, Oakville**
File: 21147
Date: February 2022

WASTEWATER LOADING CALCULATION

Apartments (over 6 storeys high) =	285	persons per ha.
Site Area =	0.720	Ha
Light Commerical Areas =	90	persons per ha.
Commerical Floor Area =	0.074	Ha

Harmon Formula (M) = 1+(14/(4+P^0.5)
where P is equivalent population in thousands

Infiltration (I) = 0.286 L/s/ha

Average Flow = 0.275 cu.m per capita

$$Q = Q_{Average} \ x \ M + I$$

	Site Area (Ha)	Equivalent Population (Persons)	Harmon Peaking Factor	Average Daily Flow (L/s)	Infiltration (L/s)	Total Flow (L/s)
Apartments		205.2	4.14	0.65		2.71
Light Commercial Areas		6.7	4.43	0.02		0.09
Infiltration	0.720				0.21	0.21
TOTAL	**0.720**	**211.9**		**0.67**	**0.21**	**3.01**

VALDOR ENGINEERING INC.

File: 21147

February 2022

TABLE: C2

PROJECT: **2163 & 2169 Sixth Line, Oakville**

Summary of Manhole Data from GIS

Manhole	Ground Elevation (m)	Total Flow (L/s)	
MH3176	145.957	89.57	
MH3057	144.799	0.26	
MH3058	144.351	0.268	
MH3054	143.528	0.29	
MH3055	142.423	0.37	
MH3056	141.474	1.34	
MH3047	139.972	0.41	
MH3049	141.114	14.42	
MH3050	140.647	0.147	
MH3050	141.078	0	
MH3072	140.932	0.136	
MH3071	139.900	2.593	
MH3118	139.271		

VALDOR ENGINEERING INC.

File: 21147

February 2022

TABLE: C3

PROJECT: **2163 & 2169 Sixth Line, Oakville**

Summary of Pipe Data From GIS

Pipe ID	Upstream Manhole	Downstream Manhole	Upstream Invert (m)	Downstream Invert (m)	Length (m)	Diameter (mm)
SMN3546	MH3176	MH3057	139.737	138.879	87.5540	0.300
SMN3550	MH3057	MH3058	138.879	138.141	71.0440	0.300
SMN3554	MH3058	MH3054	138.141	137.325	78.394	0.300
SMN3566	MH3054	MH3055	137.325	135.671	88.452	0.300
SMN3586	MH3055	MH3056	135.671	134.749	83.042	0.300
SMN3599	MH3056	MH3047	134.749	134.070	57.544	0.300
SMN3626	MH3047	MH3048	134.07	133.502	94.801	0.375
SMN3667	MH3049	MH3048	133.502	133.294	64.918	0.375
SMN3646	MH3050	MH3049	133.294	133.156	15.71	0.375
SMN3668	MH3050	MH3072	133.156	132.995	57.472	0.375
SMN3690	MH3072	MH3071	132.995	132.724	82.069	0.375
SMN3699	MH3071	MH3118	132.724	132.514	47.698	0.375

VALDOR ENGINEERING INC.
File: 21147
February 2022

TABLE: C4

PROJECT: **2163 & 2169 Sixth Line, Oakville**

Summary of Sanitary Sewer HGL Analysis for Post-Development Conditions

Manhole	Invert Elevation (m)	Ground Elevation (m)	100-year HGL			Check if	Note
			Max HGL (m)	Depth above pipe obvert (m)	Depth from Ground (m)	<1.8 m from Ground	
MH3176	139.737	145.957	140	-0.037	5.9570	OK	
MH3057	138.879	144.799	139.13	-0.049	5.6690	OK	
MH3058	138.141	144.351	138.39	-0.051	5.9610	OK	
MH3054	137.325	143.528	137.52	-0.105	6.0080	OK	
MH3055	135.671	142.423	135.91	-0.061	6.5130	OK	
MH3056	134.749	141.474	134.98	-0.069	6.4940	OK	
MH3047	134.07	139.972	134.31	-0.135	5.6620	OK	
MH3049	133.502	141.114	133.86	-0.017	7.2540	OK	
MH3050	133.294	140.647	133.61	-0.059	7.0370	OK	
MH3050	133.156	141.078	133.57	0.039	7.5080	OK	
MH3072	132.995	140.932	133.35	-0.020	7.5820	OK	
MH3071	132.724	139.9	133.02	-0.079	6.8800	OK	
MH3118	132.514	139.271					Trunk

Fig C1. Downstream Sanitary Sewer

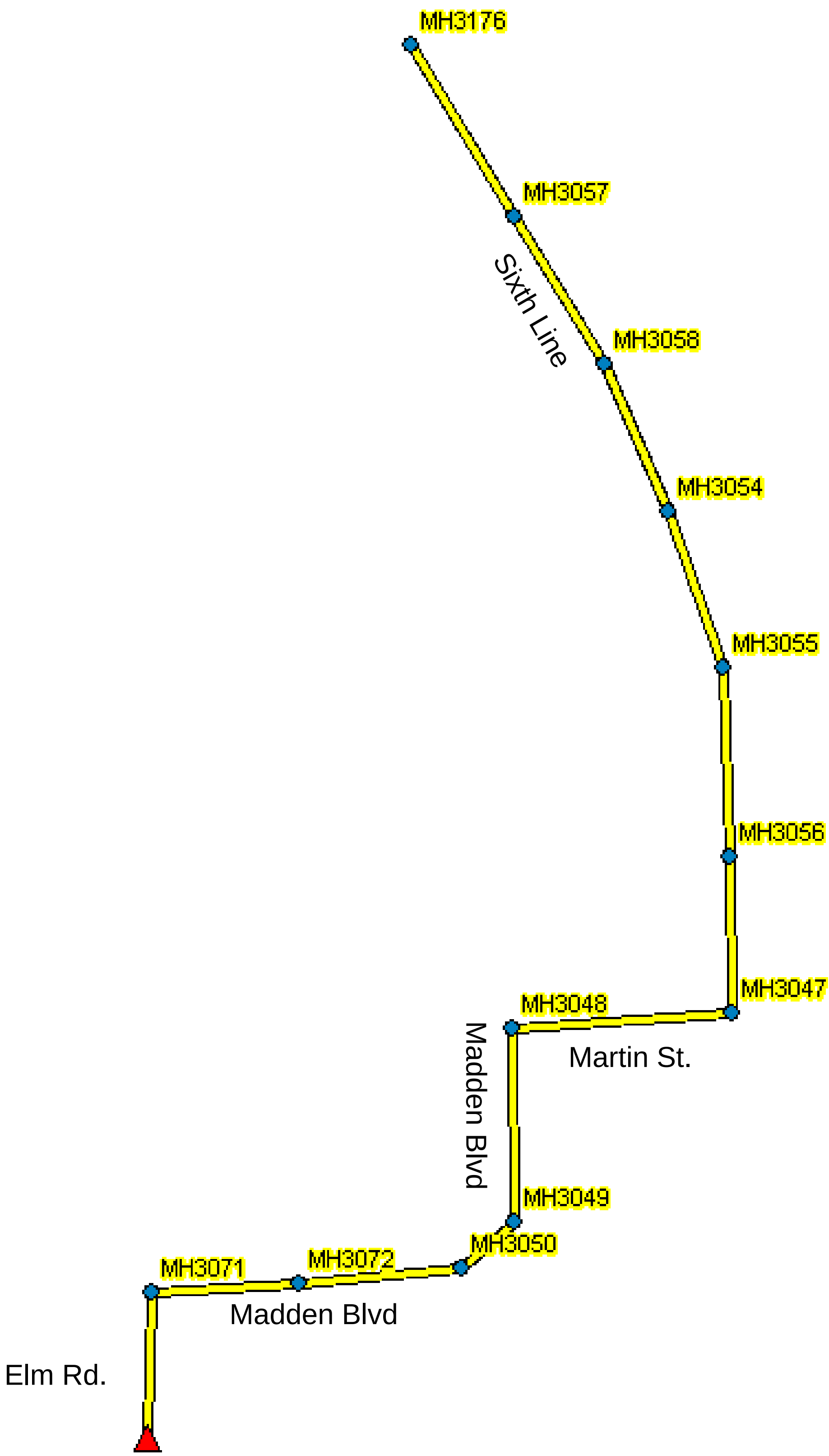


Fig C2. PCSWMM Profile - Sanitary Sewer HGL Analysis for Pre-Development Conditions

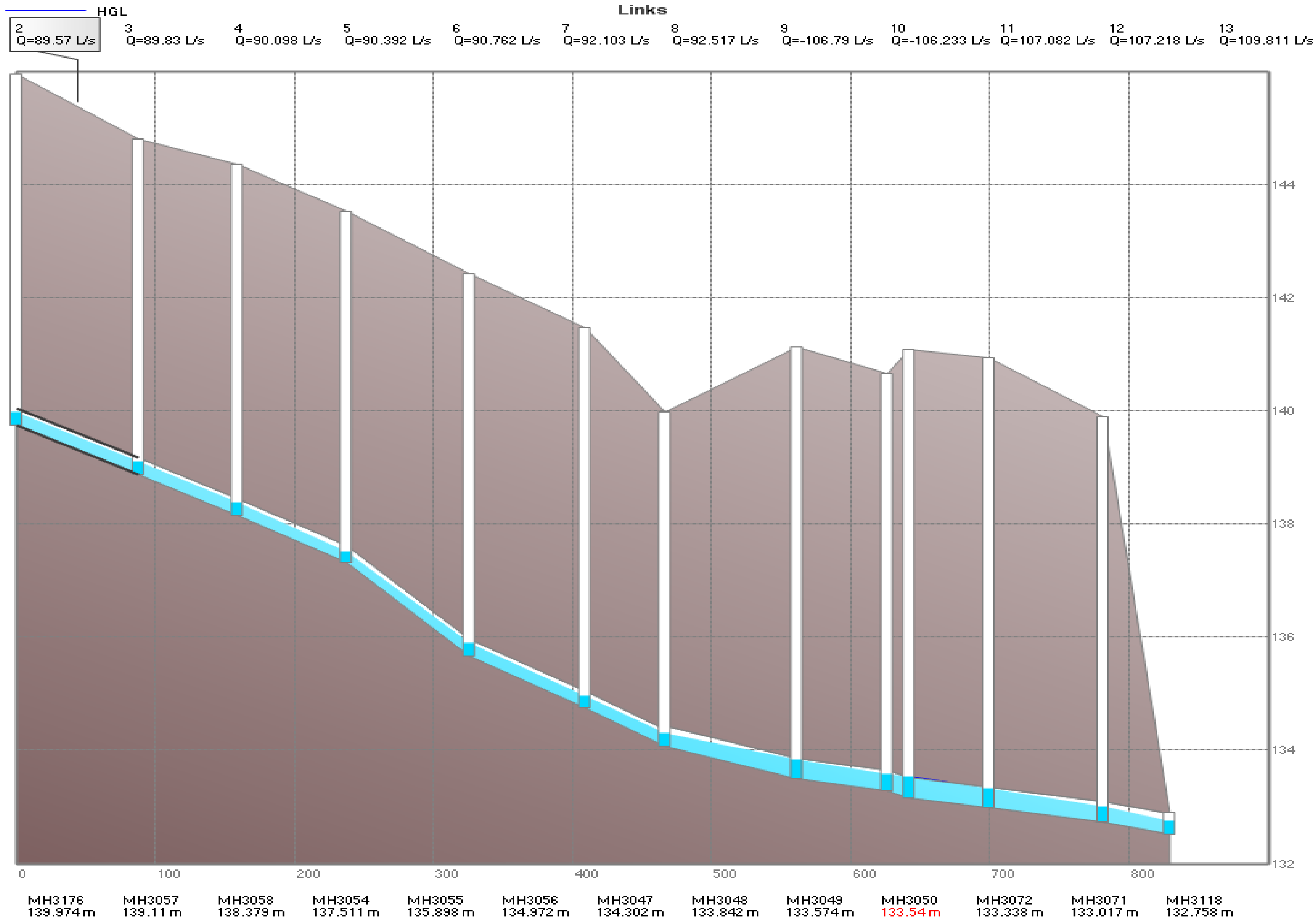
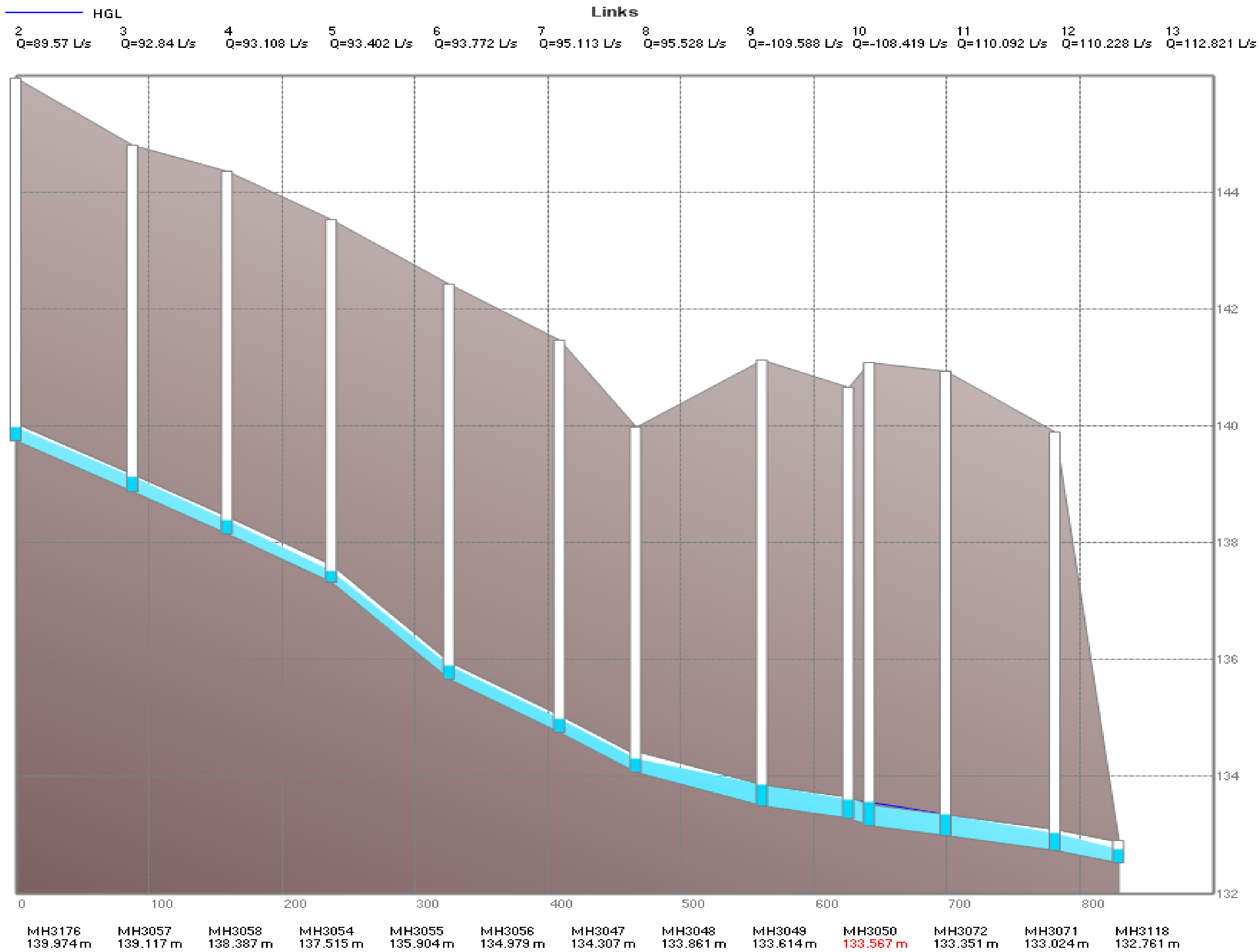
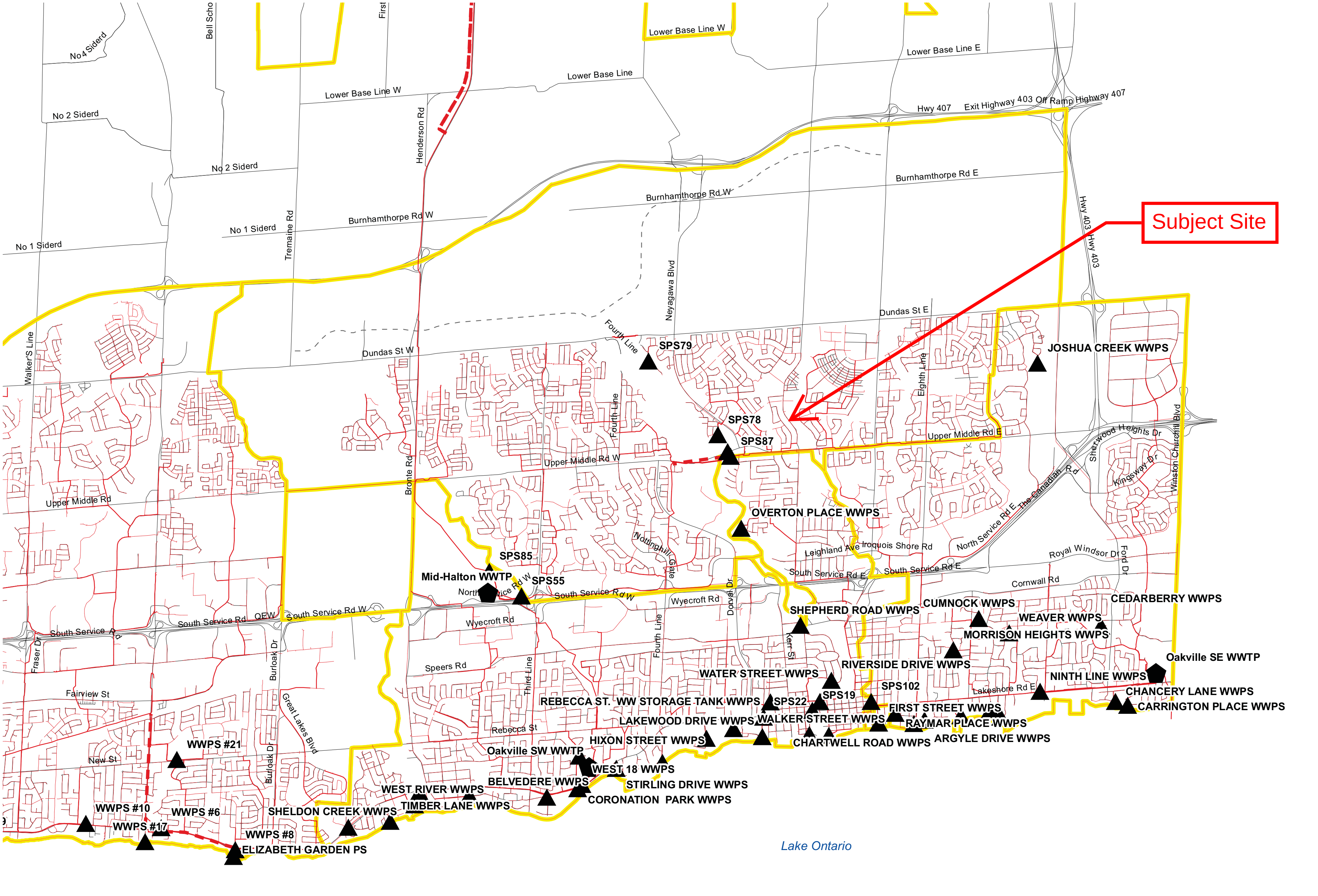


Fig C3. PCSWMM Profile - Sanitary Sewer HGL Analysis for Post-Development Conditions





Halton Region
Existing Wastewater System
Figure 21

AECOM

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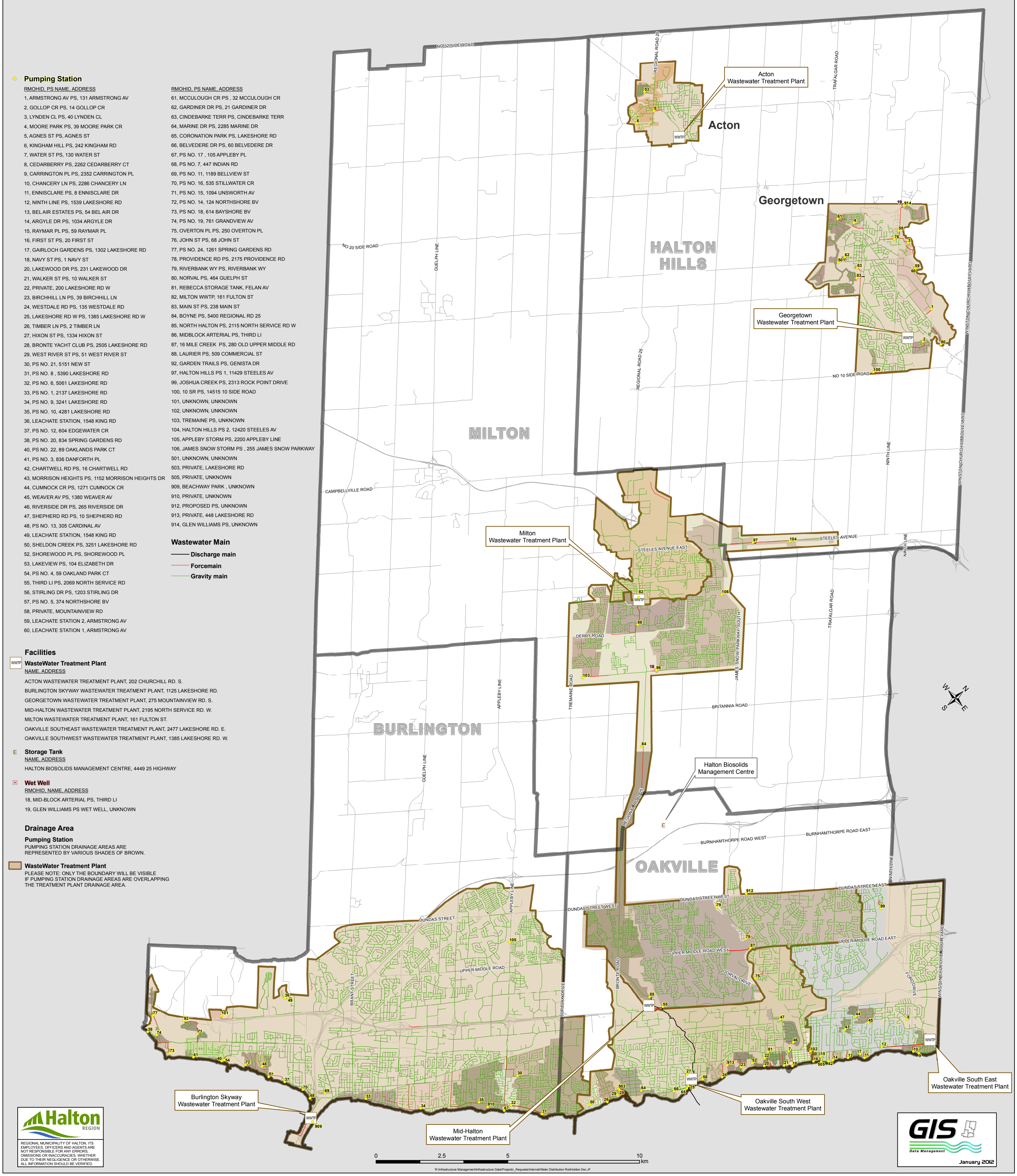
Halton Region Wastewater Collection and Facilities



APPENDIX "D"

Watershed Map, IDF Data & Regulation Mapping

WATERSHED MAP

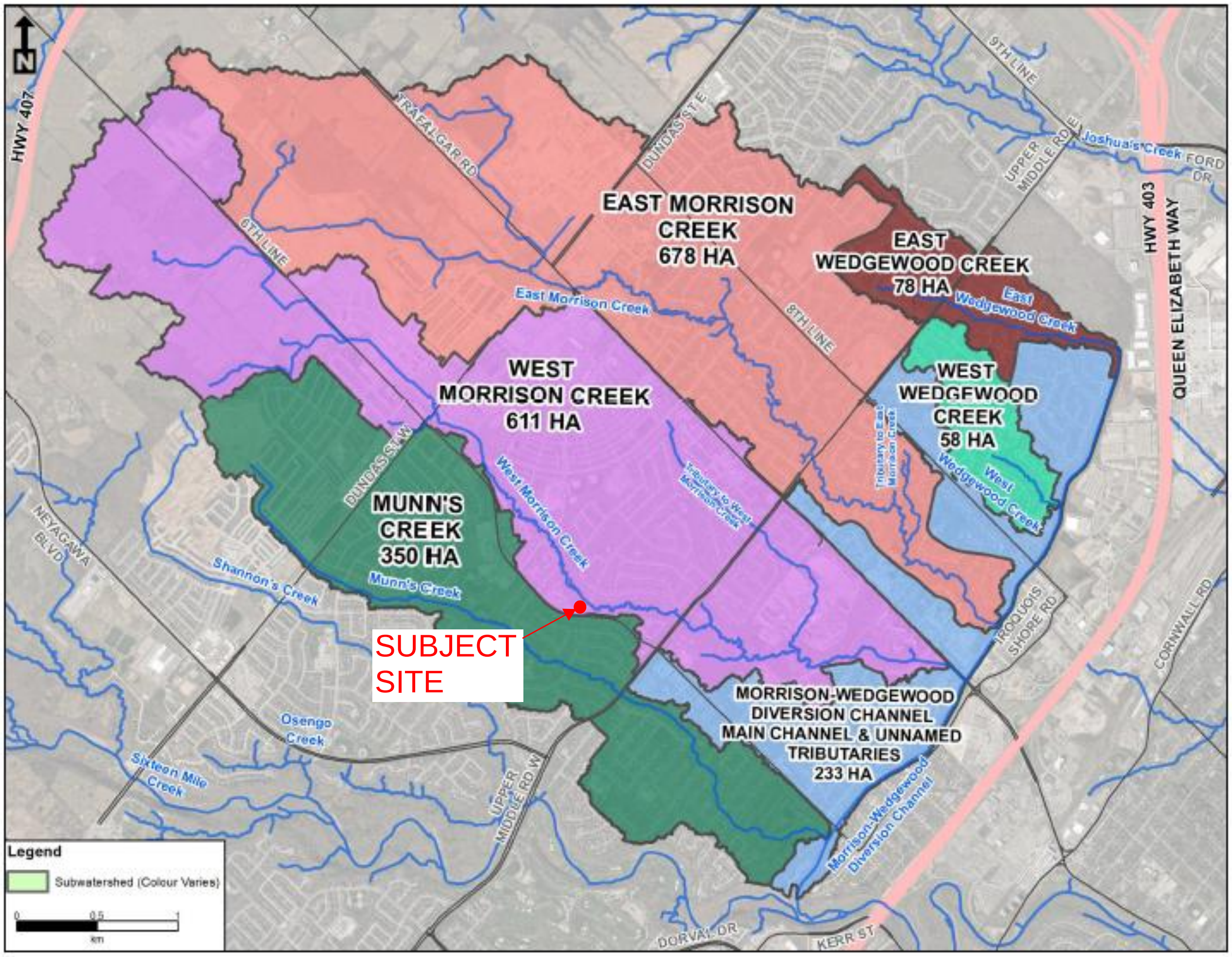


Table 3.1 INTENSITY-DURATION-FREQUENCY VALUES

Duration (minutes)	**2 Year** <<<<<<<<	**5 Year** Rainfall	**10 Year** Intensity	**25 Year** (mm / hr)	**50 Year** >>>>>>>>	**100 Year** >>>>>>>>
5	117	164	194	233	262	291
10	80	108	126	149	166	183
15	65	90	107	129	145	160
30	41	58	69	83	93	103
60	25	35	41	48	54	60
120	15	20	23	27	30	33
360	6.1	8.1	9.4	11	12	13
720	3.6	4.6	5.3	6.2	6.8	7.5
1,440	2	2.5	2.9	3.4	3.7	4.1

* Values as recorded at " AES Toronto (Bloor Street) Gauge ".

Formulations for Rainfall Intensity (Based on above IDF Table values)

$$I_{2\ year} = 725 / (tc + 4.8)^{0.808}$$

$$I_{5\ year} = 1170 / (tc + 5.8)^{0.843}$$

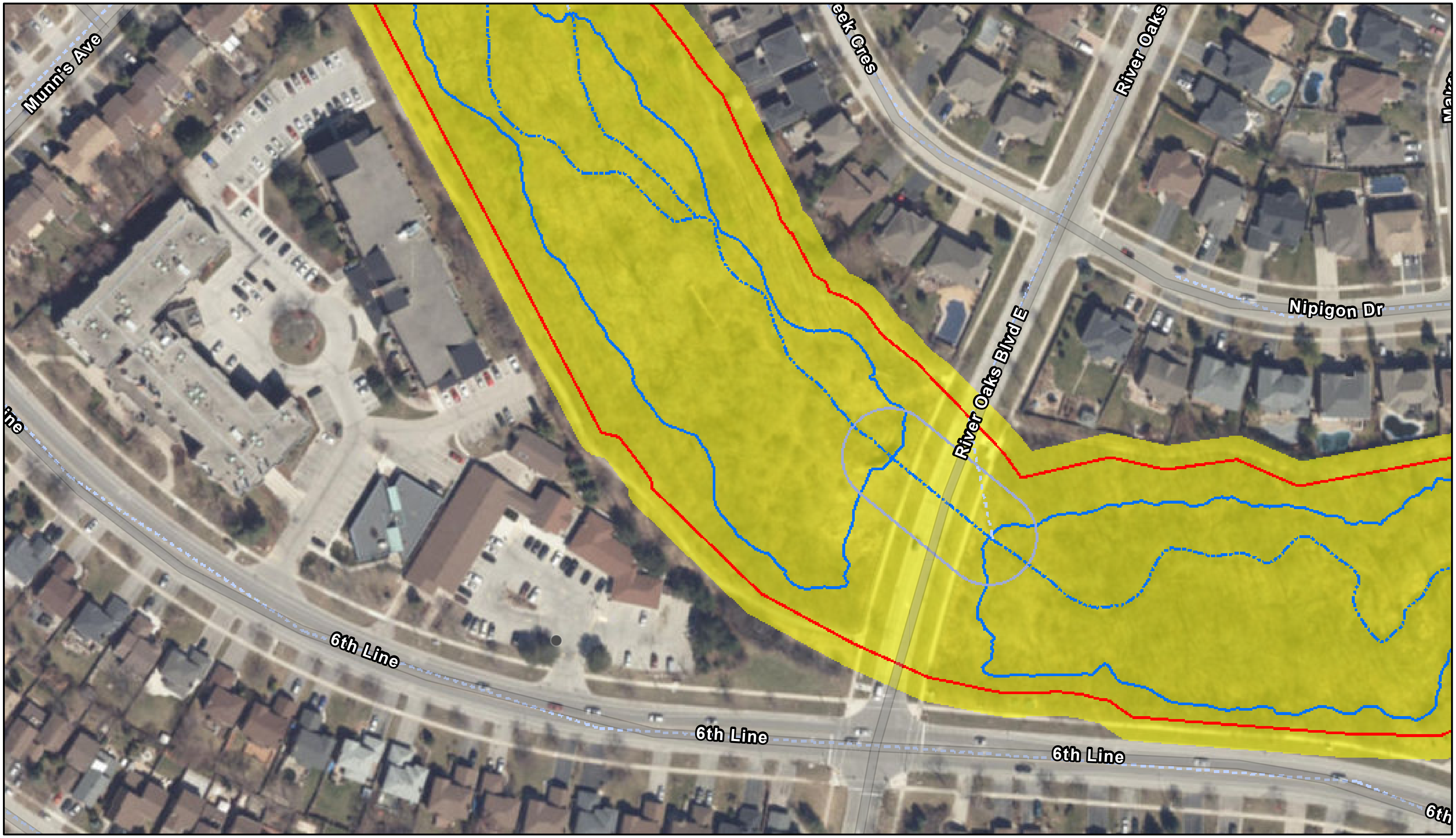
$$I_{10\ year} = 1400 / (tc + 5.8)^{0.848}$$

$$I_{25\ year} = 1680 / (tc + 5.6)^{0.851}$$

$$I_{50\ year} = 1960 / (tc + 5.8)^{0.861}$$

$$I_{100\ year} = 2150 / (tc + 5.7)^{0.861}$$

Conservation Halton Regulation Mapping



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- Approximate Regulation Limit
- Shoreline 100 year Flood Elevation Hazard
- Shoreline Dynamic Beach Hazard
- Shoreline Hazard
- Stable Top of Bank (STOB) Hazard
- Wetland Hazard
- Spill Zones Hazard
- Floodplains Hazard
- Headwater Floodplain Hazard
- Meander Belt Hazard
- Consult Conservation Halton
- Spill Arrows
- Spill Lines

1:2,257

0 0.01 0.03 0.05 mi

0 0.02 0.04 0.08 km

Esri Community Maps Contributors, City of Hamilton, Province of Ontario, Town of Oakville, Esri Canada, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada, Conservation Halton, 2021, Town of Oakville, Maxar, Microsoft,

Conservation Halton, 2021

Conservation Halton, 2021

APPENDIX "E"

Stormwater Quantity Control Calculations

VALDOR ENGINEERING INC.
File: 21147
February 2022

TABLE: E

STORAGE AND DISCHARGE SUMMARY

PROJECT: **2163 & 2169 Sixth Line, Oakville**

AREA No.	DRAINAGE AREA (Ha)	5 YEAR HWL (m)	100 YEAR HWL (m)	ORIFICE					STORAGE REQUIRED		STORAGE AVAILABLE
				LOCATION	INVERT (m)	DIAMETER (mm)	5 YEAR RELEASE (L/s)	100 YEAR RELEASE (L/s)	5 YR (cu.m.)	100 YR (cu.m.)	(cu.m.)
Controlled	0.548	145.64	146.60	MH.2	144.74	149	57.5	84.6	43.4	89.8	90.2
Un-Controlled	0.172						44.2	77.7			
TOTAL	**0.720**										
		Actual Release Rate (L/s)					**101.7**	**162.3**			
		Allowable Release Rate (L/s)					**163.0**	**163.0**			

VALDOR ENGINEERING INC.

File: 21147

February 2022

TABLE: E1

PROJECT: **2163 & 2169 Sixth Line, Oakville**

PRE-DEVELOPMENT PEAK FLOW CALCULATION

Site Area = A = 0.720 Ha

COMPOSITE R CALCULATION	A	R	A*R
PERVIOUS	0.207	0.25	0.0518
IMPERVIOUS	0.356	0.90	0.3204
ROOF	0.157	0.90	0.1413
TOTAL	0.720	0.71	

5 Year Pre-Development Flow

I =1170 / (Tc+5.8)^0.843 where I = Rainfall Rate (mm/hr)

T = 10 minutes

I = 114.21 mm/hr

R = 0.71 (composite)

N = 2.78

Q = R x A x I x N 5 year Q = 163.0 L/s

100 Year Pre-Development Flow

I = 2150/ (Tc+5.7)^0.861 where I = Rainfall Rate (mm/hr)

T = 10 minutes

I = 200.80 mm/hr

R = 0.71 (composite)

N = 2.78

Q = R x A x I x N 100 year Q = 286.6 L/s

VALDOR ENGINEERING INC.
File: 21147
February 2022

TABLE: E2

PROJECT: **2163 & 2169 Sixth Line, Oakville**

POST-DEVELOPMENT PEAK FLOW - UNMITIGATED

Area = A = 0.548 Ha

COMPOSITE R CALCULATION	A	R	A*R
PERVIOUS	0.053	0.25	0.0131
IMPERVIOUS	0.118	0.90	0.1066
GREEN ROOF	0.070	0.40	0.0279
ROOF	0.307	0.90	0.2763
TOTAL	0.548	0.77	

<u>5 Year Post-Development Flow</u>

I =1170 / (Tc+5.8)^0.843 where I = Rainfall Rate (mm/hr)

T = 10 minutes
I = 114.2 mm/hr
R= 0.77 (composite)
N = 2.78

Q = R x A x I x N 5 year Q = 134.6 L/s

<u>100 Year Post-Development Flow</u>

I = 2150/ (Tc+5.7)^0.861 where I = Rainfall Rate (mm/hr)

T = 10 minutes
I = 200.8 mm/hr
R= 0.77 (composite)
N = 2.78

Q = R x A x I x N 100 year Q = 236.6 L/s

VALDOR ENGINEERING INC.
File: 21147
February 2022

TABLE: E3

PROJECT: **2163 & 2169 Sixth Line, Oakville**

POST-DEVELOPMENT PEAK FLOW - UNCONTROLLED AREA

Area = A = 0.172 Ha

COMPOSITE R CALCULATION

	A	R	A*R
PERVIOUS	0.024	0.25	0.0060
IMPERVIOUS	0.148	0.90	0.1332
GREEN ROOF	0.000	0.40	0.0000
ROOF	0.000	0.90	0.0000
TOTAL	0.172	0.81	

<u>5 Year Post-Development Flow</u>

I =1170 / (Tc+5.8)^0.843 where I = Rainfall Rate (mm/hr)

T = 10 minutes
I = 114.2 mm/hr
R= 0.81 (composite)
N = 2.78

Q = R x A x I x N 5 year Q = 44.2 L/s

<u>100 Year Post-Development Flow</u>

I = 2150/ (Tc+5.7)^0.861 where I = Rainfall Rate (mm/hr)

T = 10 minutes
I = 200.8 mm/hr
R= 0.81 (composite)
N = 2.78

Q = R x A x I x N 100 year Q = 77.7 L/s

VALDOR ENGINEERING INC.
File: 21147
February 2022

TABLE: E4

CONTROL ORIFICE DESIGN
100 Year Storm

Orifice Pipe Location	=	MH.2		
Orifice Coefficient (C)	=	0.61	(Plate)	
Acceleration due to gravity (g)	=	9.81	(m/s/s)	
Orifice Invert	=	143.75	(m)	
High Water Level	=	145.70	(m)	100 Year
Orifice diameter	=	171	(mm)	
Cross section area of orifice (A)	=	0.0230	(sq.m.)	
Head (H)	=	1.86	(m)	
Actual Discharge (Q) (C x A x (2 x g x H)^0.5)	=	84.73	(L/s)	

VALDOR ENGINEERING INC.

File: 21147

February 2022

TABLE: E5

CONTROL ORIFICE DESIGN
5 Year Storm

Orifice Pipe Location	=	MH.2		
Orifice Coefficient (C)	=	0.61	(Plate)	
Acceleration due to gravity (g)	=	9.81	(m/s/s)	
Orifice Invert	=	143.75	(m)	
High Water Level	=	144.79	(m)	5 Year
Orifice diameter	=	171	(mm)	
Cross section area of orifice (A)	=	0.0230	(sq.m.)	
Head (H)	=	0.95	(m)	
Actual Discharge (Q) (C x A x (2 x g x H)^0.5)	=	60.62	(L/s)	

VALDOR ENGINEERING INC.

File: 11126

February 2022

TABLE: E6

Storage Volume Calculations - Rational Method
100-year Storm - Oakville

PROJECT: 2163 & 2169 Sixth Line, Oakville

Total Area (ha)	0.548
Composite Runoff Coefficient	0.77
Maximum Discharge Through Orifice (L/s)	84.7
Discharged Volume per 5 min Interval (cu.m)	25.4

Time (min)	Intensity (mm/hr)	Runoff Volume (cu.m)	Discharged Volume (cu.m)	Storage Volume (cu.m)
0	0.0	0.000	0.000	0.000
5	4.4	1.554	1.554	0.000
10	4.8	1.696	1.696	0.000
15	5.4	1.907	1.907	0.000
20	6.1	2.155	2.155	0.000
25	7.0	2.473	2.473	0.000
30	8.3	2.932	2.932	0.000
35	10.2	3.603	3.603	0.000
40	13.2	4.663	4.663	0.000
45	18.6	6.570	6.570	0.000
50	31.4	11.091	11.091	0.000
55	82.0	28.965	25.419	3.546
60	279.3	98.657	25.419	73.238
65	108.5	38.326	25.419	12.906
70	55.6	19.640	19.640	0.000
75	36.1	12.752	12.752	0.000
80	26.3	9.290	9.290	0.000
85	20.5	7.241	7.241	0.000
90	16.8	5.934	5.934	0.000
95	14.2	5.016	5.016	0.000
100	12.3	4.345	4.345	0.000
105	10.8	3.815	3.815	0.000
110	9.6	3.391	3.391	0.000
115	8.7	3.073	3.073	0.000
120	8.0	2.826	2.826	0.000
125	7.3	2.579	2.579	0.000
130	6.8	2.402	2.402	0.000
135	6.3	2.225	2.225	0.000
140	5.9	2.084	2.084	0.000
145	5.6	1.978	1.978	0.000
150	5.2	1.837	1.837	0.000
155	5.0	1.766	1.766	0.000
160	4.7	1.660	1.660	0.000
165	4.5	1.590	1.590	0.000
170	4.3	1.519	1.519	0.000
175	4.1	1.448	1.448	0.000
180	3.9	1.378	1.378	0.000
			Total Storage Volume Required (cu.m)	**89.7**

VALDOR ENGINEERING INC.

File: 21147

February 2022

TABLE: E7

Storage Volume Calculations - Rational Method
5-year Storm - Oakville

PROJECT: 2163 & 2169 Sixth Line, Oakville

Total Area (ha)	0.548
Composite Runoff Coefficient	0.77
Maximum Discharge Through Orifice (L/s)	60.6
Discharged Volume per 5 min Interval (cu.m)	18.2

Time (min)	Intensity (mm/hr)	Runoff Volume (cu.m)	Discharged Volume (cu.m)	Storage Volume (cu.m)
0	0.0	0.000	0.000	0.000
5	2.9	1.024	1.024	0.000
10	3.2	1.130	1.130	0.000
15	3.5	1.236	1.236	0.000
20	4.0	1.413	1.413	0.000
25	4.6	1.625	1.625	0.000
30	5.4	1.907	1.907	0.000
35	6.5	2.296	2.296	0.000
40	8.4	2.967	2.967	0.000
45	11.6	4.097	4.097	0.000
50	19.0	6.711	6.711	0.000
55	48.2	17.026	17.026	0.000
60	157.4	55.599	18.187	37.411
65	63.3	22.360	18.187	4.172
70	33.3	11.763	11.763	0.000
75	21.9	7.736	7.736	0.000
80	16.2	5.722	5.722	0.000
85	12.8	4.521	4.521	0.000
90	10.5	3.709	3.709	0.000
95	8.9	3.144	3.144	0.000
100	7.8	2.755	2.755	0.000
105	6.9	2.437	2.437	0.000
110	6.2	2.190	2.190	0.000
115	5.6	1.978	1.978	0.000
120	5.1	1.801	1.801	0.000
125	4.7	1.660	1.660	0.000
130	4.4	1.554	1.554	0.000
135	4.1	1.448	1.448	0.000
140	3.9	1.378	1.378	0.000
145	3.6	1.272	1.272	0.000
150	3.4	1.201	1.201	0.000
155	3.3	1.166	1.166	0.000
160	3.1	1.095	1.095	0.000
165	3.0	1.060	1.060	0.000
170	2.8	0.989	0.989	0.000
175	2.7	0.954	0.954	0.000
180	2.6	0.918	0.918	0.000

Total Storage Volume Required (cu.m) **41.6**

VALDOR ENGINEERING INC.
File: 21147
February 2022

TABLE: E8

100 YEAR AVAILABLE UNDERGROUND STORAGE

	AREA (sq.m.)	INV (m)	HIGH WATER ELEVATION (m)	Storage Depth (m)	AVAILABLE STORAGE (cu.m)
SWM TANK	46.5	143.75	145.70	1.95	90.7
SUB-TOTAL					**90.7**

STORAGE PROVIDED:	**90.7**

100 YEAR STORAGE REQUIRED:	**89.7**

VALDOR ENGINEERING INC.
File: 21147
February 2022

TABLE: E9

5 YEAR AVAILABLE UNDERGROUND STORAGE

	AREA (sq.m.)	INV (m)	HIGH WATER ELEVATION (m)	Storage Depth (m)	AVAILABLE STORAGE (cu.m)
SWM TANK	46.5	143.75	144.79	1.04	48.4
SUB-TOTAL					**48.4**

STORAGE PROVIDED:	**48.4**

5 YEAR STORAGE REQUIRED:	**41.6**

APPENDIX "F"

Stormwater Quality Control Calculations

VALDOR ENGINEERING INC.

File: 21147

February 2022

TABLE: F1

OIL / GRIT SEPARATOR SIZING

Site Area = A = 0.548 Ha

Surface Type	Runoff Coeff	Area (Ha)
Roof Area	0.90	0.307
Impervious	0.90	0.118
Pervious	0.25	0.053
Green Roof	0.40	0.070
	0.77	**0.548**

Imperviousness

% Impervious = (Runoff Coefficient - 0.20) / 0.7 x 100

% Impervious = 81.9 %

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

12/20/2021

Province:	Ontario
City:	Oakville
Nearest Rainfall Station:	TORONTO INTL AP
Climate Station Id:	6158731
Years of Rainfall Data:	20
Site Name:	
Drainage Area (ha):	0.55
% Imperviousness:	81.50
Runoff Coefficient 'c':	0.78

Project Name:	2163 & 2169 Sixth Line
Project Number:	21147
Designer Name:	Josh(Shuai) Yuan
Designer Company:	Valdor Engineering Inc.
Designer Email:	syuan@valdor-engineering.com
Designer Phone:	647-868-0198
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	14.12
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	84.63
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	79
EFO6	88
EFO8	94
EFO10	96
EFO12	99

Recommended Stormceptor EFO Model:	**EFO6**
Estimated Net Annual Sediment (TSS) Load Reduction (%):	**88**
Water Quality Runoff Volume Capture (%):	**> 90**

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

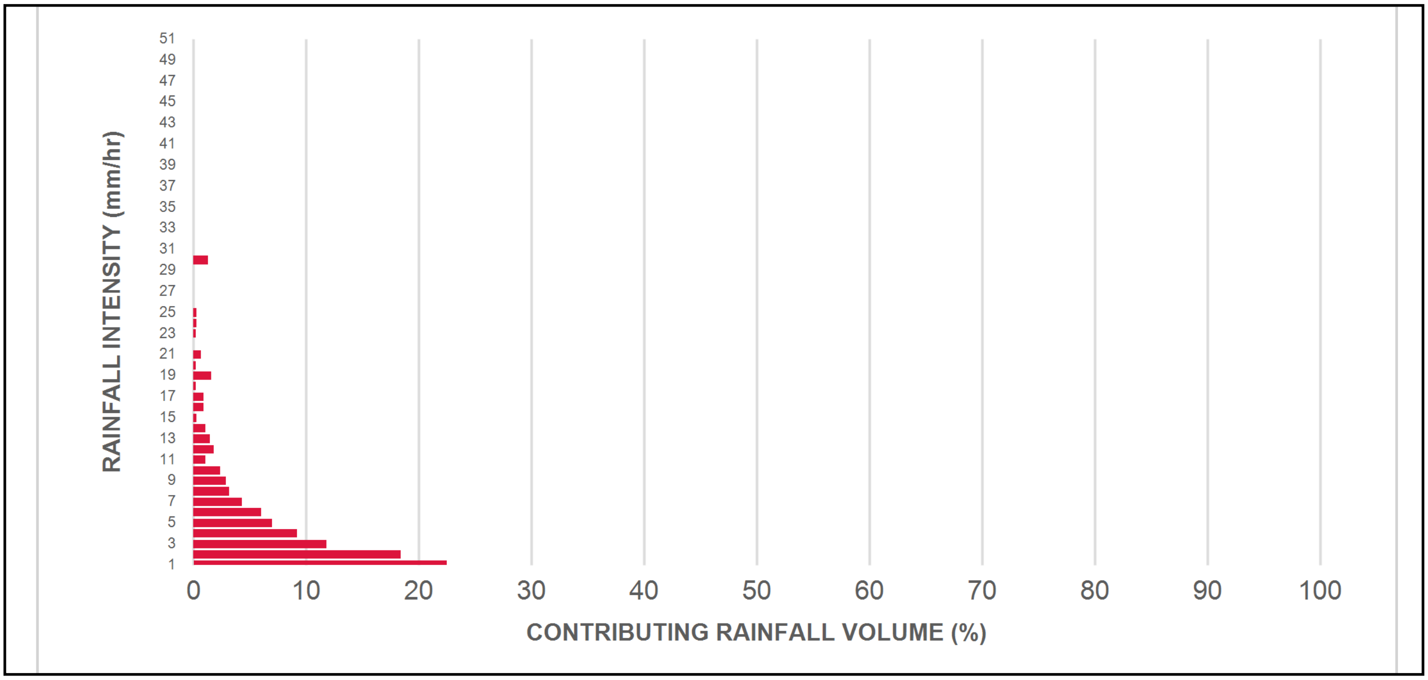
Upstream Flow Controlled Results

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	22.5	22.5	1.21	72.0	28.0	100	22.5	22.5
2	18.4	40.9	2.41	145.0	55.0	98	18.1	40.6
3	11.8	52.7	3.62	217.0	83.0	91	10.7	51.3
4	9.2	61.9	4.83	290.0	110.0	88	8.1	59.5
5	7.0	68.9	6.03	362.0	138.0	85	6.0	65.5
6	6.0	74.9	7.24	434.0	165.0	82	4.9	70.3
7	4.3	79.2	8.44	507.0	193.0	78	3.4	73.7
8	3.2	82.4	9.65	579.0	220.0	76	2.4	76.1
9	2.9	85.3	10.86	651.0	248.0	75	2.2	78.3
10	2.4	87.7	12.06	724.0	275.0	74	1.8	80.1
11	1.1	88.7	13.27	796.0	303.0	73	0.8	80.9
12	1.8	90.5	14.48	869.0	330.0	72	1.3	82.2
13	1.5	92.1	15.68	941.0	358.0	71	1.1	83.3
14	1.1	93.1	16.89	1013.0	385.0	69	0.7	84.0
15	0.3	93.5	18.10	1086.0	413.0	68	0.2	84.2
16	0.9	94.3	19.30	1158.0	440.0	67	0.6	84.8
17	0.9	95.3	20.51	1231.0	468.0	66	0.6	85.4
18	0.2	95.5	21.71	1303.0	495.0	65	0.1	85.5
19	1.6	97.1	22.92	1375.0	523.0	63	1.0	86.6
20	0.2	97.3	24.13	1448.0	550.0	62	0.1	86.7
21	0.7	98.0	25.33	1520.0	578.0	61	0.4	87.1
22	2.0	100.0	26.54	1592.0	605.0	60	1.2	88.3
23	0.2	100.2	27.75	1665.0	633.0	60	0.1	88.5
24	0.3	100.5	28.95	1737.0	661.0	60	0.2	88.6
25	0.3	100.8	30.16	1810.0	688.0	59	0.2	88.8
30	1.3	102.0	36.19	2171.0	826.0	58	0.7	89.5
35	-2.0	100.0	42.22	2533.0	963.0	57	N/A	88.4
40	0.0	100.0	48.26	2895.0	1101.0	55	0.0	88.4
45	0.0	100.0	54.29	3257.0	1238.0	52	0.0	88.4
50	0.0	100.0	60.32	3619.0	1376.0	49	0.0	88.4
Estimated Net Annual Sediment (TSS) Load Reduction =								**88 %**

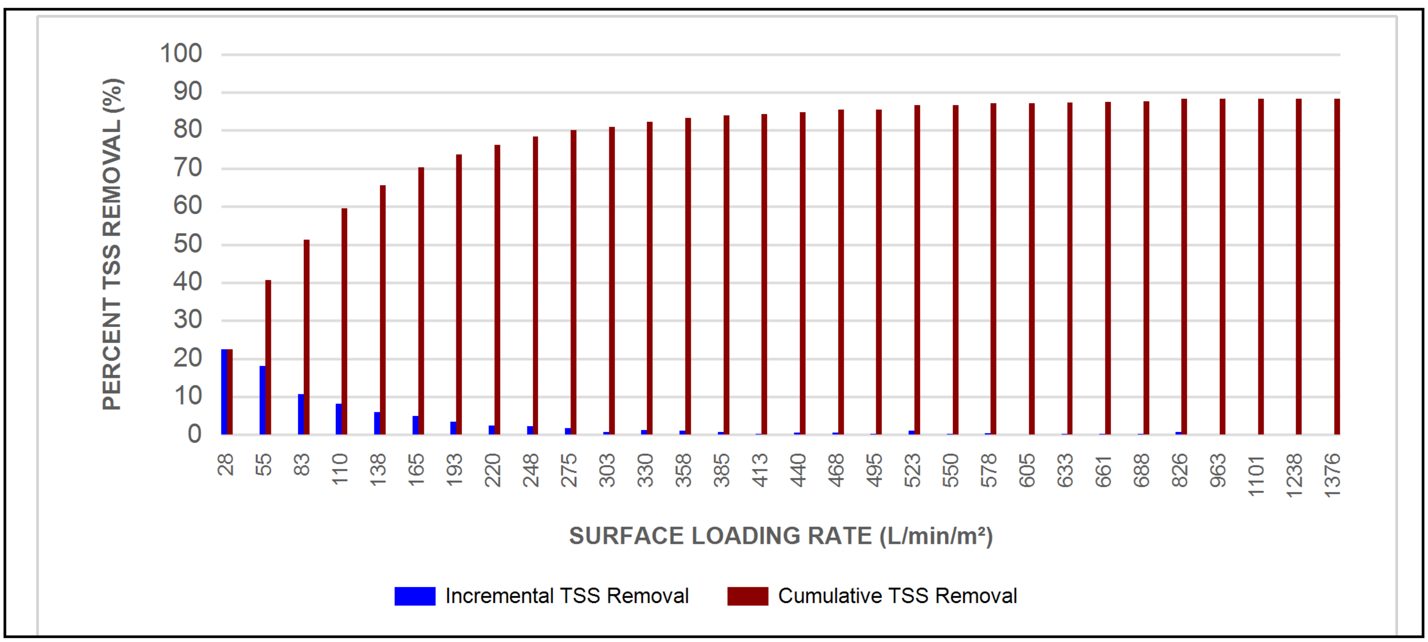
Climate Station ID: 6158731 *Years of Rainfall Data*: 20

Stormceptor® EF Sizing Report

RAINFALL DATA FROM TORONTO INTL AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

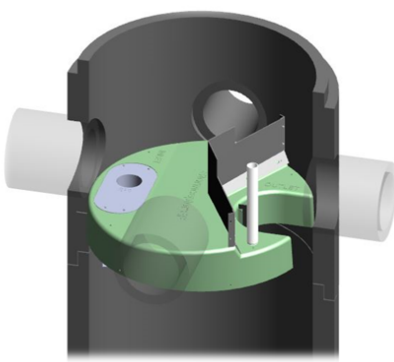
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

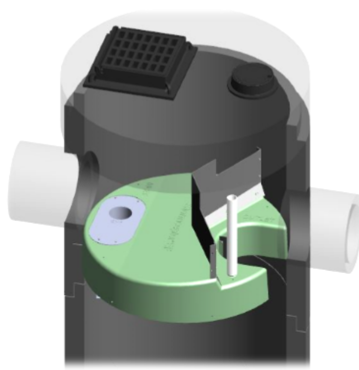
DESIGN FLEXIBILITY

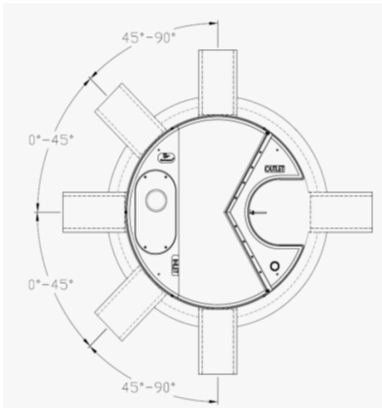
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing shall be determined using historical rainfall data and a sediment removal performance curve derived from the actual third-party verified laboratory testing data. The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

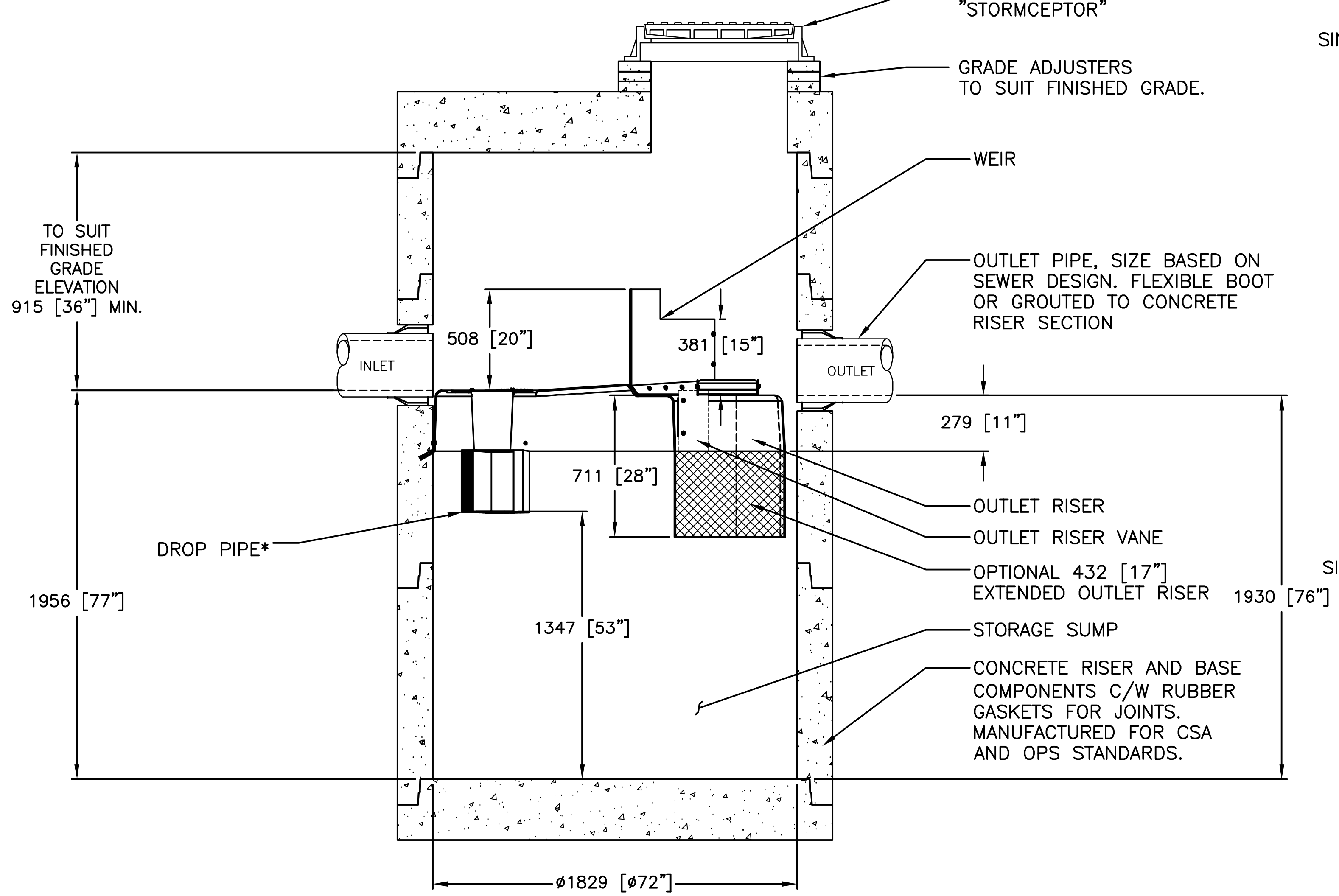
3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

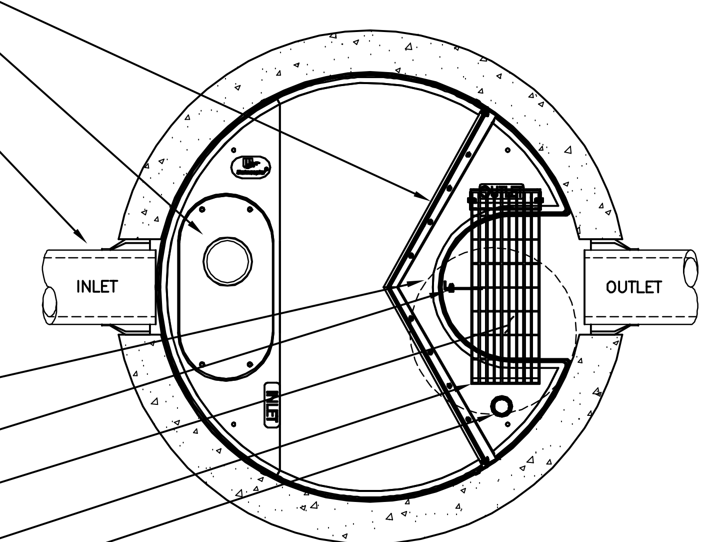
The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m2 to 2600 L/min/m2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

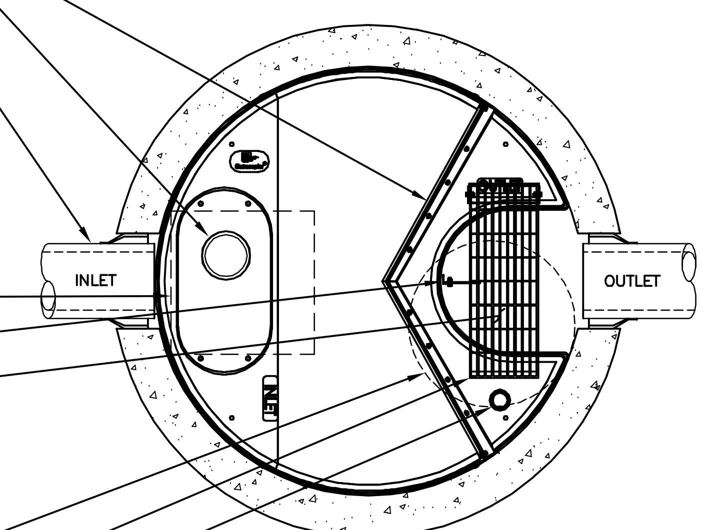
DRAWING NOT TO BE USED FOR CONSTRUCTION



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m^2 (27.9 gpm/ft^2) FOR STORMCEPTOR EF6 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO6 (OIL CAPTURE CONFIGURATION).

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO6				
STRUCTURE ID					*
HYDROCARBON STORAGE REQ'D (L)					*
WATER QUALITY FLOW RATE (L/s)					*
PEAK FLOW RATE (L/s)					*
RETURN PERIOD OF PEAK FLOW (yrs)					*
DRAINAGE AREA (HA)					*
DRAINAGE AREA IMPERVIOUSNESS (%)					*
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

MARK	DATE	REVISION DESCRIPTION	BY
1	6/8/18	OUTLET PLATFORM	JSK
0	05/26/17	INITIAL RELEASE	JSK

Stormceptor® EF

SCALE = NTS

imbrium

DATE: 10/13/2017	
DESIGNED: JSK	DRAWN: JSK
CHECKED: BSF	APPROVED: SP
PROJECT No.: EFO6	SEQUENCE No.: *
SHEET: 1 OF 1	

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Imbrium Systems ("Imbrium"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Imbrium. Failure to comply is done at the user's own risk and Imbrium expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Imbrium immediately for re-evaluation of the design. Imbrium accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

I:\IMBRIUM\PRODUCTS\STORMCEPTOR EF\40 DRAWINGS & DETAILS\STANDARD DETAILS\EFO STANDARD DETAILS\EFO6-DETAIL.DWG 4/12/2019 11:05 AM

APPENDIX "G"

Water Balance & Retention Calculations

VALDOR ENGINEERING INC.

File: 21147

February 2022

TABLE: G1

Project: **2163 & 2169 Sixth Line Road**

WATER BALANCE CALCULATIONS

1. INITIAL ABSTRACTION

Surface Type	Area (Ha)	Runoff Coefficient	Init. Abstract. (mm)
Landscape Area	0.053	0.25	5.0
Roof Area	0.307	0.90	1.0
Green Roof Area	0.070	0.40	5.0
Impervious Area	0.118	0.90	1.0
Total	**0.548**	**0.77**	**1.90**

2. STORAGE VOLUME REQUIRED

Area of Site (A) =	5,480	sq.m.
Target Retention Depth (D) =	0.005	(m)
Overall Initial Abstractions (I) =	0.00190	(m)
Storage Volume Required = V = A x (D - I) =	**17.0**	(cu.m.)

3. INFILTRATION TRENCH SIZE

Percolation Rate (P) =	12	mm/hr
Maximum Retention Time (T) =	72	hours
Max Infiltration Trench Height Allowable (D) = (PT/(1000*S)) =	0.86	m

*MOE recommend max depth of 1.5m

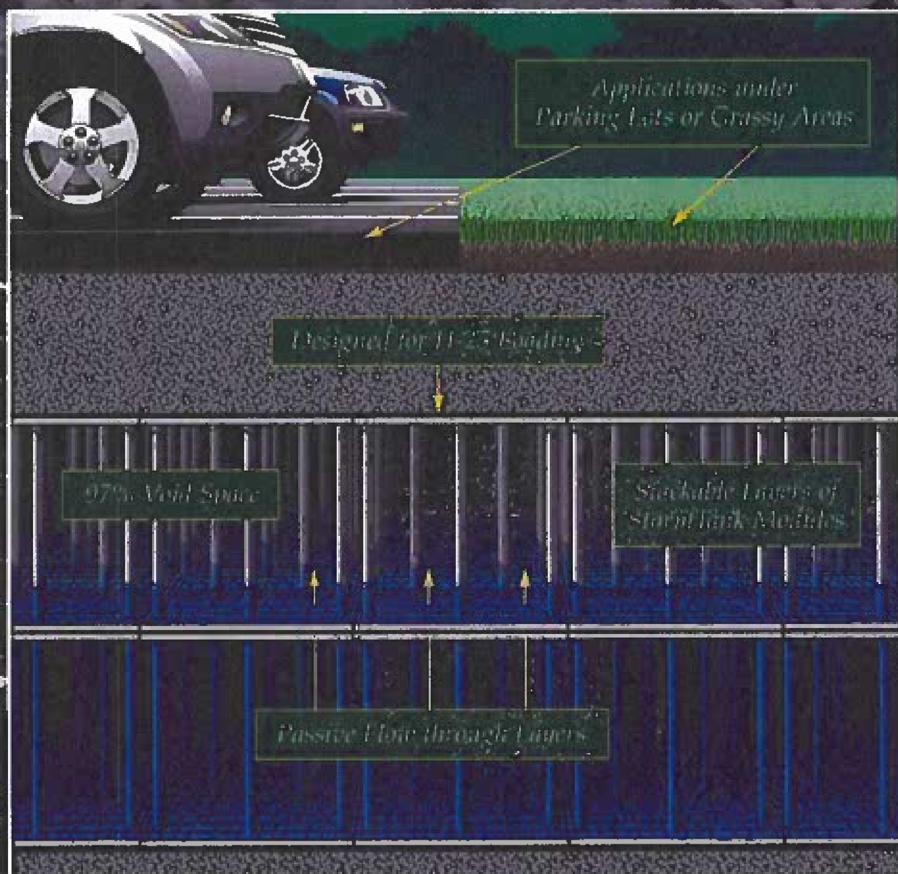
Drawdown Time at Selected Tank Height

T = (*d* / P) x 1000 = 72 hours

Trench Size using Brentwood Storm Tanks: (Unit size: 0.760m H x 0.457m W x 0.914m L)

Trench Base Area (A) =	30.0	sq.m
Modules High =	1	
Trench Height, H =	0.76	m
Modules Long =	8	
Trench Length, L =	7.31	m
Modules Wide =	7	
Trench Width, W =	3.20	m
Void Ratio =	0.97	
Total Number of Units =	56	
Volume =	**17.3**	cu.m.

STORMTANK™ STORMWATER STORAGE MODULES

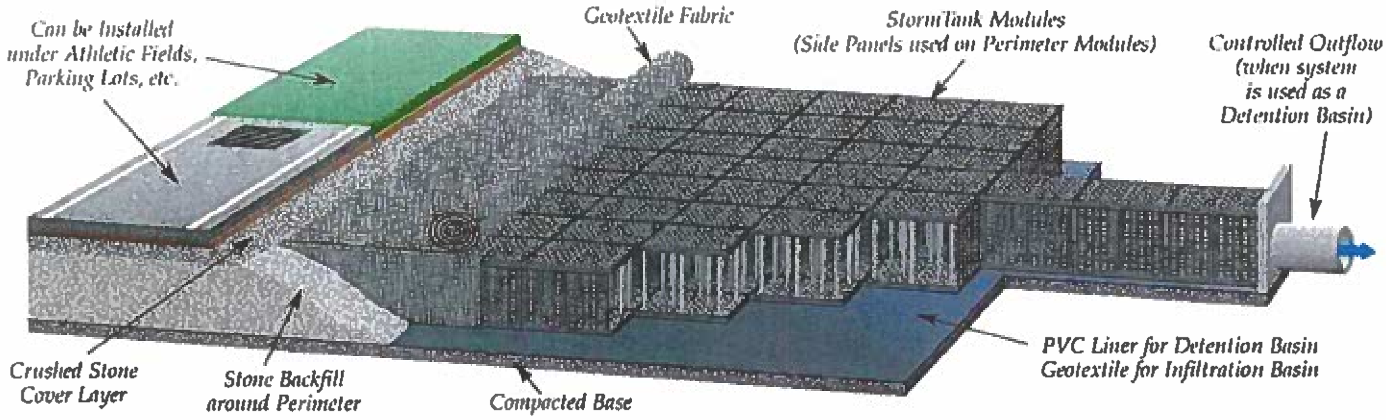


StormTank™

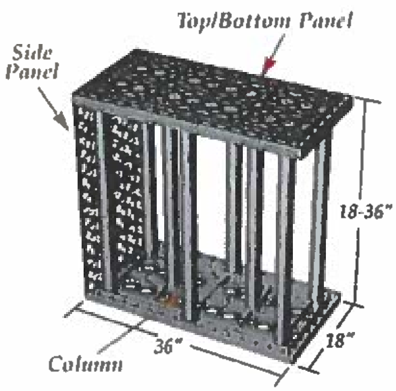
Stormwater Storage Modules are a high-void, strong, affordable alternative to crushed stone, concrete structures, or pipe chambers for sub-surface stormwater detention or infiltration basins.

BRENTWOOD INDUSTRIES

STORMTANK STORMWATER STORAGE SYSTEM



Brentwood's StormTank™ Stormwater Storage System is a high-void, strong, affordable alternative to crushed stone, concrete structures, or pipe chambers for sub-surface stormwater detention or infiltration basins.



HIGH VOID, HIGH STRENGTH Our modules offer the largest void space of any underground stormwater storage units currently on the market (97%), and are load-rated for use under parking lots, athletic fields, parks, etc. (Designed to exceed H-25 loading criteria)!

EASY TO INSTALL The entire StormTank Storage System is built on-site from Top/Bottom Panels and Side Panels made of rugged, lightweight polypropylene and 2-3/8" diameter PVC columns. Combinations of these three components create all the module configurations needed for a fully-functioning underground system (see example at top).

To minimize shipping costs, the StormTank components are delivered unassembled, but on-site assembly is a snap! No special equipment, tools, or bonding agents are needed to assemble or install the modules. All components easily attach with a secure concentric pressure fit.

StormTank installation is quick & easy ... and requires no special tools or equipment!

EASY TO CLEAN The open tops/bottoms and sides of the modules makes flushing and cleaning easy ... a great advantage over storage systems where access is limited.

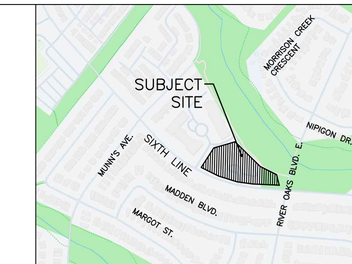
SAVES SPACE AND MONEY Because of its 97% void space, stackability, and H-25 strength, a StormTank system offers significant space and cost savings when compared to conventional stormwater storage solutions. For example:

- A StormTank installation requires a much smaller footprint than a crushed rock system with the same amount of stormwater storage capacity. And less space used also means less expense for excavation, geotextile, liner, installation, and backfill.
- Because a StormTank system is installed underground, it frees up surface space for uses that would be otherwise unavailable with a typical detention pond.
- StormTank's stackability and variable column height (18"-36") can maximize the use of a site with limited surface area.

BRENTWOOD INDUSTRIES

Brentwood Industries, Inc.
Mailing Address P.O. Box 605, Reading, PA 19603, USA
Shipping Address 610 Morgantown Rd., Reading, PA 19611
Phone 610.236.1100 *Fax* 610.736.1280
Email wwsales@brentw.com
Website www.BrentwoodProcess.com

Printed 03/07



KEY PLAN
N.T.S

LEGEND:

□	PROPOSED CATCH BASIN
○	STORM MANHOLE
●	SANITARY MANHOLE
⊖	VALVE AND BOX
◀	EXTERIOR DOOR LOCATION
	FIRE DEPARTMENT CONNECTION
	STAND ALONE FIRE DEPARTMENT CONNECTION
◪	AREA DRAIN
□	CATCH BASIN
x 130.73BW	BOTTOM OF WALL
x 130.73TC	TOP OF CURB
x 130.73EA	EDGE OF ASPHALT
— · · —	PROPERTY LINE
- - - - - -	PROPOSED DRAINAGE BREAK
⇦	PROPOSED OVERLAND FLOW ROUTE
▬ ▬ ▬	TREE PROTECTION FENCE
▲	PROPOSED TRANSFORMER

CONVERSION NOTE:

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.304.

BENCHMARK NOTE:

ELEVATIONS ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD–1928:PRE–1978) AND ARE DERIVED FROM THE TOWN OF OAKVILLE BENCHMARK MONUMENT No. 174, HAVING A PUBLISHED ELEVATION OF 171.841 METRES.

NO.	DATE	REVISIONS	BY

PRELIMINARY

VALDOR ENGINEERING INC.
Consulting Engineers - Project Managers
571 CHRISLEA ROAD, UNIT 4, 2ND FLOOR, VAUGHAN, ONTARIO, L4L 8A2
TEL (905) 264-0054, FAX (905) 264-0069
E-MAIL: info@valdor-engineering.com
www.valdor-engineering.com

PROPOSED MIXED–USE DEVELOPMENT
2163 & 2169 SIXTH LINE ROAD
TOWN OF OAKVILLE

FUNCTIONAL GRADING PLAN

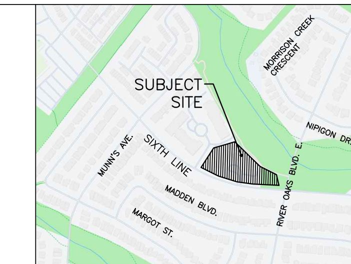
SCALE	DATE OF DWG.	PROJECT NO.
1:250	JUN 24, 2022	21147
DRAWN BY R.M.	DRAWING NO. FGP–1	
CHKD BY D.G.		

NOTES.

1. IT IS THE RESPONSIBILITY OF THE APPLICANT TO COMPLY WITH THE SEWER USE BY–LAW AND OBTAIN ALL APPROVALS/PERMITS FROM TORONTO WATER – ENVIRONMENTAL MONITORING & PROTECTION UNIT FOR ANY PROPOSED TEMPORARY OR PERMANENT DISCHARGING OF PRIVATE WATER INTO MUNICIPAL SEWER SYSTEMS AND WATERCOURSES. THE APPLICANT IS ALSO RESPONSIBLE FOR COMPLYING WITH ALL APPLICABLE PROVINCIAL REQUIREMENTS AND OBTAINING THE NECESSARY APPROVALS AND/OR PERMITS FROM THE MINISTRY OF ENVIRONMENT, CONSERVATION, AND PARKS, WITH REGARD TO ANY PROPOSED DEWATERING AND MITIGATING AND MANAGING EITHER ON–SITE OR OFF–SITE OF ANY PRIVATE WATER ENCOUNTERED DURING CONSTRUCTION
2. IT IS THE RESPONSIBILITY OF THE APPLICANT TO ENSURE COMPLIANCE WITH ALL APPLICABLE PROVINCIAL STANDARDS AND TO OBTAIN ALL PROVINCIAL APPROVALS, INCLUDING BUT NOT LIMITED TO ENVIRONMENTAL COMPLIANCE APPROVALS.
3. THE SIGNED ACCEPTANCE BY ENGINEERING AND CONSTRUCTION SERVICES PERTAINS TO THE SERVICE CONNECTIONS LOCATED WITHIN THE MUNICIPAL RIGHT OF WAY.
4. STAFF HAVE REVIEWED THIS APPLICATION ON THE UNDERSTANDING IT WILL COMPRISE A SINGLE PARCEL OF LAND, UNDER ONE OWNER, UPON COMPLETION. IF ANY PARTY, INCLUDING THE APPLICANT OR ANY SUBSEQUENT OWNER, SUBMITS AND APPLICATION FOR SEVERANCE, PART–LOT CONTROL, SUBDIVISION, CONDOMINIUM APPROVAL OR ANY OTHER FORM OF LAND DIVISION FOR THIS DEVELOPMENT NOT IN ACCORDANCE WITH THIS ASSUMPTION, DIFFERENT SERVICING CONNECTIONS, INCLUDING ALL ASSOCIATED STORMWATER MANAGEMENT FACILITIES AND ANY NECESSARY REVISED PLANS AND STUDIES, MAY BE REQUIRED BY THE CITY AT THE SOLE COST TO THAT APPLICANT.
5. ALL PROPOSED SERVICE CONNECTIONS ARE REQUIRED TO BE INSTALLED IN ACCORDANCE WITH CITY SPECIFICATIONS AND STANDARDS. PROPOSED SERVICE CONNECTIONS WITHIN THE RIGHT OF WAY ARE TO BE INSTALLED BY CITY FORCES AT THE OWNER'S EXPENSE. CONTRACTOR TO APPLY FOR AND OBTAIN SERVICE CONNECTION PERMITS FROM THE CITY. SERVICE CONNECTIONS ARE TO BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE SERVICING. CONTRACTOR TO INFORM ENGINEER IMMEDIATELY IF CONFLICTS ARE ENCOUNTERED DURING SERVICE CONNECTION CONSTRUCTION. BOULEVARD TO BE RESTORED TO THE SATISFACTION OF THE CITY. CONTRACTOR TO CONNECT CITY'S INSTALLED WORK INTO CONTROL MANHOLE.
6. THE EXISTING SERVICE CONNECTIONS ARE TO BE DISCONNECTED AND THE PROPOSED SITE SERVICE CONNECTIONS ARE TO BE INSTALLED BY CITY'S FORCES AT OWNER'S COST.

NOTES.

1. IT IS THE RESPONSIBILITY OF THE APPLICANT TO COMPLY WITH THE SEWER USE BY-LAW AND OBTAIN ALL APPROVALS/PERMITS FROM TORONTO WATER – ENVIRONMENTAL MONITORING & PROTECTION UNIT FOR ANY PROPOSED TEMPORARY OR PERMANENT DISCHARGING OF PRIVATE WATER INTO MUNICIPAL SEWER SYSTEMS AND WATERCOURSES. THE APPLICANT IS ALSO RESPONSIBLE FOR COMPLYING WITH ALL APPLICABLE PROVINCIAL REQUIREMENTS AND OBTAINING THE NECESSARY APPROVALS AND/OR PERMITS FROM THE MINISTRY OF ENVIRONMENT, CONSERVATION, AND PARKS, WITH REGARD TO ANY PROPOSED DEWATERING AND MITIGATING AND MANAGING EITHER ON-SITE OR OFF-SITE OF ANY PRIVATE WATER ENCOUNTERED DURING CONSTRUCTION
2. IT IS THE RESPONSIBILITY OF THE APPLICANT TO ENSURE COMPLIANCE WITH ALL APPLICABLE PROVINCIAL STANDARDS AND TO OBTAIN ALL PROVINCIAL APPROVALS, INCLUDING BUT NOT LIMITED TO ENVIRONMENTAL COMPLIANCE APPROVALS.
3. THE SIGNED ACCEPTANCE BY ENGINEERING AND CONSTRUCTION SERVICES PERTAINS TO THE SERVICE CONNECTIONS LOCATED WITHIN THE MUNICIPAL RIGHT OF WAY.
4. STAFF HAVE REVIEWED THIS APPLICATION ON THE UNDERSTANDING IT WILL COMPRISE A SINGLE PARCEL OF LAND, UNDER ONE OWNER, UPON COMPLETION. IF ANY PARTY, INCLUDING THE APPLICANT OR ANY SUBSEQUENT OWNER, SUBMITS AND APPLICATION FOR SEVERANCE, PART-LOT CONTROL, SUBDIVISION, CONDOMINIUM APPROVAL OR ANY OTHER FORM OF LAND DIVISION FOR THIS DEVELOPMENT NOT IN ACCORDANCE WITH THIS ASSUMPTION, DIFFERENT SERVICING CONNECTIONS, INCLUDING ALL ASSOCIATED STORMWATER MANAGEMENT FACILITIES AND ANY NECESSARY REVISED PLANS AND STUDIES, MAY BE REQUIRED BY THE CITY AT THE SOLE COST TO THAT APPLICANT.
5. ALL PROPOSED SERVICE CONNECTIONS ARE REQUIRED TO BE INSTALLED IN ACCORDANCE WITH CITY SPECIFICATIONS AND STANDARDS. PROPOSED SERVICE CONNECTIONS WITHIN THE RIGHT OF WAY ARE TO BE INSTALLED BY CITY FORCES AT THE OWNER'S EXPENSE. CONTRACTOR TO APPLY FOR AND OBTAIN SERVICE CONNECTION PERMITS FROM THE CITY. SERVICE CONNECTIONS ARE TO BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE SERVICING. CONTRACTOR TO INFORM ENGINEER IMMEDIATELY IF CONFLICTS ARE ENCOUNTERED DURING SERVICE CONNECTION CONSTRUCTION. BOULEVARD TO BE RESTORED TO THE SATISFACTION OF THE CITY. CONTRACTOR TO CONNECT CITY'S INSTALLED WORK INTO CONTROL MANHOLE.
6. THE EXISTING SERVICE CONNECTIONS ARE TO BE DISCONNECTED AND THE PROPOSED SITE SERVICE CONNECTIONS ARE TO BE INSTALLED BY CITY'S FORCES AT OWNER'S COST.



KEY PLAN
N.T.S

LEGEND:

- PROPOSED CATCH BASIN
- STORM MANHOLE
- SANITARY MANHOLE
- VALVE AND BOX
- HYDRANT
- EXTERIOR DOOR LOCATION
- FIRE DEPARTMENT CONNECTION
- STAND ALONE FIRE DEPARTMENT CONNECTION
- EXISTING AREA DRAIN
- EXISTING CATCH BASIN
- WATER METER
- BACKFLOW PREVENTER
- DCDA DOUBLE CHECK DETECTOR ASSEMBLY
- GAS EXISTING GAS MAIN

CONVERSION NOTE:

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.304.

BENCHMARK NOTE:

ELEVATIONS ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD-1928:PRE-1978) AND ARE DERIVED FROM THE TOWN OF OAKVILLE BENCHMARK MONUMENT No. 174, HAVING A PUBLISHED ELEVATION OF 171.841 METRES.

NO.	DATE	REVISIONS	BY

PRELIMINARY

VALDOR ENGINEERING INC.
Consulting Engineers - Project Managers
571 CHRISLEA ROAD, UNIT 4, 2ND FLOOR, VAUGHAN, ONTARIO, L4L 8A2
TEL (905) 264-0054, FAX (905) 264-0069
E-MAIL: info@valdor-engineering.com
www.valdor-engineering.com

PROPOSED MIXED-USE DEVELOPMENT
2163 & 2169 SIXTH LINE ROAD
TOWN OF OAKVILLE

FUNCTIONAL SERVICING PLAN

SCALE	DATE OF DWG.	PROJECT NO.
1:250	JUN 24, 2022	21147
DRAWN BY R.M.	DRAWING NO. FSP-1	
CHKD BY D.G.		

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