376 and 390 Derry Road

Functional Servicing and Stormwater Management Report

December 2023

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Submission History

Submission	Date	In Support Of	Distributed To
1st	December 2023	Re-Zoning	City of Mississauga, Peel Region and Ballymore Homes

1.0 Introduction

SCS Consulting Group Ltd. has been retained by Ballymore Homes to prepare a Functional Servicing and Stormwater Management (SWM) Report for a proposed mixed-used development located at 376 and 390 Derry Road in the City of Mississauga.

1.1 Purpose of the Report

The Functional Servicing and SWM Report has been prepared in support of the Re-Zoning application for the proposed development. The Site Plan is provided in **Appendix A**.

The purpose of this report is to demonstrate that the proposed development can be accommodated by the external storm, sanitary and water infrastructure and to establish servicing and grading expectations for the future site plan application in accordance with the City of Mississauga, Peel Region, Credit Valley Conservation Authority (CVC), the Ontario Building Code, and the Ministry of Environment, Conservation and Parks (MECP) design criteria.

1.2 Study Area

The existing site is comprised of open space areas and some commercial development located within the Credit River Watershed in the City of Mississauga. As shown on **Figure 1.1**, the study area is bound by:

- Regional road, Derry Road West to the north;
- Existing residential to the south;
- Existing commercial development (346 Derry Road West) as well as green space to the east;
- McLaughlin Road and existing residential to the west; and
- Future residential development to the East.

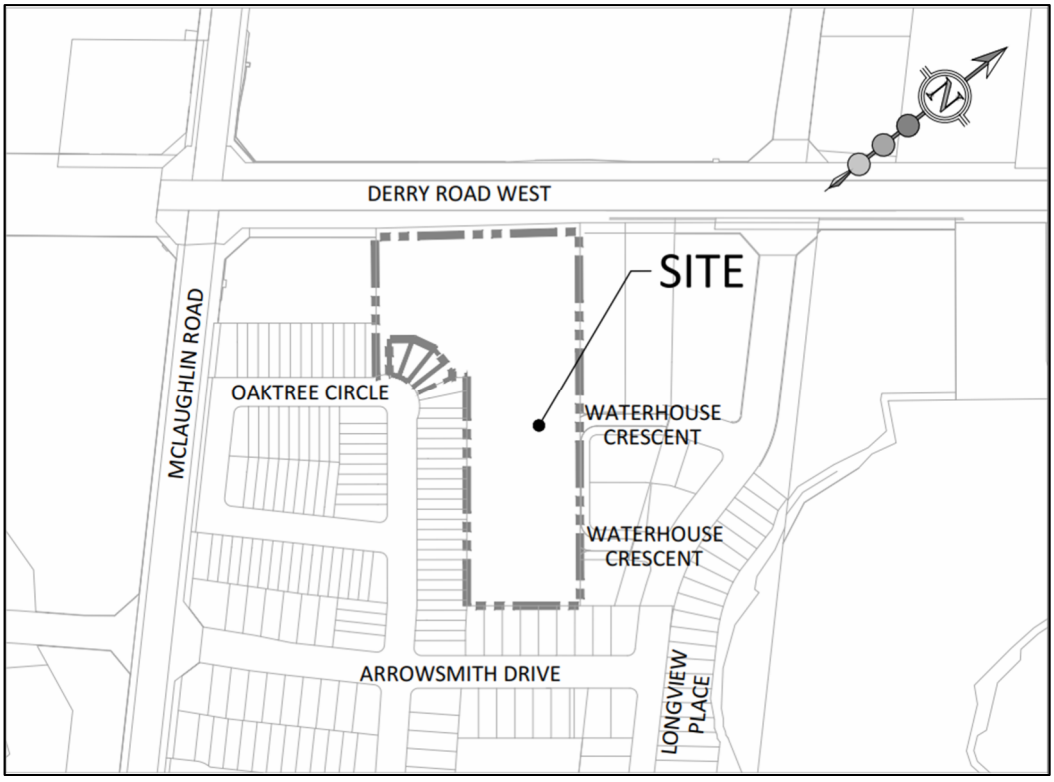

Figure 1.1: Site Location Plan

The proposed development is approximately 2.59 ha in size. A total of 2.39 ha area will be designated as a condominium block and will consist of 120 townhouse units, and 374 m^2 (GFA) of Commercial area as well as a 7.0 m wide private road. A 0.09 ha area will be designated along Derry Road West to support a future road widening. The remaining 0.11 ha, fronting Oak Tree Circle, will be separated to support the application of four free-hold residential units – 2 detached, and two semi-detached. All four units will be fronting Oak Tree Circle (refer to the Site Plan in **Appendix A**). Access to the condominium development is proposed from Derry Road West and future municipal roads extending off of Longview Place.

The existing commercial site located at 346 Derry Road West, adjacent to the east side of the development is currently non-participating. However, the master plan for this site will consist of two extensions off the municipal roads off of Longview Place, referred to as Waterhouse Crescent. This will provide two future site accesses once fully developed. However, the timing of the ultimate build-out is unknown at this time. Based on discussions with the Municipality, a surface easement in favour of the City will be granted along the east north-south road of the development to provide emergency access. However, this will be a private road; therefore, the accesses to the future Waterhouse Crescent will act as driveway entrances.

1.3 Background Servicing Information

The following reports, standards and drawings have been referred to with regard to the proposed development (relevant excerpts are included in **Appendix B**):

- Region of Peel, Public Works Stormwater Design Criteria and Procedural manual, June 2019;
- Region of Peel, Public Works Design, Specifications and Procedures Manual, Watermain Design Criteria, June 2010;
- Region of Peel, Public Works Design, Specifications and Procedures Manual, Sanitary Sewer Design Criteria, March 2017;
- City of Mississauga, Development Requirements Manual, September 2016;
- Credit Valley Conservation Authority Stormwater Management Guideline, July 2022;
- Municipal Engineering Solutions, Water and Waste Water Calculations, October 2023
- The Gates of Fletchers Creek Storm Drainage Area Plan, Drawing G-6 prepared by Urban Ecosystems Limited, February 2000;
- Design Brief for First Flush Pond No. 3 – Meadowvale Village Secondary Plan Area, prepared by Urban Ecosystems Limited, July 2000;
- R.J. Burnside, Hydrogeological Assessment and Water Balance, November 2023;
- Fisher Environmental Ltd., Phase 1 Environmental Site Assessment, August 2017;
- Fisher Environmental Ltd., Phase 2 Environmental Assessment, August 2017;
- Soil Engineers Ltd., Phase 1 Environmental Site Assessment, May 2022;
- Soil Engineers Ltd., Phase 2 Environmental Site Assessment, February 2023; and
- Soil Engineers Ltd., Geotechnical Investigation, May 2022.

2.0 Storm Servicing

2.1 Existing Storm Sewer System

As indicated in the record drawings (**Appendix B**), the sizes and locations of the existing storm sewers surrounding the site are:

- A 450 mm diameter concrete storm sewer on Oaktree Circle flowing north east towards an existing stormwater management facility, First Flush No. 3, and ultimately to Fletchers Creek;
- A 750 mm diameter concrete storm sewer on Oaktree Circle flowing south east towards an existing stormwater management facility, First Flush No. 3 and ultimately to Fletchers Creek;
- A 375 mm diameter concrete storm sewer on Derry Road West flowing south west towards an existing stormwater management facility, First Flush No. 3 and ultimately to Fletchers Creek and;
- A 450 mm diameter concrete storm sewer on Longview Place flowing south east towards an existing stormwater management facility, First Flush No. 3 and ultimately to Fletchers Creek.

Based on existing topographic survey information, the existing sites – both 376 and 390 Derry Road West, do not have a storm outlet. The current topography is sloping south towards Oaktree Cricle and ultimately drain into Fletchers Creek. Refer to **Drawing S-1 (Appendix H)** for the existing storm network.

2.2 Proposed Storm Sewer System

The private storm sewer system within the proposed development (**Drawing S-1**) is designed to capture the 100-year storm event and release the storm drainage to the allowable release rates dictated in **Section 3.0**.

The storm sewer system was designed in accordance with the City of Mississauga, Region of Peel, Ontario Building Code and MECP guidelines, including the following:

- Pipes to be sized to accommodate runoff from a 100 year storm event
- Minimum Pipe Size: 300 mm diameter
- Maximum Flow Velocity: 4.0 m/s
- Minimum Flow Velocity: 0.75 m/s
- Minimum Pipe Depth: 1.0 m to obvert

The private storm sewer system from the condominium development is proposed to connect to the existing 450mm diameter PVC storm sewer on Oaktree Circle via a new maintenance hole at the south of the proposed development, as shown on **Drawing S-1**.

Per the Oaktree Circle plan and profile (**Appendix B**), the proposed storm sewer has 4.5 m of cover at the proposed service connection, which is sufficient to service the proposed development.

The storm sewers within the condominium site will have slopes ranging between 0.5% and 2% (typically) and will be provided at 1.5 m to 5 m deep. As per Mississauga standards, roof drainage will discharge to grade, and based on the on-site stormwater management controls, sump pumps will be provided at each unit to outlet foundation drainage to grade. A stormwater management facilities are proposed within the parking and amenity area to provide adequate storm controls for the site.

As per the latest City of Mississauga standards, a 300 mm diameter minimum storm service connection is required to all commercial units. No rooftop storage has been included at this time, however may be explored at site plan application stage once a building mechanical has been engaged. It is assumed at this stage that the commercial unit will be slab on grade with no basement and will be confirmed at site plan application stage.

As per the latest City of Mississauga standards, roof leaders for the four freehold residential units will discharge to concrete splash pads at grade. A 150 mm diameter foundation drain collector is proposed to each of the four units, as shown on **Drawing S-1**.

3.0 Stormwater Management

3.1 Stormwater Runoff Control Criteria

The following stormwater runoff control criteria have been established based on the City of Mississauga design criteria (2016), Credit Valley Conservation Authority (CVC) design criteria (2022), and the MECP Stormwater Management Planning and Design Manual (2003). The stormwater runoff criteria are summarized below in **Table 3.2**.

Table 3.1: Stormwater Runoff Control Criteria

Criteria	Control Measure
Quantity Control	Control proposed peak flows to existing peak flows for the 2 through 100 year storm events (City of Mississauga).
Quality Control	Provide MECP Enhanced (Level 1) Protection for 80% TSS Removal (CVC/MECP).
Water Budget	Retention of the 5 mm rainfall runoff on-site (CVC).
Erosion Control	At a minimum retain 5 mm rainfall runoff on-site and downstream pond to account for the 25 mm – 48 hour detention from the proposed development (CVC).

3.2 Existing Drainage

Drainage from the majority of the existing lands and the future Derry Road widening (Catchments 201 and 303, 2.41 ha and 0.09 ha, **Figure 3.1**) is conveyed south via overland flow through an existing residential development to an existing 750 mm diameter storm sewer on Oaktree Circle which outlets into the existing stormwater management facility, First Flush No. 3, and ultimately to Fletchers Creek.

Drainage from the east corner of the existing lands (Catchment 202, 0.09 ha, **Figure 3.1**) is conveyed east via overland flow which outlets into the existing stormwater management facility, First Flush No. 3, and ultimately to Fletchers Creek.

3.3 Allowable Release Rates

The allowable release rates for the proposed development are the existing peak runoff rates for the subject lands for the 2 year through 100 year storm events or the capacity of the downstream storm sewer system. The proposed development was accounted for within the Gates of Fletchers Creek subdivision. Per The Gates of Fletchers Creek Storm Drainage Area Plan, Drawing G-6, **Appendix B**, a portion of the proposed development, 1.32 ha was accounted for with a runoff coefficient of 0.6 connecting into the existing storm sewer within Oaktree Circle, refer to **Figure 3.2**. The remainder of the proposed development, 1.17 ha, was accounted for with a runoff coefficient of 0.55 into the existing

storm sewer within Longview Place, refer to **Figure 3.2**. The Oaktree Circle and Longview Place existing storm sewers combine and outlet into the existing downstream stormwater management facility. Therefore, the proposed development is to control the proposed flows to the equivalent of both areas at a 5 year release rate per the approved storm sewer design sheet for the existing subdivision to the south (**Figure 3.2**).

The rational method was used to determine the target release rates from the site based on Intensity-Duration-Frequency (IDF) rainfall curves from the City of Mississauga Design Standards, supporting calculations are provided in **Appendix C**. As shown in **Table 3.2**, **t**he 5 year release rate based on 1.32 ha at a runoff coefficient of 0.6 in addition to 1.17 ha at a runoff coefficient of 0.55 results in an allowable release rate of 258.3 L/s.

Table 3.2: Allowable Release Rate

Return Period Storm	Allowable Release Rate (L/s)
100 Year	258.3

3.4 Stormwater Best Management Practices Selection

In accordance with the Ministry of Environment Stormwater Management Planning and Design Manual (2003), a review of stormwater management best practices was completed using a treatment train approach, which evaluated at-source, conveyance system, and end-of-pipe alternatives. The potential best management practices were evaluated based on the stormwater management objectives listed in **Table 3.1**.

The following site characteristics were taken into consideration:

- Developable area of 2.49 ha consisting of a townhouse development, a private laneway and a commercial building;
- The soils consist of low permeability silty to clayey till with bedrock and shale deposits encountered at approximately 4.2 m below ground;
- The proposed development is partially covered by a layer of fill and concrete material underlain by native fine texture till layer consisting of silty clay till/sandy silt till;
- The in-situ hydraulic conductivity of the shallow soils ranges from $2.0x10^{-5}$ to $5.2x10^{-8}$;
- The groundwater was measures to be 0.9 m to 3.0 m below ground with the seasonally high groundwater levels generally within 2 m of the ground surface.

The following are examples of at-source, conveyance and end-of-pipe controls that were evaluated for use in the proposed development. While evaluating the following controls, cost, feasibility, groundwater and grading constraints were taken into consideration.

At-Source Controls

At-source controls are at-source measures that reduce runoff prior to stormwater entering the conveyance system, such as:

- Increased topsoil depth;
- Roof leaders to grassed areas;
- At-source storage (i.e. rooftop or parking lot storage);
- Pervious pavement;
- Rainwater Harvesting;
- Passive Landscaping; and,
- Infiltration trenches/soak-away pits.

Conveyance Controls

Conveyance controls provide treatment of stormwater during the transport of runoff from individual lots to the receiving watercourse or end-of-pipe facility. Examples of conveyance controls include:

- Grassed Swales;
- Pervious pipe system.

End-of-Pipe Controls

End-of-pipe stormwater management facilities receive stormwater flows from a conveyance system (i.e., storm sewers or ditches) and provide treatment of stormwater prior to discharging flows to the receiving watercourse. Typical end-of-pipe controls include:

- Wet ponds;
- Wetlands;
- Dry ponds;
- Infiltration basins;
- Manufactured Treatment Devices; and
- Underground storage.

3.4.1 At-Source Controls Evaluation

It is noted these controls are proposed on private properties. Incorporating controls that require minimal routine maintenance can be an effective method in the treatment train

approach to SWM. The following controls have been evaluated for use in the proposed development:

Increased Topsoil Depth

An increase in the proposed topsoil depth is recommended to promote at source infiltration (minimum 0.3 m depth). Increased topsoil depth will also contribute to at source quality and quantity control and will contribute to groundwater recharge. A topsoil depth of 0.30 m is proposed.

Roof Leaders to Grassed Areas

Roof leaders will be discharged to grassed areas to promote at-source infiltration, thereby contributing to water quality and quantity control. The proposed rear roof leaders for the proposed buildings are proposed to discharge to grasses areas.

Passive Landscaping

Planting of gardens and other vegetation designed to minimize local runoff or use rainwater as a watering source can be used to reduce rainwater runoff by increasing evaporation, transpiration, infiltration and contribute to groundwater recharge. Homeowner education should be encouraged to use passive landscaping practices as part of the homeowner turnover package of information. By promoting infiltration through passive landscaping, water quality and quantity control is provided for the volume of water infiltrated. Passive landscaping can provide significant stormwater management benefits as part of the overall treatment train approach for the proposed development.

3.4.2 Conveyance Controls Evaluation

Conveyance controls provide treatment of stormwater during the transport of runoff from individual lots to the receiving watercourse or end-of-pipe facility. The following conveyance controls have been evaluated for use in the proposed development:

Grassed Swales

Grassed swales conveying runoff promote infiltration, filtration, and evapotranspiration, contributing to water quality and quantity control, and contribute to groundwater recharge. Rear lot runoff is conveyed via grassed swales to rear lot catchbasins.

3.4.3 Proposed End-of-Pipe Controls

While at-source and conveyance system controls are valuable components of the overall SWM plan, on their own they are not sufficient to meet the quantity and quality control objectives for the proposed development. End-of-pipe stormwater management facilities

receive stormwater flows from a conveyance system (i.e., storm sewers or ditches) and provide treatment of stormwater prior to discharging flows to the receiving outlet. Accordingly, the following end-of-pipe controls have been evaluated for use in the proposed development:

Underground Storage

To meet quantity control targets, flow restrictors can be used to control stormwater release rates. To accommodate the reduced release rate, stormwater detention facilities are required to store stormwater runoff. Stormwater storage is proposed to be provided by on-site underground storage chambers (e.g., CULTEC or approved equivalent) within the proposed development as shown on **Figure 3.3**.

Manufactured Treatment Device

A properly sized manufactured treatment device (MTD) can assist in providing MECP Enhanced (Level 1) treatment and can contribute to the treatment train approach for water quality control. The MTD unit specified (hydrodome) is Environmental Technology Verification (ETV) certified, to provide 80% TSS removal. Therefore, at-source and conveyance controls will work in conjunction with the MTD unit to provide overall Enhanced quality control.

A properly sized oil-grit separator (OGS) can provide MECP Enhanced (Level 1) treatment and contribute to the treatment train approach for water quality control. The OGS unit specified is required to have New Jersey Department of Environmental Protection (NJDEP) certification. It is recognized that TRCA policy only acknowledges 50% reduction of TSS by an OGS unit sized to removed 80% TSS; therefore, the at-source and conveyance controls will work in conjunction with the OGS unit to provide overall Enhanced quality control.

Table 3.3 below summarizes the recommended stormwater management Best Management Practices (BMPs) for the proposed development.

Table 3.3: Summary of the Recommended Stormwater Best Management Practices (BMPs)

Stormwater Management Control	Recommended BMP
At-Source Controls	Increased Topsoil Depth
	Roof Leader to Grassed Areas
	Passive Landscaping
Conveyance System Controls	Grassed Swales
End Of Pipe Controls	Underground Stormwater Detention System

Stormwater Management Control	Recommended BMP
	Manufactured Treatment Device

3.5 Proposed Storm Drainage

The proposed major and minor system flow patterns and drainage areas are shown on **Figure 3.3**. As illustrated, major and minor system drainage from the majority of the proposed development (Catchment 301, 2.37 ha, **Figure 3.3**) will be captured by the internal storm sewer system and conveyed to two (2) underground storage systems in the north and southwest corners of the proposed development. Controlled runoff will ultimately discharge to the existing 750 mm diameter storm sewer on Oaktree Circle which outlets into the existing stormwater management facility, First Flush No. 3, and ultimately to Fletchers Creek.

Drainage from the south portion of the proposed development (Catchment 302, 0.13 ha, **Figure 3.2**) will be conveyed uncontrolled to Oaktree Circle which outlets into the existing stormwater management facility, First Flush No. 3, and ultimately to Fletchers Creek.

Drainage from the future Derry Road widening (Catchment 303, 0.09 ha, **Figure 3.2**) will be conveyed uncontrolled to Derry Road.

3.5.1 Quantity Control

The proposed 100 year piped release rate from Catchment 301 will be controlled to the allowable release rate to the existing storm sewer on Oaktree Circle via an orifice tube located on the downstream face of the control manhole (**Figure 3.3** and **Drawing S-1**). Proposed release rates and required storage volumes were calculated using the modified rational method and the IDF rainfall curves from the City of Mississauga Engineering Design Standards. Calculations are included in **Appendix C**.

To accommodate the controlled release rate, proposed storm sewer storage and two underground stormwater detention systems (i.e., CULTEC or approved equivalent) are required. The two underground stormwater detention systems are located underneath the parking stalls located in the north end of the development and within the open space block at the south end of the site, and are shown on **Figure 3.3** and **Drawing S-1** in **Appendix G**. A 200 mm diameter orifice tube located on the downstream face of MH-25 will control the release rate from the proposed development (**Drawing S-1** in **Appendix G**). The underground storage systems will provide approximately 413.1 m^3 of detention storage in the north system and 150.7 m^3 in the south system and the pipe storage will provide approximately 68.8 m^3 of storage. Refer to details on **Drawing D-1**. Calculations are provided in **Appendix C**. A summary of the quantity control provided is listed in **Table 3.4** and **Table 3.5**.

Table 3.4: Summary of 100 Year Release Rates

Storm Event	Allowable Release Rate (L/s)	Controlled Release Rate (L/s)	Uncontrolled Release Rate (L/s)	Total Proposed Release Rate (L/s)
100 Year	258.31	213.46	44.76	258.22

Table 3.5: Summary of 100 Year Storage Volumes

Storm Event	Total Required Storage (m^3)	Storm Sewer Storage Provided (m^3)	Underground Storage System Provided (m^3)	Total Provided Storage (m^3)
100 Year	625.54	68.77	563.78	632.55

3.5.2 Quality Control

The existing stormwater management facility, First Flush No. 3 has been sized for the proposed development, however, to contribute to the treatment train approach and to improve the level of quality control, a hydrodynamic separator, specifically a Hydrodome, is proposed to treat runoff from the proposed development site prior to discharging to Oaktree Circle. The Hydrodome will be sized to provide MECP Enhanced (Level 1) Protection (80% TSS removal). Refer to **Appendix D** for sizing calculations.

3.5.3 Erosion Control

Retention of the 5 mm storm runoff over the proposed development is required to meet the erosion control target. However, since the proposed development drains into a downstream SWM pond, the downstream pond is to account for the 25 mm – 48 hour detention from the proposed development. Due to the high groundwater on-site and low hydraulic conductivity of the current soil, infiltration is limited. However, infiltration trenches are proposed as a best-efforts measure as outlined on **Figure 3.3**. The proposed infiltration trenches to assist with erosion control with the remainder of the development being accounted for within the downstream SWM facility will achieve erosion control.

3.5.4 Water Balance

Retention of the 5 mm storm runoff over the proposed development is required to meet the water balance target. Due to the high groundwater on-site and low hydraulic

conductivity of the current soil, infiltration is limited. However, infiltration trenches are proposed as a best-efforts measure as outlined on **Figure 3.3**

An existing water balance was completed by RJ Burnside (2023) to assess the existing infiltration and proposed infiltration volumes on an annual basis. The existing infiltration volume was calculated to be 1,430 m^3/year. The proposed infiltration volume without mitigation was calculated to be 623 m^3/year.

Infiltration trenches within the rear lots of the proposed townhouses are proposed as outlined on **Figure 3.3**. The infiltration trenches will be sized to infiltrate the 10 mm storm event from the rear roofs and discharge to surface to the infiltration trenches. The proposed infiltration volume with mitigation measures was calculated to be 1,134 m^3/yr.

4.0 Sanitary Servicing

4.1 Existing Sanitary Servicing

As indicated in the site survey (**Appendix B**), the sizes and locations of the existing sanitary sewers surrounding the site are:

- A 250 mm diameter PVC sanitary sewer on Oaktree Circle flowing south east;
- A 250mm diameter PVC sanitary sewer on Derry Road flowing north east and;
- A 250mm diameter PVC sanitary sewer on Longview Place flowing north east.

As per existing topographic information, it appears that the existing commercial site (Both 376 and 390 Derry Road West) are currently being serviced through the 250 mm diameter sanitary sewer on Derry Road West, flowing north-east. All existing sanitary connections are to be capped at property line and abandoned. As per discussion with the Region, no future sanitary connections may be proposed to the Region ROW.

It is noted, based on the Oak Tree Circle plan and profile (located in **Appendix B**), that a 250 mm sanitary sewer and maintenance have been left at Block 176. Due to the unavailability of a sanitary drainage plan, it is unclear what demand was expected at this stub. As such, an existing design sheet has been re-created from the upstream end of the subdivision (along Oak Tree Circle), towards Golden Hills Way and is located in **Appendix E**. Under existing conditions, the existing sanitary network is running at most 16% capacity located at the 250 mm diameter sewer on Golden Hills Way, approximately 300 m downstream of the site.

4.2 Proposed Sanitary Servicing

The sanitary servicing system from the proposed condominium development is to connect to the existing 250 mm diameter PVC sanitary sewer on Oaktree Circle via a new maintenance hole at the 9m servicing corridor at the south-west corner of the site, as shown on **Drawing S-1** in **Appendix G**.

Per the Oak Tree Circle plan and profile (**Appendix B**), the proposed sanitary sewer has 5 m of cover at the proposed service connection, which is sufficient to service the proposed development

The sanitary sewers within the site will have slopes ranging between 0.5% and 1% (typically) and will be provided at 3 m to 5 m deep. Each residential unit will be provided with a 125 mm diameter service connection. The commercial unit will be provided with a 150 mm diameter service connection. Refer to **Drawing S-1** in **Appendix G** for details.

The sanitary servicing system will be designed in accordance with the Region of Peel and MECP criteria, including but not limited to:

- Residential Sanitary Generation Rate: 302.8 L/c/d
- Population Densities:
  - Single detached: 4.20ppu
  - Townhouses: 3.40ppu
  - Commercial: 50 persons/ha
- Peaking Factor: 4.01
- Infiltration 0.0002 m3/sec/ha

Based on the above criteria, the commercial area and the unit counts proposed, the condominium portion of this development has an equivalent population of 408 persons. The free hold houses contribute an additional 17 persons and the commercial building contributes and additional 2 persons, bringing the total equivalent population of this development to 427 persons.

Accounting for infiltration and the equivalent population, the site is expected to generate a peak sanitary flow of **6.41 L/s** into the downstream sanitary sewer. Refer to **Appendix E** for calculations.

The existing sewer design sheet has been modified to account for this additional flow to investigate the impact on the downstream sewers. As a result of this development, the most critical downstream sewer at Golden Hills Way is now as 29% capacity, a 13% increase from existing conditions. However, no downstream sewer is exceeding 80% full, which typically indicates a sewer approaching capacity issues. Therefore, based on a design sheet, no downstream capacity issues are anticipated as a result of this development. A copy of a multi-use demand table is included in **Appendix E** for the region to verify the existing capacity. Refer to **Appendix E** for calculations.

5.0 Water Servicing

5.1 Existing Water Servicing

As indicated in the survey (**Appendix B**), the following existing watermains surround the site:

- A 200 mm diameter PVC watermain on the north side of Oaktree Circle;
- A 300 mm diameter PVC watermain on the east side of Longview Place;
- A 50 mm loop and 750mm diameter watermain on the west side on Derry Road.

Two hydrant flow tests were completed by OCWA on May 12, 2022 to investigate the existing capacity of the system. The first test was completed at 389 Oak Tree Circle, and the second test on 377 Arrowsmith Drive. See OCWA reports located in **Appendix F**

The existing lands are located within Water Pressure Zone 4 of the Municipality. All existing connections to the 50mm loop are to be removed, and no future connection to the Regional Road are permitted.

5.2 Proposed Water Servicing

A water distribution analysis was completed by MES (**Appendix F**) and was designed in accordance with the Region of Peel and MECP criteria including:

- Residential water usage rate: 280 l/c/d
- Residential Maximum Day Peaking Factor: 2.0
- Residential Peak Hour Peaking Factor: 3.0
- Commercial water usage rate: 300 l/c/d
- Commercial Maximum Day Peaking Factor: 1.4
- Commercial Peak Hour Peaking Factor: 3.0
- Minimum Pipe Size: 150 mm diameter for residential and 300mm for commercial
- Minimum Pipe Depth: 2.1 m
- Maximum Hydrant Spacing: 70 m

Each residential unit will be equipped with a single 25 mm diameter copper connection. The units fronting Oaktree Circle will connect directly into the public watermain, and the condominium townhouses will direct to a proposed private system within the development. Refer to **Drawing S-1** in **Appendix G** for details.

The commercial unit will be equipped with a 200 mm watermain connection. Although the Region standard indicates a minimum 300 mm watermain, there are no available watermains to allow for this size of connection. Once engaged, conversations with the

mechanical engineer as well as the rest of the building team will be required to ensure that a 200 mm diameter watermain is sufficient for the commercial usage.

As per discussion with the Municipality and Region, no connections are allowed to Derry Road West. Additionally, 346 Derry Road West is currently non-participating. Therefore, for the interim condition, two water connections are proposed to Oaktree Circle to provide a looped system. Once 346 Derry Road West is re-developed, this looped feed may be replaced with an additional Municipal connection to one of the legs of Waterhouse Crescent. The second feed to Oaktree Circle could then be abandoned.

Municipal Engineering Solutions (MES) has been retained to calculate the total domestic and fire flows generated from this development and compare against available hydrant flow tests. Based on the provided report, the following domestic and dire flow demands have been calculated.

- Average Day Demand: 1.39 L/s
- Peak Hour Demand: 4.15 L/s
- Maximum Day Demand: 2.76 L/s
- Fire Demand Single Family Home: 167 L/s (Based on Fire Underwriter's Survey, 'FUS')
- Fire Demand Back Townhomes: 317 L/s (Based on FUS)

Based on the governing fire flow of the townhouses, the maximum day plus fire flow demand is **319.76 L/s**.

This flow was then compared to a hydrant test preformed on Oaktree Circle on May 12, 2022 by OCWA (Ontario's Clean Water Agency). The results of this test are included within the MES report.

Based on the hydrant testing, the available flow under minimum pressure is 277.7 L/s. Therefore, the observed flow is lower than the anticipated flows from the development 319.76 L/s. It is anticipated that during detailed design, modifications to the building footprint and/or fire breaks will need to be explored to reduce the FUS fire flow results.

It is also understood that Peel Region modeling will be required to ensure adequate fire flow. The completed Multi-Use Demand Table is found in **Appendix F** for Region usage. All applicable calculations, as well as the MES report can be found in **Appendix F**.

6.0 Grading

6.1 Existing Grading Conditions

The existing topography has slopes in the range of 0.10% in the center of the site to 38.50% along the North East side of the site. The ground surface elevations through the study area range from approximately 200.6m in the north corner to approximately 196.2m in the south corner, adjacent to Oak Tree Circle, indicating a slight gradient towards the south.

6.2 Proposed Grading Concept

In general, the proposed development will be graded in a manner which satisfies the following goals:

Satisfy the City of Mississauga road grading criteria, create required depth for sanitary and storm sewer, as well as provision of an efficient earthworks program, including:

- Minimum Lot Grade: 2%
- Maximum Lot Grade: 4 % * to be considered useable
- Minimum Driveway Grade: 2%
- Maximum Driveway Grade: 8%
- Minimize the need for retaining walls
- Minimize the volume of earth to be moved and minimize cut/fill differentials
- Minimize the need for rear lot catchbasins
- Achieve the stormwater management objectives required for the proposed development.

The existing rural boulevard along Derry Road West is to be maintained. As such, a culvert is proposed along the driveway entrance to maintain the rural conditions and no pedestrian access is provided at this time. The existing ditch is to be re-stored, with conversations regarding gas relocation anticipated.

A widening is envisioned along Derry Road West in the future conditions. As such, proposed grades along the future property line have been set a fictious 2% above the back of curb to accommodate a future urbanized boulevard.

Refer to **Drawing GR-1** for the detailed grading plan to support this application in **Appendix G**.

7.0 Erosion and Sediment Control During Construction

During the detailed design stage in support of Site Plan approval, erosion and sediment control measures will be designed with a focus on erosion control practices (such as stabilization, track walking, staged earthworks, etc.) as well as sediment controls (such as fencing, mud mats, catchbasin sediment control devices, rock check dams and temporary sediment control ponds). A detailed erosion and sediment control plan will be prepared for review and approval by the City of Mississauga and CVCA prior to any proposed grading being undertaken. This plan will address phasing, inspection and monitoring aspects of erosion and sediment control. All reasonable measures will be taken to ensure sediment loading to the adjacent watercourses and properties are minimized both during and following construction.

8.0 Summary

This Functional Servicing and Stormwater Management Report has outlined the means by which:

- The site can be serviced by full municipal services (storm, sanitary and water);
- The Site Plan layout supports the stormwater management requirements;
- Runoff from the proposed development will be controlled to the existing capacity of the downstream storm sewer system;
- Stormwater quantity control will be achieved through controlled flow roof drains, and an orifice control with stormwater storage provided by underground storage chambers;
- The water quality objective is satisfied by reducing the TSS loading at source through the use of a manufactured treatment device;
- On-site retention of runoff from a 5 mm rainfall event is provided through the use of infiltration trench;
- The erosion control criteria is satisfied by the downstream stormwater management facility

Respectfully Submitted:

SCS Consulting Group Ltd.

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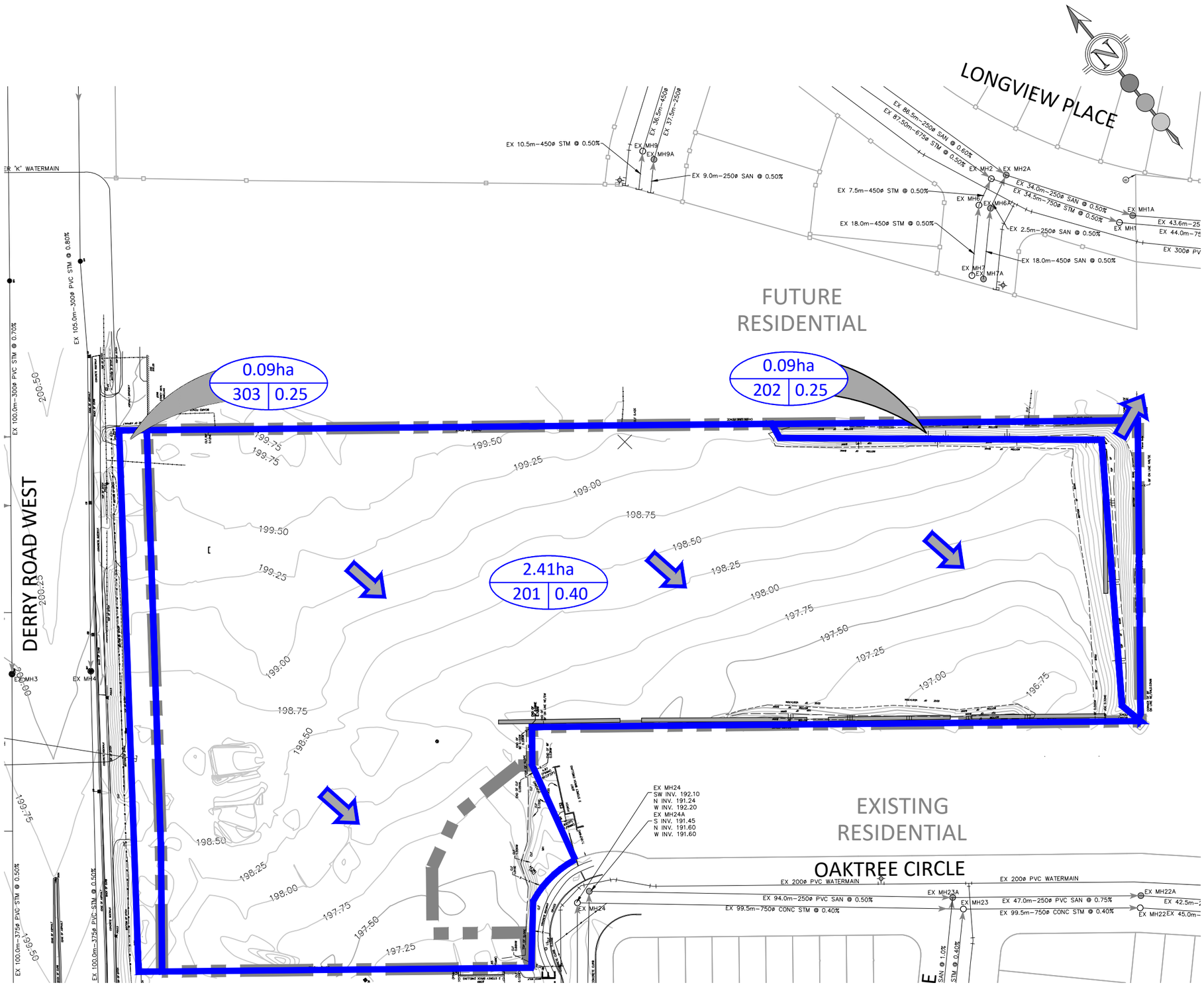
eshepherd@scsconsultinggroup.com

Paige Turchet, P.Eng.
pturchet@scsconsultinggroup.com

P:\2509 Ballymore - 376 Derry Rd\Design\Reports\FSR\Report - FSR (Site Plan).docx



LEGEND:

- LIMIT OF SITE PLAN
- STORM DRAINAGE BOUNDARY
- 198.00 — EXISTING CONTOUR AND ELEVATION
- 2.41ha / 201 | 0.40 — DRAINAGE AREA (HECTARES); RUNOFF COEFFICIENT; CATCHMENT ID
- OVERLAND FLOW

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
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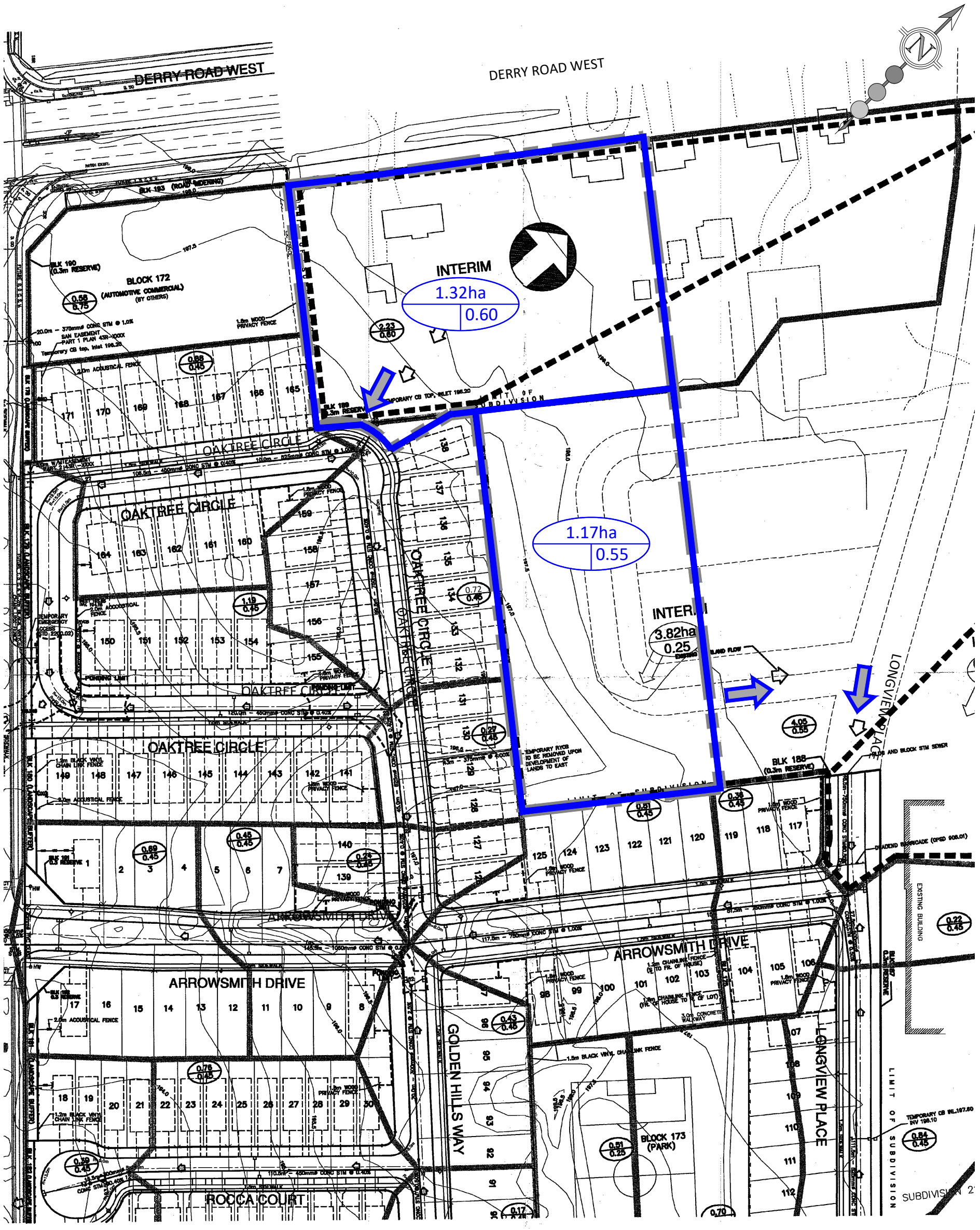
FAX: (905) 475-8335

BALLYMORE HOMES
376 & 390 DERRY ROAD WEST

EXISTING STORM DRAINAGE PLAN

DESIGNED BY:	S.G.	CHECKED BY:	J.M.P.
SCALE:	1:1000	DATE:	DECEMBER 2023
PROJECT No:	2509	FIGURE No:	3.1



BASED ON DRAWING G-6 STORM DRAINAGE AREA PLAN FROM MISSISSAUGA TRANSPORTATION AND WORKS DEPARTMENT (2001)

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

LEGEND:

- LIMIT OF DEVELOPMENT
- STORM DRAINAGE BOUNDARY
- EXTERNAL DRAINAGE BOUNDARY
- 198.00 — EXISTING CONTOUR AND ELEVATION
- 1.32ha / 0.60 — DRAINAGE AREA (HECTARES) / RUNOFF COEFFICIENT
- PROPOSED STORM DIRECTION

BALLYMORE HOMES
376 & 390 DERRY ROAD WEST

EXISTING DOWNSTREAM STORM DRAINAGE PLAN

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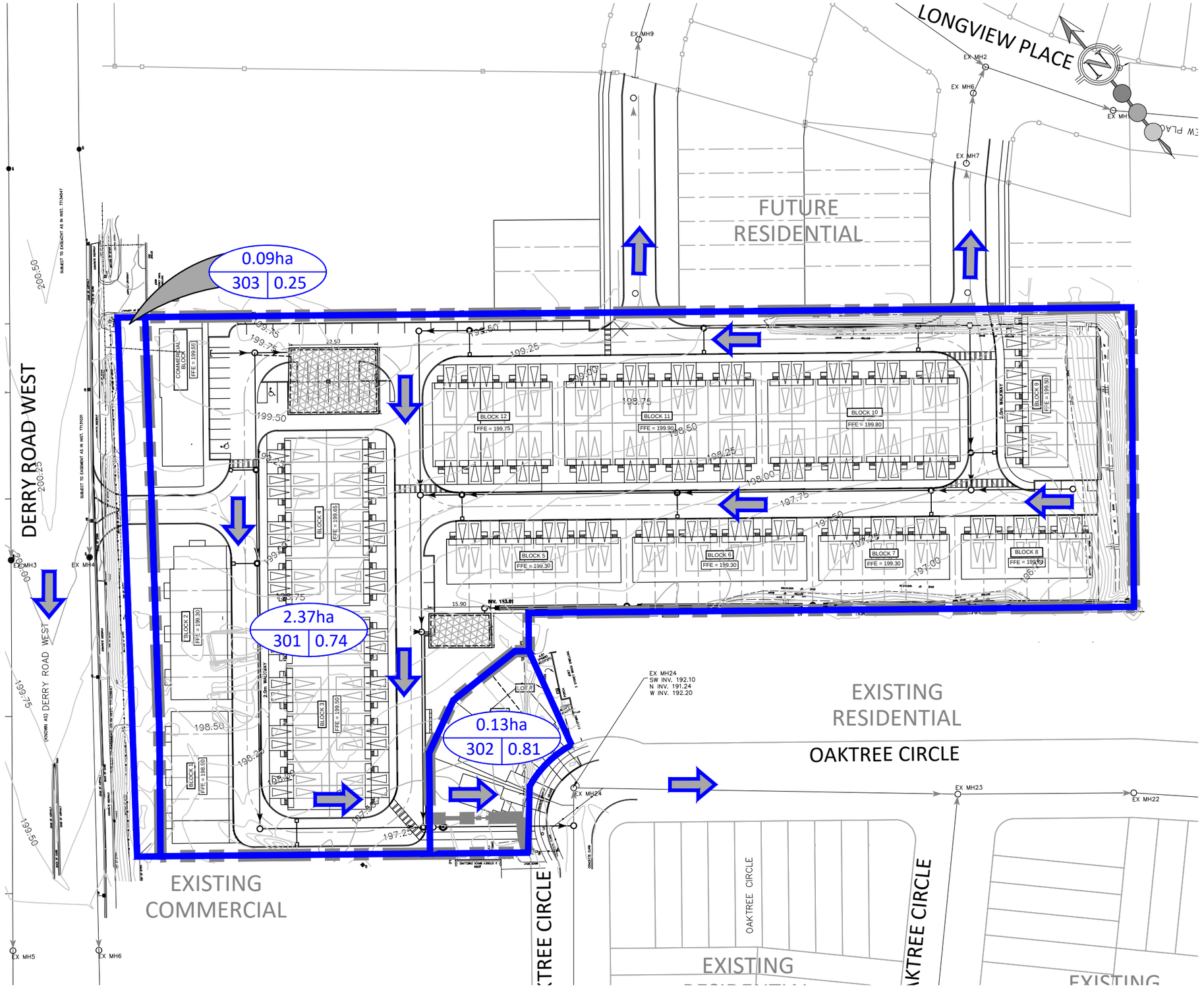
DESIGNED BY:	S.G.	CHECKED BY:	J.M.P.
SCALE:	1:1500	DATE:	DECEMBER 2023

PROJECT No: 2509

FIGURE No: 3.2



LEGEND:

- LIMIT OF SITE PLAN
- STORM DRAINAGE BOUNDARY
- PROPOSED STORM SEWER / MANHOLE
- 198.00 — EXISTING CONTOUR AND ELEVATION
- 0.09ha / 303 | 0.25 — DRAINAGE AREA (HECTARES) / RUNOFF COEFFICIENT / CATCHMENT ID
- OVERLAND FLOW

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

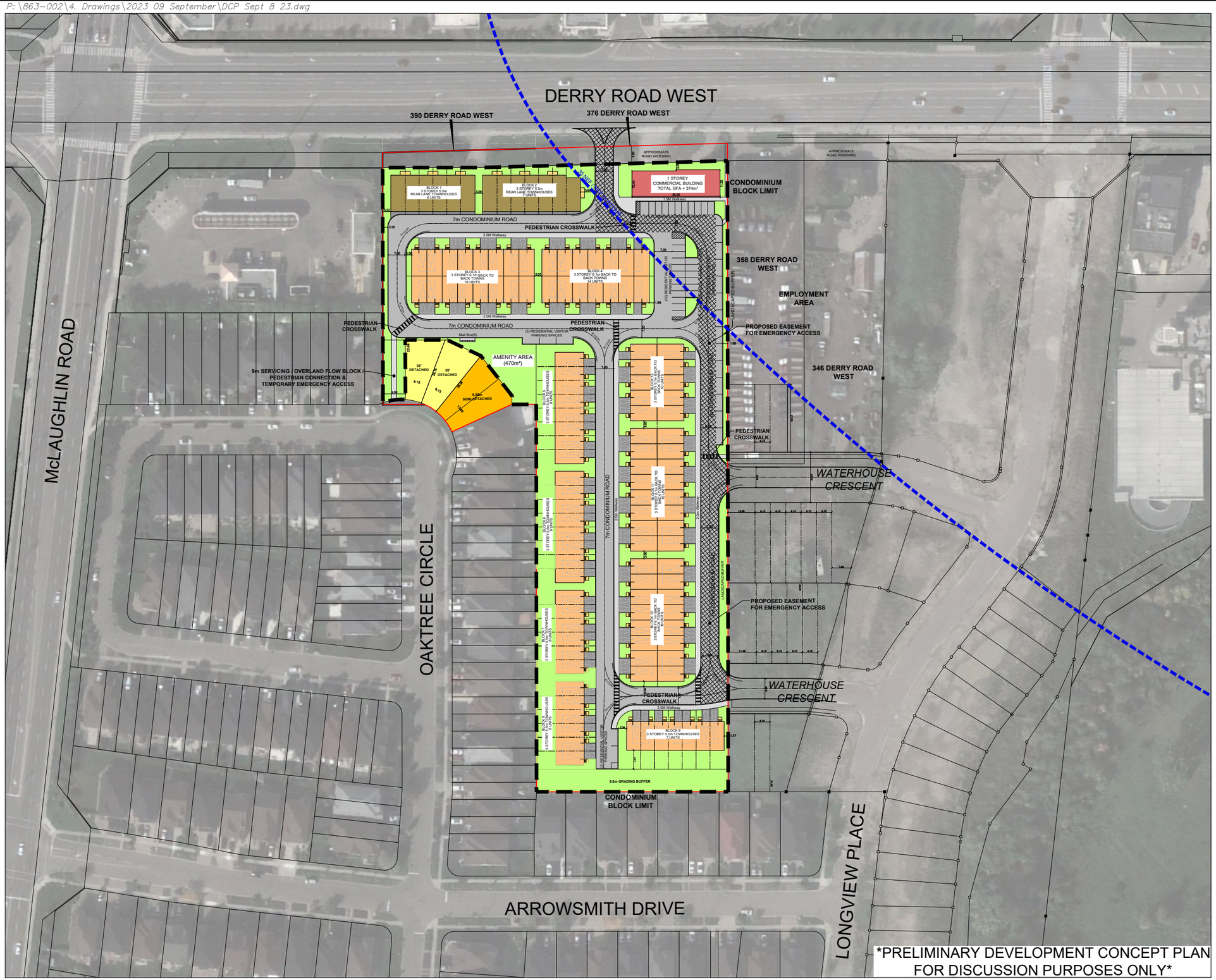
BALLYMORE HOMES
376 & 390 DERRY ROAD WEST

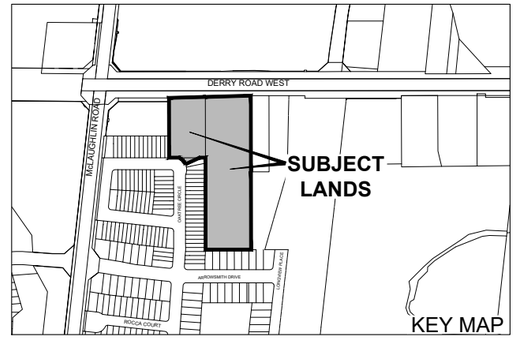
PROPOSED STORM DRAINAGE PLAN

DESIGNED BY:	S.G.	CHECKED BY:	J.M.P.
SCALE:	1:1000	DATE:	DECEMBER 2023
PROJECT No:	2509	FIGURE No:	3.3

Appendix A Site Plan

P:\863-002\4. Drawings\2023 09 September\DCP Sept 8 23.dwg





DEVELOPMENT CONCEPT PLAN
BALLYMORE HOMES

376 & 390 DERRY ROAD WEST
PART OF LOT 10, CONCESSION 1, W.H.S.
CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL

DEVELOPMENT STATISTICS - 376 & 390 DERRY ROAD W.

SITE AREAS

TOTAL SITE AREA:	2.59ha (6.40ac)
APPROXIMATE ROAD WIDENING:	0.09ha (0.22ac)
TOTAL CONDOMINIUM BLOCK AREA:	2.39ha (5.91ac)
TOTAL FREEHOLD LOT AREA:	0.11ha (0.27ac)

RESIDENTIAL CONDOMINIUM STATISTICS

AMENITY AREA REQ. (5% B2B AREA):	358m²
AMENITY AREA PROVIDED:	470m²

CONDOMINIUM UNIT TOTALS

5.5m DUAL FRONTAGE TOWNHOUSES:	13 UNITS
5.5m STREET TOWNHOUSES:	35 UNITS
6.1m BACK-TO-BACK TOWNHOUSES:	72 UNITS
TOTAL:	120 UNITS

RESIDENTIAL CONDOMINIUM PARKING STATISTICS

REQUIRED RESIDENTIAL VISITOR:	0.25 / UNIT x 120 = 30 SPACES
PROVIDED RESIDENTIAL VISITOR:	30 SPACES

COMMERCIAL STATISTICS

APPROXIMATE GFA:	374m² (4,026ft²)
REQ. PARKING (4.3-5.0 SPACES / 100m²):	16-19 SPACES
PROVIDED PARKING:	17 SPACES

RESIDENTIAL FREEHOLD STATISTICS

TOTAL FREEHOLD DETACHED:	2 UNIT
TOTAL FREEHOLD SEMI-DETACHED:	2 UNITS
TOTAL FREEHOLD UNITS:	**4 UNITS**

LEGEND

- PROPOSED EASEMENT FOR EMERGENCY ACCESS
- CONDOMINIUM BLOCK LIMIT
- PROPERTY LIMIT

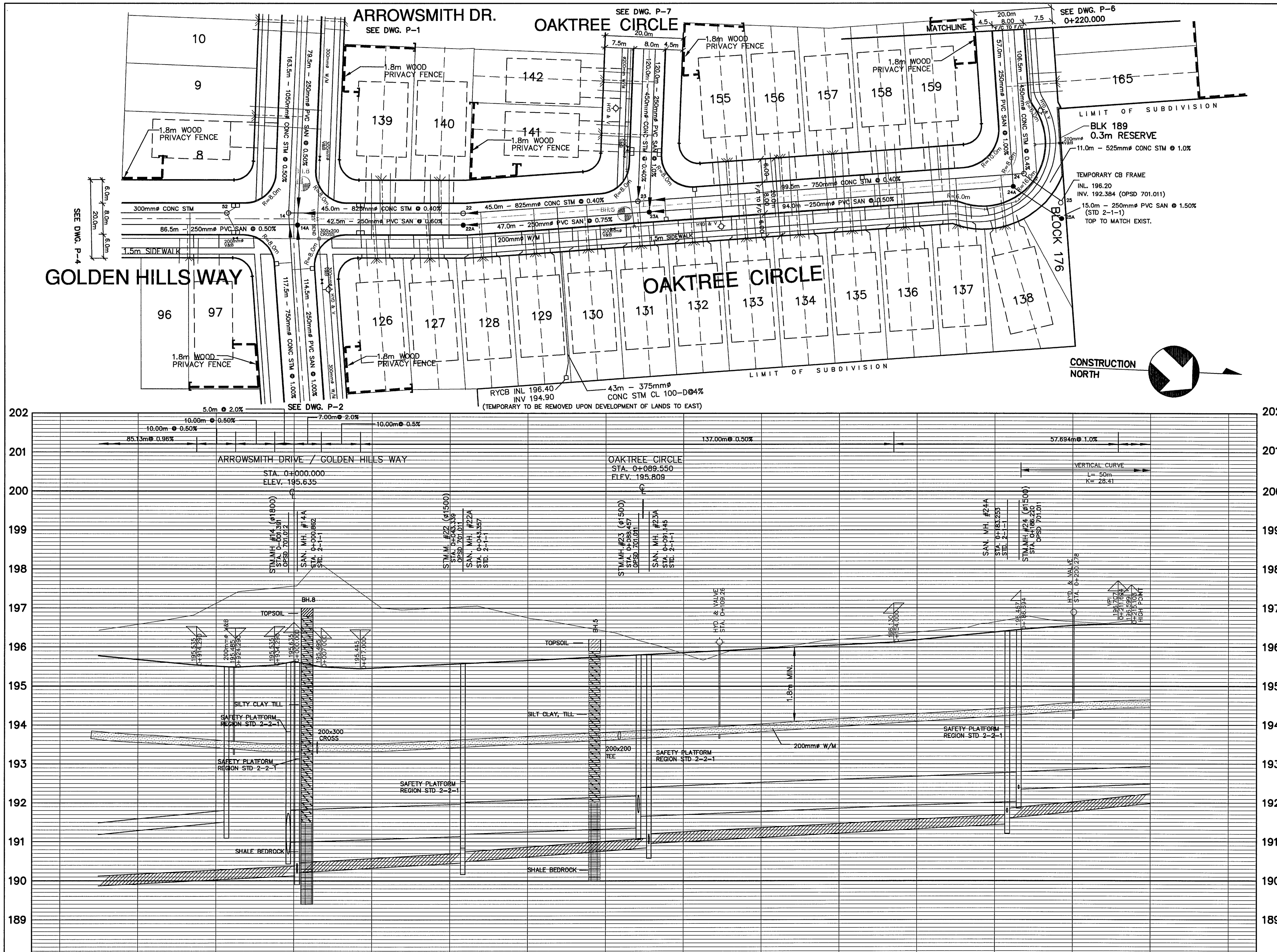
PRELIMINARY DEVELOPMENT CONCEPT PLAN FOR DISCUSSION PURPOSES ONLY

SCALE 1:1500
SEPTEMBER 8, 2023

GSAI
Glen Schnarr & Associates Inc.

Appendix B Excerpts from Background Reports

SCS consulting group ltd



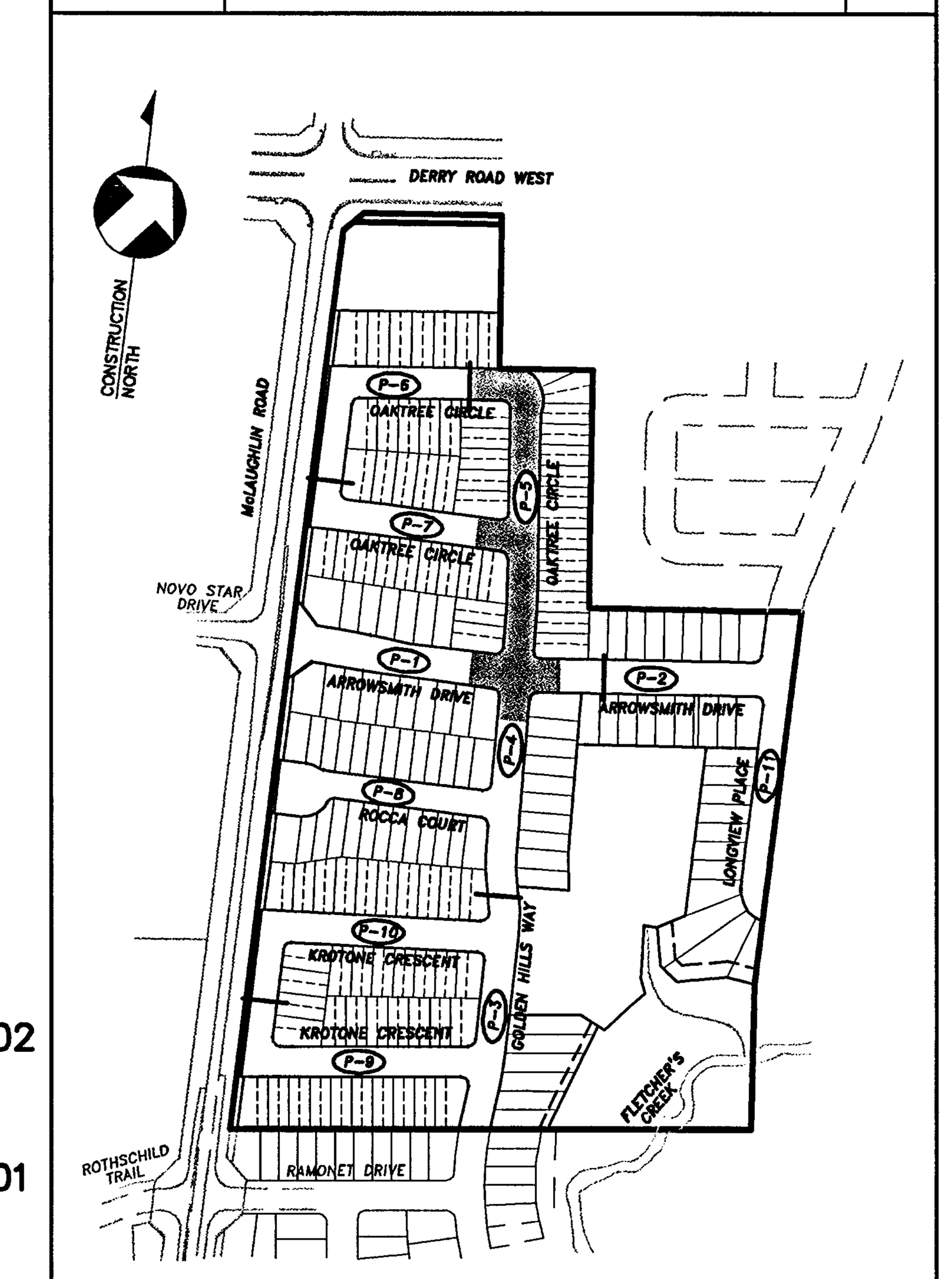
STORM INVERT					
70.0m – 300mmø CONC. STM @ 1.0% CL. 100 D – CL. 'B' BEDDING	191.511.S	190.686.W. 191.100.E. 190.986.N.	45.0m – 825mmø CONC. STM @ 0.40% CL. 100 D – CL. 'B' BEDDING	191.166.S. 191.196.N.	45.0m – 825mmø CONC. STM @ 0.40% CL. 100 D – CL. 'B' BEDDING
191.376.S. 191.751.W. 191.651.N.	99.5m – 750mmø CONC. STM @ 0.40% CL. 100 D – CL. 'B' BEDDING	192.049 S 192.274 N 192.274 W	106.5m – 450mmø CONC. STM @ 0.40% CL. 100 D – CL. 'B' BEDDING		

SANITARY INVERT					
85.0m – 250mmø PVC. SAN @ 0.50% SDR. – 35 – CL. 'B' BEDDING	190.124.S. 190.199.W 190.199.E 190.206.N	42.5m – 250mmø PVC. SAN @ 0.60% SDR. – 35 – CL. 'B' BEDDING	190.461.S. 190.491.N.	47.0m – 250mmø PVC. SAN @ 0.75% SDR. – 35 – CL. 'B' BEDDING	190.844.S. 190.952.N. 190.952.W.
94.0m – 250mmø PVC. SAN @ 0.50% SDR. – 35 – CL. 'B' BEDDING	191.450 S 191.600 N 191.600 W	57.0m – 250mmø PVC. SAN @ 0.5% SDR. – 35 – CL. 'B' BEDDING			

PROPOSED GRADES	℄ CHAINAGE
195.509	0–020
195.635	0+000
195.460	0+020
195.560	0+040
195.660	0+060
195.760	0+080
195.860	0+100
195.960	0+120
196.060	0+140
196.190	0+160
195.290	0+180
196.457	0+186.694
196.503	0+191.694
196.539	0+196.694
196.567	0+201.694
196.587	0+206.694
196.597	0+211.694
196.599	0+216.694

SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		

REVISIONS		
DATE	DETAILS	INIT.



KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DRAWING G-1

BENCH MARK:
CITY OF MISSISSAUGA
REFERENCE No. 878 ELEVATION 177.642m
ON A CONCRETE RETAINING WALL ON THE EAST SIDE OF THE SECOND LINE WEST OPPOSITE HOUSE No. 6800, BENCHMARK IS SET VERTICALLY ON THE WEST FACE, 0.20m NORTH OF THE SOUTHWEST CORNER, 0.35m ABOVE GRADE.

FIRST	SECOND	INTERIM	PRE-SER	FINAL
DATE FEB 2000	DATE JUNE 2000	DATE	DATE OCTOBER 2000	DATE MARCH, 2001

REGISTERED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO
DESIGNED Mar 16, 2001 CHKD.
APPROVED BY

URBAN ECOSYSTEMS LIMITED
7050 WESTON ROAD, SUITE 705
WOODBRIDGE, ONTARIO L4L 8G7
TELEPHONE: (905)856-0629
FAX: (905)856-0698

THE GATES OF FLETCHER'S CREEK
919848 ONTARIO INC. AND 1368781 ONTARIO INC.

MISSISSAUGA Transportation And Works Department

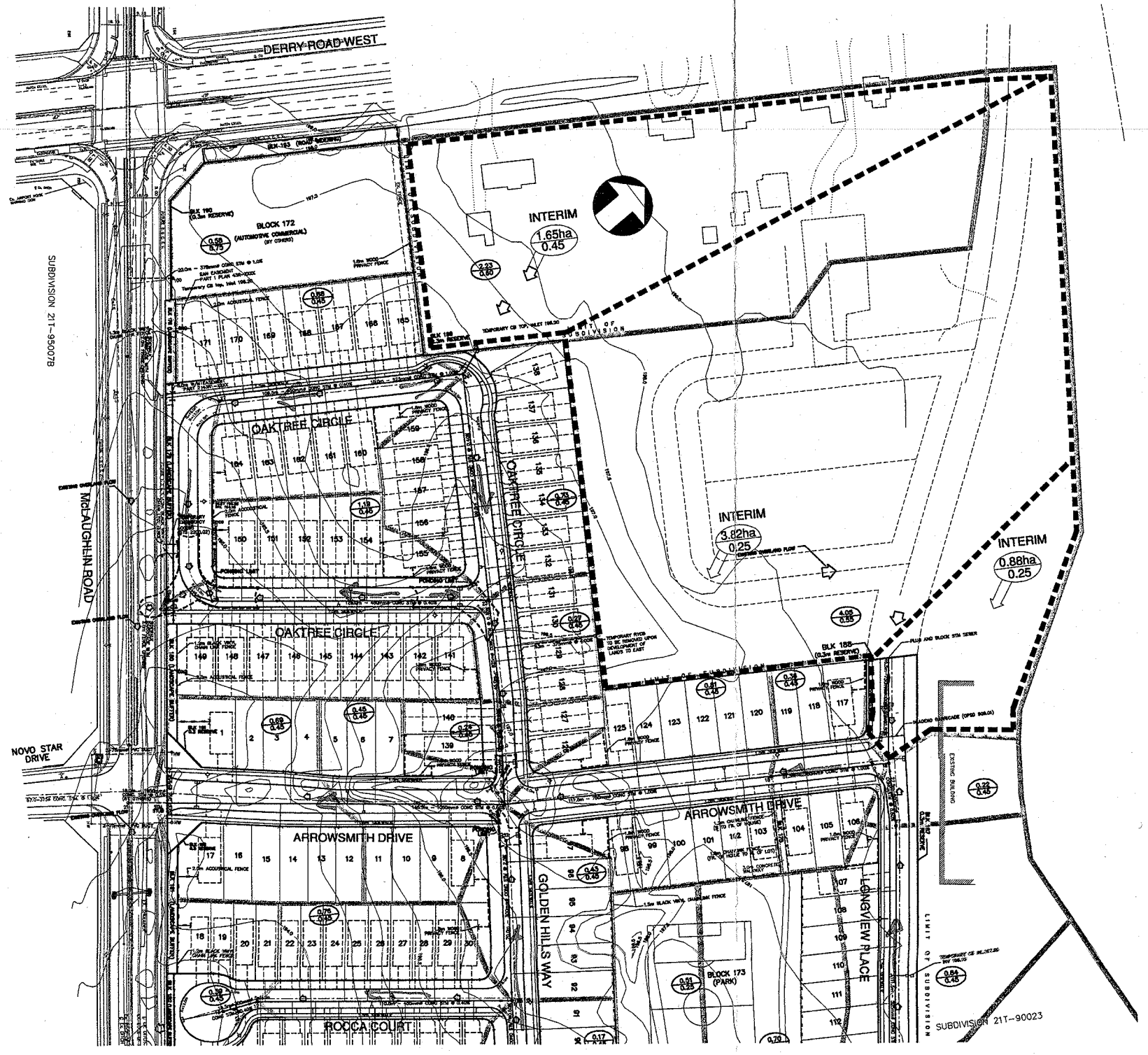
PLAN & PROFILE

OAKTREE CIRCLE

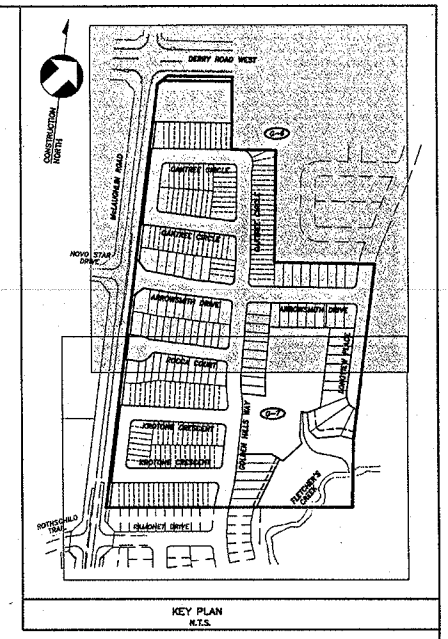
STA.0+000 TO STA. 0+220.000 21T-95020

SCALE: H 1:500 V 1:50	AREA:	PROJECT No. 95018
DRAWN BY: S.M.	CHECKED BY: N.V.	PLAN No. P-5
DATE: JUNE 1998	SHEET OF	C-38517

Printed 3/23/2001



SEE DWG G-7



KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DRAWING G-1

LEGEND

- EXISTING MANHOLE
- SANITARY MANHOLE
- STORM MANHOLE
- SINGLE CATCHBASIN
- DOUBLE CATCHBASIN
- HYDRANT & VALVE
- VALVE & BOX
- OVERLAND FLOW ROUTE
- INTERIM DRAINAGE LIMITS
- ULTIMATE DRAINAGE AREAS
- 0.60 / 0.45 — DRAINAGE AREA (ha) / DRAINAGE COEFFICIENT

NOTE:
1. LOT 1 TO 17, LOTS 82 TO 125 AND BLK 177 INCLUSIVE, ROOF LEADERS DISCHARGE TO CONCRETE SPLASH PADS ON THE LOT WITH WATER CONDUCTED ALONG SIDE LOT SWALES TO THE REAR LOT AND/ OR THE REAR LOT CATCHBASIN AND/OR THE ROAD.
2. LOT 18 TO 81, LOTS 126 TO 171 AND BLK 178 ROOF LEADERS ARE TO BE CONNECTED TO STORM SEWER CONNECTIONS.
3. LOTS 5, 13, 24, 37, 48, 59, 66, 77, 92, 102, 110, 122, 132, 145, 153, 161 AND 166 ARE DESIGNATED FIRE BREAK LOTS.

BENCH MARK:
CITY OF MISSISSAUGA
REFERENCE No. 678 ELEVATION 177.642m
ON A CONCRETE RETAINING WALL ON THE EAST SIDE OF THE SECOND LINE WEST OPPOSITE HOUSE No. 6800, BENCHMARK IS SET VERTICALLY ON THE WEST FACE, 0.20m NORTH OF THE SOUTHWEST CORNER, 0.35m ABOVE GRADE.

FIRST	SECOND	INTERIM	PRE-SER	FINAL
DATE FEB 2000	JUNE 2000	DATE	DATE OCTOBER 2000	DATE MARCH, 2001

REGISTERED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

DESIGNED Nov 16, 2001 CHKD.

APPROVED BY

URBAN ECOSYSTEMS LIMITED
7050 WESTON ROAD, SUITE 705
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FAX (905)856-2969

THE GATES OF FLETCHER'S CREEK
919848 ONTARIO INC.
AND
1368781 ONTARIO INC.

MISSISSAUGA Transportation And Works Department

STORM DRAINAGE AREA PLAN

21T-95020

SCALE: 1:1000	AREA:	PROJECT No. 95018
DRAWN BY: S.M.	CHECKED BY: N.V.	PLAN No. G-6
DATE FEB 2000	SHEET OF	C-38501

URBAN ECOSYSTEMS
LIMITED
7050 WESTON ROAD, SUITE 705
WOODBRIDGE, ONTARIO L4L 8G7
TELEPHONE: (905)856-0629
FAX: (905)856-0698

DESIGN BRIEF FOR FIRST FLUSH POND NO. 3

MEADOWVALE VILLAGE SECONDARY PLAN AREA

CITY OF MISSISSAUGA ONTARIO

REGIONAL MUNICIPALITY OF PEEL

URBAN ECOSYSTEMS LIMITED
APRIL, 1999 REV. JULY, 2000
93025

URBAN ECOSYSTEMS LIMITED

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URBAN ECOSYSTEMS LIMITED

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Figure 2	"Storm Drainage Area Plans"	Rear Pocket

APPENDIX

Appendix 'A' Geotechnical Assessment for Proposed Stormwater Management Facility"

Appendix 'B' OTTHYMO Run

Appendix 'C' Quality Pond - Facility No. 3 "Design Calculations"

Appendix 'D' Storm Sewer Design Sheets

1.0 INTRODUCTION

Urban Ecosystems has been retained by the owners of the DiBlasio Estates East Development to prepare the detail design drawing for stormwater management facility, commonly known as Facility No. 3. This Design Brief has been prepared in accordance with the recommendations contained in the previous approved report entitled, "Preliminary Servicing and Drainage Report for DiBlasio Estates West (21T-95019), DiBlasio Estates East (251T-95021) and Diano/Bonofiglio Subdivision (21T-95020)".

In summary, it was agreed that this facility will only accommodate first-flush flows, and thus provide only quality control. The facility will use settling as a principal treatment process. The facility is a private sector project, and has been identified in the approved development plans and reports. This project is, therefore, not subject to a Schedule 'C' Class Environmental Assessment.

2.0 DRAINAGE AREA

The Drainage Area for the facility encompasses all of the lands within the DiBlasio East Development, with the exception of some minor rear yard drainage that flows directly into Fletchers Creek. The majority of the DiBlasio Estates West and the lands of the Diano/Bonofiglio Subdivision are also captured. Lands east of Diano/Bonofiglio south of Derry Road also form part of the Drainage Area. No land west of McLaughlin Road, north of the DiBlasio Estates West Subdivision up to Derry Road are accommodated in the facility. It is our understanding that these lands will now drain directly into the existing tributary, west of McLaughlin Road that is to remain in its natural state. Lands north of Derry Road and West of McLaughlin Road are included in the Drainage Area.

Figure 1 - "External Storm Drainage Area Plan", shows the external Drainage Area. This plan has been completed based on current information provided by other consultants, engaged by various land owners north of Derry Road, west of McLaughlin Road. The figure now defines the exact west and north limit of the Drainage Area.

Figure 2 - "Storm Drainage Area Plan", depicts the internal drainage area from the DiBlasio Estates East Development. The two figures, besides drainage area limits, also indicate the anticipated runoff coefficients.

The captured drainage area within the City of Mississauga is 43.65 ha. north of Derry Road and 39.43 ha. south of Derry Road. The north limit of the above drainage area is the north boundary of the lands commonly referred to as the "ORC Lands". The above lands would have an impervious ration of 55% . Except for 1.21 ha of park lands within development 21T-95020 which would have an impervious ration of 35%.

North of the "ORC Lands" an additional 14.6 ha drains to the facility. The majority of this additional land is used as a major hydro electric transmission corridor and 2.4 ha is Highway No. 407. The balance of this additional land is designated as "Greenbelt". Redevelopment of this land in the future is, therefore, unlikely. The 2.4 ha Highway land will have an impervious ration of 55% and the balance 12.2 ha an impervious ration of 35%. Land north (approximately 39.4 ha) of Highway No. 407 only contribute major flows.

3.0 QUALITY FACILITY NO. 3

3.1 BACKGROUND

Based on previous reports and discussions with approving authorities, it was determined that an end of pipe facility will be provided. The site location on the DiBlasio Estates East Land was established. In conjunction with the Preliminary Servicing and Drainage Report, a Geotechnical Report was prepared by Soil Eng Limited. The report entitled, "Geotechnical Assessment for Proposed Stormwater Management Facility, the DiBlasio East, McLaughlin Road and Fletchers Creek" is found in Appendix 'A'.

The Geotechnical Report indicates the presence of some sub-surface water. At a meeting held at Credit Valley Conservation, attended by the City, Conservation staff and the writer of this Report, Mr. Chan of Soil Eng Limited indicated that, in his opinion, no sub-surface drainage system will be required to deal with the existing water. He also indicated that the water would not effect the functionality of the facility.

The facility captures the first flush volumes from the ultimate drainage area. Excess flows will pass through the facility and discharge to Fletchers Creek. A weir structure captures the excess flows and diverts them to the creek. The sediment forebay length is such to accommodate the flows.

The wet pond consists of a sediment forebay and a shallow, mid and deep permanent water pools. Discharge from the facility is by a reversed slope pipe and orifice. A maintenance pipe from the permanent pool to Fletchers Creek is also provided to allow a portion of the wet pool to be drawn down. Due to physical limitations, the pond can only be drawn down to an elevation of plus or minus 180.41 by gravity. The balance of the pond will have to be drained by mechanical means.

3.2 DETAILS

3.2.1 Facility Size

All pertinent calculations are found in Appendix 'C' Quality Pond - Facility No. 3 - Design Calculations.

The facility size is based on the requirements and criteria defined in the June 1994 Ministry of the Environment and Energy Publication, Stormwater Management Practices, Planning and Design Manual. The Manual outlines requirements for quality pond storage. The requirements are based on a degree of protection to be provided for the receiving body of water, the facility type and percent imperviousness of the development facility drainage area. As this is a wet pond facility, one will extrapolate the required storage volume for a contributing drainage area from the 1994 Ministry of the Environment and Energy Publication, Table 4.1 - "Water Quality Storage Requirements", based on receiving waters to be 190 cu.m/ha. for 55% and 140 cu.m./ha for 35% improvise ratios. For the study area and this quality control feature, the receiving body of water is Fletchers Creek. Based on habitat and stream condition information contained in the Master Drainage Study prepared by Winters & Associates, the required degree of protection would be Level 1. Credit Valley Conservation staff require the active storage component of the facility to be the larger of 40 cu.m./ha. or the volume from 25mm storm (4 hr. Chicago distribution). In Appendix 'B', please find the OTTHYMO, output for such a storm for the discharge area. From the output, a storage volume of 131.20 cu.m/ha. is required.

3.2.2 Wet Pond Detail Design

The permanent pool water level is set at 181.2m which is higher than the 25 year flood elevation of 180.15 of Fletchers Creek in the pond vicinity. The extended detention (active) storage level is 1.2m higher at an elevation of 182.40. A weir spillway is provided at an elevation 182.40, and the pond south berm is set at 183.00. The weir structure elevation of 182.40 is the same as the active water level.

3.2 DETAILS (cont'd...)

3.2.3 Treatment Volumes

The following table summarizes the treatment storage volumes and the relative elevations. This information is found in Appendix 'C' - Quality Pond Calculations.

		STORAGE	
	Elevation	**Required**	**Available**
Permanent Active	Varies to 181.20 181.20 to 182.40	14,000 cu.m 13,000 cu.m	14,050 cu.m 16,060 cu.m
Total		27,000 cu.m	30,110 cu.m

Due to pond configuration to provide the permanent volume, the active storage is greater than required. This should not affect the pond function.

3.2.4 Sediment Forebay

The forebay has been sized to meet the 1994 MOEE criteria. The forebay length has been sized for the greater of dispersion length and settling length to accommodate the flows into the pond facility [10.937 cms (see Storm Sewer Design Sheet in Appendix 'D')]. The length is set at 90m. A deep-zone width of 20m is used. The forebay length has been increased to accept greater than first flush flows due to, including 2.0 cms from the Brampton lands and 0.07 cms from the east side of McLaughlin road north of Derry Road. The sediment forebay area is not quite one third of the total pond area, but close. This is due to accepting the greater than first flush flows through the facility. It, however, has sufficient capacity to accommodate more than 10 years of expected sediments based on guidelines contained within the 1994 MOEE Manual.

3.2 DETAILS (cont'd...)

3.2.5 Extended Detention Draw-Down

The outlet for the pond is by a reversed slope outlet as requested by City staff. A 675mm.dia. outlet pipe intake is set at elevation 179.70 in the permanent pool. It raises to Manhole No. 1 located within the pond embankment. An orifice plate is attached to the manhole at the intake pipe outlet. The orifice is sized to allow for greater than 24 hours of draw-down time. From the manhole in the embankment, the flows discharge to Fletchers Creek at the headwall which also accommodates the discharge of the excess flows which are above the first flush flows.

3.2.6 Weir Spillway Structure

The flows greater than the first flush will be discharged directly to Fletchers Creek by a weir spillway. The spillway will be constructed with T-60 Terrafix block and a relative wide rip rap channel will disperse the flow before it reaches the creek.

3.2.7 Grading

Wherever possible, 5:1 slopes have been incorporated into the design of the facility. There are, however, some sections where the slope is increased to 3:1 and 4:1 due to lot grading constraints, required depth of pond and the pond overall size.

3.2.8 The Permanent Pools

In discussions with Credit Valley Conservation staff, it was agreed to provide three different depth pools of permanent water. The pools of water range from 1m to 3m in depth. The largest pool is 2m in depth and is placed between the 1m and the 3m deep pools. The 1m deep pool is adjacent to the sediment forebay, and the ponds reverse slope outlet is from the 3m deep pool. The outlet is at a relatively low invert, so as to always draw from the bottom cooler waters.

3.3 OPERATION AND MAINTENANCE

3.3.1 Details

The facility design has incorporated the following maintenance features;

A. A 4m wide access roadway into the sediment forebay, as well as an access road providing access for the entire length of the forebay. The access road is an elevation higher than the permanent water level.

B. Rip Rap and terrafix block lining of the spillway from the sediment forebay to the first permanent pool and also at the sediment forebay inlet is provided. It was agreed that rip rap lining of the entire sediment forebay would not be necessary as a forebay will be constructed in shale.

C. A sediment drying area in close proximity to the forebay is provided. The drying area is graded such that it slopes towards the sediment forebay.

D. A maintenance discharge outlet is provided from the permanent pool to Fletchers Creek. The outlet can only discharge water above the elevation of 180.41. The discharge is sized to permit the draw down in greater that 6 hours as recommended in the 1994 Ministry of Environment and Energy Manual. The balance of the water in the facility must be removed by mechanical means.

E. A gravity discharge from a sediment forebay to the lower permanent pool is incorporated into the facility. The inlet to this discharge pipe is set at 0.5m higher than a sediment forebay to avoid off sediment laden water from the deep reaches of the forebay.

F. Storage volume in the forebay is provided for the projected 10-year accumulative loading drawing.

G. In order to facilitate pond clean out, a base flow interceptor pipe is provided. A gate valve is on the interceptor. It would normally be closed and only opened during maintenance operations. The base flow interceptor discharges into the pond outlet box unit near Manhole #1.

3.3 OPERATION AND MAINTENANCE

3.3.2 Maintenance Schedule

The design and a long-term operation of quality facilities is still an on-going process with more knowledge to be learned as time passes. The implementation of quality control facilities is still relatively new. As such, track record proven maintenance records are yet to be established. Most quality ponds are usually one of kind, dealing specifically with the drainage area, so that what is prescribed for one pond may not necessarily hold true for another pond. It is, therefore, recommended that a flexible maintenance program be adopted that is guided by a regular maintenance inspection program. This would allow the City with the flexibility to carry out maintenance work as needed.

3.3.2.1 Inspection Timing

The facility has two distinct function periods. The first being during active construction of the drainage area and the other being once construction activity is complete and the drainage area is completely urbanized.

3.3.2.2 Construction Period

The pond should be inspected regularly after each significant storm event. This function should be carried out by the consultants for the pond or subsequent developers who may use the pond up to assumption of the facility by the City. It is recommended that the accumulated silt be removed from the facility once there is a 40% decrease in the available storage volume within the sediment forebay.

3.3 OPERATION AND MAINTENANCE

3.3.2 Maintenance Schedule (cont'd...)

3.3.2.3 Long-Term Urbanized Period

Once the drainage area is completely urbanized and the pond completely cleaned of accumulated construction related sediment, visual inspection should be made after every significant storm to monitor the facilities operation, including draw-down time. It is recommended that for the first three years after completion of the facility, besides the inspection after each significant storm, four site visits be conducted on an annual basis. The inspection period should coincide with the four seasons. Beyond the three-year period, bi-annual inspection, one in the spring and one in the fall should be sufficient.

3.3.2.4 Inspection Check List

Inspection should not only be of the pond facility, but also the entire pond area. The inspector should observe the general vegetation health, trash accumulation, sediment deposition and safety type hazards around the site. The following check list should be incorporated into the site inspections.

- Normal Water Level
- High Water Marks
- Side Slopes Stability
- Obstructions or Blockage of the Outlet and Inlet
- Evidence of Local Erosion at Outfall to Fletchers Creek
- Weir spillway structure operation, including any blockages of outlet pipe and the weir
- Control Manhole, including orifice plate blockage and operation of maintenance drain valve, as well as operation of the drain valve between the sediment forebay and a permanent pool
- Condition of surrounding vegetation
- Condition of aquatic vegetation such as algae

3.3 OPERATION AND MAINTENANCE

3.3.2 Maintenance Schedule (cont'd...)

3.3.2.4 Inspection Check List

- Evidence of spills and oil/grease accumulation
- Sediment accumulation in forebay and balance of pond

3.3.2.5 Trash Removal

In order to gain and maintain public acceptance of the facility, it is recommended that trash removal should be performed as required. Trash related inspection should, therefore, be on a regular basis.

3.3.2.6 Sediment Removal

Any accumulated sediment should be removed, once the forebay volume has been decreased by 40%. All removal should be done "in the dry" during summer months and in consultation with Credit Valley Conservation staff. To facilitate maintenance, stop logs could be inserted at the upstream face of the inflow culvert to the pond within the by-pass manhole. This would, therefore, mean that all flows would discharge directly to Fletchers Creek while the sediment forebay is being cleaned.

The sediment forebay has greater than 10-year accumulated capacity based on sediment yields contained in the MOEE 1994 Manual. After the drainage area is completely urbanized, clean out is recommended on a minimum of 5 to 7½ year frequency. Cleaning of the forebay will require the drawing down of the wet pool using the gravity drain. Some mechanical draw down by pumping into the wet pool from the sediment forebay will be required. Care should be taken to not draw down the sediment laden water from the bottom of the forebay.

3.3 OPERATION AND MAINTENANCE

3.3.2 Maintenance Schedule (cont'd...)

3.3.2.6 Sediment Removal

The balance of the facility should be cleaned out, say 20-25 year frequency. Once the water and the facility is drawn down, both by gravity and mechanical means, dredging of the facility will be the most appropriate means of cleaning.

APPENDIX 'A'

Geotechnical Assessment for Proposed
Stormwater Management Facility

Soil-Eng Limited
CONSULTING SOIL & FOUNDATION ENGINEERS
100 NUGGET AVENUE, SCARBOROUGH, ONTARIO M1S 3A7 • TEL (416) 754-8515 • FAX (416) 754-8516
BRANCH OFFICES BARRIE • MISSISSAUGA • BOWMANVILLE • NEWMARKET

January 21, 1997

Reference No. 9701-S.10

Urban Ecosystems Limited
7050 Weston Road
Suite 705
Woodbridge, Ontario
L4L 8G7

Attention: Mr. Nick Valle, P.Eng.

Re: **Geotechnical Assessment for**
Proposed Stormwater Management Facility
Di Blasio East
McLaughlin Road and Fletchers Creek
City of Mississauga

Dear Sir:

As per your instructions we have completed the geotechnical assessment of the captioned project and herein present our findings and recommendations.

PURPOSE OF INVESTIGATION

The purpose of the investigation was to reveal the subsurface conditions and to determine the engineering properties of the disclosed soils for the design and construction of the proposed project.

SITE AND PROJECT DESCRIPTION

The City of Mississauga is situated on Peel-Markham till plain where till dominates the soil stratigraphy. The till beds onto a shale bedrock of Dundas or Queenston Formation at shallow to moderate depths.

The proposed project consists of a storm water quality pond, with the bottom at El. 180.0± m and 181.0± m in the sediment forebay. The pond will be dug to depths ranging from 3.0 to 5.0± m below the prevailing ground surface. The permanent water level will be at El. 182.0.

FIELD WORK

The field work, consisting of two (2) boreholes to depths of 3.5 m and 3.7 m, was performed on January 10, 1997, at the locations shown on the Borehole Location Plan, Drawing No. 1, enclosed.

The holes were advanced to the sampling depths by a track-mounted, continuous-flight power-auger machine equipped for soil sampling. Standard Penetration tests, using the procedures described on the enclosed "List of Abbreviations and Terms", were performed at frequent intervals of depth. The test results are recorded as the Standard Penetration Resistance (or 'N' values) of the subsoil. The relative density of the granular strata, and the consistency of the cohesive strata are inferred from the 'N' values. Split-spoon samples were recovered for soil classification and laboratory testing.

The field work was supervised and the findings recorded by a Senior Geotechnical Technician.

The elevation at each of the borehole locations was interpolated from the contours shown on Drawing No. 1.

FINDINGS

Detailed descriptions of the encountered subsurface conditions are presented on the Borehole Logs, comprising Figures 1 and 2. The revealed stratigraphy and the engineering properties of the occurring soils are briefly discussed herein.

Beneath a topsoil veneer the site is underlain by a strata of silty clay till overlying a shale bedrock which extends to at least the maximum investigated depth of 3.7 m.

Topsoil

The revealed topsoil varies in thickness from 20 to 30 cm. Sample examinations show it contains fine roots and is dark brown in colour, indicating it has a high humus content. The humus is highly compressible rendering the topsoil unsuitable for engineering application; however, it can be used for normal landscaping application.

Silty Clay Till

The revealed silty clay till extends to El. 181.8 and 181.3 in Boreholes 1 and 2, respectively. It consists of a random mixture of soils; the particle sizes range from clay to gravel with the clay fraction exerting the dominant influence on the soil properties.

The structure of the till is heterogenous, indicating that it is a glacial deposit.

Sample examinations detected fissures permeating the upper layers of the till, becoming less prevalent with depth. This shows that the upper layers have been fractured by the weathering process. The badly fissured till occurs up to a depth 1.2± m below the prevailing ground surface. The samples within this zone were found to contain fine roots and traces of topsoil.

Hard resistance was encountered during augering, showing the till is embedded with shale debris and occasional rock slabs. The debris increases with depth, and becomes frequent close to the bedrock. This renders delineation of the interface of the till and shale bedrock difficult.

The consistency of the till was found to be very soft to hard. This is confirmed by the obtained 'N' values range from 2 to 33 blows per 30 cm of penetration. The samples displayed a low plasticity upon remoulding. The very soft till occurred in the upper layers of the weathered zone.

The natural water content was determined to range from 12% to 23%, showing the silty clay till is in a moist-to wet condition.

According to the above findings, the following engineering properties are deduced:

- Moderately frost-susceptible and water-erodible.
- Low permeability, with an estimated coefficient of 10^{-7} cm/sec, and a runoff coefficient of 0.15.
- A cohesive soil, its shear strength is primarily derived from consistency which is inversely related to its moisture content. It contains sand; therefore, its shear strength is augmented by internal friction.
- It will generally be stable in a relatively steep cut; however, long exposure will allow the weathered layers to become saturated, and this may lead to local sloughing.
- A very poor pavement-supportive material, with an estimated California Bearing Ratio (CBR) value of 3%.
- Moderately high corrosivity to buried metal, with an estimated electrical resistivity of 3,500 ohm/cm.

Shale Bedrock

The encountered shale is red in colour, indicating it is a Queenston formation, which is thin to thickly bedded and consists predominantly of mudstone with occasional hard limestone bands. The upper layer of the bedrock can be penetrated by power augering with some difficulty in grinding through the hard layers. Standard Penetration tests performed in the shale give values of 100+ blows per 3 cm or less of penetration. The fact that the shale could be penetrated by the auger and split-spoon sampler indicates that the shale rock is weathered and can be laboriously excavated by mechanical means. In sound shale, however, rock blasting may be required for efficient rock removal.

The shale, being a silt and clay rock, is susceptible to swelling and disintegration upon exposure to air and water, with a subsequent reversion to clay soil. It is impervious, with occasional pockets of groundwater trapped in the fissures. In places, the groundwater is under moderate subterranean pressure, but upon release through excavation, the water would drain readily with a limited yield.

From experience it has been noted that excavations into sound shale have created lateral movements, which are caused by the release of residual stresses in the rock mantle, and in a few instances, this movement has crushed buried structures. Experience has also shown that excavations carried out by rock blasting will create a fracture zone, which will diminish the load intensity imposed on buried structures by the rock movement.

GROUNDWATER CONDITIONS

Upon their completion, the boreholes were checked for the presence of groundwater or the occurrence of a cave-in. Groundwater was encountered in both of the boreholes at a depth of 1.2 m below the prevailing ground surface (i.e. El. 182.5±).

The encountered groundwater is likely derived from infiltrating precipitation which is perched in the fissures in the weathered silty clay till or shale bedrock..

The yield from perched ground water in the weathered silty clay till and shale bedrock will be low.

ASSESSMENT

The investigation has disclosed that the site is underlain by a stratum of very soft to hard silty clay till which extends onto a shale bedrock of Queenston Formation.

The upper layers of the till have been weathered to a depth of about 1.2 m.

Perched groundwater was encountered at a depth of 1.2 m below the prevailing ground surface in both boreholes. The yield of perched ground water from the weathered silty clay till and shale bedrock will be low.

The sides of the pond should be cut at 1:0 vertical:3.0 horizontal and flattened to 4.0 horizontal below the wet perimeter of the pond. The exposed side slopes must be vegetated and/or sodded to prevent erosion. In areas where water seepage occurs from the weathered silty clay till which is plagued with fissures, an intercept subdrain scheme may be required to stabilize the sides. In many instances, this condition will become rectified with time. The areas where seepage occurs can therefore be recorded at the time of excavation for construction of the pond and the necessity for this measure can be assessed one year after completion.

1. The sides and bottom of the ponds will generally consist of silty clay till and weathered shale bedrock which have low permeability; therefore, the quantity of groundwater recharge into the pond would be minimal.

2. As noted, the bottom of the pond will be at El. 180 to 181± and the permanent water level will be at El. 182. This shows that the sides of the pond will consist of silty clay till and the bottom will be in shale. The sides of the pond must be sloped at 1 vertical:3 horizontal above the permanent groundwater and flattened to 4 horizontal below the permanent groundwater. The side along the wet perimeter should be protected by rip-rap against erosion by wave action and the sides above the permanent groundwater level should be sodded or hydroseeded for the protection against rainwash erosion.
3. The inlet and outfall structures should be founded on sound silty clay till, i.e. at about 1.2 m below the prevailing ground surface. A Maximum Allowable Soil Pressure of 200 kPa can be used for the design of the foundations of these structures. The recommended soil bearing value incorporates a safety factor of 3 against shear failure of the underlying soils. The total and differential settlement with the total recommended soil pressure applied is estimated to be 25 mm and 15 mm, respectively.
4. The recommended soil parameters for the design of the project are tabulated below:

Soil Parameters

Soil Unit Weight (kN/m^3)		
	Bulk	Submerged
Silty Clay Till	22	12
Shale Bedrock	24	14

Soil Parameters (Cont'd)

Lateral Earth Pressure Coefficients

	Active (Ka)	At Rest (Ko)	Passive (Kp)
Silty Clay Till	0.40	0.50	2.50
Shale Bedrock	0.10	0.15	10.00

Runoff Coefficients

Slope	
0% - 2%	0.15
2% - 6%	0.20
6% +	0.28

Coefficients of Permeability 10^{-7} cm/sec

5. Excavations in excess of 1.2 m should be carried out in a manner to conform with Ontario Regulation 213/91.

For excavation, the weathered shale bedrock will require a heavy-duty backhoe properly equipped with a rock-ripper. In the sound shale, blasting may be necessary to increase the efficiency of the rock excavation. In this case, precautionary measures should be exercised to guard against damage to existing structures by properly controlling the sequence and intensity. Consultation with an expert in this matter is required.

Prospective contractors should be encouraged to perform test trenches to assess the actual status of the subsoil for excavation.

We trust this Letter Report satisfies your present requirements; should you have any queries, please do not hesitate to contact this office.

SOIL-ENG LIMITED

Ron Howieson, P.Eng.

Victor S. Chan, P.Eng.

RH/VSC:aq

2 copies

c Di Blasio Group
Attention: Mr. Alvaro Di Blasio

ENCLOSURES

Borehole Logs	Figures 1 and 2
Borehole Location Plan	Drawing No. 1

APPENDIX 'B'

OTTYHMO RUN

```
 OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    I N T E R H Y M O
O   O    T      T    H   H   Y Y   MM MM  O   O   * * * 1989b * * *
O   O    T      T    HHHHH    Y    M M M  O   O
O   O    T      T    H   H    Y    M   M  O   O
 OOO     T      T    H   H    Y    M   M   OOO    cK-316141600027
```


Input filename: 93025jul.dat
Output filename: 93025jul.out
Summary filename: 93025jul.sum

DATE: 07-19-2000 TIME: 12:58:32

COMMENTS: _____

*DIBLASIO ESTATES
*CITY OF MISSISSAUGA
*FIRST FLUSH SIMULATION - 4 HR. STM
*JULY 2000 - DATA 93025FF.DAT
*
****
** SIMULATION NUMBER: 1 **
****

*
****
*URBAN AREA
****

CALIB STANDHYD (0100) ID= 1 DT=10.0 min	Area (ha)= 97.68 Total Imp(%)= 60.00 Dir. Conn.(%)= 25.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	58.61	39.07
Dep. Storage	(mm)=	.10	.25
Average Slope	(%)=	.70	2.00
Length	(m)=	2300.00	40.00
Mannings n	=	.013	.250

New rainfall entered directly by user.
TIME STEP=10.00 min # of STEPS= 400
DURATION =66.67 hrs TOTAL RAIN= 24.97

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	.00	16.83	.00	33.50	.00	50.17	.00
.33	1.56	17.00	.00	33.67	.00	50.33	.00
.50	1.78	17.17	.00	33.83	.00	50.50	.00
.67	2.10	17.33	.00	34.00	.00	50.67	.00
.83	2.59	17.50	.00	34.17	.00	50.83	.00
1.00	3.41	17.67	.00	34.33	.00	51.00	.00
1.17	5.20	17.83	.00	34.50	.00	51.17	.00
1.33	12.59	18.00	.00	34.67	.00	51.33	.00
1.50	59.31	18.17	.00	34.83	.00	51.50	.00
1.67	16.60	18.33	.00	35.00	.00	51.67	.00
1.83	8.60	18.50	.00	35.17	.00	51.83	.00
2.00	5.89	18.67	.00	35.33	.00	52.00	.00
2.17	4.52	18.83	.00	35.50	.00	52.17	.00
2.33	3.69	19.00	.00	35.67	.00	52.33	.00
2.50	3.14	19.17	.00	35.83	.00	52.50	.00
2.67	2.74	19.33	.00	36.00	.00	52.67	.00
2.83	2.44	19.50	.00	36.17	.00	52.83	.00
3.00	2.20	19.67	.00	36.33	.00	53.00	.00

3.17	2.01	19.83	.00	36.50	.00	53.17	.00
3.33	1.85	20.00	.00	36.67	.00	53.33	.00
3.50	1.72	20.17	.00	36.83	.00	53.50	.00
3.67	1.61	20.33	.00	37.00	.00	53.67	.00
3.83	1.51	20.50	.00	37.17	.00	53.83	.00
4.00	1.42	20.67	.00	37.33	.00	54.00	.00
4.17	1.35	20.83	.00	37.50	.00	54.17	.00
4.33	.00	21.00	.00	37.67	.00	54.33	.00
4.50	.00	21.17	.00	37.83	.00	54.50	.00
4.67	.00	21.33	.00	38.00	.00	54.67	.00
4.83	.00	21.50	.00	38.17	.00	54.83	.00
5.00	.00	21.67	.00	38.33	.00	55.00	.00
5.17	.00	21.83	.00	38.50	.00	55.17	.00
5.33	.00	22.00	.00	38.67	.00	55.33	.00
5.50	.00	22.17	.00	38.83	.00	55.50	.00
5.67	.00	22.33	.00	39.00	.00	55.67	.00
5.83	.00	22.50	.00	39.17	.00	55.83	.00
6.00	.00	22.67	.00	39.33	.00	56.00	.00
6.17	.00	22.83	.00	39.50	.00	56.17	.00
6.33	.00	23.00	.00	39.67	.00	56.33	.00
6.50	.00	23.17	.00	39.83	.00	56.50	.00
6.67	.00	23.33	.00	40.00	.00	56.67	.00
6.83	.00	23.50	.00	40.17	.00	56.83	.00
7.00	.00	23.67	.00	40.33	.00	57.00	.00
7.17	.00	23.83	.00	40.50	.00	57.17	.00
7.33	.00	24.00	.00	40.67	.00	57.33	.00
7.50	.00	24.17	.00	40.83	.00	57.50	.00
7.67	.00	24.33	.00	41.00	.00	57.67	.00
7.83	.00	24.50	.00	41.17	.00	57.83	.00
8.00	.00	24.67	.00	41.33	.00	58.00	.00
8.17	.00	24.83	.00	41.50	.00	58.17	.00
8.33	.00	25.00	.00	41.67	.00	58.33	.00
8.50	.00	25.17	.00	41.83	.00	58.50	.00
8.67	.00	25.33	.00	42.00	.00	58.67	.00
8.83	.00	25.50	.00	42.17	.00	58.83	.00
9.00	.00	25.67	.00	42.33	.00	59.00	.00
9.17	.00	25.83	.00	42.50	.00	59.17	.00
9.33	.00	26.00	.00	42.67	.00	59.33	.00
9.50	.00	26.17	.00	42.83	.00	59.50	.00
9.67	.00	26.33	.00	43.00	.00	59.67	.00
9.83	.00	26.50	.00	43.17	.00	59.83	.00
10.00	.00	26.67	.00	43.33	.00	60.00	.00
10.17	.00	26.83	.00	43.50	.00	60.17	.00
10.33	.00	27.00	.00	43.67	.00	60.33	.00
10.50	.00	27.17	.00	43.83	.00	60.50	.00
10.67	.00	27.33	.00	44.00	.00	60.67	.00
10.83	.00	27.50	.00	44.17	.00	60.83	.00
11.00	.00	27.67	.00	44.33	.00	61.00	.00
11.17	.00	27.83	.00	44.50	.00	61.17	.00
11.33	.00	28.00	.00	44.67	.00	61.33	.00
11.50	.00	28.17	.00	44.83	.00	61.50	.00
11.67	.00	28.33	.00	45.00	.00	61.67	.00
11.83	.00	28.50	.00	45.17	.00	61.83	.00
12.00	.00	28.67	.00	45.33	.00	62.00	.00
12.17	.00	28.83	.00	45.50	.00	62.17	.00
12.33	.00	29.00	.00	45.67	.00	62.33	.00
12.50	.00	29.17	.00	45.83	.00	62.50	.00
12.67	.00	29.33	.00	46.00	.00	62.67	.00
12.83	.00	29.50	.00	46.17	.00	62.83	.00
13.00	.00	29.67	.00	46.33	.00	63.00	.00
13.17	.00	29.83	.00	46.50	.00	63.17	.00
13.33	.00	30.00	.00	46.67	.00	63.33	.00
13.50	.00	30.17	.00	46.83	.00	63.50	.00
13.67	.00	30.33	.00	47.00	.00	63.67	.00
13.83	.00	30.50	.00	47.17	.00	63.83	.00
14.00	.00	30.67	.00	47.33	.00	64.00	.00
14.17	.00	30.83	.00	47.50	.00	64.17	.00
14.33	.00	31.00	.00	47.67	.00	64.33	.00
14.50	.00	31.17	.00	47.83	.00	64.50	.00
14.67	.00	31.33	.00	48.00	.00	64.67	.00
14.83	.00	31.50	.00	48.17	.00	64.83	.00
15.00	.00	31.67	.00	48.33	.00	65.00	.00
15.17	.00	31.83	.00	48.50	.00	65.17	.00
15.33	.00	32.00	.00	48.67	.00	65.33	.00
15.50	.00	32.17	.00	48.83	.00	65.50	.00

15.67	.00	32.33	.00	49.00	.00	65.67	.00
15.83	.00	32.50	.00	49.17	.00	65.83	.00
16.00	.00	32.67	.00	49.33	.00	66.00	.00
16.17	.00	32.83	.00	49.50	.00	66.17	.00
16.33	.00	33.00	.00	49.67	.00	66.33	.00
16.50	.00	33.17	.00	49.83	.00	66.50	.00
16.67	.00	33.33	.00	50.00	.00	66.67	.00

	IMPERVIOUS	PERVIOUS (i)	
Max.eff.Inten.(mm/hr)=	29.50	88.60	
over (min)	30.00	40.00	
Storage Coeff. (min)=	30.40 (ii)	37.81 (ii)	
Unit Hyd. Tpeak (min)=	30.00	40.00	
Unit Hyd. peak (cms)=	.04	.03	
			TOTALS
PEAK FLOW (cms)=	1.30	1.86	3.01 (iii)
TIME TO PEAK (hrs)=	1.83	2.00	2.00
RUNOFF VOLUME (mm)=	24.87	9.20	13.12
TOTAL RAINFALL (mm)=	24.97	24.97	24.97
RUNOFF COEFFICIENT =	1.00	.37	.53

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 76.20 K (1/hr)= 4.14
Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

FINISH

==========

APPENDIX 'C'

Quality Pond Facility No. 3
Design Calculations

CITY OF MISSISSAUGA
QUALITY POND - FACILITY # 3 - DESIGN CALCULATIONS
PROJECT NUMBER: 93025
DESIGN DATE: 10-Jul-98
SUBMISSION DATE: 05-Aug-2000
SUBMISSION NO: 3

URBAN ECOSYSTEMS
LIMITED
7050 WESTON ROAD, SUITE 705
WOODBRIDGE, ONTARIO L4L 8G7
TELEPHONE:(905)856-0629
FAX:(905)856-0698

A. DRAINAGE AREA IN ha.

	IMPERVIOUS RATIO 55%	35%	
CITY OF MISSISSAUGA			
NORTH OF DERRY RD.	43.65		SEE ATTACHED FIGURES
SOUTH OF DERRY RD.	38.22	1.21	
CITY OF BRAMPTON			
ONTARIO HYDRO		12.20	
HWY 407	2.40		
TOTAL CONTRIBUTING AREA	84.27 ha.	13.41 ha.	97.68 ha. TOTAL

B. REQUIRED POND FACILITY SIZE

	STORAGE CRITERIA 55%	35%	
IMPERVIOUS RATIO			
TOTAL	190 cm/ha	140 cm/ha	
ACTIVE	40 cm/ha	40 cm/ha	
OR 25mm FIRST FLUSH WHICH EVER IS GREATER			
OTTHYMO(FIRST FLUSH)	131.2 cm/ha	131.2 cm/ha	SEE OTTHYMO RUN

i. STORAGE REQUIRED

	IMPERVIOUS RATIO 55%	35%	TOTAL
a. ACTIVE @ 40cm/ha	3370.8 cm	536.4 cm	N/A
@ FIRST FLUSH	11056 cm	1759 cm	12815 cm
b. PERMANENT	12640.5 cm	1341 cm	13981.5 cm
c. TOTAL	16011.3 cm	1877.4 cm	26796.5 cm

ii. SUMMARY

	ELEVATION	USE STORAGE	AVAILABLE	
TOP OF BERM	183.05			
FACILITY SPILLWAY	182.40	N/A	N/A	
ACTIVE	182.40	13000 cm	16060 cm	
PERMANENT	181.20	14000 cm	14050 cm	EXCL SEDIMENT FOREBAY
TOTAL		27000 cm	30110 cm	

C. SEDIMENT FOREBAY SPILL = 181.2 BOTTOM = 179.2

i. SETTLING LENGTH Ds = [(r x Qp)/Vs] ^ 0.5

where r = length to width ratio of pond assume 4.5 :1
Qp = peak pond flow rate = 0.305 cm/s
Vs = settling velocity set to 0.0003m/s for 150ym particles

Ds = 67.66 m Ds(available) = 80 m

ii. DISPERSION LENGTH Dd = 8 x Q / d x Vf

where Q = inlet flow rate = 10.937 cm/s : see DiBlasio Estates STM Design Sheet and
d = depth of permanent sediment pool = 2 m External Drain. Area Plan
Vs = desired velocoity in forebay = 0.5 m/s
Dd = 87.496 m Dd(available) = 90 m

iii. WIDTH OF DEEP ZONE W = D / 8

W = 10.94 m W (available) = 20 m

iv. SEDIMENT FOREBAY SUMMARY

TOP LENGTH =	90 m	SIDE SLOPES =	4 :1
BOTTOM LENGTH =	74 m	BOTTOM AREA =	1480 sq. m
BOTTOM WIDTH =	20 m	BOTTOM PERIMETER =	188 m
DEPTH =	2 m	VOLUME =	4630 cu. m

C. SEDIMENT FOREBAY (cont'd)

v. CHECK AVERAGE SEDIMENT FOREBAY VELOCITY

Q=VA Q= 10.937 cm/s
SECTION A= 56 sq. m
V= 0.195 m/s where 0.15m/s or less is preferred

vi. OUTLET FROM SEDIMENT FOREBAY TO POND

ASSUME RECTANGULAR WEIR

Qrect-weir= 1.84(L-0.2H)H**3/2 cms

Qdes= 10.937 cms
L(Length of spill weir)= 20 m
Qspill weir= 31.138 cms

SPILL FREE BOARD= 0.3
ACTIVE WATER ELEV= 182.40
SPILL ELEV= 181.50
H(Height of spill weir)= 0.90 m

vii. ANNUAL SEDIMENT LOADING/CLEANOUT FREQUENCY

CATCHMENT AREA ha	IMPERVIOUS RATIO %	ANNUAL SEDIMENT LOADING RATE cu.m/ha/yr	AMOUNT cu.m/yr	yr CLEANOUT FREQUENCY	TOTAL SEDIMENT cu.m
84.27	55	1.9	160.113	10	1610
13.41	35	0.6	8.046	10	90
				TOTAL STORAGE REQUIRED =	1700
				TOTAL STORAGE AVAILABLE =	4630

FOR ANNUAL LOADING RATE SEE TABLE 5.3,PAGE 209,MOEE 94 MANUAL

viii. SEDIMENT DRYING AREA

BOTTOM LENGTH = 45 m
BOTTOM WIDTH = 18 m
NET BOTTOM SURFACE AREA AVAILABLE = 810 sq. m
REASONABLE STOCKPILE HEIGHT = 2.1 m
NET TOP SURFACE AREA AVAILABLE = 810 sq. m
REASONABLE STOCKPILE SIDE SLOPE = 4 :1
REASONABLE STOCKPILE VOLUME = 1701 cu. m > Vreq = 1700 cu. m

D. DRAWDOWN ANALYSIS FOR REVERSE OUTLET - ORIFICE OPENING SIZE CALCULATION

i. REGRESSION METHOD

	ELAVATION	SURFACE AREA
ACTIVE	182.4	15230 sq.m
PERMANENT	181.2	11460 sq.m

h = 1.2 max water elevation @ orifice

A=C2(h)+C3 LINEAR REGRESSION THUS

15230 sq. m = C2(1.2)+C3
11460 sq. m = C2(0)+C3

THUS C3= 11460 sq.m
C2= 3770 sq.m

THUS DRAWDOWN TIME $t = \frac{0.66C2h^{1.5} + 2C3h^{0.5}}{2.75Aorif}$

REARRANGING $Aorif = \frac{0.66C2h^{1.5} + 2C3h^{0.5}}{2.75t}$

t = 24 hrs OR 86400 sec
Aorif = 0.119 sq. m

a. RETANGULAR 350 mm X 341 mm
b. CIRCULAR DIAM.= 390 mm

ii. ORIFICE OPENING DRAWDOWN TIME

$t = \frac{2 Ap h^{0.5}}{CAorif(2g)^{0.5}}$

C= discharge coefficient usual0.62
t = draw down time 24 hrs OR

A = active pond surface area = 15230 sq.m
A = perm. pond surface area = 11460 sq.m
26690 sq.m
Ap = 13345 sq.m
86400 sec

D. DRAWDOWN ANALYSIS FOR REVERSE OUTLET - ORIFICE OPENING SIZE CALCULATION (cont'd)

ii. ORIFICE OPENING DRAWDOWN TIME (cont'd)

REARRANGING $A_{orif} = \frac{2 A_p h^{0.5}}{C_t (2g)^{0.5}}$

$A_{orif} =$ 0.123221 sq.m

a. RETANGULAR 350 mm X 352 mm

b. CIRCULAR DIAM= 396 mm USE DIAM= 375 mm

iii. CHECK SIZE FROM REGRESSION METHOD

a. use retangular orifice 350 mm X 300 mm

$t = \frac{2 A_p h^{0.5}}{C A_{orif} (2g)^{0.5}}$

t = 28.16 hrs

b. use circular orifice 375 mm t= 26.78 hrs

iv. PEAK POND FLOW RATE

Qorifice=C *A* (2 *g*H)**0.5 =cms where c= 0.82 for tube or 0.62 for plate

a. for retangular orifice Qorifice = 0.295 cms H= 1.2 - half orifice height

b. for circular orifice Qorifice = 0.305 cms H= 1.2 - half orifice height

v. USE CIRCULAR ORIFICE 375 mm DIAM.

E. BY-PASS MANHOLE WIER -- N/A

Qpipe =	N/A	cms	SEE STORM DESIGN SHEETS		ELEVATIONS
Qflush =	N/A	cms	OTTYHMO 25MM STORM RUN	SPILLWAY	182.40 m
Qdes =		cms		FIRST FLUSH	182.40 m
Qrect-weir=	1.84(L-0.2H)H**3/2	cms		H(Height of weir)=	m
L(Length of weir)=	N/A	m			
Qweir=		cms			

F. OUTLET DRAIN SIZE FROM MANHOLE #1:

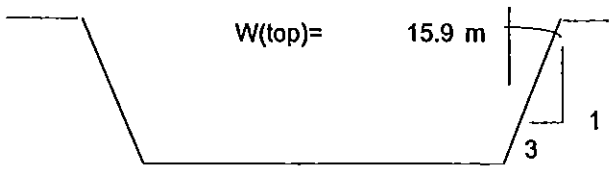
Qdes=	0.339 cms	MAX FLOW FROM ORIFICE PLATE,ACTIVE AND PERMANENT DRAWDOWN
DIAM.=	675 mm	
SLOPE=	0.40 %	
Qdrain=	0.532 cms	
Vel=	1.486 ms	

G. OVERFLOW FROM POND

i. WEIR

Qdes= 10.937 cms

TRAPEZOIDAL WEIR <angle= 71.57 degrees



BERM TOP = 183.05

SPILLWAY ELEV = 182.40

H= 0.65 m

OR

33.3 % SLOPE

W(bottom)= 12 m Cd= 0.62

Qweir= .6666*Cd*(2g)**0.5*H**1.5*(W+0.8*TAN(2*</2)*H)

Qweir= 13.008 cms

G. OVERFLOW FROM POND (cont'd)

ii. SPILLWAY CHANNEL ASSUME SAME SIDE SLOPE AS WEIR AND REDUCED BOTTOM WIDTH

W(bottom)=	6	m			
W(top)=	9.9	m			
A area=	5.168	sm			
p perim.=	10.111	m			
R (A/P) =	0.511				
S(slope)=	0.70	%			
n=	0.024				
Qsw.= 11.515	cms	@	h=	0.65	m
		and	V=	2.23	ms
		and	F=	0.88	FROUDE NUMBER
Qorifice = 0.305	cms				
11.821	cms				

H. MAINTENANCE DRAWDOWN DRAIN

DRAWDOWN ELEVATION= 180.48 m SET BY OUTLET TO CREEK

i. PERMANENT POND DRAWDOWN

APPROX. DRAWDOWN VOLUME= 8500 cm permanent water level = 181.20

DRAIN SIZE= 600 mm Diameter outlet invert = 180.48

h = 0.72

CHECK DRAIN TIME BY REGRESSION METHOD $t = \frac{2 Ap h^{0.5}}{CAorif(2g)^{0.5}}$

t = 6.96 hrs

Q= 0.339 cms

ii. ACTIVE POND DRAWDOWN

APPROX. DRAWDOWN VOLUME= 15000 cm active water level = 182.40

DRAIN SIZE= 600 mm Diameter outlet invert = 180.48

h = 1.92

CHECK DRAIN TIME BY REGRESSION METHOD $t = \frac{2 Ap h^{0.5}}{CAorif(2g)^{0.5}}$

t = 15.10 hrs

Q= 0.276 cms

APPENDIX 'D'

Storm Sewer Design Sheets

DiBLASIO ESTATES EAST

PROJECT Number: 93025
PREPARED BY: SM
CHECKED BY: NV
DESIGN DATE: 07/21/98
SUBMISSION DATE: 07/19/2000
SUBMISSION NO.: 2

URBAN ECOSYSTEMS
LIMITED
7050 WESTON ROAD, SUITE 705
WOODBRIDGE . ONTARIO L4L 8G7
TELEPHONE:(905)856-0629
FAX:(905)856-0698

STREET NAME	FROM M.H.	TO M.H.	AR	E SECTION D.	DIAM mm	LGTH m	FULL VEL m/sec	CAP. cms	LOWER m	FLOW TIME min
GOLDEN HILLS WAY	STUB	13	0.0							
EXTERNAL			0.0	0	375	41.0	1.43	**0.164**		0.48
	13	12	0.0	0	375	60.0	1.43	**0.164**		0.70
	12	11	0.0	0	525	74.0	1.42	**0.317**		0.87
	11	10	0.0	0	525	80.5	1.42	**0.317**		0.95
	10	9	0.0	5	525	59.0	1.74	**0.389**		0.57
	9	8	0.0	5	525	13.0	1.74	**0.389**		0.12
	8	7	0.0	0	525	60.0	2.01	**0.449**		0.50
	7	6	0.0	5	525	78.5	2.24	**0.502**		0.58
	6	5	0.0	0	525	37.0	2.84	**0.634**		0.22
RAMONET DRIVE	26	25	0.0	0	300	62.0	1.96	**0.143**		0.53
	27	25	0.0	0	375	68.0	1.13	**0.129**		1.00
TATTINGER AVENUE	25	24	0.0	0	450	47.5	1.28	**0.210**		0.62
	24	23	0.0	0	525	44.0	1.42	**0.317**		0.52
	23	22	0.0	0	525	58.0	2.01	**0.449**		0.48
TREMBLANT COURT	31	30	0.0	0	300	30.0	1.38	**0.101**		0.36
	30	22	0.0	0	450	90.5	1.28	**0.210**		1.18
TATTINGER AVENUE	22	21	0.0	0	600	24.5	1.55	**0.453**		0.26
	21	20	0.0	0	600	18.5	2.19	**0.641**		0.14
	20	5	0.0	0	600	45.0	2.19	**0.641**		0.34
GOLDEN HILLS WAY	5	4	1.5	5	750	161.5	2.35	**1.071**		1.15

DiBLASIO ESTATES EAST

PROJECT Number: 93025
PREPARED BY: SM
CHECKED BY: NV
DESIGN DATE: 07/21/98
SUBMISSION DATE: 07/19/2000
SUBMISSION NO.: 2

URBAN ECOSYSTEMS
LIMITED
7050 WESTON ROAD, SUITE 705
WOODBRIDGE, ONTARIO L4L 8G7
TELEPHONE:(905)856-0629
FAX.(905)856-0698

STREET NAME	FROM M.H.	TO M.H.	A	E SECTION D.	DIAM mm	LGTH m	FULL VEL m/sec	CAP. cms	LOWER m	FLOW TIME min
EXT. McLAUGHLIN RD NORTH OF DERRY AND CITY OF MISS MH 10			8 1 11 7 3 5							
EXT. (BONOFIGLIO)			1 13 3 2 0							
EXT. McLAUGHLIN RD SOUTH DERRY RD AND CITY OF MISS MH 10			3							
	4	3		0	3000X1500	35.0	3.25	12.112		0.18
EXT.WEST	STUB	3	5	5	825	80.0	1.61	0.886		0.83
	3	H/W	0	0	3000X1500	71.5	3.25	12.11		0.37

NOTE: TIME OF CONCENTRATION FOR SEWER NOR
STORM SEWER DESIGN SHEET FOR McLAUGHLIN F

NOTE: INITIAL EXTERNAL TIME OF CONCENTRATION
ASSUME 450 lm @ 2
LENGTH OF SEWER IS FROM NORTH DRAINAGE LIM

DRAINAGE AREA TOTAL a. DESIGN SHE
NORTH OF '
HWY 407

M HYDRO & BRAMPTON LANDS
Y VALDOR ENG. AND CITY OF MISSISSAUGA
M WOODLOT NORTH OF DERRY RD AND
LIN RD
Y ADAMSON, LAWSON SURBRAY
SSAUGA

Appendix C Stormwater Management Calculations

SCS consulting group ltd

ALLOWABLE RELEASE RATE

376 390 Derry Road West
Project Number: 2509
Date: December 2023
Designer Initials: J.L.B

Oaktree Circle Existing Storm Sewer Capacity Calculation

Per The Gates of Fletchers Creek Storm Drainage Area Plan Drawing G-6, the proposed development was included in the downstream storm sewer.

5 Year storm

IDF Parameters*
- **a =** 820
- **t =** 15 min
- **b =** 4.6
- **c =** 0.78

Runoff Coefficient:
- **C1 =** 0.60
- **C2 =** 0.55

Allowable Release Rate Calculation

Outlet ID	Area	time t	Intensity i=a/(t+b)^c	Flow Q=CiA/360
	ha	*min*	*mm/hr*	*l/s*
Oaktree Circle	1.32	15.00	80.51	114.39
Longview Place	1.17	15.00	80.51	143.91
Total Allowable	2.49	15.00	80.51	**258.31**

* a,b,c's per City of Mississauga

Therefore, the proposed development was accounted for within the existing storm sewer network with a release rate of 258.3 L/s. Refer to Figure 2.1.

PROPOSED WEIGHTED RUNOFF COEFFICIENT

376 390 Derry Road West
Project Number: 2509
Date: December 2023
Designer Initials: J.L.B

Catchment 301 Outlets to: Oaktree Circle

	Runoff Coefficient	Area (ha)	Weighted Runoff Coefficient	Weighted Runoff Coefficient (10 Year)	Weighted Runoff Coefficient (25 Year)	Weighted Runoff Coefficient (50 Year)	Weighted Runoff Coefficient (100 Year)
Asphalt	0.90	0.94	0.36	0.36	0.39	0.40	0.40
Rooftops	0.90	0.83	0.32	0.32	0.35	0.35	0.35
Grass	0.25	0.60	0.06	0.06	0.07	0.08	0.08
TOTAL		2.37	0.74	0.74	0.81	0.82	0.83

Catchment 302 Outlets to: Oaktree Circle

	Runoff Coefficient	Area (ha)	Weighted Runoff Coefficient	Weighted Runoff Coefficient (10 Year)	Weighted Runoff Coefficient (25 Year)	Weighted Runoff Coefficient (50 Year)	Weighted Runoff Coefficient (100 Year)
Asphalt	0.90	0.01	0.04	0.04	0.05	0.05	0.05
Rooftops	0.90	0.10	0.74	0.74	0.81	0.82	0.82
Grass	0.25	0.02	0.03	0.03	0.04	0.04	0.04
TOTAL		0.13	0.81	0.81	0.90	0.91	0.91

Oaktree Circle Total

Catchment	Runoff Coefficient	Area	Weighted Runoff Coefficient	Weighted Runoff Coefficient (10 year)	Weighted Runoff Coefficient (25 year)	Weighted Runoff Coefficient (50 year)	Weighted Runoff Coefficient (100 year)
301	0.74	2.37	0.70	0.70	0.77	0.84	0.87
302	0.81	0.13	0.04	0.04	0.05	0.05	0.05
TOTAL		2.49	0.74	0.74	0.81	0.89	0.92

SCS consulting group ltd

SUMMARY

376 390 Derry Road West
Project Number: 2509
Date: December 2023
Designer Initials: J.L.B

			100 Year								
Catchment ID	Runoff Coef.	Area (ha)	Release Rate (L/s) [2]	Storage Required (m^3) [2]	Storage Available (m^3) [3]	Draw Down Time (mins) [5]	Orifice Size (mm) [4]	Orifice Release Rate (L/s)	Uncontrolled Release Rate (L/s)	Location of Orifice	VERTICAL/TUBE Control
301	0.83	2.37	213.46	625.54	632.55	48.84	201.16	213.46		MH17	tube
302	0.91	0.13	44.76	0.00	0.00	0.00	uncontrolled	-	44.76	0.00	-
Total		2.49	258.22	625.54	632.55	-	-	-		-	-

Oaktree Circle Allowable Release Rate	258.31	L/s
Oaktree Circle Proposed Release Rate	258.22	L/s

Notes:

[2] Per Modified Rational Calculations (attached)

[4] See attached for orifice details

[5] Draw down time calculated based on surface storage only

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MODIFIED RATIONAL METHOD

376 390 Derry Road West
Project Number: 2509
Date: December 2023
Designer Initials: J.L.B

Area ID: 301

Area = **2.369** ha
"C" = **0.83**
AC= **1.9584**
Tc = **15.0** min
Time Increment = **3.0** min
Release Rate = **213.46** l/s
Max.Storage = **625.5** m^3

City of Mississauga 100 Year
a= 1450
b= 4.9
c= 0.78

Time (min)	Rainfall Intensity (mm/hr)	Storm Runoff (l/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	
15.0	140.7	765.96	689.4	192.1	497.2	
18.0	126.1	686.50	741.4	211.3	530.1	
21.0	114.5	623.64	785.8	230.5	555.3	
24.0	105.2	572.54	824.5	249.7	574.7	
27.0	97.4	530.09	858.8	269.0	589.8	
30.0	90.8	494.20	889.6	288.2	601.4	
33.0	85.1	463.42	917.6	307.4	610.2	
36.0	80.2	436.68	943.2	326.6	616.6	
39.0	75.9	413.23	966.9	345.8	621.1	
42.0	72.1	392.46	989.0	365.0	624.0	
45.0	68.7	373.93	1009.6	384.2	625.4	
48.0	65.6	357.28	1029.0	403.4	625.5	<<<<
51.0	62.9	342.24	1047.2	422.6	624.6	
54.0	60.4	328.56	1064.5	441.9	622.7	
57.0	58.1	316.08	1081.0	461.1	619.9	
60.0	56.0	304.62	1096.6	480.3	616.4	
63.0	54.0	294.07	1111.6	499.5	612.1	
66.0	52.2	284.32	1125.9	518.7	607.2	
69.0	50.6	275.28	1139.6	537.9	601.7	
72.0	49.0	266.86	1152.8	557.1	595.7	
75.0	47.6	259.01	1165.6	576.3	589.2	
78.0	46.2	251.67	1177.8	595.5	582.3	
81.0	45.0	244.79	1189.7	614.8	574.9	
84.0	43.8	238.32	1201.1	634.0	567.2	

ON-SITE DETENTION AND ORIFICE DETAILS

376 390 Derry Road West
Project Number: 2509
Date: December 2023
Designer Initials: J.L.B

Area ID 301

Orifice Equation: $Q = C_d A(2gh)^{1/2}$

Type of Control: tube
Location: MH17

2 - 10 Year

	201	mm
Area:	0.032	m^2
g =	9.81	m/sec^2
C_d =	0.82	

Pipe Storage

Diameter (mm)	Area (m^2)	Length (m)	Volume (m^3)
300	0.071	213	15.03
375	0.110	427	47.13
450	0.159	42	6.62
		Total Volume	**68.77**

Underground Storage

Underground Storage #1 Volume =	413.07	m^3
Underground Storage #2 Volume =	150.71	m^3
Total Underground Storage Volume =	563.78	m^3

Total Storage = **632.6** m^3

	Stage (m)	Orifice Head (m)	Storage (m^3)	Discharge (m^3/s)
Orifice Invert E.L.	192.72	0.00	0.0	0.00
Ground E.L.	196.77	3.95	0.0	0.229
100 Year WL	196.24	3.42	632.6	0.213

Storage Summary

376 390 Derry Road West
Project Number: 2509
Date: December 2023
Designer Initials: J.L.B

Total Storage Provided **632.55 m^3**

Cultec 1 Parameters

Stage/Storage Table:

Stage (m)	Volume Cultec 1 (m3)
193.11	0.00
193.14	0.00
193.16	0.00
193.19	0.00
193.21	0.00
193.24	0.00
193.26	0.00
193.29	0.00
193.31	0.00
193.34	0.00
193.36	0.00
193.39	0.00
193.41	0.00
193.44	0.00
193.47	0.00
193.49	0.00
193.52	0.00
193.54	0.00
193.57	0.00
193.59	0.00
193.62	0.00
193.64	0.00
193.67	0.00
193.69	0.00
193.72	0.00
193.75	0.00
193.77	0.00
193.80	0.00
193.82	0.00
193.85	0.00
193.87	0.00
193.90	0.00
193.92	0.00
193.95	0.00
193.97	0.00
194.00	0.00
194.02	0.00
194.05	0.00
194.08	0.00
194.10	0.00
194.13	0.00
194.15	0.00
194.18	0.00
194.20	0.00
194.23	0.00
194.25	0.00
194.28	0.00
194.30	0.00
194.33	0.00
194.35	0.00
194.38	0.00
194.41	0.00
194.43	0.00
194.46	0.00
194.48	0.00
194.51	0.00
194.53	0.00
194.56	0.00
194.58	0.00
194.60	0.00
194.63	3.78
194.65	7.56
194.68	11.35
194.70	15.13
194.73	18.91
194.75	22.69
194.78	26.48
194.80	30.26
194.83	34.04
194.85	42.06
194.88	50.08
194.90	58.09
194.93	66.11
194.96	74.03
194.98	81.95
195.01	89.79
195.03	97.63
195.06	105.46
195.08	113.29
195.11	121.03
195.13	128.76
195.16	136.48
195.18	144.21
195.21	151.85
195.24	159.49
195.26	167.05
195.29	174.60
195.31	182.06
195.34	189.53
195.36	196.99
195.39	204.38

Cultec 2 Parameters

Stage/Storage Table:

Stage (m)	Volume Cultec 2 (m3)
193.11	0.00
193.14	1.41
193.16	2.81
193.19	4.22
193.21	5.63
193.24	7.04
193.26	8.44
193.29	9.85
193.31	11.26
193.34	12.66
193.36	15.57
193.39	18.47
193.41	21.38
193.44	24.28
193.47	27.16
193.49	30.02
193.52	32.87
193.54	35.71
193.57	38.54
193.59	41.38
193.62	44.18
193.64	46.98
193.67	49.77
193.69	52.57
193.72	55.33
193.75	58.10
193.77	60.83
193.80	63.56
193.82	66.27
193.85	68.97
193.87	71.67
193.90	74.35
193.92	77.02
193.95	79.69
193.97	82.33
194.00	84.97
194.02	87.59
194.05	90.20
194.08	92.78
194.10	95.33
194.13	97.85
194.15	100.33
194.18	102.82
194.20	105.28
194.23	107.71
194.25	110.07
194.28	112.41
194.30	114.71
194.33	116.95
194.35	119.20
194.38	121.35
194.41	123.44
194.43	125.46
194.46	127.37
194.48	129.15
194.51	130.78
194.53	132.35
194.56	133.82
194.58	135.23
194.61	136.64
194.63	138.04
194.66	139.45
194.68	140.86
194.71	142.26
194.74	143.67
194.76	145.08
194.79	146.49
194.81	147.89
194.84	149.30
194.86	150.71
194.88	150.71
194.90	150.71
194.93	150.71
194.96	150.71
194.98	150.71
195.01	150.71
195.03	150.71
195.06	150.71
195.08	150.71
195.11	150.71
195.13	150.71
195.16	150.71
195.18	150.71
195.21	150.71
195.24	150.71
195.26	150.71
195.29	150.71
195.31	150.71
195.34	150.71
195.36	150.71
195.39	150.71

Storm Sewer Parameters

Stage/Storage Table:

Stage (m)	Volume PipeS (m3)
193.11	0.00
193.14	0.00
193.16	0.00
193.19	0.00
193.21	0.00
193.24	0.00
193.26	0.00
193.29	0.00
193.31	0.00
193.34	0.00
193.36	0.00
193.39	0.00
193.41	0.00
193.44	0.00
193.47	0.00
193.49	0.00
193.52	0.00
193.54	0.00
193.57	0.00
193.59	0.00
193.62	0.00
193.64	0.00
193.67	0.00
193.69	0.00
193.72	6.62
193.75	6.62
193.77	6.62
193.80	6.62
193.82	6.62
193.85	6.62
193.87	6.62
193.90	7.79
193.92	7.79
193.95	7.79
193.97	7.79
194.00	7.79
194.02	7.79
194.05	7.79
194.08	7.79
194.10	7.79
194.13	12.39
194.15	12.39
194.18	12.39
194.20	19.27
194.23	19.27
194.25	19.27
194.28	19.27
194.30	19.27
194.33	26.73
194.35	26.73
194.38	26.73
194.41	29.82
194.43	29.82
194.46	29.82
194.48	29.82
194.51	29.82
194.53	29.82
194.56	36.95
194.58	36.95
194.60	39.58
194.63	39.58
194.65	39.58
194.68	45.93
194.70	45.93
194.73	45.93
194.75	45.93
194.78	45.93
194.80	45.93
194.83	46.98
194.85	46.98
194.88	50.99
194.90	53.10
194.93	53.10
194.96	53.10
194.98	53.10
195.01	53.10
195.03	53.10
195.06	53.10
195.08	53.10
195.11	53.10
195.13	53.10
195.16	53.10
195.18	53.10
195.21	53.10
195.24	59.77
195.26	59.77
195.29	59.77
195.31	60.71
195.34	60.71
195.36	60.71
195.39	60.71

Stage (m)	Total Volume (m3)
193.11	0.00
193.14	1.41
193.16	2.81
193.19	4.22
193.21	5.63
193.24	7.04
193.26	8.44
193.29	9.85
193.31	11.26
193.34	12.66
193.36	15.57
193.39	18.47
193.41	21.38
193.44	24.28
193.47	27.16
193.49	30.02
193.52	32.87
193.54	35.71
193.57	38.54
193.59	41.38
193.62	44.18
193.64	46.98
193.67	49.77
193.69	52.57
193.72	61.95
193.75	64.71
193.77	67.45
193.80	70.18
193.82	72.88
193.85	75.59
193.87	78.29
193.90	82.13
193.92	84.81
193.95	87.48
193.97	90.12
194.00	92.76
194.02	95.37
194.05	97.98
194.08	100.57
194.10	103.11
194.13	110.24
194.15	112.73
194.18	115.21
194.20	124.55
194.23	126.98
194.25	129.34
194.28	131.68
194.30	133.98
194.33	143.68
194.35	145.92
194.38	148.07
194.41	153.26
194.43	155.28
194.46	157.19
194.48	158.97
194.51	160.60
194.53	162.17
194.56	170.78
194.58	172.18
194.60	176.22
194.63	181.41
194.65	186.60
194.68	198.14
194.70	203.33
194.73	208.52
194.75	213.71
194.78	218.90
194.80	224.09
194.83	230.32
194.85	239.75
194.88	251.78
194.90	261.90
194.93	269.91
194.96	277.84
194.98	285.76
195.01	293.60
195.03	301.43
195.06	309.27
195.08	317.10
195.11	324.83
195.13	332.56
195.16	340.29
195.18	348.02
195.21	355.66
195.24	369.97
195.26	377.53
195.29	385.08
195.31	393.48
195.34	400.94
195.36	408.41
195.39	415.79

SCS consulting group ltd

Storage Summary

376 390 Derry Road West
Project Number: 2509
Date: December 2023
Designer Initials: J.L.B

195.41	211.75
195.44	219.13
195.46	226.42
195.49	233.71
195.51	240.91
195.54	248.11
195.57	255.23
195.59	262.26
195.62	269.20
195.64	276.05
195.67	282.90
195.69	289.67
195.72	296.35
195.74	302.85
195.77	309.27
195.79	315.60
195.82	321.75
195.84	327.90
195.87	333.80
195.90	339.51
195.92	345.05
195.95	350.25
195.97	355.09
196.00	359.49
196.02	363.72
196.05	367.69
196.07	371.47
196.10	375.25
196.12	379.03
196.15	382.81
196.17	386.60
196.20	390.38
196.23	394.16
196.25	397.94
196.28	401.73
196.30	405.51
196.33	409.29
196.35	413.07

195.41	150.71
195.44	150.71
195.46	150.71
195.49	150.71
195.51	150.71
195.54	150.71
195.57	150.71
195.59	150.71
195.62	150.71
195.64	150.71
195.67	150.71
195.69	150.71
195.72	150.71
195.74	150.71
195.77	150.71
195.79	150.71
195.82	150.71
195.84	150.71
195.87	150.71
195.90	150.71
195.92	150.71
195.95	150.71
195.97	150.71
196.00	150.71
196.02	150.71
196.05	150.71
196.07	150.71
196.10	150.71
196.12	150.71
196.15	150.71
196.17	150.71
196.20	150.71
196.23	150.71
196.25	150.71
196.28	150.71
196.30	150.71
196.33	150.71
196.35	150.71

195.41	60.71
195.44	60.71
195.46	60.71
195.49	60.71
195.51	60.71
195.54	60.71
195.57	60.71
195.59	60.71
195.62	60.71
195.64	60.71
195.67	60.71
195.69	60.71
195.72	60.71
195.74	60.71
195.77	60.71
195.79	60.71
195.82	64.92
195.84	64.92
195.87	68.77
195.90	68.77
195.92	68.77
195.95	68.77
195.97	68.77
196.00	68.77
196.02	68.77
196.05	68.77
196.07	68.77
196.10	68.77
196.12	68.77
196.15	68.77
196.17	68.77
196.20	68.77
196.23	68.77
196.25	68.77
196.28	68.77
196.30	68.77
196.33	68.77
196.35	68.77

195.41	423.17
195.44	430.54
195.46	437.83
195.49	445.12
195.51	452.33
195.54	459.53
195.57	466.65
195.59	473.67
195.62	480.61
195.64	487.47
195.67	494.32
195.69	501.08
195.72	507.76
195.74	514.26
195.77	520.68
195.79	527.01
195.82	537.38
195.84	543.53
195.87	553.28
195.90	558.99
195.92	564.53
195.95	569.73
195.97	574.57
196.00	578.97
196.02	583.20
196.05	587.16
196.07	590.95
196.10	594.73
196.12	598.51
196.15	602.29
196.17	606.08
196.20	609.86
196.23	613.64
196.25	617.42
196.28	621.21
196.30	624.99
196.33	628.77
196.35	**632.55**

MODIFIED RATIONAL METHOD

376 390 Derry Road West
Project Number: 2509
Date: December 2023
Designer Initials: J.L.B

Area ID: 302

Area = **0.126** ha
"C" = **0.91**
AC= **0.1144**
Tc = **15.0** min
Time Increment = **3.0** min
Release Rate = **44.76** l/s
Max.Storage = **0.0** m^3

City of Mississauga 100 Year
a= 1450
b= 4.9
c= 0.78

Time (min)	Rainfall Intensity (mm/hr)	Storm Runoff (l/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	
15.0	140.7	44.76	40.3	40.3	0.0	<<<<

CULTEC Stormwater Design Calculator

Date:	December 04, 2023

Cultec 1

Project Information:

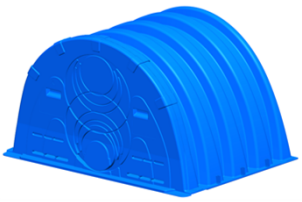
376 and 390 Derry Road West

Mississauga

Calculations Performed By:

SCS Consulting Group Ltd.

RECHARGER 902HD



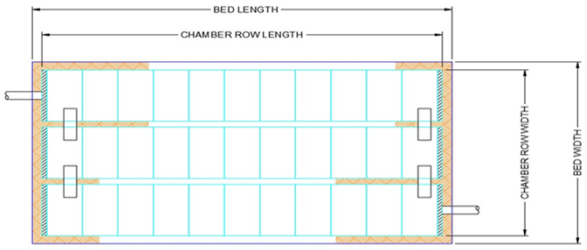
Recharger 902HD Chamber Specifications		
Height	**1219**	mm
Width	**1981**	mm
Length	**1.25**	meters
Installed Length	**1.12**	meters
Bare Chamber Volume	**1.80**	cu. meters
Installed Chamber Volume	**2.81**	cu. meters

Breakdown of Storage Provided by Recharger 902HD Stormwater System		
Within Chambers	**253.18**	cu. meters
Within Feed Connectors	**0.35**	cu. meters
Within Stone	**159.57**	cu. meters
Total Storage Provided	**413.1**	**cu. meters**
Total Storage Required	400.00	cu. meters

Materials List

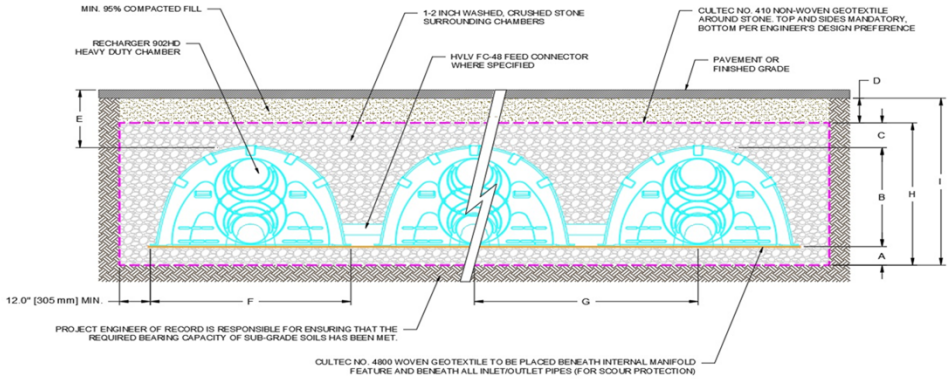
Recharger 902HD			
Total Number of Chambers Required	**140**	**pieces**	
Separator Row Chambers	**14**	pieces	Separator Row Qty Included in Total
Chamber Units	**140**	pieces	
End Caps	**20**	pieces	
HVLV FC-48 Feed Connectors	**18**	pieces	*Based on 2 Internal Manifolds*
CULTEC No. 410 Non-Woven Geotextile	**1102**	sq. meters	
CULTEC No. 4800 Woven Geotextile	**62**	meters	
Stone	**399**	cu. meters	

Bed Detail



Bed Layout Information		
Number of Rows Wide	**10**	pieces
Number of Chambers Long	**14**	pieces
Chamber Row Width	**21.87**	meters
Chamber Row Length	**15.95**	meters
Bed Width	**22.48**	meters
Bed Length	**16.56**	meters
Bed Area Required	**372.28**	sq. meters
Length of Separator Row	**15.95**	meters

Bed detail for reference only. Not project specific. Not to scale.



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**229**	mm
B	Chamber Height	**1219**	mm
C	Depth of Stone Above Units	**305**	mm
D	Depth of 95% Compacted Fill	**305**	mm
E	Max. Depth Allowed Above the Chamber	**2.54**	meters
F	Chamber Width	**1981**	mm
G	Center to Center Spacing	**2.21**	meters
H	Effective Depth	**1.75**	meters
I	Bed Depth	**2.06**	meters

CULTEC Stage-Storage Calculations

Date:	December 4, 2023

Project Information:
376 and 390 Derry Road West Mississauga

Project Number:
0

Chamber Model -	**Recharger 902HD**	
Number of Rows-	10	units
Total Number of Chambers -	140	units
HVLV FC-48 Feed Connectors-	18	units
Stone Void -	40	%
Stone Base -	229	mm
Stone Above Units -	305	mm
Area -	372.28	m2
Base of Stone Elevation -	194.60	

Recharger 902HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Elevation		
in	mm	ft³	m³	ft3	m3	ft³	m³	ft³	m³	ft³	m³	ft	m	
69.0	1753	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	14587.60	413.07	200.35	196.35	Top of Stone Elevation
68.0	1727	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	14454.03	409.29	200.27	196.33	
67.0	1702	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	14320.45	405.51	200.18	196.30	
66.0	1676	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	14186.88	401.73	200.10	196.28	
65.0	1651	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	14053.30	397.94	200.02	196.25	
64.0	1626	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	13919.73	394.16	199.93	196.23	
63.0	1600	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	13786.16	390.38	199.85	196.20	
62.0	1575	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	13652.58	386.60	199.77	196.17	
61.0	1549	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	13519.01	382.81	199.68	196.15	
60.0	1524	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	13385.43	379.03	199.60	196.12	
59.0	1499	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	13251.86	375.25	199.52	196.10	
58.0	1473	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	13118.28	371.47	199.43	196.07	
57.0	1448	10.7	0.3	0.0	0.0	129.3	3.7	139.967	4.0	12984.71	367.69	199.35	196.05	Top of Chamber Elevation
56.0	1422	26.2	0.7	0.0	0.0	123.1	3.5	149.323	4.2	12844.74	363.72	199.27	196.02	
55.0	1397	36.5	1.0	0.0	0.0	119.0	3.4	155.483	4.4	12695.42	359.49	199.18	196.00	
54.0	1372	62.4	1.8	0.0	0.0	108.6	3.1	171.000	4.8	12539.94	355.09	199.10	195.97	
53.0	1346	83.1	2.4	0.0	0.0	100.3	2.8	183.436	5.2	12368.94	350.25	199.02	195.95	
52.0	1321	103.4	2.9	0.0	0.0	92.2	2.6	195.640	5.5	12185.50	345.05	198.93	195.92	
51.0	1295	113.9	3.2	0.0	0.0	88.0	2.5	201.916	5.7	11989.86	339.51	198.85	195.90	
50.0	1270	124.2	3.5	0.0	0.0	83.9	2.4	208.076	5.9	11787.94	333.80	198.77	195.87	
49.0	1245	139.6	4.0	0.0	0.0	77.7	2.2	217.316	6.2	11579.87	327.90	198.68	195.84	
48.0	1219	139.6	4.0	0.0	0.0	77.7	2.2	217.316	6.2	11362.55	321.75	198.60	195.82	
47.0	1194	149.8	4.2	0.0	0.0	73.6	2.1	223.476	6.3	11145.24	315.60	198.52	195.79	
46.0	1168	155.2	4.4	0.0	0.0	71.5	2.0	226.672	6.4	10921.76	309.27	198.43	195.77	
45.0	1143	160.1	4.5	0.0	0.0	69.5	2.0	229.636	6.5	10695.09	302.85	198.35	195.74	
44.0	1118	170.4	4.8	0.0	0.0	65.4	1.9	235.796	6.7	10465.45	296.35	198.27	195.72	
43.0	1092	175.7	5.0	0.0	0.0	63.3	1.8	238.992	6.8	10229.66	289.67	198.18	195.69	
42.0	1067	180.6	5.1	0.0	0.0	61.3	1.7	241.956	6.9	9990.67	282.90	198.10	195.67	
41.0	1041	180.6	5.1	0.0	0.0	61.3	1.7	241.956	6.9	9748.71	276.05	198.02	195.64	
40.0	1016	186.0	5.3	0.0	0.0	59.2	1.7	245.152	6.9	9506.75	269.20	197.93	195.62	
39.0	991	190.9	5.4	0.0	0.0	57.2	1.6	248.116	7.0	9261.60	262.26	197.85	195.59	
38.0	965	196.4	5.6	0.0	0.0	55.0	1.6	251.428	7.1	9013.49	255.23	197.77	195.57	
37.0	940	201.2	5.7	0.0	0.0	53.1	1.5	254.276	7.2	8762.06	248.11	197.68	195.54	
36.0	914	201.4	5.7	0.0	0.0	53.0	1.5	254.392	7.2	8507.78	240.91	197.60	195.51	
35.0	889	206.5	5.8	0.0	0.0	51.0	1.4	257.472	7.3	8253.39	233.71	197.52	195.49	
34.0	864	206.3	5.8	0.0	0.0	51.1	1.4	257.356	7.3	7995.92	226.42	197.43	195.46	
33.0	838	211.6	6.0	0.0	0.0	48.9	1.4	260.552	7.4	7738.56	219.13	197.35	195.44	
32.0	813	211.6	6.0	0.0	0.0	48.9	1.4	260.552	7.4	7478.01	211.75	197.27	195.41	
31.0	787	211.8	6.0	0.0	0.0	48.8	1.4	260.668	7.4	7217.46	204.38	197.18	195.39	
30.0	762	216.8	6.1	0.0	0.0	46.9	1.3	263.632	7.5	6956.79	196.99	197.10	195.36	
29.0	737	216.8	6.1	0.0	0.0	46.9	1.3	263.632	7.5	6693.16	189.53	197.02	195.34	
28.0	711	216.8	6.1	0.0	0.0	46.9	1.3	263.632	7.5	6429.53	182.06	196.93	195.31	
27.0	686	221.9	6.3	0.0	0.0	44.8	1.3	266.712	7.6	6165.89	174.60	196.85	195.29	
26.0	660	221.9	6.3	0.0	0.0	44.8	1.3	266.712	7.6	5899.18	167.05	196.77	195.26	
25.0	635	227.2	6.4	0.0	0.0	42.7	1.2	269.908	7.6	5632.47	159.49	196.68	195.24	
24.0	610	227.0	6.4	0.0	0.0	42.8	1.2	269.792	7.6	5362.56	151.85	196.60	195.21	
23.0	584	232.2	6.6	0.0	0.0	40.7	1.2	272.872	7.7	5092.77	144.21	196.52	195.18	
22.0	559	232.2	6.6	0.0	0.0	40.7	1.2	272.872	7.7	4819.90	136.48	196.43	195.16	
21.0	533	232.4	6.6	0.1	0.0	40.6	1.1	273.021	7.7	4547.02	128.76	196.35	195.13	
20.0	508	232.2	6.6	0.4	0.0	40.5	1.1	273.123	7.7	4274.00	121.03	196.27	195.11	
19.0	483	237.5	6.7	0.8	0.0	38.3	1.1	276.554	7.8	4000.88	113.29	196.18	195.08	
18.0	457	237.5	6.7	1.0	0.0	38.2	1.1	276.660	7.8	3724.33	105.46	196.10	195.06	
17.0	432	237.5	6.7	1.1	0.0	38.1	1.1	276.724	7.8	3447.67	97.63	196.02	195.03	
16.0	406	237.5	6.7	1.1	0.0	38.1	1.1	276.757	7.8	3170.94	89.79	195.93	195.01	
15.0	381	242.4	6.9	1.2	0.0	36.1	1.0	279.753	7.9	2894.19	81.95	195.85	194.98	
14.0	356	242.6	6.9	1.3	0.0	36.0	1.0	279.902	7.9	2614.43	74.03	195.77	194.96	
13.0	330	247.8	7.0	1.3	0.0	34.0	1.0	282.998	8.0	2334.53	66.11	195.68	194.93	
12.0	305	248.0	7.0	1.3	0.0	33.9	1.0	283.130	8.0	2051.53	58.09	195.60	194.90	
11.0	279	247.8	7.0	1.3	0.0	33.9	1.0	283.030	8.0	1768.40	50.08	195.52	194.88	
10.0	254	248.0	7.0	1.4	0.0	33.8	1.0	283.203	8.0	1485.37	42.06	195.43	194.85	
9.0	229	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	1202.17	34.04	195.35	194.83	Bottom of Chamber Elevation
8.0	203	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	1068.59	30.26	195.27	194.80	
7.0	178	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	935.02	26.48	195.18	194.78	
6.0	152	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	801.45	22.69	195.10	194.75	
5.0	127	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	667.87	18.91	195.02	194.73	
4.0	102	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	534.30	15.13	194.93	194.70	
3.0	76	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	400.72	11.35	194.85	194.68	
2.0	51	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	267.15	7.56	194.77	194.65	
1.0	25	0.0	0.0	0.0	0.0	133.6	3.8	133.574	3.8	133.57	3.78	194.68	194.63	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	194.60	194.60	Bottom of Stone Elevation
-1.0														
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Recharger 902HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Elevation	
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft	m
-12.0													
-13.0													
-14.0													
-15.0													
-16.0													
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-18.0													
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CULTEC Stormwater Design Calculator

Date:	December 04, 2023

Cultec 2

Project Information:

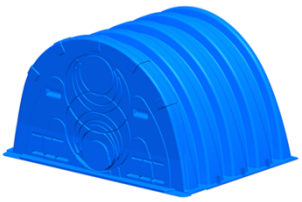
376 and 390 Derry Road West

Mississauga

Calculations Performed By:

SCS Consulting Group Ltd.

RECHARGER 902HD



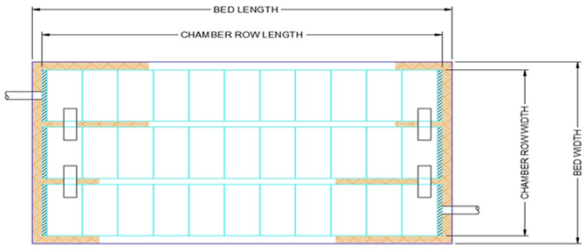
Recharger 902HD Chamber Specifications		
Height	**1219**	mm
Width	**1981**	mm
Length	**1.25**	meters
Installed Length	**1.12**	meters
Bare Chamber Volume	**1.80**	cu. meters
Installed Chamber Volume	**2.81**	cu. meters

Breakdown of Storage Provided by Recharger 902HD Stormwater System		
Within Chambers	**89.16**	cu. meters
Within Feed Connectors	**0.23**	cu. meters
Within Stone	**61.33**	cu. meters
Total Storage Provided	**150.7**	**cu. meters**
Total Storage Required	150.00	cu. meters

Materials List

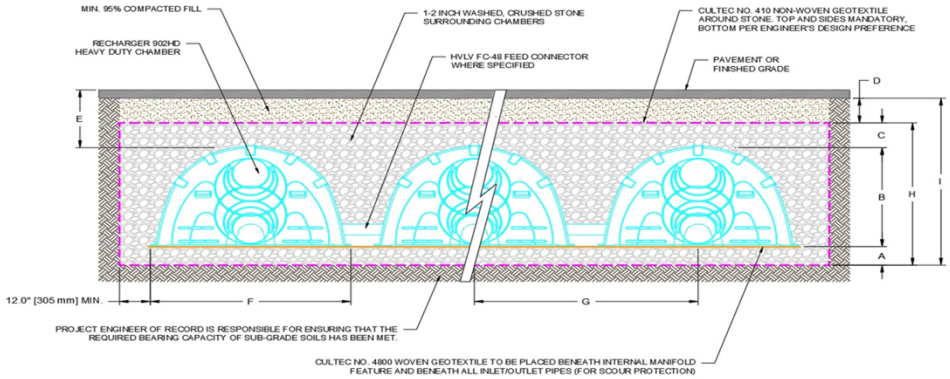
Recharger 902HD			
Total Number of Chambers Required	**49**	**pieces**	
Separator Row Chambers	**7**	pieces	Separator Row Qty Included in Total
Chamber Units	**49**	pieces	
End Caps	**14**	pieces	
HVLV FC-48 Feed Connectors	**12**	pieces	*Based on 2 Internal Manifolds*
CULTEC No. 410 Non-Woven Geotextile	**454**	sq. meters	
CULTEC No. 4800 Woven Geotextile	**41**	meters	
Stone	**153**	cu. meters	

Bed Detail



Bed Layout Information		
Number of Rows Wide	**7**	pieces
Number of Chambers Long	**7**	pieces
Chamber Row Width	**15.24**	meters
Chamber Row Length	**8.13**	meters
Bed Width	**15.85**	meters
Bed Length	**8.74**	meters
Bed Area Required	**138.50**	sq. meters
Length of Separator Row	**8.13**	meters

Bed detail for reference only. Not project specific. Not to scale.



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**229**	mm
B	Chamber Height	**1219**	mm
C	Depth of Stone Above Units	**305**	mm
D	Depth of 95% Compacted Fill	**305**	mm
E	Max. Depth Allowed Above the Chamber	**2.54**	meters
F	Chamber Width	**1981**	mm
G	Center to Center Spacing	**2.21**	meters
H	Effective Depth	**1.75**	meters
I	Bed Depth	**2.06**	meters

CULTEC Stage-Storage Calculations

Date:	December 4, 2023

Project Information:
376 and 390 Derry Road West Mississauga

Project Number:
0

Chamber Model -	**Recharger 902HD**	
Number of Rows-	7	units
Total Number of Chambers -	49	units
HVLV FC-48 Feed Connectors-	12	units
Stone Void -	40	%
Stone Base -	229	mm
Stone Above Units -	305	mm
Area -	138.50	m2
Base of Stone Elevation -	193.11	

Recharger 902HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Elevation		
in	mm	ft³	m³	ft3	m3	ft³	m³	ft³	m³	ft³	m³	ft	m	
69.0	1753	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	5322.19	150.71	198.86	194.86	Top of Stone Elevation
68.0	1727	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	5272.49	149.30	198.78	194.84	
67.0	1702	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	5222.80	147.89	198.69	194.81	
66.0	1676	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	5173.11	146.49	198.61	194.79	
65.0	1651	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	5123.42	145.08	198.53	194.76	
64.0	1626	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	5073.73	143.67	198.44	194.74	
63.0	1600	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	5024.03	142.26	198.36	194.71	
62.0	1575	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	4974.34	140.86	198.28	194.68	
61.0	1549	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	4924.65	139.45	198.19	194.66	
60.0	1524	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	4874.96	138.04	198.11	194.63	
59.0	1499	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	4825.26	136.64	198.03	194.61	
58.0	1473	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	4775.57	135.23	197.94	194.58	
57.0	1448	3.9	0.1	0.0	0.0	48.1	1.4	52.011	1.5	4725.88	133.82	197.86	194.56	Top of Chamber Elevation
56.0	1422	9.4	0.3	0.0	0.0	45.9	1.3	55.327	1.6	4673.87	132.35	197.78	194.53	
55.0	1397	13.0	0.4	0.0	0.0	44.5	1.3	57.483	1.6	4618.54	130.78	197.69	194.51	
54.0	1372	22.1	0.6	0.0	0.0	40.9	1.2	62.954	1.8	4561.06	129.15	197.61	194.48	
53.0	1346	29.4	0.8	0.0	0.0	37.9	1.1	67.347	1.9	4498.10	127.37	197.53	194.46	
52.0	1321	36.5	1.0	0.0	0.0	35.1	1.0	71.578	2.0	4430.76	125.46	197.44	194.43	
51.0	1295	40.2	1.1	0.0	0.0	33.6	1.0	73.815	2.1	4359.18	123.44	197.36	194.41	
50.0	1270	43.8	1.2	0.0	0.0	32.2	0.9	75.971	2.2	4285.36	121.35	197.28	194.38	
49.0	1245	49.2	1.4	0.0	0.0	30.0	0.8	79.205	2.2	4209.39	119.20	197.19	194.35	
48.0	1219	49.2	1.4	0.0	0.0	30.0	0.8	79.205	2.2	4130.19	116.95	197.11	194.33	
47.0	1194	52.8	1.5	0.0	0.0	28.6	0.8	81.361	2.3	4050.98	114.71	197.03	194.30	
46.0	1168	54.7	1.5	0.0	0.0	27.8	0.8	82.521	2.3	3969.62	112.41	196.94	194.28	
45.0	1143	56.4	1.6	0.0	0.0	27.1	0.8	83.517	2.4	3887.10	110.07	196.86	194.25	
44.0	1118	60.0	1.7	0.0	0.0	25.7	0.7	85.673	2.4	3803.58	107.71	196.78	194.23	
43.0	1092	61.9	1.8	0.0	0.0	24.9	0.7	86.833	2.5	3717.91	105.28	196.69	194.20	
42.0	1067	63.6	1.8	0.0	0.0	24.3	0.7	87.829	2.5	3631.08	102.82	196.61	194.18	
41.0	1041	63.6	1.8	0.0	0.0	24.3	0.7	87.829	2.5	3543.25	100.33	196.53	194.15	
40.0	1016	65.5	1.9	0.0	0.0	23.5	0.7	88.989	2.5	3455.42	97.85	196.44	194.13	
39.0	991	67.2	1.9	0.0	0.0	22.8	0.6	89.985	2.5	3366.43	95.33	196.36	194.10	
38.0	965	69.2	2.0	0.0	0.0	22.0	0.6	91.226	2.6	3276.44	92.78	196.28	194.08	
37.0	940	70.7	2.0	0.0	0.0	21.4	0.6	92.141	2.6	3185.22	90.20	196.19	194.05	
36.0	914	70.9	2.0	0.0	0.0	21.3	0.6	92.223	2.6	3093.08	87.59	196.11	194.02	
35.0	889	72.7	2.1	0.0	0.0	20.6	0.6	93.301	2.6	3000.85	84.97	196.03	194.00	
34.0	864	72.5	2.1	0.0	0.0	20.7	0.6	93.219	2.6	2907.55	82.33	195.94	193.97	
33.0	838	74.5	2.1	0.0	0.0	19.9	0.6	94.379	2.7	2814.33	79.69	195.86	193.95	
32.0	813	74.5	2.1	0.0	0.0	19.9	0.6	94.379	2.7	2719.95	77.02	195.78	193.92	
31.0	787	74.6	2.1	0.0	0.0	19.8	0.6	94.460	2.7	2625.58	74.35	195.69	193.90	
30.0	762	76.3	2.2	0.0	0.0	19.2	0.5	95.457	2.7	2531.12	71.67	195.61	193.87	
29.0	737	76.3	2.2	0.0	0.0	19.2	0.5	95.457	2.7	2435.66	68.97	195.53	193.85	
28.0	711	76.3	2.2	0.0	0.0	19.2	0.5	95.457	2.7	2340.20	66.27	195.44	193.82	
27.0	686	78.1	2.2	0.0	0.0	18.5	0.5	96.535	2.7	2244.75	63.56	195.36	193.80	
26.0	660	78.1	2.2	0.0	0.0	18.5	0.5	96.535	2.7	2148.21	60.83	195.28	193.77	
25.0	635	80.0	2.3	0.0	0.0	17.7	0.5	97.694	2.8	2051.68	58.10	195.19	193.75	
24.0	610	79.9	2.3	0.0	0.0	17.7	0.5	97.613	2.8	1953.98	55.33	195.11	193.72	
23.0	584	81.7	2.3	0.0	0.0	17.0	0.5	98.691	2.8	1856.37	52.57	195.03	193.69	
22.0	559	81.7	2.3	0.0	0.0	17.0	0.5	98.691	2.8	1757.68	49.77	194.94	193.67	
21.0	533	81.8	2.3	0.0	0.0	17.0	0.5	98.794	2.8	1658.99	46.98	194.86	193.64	
20.0	508	81.7	2.3	0.3	0.0	16.9	0.5	98.858	2.8	1560.19	44.18	194.78	193.62	
19.0	483	83.6	2.4	0.5	0.0	16.0	0.5	100.174	2.8	1461.34	41.38	194.69	193.59	
18.0	457	83.6	2.4	0.7	0.0	16.0	0.5	100.244	2.8	1361.16	38.54	194.61	193.57	
17.0	432	83.6	2.4	0.7	0.0	16.0	0.5	100.288	2.8	1260.92	35.71	194.53	193.54	
16.0	406	83.6	2.4	0.8	0.0	15.9	0.5	100.309	2.8	1160.63	32.87	194.44	193.52	
15.0	381	85.3	2.4	0.8	0.0	15.3	0.4	101.327	2.9	1060.32	30.02	194.36	193.49	
14.0	356	85.4	2.4	0.8	0.0	15.2	0.4	101.430	2.9	958.99	27.16	194.28	193.47	
13.0	330	87.2	2.5	0.9	0.0	14.5	0.4	102.519	2.9	857.56	24.28	194.19	193.44	
12.0	305	87.3	2.5	0.9	0.0	14.4	0.4	102.611	2.9	755.04	21.38	194.11	193.41	
11.0	279	87.2	2.5	0.9	0.0	14.5	0.4	102.541	2.9	652.43	18.47	194.03	193.39	
10.0	254	87.3	2.5	1.0	0.0	14.4	0.4	102.660	2.9	549.89	15.57	193.94	193.36	
9.0	229	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	447.23	12.66	193.86	193.34	Bottom of Chamber Elevation
8.0	203	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	397.54	11.26	193.78	193.31	
7.0	178	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	347.85	9.85	193.69	193.29	
6.0	152	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	298.15	8.44	193.61	193.26	
5.0	127	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	248.46	7.04	193.53	193.24	
4.0	102	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	198.77	5.63	193.44	193.21	
3.0	76	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	149.08	4.22	193.36	193.19	
2.0	51	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	99.38	2.81	193.28	193.16	
1.0	25	0.0	0.0	0.0	0.0	49.7	1.4	49.692	1.4	49.69	1.41	193.19	193.14	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	193.11	193.11	Bottom of Stone Elevation
-1.0														
-2.0														
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Recharger 902HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Elevation	
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft	m
-12.0													
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Appendix D Hydrodynamic Separator Sizing

SCS consulting group ltd

Hydroworks Sizing Summary

376 Derry Road
Mississauga, Ontario

12-01-2023

Recommended Size: HydroDome HD 12

A HydroDome HD 12 is recommended to provide 80 % annual TSS removal based on a drainage area of 2.37 (ha) with an imperviousness of 78 % and Toronto Central, Ontario rainfall for the ETV/NJDEP particle size distribution.

The recommended HydroDome HD 12 treats 100 % of the annual runoff and provides 84 % annual TSS removal for the Toronto Central rainfall records and ETV/NJDEP particle size distribution.

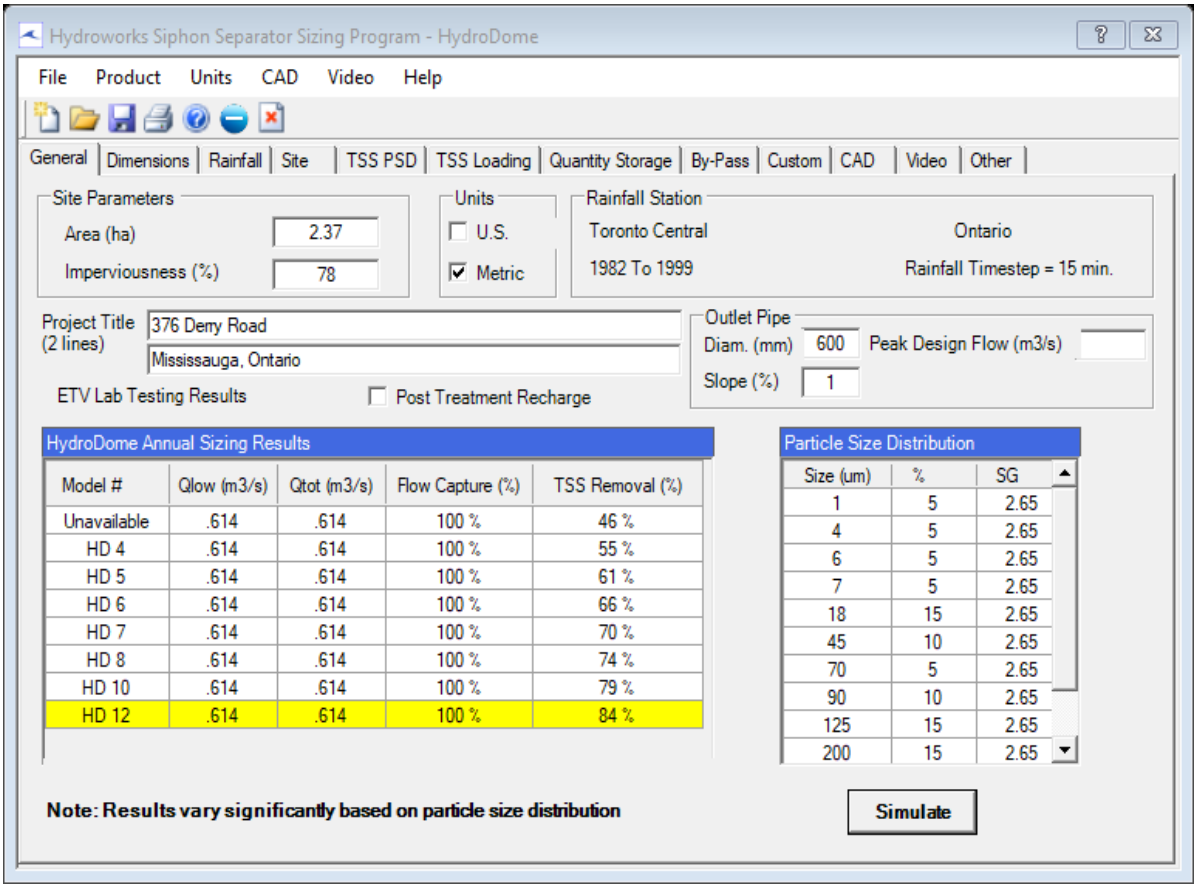
The HydroDome has a siphon which creates a discontinuity in headloss. Since a peak flow was not specified, headloss was calculated using the full pipe flow of .61 (m3/s) for the given 600 (mm) pipe diameter at 1% slope. The headloss was calculated to be 415 (mm) above the crown of the 600 (mm) outlet pipe.

This summary report provides the main parameters that were used for sizing. These parameters are shown on the summary tables and graphs provided in this report.

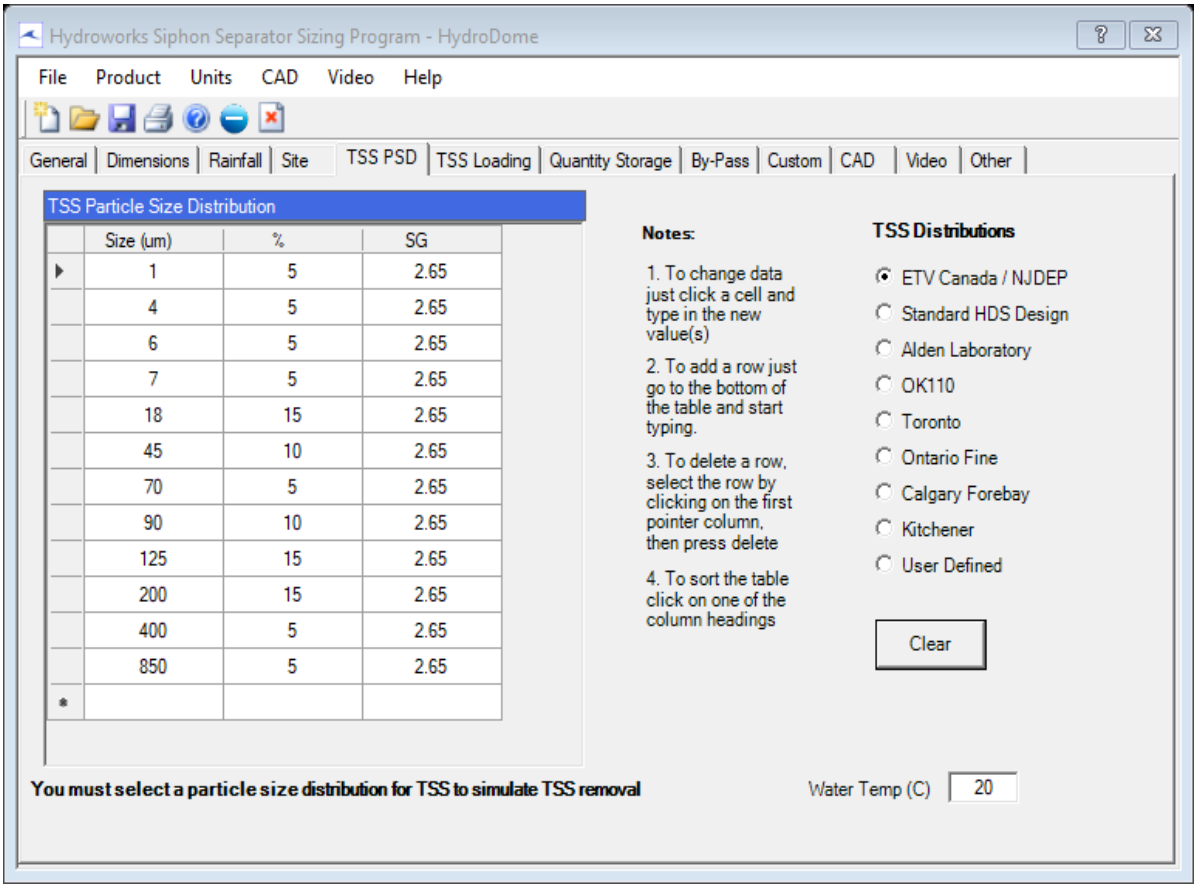
If you have any questions regarding this sizing summary please do not hesitate to contact Hydroworks at 888-290-7900 or email us at support@hydroworks.com.

The sizing program is for sizing purposes only and does not address any site specific parameters such as hydraulic gradeline, tailwater submergence, groundwater, soils bearing capacity, etc. Headloss calculations are not a hydraulic gradeline calculation since this requires a starting water level and an analysis of the entire system downstream of the HydroDome .

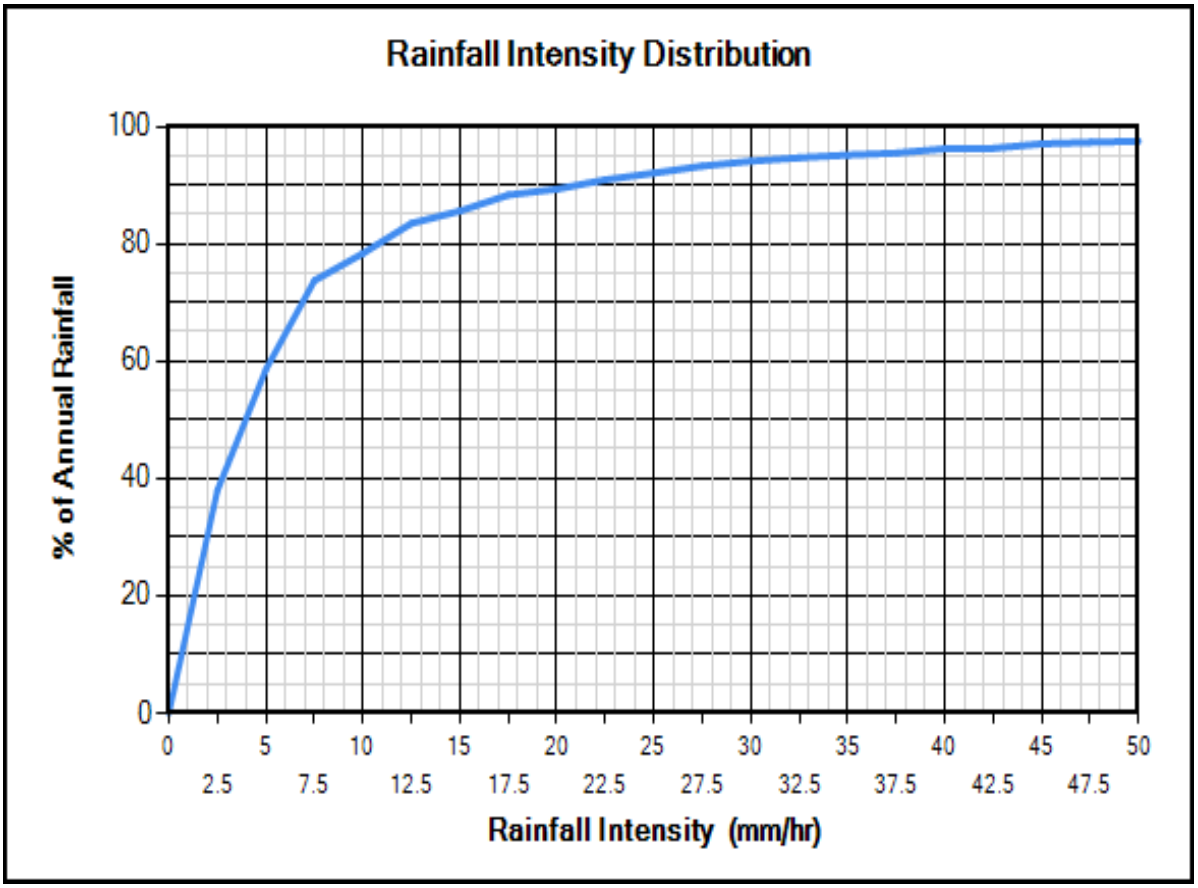
TSS Removal Sizing Summary



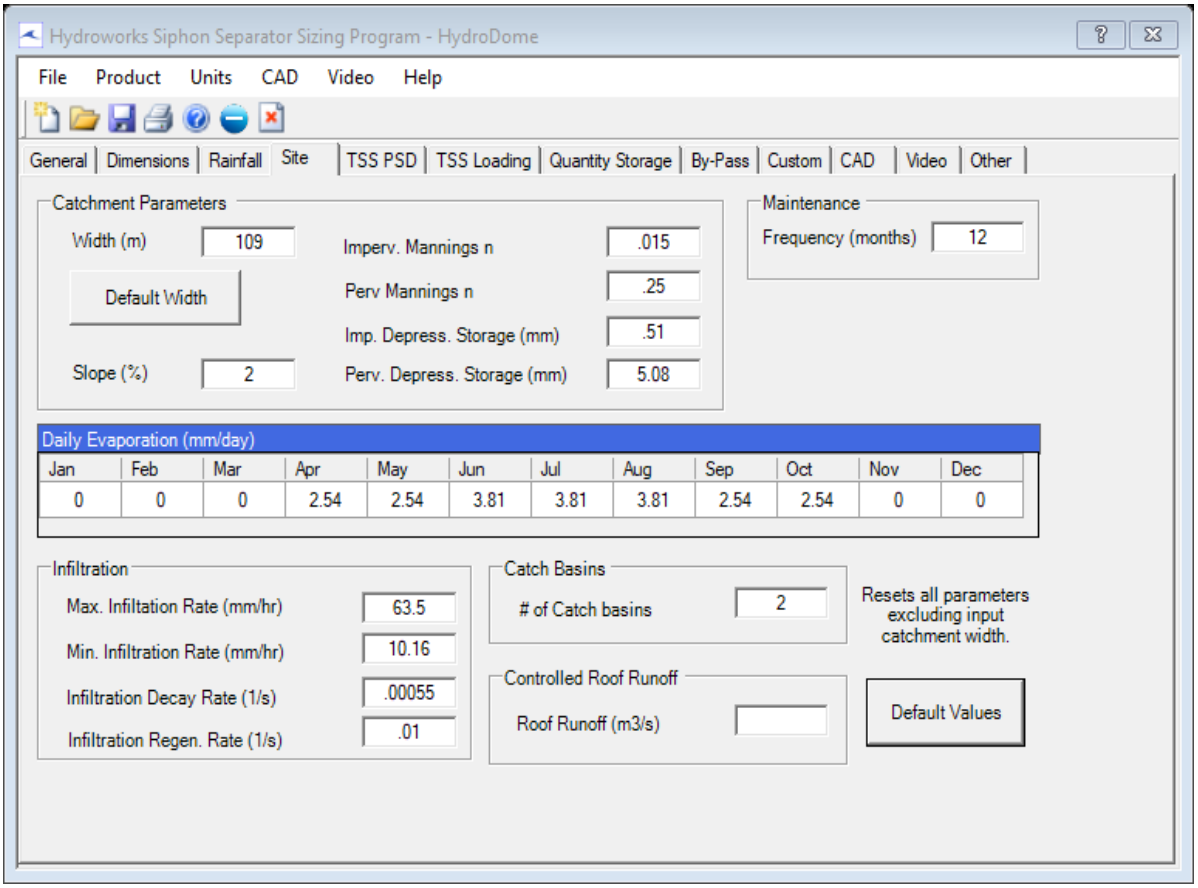
TSS Particle Size Distribution



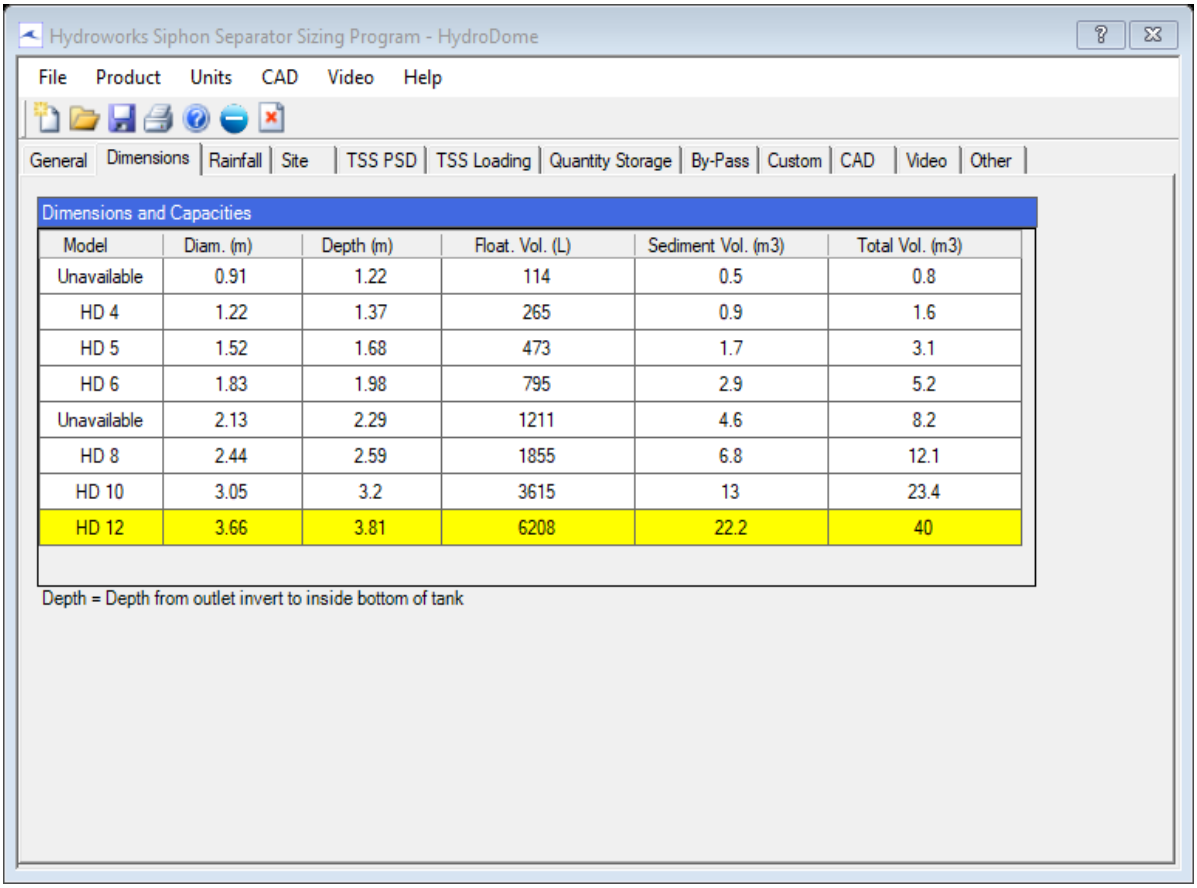
Rainfall Station - Toronto Central, Ontario(1982 To 1999)



Site Physical Characteristics



Dimensions And Capacities

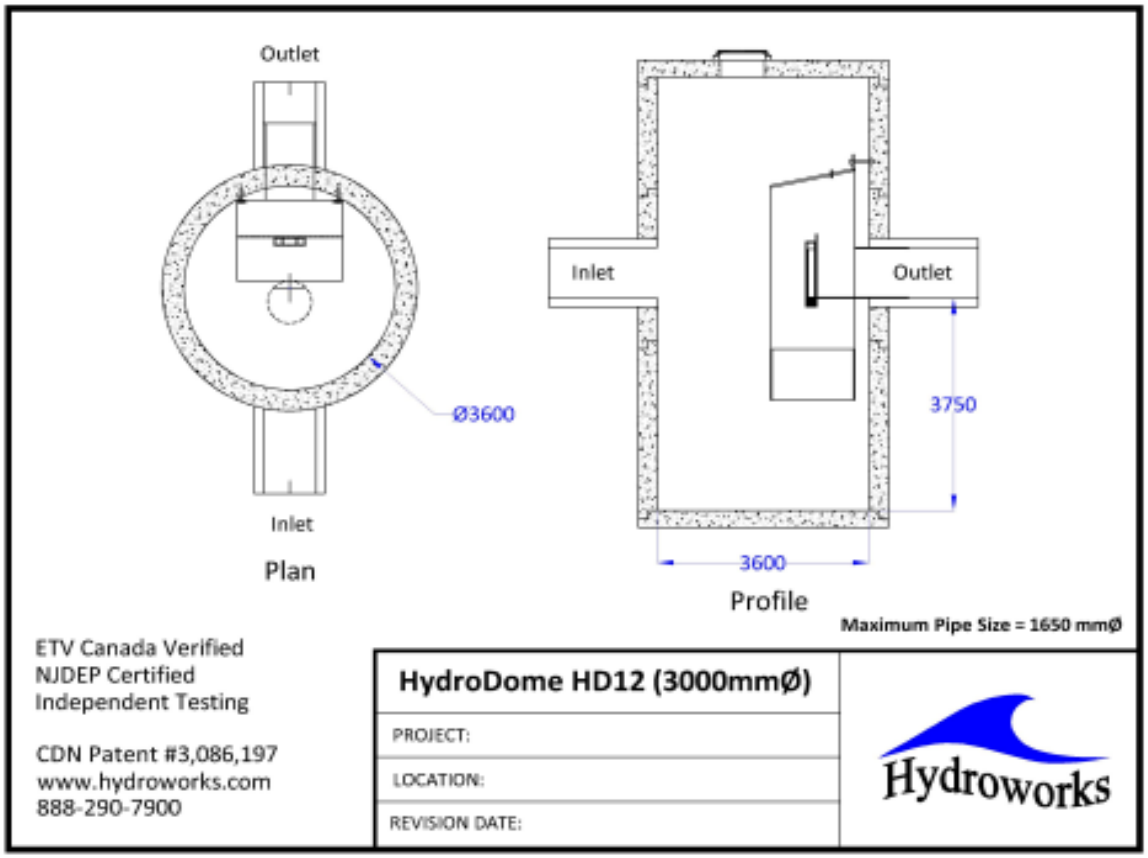


Dimensions and Capacities

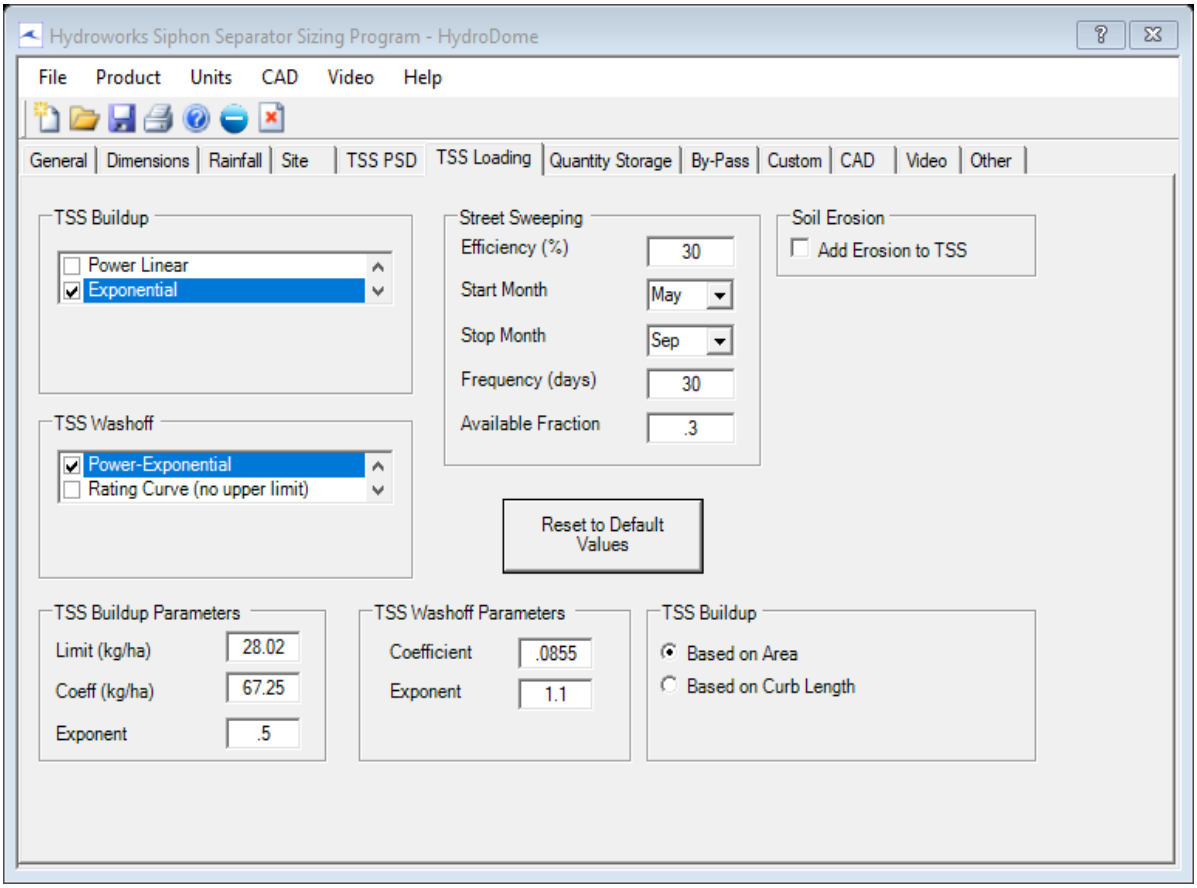
Model	Diam. (m)	Depth (m)	Float. Vol. (L)	Sediment Vol. (m3)	Total Vol. (m3)
Unavailable	0.91	1.22	114	0.5	0.8
HD 4	1.22	1.37	265	0.9	1.6
HD 5	1.52	1.68	473	1.7	3.1
HD 6	1.83	1.98	795	2.9	5.2
Unavailable	2.13	2.29	1211	4.6	8.2
HD 8	2.44	2.59	1855	6.8	12.1
HD 10	3.05	3.2	3615	13	23.4
HD 12	3.66	3.81	6208	22.2	40

Depth = Depth from outlet invert to inside bottom of tank

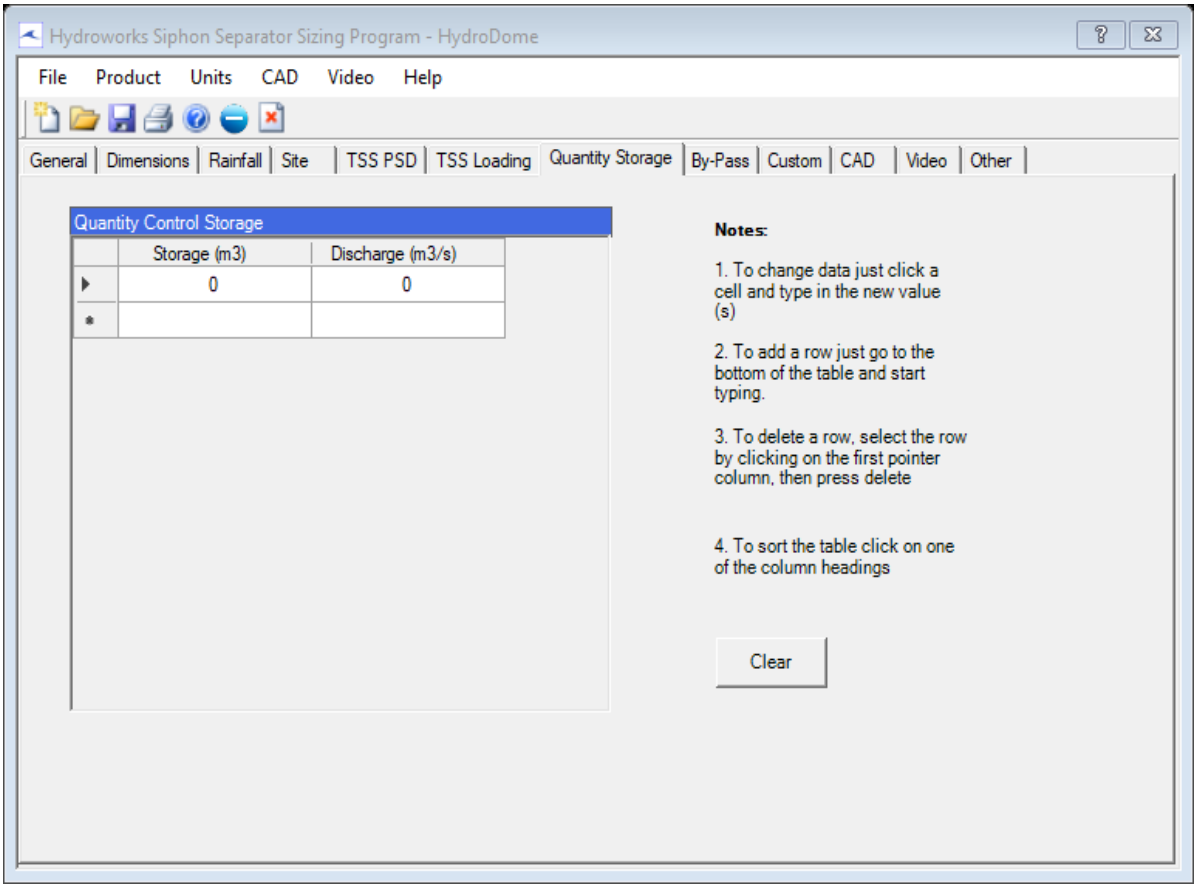
Generic HD 12 CAD Drawing



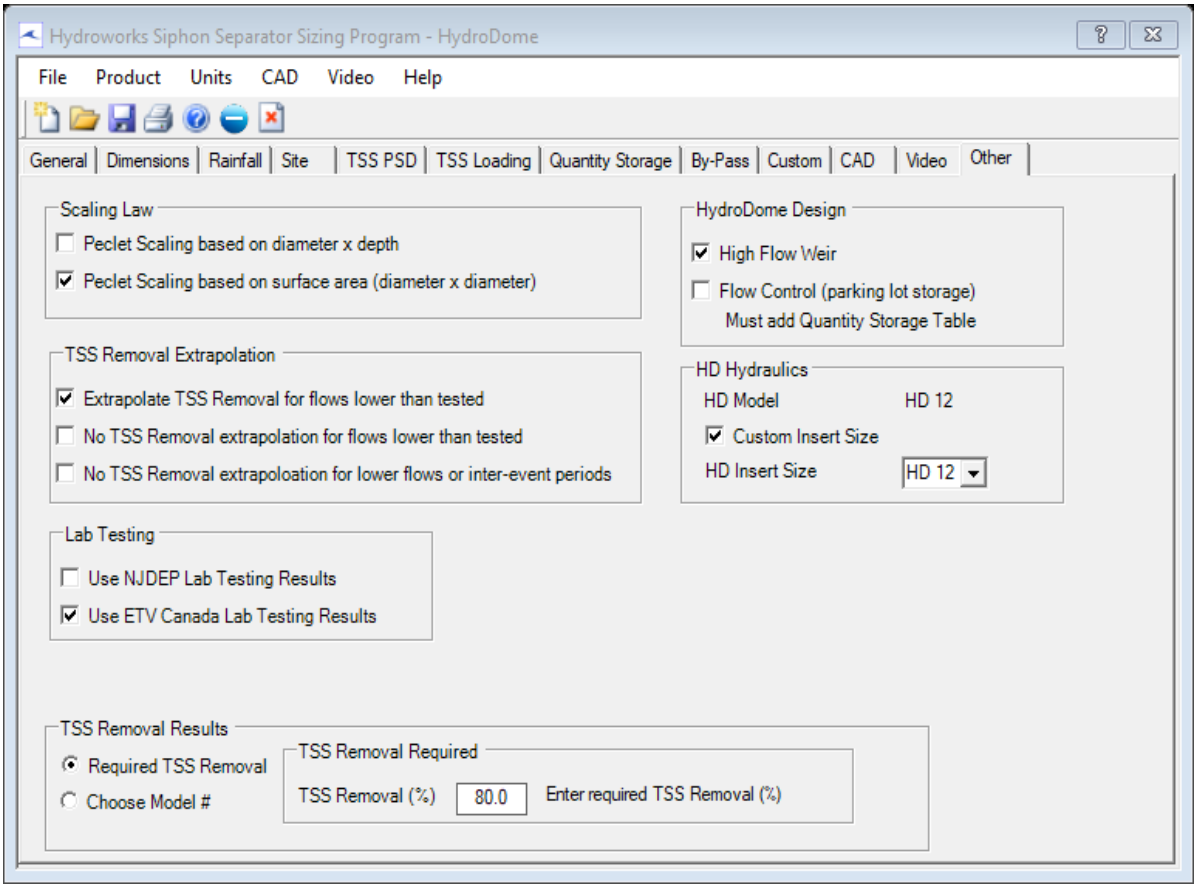
TSS Buildup And Washoff



Upstream Quantity Storage



Other Parameters



Flagged Issues

If there is underground detention storage upstream of the HydroDome please contact Hydroworks to ensure it has been modeled correctly.

Hydroworks Sizing Program - Version 5.8

1-800-290-7900
www.hydroworks.com

Appendix E Sanitary Flow Calculations

SCS consulting group ltd

Sanitary Design Sheet
376 and 390 Derry Road West
Existing Conditions
Mississauga, Peel Region

Minimum Sewer Diameter (mm) =	**250**	**Avg. Domestic Flow (l/cap/day) =**	**302.8**
Mannings n =	**0.013**	**Infiltration Rate (l/s/ha) =**	**0.2**
Minimum Velocity (m/s) =	**0.75**	**Max. Harmon Peaking Factor =**	**4.0**
Maximum Velocity (m/s) =	**3.5**	**Min. Harmon Peaking Factor =**	**2.0**
Minimum Pipe Slope (%) =	**0.50**	**NOMINAL PIPE SIZE USED**	

Project: 376 and 390 Derry Road West
Project No. 2509
Date: 16-May-23
Designed By: S.G.
Reviewed By: E.S.

P:\2509 Ballymore - 376 Derry Rd\Design\Pipe Design\Sanitary\[Sanitary Sheet Design - External - 2023 07(Sep) 08.xlsm]Design

LOCATION			RESIDENTIAL							INDUSTRIAL/COMMERCIAL/INSTITUTIONAL					FLOW CALCULATIONS								PIPE DATA					
STREET	MANHOLE		AREA	ACCUM. AREA	UNITS	DENSITY		RESIDENTIAL POPULATION	ACCUM. RESIDENTIAL POPULATION	AREA	ACCUM. AREA	POPULATION DENSITY	FLOW RATE	ACCUM. EQUIV. POPULATION	INFILTRATION	TOTAL ACCUM. POPULATION	AVG. DOMESTIC FLOW	ACCUM. AVG. DOMESTIC FLOW	PEAKING FACTOR	PEAKED RESIDENTIAL FLOW	ICI FLOW	TOTAL FLOW	LENGTH	PIPE DIAMETER	SLOPE	FULL FLOW CAPACITY	FULL FLOW VELOCITY	
	FROM	TO				PER UNIT	PER HA																					
			(ha)	(ha)	(#)	(p/unit)	(p/ha)			(ha)	(ha)	(p/ha)	(l/s/ha)		(L/s)		(L/s)	(L/s)		(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(L/s)	(m/s)	Qdes/Qcap
OAKTREE CIRCLE	27A	26A	0.63	0.63	15		70.0	44.1	44.1	0	0	0	0	0	0.1	44.1	0.2	0.2	4.00	0.6	0.0	0.7	70.0	250	0.90	56.4	1.15	1%
OAKTREE CIRCLE	26A	24A	0.46	1.09	13		70.0	32.2	76.3	0	0	0	0	0	0.2	76.3	0.1	0.3	4.00	1.1	0.0	1.3	42.9	250	1.00	59.4	1.21	2%
OAKTREE CIRCLE	24A	23A	0.76	1.85	24		70.0	53.2	129.5	0	0	0	0	0	0.4	129.5	0.2	0.5	4.00	1.8	0.0	2.2	94.0	250	0.50	42.0	0.86	5%
OAKTREE CIRCLE	26AA	23A	1.01	1.01	28		70.0	70.7	70.7	0	0	0	0	0	0.2	70.7	0.2	0.2	4.00	1.0	0.0	1.2	120.0	250	1.00	59.4	1.21	2%
OAKTREE CIRCLE	23A	22A	0.27	3.13	8		70.0	18.9	219.1	0	0	0	0	0	0.6	219.1	0.1	0.8	4.00	3.1	0.0	3.7	47.0	250	0.75	51.5	1.05	7%
OAKTREE CIRCLE	22A	14A	0.5	3.63	8		70.0	35	254.1	0	0	0	0	0	0.7	254.1	0.1	0.9	4.00	3.6	0.0	4.3	42.5	250	0.60	46.0	0.94	9%
ARROWSMITH DRIVE	16A	15A	0.43	0.43	6		50.0	21.5	21.5	0	0	0	0	0	0.1	21.5	0.1	0.1	4.00	0.3	0.0	0.4	55.0	250	1.00	59.4	1.21	1%
ARROWSMITH DRIVE	15A	14A	0.73	1.16	12		50.0	36.5	58	0	0	0	0	0	0.2	58	0.1	0.2	4.00	0.8	0.0	1.0	114.5	250	1.00	59.4	1.21	2%
ARROWSMITH DRIVE	21A	20A	0.55	0.55	9		50.0	27.5	27.5	0	0	0	0	0	0.1	27.5	0.1	0.1	4.00	0.4	0.0	0.5	42.5	250	1.00	59.4	1.21	1%
ARROWSMITH DRIVE	20A	14A	0.5	1.05	8		50.0	25	52.5	0	0	0	0	0	0.2	52.5	0.1	0.2	4.00	0.7	0.0	0.9	79.5	250	0.50	42.0	0.86	2%
GOLDEN HILLS WAY	14A	11A	0.43	6.27	6		50.0	21.5	386.1	0	0	0	0	0	1.3	386.1	0.1	1.4	4.00	5.4	0.0	6.7	85.0	250	0.50	42.0	0.86	16%

scs consulting group ltd

Sanitary Design Sheet
376 and 390 Derry Road West
Mixed-Use Development
Mississauga, Peel Region

Minimum Sewer Diameter (mm) =	250	Avg. Domestic Flow (l/cap/day) =	302.8
Mannings n =	0.013	Infiltration Rate (l/s/ha) =	0.2
Minimum Velocity (m/s) =	0.75	Max. Harmon Peaking Factor =	4.0
Maximum Velocity (m/s) =	3.5	Min. Harmon Peaking Factor =	2.0
Minimum Pipe Slope (%) =	0.50	NOMINAL PIPE SIZE USED	

Project: 376 and 390 Derry Road West
Project No. 2509
Date: 16-May-23
Designed By: S.G.
Reviewed By: E.S.
P:\2509 Ballymore - 376 Derry Rd\Design\Pipe Design\Sanitary\[Sanitary Sheet Design - Internal and External - 2023 07(Sep) 08.xlsm]Design

CONFIRM IF MUNICIPALITY REQUIRES ACTUAL VELOCITY TO BE SHOWN. HIDE COLUMN IF NOT REQUIRED

LOCATION			RESIDENTIAL							INDUSTRIAL/COMMERCIAL/INSTITUTIONAL					FLOW CALCULATIONS								PIPE DATA						
STREET	MANHOLE		AREA	ACCUM. AREA	UNITS	DENSITY		RESIDENTIAL POPULATION	ACCUM. RESIDENTIAL POPULATION	AREA	ACCUM. AREA	POPULATION DENSITY	FLOW RATE	ACCUM. EQUIV. POPULATION	INFILTRATION	TOTAL ACCUM. POPULATION	AVG. DOMESTIC FLOW	ACCUM. AVG. DOMESTIC FLOW	PEAKING FACTOR	PEAKED RESIDENTIAL FLOW	ICI FLOW	TOTAL FLOW	LENGTH	PIPE DIAMETER	SLOPE	FULL FLOW CAPACITY	FULL FLOW VELOCITY	ACTUAL VELOCITY	
	FROM	TO				PER UNIT	PER HA																						
			(ha)	(ha)	(#)	(p/unit)	(p/ha)			(ha)	(ha)	(p/ha)	(l/s/ha)		(L/s)		(L/s)	(L/s)		(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(L/s)	(m/s)	(m/s)	Qdes/Qcap
CONDO	37A	38A	0.22	0.22	12	2.7		32.4	32.4	0	0	0	0	0	0.0	32.4	0.1	0.1	4.00	0.5	0.0	0.5	81.4	250	1.00	59.4	1.21	0.35	1%
CONDO	38A	40A	0.18	0.4	7	2.7		18.9	51.3	0	0	0	0	0	0.1	51.3	0.1	0.2	4.00	0.7	0.0	0.8	41.8	250	0.60	46.0	0.94	0.35	2%
CONDO	41A	40A	0.14	0.14	5	2.7		13.5	13.5	0	0	0	0	0	0.0	13.5	0.0	0.0	4.00	0.2	0.0	0.2	26.4	250	0.60	46.0	0.94	0.21	0%
CONDO	40A	39A	0.33	0.87	22	2.7		59.4	124.2	0	0	0	0	0	0.2	124.2	0.2	0.4	4.00	1.7	0.0	1.9	70.2	250	0.60	46.0	0.94	0.44	4%
CONDO	39A	32A	0.32	1.19	22	2.7		59.4	183.6	0	0	0	0	0	0.2	183.6	0.2	0.6	4.00	2.6	0.0	2.8	72.9	250	0.60	46.0	0.94	0.50	6%
CONDO	37A	36A	0.27	0.27	9	2.7		24.3	24.3	0	0	0	0	0	0.1	24.3	0.1	0.1	4.00	0.3	0.0	0.4	103.5	250	1.00	59.4	1.21	0.31	1%
	36A	32A	0.14	0.41	2			5.4	0																				
CONDO	35A	34A	0.49	0.49	28	2.7		75.6	75.6	0.15	0.15	50	0	7.5	0.1	83.1	0.3	0.3	4.00	1.2	0.0	1.3	101.5	250	0.60	46.0	0.94	0.40	3%
CONDO	34A	31A	0.05	0.54	0	2.7		0	75.6	0	0.15	0	0	7.5	0.1	83.1	0.0	0.3	4.00	1.2	0.0	1.3	41.6	250	0.60	46.0	0.94	0.40	3%
CONDO	32A	31A	0.27	1.87	13	2.7		35.1	218.7	0	0	0	0	0	0.4	218.7	0.1	0.8	4.00	3.1	0.0	3.4	84.6	250	0.60	46.0	0.94	0.54	7%
CONDO	31A	30A	0.02	2.43	0	2.7		0	294.3	0	0.15	0	0	7.5	0.5	301.8	0.0	1.1	4.00	4.2	0.0	4.7	42.5	250	0.60	46.0	0.94	0.59	10%
OAKTREE CIRCLE	27A	26A	0.63	0.63	15		70.0	44.1	44.1	0	0	0	0	0	0.1	44.1	0.2	0.2	4.00	0.6	0.0	0.7	70.0	250	0.90	56.4	1.15	0.40	1%
OAKTREE CIRCLE	26A	30A	0.31	0.94	9		70.0	21.7	65.8	0	0	0	0	0	0.2	65.8	0.1	0.2	4.00	0.9	0.0	1.1	42.9	250	1.00	59.4	1.21	0.45	2%
OAKTREE CIRCLE	30A	24A	0.15	3.52	4		70.0	10.5	370.6	0	0.15	0	0	7.5	0.7	378.1	0.0	1.3	4.00	5.3	0.0	6.0	15.8	250	1.00	59.4	1.21	0.77	10%
OAKTREE CIRCLE	24A	23A	0.76	4.28	24		70.0	53.2	423.8	0	0.15	0	0	7.5	0.9	431.3	0.2	1.5	4.00	6.0	0.0	6.9	94.0	250	0.50	42.0	0.86	0.63	16%
OAKTREE CIRCLE	26AA	23A	1.01	1.01	28		70.0	70.7	70.7	0	0	0	0	0	0.2	70.7	0.2	0.2	4.00	1.0	0.0	1.2	120.0	250	1.00	59.4	1.21	0.45	2%
OAKTREE CIRCLE	23A	22A	0.27	5.56	8		70.0	18.9	513.4	0	0.15	0	0	7.5	1.1	520.9	0.1	1.8	3.97	7.2	0.0	8.4	47.0	250	0.75	51.5	1.05	0.77	16%
OAKTREE CIRCLE	22A	14A	0.5	6.06	8		70.0	35	548.4	0	0.15	0	0	7.5	1.2	555.9	0.1	1.9	3.95	7.7	0.0	8.9	42.5	250	0.60	46.0	0.94	0.71	19%
ARROWSMITH DRIVE	16A	15A	0.43	0.43	6		50.0	21.5	21.5	0	0	0	0	0	0.1	21.5	0.1	0.1	4.00	0.3	0.0	0.4	55.0	250	1.00	59.4	1.21	0.31	1%
ARROWSMITH DRIVE	15A	14A	0.73	1.16	12		50.0	36.5	58	0	0	0	0	0	0.2	58	0.1	0.2	4.00	0.8	0.0	1.0	114.5	250	1.00	59.4	1.21	0.45	2%
ARROWSMITH DRIVE	21A	20A	0.55	0.55	9		50.0	27.5	27.5	0	0	0	0	0	0.1	27.5	0.1	0.1	4.00	0.4	0.0	0.5	42.5	250	1.00	59.4	1.21	0.35	1%
ARROWSMITH DRIVE	20A	14A	0.5	1.05	8		50.0	25	52.5	0	0	0	0	0	0.2	52.5	0.1	0.2	4.00	0.7	0.0	0.9	79.5	250	0.50	42.0	0.86	0.34	2%
GOLDEN HILLS WAY	14A	11A	0.43	8.7	6		50.0	21.5	680.4	0	0.15	0	0	7.5	1.8	687.9	0.1	2.4	3.90	9.4	0.0	11.2	85.0	250	0.50	42.0	0.86	0.72	27%

Appendix F Water Calculations

SCS consulting group ltd

Municipal Engineering Solutions

October 3, 2023 Project No. 17002-150

Ms. Emma Shepherd
SCS Consulting Group Ltd.
30 Centurian Drive, Suite 100
Markham, ON, L3R 8B8

Subject: 376 & 390 Derry Road West Water and Wastewater Calculations
City of Mississauga, Region of Peel

Dear Ms. Shepherd,

Municipal Engineering Solutions ("MES") was retained by SCS to calculate the water demands and sanitary flow for the proposed 376 & 390 Derry Road West Development in the City of Mississauga (Region of Peel). As part of this assignment MES was requested to calculate the flow requirements for the proposed development using Region of Peel, Fire Underwriters Survey, provincial and industry design standards to complete the Region's Multi-Use Demand Table.

Development Background

The development site is located on the southeast corner of Derry Road West and McLaughlin Road in the City of Mississauga. The development consists of street townhomes, back to back townhomes, 4 single family homes (facing Oaktree Circle) and a commercial building.

Equivalent Population Serviced

To calculate the equivalent population for the proposed development MES used population densities from the Region of Peel *"Water and Wastewater Modelling Demand Table, January 2023"*. **Table 1** summarizes the residential and ICI population densities.

Table 1 – Equivalent Population Density

Type of Development	Equivalent Population Density
Single Family Homes	4.2 People/unit
Townhomes	3.4 People/unit
Commercial	50 People/ha

Source: Region of Peel Water and Wastewater Modelling Demand Table, January 2023

The equivalent population for the site was calculated to be 427 people. Detailed calculations are attached.

Domestic Water Usage

The domestic water demands for the development a calculated using the design criteria outlined in the Region of Peel "*Watermain Design Criteria, 2010*". **Table 2** summarizes the average daily demand and peaking factors used for this analysis.

55 Gilbank Drive, Aurora, Ontario L4G 6H9

Tel: 905.726.1016 Cell: 416.434.0186 Fax: 905.726.1225

Table 2 - Water Design Factors

Type of Development	Average Daily Demand	Maximum Daily Demand Peaking Factor	Peak Hourly Demand Peaking Factor
Residential	280 L/capita/day	2.0	3.0
ICI	300 L/capita/day	1.4	3.0

Source: Region of Peel Watermain Design Criteria, 2010

Utilizing the equivalent population data from Table 1 and the corresponding Maximum Day and Peak Hour data from Table 2 the water demands for this development were calculated. The calculated demands for the development are summarized in **Table 3**. Detailed water demand calculations are attached.

Table 3 – 376 & 390 Derry Road West Development

	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Residential & ICI	1.39	2.76	4.15

Fire Flow Demands

The fire demands for the development are to be based on the Fire Underwriters Survey ("FUS") formula outlined in the *'Water Supply For Public Fire Protection Guideline',* dated 2020. Since the detailed design data (specifics) for the proposed units/buildings are not known at this time, fire flows that have been used by MES for other similar developments previously submitted in Peel were utilized.

Table 4 - Fire Flow Requirements

Type of Development	Estimated Fire Flow (L/s)
Single Family Homes	167
Back to Back Townhomes	317

Source: Fire Underwriters Survey

Once the detailed design data (specifics) for this development are finalized the FUS calculations must be completed and confirmed by the appropriate designer to determine the actual fire flows required and any design/criteria changes required are to be reported to MES. Building construction and sprinkler systems may need to be designed to suit the available flow and pressure. The fire flows used are shown in **Table 4**.

Hydrant Test

A hydrant test was performed on Oaktree Circle on May 12, 2022 by OCWA (Ontario Clean Water Agency). The results of the hydrant test are attached.

The results of the hydrant test indicate that the theoretical available fire flow at 20 psi (140 kPa) from the existing hydrant on Oaktree Circle is 4,401 usgpm (277.7 L/s). The available flows at internal site hydrants have not been calculated.

Watermain Hydraulic Modelling

The intent of this report is to complete the Region's Multi-Use Demand Table. It should be noted that water hydraulic modeling will be require within the development to ensure that the required fire flows are met at internal hydrants.

The observed flow from the hydrant test is 4,401 usgpm (277.7 L/s) are lower than the maximum day plus fire flow requirements estimated for the development of 319.76 L/s. Depending on the final design of the buildings, modifications to the design of the buildings may be required to reduce the fire flow required for the buildings such as the addition of firewalls or sprinkler systems.

Sanitary Sewer Flow

The sanitary flow for the development was calculated using the design criteria outlined in the Region of Peel "*Sanitary Sewer Design Criteria, March 2017*". **Table 5** summarizes the sanitary flow and infiltration allowance used for this analysis.

Table 5 - Sanitary Design Factors

Type of Development	Sewage Flow
Domestic Sewage Flow	302.8 L/capita/day
Peak Flow Factor	Harmon Formula
Infiltration	0.0002 m^3/sec/Ha

Source: Region of Peel Sanitary Sewer Design Criteria, 2023

Utilizing the equivalent population and the corresponding rates from Table 5 the sanitary flow for this development was calculated.

The calculated sanitary flow for the development is summarized in **Table 6**. Detailed sanitary flow calculations are attached.

Table 6 – Total Sanitary Flow

	Sanitary Flow (L/s)
Total Sanitary Sewer Effluent	6.41

Conclusions/Recommendations

Please see the Region's Multi-Use Demand Table attached for the projected water demands and sanitary flow rates for the proposed development.

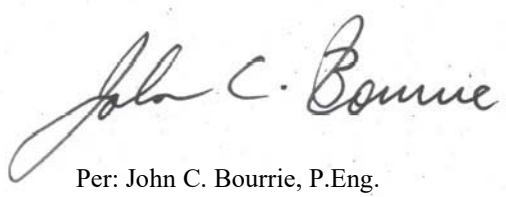
Once the building designs have been finalized the required fire flow for each building will need to be verified to determine the minimum required fire flow for the development as per the Fire Underwriters Survey. The required fire flows for this site must be discussed and confirmed by the Region. Regardless, buildings will need to be designed to suit the fire flow available to the site.

Watermain hydraulic modelling will be required for the internal watermains to ensure that the minimum required fire flows can be met at each of the hydrants within the development. For the commercial building, the supply pipe size should be confirmed by the mechanical designer.

We trust you will find this report satisfactory. Should you have any questions or require further clarification, please call.

Yours truly,

Municipal Engineering Solutions



Per: John C. Bourrie, P.Eng.

/LMC

Attachments:
Connection Multi-Use Demand Table
Region of Peel Design Criteria
Domestic Water Usage Calculations
Hydrant Test Result
Hydrant Test Location Drawings
Sanitary Sewer Flow Calculation

Water and Wastewater Modelling Demand Table - Site Plan applications

Version - January 2023

		units	persons
Proposed Residential[1)]			
	Singles/Semis	4	17
	townhouses	120	408
	large apartments (>750sqft)		
	small apartments (<=750sqft)		
Total Proposed Residential		124	425
Proposed Institutional Population[2)]			
Proposed Employment Population[3)]			
Total		124	425

Proposed GFA (commercial/retail) (sqm)	374

WATER CONNECTION

Hydrant flow test			
Hydrant flow test locations [4)]	389 Oaktree Circle		
	Pressure (kPa)	Flow (in l/s)	Time
Minimum water pressure	280	131.3 L/s	12:01 PM
Maximum water pressure	327	0 L/s	12:01 PM

No.	**Water demands**				
	Demand type	**Demand (in l/s)**			
		Use 1 [6)]	**Use 2 [6)]**	**Use 3 [6)]**	**Total**
1	Average day flow	1.32	0.06	0.01	1.39
2	Maximum day flow	2.64	0.11	0.01	2.76
3	Peak hour flow	3.97	0.17	0.02	4.15
4	Fire flow [5)]	317	167	50	317
Analysis					
5	Maximum day plus fire flow				319.76

Use 1 - Townhomes
Use 2 - Single Family
Use 3 - Commercial

WASTEWATER CONNECTION

		Discharge Location[7)]	**Flow**
6	Wastewater sewer effluent (in l/s)		6.61
7	Wastewater sewer effluent (in l/s)		
8	Wastewater sewer effluent (in l/s)		
9	Total Wastewater sewer effluent (in l/s)		6.61

[1)] For the design flow calculations, please consider the following PPU's, which are found in the Region of Peel 2020 DC Background Study

☐Singles/Semi – 4.2

☐Multiples (Townhouses) – 3.4
☐Large Apartments (larger than 750 square feet) – 3.0
☐Small Apartments (equal to or less than 750 square feet) – 1.6

[2)] refer to Region of Peel design criteria

[3)] For the commercial and industrial design flow calculations, please use your site specific estimated population or the most current Ontario Building Code Occupant Load determination

[4)] Please include the graphs associated with the hydrant flow test information table

[4)] Hydrant flow tests should be performed within 2 years of submisison to the Region.
The Region will not permit hydrant flow tests during the winter, please check with the Region for scheduling

[5)] Please reference the Fire Underwriters Survey Document

[6)] Please identify the flows for each use type, if applicable

[7)] Please include drainage plan for mutliple discharge locations

The calculations should be based on the development proposal
All required calculations must be submitted with the demand table submission
Table shall include Professional Engineer's signature and stamp
Site servicing concept shall be included

This table will be deemed complete when all the above is submitted and/or included. Modelling will commence with a complete table.

Region of Peel Design Criteria

Watermain Design Criteria, June 2010 (unless otherwise stated)

Equivalent Population by Unit

Type of Development	Equivalent Population Density *(Person/Unit)*
Single/Semi-detached	4.20
Townhouses	3.40
Apartments	3.00

Source: Region of Peel Water and Wastewater Modelling Demand Table, January 2023

Equivalent Population by Area

Type of Development	Equivalent Population Density *(Persons/Ha)*
Apartment Buildings	475
Commercial	50
Senior Public School	1/2 x number of students (900 students minimum)

Source: Region of Peel Linear Wastewater Standards, March 2023

Water Design Factors

Residential	
Average Daily Demand (L/person/day)	280
Maximum Day Factor	2.0
Peak Hour Factor	3.0
Industrial, Commercial and Institutional (ICI)	
Average Daily Demand (L/person/day)	300
Maximum Day Factor	1.4
Peak Hour Factor	3.0

Sanitary Design Factors

Design Flow	Sewage Flow
Domestic Sewage Flow (Residential)	290 L/capita/day
Domestic Sewage Flow (ICI)	270 L/capita/day
Peak Flow Factor	Harmon Formula
Infiltration by Hectare	0.00026 m^3/sec/Ha

Source: Region of Peel Linear Wastewater Standards, March 2023

RESIDENTIAL

Population (Residential - Houses and Townhouses)

Unit Type	No. of Units	People/Unit	Population (Res)
Single Detached	4	4.20	16.8
Townhouses	120	3.40	408.0
Residential Population			**425**

Population (Residential - Apartments)

Unit Type	Ha	People/Ha	Population (Res)
Apartments (Med Density)		475.00	0.0
Residential Population			**0**

Water Demands

Demand Type	Population	Demand Rate	
Average Day (Residential)	425	280.00	L/capita/day
Average Day Water Demand Residential		119000	L/day
		1.38	L/s

Water Demands

Demand Type	Peaking Factor (Res)	Water Demands (Res)
Average Day		1.38 L/s
Maximum Day	2.0	2.75 L/s
Peak Hour	3.0	4.13 L/s

INSTITUTIONAL AND COMMERCIAL

Population (ICI)

Unit Type	Site Area (Ha)	People/Ha	Population (ICI)
Institutional		-	0
Commercial	0.0374	50.0	1.9
ICI Population			**2**

Water Demands

Demand Type	Population	Demand Rate	
Average Day (ICI)	2	300.0	L/capita/day
Average Day Water Demand ICI		600	L/day
		0.01	L/s

Water Demands

Demand Type	Peaking Factor (ICI)	Water Demands (ICI)
Average Day		0.01 L/s
Maximum Day	1.4	0.01 L/s
Peak Hour	3.0	0.02 L/s

TOTAL

Population

Total Population	427

Total Demands

Demand Type	Demand (L/s)
Average Day	1.39
Maximum Day	2.76
Peak Hour	4.15

HYDRANT INSPECTION & FLOW REPORT

SUGGESTED NFPA RATING	
BLUE	CLASS AA
4401 gpm @ 20 psi (138 kPa)	

ONTARIO CLEAN WATER AGENCY
AGENCE ONTARIENNE DES EAUX

Prepared By: The Ontario Clean Water Agency
Prepared For: SCS Consulting
Residual Hyd Andrew Cruickshank
Flow Hyd(s) Emanual Castro, Kurt Kahler

Date: 12-May-22 Time: 12:01 PM

HYDRANT DESCRIPTION

Hydrant ID:	6511584	Side of Street:		Make:	Canada Valve	Open Dir:	Left
Address:	389 Oaktree Circle			Model:	Century	Latitude:	
Location:	Mississauga ON			Year:		Longitude:	

GENERAL INSPECTION

OK - Good Condition *FR - Future Repair Required* *N/A - Not Applicable* *CF - Component Failure*

Upper Section	OK	FR	N/A	CF
Bonnet	☐	☐	☑	☐
Operating Nut	☐	☐	☑	☐
Gaskets / Bolts	☐	☐	☑	☐
O-Ring(s)	☐	☐	☑	☐

Mid Section	OK	FR	N/A	CF
Port Height	☐	☐	☑	☐
Caps / Nozzles	☐	☐	☑	☐
Chains	☐	☐	☑	☐
Traffic Flange	☐	☐	☑	☐

General	OK	FR	N/A	CF
Accessibility	☐	☐	☑	☐
Position / Height	☐	☐	☑	☐
Paint Cond	☐	☐	☑	☐
Drain Ports	☐	☐	☑	☐

Hydrostatic Leak Testing		
Hydrant Closed	Above Grade Leak	N/A
	Subsurface Leak	N/A
Hydrant Open	Above Grade Leak	N/A
	Subsurface Leak	N/A

Maintenance	
Lubricate Operating Nut	N/A
Lubricate & Clean Nozzle Threads	N/A
Lubricate & Clean Cap Threads	N/A
Water Removed (if non-draining)	N/A

Auxiliary / Secondary Valve	
Located / Accessible	N/A
Operated/Exercised	N/A
Number of Turns	N/A
Open Direction	

Comments:

Auxiliary Valve Location:

FLUSHING

*If hydrants are being flow tested, inspections and flushing are completed prior to testing

Hydrant Operated	Clear Flow Obtained	Cl2 Residual	Time Flushed	Flow	Total Flow	Dechlorinated
Yes - Easily Operated	Yes	N/A	5 minutes	2081 gal	10405 gal	Yes

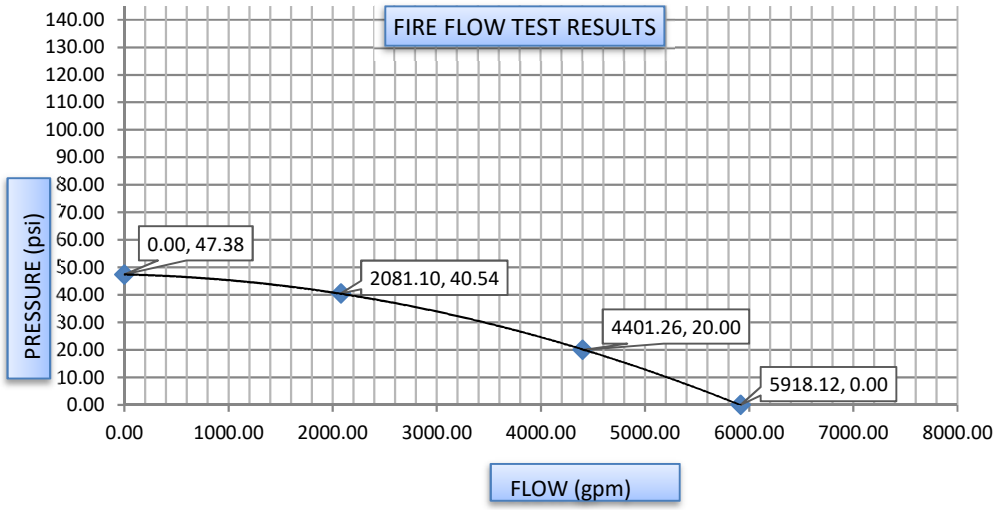
Comments: **STATIC AFTER FLOW TEST WAS PERFORMED 47.02 PSI**

FLOW TESTING

*Flow testing results may be from previous year(s). Note date & time

Date: 12-May-22 Time: 12:01 PM

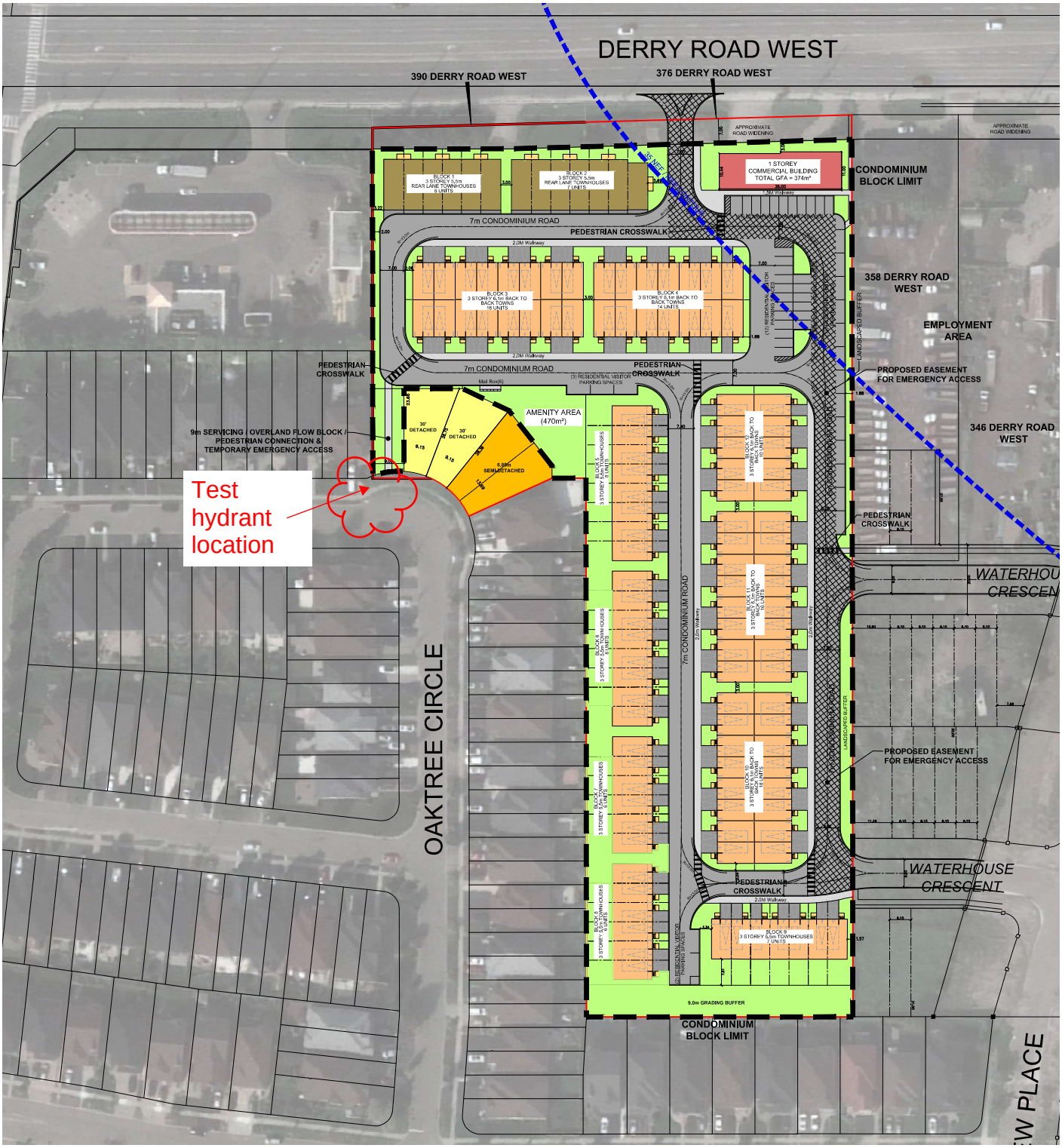
Flow Hydrant								Test Hydrant		
ID	Flow Device Used	Size	Coefficient	Time Flushed	Flow	Total Flow	Pitot	ID	Static	Residual
6511585	Pollard Diffuser	2.5"	0.832	5.0 minutes	694 gal	3468 gal	20 psi	6511584	47.38	40.54
6511585	Pollard Diffuser	2.5"	0.832	5.0 minutes	694 gal	3468 gal	20 psi			
6511624	Pollard Diffuser	2.5"	0.832	5.0 minutes	347 gal	1734 gal	5 psi			
6511624	Pollard Diffuser	2.5"	0.832	5.0 minutes	347 gal	1734 gal	5 psi			



Calculated Results	
Calculated Flow @ 20 psi	4401 gpm
Calculated Flow @ 0 psi	5918 gpm
Pressure Drop	14.44%

Comments:

Hose used on both ports for hydrant #6511624


DERRY ROAD WEST
390 DERRY ROAD WEST
376 DERRY ROAD WEST
APPROXIMATE ROAD WIDENING
1 STOREY COMMERCIAL BUILDING TOTAL GFA = 374m²
CONDOMINIUM BLOCK LIMIT
BLOCK 1 3 STOREY 6.5m REAR LANE TOWNHOUSES 6 UNITS
BLOCK 2 3 STOREY 5.5m REAR LANE TOWNHOUSES 7 UNITS
7m CONDOMINIUM ROAD
PEDESTRIAN CROSSWALK
2.0M Walkway
BLOCK 3 3 STOREY 6.1m BACK TO BACK TOWNS 16 UNITS
BLOCK 4 3 STOREY 6.1m BACK TO BACK TOWNS 14 UNITS
358 DERRY ROAD WEST
EMPLOYMENT AREA
LANDSCAPED BUFFER
PROPOSED EASEMENT FOR EMERGENCY ACCESS
346 DERRY ROAD WEST
PEDESTRIAN CROSSWALK
Mail Box(s)
(3) RESIDENTIAL VISITOR PARKING SPACES
AMENITY AREA (470m²)
9m SERVICING / OVERLAND FLOW BLOCK / PEDESTRIAN CONNECTION & TEMPORARY EMERGENCY ACCESS
30' DETACHED
30' DETACHED
6.99m SEMI-DETACHED
Test hydrant location
OAKTREE CIRCLE
BLOCK 5 3 STOREY 6 UNITS TOWNHOUSES
BLOCK 6 3 STOREY 6 UNITS TOWNHOUSES
BLOCK 7 3 STOREY 6 UNITS TOWNHOUSES
BLOCK 8 3 STOREY 6 UNITS TOWNHOUSES
BLOCK 12 3 STOREY 6.1m BACK TO BACK TOWNS 16 UNITS
BLOCK 11 3 STOREY 6.1m BACK TO BACK TOWNS 16 UNITS
BLOCK 10 3 STOREY 6.1m BACK TO BACK TOWNS 16 UNITS
BLOCK 9 3 STOREY 5.5m TOWNHOUSES 7 UNITS
9.0m GRADING BUFFER
CONDOMINIUM BLOCK LIMIT
WATERHOUSE CRESCENT
WATERHOUSE CRESCENT
W PLACE

SANITARY FLOW

Population (Residential - Houses and Townhouses)

Unit Type	No. of Units	People/Unit	Population (Res)
Single Detached	4	4.20	16.8
Townhouses	120	3.40	408.0
Residential Population			**425**

Population (Residential - Apartments)

Unit Type	Ha	People/Ha	Population (Res)
Apartments (Med Density)		475.00	0.0
Residential Population			**0**

Population (ICI)

Unit Type	Site Area (Ha)	People/Ha	Population (ICI)
Institutional		-	
Commercial	0.0374	50.00	1.9
ICI Population			**2**

Design Flow

Demand Type	Population	Demand Rate	
Domestic Flow (Residential)	425	290	L/capita/day
Domestic Flow (ICI)	2	270	L/capita/day
Average Domestic Sanitary Sewage Flow		123790	L/day
		1.43	L/sec

Peak Flow

Harmon Peaking Factor (see notes below)	4.01	
Peak Domestic Flow including the Harmon PF	496215	L/day
Domestic Sanitary Sewage Flow	5.74	L/s

Infiltration

Demand Type	Area (Ha)	Demand Rate	
Infiltration	2.59	0.00026	m^3/sec/Ha
Infiltration (Future)		0.00026	m^3/sec/Ha
Infiltration		0.67	L/s

Total Sanitary Flow

Demand Type		Sanitary Flow	
Domestic and Infiltration		6.41	L/s

TOTAL

Population

Total Population	427

Total Sanitary Flow

Demand Type	Demand (L/s)
Peak Domestic Flow	6.41

Notes:

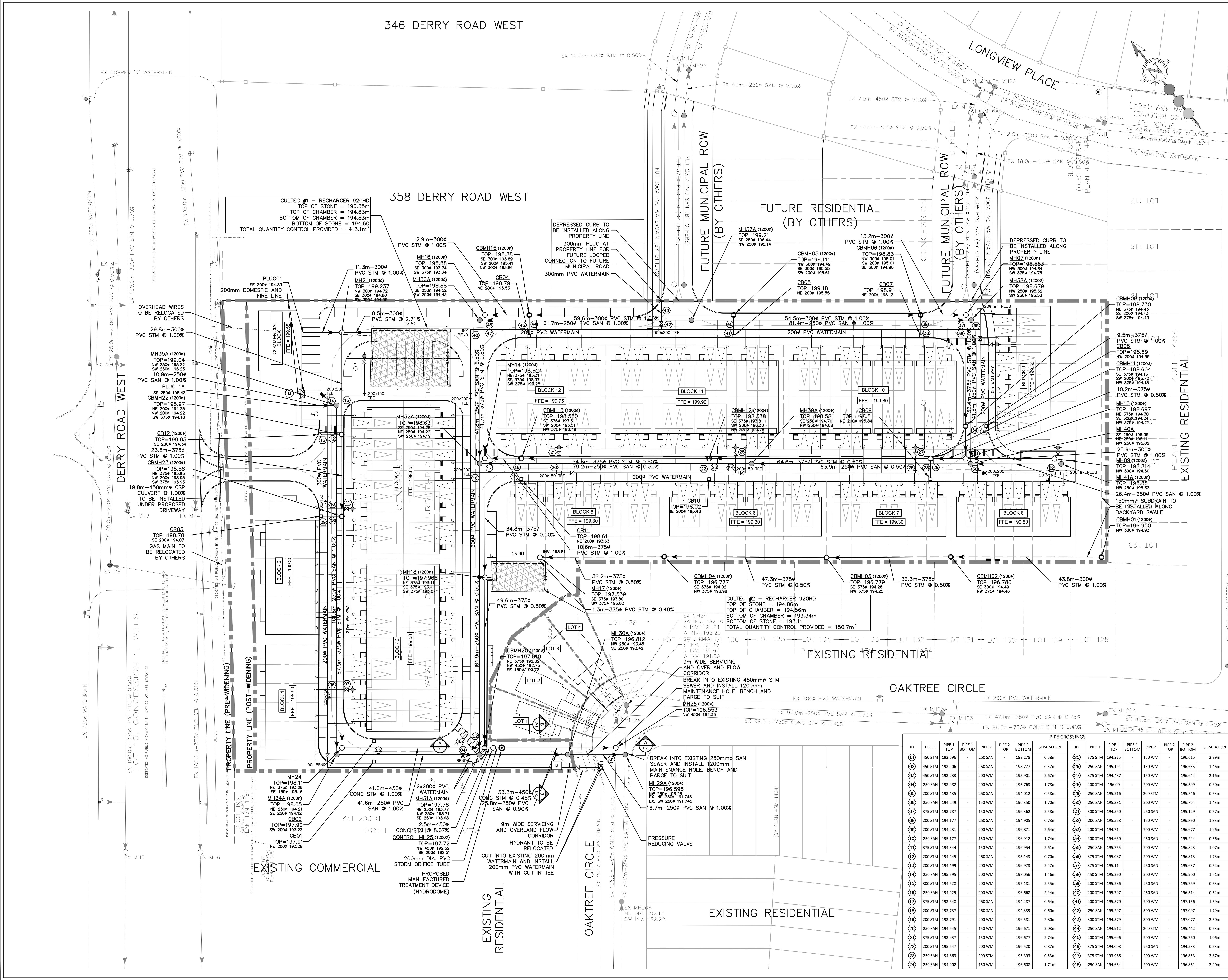
Harmon Formula

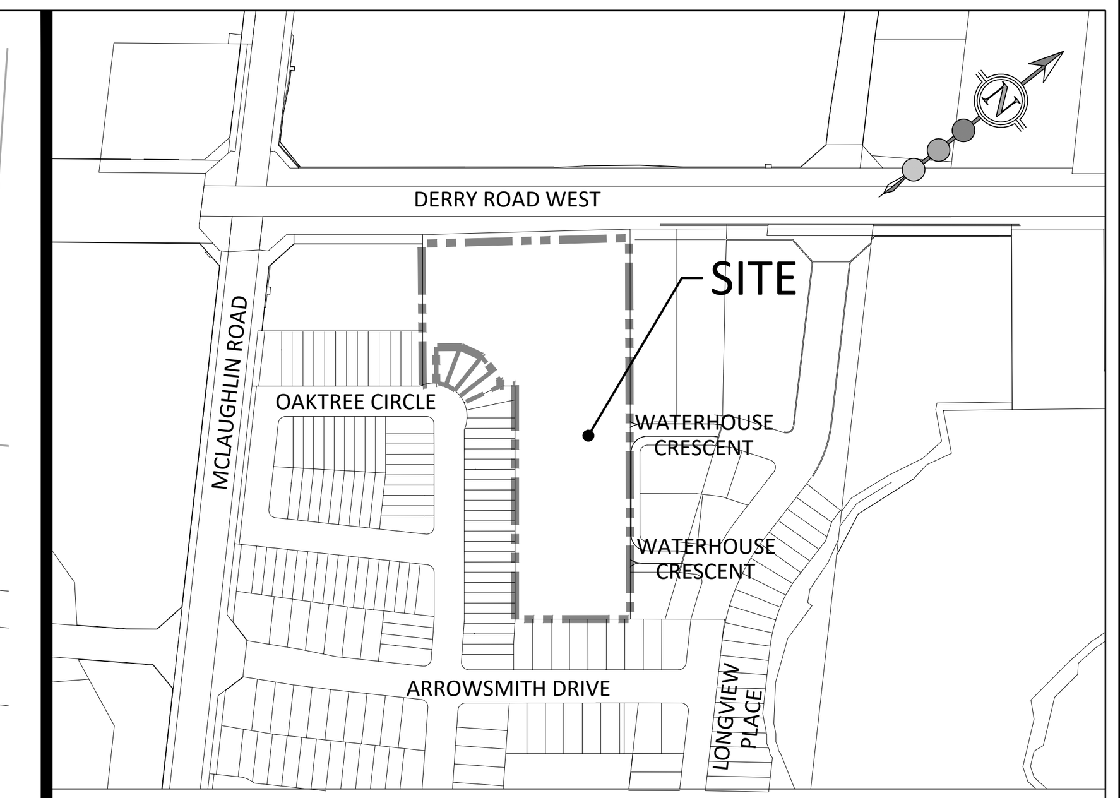
$$H = 1 + \frac{14}{4 + p^{0.5}}$$

Where:
H = Ratio of peak flow to average flow
p = population in thousands

Appendix G Drawings

SCS consulting group ltd





KEY PLAN
N.T.S.

BENCHMARK: ELEV. 194.056m

ELEVATIONS ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK NO. 1050, BEING A TABLET SET HORIZONTALLY AT THE SOUTHEAST CORNER OF McLAUGHLIN ROAD AND ARROWSMITH DRIVE, HAVING A PUBLISHED ELEVATION OF 194.056m.

LEGEND:

- LIMIT OF CONDOMINIUM
- PROPOSED LOT LINE
- TREE PRESERVATION HOARDING
- DEPRESSED CURB
- 150mmØ SUBDRAIN
- PROPOSED STORM SEWER AND MAINTENANCE HOLE
- PROPOSED CATCHBASIN MAINTENANCE HOLE
- PROPOSED CATCHBASIN
- PROPOSED SANITARY SEWER AND MAINTENANCE HOLE
- PROPOSED WATERMAIN
- VALVE CHAMBER
- FIRE HYDRANT AND VALVE
- WATERMAIN VALVE
- EXISTING STORM SEWER AND MAINTENANCE HOLE
- EXISTING SANITARY SEWER AND MAINTENANCE HOLE
- SANITARY SERVICE CONNECTION
- WATER SERVICE CONNECTION

*REFER TO DRAWING R-1 FOR REMOVAL PLAN
TOPOGRAPHIC SURVEY PROVIDED BY KRCMAR SURVEYORS LTD, JULY 2016

PIPE CROSSINGS

ID	PIPE 1	PIPE 1 TOP	PIPE 1 BOTTOM	PIPE 2	PIPE 2 TOP	PIPE 2 BOTTOM	SEPARATION
01	450 STM	192.696	-	250 SAN	-	193.278	0.58m
02	450 STM	193.206	-	250 SAN	-	193.777	0.57m
03	450 STM	193.233	-	200 WM	-	195.901	2.67m
04	250 SAN	193.982	-	200 WM	-	195.763	1.78m
05	200 STM	193.435	-	250 SAN	-	194.012	0.58m
06	250 SAN	194.649	-	150 WM	-	196.350	1.70m
07	375 STM	193.787	-	150 WM	-	196.362	2.58m
08	200 STM	194.177	-	250 SAN	-	194.905	0.73m
09	200 STM	194.231	-	200 WM	-	196.871	2.64m
10	250 SAN	195.177	-	150 WM	-	196.912	1.74m
11	375 STM	194.344	-	150 WM	-	196.954	2.61m
12	200 STM	194.445	-	250 SAN	-	195.143	0.70m
13	200 STM	194.499	-	200 WM	-	196.973	2.47m
14	250 SAN	195.595	-	200 WM	-	197.056	1.46m
15	300 STM	194.628	-	200 WM	-	197.181	2.55m
16	250 SAN	194.425	-	200 WM	-	196.668	2.24m
17	375 STM	193.648	-	250 SAN	-	194.287	0.64m
18	200 STM	193.737	-	250 SAN	-	194.339	0.60m
19	200 STM	193.791	-	200 WM	-	196.581	2.80m
20	250 SAN	194.645	-	150 WM	-	196.671	2.03m
21	375 STM	193.937	-	150 WM	-	196.677	2.74m
22	200 STM	195.647	-	200 WM	-	196.520	0.87m
23	250 SAN	194.863	-	200 STM	-	195.393	0.53m
24	250 SAN	194.902	-	150 WM	-	196.608	1.71m

ID	PIPE 1	PIPE 1 TOP	PIPE 1 BOTTOM	PIPE 2	PIPE 2 TOP	PIPE 2 BOTTOM	SEPARATION
25	375 STM	194.225	-	150 WM	-	196.615	2.39m
26	250 SAN	195.194	-	150 WM	-	196.655	1.46m
27	375 STM	194.487	-	150 WM	-	196.644	2.16m
28	200 STM	196.00	-	200 WM	-	196.599	0.60m
29	250 SAN	195.216	-	200 STM	-	195.746	0.53m
30	250 SAN	195.331	-	200 WM	-	196.764	1.43m
31	300 STM	194.560	-	250 SAN	-	195.129	0.57m
32	200 SAN	195.558	-	150 WM	-	196.890	1.33m
33	200 STM	194.714	-	200 WM	-	196.677	1.96m
34	200 STM	194.660	-	250 SAN	-	195.224	0.56m
35	250 SAN	195.755	-	200 WM	-	196.823	1.07m
36	375 STM	195.087	-	200 WM	-	196.813	1.73m
37	375 STM	195.114	-	250 SAN	-	195.637	0.52m
38	450 STM	195.290	-	200 WM	-	196.900	1.61m
39	200 STM	195.236	-	250 SAN	-	195.769	0.53m
40	200 STM	195.797	-	250 SAN	-	196.314	0.52m
41	200 STM	195.570	-	200 WM	-	197.156	1.59m
42	250 SAN	195.297	-	300 WM	-	197.097	1.79m
43	300 STM	194.579	-	300 WM	-	197.077	2.50m
44	250 SAN	194.912	-	200 STM	-	195.442	0.53m
45	200 STM	195.696	-	200 WM	-	196.760	1.06m
46	375 STM	194.008	-	250 SAN	-	194.533	0.53m
47	375 STM	193.986	-	200 WM	-	196.853	2.87m
48	250 SAN	194.664	-	200 WM	-	196.861	2.20m

REVISIONS

No.	DESCRIPTION	DATE	BY	APPROVED
1.	ISSUED FOR 1ST SUBMISSION REZONING	DEC 05/23	E.R.S.	

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

376 AND 390 DERRY ROAD WEST
BALLYMORE HOMES

SERVICING PLAN

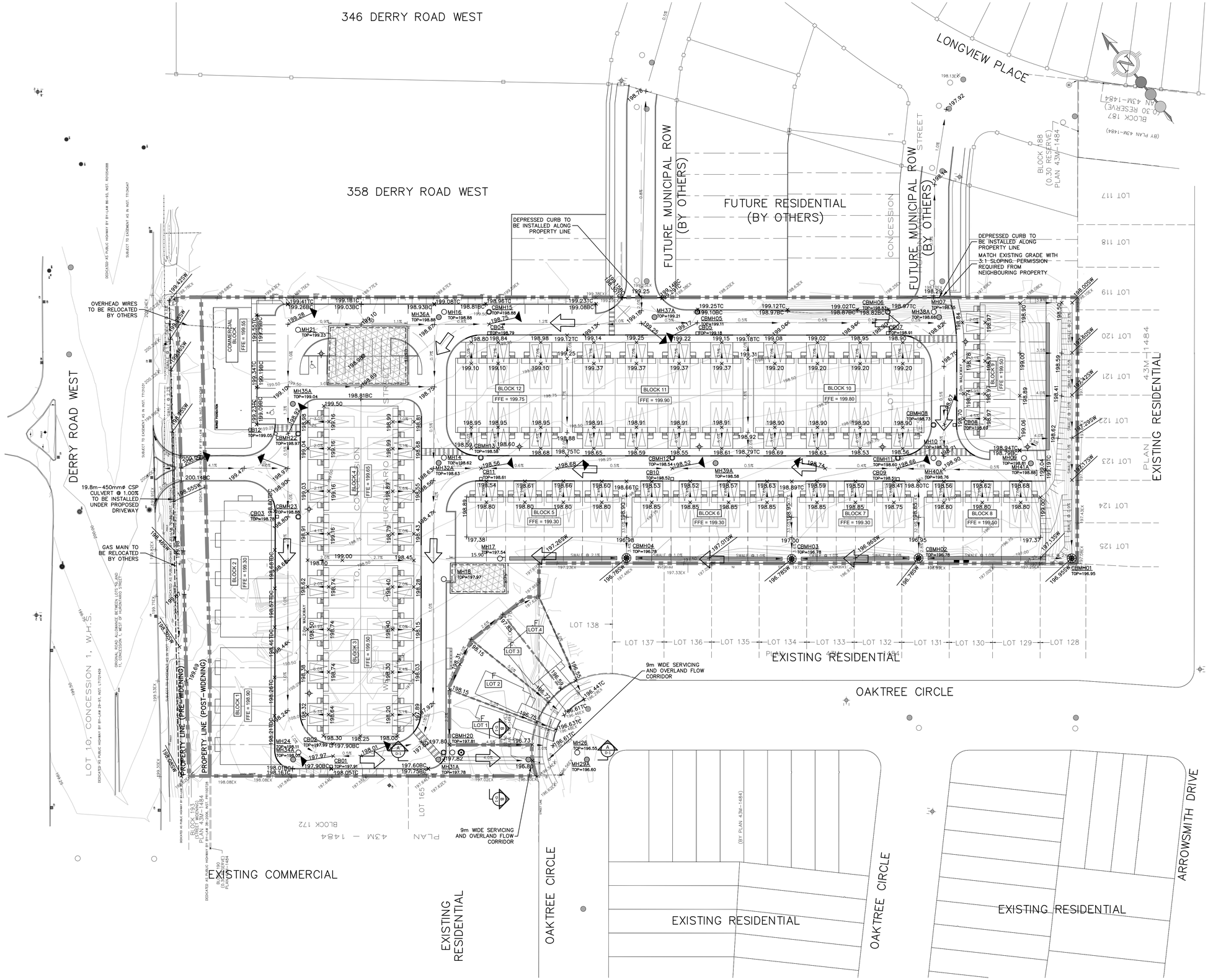
DATE:	NOVEMBER 2023	DESIGNED BY:	E.R.S.	CHECKED BY:	J.S.H.
SCALE:	1:500	DRAWN BY:	E.R.S.	CHECKED BY:	J.S.H.

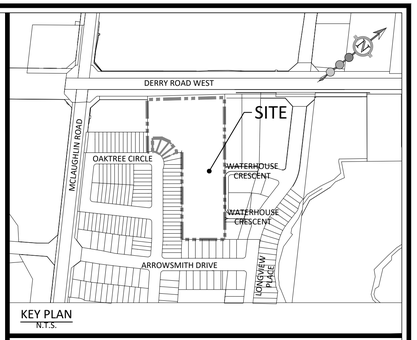
5 0 10 20 30 40

PROJECT No: 2509

DRAWING No: S-1

File: P:\2509 Ballymore – 376 Derry Rd\Drawings\Phase 1\Gen\2509D–GENP–S1.dwg – Revised by <CTZUMERKAS> : Tue, Dec 05 2023 – 1:59pm





KEY PLAN
N.T.S.

BENCHMARK: ELEV. 194.056m

ELEVATIONS ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK NO. 1050, BEING A TABLET SET HORIZONTALLY AT THE SOUTHEAST CORNER OF McLAUGHLIN ROAD AND ARROWSMITH DRIVE, HAVING A PUBLISHED ELEVATION OF 194.056m.

LEGEND:

- LIMIT OF CONDOMINIUM
- PROPOSED LOT LINE
- TREE PRESERVATION HOARDING
- DEPRESSED CURB
- ×123.23 PROPOSED ELEVATION
- ×123.23EX EXISTING ELEVATION
- 123.23 CENTERLINE OF ROAD ELEVATION
- ×123.23(G) PROPOSED GUTTER GRADE ELEVATION
- ×123.23BC PROPOSED BOTTOM OF CURB ELEVATION
- ×123.23TC PROPOSED TOP OF CURB ELEVATION
- PROPOSED EMBANKMENT (MAX. 3:1 UNLESS OTHERWISE NOTED)
- PROPOSED STORM MAINTENANCE HOLE
- PROPOSED CATCHBASIN MAINTENANCE HOLE
- PROPOSED CATCHBASIN
- 100 YEAR CAPTURE LOCATION
- PROPOSED SANITARY MAINTENANCE HOLE
- PROPOSED HYDRANT
- INFILTRATION TRENCH

*REFER TO DRAWING R-1 FOR REMOVAL PLAN
TOPOGRAPHIC SURVEY PROVIDED BY KRCMAR SURVEYORS LTD, JULY 2016
ELEVATIONS SHOWN HEREON ARE MISSISSAUGA DATUM AND ARE RELATED TO THE CITY OF MISSISSAUGA BENCHMARK No. 1050 HAVING AN ELEVATION OF 194.056 METRES.

REVISIONS

No.	DESCRIPTION	DATE	BY	APPROVED
1.	ISSUED FOR 1ST SUBMISSION REZONING	DEC 05/23	E.R.S.	

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

376 AND 390 DERRY ROAD WEST
BALLYMORE HOMES

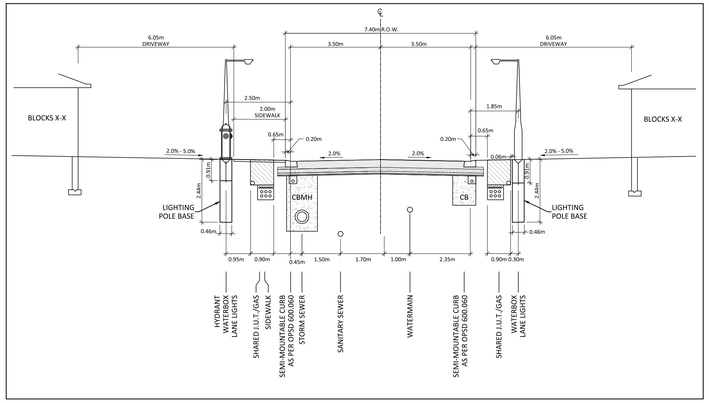
GRADING PLAN

DATE:	NOVEMBER 2023	DESIGNED BY:	E.R.S.	CHECKED BY:	J.S.H.
SCALE:	1:500	DRAWN BY:	E.R.S.	CHECKED BY:	J.S.H.

5 0 10 20 30 40

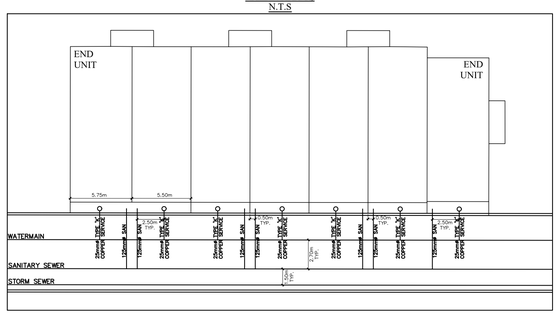
PROJECT No: 2509

DRAWING No: GR-1

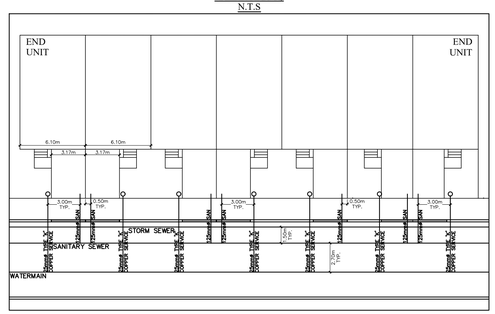


TYPICAL 7.0m ASPHALT PRIVATE LANEWAY
N.T.S

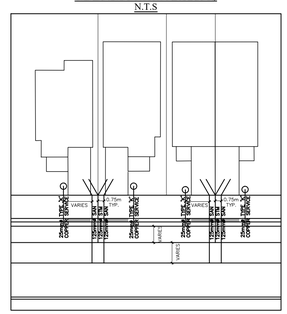
TYPICAL SERVICE CONNECTION DETAIL (REAR LANE TOWNHOUSES)
N.T.S

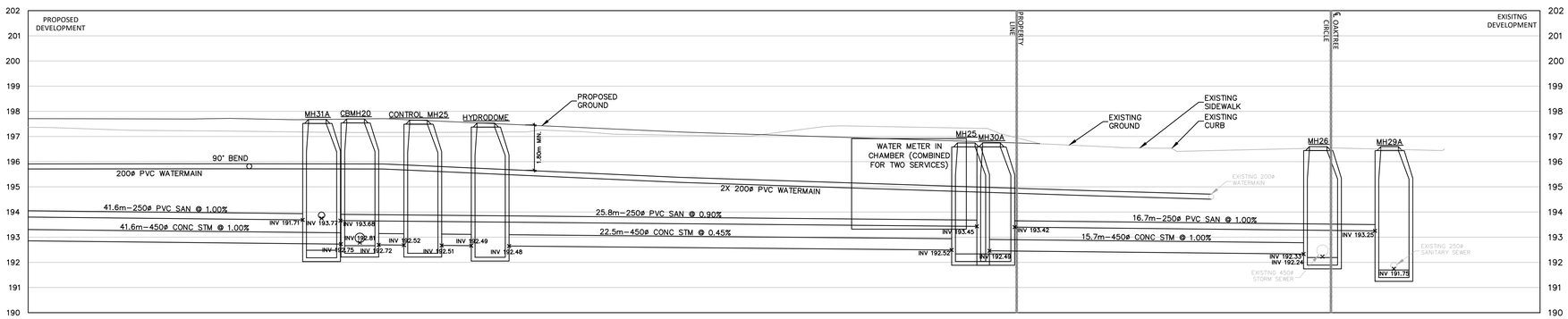


TYPICAL SERVICE CONNECTION DETAIL (BACK TOWNHOUSES)
N.T.S

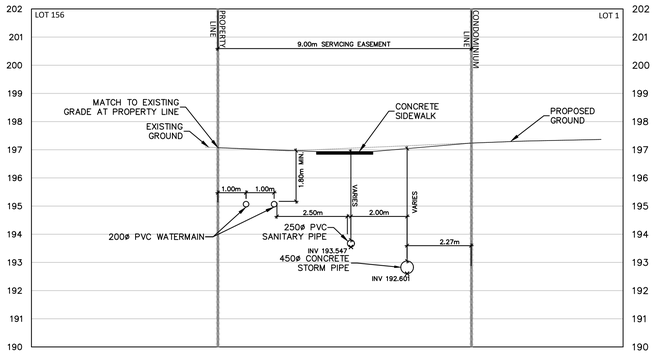


TYPICAL SERVICE CONNECTION DETAIL (DETACHED AND SEMI DETACHED HOUSES)
N.T.S





S-1 WALKWAY ENTRANCE SECTION
SCALE: 1:100



S-1 9.0M SERVICING EASEMENT/OVERLAND FLOW ROUTE
SCALE: 1:100

REVISIONS				
No.	DESCRIPTION	DATE	BY	APPROVED
1.	ISSUED FOR 1ST SUBMISSION REZONING	DEC 23/05	E.R.S.	

SCS consulting group ltd
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TEL: (905) 475-1900
FAX: (905) 475-8335

BALLYMORE - 376 DERRY ROAD

DETAILS PLAN

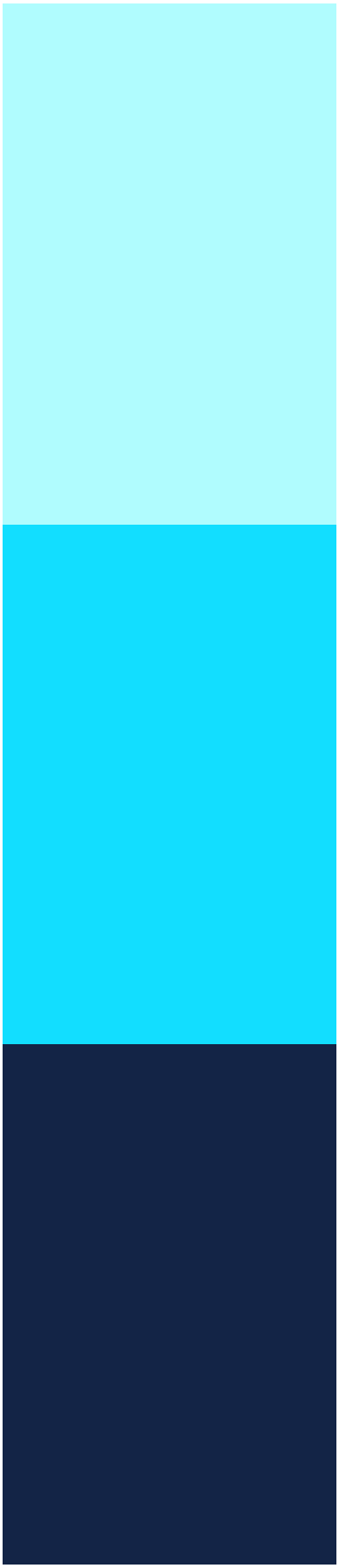
DATE:	SEPTEMBER 2023	DESIGNED BY:	E.R.S.	CHECKED BY:	???
SCALE:	AS NOTED	DRAWN BY:	E.R.S.	CHECKED BY:	???

APPROVED AS TO FORM IN RELIANCE UPON THE PROFESSIONAL SKILL AND ABILITY OF SCS CONSULTING GROUP LTD. CONSULTING ENGINEERS AS TO DESIGN AND SPECIFICATION.

PROJECT No: 2509

DRAWING No: D-1

?????????????, Director Of Engineering Date



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