7370 Centre Road, Uxbridge

Functional Servicing and Stormwater Management Report

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SUBMISSION HISTORY

Submission	Date	In Support Of	Distributed To
1st	March 2021	Draft Plan Approval	Township of Uxbridge, LSRCA, Region of Durham

1.0 INTRODUCTION

SCS Consulting Group Ltd. has been retained by Bridgebrook Corp. to prepare a Functional Servicing and Stormwater Report (FSSR) for a proposed residential development located at 7370 Centre Road North, north of Bolton Drive within the Township of Uxbridge.

1.1 Purpose of the Functional Servicing Report

The FSSR has been prepared in support of the Draft Plan of Subdivision application for the proposed development. The Draft Plan of Subdivision is provided in **Appendix A**. The proposed development consists of the following land uses:

- low density residential (521 units),
- medium density residential (69 units),
- parks,
- natural heritage system (NHS),
- Stormwater Management (SWM) blocks, and
- Proposed roads and laneways.

The purpose of this report is to demonstrate that the development can be graded and serviced in accordance with the Township of Uxbridge, Lake Simcoe Region Conservation Authority (LSRCA), Region of Durham, and the Ministry of Environment, Conservation and Parks (MECP) design criteria.

1.2 Study Area

The study area is approximately 39.9 ha in size and is bound by 6th Concession Road to the west, Centre Road North to the east, existing residential development to the south (Quaker Village) and existing agricultural lands to the north (see **Figure 1.1**).

The existing lands are comprised of agricultural land and NHS areas. The proposed development is located within the Uxbridge Brook Subwatershed in the Township of Uxbridge.

1.3 Background Servicing Information

In preparation of the servicing and SWM strategies, the following design guidelines and standards were used:

- Design Criteria and Standard Detail Drawings for Subdivision Developments and Site Plans, Town of Uxbridge (2016);
- Design Specifications for Engineering Submissions, Regional Municipality of Durham (April 2020);
- LSRCA Technical Guidelines for Stormwater Management Submissions, LSRCA (June 2016);
- Low Impact Development Stormwater Management Planning and Design Guide, Credit Valley Conservation & Toronto and Region Conservation (2010);
- Phosphorus Offsetting Policy, Lake Simcoe Region Conservation Authority (May 2019);
- Design Guidelines for Sewage Works, MOE (2008);

- Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning and Design Manual (March 2003); and
- Ministry of Transportation (MTO) Drainage Management Manual (1997).

The site servicing and SWM strategies in this report are based on the following reports for this Draft Plan of Subdivision:

- Geotechnical Investigation, Proposed Residential Development, 7370 Centre Road, prepared by Soil Engineers Ltd., dated February 16, 2018;
- Hydrogeological Investigation, Water Balance and Catchment Based Water Balance, 7370 Centre Road, prepared by Beacon Environmental, dated March 2021; and
- Environmental Impact Study, 7370 Centre Road, prepared by Beacon Environmental, dated March 2021; and
- Geomorphic Assessment, 7370 Centre Road, prepared by Beacon, dated March 2020.

The servicing and SWM strategies are also based on the following approved Engineering Drawings:

- Drawing P01 – Oakside Drive Sta. -0+10 to 2+50, Mason Homes, October 2004, prepared by Roberts Bell Engineering Ltd.;
- Drawing SAN –Sanitary Drainage Area Plan, Mason Homes, September 2004, prepared by Roberts Bell Engineering Ltd.;
- Drawing G-102 – General Plan Quaker Village Phase 2, September 1987, prepared by G.M. Sernas & Associates Ltd.;
- Drawing P-101 – Bolton Drive Sta. 0+000 to 0+200.0, Quaker Village Phase 2, September 1987, prepared by G.M. Sernas & Associates Ltd.;
- Drawing P-102 – Bolton Drive Sta. 0+200.0 to 0+396.080, Quaker Village Phase 2, September 1987, prepared by G.M. Sernas & Associates Ltd.;
- Drawing G-202 – General Plan Quaker Village Phase 5, September 1997, prepared by G.M. Sernas & Associates Ltd.;
- Drawing G-102B – Storm Drainage Area Plan, Quaker Village Phase 5, September 1997, prepared by G.M. Sernas & Associates Ltd.; and
- Township of Uxbridge Water Supply System Map, March 22, 2019.

Excerpts from the above listed documents are included in **Appendix B**.

A Rainscaping charrette with the Township of Uxbridge and the LSRCA was held on August 25, 2020, which confirmed the following low impact development (LID) measures would be acceptable to be considered for use in this proposed development:

<u>Public LIDs:</u>
- Surface infiltration facilities (bioswales/rain gardens) within the boulevards of municipal roads with no driveways, and within parks;
- Rear-yard at-surface infiltration trenches;
- Catchbasin infiltration/filtration trenches;
- Surface infiltration facilities may be used within the buffer area along the back of lots;
- Underground active storage facility; and

- Downstream Infiltration/filtration facilities.

Preliminary design input and operations and maintenance concerns were provided as part of the Rainscaping charrette process and were incorporated into the LID design outlined in the relevant report sections below. Excerpts from the Rainscaping meeting minutes are included in **Appendix B**.

1.4 Site Phasing

The proposed development may proceed as two separate phases with the first phase comprised of the lots east of the NHS and the second phase west of the NHS. The servicing of the subdivision phases will be discussed in greater detail below.

2.0 STORMWATER MANAGEMENT

2.1 Stormwater Runoff Control Criteria

The following stormwater runoff control criteria have been established based on the greatest requirements of each of the design guidelines and standards listed in **Section 1.3**. The stormwater runoff criteria are summarized below in **Table 2.1**:

Table 2.1 – 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 (MECP).
Quality Control	Provide MECP Enhanced (Level 1) Protection for 80% TSS Removal (MECP).
Erosion Control	Detention of the 40 mm storm event for a minimum of 24 hours (Uxbridge).
Volume Control	On-site retention of the 25 mm rainfall runoff (treatment alternatives to be used as necessary as outlined in LSRCA Guidelines).
Water Budget	Where feasible, measures to minimize development impacts on the water balance to be incorporated into the development design (i.e. infiltration measures) (LSRCA).
Phosphorus Budget	The target is "zero" export from development. Minimum 90% Phosphorus to be removed through mitigation (Mitigated vs Unmitigated) (Uxbridge). Any remaining phosphorus exported from the site will be compensated as outlined in the LSRCA Phosphorus Offsetting Policy (LSRCA).

For the purposes of this FSSR, the portion of the proposed development west of the NHS and the portion of the development east of the NHS will meet quality control and erosion control individually for their respective development areas. The quantity control, volume control, water budget, and phosphorus budget will be calculated based on the entire proposed development.

2.2 Existing Drainage

As shown on **Figure 2.1**, the majority of runoff from Catchment 101 is conveyed southeast to a tributary of the Uxbridge Brook running through it. Flows in the tributary are controlled by an upstream existing SWM Pond located in the subdivision immediately south of the proposed development (Quaker Village SWM Pond) which outlets north through a storm sewer under Bolton Drive. Drainage from the tributary is then conveyed east through a concrete box culvert underneath Centre Road North.

Runoff from a portion of Catchment 101 is directed south towards an existing crushed CSP culvert which conveys flows underneath the existing access road to the south portion of the

NHS and the Uxbridge Brook tributary. An existing RLCB in the Quaker Village Subdivision has been sized to capture minor system (5 year) flows from 7.9 ha of the existing site (runoff coefficient 0.25) and convey them to the Quaker Village Subdivision SWM Pond (refer to Drawing G-102B in **Appendix B**).

Runoff from Catchment 102 is conveyed northeast to an existing CSP culvert under Centre Road which outlets to a swale draining east through the adjacent property and ultimately to a tributary of the Uxbridge Brook. The extents of the existing storm drainage boundaries were established based on the limit of development to determine relevant target release rates.

2.2.1 Existing Site Characterization

The soil classifications were identified in geotechnical and hydrogeological investigations undertaken by Soil Engineers Ltd. and Beacon Environmental Ltd. respectively. The geotechnical investigation identified that the soils within the study limits generally consist of silty clay/silty clay tills with deposits of sand and silt at various locations. Hydraulic conductivity testing was conducted at several of the sand locations across the site, the lowest measured hydraulic conductivity was 9.5×10^{-5} cm/s which corresponds to an infiltration rate of approximately 49 mm/hr (per LID SWM Planning and Design Guide Table C1). For design purposes, a conservative infiltration rate of 12 mm/hr, based on the presence of silty clay soils, has been used. The design infiltration rate will be confirmed with in-situ testing at the detailed design stage. Relevant excerpts from the geotechnical and hydrogeological investigations are provided in **Appendix B**.

Groundwater measurements have been conducted from December 2017 to August 2020 at all accessible monitoring locations. Groundwater depths ranged from approximately 0.2 meters below ground surface (mbgs) to 8.92 mbgs. Groundwater elevations were found to range from approximately 332.0 masl to 285.2 masl. The groundwater appears to reside unconfined within layers of silty clay and silty sand. Relevant excerpts from the hydrogeological investigation are provided in **Appendix B**.

2.2.2 Existing Hydrologic Modelling

Hydrologic modelling was undertaken using the Visual Otthymo Version 6.0 software (VO6) based on the 4-hour Chicago and 12-hour SCS Type II design storm distributions (per Uxbridge design standards). The proposed development is located within the Township of Uxbridge, therefore, the IDF rainfall information was obtained from the Township of Uxbridge design standards to determine the existing peak flows to outlet locations. The Uxbridge design standards do not include IDF information for the 50 year storm event so it has been excluded from the hydrologic analysis.

The existing flows from the study area to the outlet locations are summarized in **Table 2.2**.

Table 2.2: Summary of Existing Peak Flows

Return Period Storm	To Uxbridge Brook Tributary – VO Node 101		To Centre Road CSP Culvert – VO Node 102	
	4-Hour Chicago	12-Hour SCS	4-Hour Chicago	12-Hour SCS
2 Year	0.702	1.138	0.051	0.085
5 Year	1.431	2.091	0.109	0.148
10 Year	1.964	2.752	0.151	0.190
25 Year	2.636	3.508	0.212	0.238
100 Year	4.087	4.871	0.329	0.323

A summary of modelling parameters and an existing VO6 schematic are provided in **Appendix C**. A CD containing the VO6 hydrology model is also provided in **Appendix C**.

2.3 Best Management Practices

In accordance with the MECP Stormwater Management Planning and Design Manual (2003), a review of stormwater management best practices was completed using a treatment train approach, which evaluated lot level, conveyance system and end-of-pipe alternatives. The potential best management practices were evaluated based on the stormwater management criteria listed in **Table 2.1**.

The following are examples of lot level, conveyance and end-of-pipe controls that were evaluated for use in the proposed development.

<u>Lot Level Controls</u>

Lot-level 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);
- Permeable pavements; and
- Infiltration trenches/soak-away pits.

<u>Conveyance Controls</u>

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;
- Bioretention systems;
- Catchbasin infiltration/filtration systems;

- Permeable pavement;
- Grassed filter strips, and
- Pervious pipe systems.

<u>End-of-Pipe Controls</u>

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/filtration basins;
- Manhole insert treatment systems (i.e. oil-grit-separators and filters); and
- Underground storage.

2.3.1 Proposed Lot Level Controls

Lot level controls present an opportunity to reduce runoff at the source. These controls are proposed on private properties. Incorporating controls that require minimal maintenance can be an effective method in the treatment train approach to SWM. The following lot level controls have been proposed for use in the proposed development:

<u>Increased Topsoil Depth</u>

An increase in the proposed topsoil depth on lots is recommended to promote lot level infiltration (up to 0.3 m depth). Increased topsoil depth will passively contribute to lot level quality and quantity control and to groundwater recharge. This contribution is not quantified to address the stormwater runoff control criteria in **Table 2.1**. A topsoil depth of 0.3 m is proposed for all landscaped areas.

<u>Roof Leaders to Grassed Areas</u>

Roof leaders will be discharged to grassed areas where feasible to promote lot level infiltration, thereby passively contributing to water quality and quantity control. This contribution is not quantified to address the stormwater runoff control criteria in **Table 2.1**.

<u>Rear Yard At-Surface Infiltration Trenches</u>

Infiltration trenches will be provided in the single detached rear yards as able, thereby passively contributing to water quality and quantity control. This contribution is not quantified as part of the quality and quantity control requirement in **Table 2.1**. At-surface trenches will however be utilized to meet water balance, phosphorus budget, and volume control requirements.

2.3.2 Proposed 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. The following conveyance controls have been proposed for use in the proposed development:
<u>Catchbasin Infiltration/Filtration Systems</u>

Catchbasin infiltration/filtration systems will provide quality control throughout the subdivision by capturing drainage from the right-of-way. Pre-treatment will be provided in the deep sump catchbasins and other means (e.g. goss trap, CB Shield, Litta Trap, etc.) to increase the operating lifespan of the trenches. An overflow connection will be provided from the catchbasins to the storm sewer to convey runoff in excess of the trench capacities. Infiltration trenches will be provided where there is adequate separation to the seasonally high groundwater. The stone filled trenches will be lined with an impermeable liner and provided with a subdrain where there is not adequate separation to the seasonally high groundwater (i.e. filtration trenches).

<u>Grassed Filter Strip</u>

Grassed filter strips provide passive treatment of runoff in a sheet flow condition contributing to water quality and quantity control. This contribution is not quantified as part of the quality and quantity control requirement in **Table 2.1**. A grassed filter strip will be utilized at the outlet of the dry SWM Pond to meet phosphorus budget requirements.

2.3.3 Proposed End-of-Pipe Controls

While lot level 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 subject 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 watercourse. Accordingly, the following end-of-pipe controls have been proposed for use in the proposed development:

<u>Wet Pond</u>

To meet quantity, quality and erosion control targets, flow restrictors are used to control stormwater release rates. To accommodate the reduced release rate, stormwater detention facilities are required to store stormwater runoff. Stormwater storage for the proposed development west of the NHS will be provided by a wet pond system.

<u>Dry Pond</u>

To meet quantity and erosion control targets, flow restrictors are used to control stormwater release rates. To accommodate the reduced release rate, stormwater detention facilities are required to store stormwater runoff. Stormwater storage for the proposed development east of the NHS will be provided by a dry pond system.

Manufactured Treatment Device

A manufactured treatment device can contribute to the treatment train approach for water quality control. Per Township of Uxbridge criteria, a Vortech oil-grit-separator (OGS) Unit (or approved equivalent) will be provided to treat runoff before it enters the wet pond and the underground storage facility.

Table 2.3 below summarizes the recommended stormwater management Best Management Practices (BMPs) for the subject development.

Table 2.3: Summary of the Recommended Stormwater Best Management Practices (BMPs)

Stormwater Management Control	Recommended BMP
Lot Level Controls	Increased Topsoil Depth
	Roof Leader to Grassed Areas
	Rear Yard At-Surface Infiltration Trenches
Conveyance System Controls	Catchbasin Infiltration/Filtration Systems
	Grassed Filter Strip
End Of Pipe Controls	Wet Pond
	Dry Pond
	Manufactured Treatment Device (OGS)

2.4 Proposed Storm Drainage

The proposed storm drainage plan is shown on **Figure 2.2**.

Runoff from Catchment 201 will be initially conveyed to local rear yard at-surface infiltration trenches and catchbasin infiltration/filtration facilities, where feasible, or otherwise captured in the minor system (refer to **Figure 2.3** for LID location plan). A wet SWM pond (Wet SWM Pond 1) will provide quantity, quality and erosion control for runoff up to and including the 100 year storm event before outletting to the Uxbridge Brook tributary. As per Uxbridge design criteria, an OGS will provide pre-treatment upstream of the wet SWM Pond. Major system flows will be conveyed by the proposed road right-of-ways to an overland flow route in the wet SWM pond block which doubles as the wet SWM pond access road. In an emergency spill scenario, runoff will be conveyed via an emergency spillway in the wet SWM pond to the Uxbridge Brook Tributary. A plan view of Wet SWM Pond 1 and associated infrastructure has been provided on **Figure 2.4**.

Runoff from Catchment 202 will be conveyed overland to a proposed 600 mm diameter bypass storm sewer and will outlet directly to the Uxbridge Brook tributary.

Runoff from Catchment 203 will be conveyed overland directly to the proposed dry SWM pond.

Runoff from Catchment 204 will initially be conveyed to local rear yard at-surface infiltration trenches and catchbasinfiltration facilities (refer to **Figure 2.3**), followed by conveyance via storm sewers and overland flow along road right of ways to an end of pipe stormwater attenuation facility. The catchbasin filtration facilities will provide the quality control requirements for Catchment 204. A dry SWM pond (Dry SWM Pond 1) will provide quantity and erosion control for runoff up to and including the 100 year storm event before outletting to the Uxbridge Brook tributary. An OGS will provide pre-treatment upstream of the dry SWM pond. Outflow from the control manhole will be directed to a grassed filter strip before outletting to the Uxbridge Brook Tributary via a trapezoidal outlet swale. Major system flows will be conveyed by the proposed road right-of-ways to an overland flow route on Street 'M' (west overland flow route) and Street 'J' (north overland flow route). In an emergency spill scenario, runoff will be conveyed via an emergency spillway in the dry SWM pond to the Centre Road ditch which conveys flows to the Uxbridge Brook Tributary. A plan view of the Dry SWM Pond 1 has been provided on **Figure 2.5**.

Runoff from Catchment 205 will be conveyed overland directly to the proposed dry SWM pond.

Runoff from Catchment 206 and 208 will be conveyed to local at-surface rear yard at-surface infiltration trenches, where able, or otherwise drain uncontrolled to the Centre Road ditch and Uxbridge Brook tributary, respectively.

Runoff from Catchment 207 will be conveyed to local at-surface rear yard at-surface infiltration trenches, where able, or otherwise drain uncontrolled to the Centre Road CSP culvert.

2.5 Proposed Stormwater Management Plan

2.5.1 Quantity Control and Erosion Control

The allowable release rates to the existing wetland and the north Centre Road CSP culvert for each design storm are presented in **Table 2.2** above.

Wet SWM Pond 1 will control proposed peak flows to the Uxbridge Brook tributary from the proposed development west of the NHS. Dry SWM Pond 1 will control proposed peak flows to the Uxbridge Brook tributary from the proposed development east of the NHS. Each quantity control facility is discussed in greater detail below. The active storage facilities above will control peak flows from the proposed development to existing peak flows for the 2 through 100 year storm events.

Proposed hydrology modelling was completed using the VO6 model to determine the required wet SWM pond and dry SWM Pond active storage volumes. A summary of modelling parameters and a proposed VO6 schematic are provided in **Appendix C**. A USB containing the VO6 hydrology model is also provided in **Appendix C**.

Wet SWM Pond 1

The attenuation of the extended detention volume in the wet SWM pond will provide erosion protection for the downstream watercourse as well as promote sediment removal for water quality. The extended detention volume for the proposed wet SWM pond has been sized based on the detention of the 40 mm - 4 hour Chicago rainfall event for a minimum of 24 hours. The required extended detention volume for the wet SWM pond is 4,980 m^3. This volume is greater than the 2003 MECP guidelines minimum extended detention volume of 40 m^3/ha or 1,090 m^3 based on the 27.26 ha drainage area. The peak release rate for the extended detention volume is approximately 0.094 m^3/s. Calculations are provided in **Appendix D**.

A 225 mm diameter extended detention orifice plate and a 2.4 m long broad crested weir are required to meet the design peak flow rates in **Table 2.2**. The weir will be provided as a cut-out from the proposed control manhole. A bottom draw outlet will be provided to convey low flows from the wet SWM pond to the control manhole. Multiple outlet design configuration and calculations are provided in **Appendix D**. The storage discharge characteristics of the wet SWM pond are provided below in **Table 2.4**.

Table 2.4: Wet SWM Pond 1 Operating Characteristics

Return Period Storm	4-Hour Chicago (VO Node 5)			12-Hour SCS Type II (VO Node 5)		
	Stage (m)	Discharge (m^3/s)	Storage (m^3)	Stage (m)	Discharge (m^3/s)	Storage (m^3)
40 mm	296.34	0.094	4,980	-	-	-
2 Year	296.18	0.082	3,895	296.32	0.092	4,808
5 Year	296.44	0.233	5,684	296.54	0.484	6,387
10 Year	296.54	0.472	6,362	296.67	0.897	7,279
25 Year	296.65	0.832	7,138	296.80	1.466	8,248
100 Year	296.87	1.826	8,824	297.03	2.659	10,047

Dry SWM Pond 1

The attenuation of the extended detention volume in the dry SWM pond will provide erosion protection for the downstream Uxbridge Brook tributary. The extended detention volume for the proposed dry SWM pond has been sized based on the detention of the 40 mm - 4 hour Chicago rainfall event for a minimum of 24 hours. The required extended detention volume for the dry SWM pond is 1,160 m^3. This volume is greater than the 2003 MECP guidelines minimum extended detention volume of 40 m^3/ha or 249.6 m^3 based on the 6.24 ha drainage area. The peak release rate for the extended detention volume is approximately 0.021 m^3/s. Calculations are provided in **Appendix D**.

A 90 mm diameter extended detention orifice plate and a 0.4 m long broad crested weir are required to meet the design peak flow rates in **Table 2.2**. The weir will be provided as a cut-out from a concrete wall internal to the control manhole. Multiple outlet design configuration and calculations are provided in **Appendix D**. The storage discharge characteristics of the dry SWM Pond are provided in **Table 2.5**.

Table 2.5: Dry SWM Pond 1 Operating Characteristics

Return Period Storm	4-Hour Chicago (VO Node 15)			12-Hour SCS Type II (VO Node 15)		
	Stage (m)	Discharge (m^3/s)	Storage (m^3)	Stage (m)	Discharge (m^3/s)	Storage (m^3)
40 mm	285.11	0.021	1,160	-	-	-
2 Year	284.98	0.015	920	285.07	0.019	1,090
5 Year	285.20	0.056	1,331	285.25	0.119	1,435
10 Year	285.25	0.124	1,442	285.34	0.229	1,613
25 Year	285.33	0.222	1,602	285.43	0.420	1,808
100 Year	285.49	0.550	1,921	285.60	0.831	2,159

<u>Peak Flow Comparison</u>

The proposed development was designed to control proposed peak flows to the existing peak flows. **Table 2.6** and **Table 2.7** provide a comparison of existing and proposed peak flows to the existing wetland and to the Centre Road CSP culvert.

Table 2.6: Comparison of Existing and Proposed Peak Flows – 4-hour Chicago

Return Period Storm	To Uxbridge Brook Tributary (m^3/s) – VO Node 17		To Centre Road CSP Culvert (m^3/s) – VO Node 207	
	Ex.	Prop.	Ex.	Prop.
2 Year	0.702	0.219	0.051	0.012
5 Year	1.431	0.394	0.109	0.024
10 Year	1.964	0.871	0.151	0.034
25 Year	2.636	1.519	0.212	0.048
100 Year	4.087	3.146	0.329	0.075

Table 2.7: Comparison of Existing and Proposed Peak Flows – 12-hour SCS Type II

Return Period Storm	To Uxbridge Brook Tributary (m^3/s) – Node 17		To Centre Road CSP Culvert (m^3/s) – Node 207	
	Ex.	Prop.	Ex.	Prop.
2 Year	1.138	0.317	0.085	0.017
5 Year	2.091	0.919	0.148	0.031
10 Year	2.752	1.606	0.190	0.043
25 Year	3.508	2.548	0.238	0.055
100 Year	4.871	4.376	0.323	0.076

As shown above, the proposed peak flows are less than or equal to the existing peak flows for the 2 through 100 year storm events. A summary of modelling parameters and an existing VO6 schematic are provided in **Appendix C**. A USB containing the VO6 hydrology model is also provided in **Appendix C**.

2.5.2 Quality Control

Quality control will be provided for the proposed development to meet MECP Enhanced Level Protection (80% TSS Removal) requirements. The solutions for each development area are discussed below.

West of the NHS

Quality control for Catchment 201 and 203 will be provided by the proposed wet SWM pond located adjacent to the existing wetland. The wet SWM pond has been sized for a minimum of 80% TSS removal (MECP Enhanced Level), this corresponds to a required permanent pool volume of 4,307 m^3. The preliminary grading of the wet SWM pond will provide a permanent pool volume of 5,310 m^3,calculations are provided in **Appendix D**. Additional removal of sediment from the runoff will be provided by upstream BMPs such as catchbasin infiltration/filtration trenches, rear yard at-surface infiltration trenches, and an OGS (Vortech Unit) located upstream of the wet SWM pond. The design of these additional facilities is discussed further in the following sections.

Quality control for Catchment 202 is not required. It is noted that the drainage associated with Catchment 202 is from roofs and rear yards which is generally considered clean. The runoff will have an opportunity to infiltrate in rear yard at-surface infiltration trenches and as it crosses grassed surfaces before sheet flowing to the NHS.

East of the NHS

Quality control for Catchment 204 will be provided by proposed catchbasin filtration trenches sized for a minimum of 80% TSS removal (MECP Enhanced Level), this corresponds to a required filtration volume of 182.7 m^3. The preliminary catchbasin filtration trench layout and design for Catchment 204 will provide a filtration volume of 188.0 m^3, calculations are provided in **Appendix E**. The design of the catchbasin filtration trenches is discussed further in the followings sections. Additional removal of sediment from the runoff will be provided by upstream BMPs such as rear yard at-surface infiltration trenches, an OGS (Vortech Unit) upstream of the dry SWM Pond, and a grassed filter strip downstream of the dry SWM Pond.

Quality control for Catchments 205, 206, and 207 is not required. It is noted that the drainage associated with these catchments is from roofs and rear yards and the SWM block which is generally considered clean. The runoff will have an opportunity to infiltrate in rear yard at-surface infiltration trenches and as it crosses grassed surfaces before sheet flowing to the NHS or to grass roadside ditches.

2.5.3 Volume Control

The proposed development will include more than 0.5 ha of new impervious surface, therefore, per LSRCA criteria, the post-development runoff volume from a 25 mm rainfall event from impervious surfaces must be retained on-site unless the site is considered a “site with restrictions”. Volume control was calculated for each development area as outlined below.

Volume control for the proposed development will be provided through rear yard at-surface infiltration trenches, and catchbasin infiltration/filtration trenches. Rear yard at-surface infiltration trenches will be provided on all split draining lots where feasible. Catchbasin infiltration trenches will be provided wherever there is adequate clearance to the seasonally high groundwater. Catchbasin filtration trenches will be provided where infiltration trenches are not feasible. Catchbasin infiltration/filtration trenches cannot be provided where they would have to cross an intersection or where it would interfere with lot servicing connections. The design of the infiltration and filtration facilities is discussed further in the following sections.

The combined volume provided based on the preliminary BMPs above is 1,229.4 m^3 which corresponds to an equivalent depth of rainfall over the total impervious area of 6.4 mm. This achieves Alternative #2 criteria for volume control. Additional volume control cannot be provided due to the high seasonal groundwater conditions, generally low infiltration rate across the site (to be confirmed through detailed design).The number and size of rear yard infiltration trenches has been maximized. The size of the catchbasin infiltration/filtration trenches have been maximized to still achieve relevant sizing criteria and not interfere with required service connections and utilities in the right-of-way. Calculations are provided in **Appendix E**.

2.5.4 Water Budget

Where feasible, measures to minimize impacts on the water budget will be incorporated into the development design. As noted in the Hydrogeological Study, the estimated existing infiltration volume on the proposed development is approximately 60,883 m^3. Without mitigation the proposed development infiltration volume is approximately 31,668 m^3. It is anticipated that a proposed infiltration volume of approximately 160,246 m^3 can be achieved through the proposed mitigation measures outlined above.

2.5.5 Phosphorus Budget

Under the Lake Simcoe Protection Plan, a stormwater management plan must demonstrate how phosphorus loadings are minimized between existing and proposed. The MECP database application *Lake Simcoe Phosphorus Loading Development Tool* (v2, 01-April-2012 update) was used to complete the phosphorus budget for the proposed development. Due to the complex treatment train provided by the SWM measures outlined above, a spreadsheet based on the MECP database application was developed to determine the existing and proposed phosphorus budget.

Existing Phosphorus Loadings

The existing land uses and areas are shown on **Figure 2.6**. Based on the Phosphorus Loading Development Tool, the existing annual phosphorus loadings were calculated to be 3.72 kg/year. Refer to **Appendix E** for the phosphorus loading tool output.

Proposed Phosphorus Loadings

The proposed land uses for the site are shown on **Figure 2.7**. The proposed phosphorus loading with no BMPs was calculated to be 40.42 kg/yr (refer to **Appendix E**).

The proposed phosphorus loading with the treatment train of BMPs was calculated to be 3.97 kg/yr (see **Appendix E**). In addition to the BMPs, runoff from the site has the opportunity for additional treatment as it is conveyed to the Uxbridge Brook Tributary such as through the

NHS (Stream Buffer) and through grassed ditches along Centre Road North and through the adjacent property to the east (enhanced grass swales). **Table 2.8** provides a summary of the phosphorus budget calculations.

Table 2.8: Phosphorus Budget Summary

Phosphorus Loading (kg/yr)		
Existing	**Proposed without BMPs**	**Proposed with BMPs**
3.72	40.42	3.97

Based on the site conditions, the proposed phosphorus export will be approximately 6.7% greater than existing conditions and 90.2% of the unmitigated phosphorus export will be removed by the proposed BMPs and outlet conveyance treatments. All remaining phosphorus exported from the proposed development will be compensated as outlined in the LSRCA Phosphorus Offsetting Policy.

2.6 Wet Stormwater Management Pond 1 Design Criteria

Preliminary wet pond grading is provided on **Figure 2.4**. The preliminary wet pond design was established based on the following general criteria:

- A maintenance access road in accordance with Uxbridge standard US-807 will be provided from a proposed road with a maximum longitudinal slope of 10% and a crossfall of 2% (max). A maximum longitudinal slope of 5% will be used where pedestrian access is anticipated. The maintenance access road will be used to facilitate machinery to access the forebay during scheduled maintenance as well as to access the outlet structure for maintenance purposes;
- A Vortech OGS Unit (or approved equivalent) will be provided upstream of the wet SWM pond per Uxbridge design criteria, preliminary sizing calculations are provided in **Appendix F**;
- A safety shelf with a maximum slope of 6:1 for 3.0 m to either side of the normal water level will be provided;
- A maximum slope of 4:1 will be provided above and below the safety shelf; and
- A maximum slope of 3:1 will be provided as required to match into existing and proposed grades at the edges of the pond block.

2.7 Dry Stormwater Management Pond 1 Design Criteria

Preliminary dry pond grading is provided on **Figure 2.5**. The preliminary dry pond design was established based on the following general criteria:

- A 4 m wide maintenance access road will be provided from a proposed road with a maximum longitudinal slope of 10% and a crossfall of 5% (max). The maintenance access road will be used to facilitate machinery to access the facility during scheduled maintenance as well as to access the outlet structure for maintenance purposes. A 6m radius turning circle will be provided at the downstream end of the facility;

- The pond bottom will have a minimum slope of 0.5% towards the outlet headwall;
- A Vortech OGS Unit (or approved equivalent) will be provided upstream of the dry SWM pond per Uxbridge design criteria, preliminary sizing calculations are provided in **Appendix F**;
- A maximum slope of 4:1 will be provided below the top of pond;
- A maximum slope of 3:1 will be provided as required to match into existing and proposed grades at the edges of the pond block; and
- A grassed filter strip/outfall swale will be provided downstream of the facility to provide additional treatment for low flows.

2.8 Rear Yard At-Surface Infiltration Trenches

Rear yard at-surface infiltration trenches are proposed throughout the site for all split drainage lots where feasible. Overflow from the proposed trenches will drain uncontrolled into the Uxbridge Brook tributary or to the proposed wet SWM Pond or dry SWM Pond.

The trenches will be located beneath the rear yard swales, covered by approximately 0.15 m of topsoil. Based on the design infiltration rate of 12 mm/hr, a maximum trench depth of 0.6m can be infiltrated with 48 hours. The rear yard infiltration trenches will provide sufficient storage volume to infiltrate the 25mm storm event over the rear roof area of the lot. This corresponds to a total infiltration volume of approximately 560.6 m^3 provided by the rear yard at-surface infiltration trenches. Preliminary maximum infiltration trench dimensions based on lot frontage are provided in **Table 2.9** below. Refer to **Figure 2.8** for rear yard at-surface infiltration trench details, calculations are provided in **Appendix E**.

Table 2.9: Rear Yard At-Surface Infiltration Trench Dimensions

Maximum Trench Dimensions				
Minimum Typical Lot Frontage (m)	**Length (m)**	**Width (W)**	**Depth (m)**	**Maximum Infiltration Volume Provided (m^3)**
10.4	9.4	1.5	0.6	3.4
11.5	10.5	1.5	0.6	3.8
13.4	12.4	1.5	0.6	4.5

2.9 Catchbasin Infiltration and Filtration Trenches

Catchbasin infiltration and filtration trenches are proposed to provide treatment of runoff from the road right-of-way and lots within the proposed development. Runoff entering deep sump catchbasins will be directed through a catchbasin pretreatment device (e.g. goss trap, CB Shield, Litta Trap, etc.) before entering a lead directed to the trenches. Runoff in excess of the capacity of the lead, or if an infiltration trench has reached capacity, will be directed through an overflow lead into the minor system. The trenches will be located beneath the right-of-way boulevards. The proposed subdivision right-of-way is discussed further in **Section 6.0**.

Based on the design infiltration rate of 12 mm/hr, a maximum trench depth of 0.6 m can be infiltrated with 48 hours. The catchbasin infiltration trenches will be composed of washed clear stone with approximate dimensions of 0.6 m deep and 1.0 m wide. Approximately 235 m of infiltration trench is proposed, the length of individual infiltration trenches will vary based on catchbasin spacing and tributary area. This corresponds to a total provided infiltration volume of 56.4 m^3. Refer to **Figure 2.9** for catchbasin infiltration trench details, calculations are provided in **Appendix E**.

The catchbasin filtration trenches will be composed of 0.6 m of washed clear stone on top of 0.4 m of brick sand and will be approximately 1.0 m wide. A perforated drain within the brick sand layer connected to the minor system will be provided at the downstream end of the filtration facility. Approximately 1,565 m of filtration trench is proposed, the length of individual filtration trenches will vary based on catchbasin spacing and tributary area. This corresponds to a total provided filtration volume of 626.0 m^3. Within catchment 204, approximately 470 m of filtration trench is proposed (188.0 m^3 of filtration volume) to provide the required quality control volume (182.7 m^3). Refer to F**igure 2.9** for catchbasin filtration trench details, calculations are provided in **Appendix E**.

2.10 Storm Servicing

The storm sewer system (minor system) will be designed for the 5 year storm event as per the Township of Uxbridge standards.

The storm sewer system will typically be designed with grades between 0.5% and 4%. Throughout the proposed development, the storm sewer will be constructed at a minimum depth of 1.5 m to obvert to provide frost protection and at sufficient depth to accommodate foundation drains where connections are required. The preliminary layout for the proposed storm sewer within the proposed development is provided on **Figure 2.2**. The storm drainage system will be designed in accordance with the Township of Uxbridge and MECP guidelines, including the following:

- Pipes to be sized to accommodate runoff from a 5 year storm event,
- Minimum Pipe Size: 300 mm diameter,
- Maximum Flow Velocity: 4.5 m/s,
- Minimum Flow Velocity: 0.75 m/s,

The rainfall intensity will be calculated as follows, where 'i' is the rainfall intensity (mm/hour) and A, B, and C are as per **Table 2.10**:

$$i = A / (T_c + B)^c$$

Table 2.10: Rainfall Intensity Parameters

Return Period Storm	A	B	C
2 Year	645	5	0.786
5 Year	904	5	0.788
10 Year	1065	5	0.788
25 Year	1234	4	0.787
100 Year	1799	5	0.810

Preliminary sizing calculations were prepared for sizing the storm sewers entering the proposed wet SWM pond and dry SWM pond. The design sheet is provided in **Appendix D**.

2.11 Overland Flow

Major system flows (greater than the 5 year up to the 100 year storm event) will be conveyed within the road right-of-ways and laneways to suitable outlets. Right-of-way capacity calculations are provided in **Appendix D.**

An overland flow route is provided west of the NHS to convey major system flows to the wet SWM Pond. The overland flow route doubles as the access road to the pond. A 0.3m deep channel will convey flows to the downstream end of the forebay. Calculations are provided in **Appendix D**.

East of the NHS, major system flows will be conveyed to low points on Street 'J' and Street 'M'. Overland flow routes will convey major system flows to the dry pond. The overland flow route from Street 'M' will be located in a 6m wide block between two proposed lots. Calculations are provided in **Appendix D**.

A 600 mm diameter HDPE bypass storm sewer is proposed to convey the external and rear yard flows from Catchment 202 to the existing wetland. The culvert will convey the peak flow from the greater of the 100 year and Regional storm events. Conveyance calculations are provided in **Appendix D**.

2.12 Stormwater Management and Servicing Phasing

The stormwater management and servicing of Phase 1 of the proposed development will be able to proceed without any Phase 2 infrastructure. The proposed stormwater management infrastructure (Dry SWM Pond 1, catchbasin filtration trenches, and rear yard infiltration trenches) and storm sewer system are independent of Phase 2. The bypass storm sewer will be constructed as part of Phase 2 as the crossing is not required until the Phase 2 subdivision has been constructed.

3.0 SANITARY SERVICING

3.1 Existing Sanitary Sewer System

Existing sanitary sewers are located on Oakside Drive and Bolton Drive to the south of the proposed development. The existing sanitary sewer system is illustrated on **Figure 3.1.** The anticipated flows from the proposed development were not included in the design of downstream infrastructure (refer to Drawing SAN for the Mason Lands Phase 1 development in **Appendix B)**. A capacity analysis based on the proposed sanitary sewer system was undertaken and is discussed further below.

3.2 Proposed Sanitary Sewer System

The preliminary layout for the proposed sanitary sewer within the proposed development is provided on **Figure 3.1**.

The sanitary sewers within the proposed development will have slopes ranging between 0.5% and 4% (typically) and will be provided at 3 m to 6.5 m deep. Approximately 350 m of sanitary sewer will be provided on 6th Concession to service the proposed townhouses fronting onto the road.

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

- Residential Sanitary Generation Rate: 364 l/c/d,
- Population Density:
  - Townhouse – 3.0 people/unit,
  - Single Detached – 3.5 people/unit
- Peaking Factor: Harmon (Max. 3.8, Min 1.5),
- Infiltration Rate: 0.26 L/s/ha,
- Minimum Pipe Size: 200 mm diameter,
- Minimum Actual Velocity: 0.60 m/s, and
- Maximum Velocity: 3.65 m/s.

An area of 31.81 ha comprised of 69 townhouses and 521 single detached dwellings (total population 2,031) will be serviced as part of the proposed development. A preliminary sanitary sewer design sheet is provided in **Appendix G**.

External sanitary sewer options evaluated to service the proposed development include:

1) Bolton Drive System – The Bolton Drive sanitary sewer elevation is too high to feasibly connect the eastern half of the site. Additionally, a portion of the Bolton Drive sanitary sewer which crosses the Uxbridge Brook tributary was built at a shallow slope (0.3%) such that there is limited capacity available for even a portion of the proposed development (refer to Drawing P-101 in **Appendix B**). Downstream sewer sizes on this system also decrease in size, thereby further limiting capacity.
2) Oakside Drive System – The Oakside Drive system has some existing residual capacity and is described in further detail in **Section 3.3** below.

3) Future Mason Phase 2 development immediately east of the proposed development - The future Mason Phase 2development has been accommodated with a connection to the existing sanitary sewer system on Apple Tree Crescent. A further analysis is included below in **Section 3.3**.

An analysis of the potential external sanitary servicing options for the proposed development is provided below.

3.3 External Sanitary Servicing

An excerpt of the Township of Uxbridge Sanitary Sewerage System map (dated March 22, 2019) has been provided in **Appendix G** which shows the existing sanitary sewer system downstream of the proposed development.

As identified in **Section 3.2** there are two viable potential options for connecting the proposed development to the existing sanitary sewer system: connecting to the existing 200 mm diameter sanitary sewer located at the intersection of Centre Road and Oakside Drive (MH 113), or connecting to the future Mason Lands Phase 2 sanitary sewer. The Mason Lands Phase 2 sanitary sewer will connect to the existing 250 mm diameter sanitary sewer on Apple Tree Crescent (MH 008), refer to Drawing SAN for the Mason Lands Phase 1 development in **Appendix B**. Both existing sanitary sewers convey flows to Ash Green Lane which ultimately connects to the Uxbridge Water Pollution Control Plant.

As shown on the Mason Phase 1 sanitary drainage plan referenced above, the Oakside Drive sanitary sewer was not sized in anticipation of external flows however there is some inherent residual capacity remaining in the system based on the original Apple Tree Crescent sanitary sewer design (12.90 ha and a population of 800 persons).

As shown on **Figure 3.1**, the sanitary sewer to Oakside Drive would be constructed on Centre Road. An existing box culvert conveys the flows of the Uxbridge Brook Tributary from west to east across Centre Road and is located between Oakside Drive and the Centre Road intersection of the proposed development. The existing culvert has an upstream invert of 281.31 m, a downstream invert of 280.94 m, and a road surface elevation of approximately 284.5 m. There is insufficient clearance above the box culvert for the sanitary sewer to cross and maintain minimum frost cover and separation from the obvert of the culvert, therefore an inverted siphon would be required for the crossing which would pass beneath the existing culvert and continue to drain by gravity to the existing Oakside Drive sanitary sewer.

Alternatively the proposed development can connect across the proposed intersection at Centre Road to the Phase 2 Mason development, however the timing of this development is unknown and so a connection may not be available when required by the proposed development.

A capacity analysis of the two different connection options was undertaken to confirm the capacity of the downstream sanitary sewer systems and to identify any potential infrastructure upgrades to support the construction of the proposed development. Phase 1 of the proposed development, which has an area of approximately 6.17 ha and a population of 360.5 persons, was also analysed. In total, four different capacity analyses were performed:

- Option 1 – Phase 1 proposed development to Oakside Drive
- Option 2 – Phase 1 proposed development to Mason Lands Phase 2
- Option 3 – Ultimate proposed development to Oakside Drive
- Option 4 – Ultimate proposed development to Mason Lands Phase 2

For clarity, Options 1 and 3 include only flow contribution from the proposed development. Options 2 and 4 include flow contribution from the proposed development and the Mason Phase 2 lands.

The Township of Uxbridge sanitary map has been modified to provide summary figures for each of the scenarios above which show the sections of sanitary sewer where capacity is exceeded (coloured red) or close to being exceeded (85% to 100% capacity, coloured yellow). The figures and preliminary design sheets have been provided in **Appendix G**. The sewers where the capacity is exceeded will need to be upgraded in order to convey the sanitary flows from the proposed development and/or the Mason Phase 2 development. The sanitary sewer upgrades resulting from the capacity analysis have been summarized below for the four scenarios analysed:

- Option 1 – 180m of sewer exceeding capacity
- Option 2 – 260m of sewer exceeding capacity, 182m close to exceedance
- Option 3 – 1380m of sewer exceeding capacity, 95m close to exceedance
- Option 4 – 1115m of sewer exceeding capacity

In general Option 1 and Option 2 result in minimal surcharging of the sanitary sewer system on Dallas Street where the sewer was constructed at very shallow slopes (<0.4%), otherwise the system has sufficient capacity to convey the proposed flows. Option 3 and Option 4 require modifications to a significant length of the existing sanitary sewer system from Ash Green Lane to Dallas Street.

An HGL analysis was performed for Option 1. Based on the analysis there will be no anticipated negative impacts on upstream properties due to the anticipated surcharging. The analysis has been provided in **Appendix G**.

Consideration should be given to conducting a sanitary flow monitoring program to confirm actual flow rates in the existing sanitary sewers. If the actual flow rate is lower than the Region's theoretical design criteria, the required modifications to the existing sewer could be reduced. For example, under Option 3, by reducing the average domestic flow to 275 L/cap/day the length of sewer exceeding capacity is reduced to 640m.

Should the confirmation of existing flow rates be an acceptable approach to Durham Region, coordination with the Region will continue through the draft plan approval process to confirm the scope of the sanitary flow monitoring program.

3.4 Servicing Allocation

Durham Region operates the water supply and treatment infrastructure as well as the wastewater collection and treatment systems. As such, Durham Region provides bulk servicing allocation to the Township of Uxbridge. The Township of Uxbridge Council provides Servicing Allocation to individual development applications.

Wastewater servicing allocation is the limiting factor in the Township of Uxbridge. Servicing allocation is based on the capacity of the Uxbridge Brook Water Pollution Control Plant (WPCP). The WPCP current capacity is 15,000 people. The Region is currently undertaking a planned upgrade to the oxygenation system which could increase the current capacity to 16,470 people.

Uxbridge has been divided into two phasing areas. Phase 1 is the current Urban Area boundary and includes some potential infill and intensification areas. Phase 2 includes three proposed development properties outside of the current Urban Area as identified in the Township's Development Services – Planning staff report DS-03/19:

1) 1,905 people - Mediterra – 7370 Centre Rd (proposed development, current draft plan proposes a population of 2,031 per **Section 3.2**)
2) +/- 910 people - Mason – 7309 Centre Rd
3) +/- 1,245 people - Furlan – E. of Conc. 7, S. or Enzo Cres.

The following existing and proposed population statistics were identified in the Township's Development Services Planning Report DS 03/19 dated January 21, 2019:

- 11,520 - Current population estimate in Uxbridge (serviced)
- 555 - Current population estimate in Uxbridge (un-serviced)
- 600 – Allocation for Downtown Uxbridge
- 150 – Allocation for Long Term Care Facility
- 225 – Allocation for public lands
- 444 – Unbuilt Residential Development with Sanitary Capacity Allocated by the Region (Registered/Agreement)
- 680 – Unbuilt Residential Development Approved by the Township or OMB (Conditional)
- 535 – Phase 1 Potential Residential Development (Active applications or pre-consultation)
- 16,470 – Anticipated 2031 population forecast for Uxbridge and also the anticipated capacity of the WWTP upon completion of the current upgrade
- 1,761 – Remaining capacity to service the Phase 2 lands.

Based on the anticipated total Phase 2 population values noted above, there will be a Servicing Allocation shortfall of approximately 2,425 people based on the currently anticipated WPCP capacity (2,031+910+1,245-1,761). Based on the currently anticipated available servicing capacity of 16,470 people, the following options are available to service the proposed development, along with the remaining Phase 2 area:

- Durham Region to pursue a WPCP expansion through completion of a Class EA and an update of the Environmental Compliance Approval with the objective of servicing the entire Phase 2 population;
- Durham Region to investigate opportunities to re-rate the existing WPCP to maximize the servicing capacity, up to the full Phase 2 population if possible (may include stress testing the existing facility and possible incorporation of inflow/infiltration reduction measures or water use reduction measures);

- Utilize (borrow) a portion of the Phase 1 reserved servicing allocation to advance Phase 2 lands prior to implementing further WPCP improvements;
- Utilize private communal wastewater treatment facilities in portion of the Phase 2 lands (subject to a detailed site assessment to confirm this is a suitable approach), beyond the overall available WPCP capacity; or
- Combinations of the options above.

4.0 WATER SUPPLY AND DISTRIBUTION

4.1 Existing Water Distribution

The existing watermain system extends to the intersections of Bolton Drive and 6th Concession Road and Oakside Drive and Centre Road North. The existing watermain system is illustrated on **Figure 4.1**.

The Quaker Hill reservoir and Quaker Hill pumping station are immediately south of Bolton Drive fronting onto 6th Concession. The proposed development is bisected by the U1 and U2 pressure zones. Refer to **Appendix B** for the Township of Uxbridge (West) Water Supply System map. The U1 reservoir high water level (static HGL) is 330.6 m and has approximate maximum ground level service elevation of 300m. The U2 reservoir high water level (static HGL) is 362m and has an approximate maximum ground level service elevation of 330.5m.

4.2 Proposed Water System

The preliminary layout for the proposed watermain system is provided on **Figure 4.1.** The development is proposed to be serviced as follows:

- Connection to the existing 300 mm diameter watermain on 6th Concession; and
- Connection to the existing 300 mm diameter watermain on Centre Road North.

The watermain will be extended by approximately 610 m along 6th Concession from Bolton Drive, to service the proposed development. The watermain will be extended by approximately 320 m on Centre Road to the proposed Street J intersection. An interconnection can be provided for the future Phase 2 Mason Lands development.

A watermain loop will be provided between Street ‘L’ and Street ‘J’ within a 6 m wide servicing easement. In support of Phase 1 of the proposed development a secondary connection will be provided to Centre Road from Street ‘L’ within a 6 m wide servicing easement.

Through discussions with the Region it is understood that the following Regional infrastructure upgrades are required to accommodate Phase 2 of the Township of Uxbridge Master Plan:

- Additional wells for water supply. (Project is identified in 2018 DC and current Budget/Forecast)
- Additional Zone 1 water Storage. (Project is identified in 2018 DC and current Budget/Forecast)
- Additional Zone 2 pumping capacity at the Quaker Hill Reservoir & Pumping Station. (Project is not identified in 2018 DC and current Budget/Forecast)

An analysis of the site water distribution network was completed by Municipal Engineering Solutions. A copy of the analysis is included in **Appendix H**. The analysis identified issues with servicing phase 2 of the proposed development where road surface elevation exceeds the current servicing provided by Zone U2 (centerline elevation of approximately 330.5m) which is consistent with the required infrastructure upgrades noted by the Region above. Phase 1 of the analysis can be serviced by the existing Zone U1 pressures. Further analysis of the complete water model of the Township is recommended to account for pressure variations not captured by the hydrant tests performed in support of the analysis as well as the typical operation of the Township's water system.

Coordination with the Region will continue through the draft plan approval process to confirm implementation timing of the required upgrades as well as additional analysis to confirm the water servicing of the site.

The watermain system will be designed in accordance with the Region of Durham and MECP criteria including:

- Residential water usage rate: 450 L/c/d,
- Population Single Family Dwelling: 3.5 persons/unit;
- Townhouse Dwelling: 3.0 persons/unit;
- Minimum Residential Pipe Size: 150 mm diameter;
- Minimum Pipe Depth: 1.8 m;
- Maximum of 20 houses on a dead end section; and
- Maximum Hydrant Spacing: 150 m.

A closed valve will be provided on Street 'J' at the break between Zone U1 and Zone U2 as noted on **Figure 4.1**.

5.0 GRADING

5.1 Existing Grading Conditions

The existing topography has slopes in the range of 0.5% to 25%. The ground surface elevations through the proposed development range from approximately 335 m in the northwest corner to approximately 282.5 m in the southeast corner.

5.2 Proposed Grading Concept

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

- Satisfy the Township of Uxbridge lot and road grading criteria including:
  - Minimum Road Grade: 0.5%
  - Maximum Road Grade: 5.0%
  - Minimum Lot Slope: 2%
  - Maximum Lot Slope: 5%
  - Maximum Lot Grade: 12% (calculated from difference in lot elevations between the rear wall of the house and property line – embankments included)
  - Maximum slope between terraces and embankments shall be 3:1 when vertical difference does not exceed 1 metre and 4:1 otherwise.
- Provide continuous road grades for overland flow conveyance;
- Minimize the need for retaining walls;
- Minimize the volume of earth to be moved and minimize cut/fill differential;
- Minimize the need for rear lot catchbasins; and
- Achieve the stormwater management objectives required for the proposed development.

A preliminary grading plan is provided on **Figure 5.1**.

The change in elevation across the site is substantial. For the main road which bisects the proposed development (Street 'J'), the western intersection with 6th Concession has an elevation of approximately 334.6 m and the eastern intersection with Centre Road North has an elevation of approximately 287.8 m (46.8m difference). The difference in elevation across the site has been considered in the preliminary grading plan and results in maximum road grades and grade change accommodation through both built form and retaining walls.

In order to match into the existing road at the site boundaries and NHS, the required road grade across the site utilizes the maximum allowable grade, with all roads that have an east-west alignment at a grade of 5% to the extent possible. The municipal design criteria limitations of the centerline grading result in significant areas of cut and fill throughout the site with a maximum proposed cut depth of approximately 5.0 m and a maximum proposed fill depth of approximately 6.3 m. A slightly steeper road slope than the current municipal design criteria (i.e. 6.0%) would significantly minimize the proposed cut and fill volumes and would also minimize retaining walls and significant grade drops through built form (i.e. reduction in deck requirements). This will be discussed further with Township staff through the draft plan approval process and can be implemented at the detailed design stage.

Retaining walls are proposed in one location (south retaining wall shown on **Figure 5.1**). The south retaining wall is approximately 190 m long with a maximum height of 3.9 m. In order to reduce the height of the retaining wall, embankment grading is proposed to within 5m of the NHS. Sloping is required into the NHS around the Street 'I' cul-de-sac. Per the Beacon Environmental Impact Study, the NHS in this area (HDF2) is described as ephemeral and will be compensated for accordingly (refer to relevant excerpts in **Appendix B**). The increase in allowable maximum road slope recommended above would also reduce the height and extents of the proposed retaining wall and sloping.

At the detailed design stage, the preliminary grading shown on **Figure 5.1** will be subject to a more in-depth analysis in an attempt to balance the cut and fill volumes and minimize slopes and walls.

6.0 RIGHT-OF-WAYS AND SIDEWALKS

The proposed road network of the proposed development is composed of 20.0 m right-of-ways and two 6.0 m laneways.

The 20.0 m right-of-way will be the Township standard which has been modified to incorporate a catchbasin infiltration/filtration trench. The location of the trench is such that none of the standard geometry or service locations require modification. Sidewalk will be provided on the same sides of the right-of-way as the watermain to avoid conflicts with the proposed catchbasin infiltration/filtration trenches.

The 6.0 m laneway will have the same pavement and utility geometry as the City of Markham's 8.5 m laneway standard. The lane lights and utilities required in the City of Markham standard have been incorporated into the lot footprint and will be accessible via a blanket easement across the frontage of the units. No servicing connections will be made from the laneways to the proposed laneway townhouses. The driveway setbacks for the proposed laneway match the City of Markham standard which provides sufficient access for laneway garages. Laneway garages are proposed on the west side of the laneway only, the eastern lots backing onto the laneway will have driveway and garage access from their eastern frontage.

The proposed right-of-way cross-sections are provided in **Appendix I**.

7.0 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

During the detailed design stage, 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). These measures will be designed and constructed as per the "Erosion and Sediment Control Guide for Urban Construction" document (TRCA, 2019). A detailed erosion and sediment control plan will be prepared for review and approval by the Municipality and Conservation Authority 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 been prepared in support of the Draft Plan of Subdivision application for the proposed 7370 Centre Road development in the Township of Uxbridge. The purpose of this report is to demonstrate that the development can be graded and serviced in accordance with the Township of Uxbridge, Lake Simcoe Region Conservation Authority (LSRCA), Region of Durham, and the Ministry of Environment, Conservation and Parks (MECP) design criteria.

General Information

- The existing land use is comprised of agricultural land and natural heritage system;
- The proposed development is located in the Uxbridge Brook subwatershed;
- The proposed development consists of low and medium density residential, parks, natural heritage system, stormwater management block, and road and laneways; and
- Construction of the proposed development will potentially be phased with Phase 1 consisting of the lands east of the NHS and Phase 2 consisting of the lands west of the NHS.

Stormwater Management and Storm Servicing

- Quality Control: MECP Enhanced (Level 1) water quality protection will be provided for the west half of the proposed development by a proposed Wet SWM Pond 1. Quality control will be provided for the east half of the proposed development by catchbasin filtration trenches in the right-of-way boulevard;
- Erosion Control: The runoff volume from a 40 mm rainfall event will be detained over 24 hours for the west half of the proposed development by Wet SWM Pond 1 and for the east half of the proposed development by the Dry SWM Pond 1;
- Quantity Control: Quantity control will be provided for the west half of the proposed development by Wet SWM Pond 1 and for the east half of the proposed development by Dry SWM Pond 1 to control peak flows for the 2 through 100 year storm events;
- Volume Control: The combined volume provided based on the preliminary BMPs is 1,229.4 m^3 which corresponds to an equivalent depth of rainfall over the total impervious area of 6.4 mm. This achieves Alternative #2 criteria for volume control. The proposed development is considered a site with restrictions due to proximity to seasonally high groundwater, and low infiltration rates;
- Water Budget: A water budget analysis was completed to demonstrate that the proposed annual infiltration volume will be greater than the existing annual volume;
- Phosphorus Budget: A phosphorus budget analysis was completed using the MECP phosphorus budget tool, which shows that the unmitigated phosphorus export will be reduced by approximately 90.2% through the use of BMPs throughout the proposed development including: rear yard at-surface infiltration trenches, catchbasin infiltration/filtration trenches, a wet SWM pond, a dry SWM pond, and a grassed filter strip;
- Storm Servicing:
  - Storm runoff will be conveyed by storm sewers designed in accordance with Township of Uxbridge and MECP criteria;
  - Storm sewers will generally be designed for the 5 year storm event; and
  - Adequate 100 year overland flow routes will be provided.

- Existing external drainage will be accommodated through the proposed development via a bypass storm sewer crossing Street 'J'.

Sanitary Sewage Disposal

- There are existing municipal sanitary sewers on Bolton Drive and Oakside Drive;
- A potential sanitary sewer connection can be made through the future Phase 2 Mason Lands development;
- The existing downstream sanitary sewer systems were not sized to convey flows from the proposed development, a capacity analysis was prepared to determine remaining capacity in the downstream Mason Phase 1 development system and potential required modifications based on a phased buildout of the proposed development.
- A sanitary monitoring program is proposed to confirm actual sanitary flow rates to reduce the amount of sanitary sewer replacement required to convey flows from the proposed development and Mason Phase 2 development.
- A servicing allocation shortfall is noted in the existing Uxbridge Water Pollution control plant for servicing the entirety of the Uxbridge Phase 2 development area. Several options are presented that allow for the proposed development to proceed.
- Sanitary allocation is required from the Town.

Water Supply

- There are existing municipal watermains on 6th Concession and Centre Road North;
- The development is proposed to be serviced with a connection to the existing watermains on 6th Concession and Centre Road North;
- Municipal Engineering Solutions has completed a watermain hydraulic analysis to show that there is sufficient domestic and fire flows to service the development; and
- Water supply allocation is required from the Town.

Grading

- The proposed development grading has been developed to match to the existing surrounding grades, and provide conveyance of stormwater runoff, including external drainage;
- The road slope has been maximized based on Township criteria to minimize cut and fill throughout the proposed development, an exception to this criteria to increase the allowable slope is recommended and requires further discussion with Township staff;
- Retaining walls are proposed in one locations with a maximum height of 3.9 m; and
- The lot grading will be subject to further grading design at the detailed design stage.

Right-of-Ways and Sidewalks

- The proposed municipal roads will be a 20.0 m right-of-way that follows the Township of Uxbridge standards, and has been modified to include BMP measures; and
- A 6.0 m laneway is proposed based on the City of Markham 8.5 m laneway standard.

Erosion and Sediment Control during Construction

- An erosion and sediment control plan will be prepared at the detailed engineering stage, in accordance with the "Erosion and Sediment Control Guide for Urban Construction" document (TRCA, 2019).

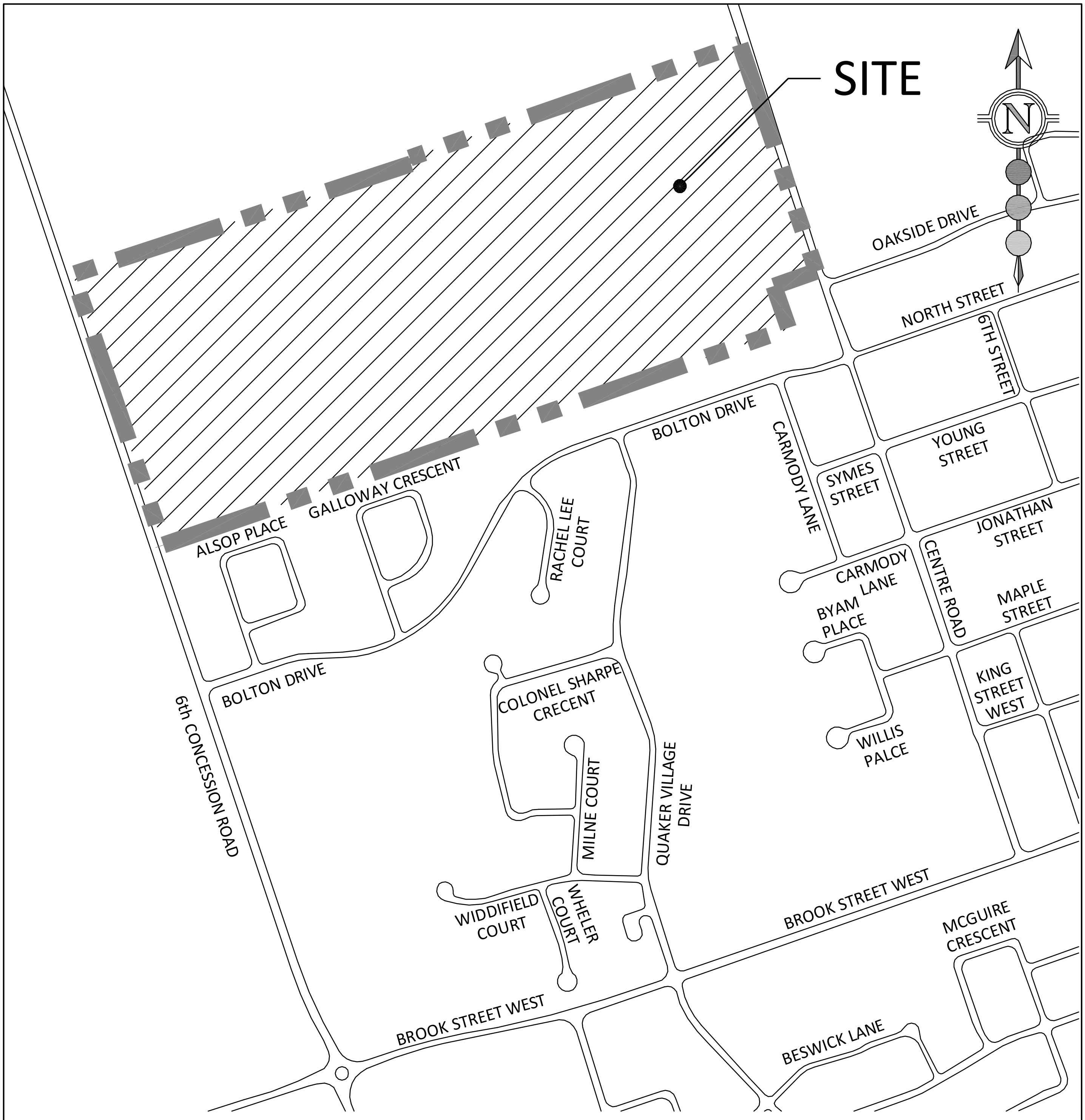
Respectfully Submitted:

SCS Consulting Group Ltd.

LICENSED PROFESSIONAL ENGINEER
N.D.MCINTOSH
100230564
March 9, 2021
PROVINCE OF ONTARIO

Colby Maier-Downing, E.I.T.
cmaier-downing@scsconsultinggroup.com

Nicholas McIntosh, M.A.Sc., P. Eng.
nmcintosh@scsconsultinggroup.com



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

7370 CENTRE ROAD UXBRIDGE

FSSR

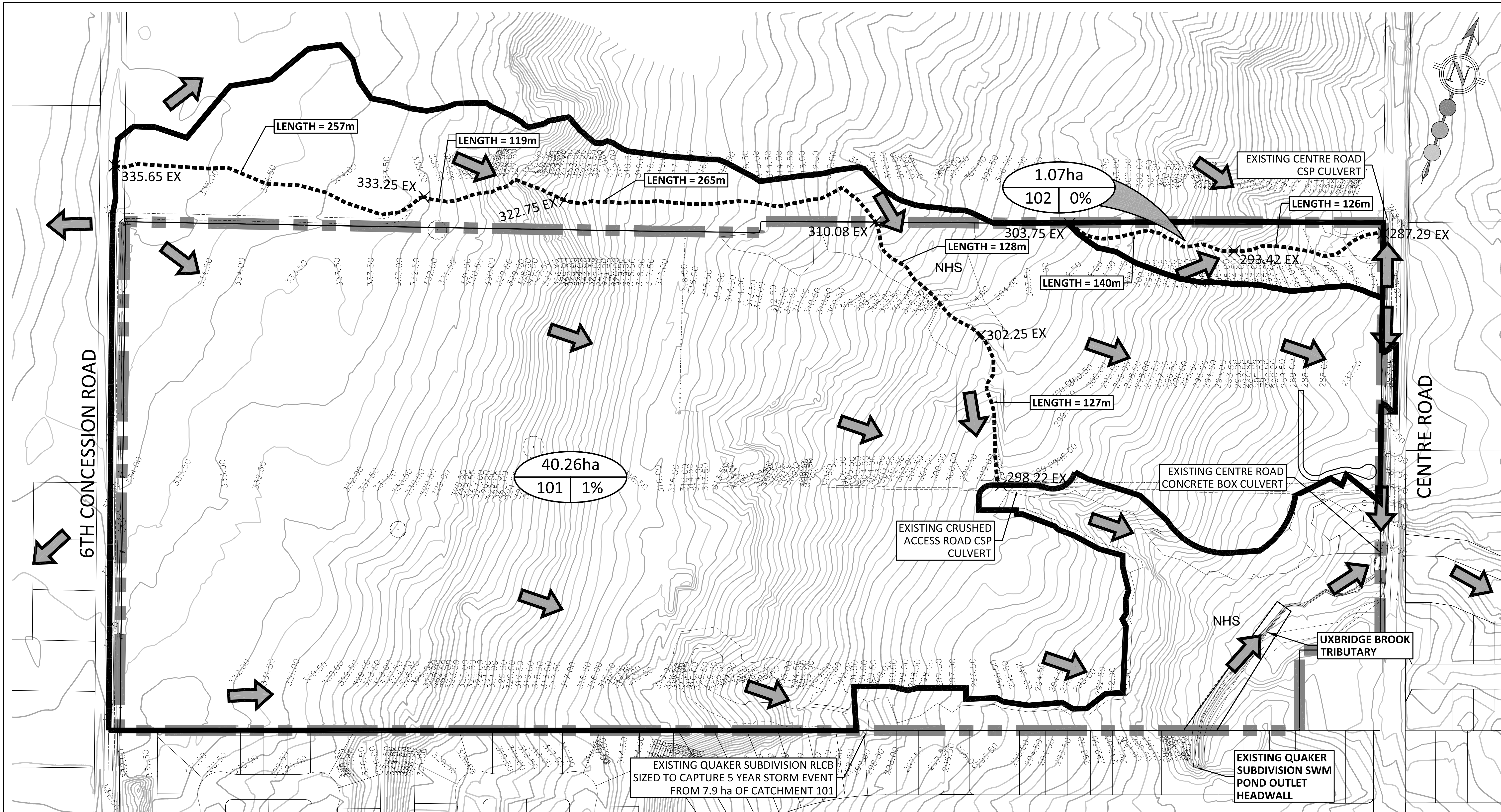
SITE LOCATION PLAN

DESIGNED BY:	N.D.M.	CHECKED BY:	L.C.M.
SCALE:	N.T.S.	DATE:	MARCH 2021

PROJECT No: 2099

FIGURE No: 1.1

File: P:\2099 7370 Centre Road Uxbridge\Drawings\FSP\Fig\Report Figures\2099P-LOCT-1.1.dwg – Revised by <STAN> : Fri, Mar 05 2021 – 9:24am



*NOTE: DRAINAGE BOUNDARIES BASED ON LIMIT OF DEVELOPMENT

LEGEND:

LIMIT OF PROPERTY	
STORM DRAINAGE BOUNDARY	
TIME TO PEAK FLOW PATH	
EXISTING CONTOUR AND ELEVATION (318.00)	
40.26ha	DRAINAGE AREA (HECTARES)
1%	(%) IMPERVIOUS
101	CATCHMENT ID
	OVERLAND FLOW DIRECTION
×302.25 EX	EXISTING ELEVATION

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7370 CENTRE ROAD UXBRIDGE

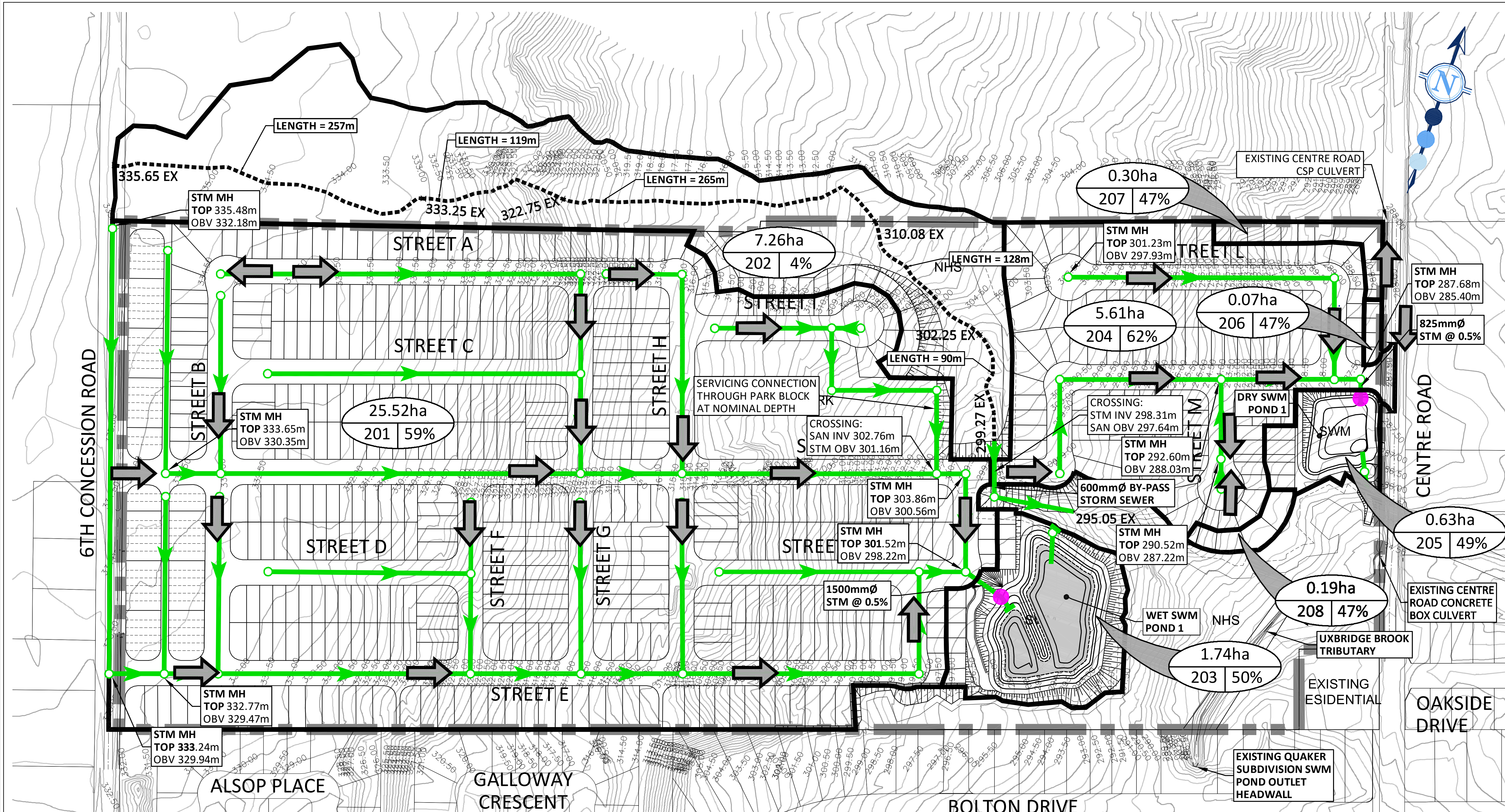
EXISTING STORM DRAINAGE PLAN

DESIGNED BY:	N.D.M.	CHECKED BY:	L.C.M.
SCALE:	1:3000	DATE:	MARCH 2021

PROJECT No: 2099

FIGURE No: 2.1

File: P:\2099 7370 Centre Road Uxbridge\Drawings\FSP\Fig\Report Figures\2099P-STRM-EXST-2.1.dwg - Revised by <STAN> : Fri, Mar 05 2021 - 9:13am



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

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LEGEND:

LIMIT OF PROPERTY	
PROPOSED STORM DRAINAGE BOUNDARY	
STORM SEWER AND MANHOLE	
EXISTING CONTOUR AND ELEVATION (318.00)	
25.52ha / 201 / 59%	DRAINAGE AREA (HECTARES); (%) IMPERVIOUS; CATCHMENT ID
	VORTECH OIL GRIT SEPARATOR
	OVERLAND FLOW DIRECTION

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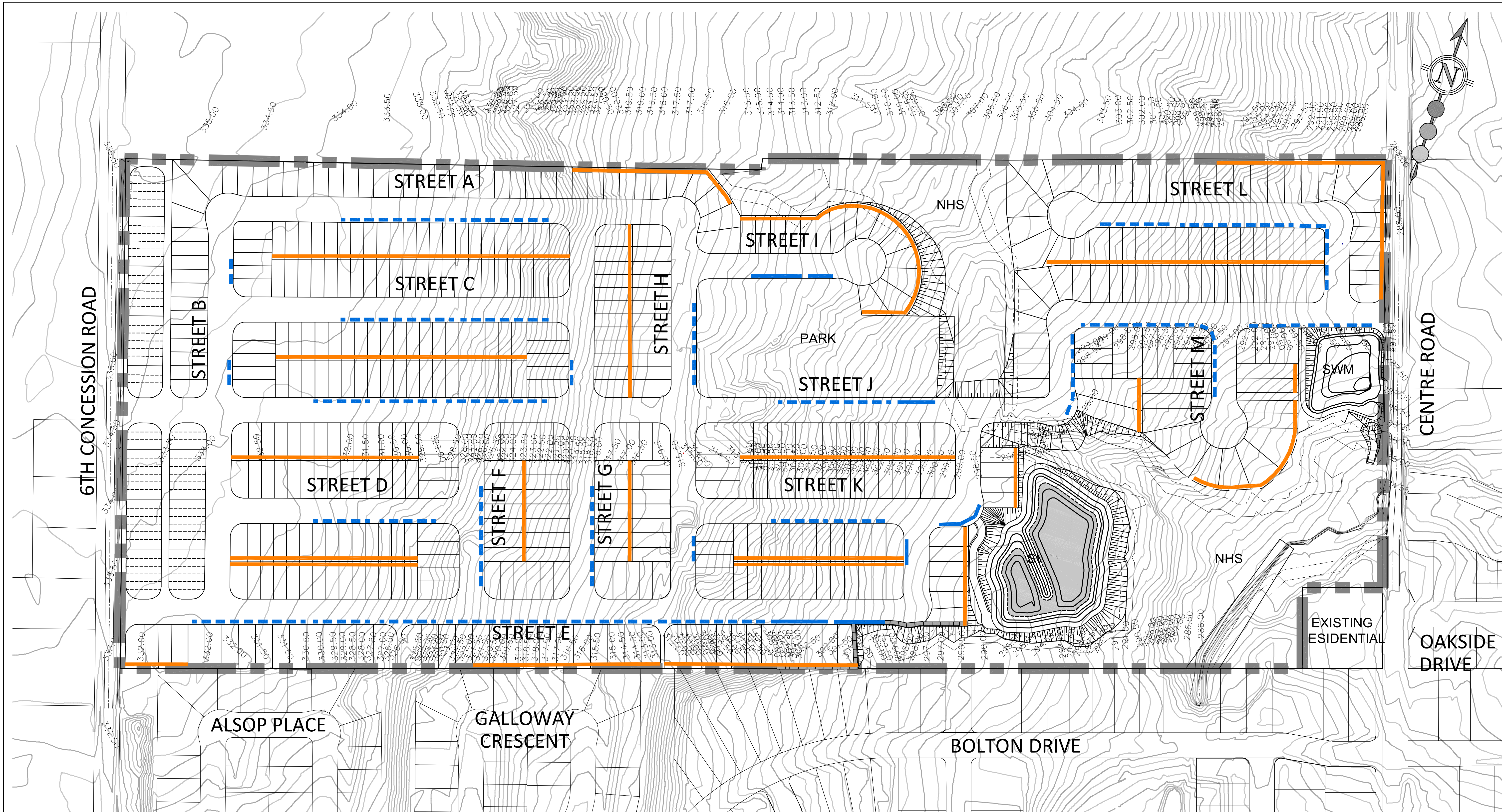
7370 CENTRE ROAD UXBRIDGE

PROPOSED STORM DRAINAGE PLAN

DESIGNED BY:	N.D.M.	CHECKED BY:	L.C.M.	PROJECT No: 2099	FIGURE No: 2.2
SCALE:	1:3000	DATE:	MARCH 2021		

File: P:\2099 7370 Centre Road Uxbridge\Drawings\FSP\Fig\Report Figures\2099P-STRM-PROP-2.2.dwg - Revised by <STAN> : Fri, Mar 05 2021 - 9:14am



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

LEGEND:

- LIMIT OF PROPERTY
- PROPOSED CATCHBASIN INFILTRATION FACILITY WITH CATCHBASIN PRETREATMENT
- PROPOSED CATCHBASIN FILTRATION FACILITY WITH CATCHBASIN PRETREATMENT
- REAR YARD AT-SURFACE INFILTRATION TRENCH

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FAX: (905) 475-8335

7370 CENTRE ROAD UXBRIDGE

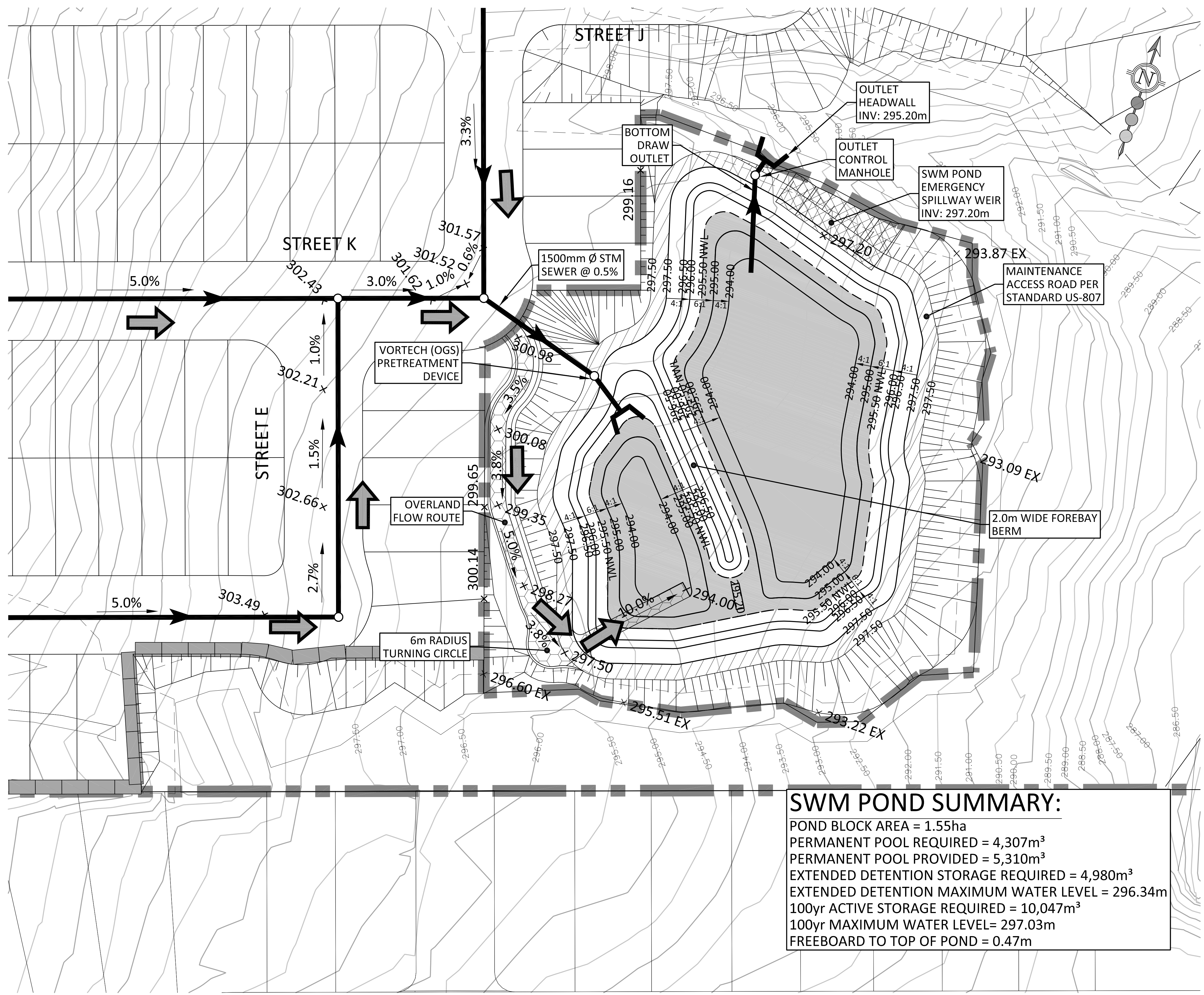
LID LOCATION PLAN

DESIGNED BY:	N.D.M.	CHECKED BY:	L.C.M.
SCALE:	1:3000	DATE:	MARCH 2021

PROJECT No: 2099

FIGURE No: 2.3

File: P:\2099 7370 Centre Road Uxbridge\Drawings\FSP\Fig\Report Figures\2099P-LIDS-2.3.dwg — Revised by <STAN> : Fri, Mar 05 2021 — 9:23am



LEGEND:

	LIMIT OF PROPERTY
	LIMIT OF SWM POND BLOCK
	STORM SEWER AND MANHOLE
293.00	EXISTING CONTOUR AND ELEVATION
295.50 NWL	PROPOSED NORMAL WATER ELEVATION
296.00	PROPOSED POND CONTOUR
	PROPOSED EMBANKMENT (MAX 3:1)
	MAINTENANCE ACCESS ROAD
	PERMANENT POOL
	OVERLAND FLOW ROUTE/MAINTENACE ACCESS ROAD
	EMERGENCY SPILL WAY
× 301.62	PROPOSED ELEVATION
× 296.50SW	PROPOSED SWALE ELEVATION
× 297.88 EX	EXISTING ELEVATION
	OVERLAND FLOW DIRECTION

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

SWM POND SUMMARY:

POND BLOCK AREA = 1.55ha
PERMANENT POOL REQUIRED = 4,307m^3
PERMANENT POOL PROVIDED = 5,310m^3
EXTENDED DETENTION STORAGE REQUIRED = 4,980m^3
EXTENDED DETENTION MAXIMUM WATER LEVEL = 296.34m
100yr ACTIVE STORAGE REQUIRED = 10,047m^3
100yr MAXIMUM WATER LEVEL= 297.03m
FREEBOARD TO TOP OF POND = 0.47m

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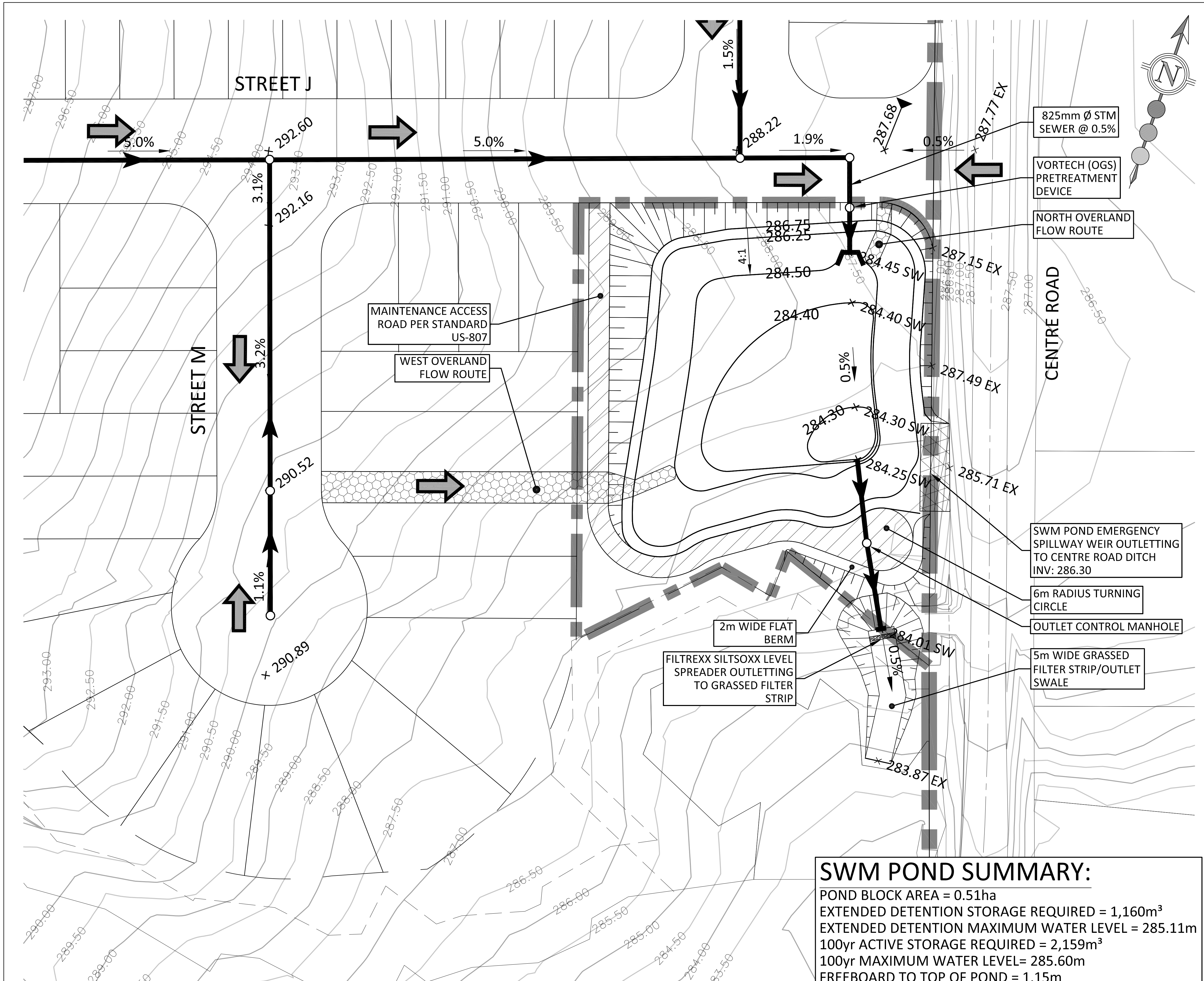
7370 CENTRE ROAD UXBRIDGE

WET STORMWATER MANAGEMENT POND 1

DESIGNED BY:	N.D.M.	CHECKED BY:	L.C.M.
SCALE:	1:1000	DATE:	MARCH 2021
PROJECT No:	2099	FIGURE No:	2.4

File: P:\2099 7370 Centre Road Uxbridge\Drawings\FSP\Fig\Report Figures\2099P-POND-2.4.dwg - Revised by <STAN> : Fri, Mar 05 2021 - 9:16am



SWM POND SUMMARY:

POND BLOCK AREA = 0.51ha
EXTENDED DETENTION STORAGE REQUIRED = 1,160m³
EXTENDED DETENTION MAXIMUM WATER LEVEL = 285.11m
100yr ACTIVE STORAGE REQUIRED = 2,159m³
100yr MAXIMUM WATER LEVEL= 285.60m
FREEBOARD TO TOP OF POND = 1.15m

LEGEND:

	LIMIT OF PROPERTY
	LIMIT OF SWM POND BLOCK
	STORM SEWER AND MANHOLE
288.00	EXISTING CONTOUR AND ELEVATION
	PROPOSED EMBANKMENT (MAX 3:1)
	MAINTENANCE ACCESS ROAD
	OVERLAND FLOW ROUTE
× 287.77 EX	EXISTING ELEVATION
× 292.60	PROPOSED ELEVATION
× 284.18SW	PROPOSED SWALE ELEVATION
	OVERLAND FLOW DIRECTION

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

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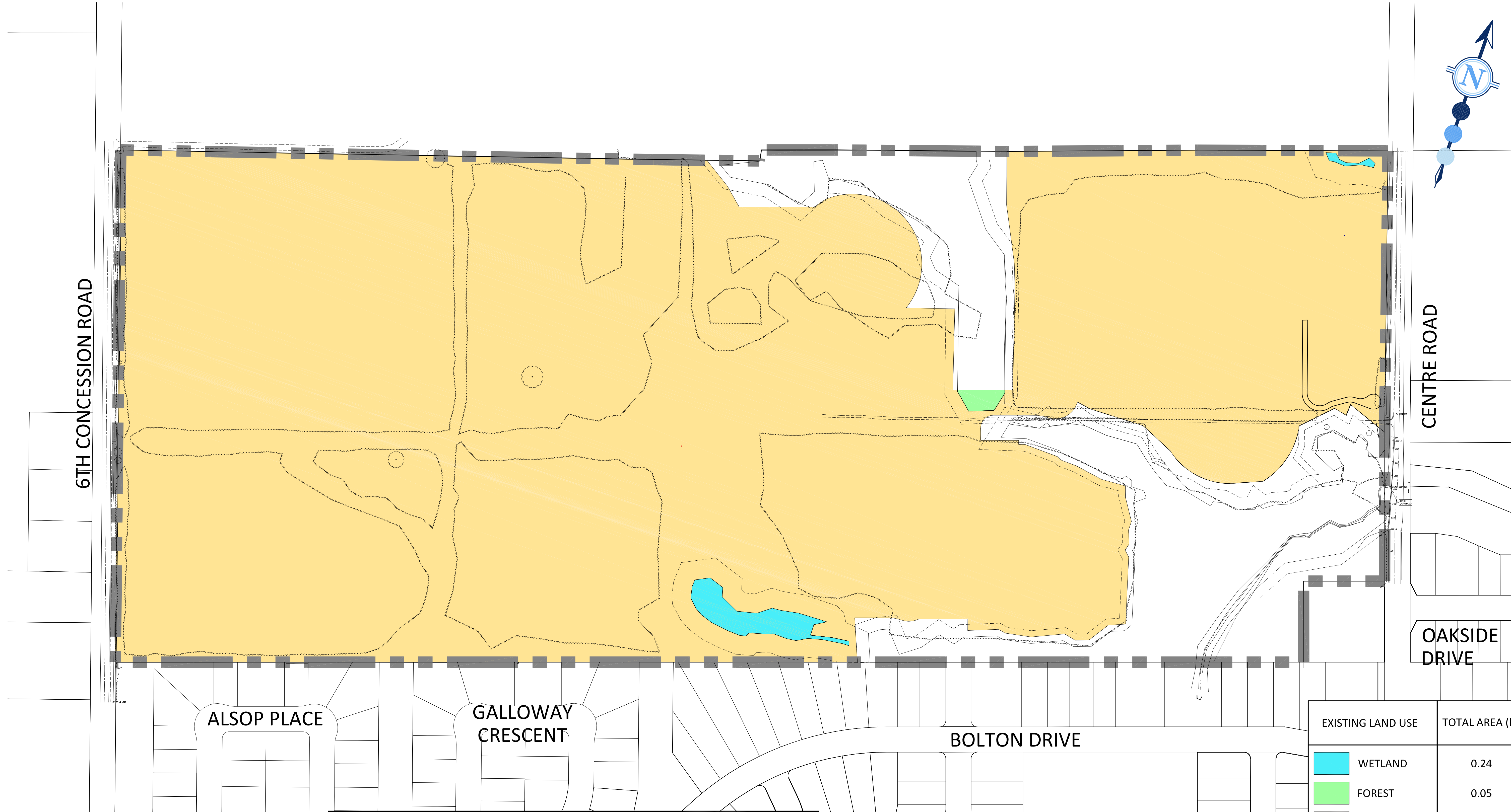
DRY STORMWATER MANAGEMENT POND 1

DESIGNED BY:	N.D.M.	CHECKED BY:	L.C.M.
SCALE:	1:750	DATE:	MARCH 2021
PROJECT No:	2099	FIGURE No:	2.5



EXISTING LAND USE	TOTAL AREA (ha)
WETLAND	0.24
FOREST	0.05
CROPLAND	33.75

LEGEND:

LIMIT OF PROPERTY

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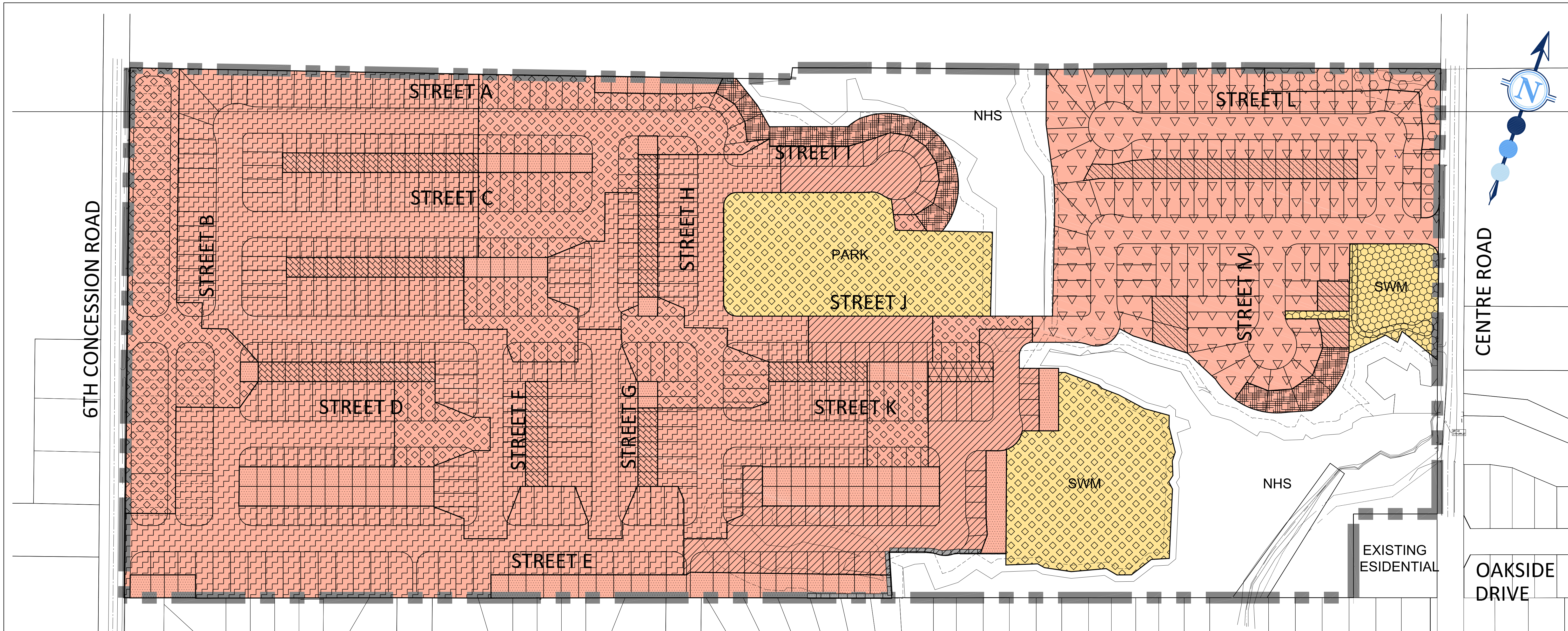
7370 CENTRE ROAD UXBRIDGE

EXISTING PHOSPHORUS BUDGET

DESIGNED BY: N.D.M.
CHECKED BY: L.C.M.
SCALE: 1:3000
DATE: MARCH 2021
PROJECT No: 2099
FIGURE No: 2.6

File: P:\2099 7370 Centre Road Uxbridge\Drawings\FSP\Fig\Report Figures\2099P-PHSB-EXST-2.6.dwg – Revised by <STAN> : Fri, Mar 05 2021 – 9:14am



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

PROPOSED LAND USE	TOTAL AREA TO BEST MANAGEMENT PRACTICE (ha)											
	OUTLETTING TO STREAM BUFFER								OUTLETTING TO GRASSED SWALE	OUTLETTING TO GRASSED FILTER STRIP		
	CATCHBASIN INFILTRATION TRENCH TO WET POND	CATCHBASIN FILTRATION TRENCH TO WET POND	REAR YARD AT - SURFACE INFILTRATION TO WET POND	UNCONTROLLED	REAR YARD AT-SURFACE INFILTRATION TO CATCHBASIN INFILTRATION TRENCH TO WET POND	WET SWM POND	REAR YARD AT-SURFACE INFILTRATION TO CATCHBASIN FILTRATION TRENCH TO WET POND	REAR YARD AT - SURFACE INFILTRATION ONLY	REAR YARD AT - SURFACE INFILTRATION ONLY	CATCHBASIN FILTRATION TRENCH TO DRY SWM POND	REAR YARD AT-SURFACE INFILTRATION TO CATCHBASIN FILTRATION TRENCH TO DRY SWM POND	DRY SWM POND
HIGH INTENSITY DEVELOPMENT (RESIDENTIAL)	2.58	12.43	2.18	0.00	0.07	5.27	1.13	0.59	0.37	5.13	0.50	0.00
LOW INTENSITY DEVELOPMENT (RESIDENTIAL)	0.00	0.00	0.00	0.52	0.00	3.25	0.00	0.00	0.00	0.00	0.00	0.54

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LEGEND:

LIMIT OF PROPERTY

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7370 CENTRE ROAD UXBRIDGE

PROPOSED PHOSPHORUS BUDGET

DESIGNED BY:	N.D.M.	CHECKED BY:	L.C.M.
SCALE:	1:3000	DATE:	MARCH 2021
PROJECT No:	2099	FIGURE No:	2.7

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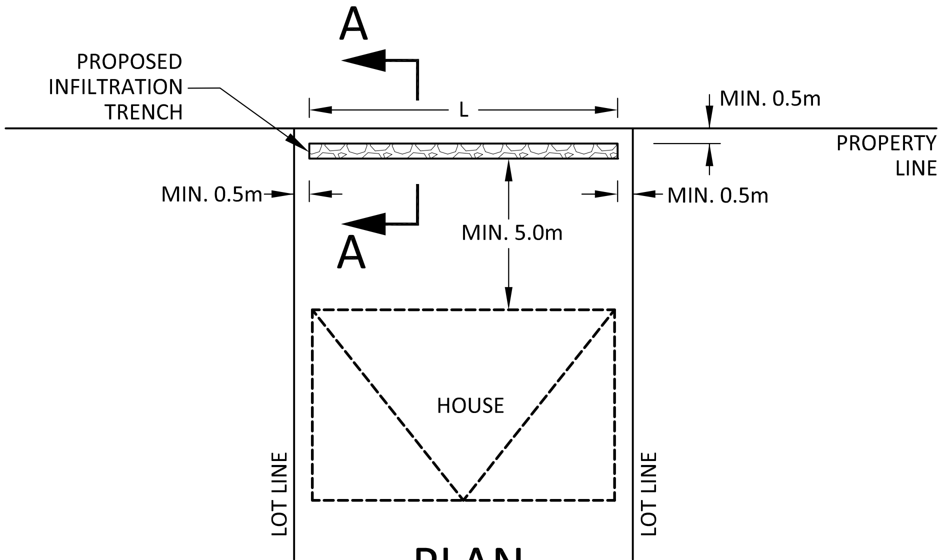
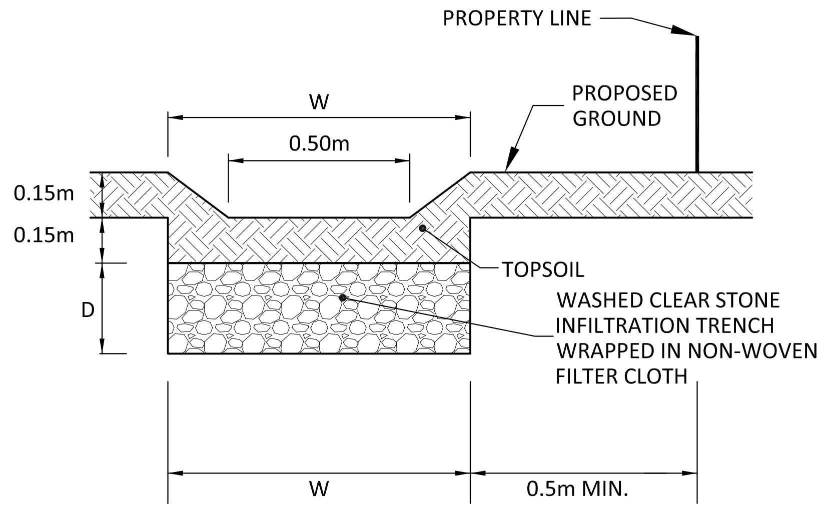


PLAN

SCALE 1:250



CROSS - SECTION A-A

SCALE: N.T.S.

MAXIMUM TRENCH DIMENSIONS:				
MINIMUM TYPICAL LOT FRONTAGE (m)	L (m)	W (m)	D (m)	MAXIMUM INFILTRATION VOLUME PROVIDED (m^3)
10.4	9.4	1.5	0.6	3.4
11.5	10.5	1.5	0.6	3.8
13.4	12.4	1.5	0.6	4.5

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7370 CENTRE ROAD UXBRIDGE

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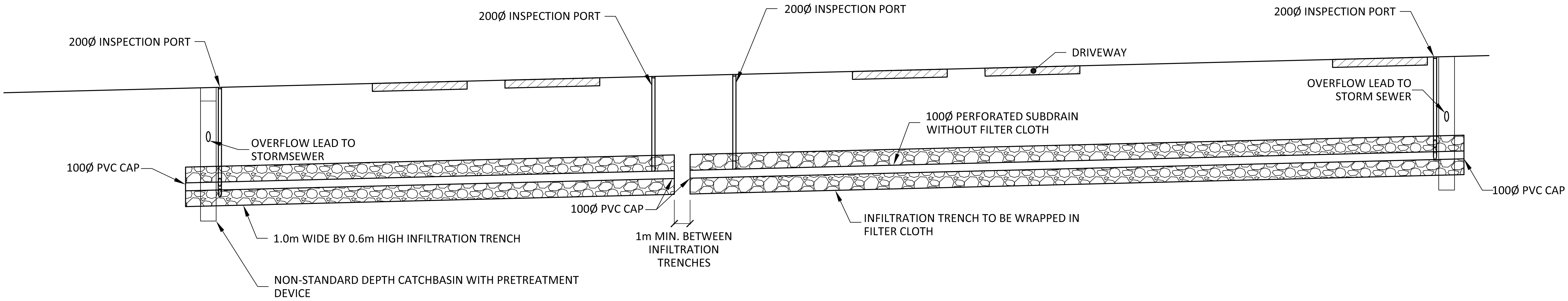
REAR YARD INFILTRATION TRENCH DETAILS

DESIGNED BY:	E.S.D.	CHECKED BY:	L.C.M.
SCALE:	N.T.S.	DATE:	MARCH 2021

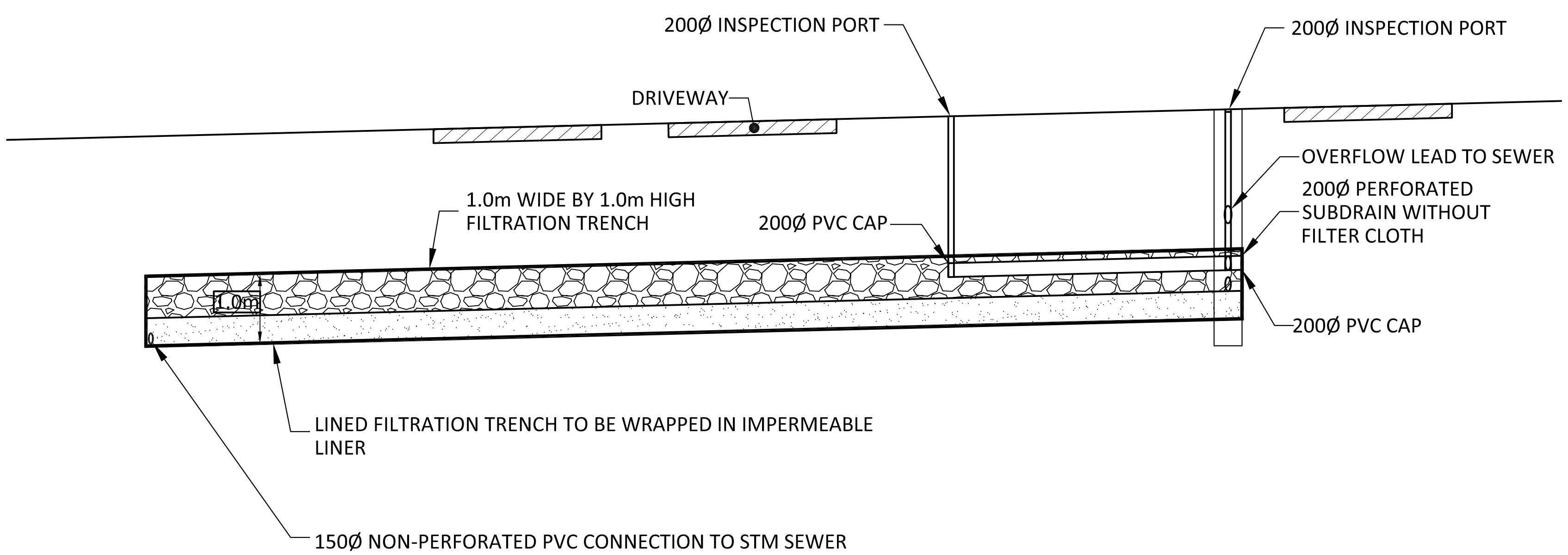
PROJECT No: 2099

FIGURE No: 2.8



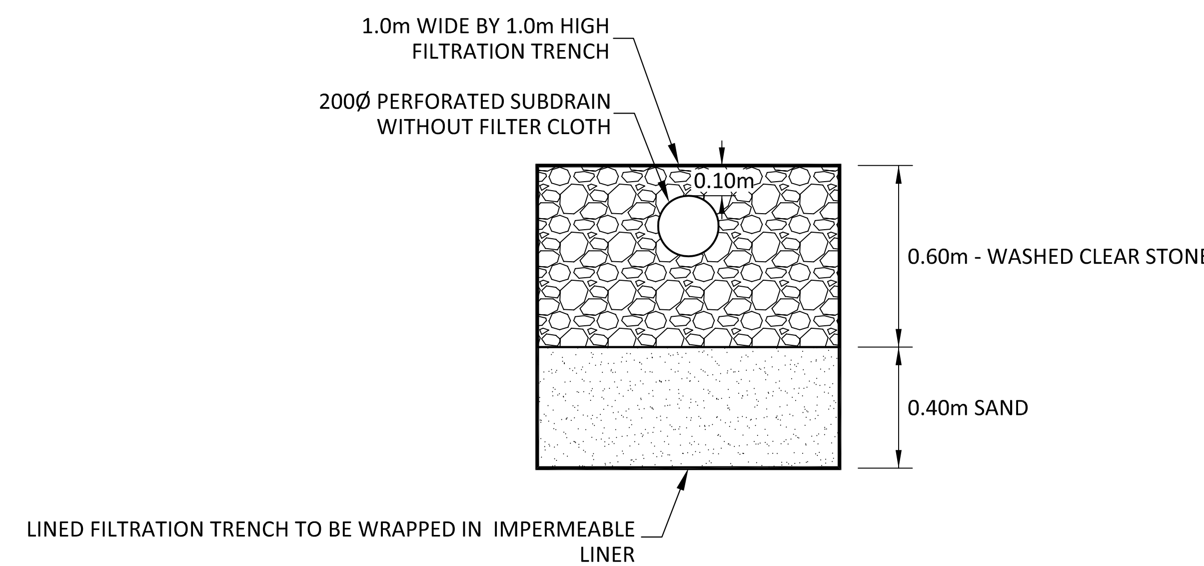
PRELIMINARY INFILTRATION TRENCH - PROFILE VIEW

SCALE: N.T.S.



PRELIMINARY FILTRATION TRENCH - PROFILE VIEW

SCALE: N.T.S.



PRELIMINARY FILTRATION TRENCH CROSS-SECTION

SCALE: N.T.S.

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

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FAX: (905) 475-8335

LEGEND:

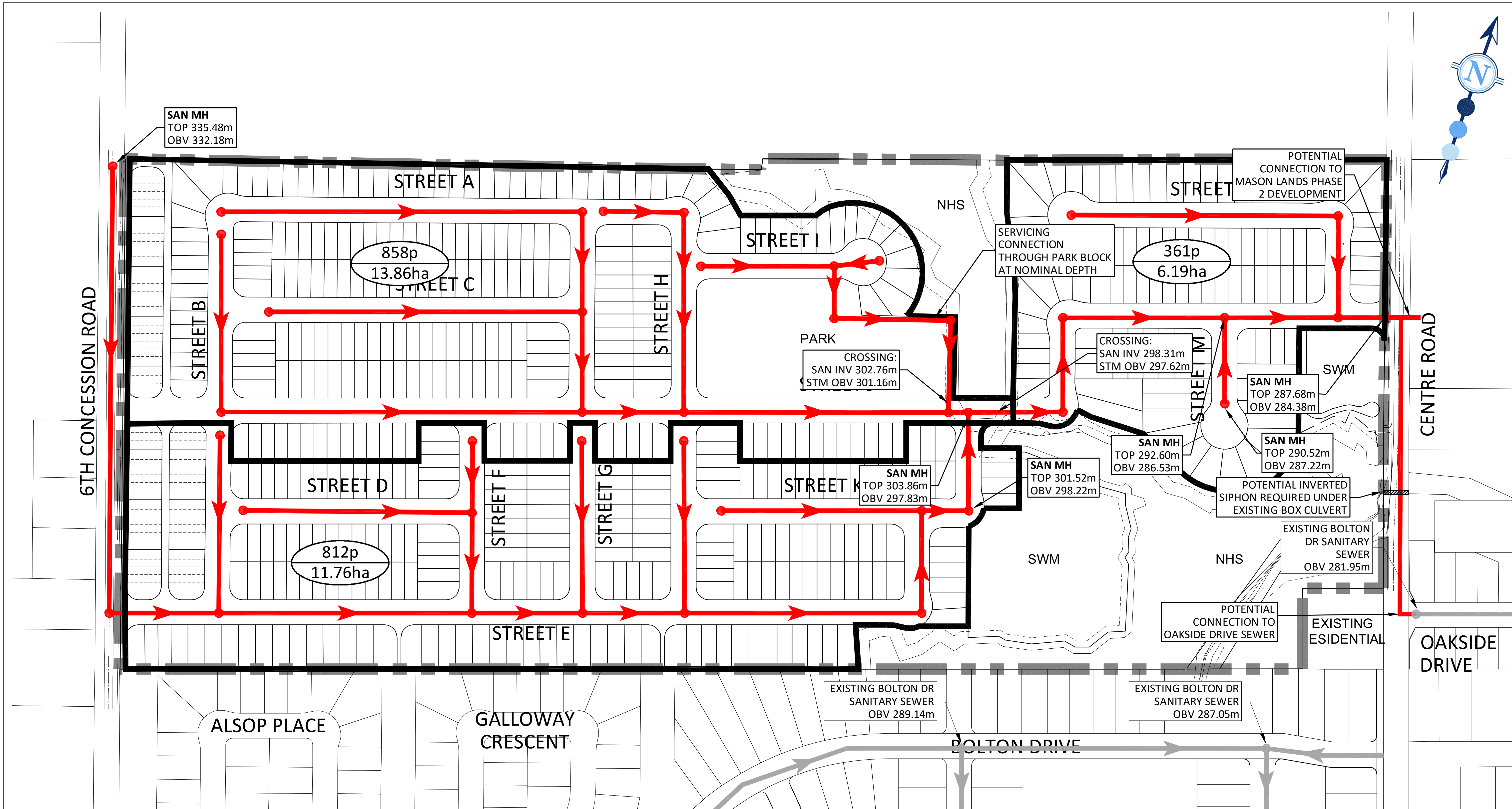
7370 CENTRE ROAD UXBRIDGE

CATCHBASIN INFILTRATION/ FILTRATION TRENCH DETAILS

DESIGNED BY:	E.S.D.	CHECKED BY:	L.C.M.
SCALE:	1:1000	DATE:	MARCH 2021

PROJECT No: 2099

FIGURE No: 2.9



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

LEGEND:

- LIMIT OF PROPERTY
- SANITARY DRAINAGE BOUNDARY
- PROPOSED SANITARY SEWER AND MANHOLE
- EXISTING SANITARY SEWER AND MANHOLE
- 318.00 EXISTING CONTOUR AND ELEVATION
- PROPOSED SANITARY FLOW
- 858p POPULATION (PERSONS)
- 13.86ha DRAINAGE AREA (HECTARES)

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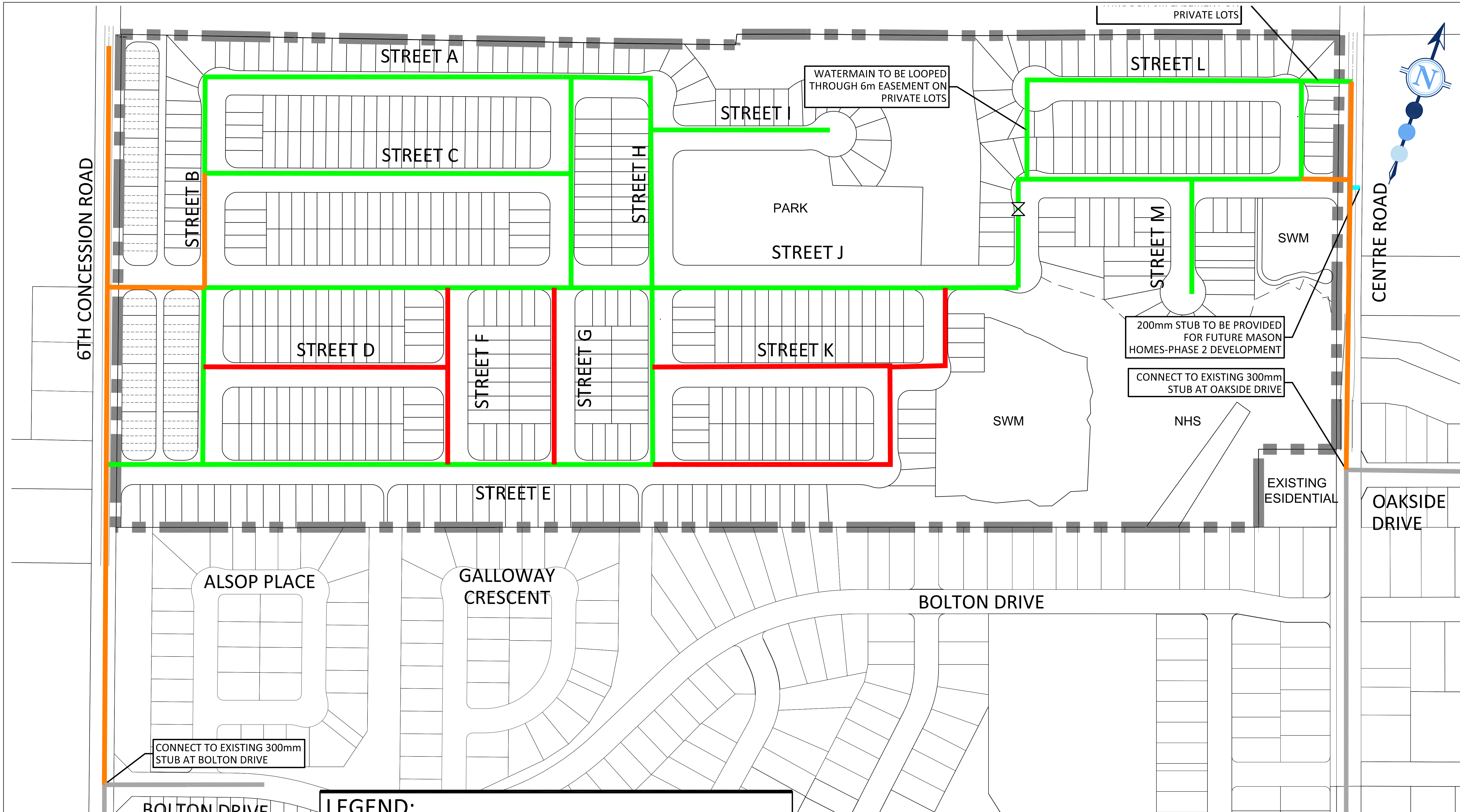
7370 CENTRE ROAD UXBRIDGE

PROPOSED SANITARY DRAINAGE PLAN

DESIGNED BY:	N.D.M.	CHECKED BY:	L.C.M.
SCALE:	1:3000	DATE:	MARCH 2021

PROJECT No:	FIGURE No:
2099	3.1

File: P:\2099 7370 Centre Road Uxbridge\Drawings\FSP\Fig\Report Figures\2099P-SANI-3.1.dwg – Revised by <STAN> : Fri, Mar 05 2021 – 9:19am



LEGEND:

LIMIT OF PROPERTY	PROPOSED CLOSED VALVE
EXISTING WATERMAIN	
PROPOSED 150Ø WATERMAIN	
PROPOSED 200Ø WATERMAIN	
PROPOSED 300Ø WATERMAIN	

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7370 CENTRE ROAD UXBRIDGE

WATER DISTRIBUTION PLAN

DESIGNED BY:	N.D.M.	CHECKED BY:	L.C.M.
SCALE:	1:3000	DATE:	MARCH 2021

PROJECT No: 2099

FIGURE No: 4.1

File: P:\2099 7370 Centre Road Uxbridge\Drawings\FSP\Fig\Report Figures\2099P-WTRM-DIST-4.1.dwg – Revised by <STAN> : Fri, Mar 05 2021 – 9:13am

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

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FAX: (905) 475-8335

LEGEND:

	LIMIT OF PROPERTY	× 112.75SW	PROPOSED SWALE ELEVATION
332.00	EXISTING CONTOUR AND ELEVATION	330.51	PROPOSED ROAD ELEVATION
× 333.50	PROPOSED ELEVATION	3.5%	ROAD GRADE FLOW DIRECTION
× 320.84EX	EXISTING ELEVATION	F	FRONT DRAINING LOT
S	SPLIT DRAINING LOT	W/O	WALKOUT LOT
F W/I	FRONT WALK IN LOT		RETAINING WALL

7370 CENTRE ROAD UXBRIDGE		PRELIMINARY GRADING PLAN	
DESIGNED BY: N.D.M.	CHECKED BY: L.C.M.	PROJECT No: 2099	FIGURE No: 5.1
SCALE: 1:1500	DATE: MARCH 2021		

File: P:\2099 7370 Centre Road Uxbridge\Drawings\FSP\Fig\Report Figures\2099P-GRAD-5.1.dwg - Revised by <STAN> : Fri, Mar 05 2021 - 9:22am

APPENDIX A

DRAFT PLAN OF SUBDIVISION

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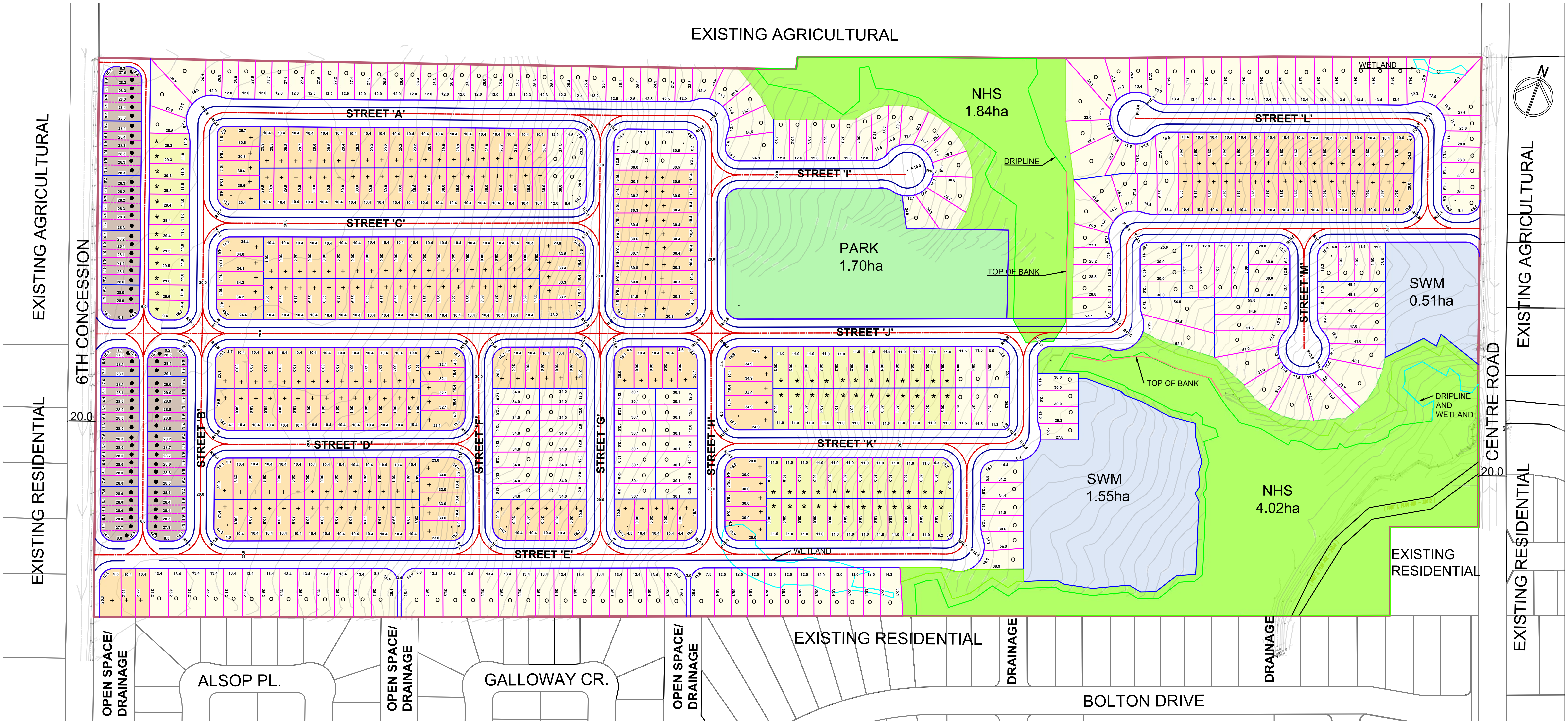


DRAFT PLAN OF SUBDIVISION
Bridge-Brook Corp.

FILE # xxxxxxxx

7370 CENTRE ROAD
PARTS 1 & 2 OF LOT 33, CONCESSION 6
TOWNSHIP OF UXBRIDGE,
REGIONAL MUNICIPALITY OF DURHAM

0 10 25 50 100 150m

Date: October 29, 2020

SURVEYORS CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE CORRECTLY AND ACCURATELY SHOWN.

SIGNED ______________________ DATE: ____________

H. F. GRANDER, OLS
H. F. GRANDER CO. LTD.
1575 HIGHWAY 7A WEST, UNIT 2A
PORT PERRY, ON, L9L 1A6
PHONE: 905-985-3600
EMAIL: hfg@hfgols.ca

OWNER'S AUTHORIZATION

I AUTHORIZE MDTR GROUP TO PREPARE AND SUBMIT THIS PLAN FOR DRAFT APPROVAL.

SIGNED ______________________ DATE: ____________

JOHN SPINA, ASO
BRIDGEBROOK CORP.
7681 HWY 27 UNIT 16,
WOODBRIDGE, ONTARIO
L4L 4M5

ADDITIONAL INFORMATION

(UNDER SECTION 51(17) OF THE PLANNING ACT) INFORMATION REQUIRED BY CLAUSES A,B,C,E,F,G,J, & L ARE SHOWN ON THE DRAFT AND KEY PLANS.

D) REFER TO THE LAND USE SCHEDULE HEREIN

H) MUNICIPAL WATER SERVICING TO BE PROVIDED

I) SILTY CLAY/SILTY CLAY TILL, SILTY SAND TILL, SANDY SILT/SILT, AND SAND

K) MUNICIPAL STORM SEWERS TO BE PROVIDED

NOTES

-Limit of daylighting triangles to be 30 metres from minimum tangent length at intersections as required by the Township of Uxbridge Design Critera and Standards (2016)

-Pavement illustration is diagrammatic only

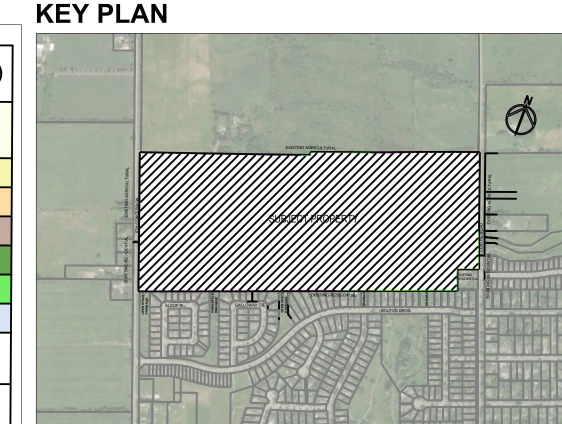
-Top of Slope and Wetlands as staked July 24, 2020

-Dripline staked June 24, 2020

-All measurements made using metric system

LAND USE SCHEDULE		UNITS	AREA (ha.)
SINGLE DETACHED 1 (MIN. 11.5m)	o	215	8.99
SINGLE DETACHED 2 (MIN. 10.4m)	+	246	8.05
LINKS (MIN. 11m)	*	60	1.93
TOWNHOUSES (MIN. 6.1m)	•	69	1.29
PARK			1.70
NATURAL HERITAGE SYSTEM			5.86
STORM WATER MANAGEMENT FACILITY			2.06
20m ROADS AND WALKWAYS			10.0
TOTALS		590	39.9

KEY PLAN



APPENDIX B

RELEVANT EXCERPTS

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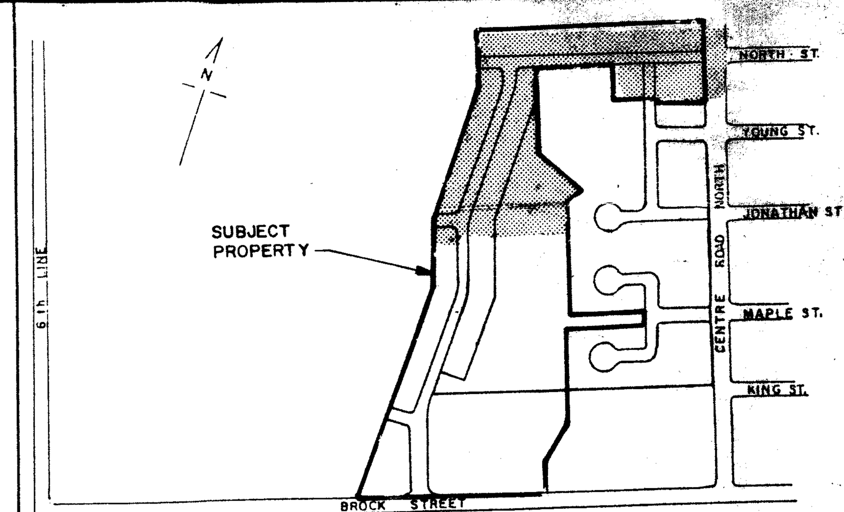
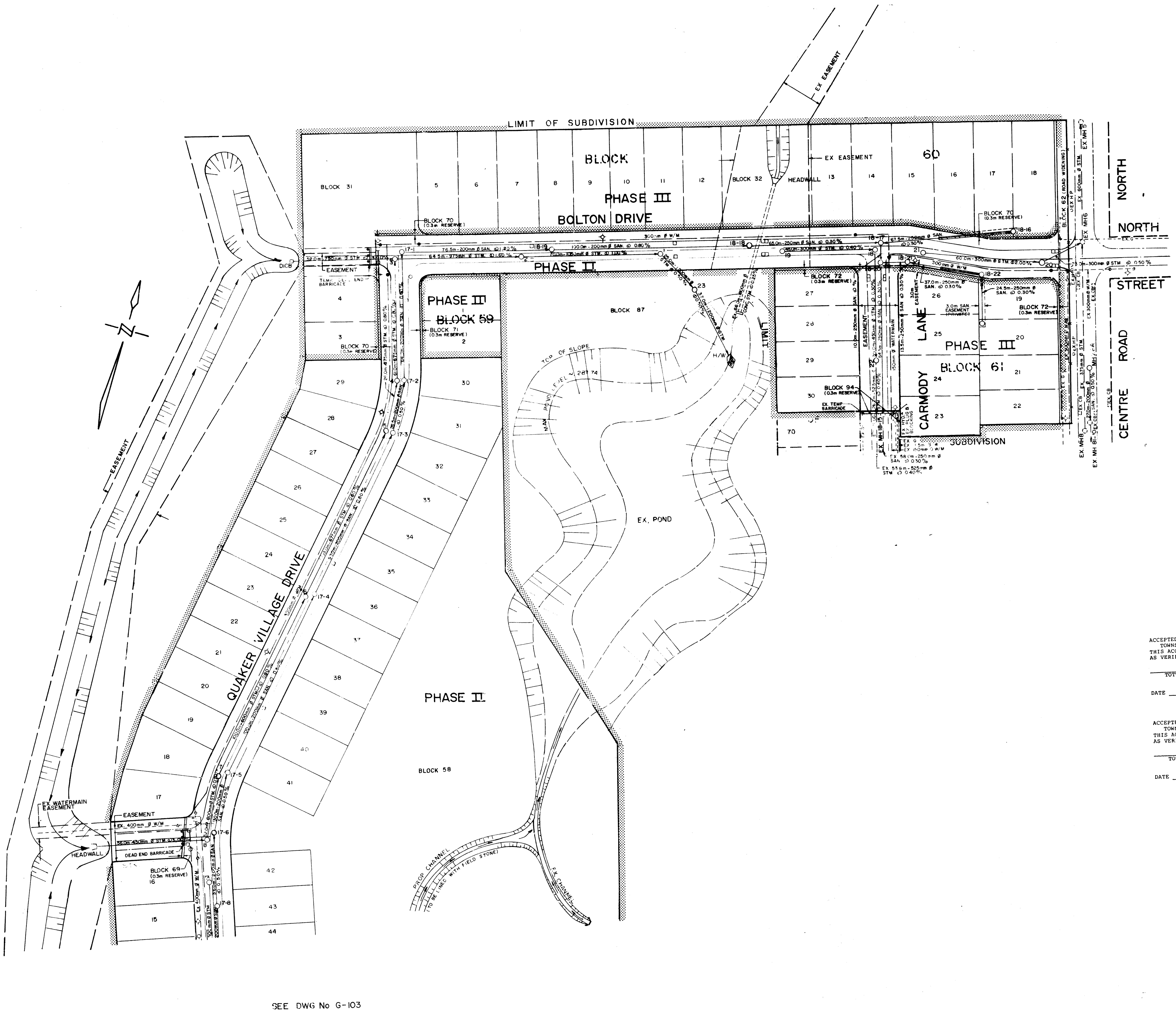
METRIC



KEY PLAN
SCALE 1:10000

NOTE
FOR GENERAL NOTES AND LEGEND SEE DWG No. G 101



SEE DWG No G-103

CONTRACTOR TO BE RESPONSIBLE FOR LOCATION OF ALL EXISTING U/G & OVERHEAD UTILITIES. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCE NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. THE CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

ACCEPTED TO BE IN ACCORDANCE WITH THE TOWNSHIP OF UXBRIDGE STANDARDS THIS ACCEPTANCE IS NOT TO BE CONSTRUED AS VERIFICATION OF ENGINEERING CONTENT

TOTTEN SIMS HUBICKI ASSOCIATES (1981) LIMITED

DATE 88/06/13

ACCEPTED TO BE IN ACCORDANCE WITH THE TOWNSHIP OF UXBRIDGE STANDARDS THIS ACCEPTANCE IS NOT TO BE CONSTRUED AS VERIFICATION OF ENGINEERING CONTENT

TOTTEN SIMS HUBICKI ASSOCIATES (1981) LIMITED

DATE

APPROVED	APPROVED
P Eng Township Engineer For The Township of Uxbridge Date	Clifford Curtis Regional Municipality Of Durham Date Sept 02, 1988

No	DESCRIPTION	DATE	BY	APPROVED

REVISIONS

CORPORATION OF THE TWP. OF UXBRIDGE
ENGINEERING DEPARTMENT

QUAKER VILLAGE PHASE II

GENERAL PLAN

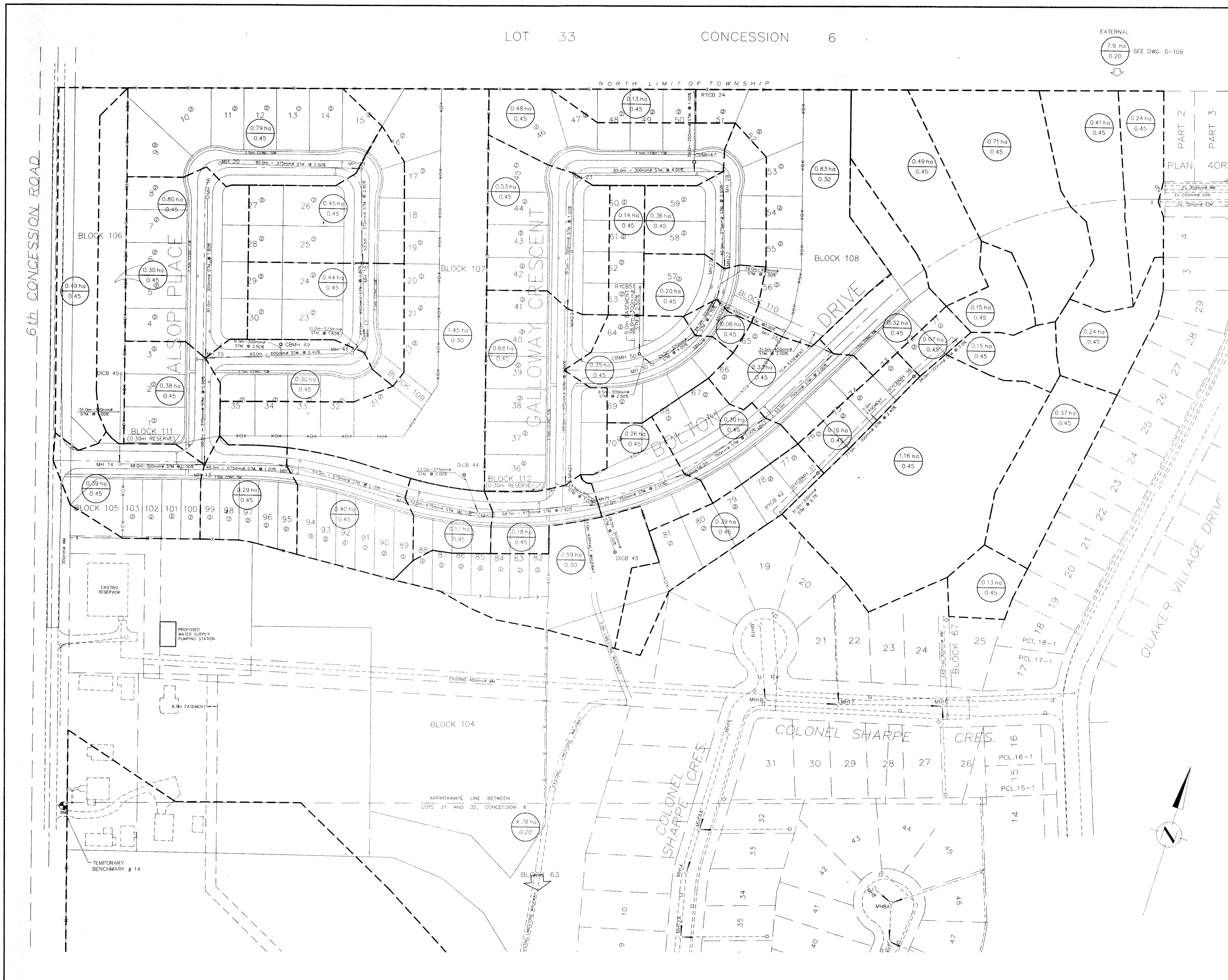
CONSULTING ENGINEERS
G. M. SERNAS & ASSOC. LTD.
185 BROCK ST. NORTH, SUITE 207
WHITBY, ONTARIO, L1N 4H3
TEL. 668-0764

LICENSED PROFESSIONAL ENGINEER A. S. Y. LI ONTARIO

SCALE:	1:1000	PROJECT No. 8614
DRAWN BY:	L.J.M.	DRAWING No.
DESIGNED BY:	D.Y.	G-102
CHECKED BY:	A.L.	
DATE:	SEPT, 1987	

OCTOBER 13

NOV 1



NOTE

1) FOR GENERAL NOTES AND LEGEND SEE DWG. G-101.

2) MEASUREMENTS IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN.

LEGEND

0.44 ha — DRAINAGE AREA IN HECTARES
0.45 — RUNOFF COEFFICIENT

TOWN OF UXBRIDGE

KEY PLAN
N.T.S.

ACCEPTED TO BE IN GENERAL CONFORMANCE WITH THE TOWNSHIP OF UXBRIDGE STANDARDS THIS ACCEPTANCE IS NOT TO BE CONSTRUED AS VERIFICATION OF ENGINEERING CONTENT
J.D. McEWEN, P.ENG
TOTTEN SIMS HUBICKI ASSOCIATES (1997) LIMITED
Date: Oct. 1997

APPROVED
[redacted] P. Eng.
Department Of Works
Region Of Durham
Date:

REVISIONS

No.	Revision	Date	By	Approved

CORPORATION OF THE TOWNSHIP OF UXBRIDGE
Engineering Department

QUAKER VILLAGE - PHASE V
18T-94016

GENERAL PLAN

STORM DRAINAGE AREA PLAN

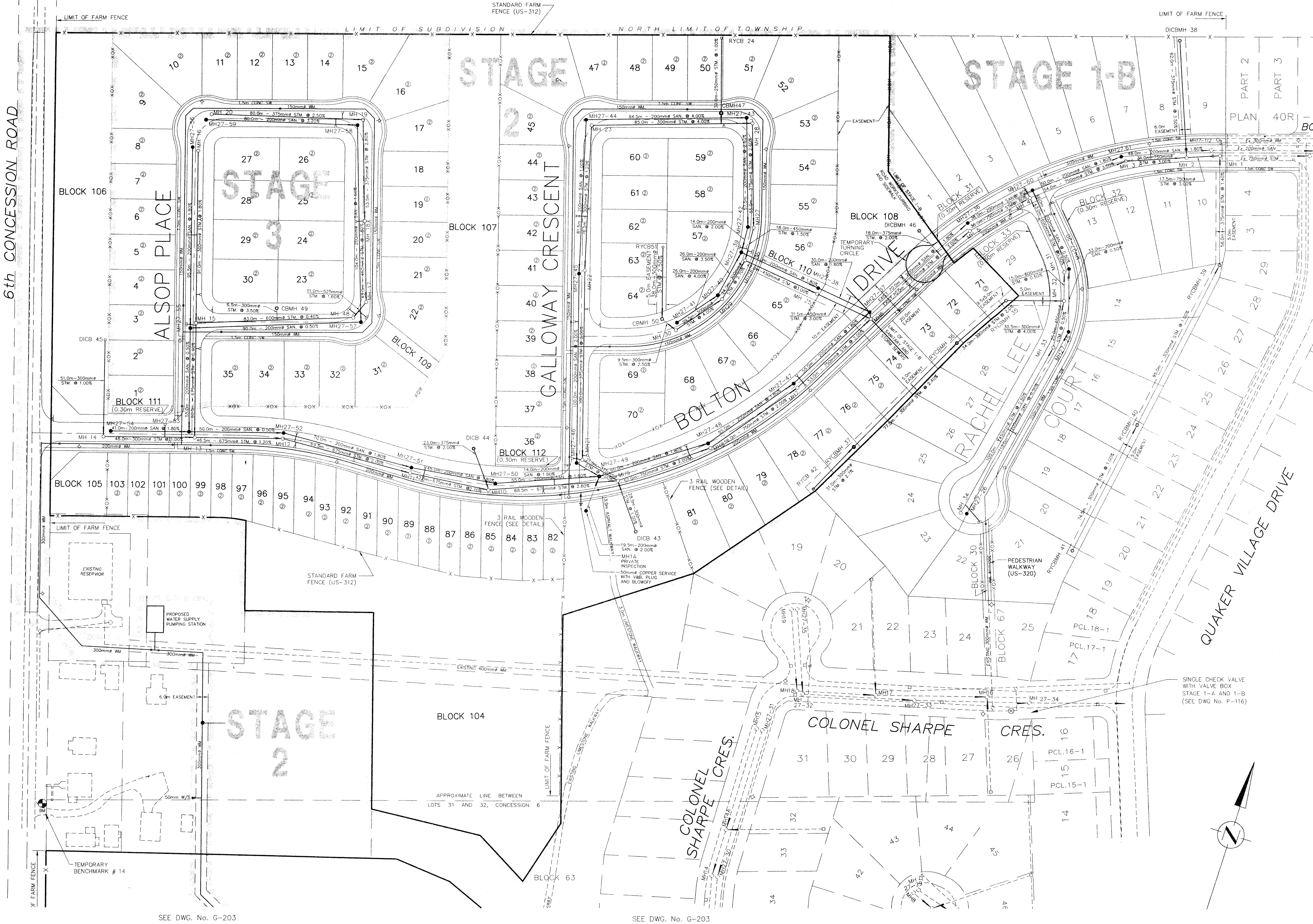
G.M.Sernas & Associates Ltd.
Consulting Engineers & Planners

110 SCOTIA COURT UNIT 41
WHITBY, ONTARIO L1N 8Y7
TEL (905) 432-7878
FAX (905) 432-7877

SCALE : 1 : 1000	PROJECT No.	94019
DATE : SEPTEMBER, 1997	DRAWING No.	
DRAWN BY : P.W.		G-102B
DESIGNED BY : D.Y.		
CHECKED BY : D.Y./R.F.T.		

R/P Date - SEPT. 29, 1997 File: 94019G2B

ISSUED FOR CONSTRUCTION OCT 06 1997



NOTE

1) FOR GENERAL NOTES AND LEGEND SEE DWG. G-101.
2) MEASUREMENTS IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN.

LEGEND

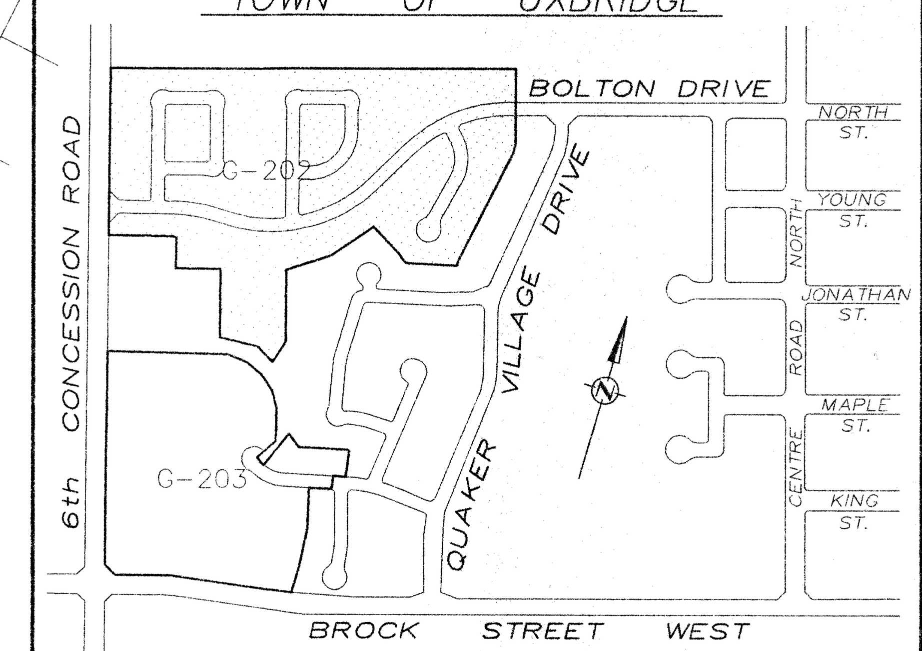
3② DENOTES STAGE 2 LOTS

LIMIT OF AREA TO BE SERVICED UNDER REGION OF DURHAM SUBDIVISION AREEMENT

SITE BENCHMARK

TEMPORARY BENCHMARK # 14 ELEV. 329.038m
HEAD OF SPIKE IN SOUTH FACE OF HYDRO POLE AND LIGHT STANDARD, EAST SIDE OF THE 6th CONCESSION ROAD IN FRONT OF THE MUSEUM

TOWN OF UXBRIDGE



KEY PLAN
N.T.S.

ACCEPTED TO BE IN GENERAL CONFORMANCE WITH THE TOWNSHIP OF UXBRIDGE STANDARDS THIS ACCEPTANCE IS NOT TO BE CONSTRUED AS VERIFICATION OF ENGINEERING CONTENT
J.D. McEWEN, P.ENG.
TOTTEN SIMS HUBICKI ASSOCIATES (1997) LIMITED
Date: OCT. 1, 1997

APPROVED
U. Sikora P. Eng.
Department Of Works
Region Of Durham
Date: OCT. 3, 1997

REVISIONS

No.	Revision	Date	By	Approved

CORPORATION OF THE TOWNSHIP OF UXBRIDGE
Engineering Department

QUAKER VILLAGE - PHASE V
18T-94016 STAGE 2

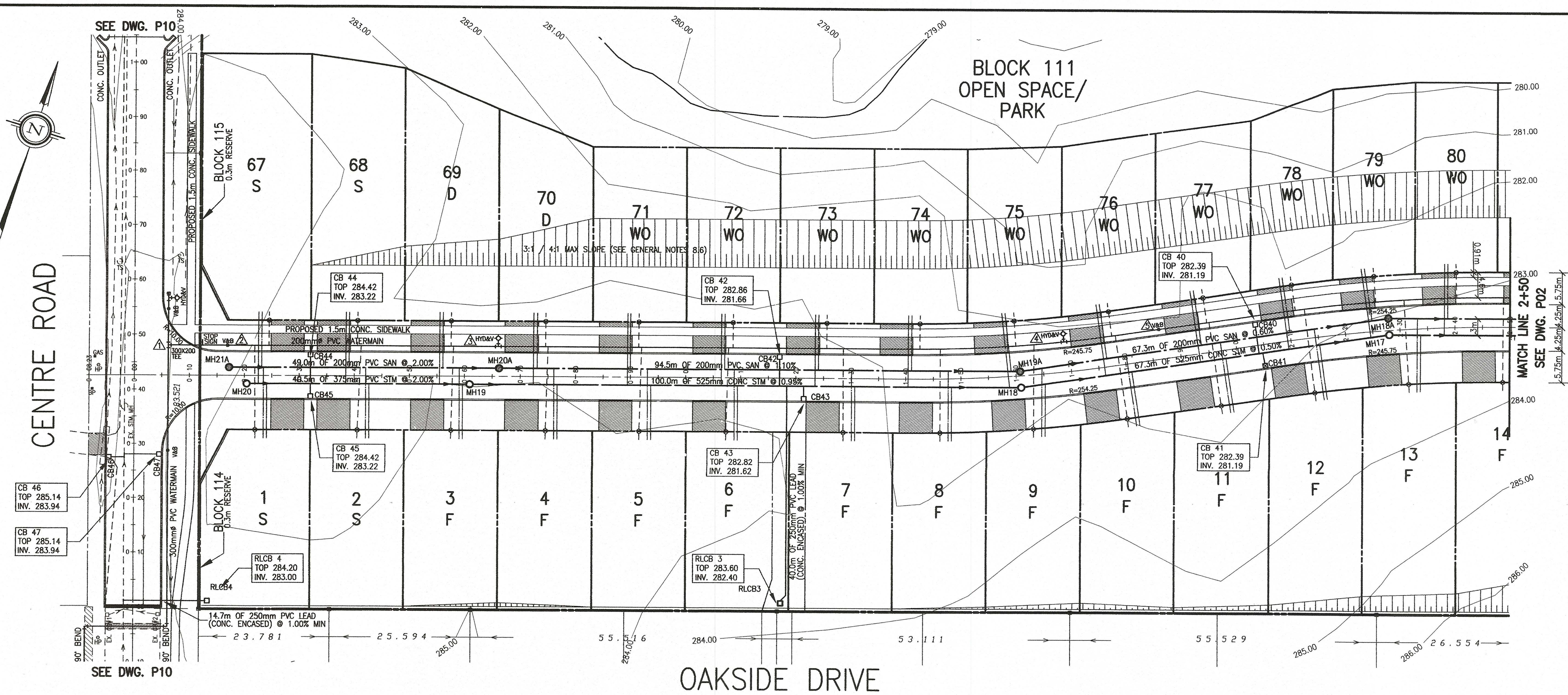
GENERAL PLAN

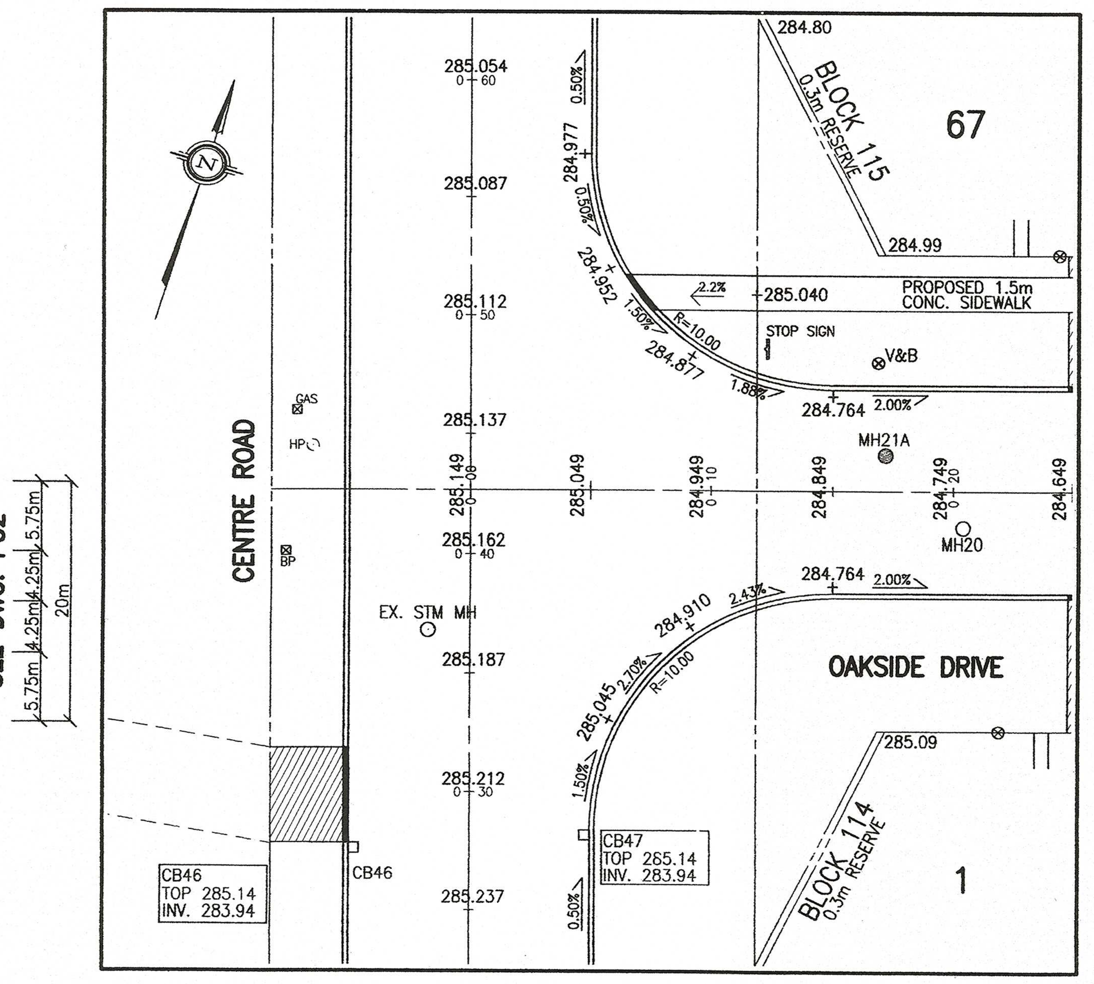
G.M. Sernas & Associates Ltd.
Consulting Engineers & Planners
110 SCOTIA COURT UNIT 41
WHITBY, ONTARIO L1N 8Y7
TEL (905) 432-7878
FAX (905) 432-7877

REGISTERED PROFESSIONAL ENGINEER
R.F. TRANQUADA
1-10-97
PROVINCE OF ONTARIO

SCALE : 1 : 1000	PROJECT No. 94019
DATE : SEPTEMBER, 1997	DRAWING No.
DRAWN BY : P.W.	G-202
DESIGNED BY : P.W./D.Y.	
CHECKED BY : D.Y./R.F.T.	

ISSUED FOR CONSTRUCTION OCT 0 6 1997





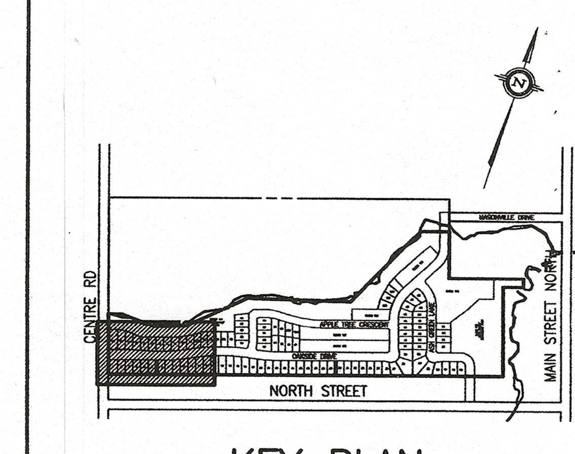
GRADING DETAIL

CENTRE ROAD & OAKSIDE DRIVE

SCALE 1:250

WATERMAIN DATA			
△ MARK	ELEVATION	DESCRIPTION	CHAINAGE
1	283.25	300X200 TEE	0+07
2	283.02	200ø VALVE AND BOX	0+17
3	282.02	HYDRANT AND VALVE	0+66
4	280.85	HYDRANT AND VALVE	1+69
5	280.77	200ø VALVE AND BOX	1+87

RESTRICTED CATCHBASIN		
CB/DCB	CHAINAGE	STREET
CB41	2+05	OAKSIDE DRIVE



KEY PLAN

SCALE 1:12,500

LEGEND

- EXISTING CONTOUR
- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- EXISTING CATCHBASIN
- PROPOSED SWALE, OR GUTTER LINE
- PROPOSED DITCH
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED CATCHBASIN/RESTRICTED
- PROPOSED DOUBLE CATCHBASIN
- PROPOSED WATER BOX/WATER VALVE
- PROPOSED HYDRANT AND VALVE
- PROPOSED 4:1/3:1 MAX SLOPE
- PROPOSED DRIVEWAY & CURB CUT
- PROPOSED WATER SERVICE
- PROPOSED SANITARY SERVICE
- PROPOSED STORM SERVICE
- PROPOSED FRONT DRAINAGE LOT — F
- PROPOSED SPLIT DRAINAGE LOT — S
- PROPOSED DECK LOT — D
- PROPOSED WALKOUT LOT — WO

ROAD PAVEMENT DESIGN

COURSE (OPS SPECIFICATIONS)	THICKNESS (mm)
ASPHALT SURFACE (HL-3)	40
ASPHALT BINDER (HL-8)	50
GRANULAR BASE – GRANULAR 'A'	150
GRANULAR SUB-BASE LOCAL – GRANULAR 'B'	350

NOTE:
REFER TO DRAWINGS DE1 TO DE6 FOR NOTES & DETAILS

SURVEY INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY
H.F. GRANDER O.L.S.

BENCHMARK

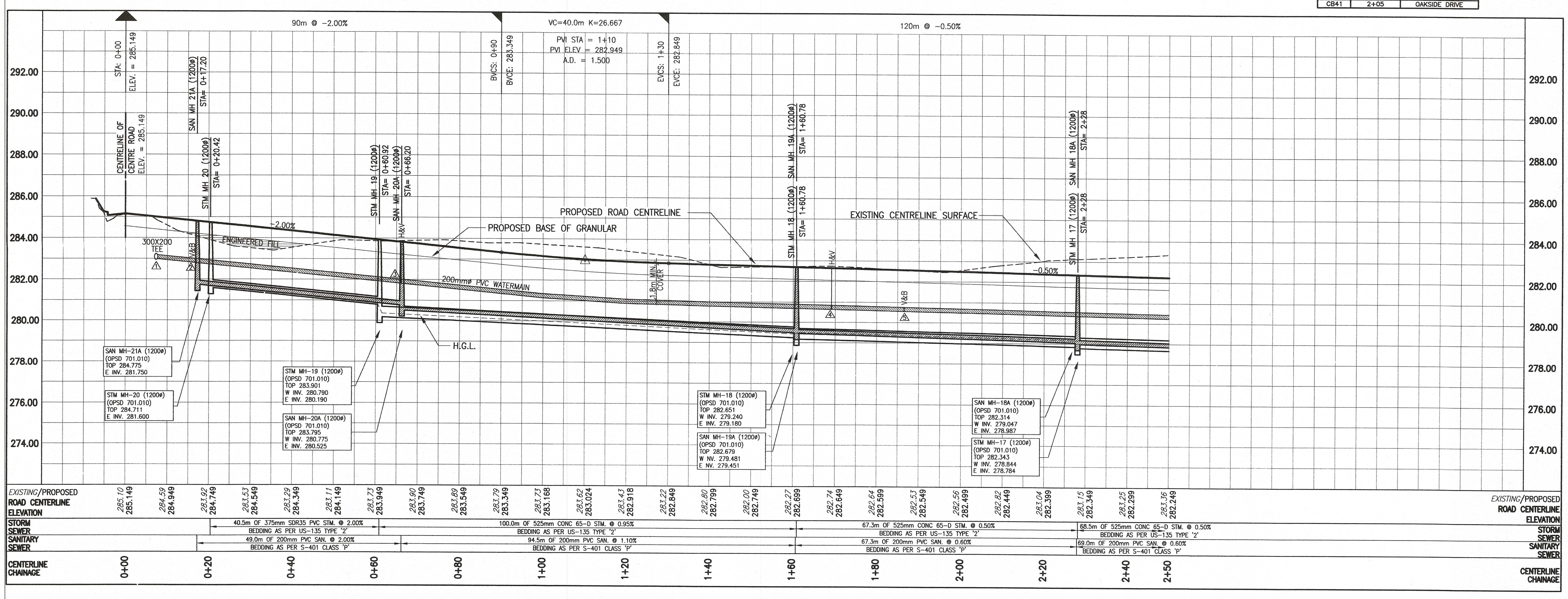
UXBRIDGE, UNITED CHURCH, TABLET IN SOUTH SIDEWALL, 17.2m FROM SOUTHEAST CORNER, 1.57m BELOW BRICKWORK, MIDWAY BETWEEN TWO LARGE BASEMENT WINDOWS.
GSC – 31U517S – ELEV. 272.440 (1978 ADJUSTED)
GSC – 31U517S – ELEV. 272.528 (1931 ADJUSTED)

ACCEPTED TO BE IN GENERAL CONFORMANCE WITH THE TOWNSHIP OF UXBRIDGE STANDARDS THIS ACCEPTANCE IS NOT TO BE CONSTRUED AS VERIFICATION OF ENGINEERING CONTENT.
MCEWEN, P.ENG
TOTTEN SIMS HUBICKI ASSOCIATES (1997) LIMITED
DATE OCT. 20, 2004

APPROVAL
Paul Allen
DEPARTMENT OF WORKS
REGIONAL MUNICIPALITY OF DURHAM
DATE Oct 20, 2004

NO.	REVISIONS	DATE	BY
5.	6th SUBMISSION REVISION	04/10/07	ALX
4.	4th SUBMISSION REVISION	04/08/27	Y.K.
3.	3rd SUBMISSION REVISION	04/07/28	Y.K.
2.	2nd SUBMISSION REVISION	04/05/03	Y.K.
1.	REVISED AS PER COMMENTS BY T.S.H.	04/03/12	DLT

LICENSED PROFESSIONAL ENGINEER
MICHAEL A. BELL
Oct 7/04
PROVINCE OF ONTARIO



TOWNSHIP OF UXBRIDGE
REGION MUNICIPALITY OF DURHAM

PLAN AND PROFILE

OAKSIDE DRIVE STA -0+10 TO 2+50

PROPOSED RESIDENTIAL SUBDIVISION

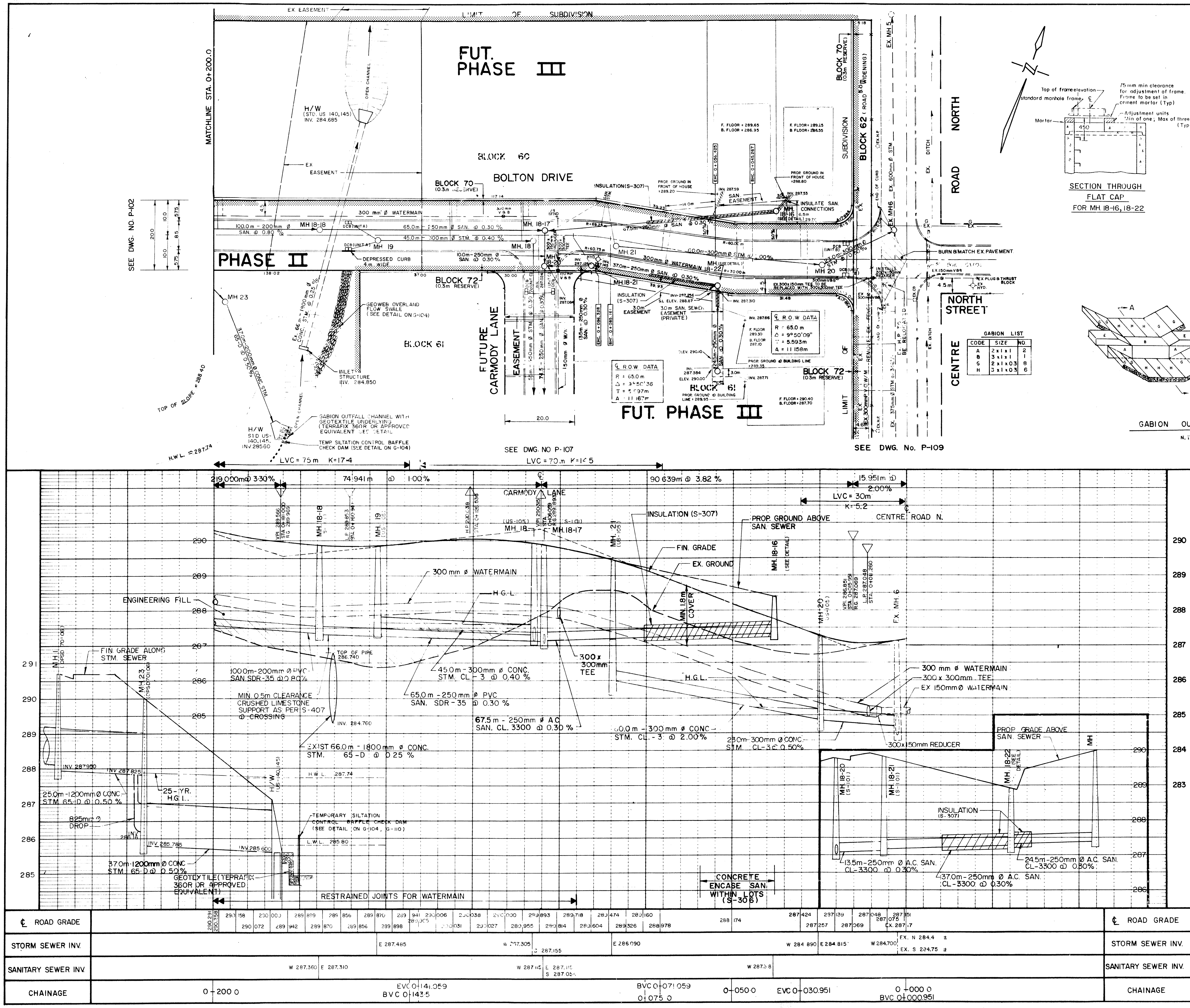
MASON HOMES

PART OF LOT 33, CONCESSION 6

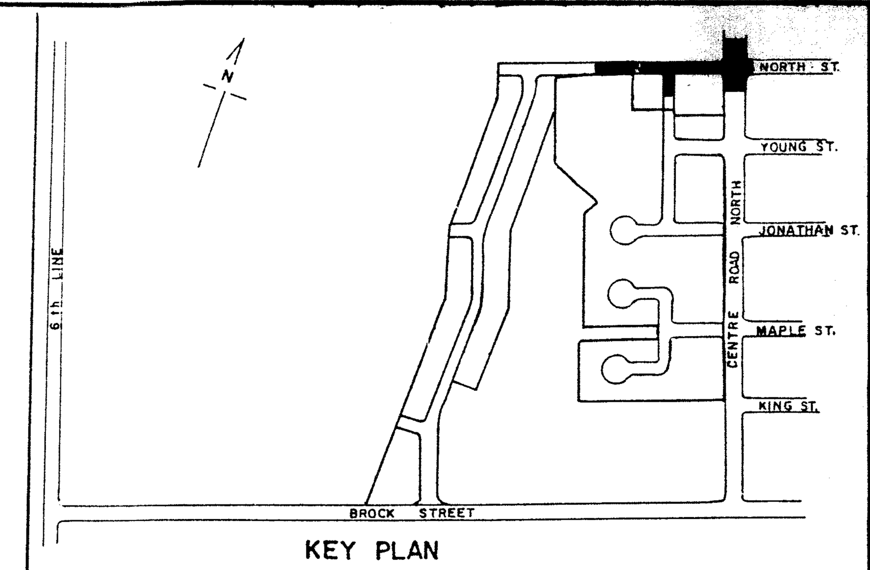
Roberts Bell Engineering Limited
PROFESSIONAL ENGINEERS & LAND DEVELOPMENT SERVICES www.rbeng.ca
37 SANDIFORD DRIVE UNIT 102 STOUFFVILLE ONTARIO L4A 7X5
T: 905.640.2100 F: 905.640.5100 E: info@rbeng.ca

SCALE: H 1:500 V 1:100	PROJECT NO: 02-1579
DRAWN BY: DLT	
DESIGNED BY: ALX	DRAWING NO: P01
CHECK BY: MAB	
DATE: JUNE 1, 2003	

METRIC



SECTION THROUGH FLAT CAP FOR MH. 18-16, 18-22



KEY PLAN
SCALE 1:10000

NOTE:

1. FOR GENERAL NOTES & LEGEND SEE DWG NO. G-101.
2. PAVEMENT & BOULEVARD RESTORATION SHALL BE DONE TO THE SATISFACTION OF THE TOWN ENGINEER.
3. THE CONTRACTOR IS RESPONSIBLE FOR THE STAKE OUT OF ALL EXISTING U/G & OVERHEAD UTILITIES 72 HOURS PRIOR TO ANY COMMENCEMENT OF WORKS ON BROCK ST. THE CONSULTING ENGINEER ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

GABION LIST		
CODE	SIZE	NO.
A	2x1x1	2
B	3x1x1	1
G	2x1x0.3	8
H	3x1x0.3	6

GABION OUTFALL CHANNEL
N.T.S

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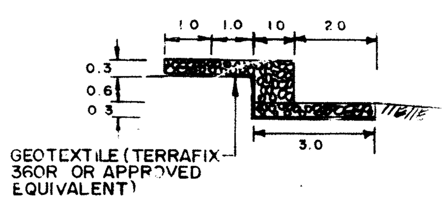
TOTTEN SIMS HUBICKI ASSOCIATES (1981) LIMITED
DATE



SECTION A-A

CONTRACTOR TO BE RESPONSIBLE FOR LOCATION OF ALL EXISTING U/G & OVERHEAD UTILITIES. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCE NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. THE CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

APPROVED	APPROVED
Township Engineer For The Township of Uxbridge P.Eng. Date	Regional Municipality Of Durham Date Oct 11/88

No.	DESCRIPTION	DATE	BY	APPROVED

REVISIONS

CORPORATION OF THE TWP. OF UXBRIDGE
ENGINEERING DEPARTMENT

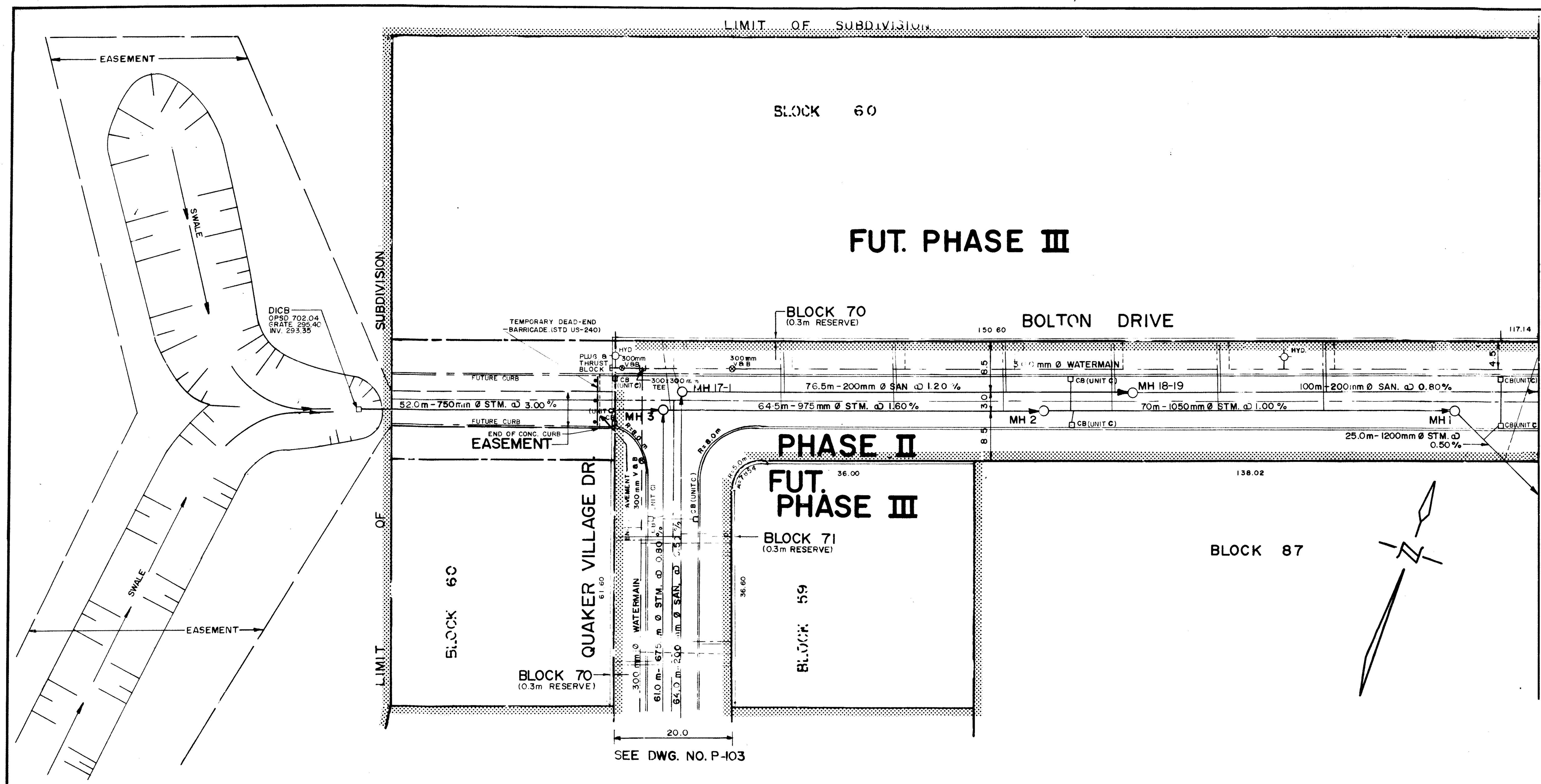
QUAKER VILLAGE PHASE II

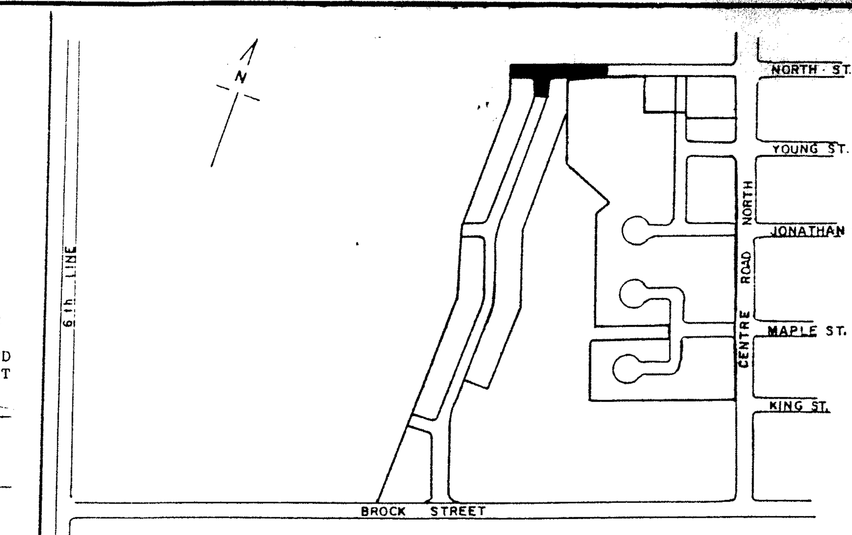
BOLTON DRIVE
FROM STA 0 +000.0 TO STA. 0 + 200.0

CONSULTING ENGINEERS
G. M. SERNAS & ASSOC. LTD.
185 BROCK ST. NORTH, SUITE 207
WHITBY, ONTARIO, L1N 4H3
TEL. 668-0764

SCALE:	1:500 HORIZ. 1:50 VERT.
PROJECT No.	8614
DRAWN BY:	R.E.
DESIGNED BY:	D.Y.
CHECKED BY:	A.L.
DATE:	SEPT., 1987
DRAWING No.	P-101

METRIC





KEY PLAN
SCALE 1:10000

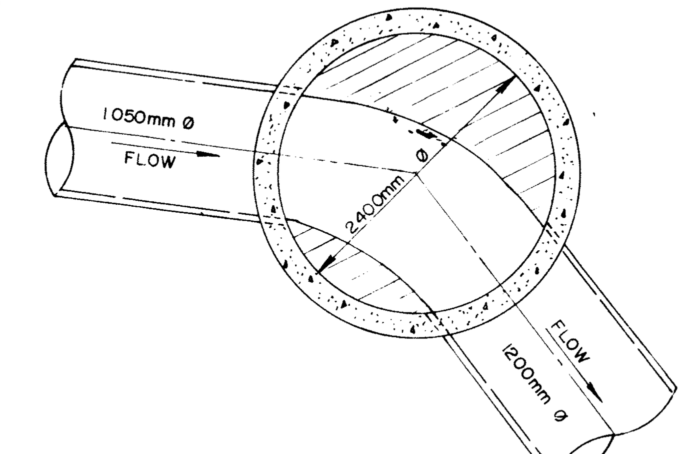
ACCEPTED TO BE IN ACCORDANCE WITH THE TOWNSHIP OF UXBRIDGE STANDARDS
THIS ACCEPTANCE IS NOT TO BE CONSTRUED AS VERIFICATION OF ENGINEERING CONTENT

TOTTEN SIMS HUBICKI ASSOCIATES (1981) LIMITED

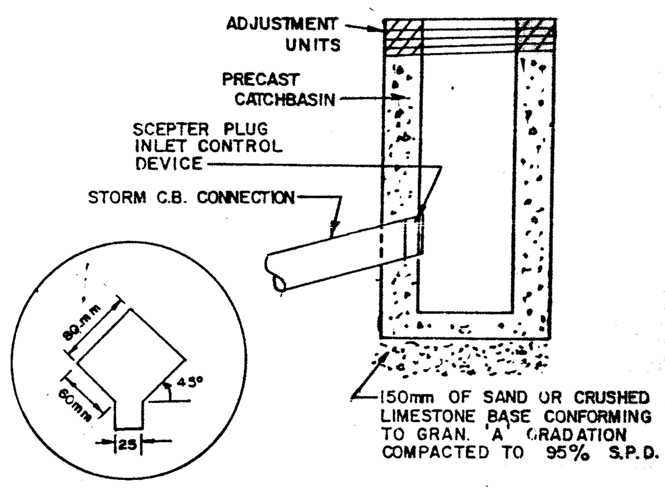
DATE ______

NOTE:

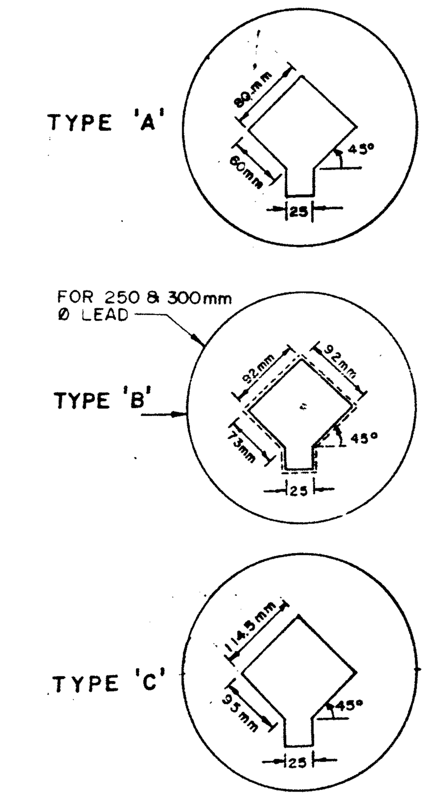
1. FOR GENERAL NOTES & LEGEND SEE DWG. NO. G-101.



BENCHING DETAIL FOR MANHOLE 1
N.T.S.



TYPICAL SCEPTER PLUGS INLET CONTROL DEVICE IN CATCHBASIN
N.T.S



INLET CONTROL DEVICES
N.T.S.

CONTROL FLOW RATES
H=1.22

UNIT	Q (LITRES/SEC.)
A	19.8
B	28.3
C	36.8

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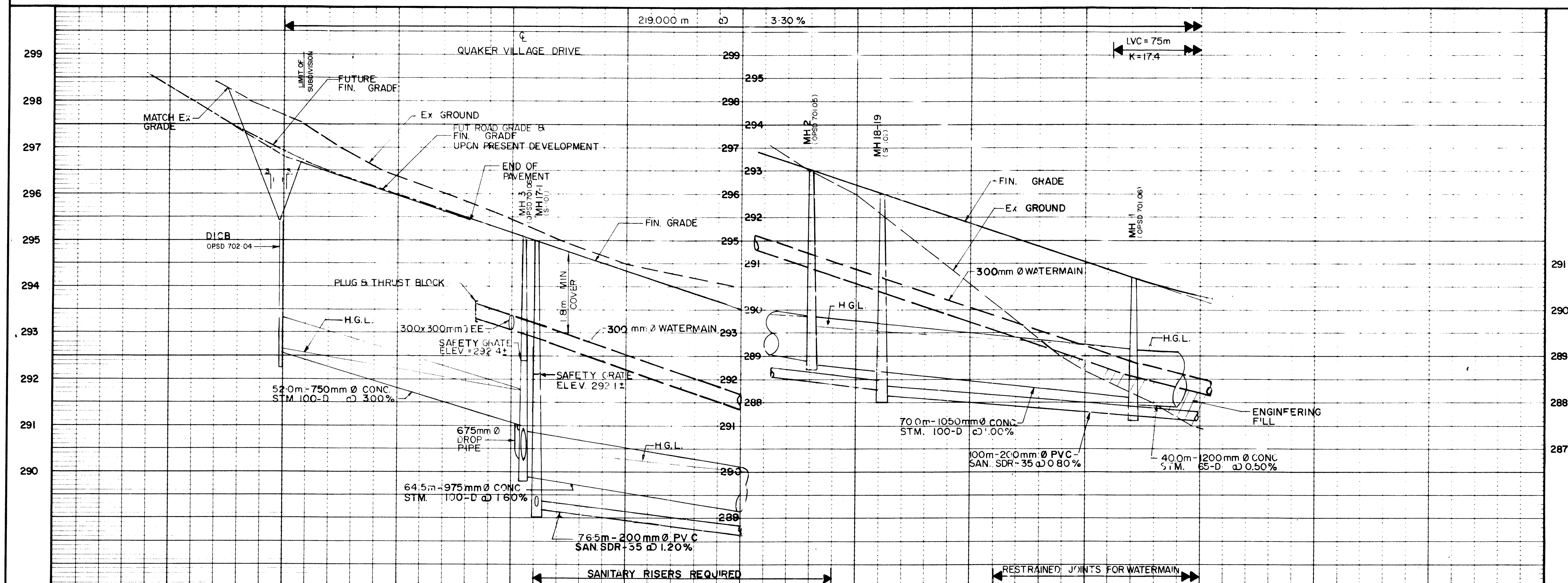


℄ ROAD GRADE	296.698	295.968	295.063 / 295.143	294.318	293.493	292.668	291.843	291.019 / 290.804 / 290.646 / 290.502 / 290.373 / 290.291	℄ ROAD GRADE
STORM SEWER INV.	292.565		675mm Ø DROP W 290.212; W.S. 005; S 290.212; E 289.912			288.880; 288.800		288.100; 287.950	STORM SEWER INV.
SANITARY SEWER INV.			S 289.230; E 289.138			288.220; 288.160			SANITARY SEWER INV.
CHAINAGE	LIMIT OF SUBDIVISION 0+395.582	0+375.0	0+347.582 / 0+350.0	0+325.0	0+300.0	0+275.0	0+250.0	0+225.0 / EVC 0+218.5 / 0+200.0	CHAINAGE

APPROVED	APPROVED
Township Engineer For The Township of Uxbridge, P.Eng	Regional Municipality Of Durham
Date	Date 24/11/88

No.	DESCRIPTION	DATE	BY	APPROVED

REVISIONS

CORPORATION OF THE TWP. OF UXBRIDGE
ENGINEERING DEPARTMENT

QUAKER VILLAGE PHASE II

BOLTON DRIVE

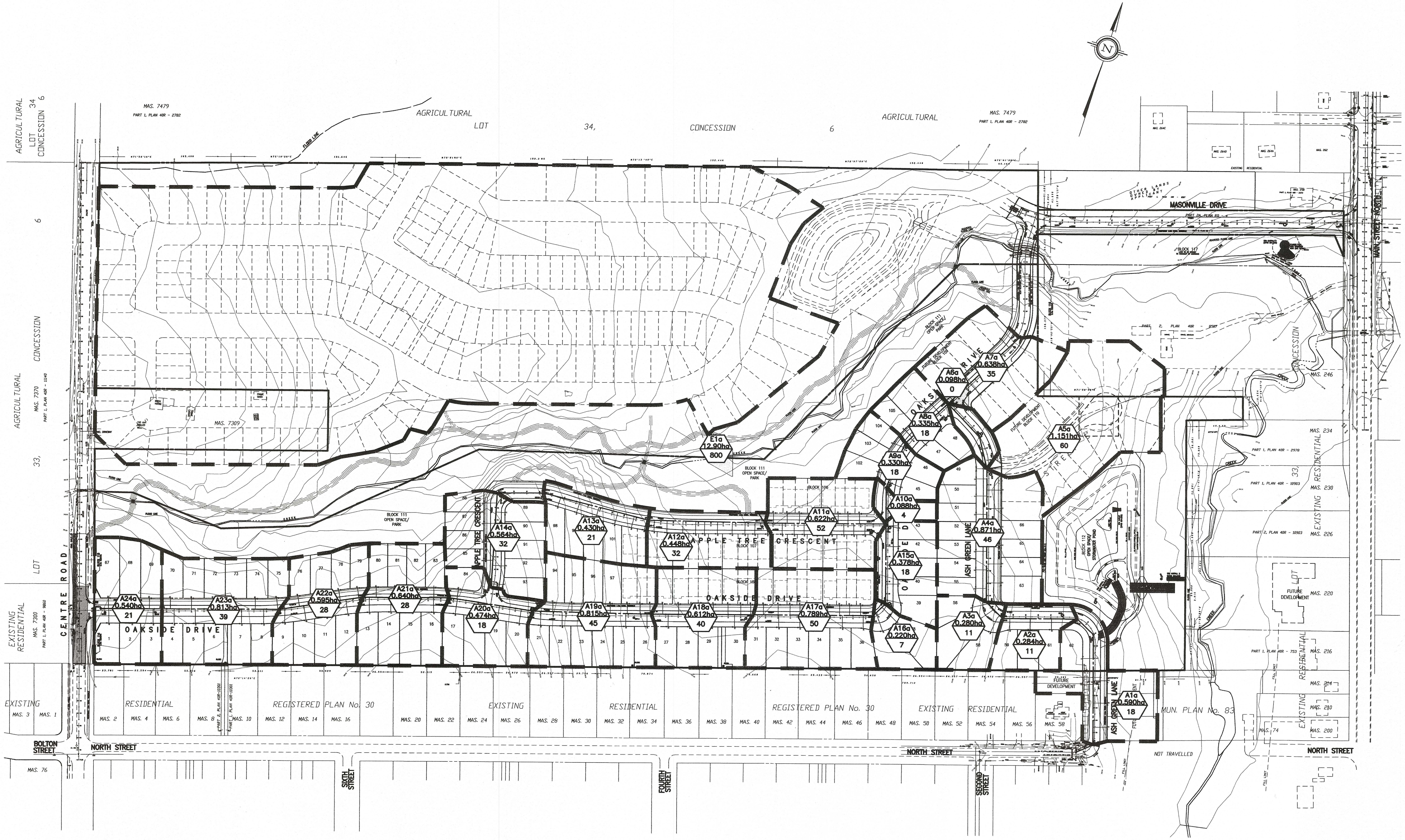
FROM STA 0 + 200.0 TO STA. 0 + 396.080

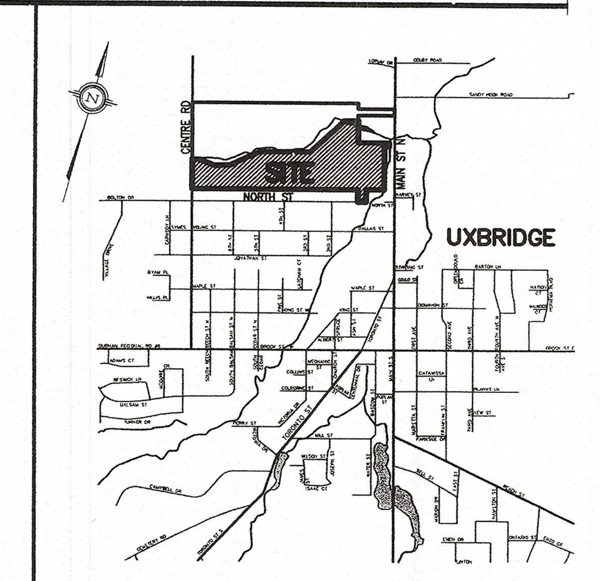
CONSULTING ENGINEERS
G. M. SERNAS & ASSOC. LTD.
185 BROCK ST. NORTH, SUITE 207
WHITBY, ONTARIO, L1N 4H3
TEL. 668-0764

LICENSED PROFESSIONAL ENGINEER
A. S. Y. LI
ONTARIO

SCALE:	1:500 HORIZ. 1:50 VERT.	PROJECT No.	8614
DRAWN BY:	D.K.	DRAWING No.	P-102
DESIGNED BY:	D.Y.		
CHECKED BY:	A.L.		
DATE:	SEPT 1987		

OCTOBER 13 '88
NOV 1





LOCATION PLAN
SCALE 1:30,000

LEGEND

EXISTING CONTOUR
EXISTING STORM MANHOLE
EXISTING SANITARY MANHOLE
EXISTING CATCHBASIN
PROPOSED STORM MANHOLE
PROPOSED SANITARY MANHOLE
PROPOSED CATCHBASIN/RESTRICTED
PROPOSED DOUBLE CATCHBASIN
PROPOSED SANITARY SERVICE
SANITARY DRAINAGE BOUNDARY

SANITARY DRAINAGE AREA NUMBER — A1a
DRAINAGE AREA (ha) — 0.513ha
POPULATION — 14

NOTE:
REFER TO DWGS DE1 TO DE6 FOR NOTES & DETAILS

SURVEY INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY
H.F. GRANDER O.L.S.

BENCHMARK

UXBRIDGE, UNITED CHURCH, TABLET IN SOUTH SIDEWALL, 17.2m FROM SOUTHEAST CORNER, 1.57m BELOW BRICKWORK, MIDWAY BETWEEN TWO LARGE BASEMENT WINDOWS.
GSC – 31U517S – ELEV. 272.440 (1978 ADJUSTED)
GSC – 31U517S – ELEV. 272.528 (1931 ADJUSTED)

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J.D. McEWEN, P.ENG
TOTTEN SIMS HUBICKI ASSOCIATES (1997) LIMITED
DATE Oct. 20, 2004

APPROVAL
Paul Allen
DEPARTMENT OF WORKS
REGIONAL MUNICIPALITY OF DURHAM
DATE Oct 20, 2004

NO.	REVISIONS	DATE	BY
4.	4th SUBMISSION REVISION	04/08/27	Y.K.
3.	3rd SUBMISSION REVISION	04/07/28	Y.K.
2.	2nd SUBMISSION REVISION	04/05/03	Y.K.
1.	REVISED AS PER COMMENTS BY T.S.H.	04/03/12	DLT

LICENSED PROFESSIONAL ENGINEER
MICHAEL A. BELL
Sept. 21/04
PROVINCE OF ONTARIO

TOWNSHIP OF UXBRIDGE
REGION MUNICIPALITY OF DURHAM

SANITARY DRAINAGE AREA PLAN

PROPOSED RESIDENTIAL SUBDIVISION
MASON HOMES
PART OF LOT 33, CONCESSION 6

Roberts Bell Engineering Limited
PROFESSIONAL ENGINEERS & LAND DEVELOPMENT SERVICES www.rbeng.ca
37 SANDIFORD DRIVE UNIT 102 STOUFFVILLE ONTARIO L4A 7X5
T: 905.640.2100 F: 905.640.5100 E: info@rbeng.ca

SCALE: 1:1500	PROJECT NO: 02–1579
DRAWN BY: DLT	
DESIGNED BY: ALX	DRAWING NO: SAN
CHECKED BY: MAB	
DATE: JUNE 1, 2003	

MEETING MINUTES

File #:	**2099**
Date:	**October 14, 2020**

Project:	**7370 Centre Road, Uxbridge**
Purpose:	**Rainscaping Charrette**
Date/Time of Meeting:	**August 25, 2020 – 10:00 am – 12:00 pm**
Location:	**SCS Consulting Group – Virtual Boardroom #2**
Next Meeting:	**TBD**

	Recipient(s):	Email:
Attendees:	Mr. John Spina, MDTR	john@mdtrgroup.com
	Ms. Tina Fang, MDTR	tina@mdtrgroup.com
	Ms. Lindsay Chen, MDTR	lindsay@mdtrgroup.com
	Mr. Steve Schaefer, SCS	sschaefer@scsconsultinggroup.com
	Mr. Nick McIntosh, SCS	nmcintosh@scsconsultinggroup.com
	Mr. Matthew Cory, MGP	mcory@mgp.ca
	Mr. Zen Keizars, Beacon	zkeizars@beaconenviro.com
	Ms. Julianna MacDonald, Beacon	jmacdonald@beaconenviro.com
	Mr. Peter Middaugh, AECOM (Township)	peter.middaugh@aecom.com
	Mr. Dave Ruggle (LSRCA)	d.ruggle@lsrca.on.ca
	Ms. Renata Sadowska (LSRCA)	r.sadowska@lsrca.on.ca
	Ms. Shelly Cuddy (LSRCA)	s.cuddy@lsrca.on.ca

The following is considered to be a true and accurate record of the items discussed. Any errors or omissions in these minutes should be provided in writing to the author immediately.

Item:	**Action:**
Below is a summary of the items discussed at the RainScaping meeting and the various potential low impact development (LID) and stormwater management (SWM) measures that <u>may</u> be considered to be utilized in the proposed development. It is noted that the Draft Plan has not been finalized and the final LID and SWM solution(s) will be developed through the Draft Plan (Functional Servicing and Stormwater Management Report) and subsequent detailed design processes and may not be exactly as presented at the RainScaping meeting.	

Item:	**Action:**
1.0 General	
1.1 Natural Heritage	
• Existing land use is predominantly agricultural • A headwater drainage feature is located in the central area of the site, conveying external drainage from the north to the existing wetland and tributary in the southeast corner of the site. • A tributary of the Uxbridge Brook conveys flows through the southeast wetland from a culvert under Bolton Drive to a Culvert under Centre Road. • A second smaller existing wetland is located in the approximate centre of the southern edge of the site. • A third small existing wetland is located at the northeast corner of the site. • Natural Heritage investigations and site staking is ongoing. • LSRCA Recommendations (See **Attachment A** for original LSRCA Comments): o Separate comments on previous meeting minutes have been provided to MDTR. They have been provided in **Attachment A** for reference.	Info
1.2 Geotechnical Investigation	
• Preliminary Geotechnical Investigation prepared by Soil Engineers Ltd., February, 2018. • 14 boreholes advanced to depth of 6.3 to 15.7 m from November to December, 2017. • ~0.6-1.5 m topsoil/Plowed soil. • Site is generally underlain by a complex stratigraphy of stiff to hard silty clay, hard silty clay till, and generally compact silty sand till, with layers of loose to very dense sand and compact to very dense silt deposits. • Silty Sand Till identified in several locations: east edge of site, the approximate location of the proposed western park block, and the southwest corner of the site.	Info
1.3 Hydrogeological Investigation	
• Depths ranging from 0.15 to 4.65 m below ground • Groundwater level generally follows existing topography, higher elevations on west side of site, lower elevations on east side of site • Groundwater level ranges from approximately 0.2 mbgs to 8.92mbgs, consistently deeper in BH13 (at approximately location of proposed park block) • LIDs expected to be within 1-2 m of the native silty clay soil • Groundwater level will fluctuate with the seasons	Info

Item:	**Action:**
→ Site is located in WHPA-Q1 and Q2 and Significant groundwater recharge area. → Site is not located in Wellhead Protection Area. → LSRCA Recommendations (See **Attachment A** for original LSRCA Comments): o Site design should include maintaining drainage (overland flow) and infiltration supporting all features that will be preserved onsite (water course/headwaters and vegetated areas/buffers). o It would be beneficial if the site concept plan could be updated to allow for infiltration facilities where groundwater/soil conditions are less constraining.	
1.4 Draft Plan	
→ Site is located within Uxbridge Urban Area (Special Study Area 6). → Draft Plan to be composed of single detached and townhouse residences, two park blocks, municipal roads, and two stormwater management blocks. → Draft Plan is preliminary and may be subject to modifications through Draft Plan application process.	Info
1.5 Stormwater Management and Grading	
→ Proposed lot and road grades will range between 0.5% and 5.0%. → Road grades from east to west are steep (5.0%) throughout site. → Drainage function of the headwater drainage feature to be retained, will require culvert underneath road or storm sewer connection. → 3:1 sloping to match existing in open space blocks/buffers (may limit LID opportunities). → SWM Criteria o Quantity Control: Control proposed peak flows to existing peak flows for the 2 through 100 year storm events (MECP/Uxbridge). o Quality Control: Enhanced Level (80% TSS Removal) (Uxbridge). o Erosion Control: minimum 24 hour detention of the 40mm storm event (Uxbridge SWM Master Plan). o Water Budget: maintain proposed to existing to the extent feasible (LSRCA). o Phosphorus: “Zero” export target (LSRCA) with offsetting for any remaining balance, minimum 90% removal (Uxbridge SWM Master Plan). o Volume Control: On-site retention of the 25mm rainfall runoff from all impervious surfaces (LSRCA).	Info

Item:	**Action:**
• Confirm SWM Criteria conformance with subwatershed study as part of Functional Servicing Report.	SCS
• LSRCA Recommendations (See **Attachment A** for original LSRCA Comments): o SWM opportunities should be confirmed upon approval of the NH features and associated requirements. o There may be some benefit in locating the park block adjacent to the SWM block at the south end of the plan. o Infiltration opportunities should be maximized within the central area of the site and may require consideration of the designated SWM block or corridor. o LIDs along the buffer areas, outside of the private properties and with provision of a maintenance access, may further support the SWM plan.	Info
Item:	**Action:**
2.0 Right-of-Way (ROW) LID and SWM Measures	
The following potential LID and SWM options were considered for the proposed right-of-ways (refer to Attached **Figure 1**):	
• Raingardens/Bioswales are a surface based infiltration/filtration measure that can be provided in open space blocks, side flankages, single loaded roads, and backing onto rear lot lines. • Catchbasins can be equipped with deeper sumps and potentially catchbasin inserts (i.e. CB Shield© - http://www.cbshield.com/ Litta Trap - http://www.imbriumsystems.com/stormwater-treatment-solutions/littatrap) that will minimize turbulence in the CB and allow sediment and pollutants to settle out and stay captured in the deeper sump until the CB's are cleaned out. • CB's can have a piped connection to a stone-filled infiltration/filtration trench in the boulevard with a perforated pipe running along the trench to distribute flows.	Info
2.1 Township Comments (See **Attachment B** for Township Comments provided prior to the meeting)	
• Raingarden/Bioswale: o Work Department uses sand and salt and have concerns regarding sand filling up and plugging system quickly leading to potential for nuisance complaints o They should not be implemented in well head protection areas o A maximum road grade guideline would need to be developed to manage the application to preferred locations.	Info
o Provide example for a single CB Application	SCS

Item:	**Action:**
• Catchbasin Pretreatment Insert: o Not desirable as individual measure to be implemented in new draft plan of subdivision. o Note: Township requires all new end-of-pipe SWM quantity/quality control measures to include a Stormceptre (OGS) device for pre-treatment. o Consideration may be given on a site specific basis. o Can potentially implement on temporary basis to intercept litter and debris from temporary land use/construction activities.	Info
• Catchbasin Infiltration/Filtration Trench o Do not implement infiltration measures in Well Head Protection Areas. o Works Department would like to have trench moved to outside edge of road allowance.	Info
3.0 Private Lot LID Measures	
The following potential LID and SWM options were considered for the proposed private lots (refer to Attached **Figure 1**):	
• Rear yard infiltration trenches may be utilized in internal split draining and walkout lots pending confirmation of foundation setbacks for Phosphorous and water balance controls (no credit for water quality or quantity control).	Info
3.1 Township Comments (See **Attachment B** for Township Comments provided prior to the meeting)	
• Rear Yard Infiltration Trenches: o Would only be considered on split drainage lots o Township will not take easements and assume are a private measure o should not be implemented in well head protection areas o A maximum road grade guideline would need to be developed to manage the application to preferred locations.	Info
3.2 LSRCA Comments (See **Attachment A** for original LSRCA Comments)	
• Rear Yard Infiltration Trenches: o Cannot be approved for quality or quantity control without municipal easement, can be approved for water balance, phosphorus, and volume control. *Comment was provided verbally during meeting and is not noted in **Attachment A**.*	Info

Item:	Action:
4.0 SWM Block LID and SWM Measures	
The following potential LID and SWM options were considered for the SWM Blocks (refer to Attached **Figure 1**):	
• Dry and Wet Ponds presented as standard SWM solutions. • Underground Infiltration/Active Storage Facilities, can use concrete (StormTrap) or plastic chamber systems (Cultec), Pre-treatment provided upstream of the facility if used for infiltration (OGS, Isolator Inlet Row). • Downstream Filtration Facility, can use manhole insert system (Jellyfish) or chamber system (StormFilter).	Info
4.1 Township Comments (See **Attachment B** for Township Comments provided prior to the meeting)	
• Underground Infiltration/Active Storage Facilities: o Infiltration not to be implemented in the well head protection areas o Consideration would be given adjacent to parkland dedications, not in parkland dedications o Site specific geotechnical investigations required to address feasibility o SCS to prepare Cost/Benefit analysis for Township	Info SCS
• Downstream Filtration Facility: o Not desirable as individual measure to be implemented in new draft plan of subdivision. o Note: Township requires all new end-of-pipe SWM quantity/quality control measures to include a Stormceptre (OGS) device for pre-treatment. o Consideration may be given on a site specific basis such as smaller infill type developments, as evaluated on a case by case basis.	Info
5.0 Park Block LID and SWM Measures	
The following potential LID and SWM options were considered for the proposed Park Blocks (refer to Attached **Figure 1**):	
• Raingardens/Bioswales are a surface based infiltration/filtration measure that can be provided backing onto rear lot lines. • Underground Infiltration/Active Storage Facilities, can be provided underneath park blocks to provide dual functionality of land allowing for additional lots and DC/property tax revenue, can use concrete (StormTrap) or plastic chamber systems (Cultec), Pre-treatment provided upstream of the facility if used for infiltration (OGS, Isolator Inlet Row).	Info

Item:	**Action:**
5.1 Township Comments (See **Attachment B** for Township Comments provided prior to the meeting)	
• Raingarden/Bioswale: o See recommendations in **Section 2.1**. • Underground Infiltration/Active Storage Facilities: o See recommendation in **Section 4.1**.	
6.0 Next Steps	
• Township and LSRCA to provide feedback based on the items above.	Town/LSRCA
• The Functional Servicing design of the LIDs will be initiated and submitted as part of a Draft Plan Application	SCS

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Attachments: Figure 1 – Rainscaping Summary Figure
Attachment A – LSRCA Rainscaping Recommendations
Attachment B – Township Preliminary LID Review Comments
Attachment C – August 25, 2020 Presentation Slides

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A REPORT TO
BRIDGE BROOK CORP.

A GEOTECHNICAL INVESTIGATION FOR PROPOSED RESIDENTIAL DEVELOPMENT

7370 CENTRE ROAD

TOWN OF UXBRIDGE

REFERENCE NO. 1711-S047

FEBRUARY 2018

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6.0 DISCUSSION AND RECOMMENDATIONS

The investigation revealed that beneath a veneer of topsoil and ploughed soils, the site is generally underlain by a complex stratigraphy consisting of stiff to hard, generally very stiff silty clay; firm to hard, generally hard silty clay till and loose to very dense, generally compact silty sand till, with layers of loose to very dense, generally compact sand and compact to very dense, generally compact silt deposits at various depths and locations. The wet sand and silts are water-bearing.

Upon the completion of borehole drilling, groundwater was recorded in the boreholes between El. 273.0 m and El. 330.9 m, dropping in the east southeast direction. The stabilized groundwater in the monitoring wells was recorded between El. 286.6 m and El. 332.4 m. The groundwater within the saturated sand and silt generally represents the permanent groundwater regime at the site. Perched water also exists in certain areas at shallower depths. The groundwater level will fluctuate with seasons.

In excavation, groundwater yield from the clay and tills will be slow and limited in quantity, whereas the groundwater yield from the saturated sand and silts below the water level will be appreciable and persistent.

It is understood that the property will be developed into a residential subdivision. Detailed design of the development, however, is not available at the time this report is prepared. The geotechnical findings which warrant special consideration are presented below:

1. The topsoil and ploughed soil must be removed for the development. The thickness of topsoil and ploughed soil may vary or becomes thicker in some areas, especially in the treed areas and depressed areas. In order to prevent

overstripping, a diligent control of the stripping operation will be required. A test pit programme can be carried out prior to or during construction to determine the thickness of the topsoil and ploughed soils.

2. The topsoil is void of engineering value. It must not be buried within the building envelope or deeper than 1.2 m below the exterior finished grade of the development. It can only be used for landscaping and landscape contouring purposes.
3. The weathered soils are not suitable to support any structure sensitive to movement. They must be subexcavated and sorted free of topsoil inclusions or deleterious materials before it is reused as engineered fill or structural backfill.
4. The sound natural soils below the topsoil, ploughed soil, and weathered soils, are suitable for normal spread and strip footing construction for the proposed buildings. The footings must be designed in accordance with the recommended bearing pressures in Section 6.1 and the footing subgrade must be inspected by a geotechnical engineer to ensure that its condition is compatible with the design of the foundations.
5. The footings must be maintained at least 0.5 m above the groundwater levels. If groundwater seepage is encountered during excavation, or where the subgrade of the normal foundations is found to be wet, the subgrade should be protected by a concrete mud-slab immediately after exposure. Dewatering may be required prior to and during construction.
6. Where earth fill is required to raise the site, or where extended footings are necessary, it is generally more economical to place engineered fill for normal footing, sewer and road construction.
7. A Class 'B' bedding, consisting of compacted 20-mm Crusher-Run Limestone, or equivalent, is recommended for the construction of the underground services. The pipe joints should be leak proof or wrapped with a

waterproof membrane. Where saturated soils are present or extensive dewatering is required, a Class 'A' bedding will be required.

8. All excavation should be carried out in accordance with Ontario Regulation 213/91.

The recommendations appropriate for the project described in Section 2.0 are presented herein. One must be aware that the subsurface conditions may vary between boreholes. Should this become apparent during construction, a geotechnical engineer must be consulted to determine whether the following recommendations require revision.

6.1 Foundations

It is assumed that the site will be regraded for the proposed development. It is generally more economical to place engineered fill for normal footing, sewer and pavement construction. Soil bearing pressures of 150 kPa (SLS) and 250 kPa (ULS) are recommended for the design of building foundations, consisting of normal spread and strip footings founded on the engineered fill or on the sound native soil stratum. The requirements for engineered fill construction are discussed in Section 6.2.

The appropriate founding levels in the natural soils range from 1.0± to 2.5± m from the prevailing ground surface, depending on the location.

The recommended soil pressures (SLS) incorporate a safety factor of 3. The total and differential settlements of the footings are estimated to be 25 mm and 15 mm, respectively.

One must be aware that the recommended bearing pressures are given as a guide for foundation design and the soils at the bearing level must be confirmed by inspection

BEACON ENVIRONMENTAL

GUIDING SOLUTIONS IN THE NATURAL ENVIRONMENT

Hydrogeological Investigation, Water Balance and Catchment-Based Water Balance

7370 Centre Road, Uxbridge, Ontario

Preliminary Report

Prepared For:

Bridge Brook Corporation

Prepared By:

Beacon Environmental Limited

Date:	*Project:*
March 2021	**217431.2**

Table 1. Summary of Groundwater Monitoring Well Conditions

Location ID	Reported Date of Construction	Approximate Location		Approximate Ground Surface	Reported Screened Interval	Soils Reported at Screened Interval	Approximate SPT N-Value at Screened Interval
		Latitude	Longitude	SoilEng, 2018 (Beacon, 2019) [3]	mbgl (masl) [5]		
BH3 [1]	*December 15, 2017*	44.1130°	-79.1416°	*305.0* (304.421)	*2.4 to 6.1* *(302.0 to 298.3)*	*Silty Clay Till*	*37 to 27*
BH6 (S) [2]	- [2]	- [2]	- [2]	(288.078)	- [2]	BOW 7.01 m on March 16, 2020 [2]	- [2]
BH6 (D)	*December 12, 2017*	44.1148°	-79.1378°	*287.9* (288.075)	*11.6 to 15.2* *(276.4 to 272.9)*	*Silty Clay Till*	*42 to 74*
BH7	*December 15, 2017*	*44.1138°*	*-79.1399°*	*297.8* (297.606)	*2.4 to 6.1* *(295.2 to 291.5)*	*Silty Sand Till*	*20 to 48*
BH9 (S) [2]	- [2]	- [2]	- [2]	(323.17)	- [2]	BOW 6.95 m on March 16, 2020 [2]	- [2]
BH9 (D)	*December 20, 2017*	44.1135°	-79.1447°	*321.9* (323.343)	11.6 to 15.2 (311.7 to 308.1)	Silty Clay Till to Silt	68 to 74
BH10	*December 21, 2017*	44.1129°	-79.1474°	*332.6* (332.254)	2.4 to 6.1 (329.8 to 326.1)	Silty Sand Till to Silty Clay Till	18 to >100
BH11	*November 27, 2017*	44.1158°	-79.1380°	*291.4* (289.224)	2.4 to 6.1 (286.8 to 283.1)	Silty Sand Till	35 to >100
BH13	*January 15, 2018*	44.1148°	-79.1448°	322.6 (322.284)	2.4 to 6.1 (319.8 to 316.8)	Sand to Silty Clay Till	62 to >100

Italics – indicates data collected by others (SoilEng, 2018)
BOW – "bottom of well"
[1] BH3 was confirmed destroyed
[2] borehole logs were not provided in the geotechnical report
[3] ground elevations provided by SoilEng.
[4] elevation measurements from survey carried out March 19, 2020.
[5] masl measurements corrected to survey carried out March 19, 2020 using the mbgl measurements in SoilEng, 2018.

Table 2. Summary of Measured Groundwater Levels

Location ID	Approximate Top of Pipe	Approximate Ground Surface Elevation	Groundwater Measurements									
			Upon Completion	2018					2019	2020		
				Jan 31	Mar 22	June19 and July 4	Sept 6	Dec 4	Sept 11	Mar 16	Apr 28	Aug 25
	masl (mbgl)	masl	mbgs (masl)	mbgs (masl) [3]	mbgs (masl) [3]	mbgs (masl) [3]	mbgs (masl) [3]	mbgs (masl) [3]	mbgs (masl)	mbgs (masl)	mbgs (masl)	mbgs (masl)
BH3		(304.421)	302.3	0.4 (304.0)	*0.5 (303.9)*	*1.1 (303.3)*	*0.7 (303.7)*	*0.2 (304.2)*	confirmed destroyed			
BH6 S	+ 0.83	(288.078)	- [2]	- [2]	*1.2 (286.8)*	*1.4 (286.6)*	*1.8 (286.2)*	*0.9 (287.2)*	2.44 (285.63)	**0.87 (287.13)**	1.2 (286.87)	2.49 (285.59)
BH6 D	+0.70	(288.075)	273.0	1.3 (286.7)	*1.4 (286.6)*	*1.6 (286.4)*	*2.0 (286.0)*	*1.1 (286.9)*	2.81 (285.26)	**0.98 (287.10)**	1.45 (286.63)	2.80 (285.27)
BH7	+0.80	(297.606)	293.0	0.9 (296.7)	*1.1 (296.5)*	*2.2 (295.4)*	*2.5 (295.1)*	*0.5 (297.1)*	3.91 (293.70)	**1.04 (296.56)**	1.71 (295.90)	3.95 (293.65)
BH9 S	+ 0.82	(323.170)	- [2]	- [2]	*1.0 (322.1)*	*2.1 (321.0)*	*2.3 (320.8)*	*0.7 (322.4)*	3.39 (319.78)	**1.30 (321.87)**	1.50 (321.67)	3.20 (319.97)
BH9 D	+ 0.82	(323.343)	*307.3*	*7.4 (315.9)*	7.5 (315.8)	*7.9 (315.4)*	*8.1 (315.2)*	*7.4 (315.9)*	8.9 (314.44)	**7.53 (315.81)**	7.74 (315.60)	8.92 (314.42)
BH10	+ 0.93	(332.254)	*329.0*	*0.2 (332.0)*	0.9 (331.3)	*1.7 (330.5)*	*1.4 (330.8)*	*0.3 (331.9)*	2.39 (329.85)	**0.52 (331.73)**	1.20 (331.05)	2.22 (330.03)
BH11	+ 0.91	(289.224)	290.2	1.1 (288.1)	*1.1 (288.1)*	*1.4 (287.8)*	*1.8 (287.4)*	*0.7 (286.6)*	2.56 (286.66)	**0.54 (288.68)**	1.07 (288.15)	2.56 (286.66)
BH13	+ 0.73	(322.284)	319.0	3.5 (318.8)	*3.3 (319.0)*	*3.2 (319.0)*	*3.7 (318.6)*	*3.7 (317.8)*	4.47 (317.81)	**3.08 (319.20)**	3.24 (319.04)	4.59 (317.69)

Italics – indicates data collected by others (SoilEng, 2018)

Grey shading - indicates water level measured at the time of drilling completion - water levels measured at the time of completion are not directly comparable to the other measurements.

Bold values – indicates the highest measured groundwater levels

[2] reference to the shallow nested wells were not provided in the geotechnical report (SoilEng, 2018) – water levels are found in the subsequent monitoring program letters.

[3] masl measurements corrected to survey carried out March 19, 2020 using the mbgl measurements in SoilEng, 2018.

Table 4. Summary of Estimated Infiltration Rates

Location ID	Soil Description	Approximate Test Depth	Estimated Field-Saturated Hydraulic Conductivity	Theoretical K_{fs} @ 4°C "freshet"	Theoretical K_{fs} @ 24°C "summer"	Estimated Infiltration Rate[1]	Correction Factor Used	Estimated Design Infiltration Rate[2]
		(mbgl)	K_{fs} (cm/s)	K_{fs} (cm/s)	K_{fs} (cm/s)	(mm/hr)		(mm/hr)
PT20-1 (near BH6)	Brown silty sand, rootlets, moist	0.42	9×10^{-5}	8×10^{-5}	1×10^{-4}	49	2.5	20
PT20-2 (near BH7)	Brown silty sand, rootlets, moist	0.26	4×10^{-5}	3×10^{-5}	6×10^{-5}	42	2.5	17
PT20-3 (near BH11)	Brown silty sand, rootlets, moist	0.62	4×10^{-5}	3×10^{-5}	5×10^{-5}	42	2.5	17

Notes:
mbgl = metres below ground surface
cm/s = centimetres per second
mm/hr = millimetres per hour
[1] – based on Estimated Field-Saturated Conductivity and Table C1 from TRCA and CVCA (2010).
[2] – correction factor in accordance with Table C2 from TRCA and CVCA (2010).

4.2 Global Site-Specific Water Balance

4.2.1 Pre-Development Constraints

The existing pre-development conditions of the subject property includes three general vegetation types, including 'moderately rooted crops' (corn), 'mature forest', and 'swamps and marshes', as summarized in **Table 6.** A small amount of land dedicated to a dirt driveway bisects the property and is characterized as impermeable, due to long term compaction**.**

Table 6. Existing Pre-Development Conditions

Existing Catchment Land Use	Approximate Pervious Land Area (m^2)	Approximate Impervious Land Area (m^2)	Sums (m^2)
Principle Area – (corn fields)	349,668	-	349,668
Mature Forest Areas (areas defined as FOD [1])	41,220	-	41,220
Marshes and Swamp Areas (areas defined as MAS2-1 [1] and SWT-2 [1])	9,984		9,984
Driveway (4 metres wide by 732 metres long)	-	2,928	2,928
Total Areas	**400,872**	**2,928**	**403,800**

FOD – 'deciduous forest areas'
MAS2-1 – 'Cattail Mineral Shallow Marsh' SWT-2 – 'Willow Mineral Thicket Swamp'
[1] Source: Figure 2 – Existing Conditions (Beacon; August, 2020)

As summarized in **Table 6**, the area of the subject property used in the calculations was 403,800 m^2 in area, which includes approximately 2,928 m^2 of impermeable area.

4.2.2 Post-Development Constraints

Post-development conditions for Phase One Conditions were based on drawings provided by SCS, dated December 2020 (**Figure**; **Appendix A**). The proposed conditions of the subject property include one general vegetation type which have been classified as Urban Lawn/Shallow Rooted Crops, as well as impervious lands comprised of concrete pavements, asphalt pavements, and building structures, as summarized in **Table 7.**

Table 7. Proposed Post-Development Conditions

Proposed Land Uses [1, 2]	Approximate Pervious Land Area (m^2)	Approximate Impervious Land Area (m^2)	Sums (m^2)
	Area within FOI Catchment	Area within FOI Catchment	
Catchment 201	104,632	150,568	255,200
Catchment 202	21,120	1,880	23,000
Catchment 203 (Wet SWMP 1)	8,700	8,700	17,400
Catchment 204	21,318	34,782	56,100
Catchment 205 (Dry SWMP 1)	3,213	3,087	6,300
Catchment 206	371	329	700
Catchment 207	1,590	1,410	3,000
Catchment 208	1,007	893	1,900
Uxbridge Brook NHS	40,200	-	40,200
Total	**202,941**	**201,649**	**403,800**

[1] Based on information provided by SCS (December 2020).
[2] These represent the area of each catchment limited to the subject property that are interpreted to flow toward the FOI.SWMP – storm water management pond

The subject property remains approximately 403,800 m^2 in area. Impermeable areas are increasedfrom approximately 1% of the subject property in pre-development conditions, to approximately 50% of the subject property in post-development conditions.

4.2.3 Comparison of Pre-Development and Post-Development Water Balance Conditions

The pre-development hydrologic budget and post-development hydrologic budget for the subject property was estimated based on the existing catchment conditions summarized above. The estimated pre-development conditions are compared to anticipated post-development conditions in **Table 8,** below.

Table 8. Theoretical Average Annual Water Budgets

Component	Pre-Development Conditions	Post-Development Conditions	
	(m^3 per annum)	(m^3 per annum)	Relative Difference from Pre-Development (m^3 per annum)
(P) Precipitation	329,905	329,905	-
(ET) Evapotranspiration	292,285	150,568	-141,717
(Q_G) Infiltration	60,883	31,668	-29,215
(Q_S) Run-off	59,532	258,987	+199,455

Based on the summary of analyses provided in **Table 8,** it is noted that the proposed changes to the subject property are anticipated to result in an annual infiltration decrease of approximately 27,764 m^3, and an annual runoff increase of approximately 199,455 m^3 in comparison to existing conditions. Further details, including a monthly resolution breakdown, are provided in **Appendix D**.

Estimated decreases in infiltration volume and increases in run-off volume are interpreted to be due to relatively greater proposed impermeable area, as well as an exchange of moderately rooted crops (e.g. corn) with shallow rooted crops (e.g. urban lawns), which have a lower assigned water holding capacity (re: **Table 5**, above).

4.2.4 Low Impact Development (LID) Measures and Influence of SWMPs

Low Impact Development Measures located within the subject property area are proposed. These include Catchbasin Infiltration/Filtration Trenches and Rear Yard At-Surface Infiltration Trenches which effectively convert runoff volume from impermeable areas to infiltration volume. As well, a wet SWMP is proposed (Catchment 203) and a dry SWMP is proposed (Catchment 205). The wet SWMP contributes to evapotranspiration processes, and has an impermeable ratio of 50% (SCS, 2020). The dry SWMP contributes to evapotranspiration processes and infiltration processes.

The combined monthly influence of these proposed mitigation methods are provided in **Appendix D**.As shown, the LID measures appear to be least active during winter months, June, and September (limited by available runoff), and are most effective during the freshet months and fall rains.

4.2.5 Comparison of Pre-Development and Post-Development Catchment-Based Water Balance Conditions (Including Mitigations)

The pre-development hydrologic budget for the subject property was estimated based on the existing catchment conditions summarized above, and the post-development hydrologic budgets were estimated based on the Post-Development Drainage Plan and related mitigation measures, summarized above. The estimated pre-development conditions are compared to anticipated post-development conditions in **Table 9,** below. A more detailed analysis of the values summarized in **Table 9** is provided at monthly resolution in **Appendix D**.

Table 9. Theoretical Average Catchment-Based Water Budgets

Component	Pre- Development FOI Catchment	Proposed Post-Development Conditions		Proposed Post-Development Conditions with Mitigation Measures (Ultimate Conditions)	
	(m^3 per annum)	(m^3 per annum)	Relative Difference from Pre- Development (m^3 per annum)	(m^3 per annum)	Relative Difference from Pre-Development (m^3 per annum)
(P) Precipitation	329,905	329,905	-	329,905	-
(ET) Evapotranspiration	292,285	150,568	-141,717	150,568	-141,717
(Q_G) Infiltration	60,883	31,668	-29,215	160,246	+99,363
(Q_S) Run-off	59,532	258,987	+199,455	130,409	+70,877

Based on the summary of analyses provided in **Table 9,** it is noted that the ultimate proposed conditions for the subject property are anticipated to result in an annual increase of infiltration by approximately 99,363 $m^{3,}$ and an annual increase in runoff by approximately 70,877 m^3 in comparison to existing conditions.

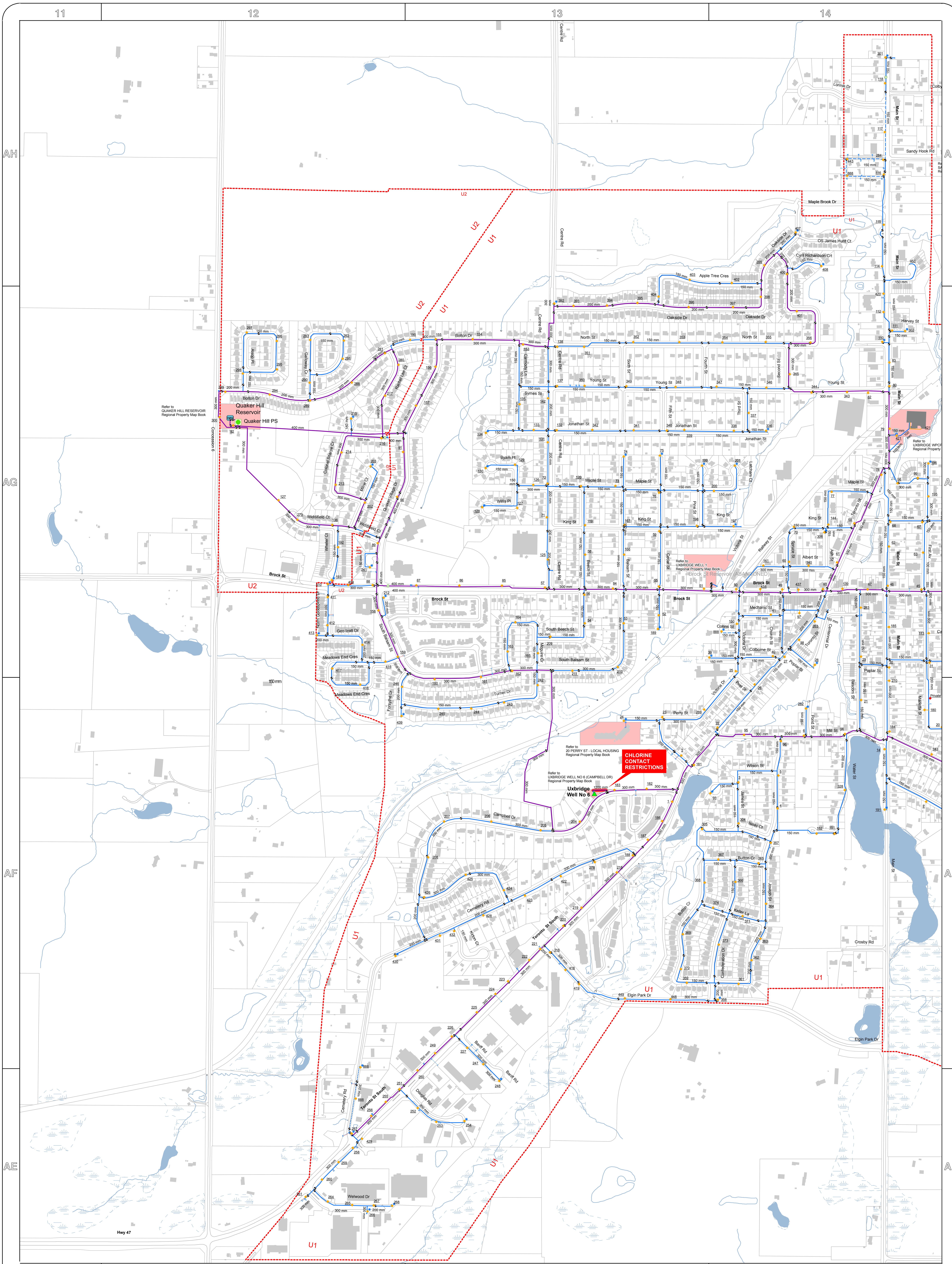
As shown in **Appendix D**, LID measures convert approximately 4,262 m^3 to 18,498 m^3 of theoretical runoff volume to theoretical infiltration per month. Resulting monthly infiltration trends appear to have generally higher infiltration volumes. Controlled runoff volumes result in more extreme wet periods, a longer freshet period and a drier summer season.

It is acknowledged that the values and coefficients presented above are standardized estimates. It is important to understand that infiltration rates and water holding capacities are dependent upon the effective porosity and hydraulic conductivity of the surficial soils which may vary over several orders of magnitude. As such, the resulting run-off and infiltration estimates inherit potentially large margins of error. These margins of error are recognized, but for the purposes of this assessment, the numbers used in the water balance calculations are considered reasonable estimates based on the site-specific conditions and useful for comparison of pre- to post- development conditions.

4.3 Catchment-Based Water Balance

A Catchment-Based Water Balance (CBWB) assessment was carried out for Beacon by Terrapex, limited to the catchment area belonging to the Feature of Interest (FOI). For the purposes of this report, the FOI is the portion of Uxbridge Brook located within the bounds of the subject property.

The purpose of the catchment-based water balance assessment is to compare the hydrological conditions of the proposed development conditions on the surfacewater reaching/‘feeding’ the FOI. For the purposes of this assessment, the FOI is defined as the portion of Uxbridge Brook and associated lower banks (presumed spring flood tier) located at the southeast corner of the subject property.



The Regional Municipality of Durham
Works Department
WATER SUPPLY SYSTEM

This map has been produced from a variety of sources.
The Region of Durham does not make any representations concerning the accuracy, likely results, or reliability of the use of the materials. The Region hereby disclaims all representations and warranties.

Servicing Note: This map depicts proximity of services only.
It is not to be used to determine individual site servicing or availability of capacity within the system.
For detailed site servicing information please contact the development approvals section of the works department.

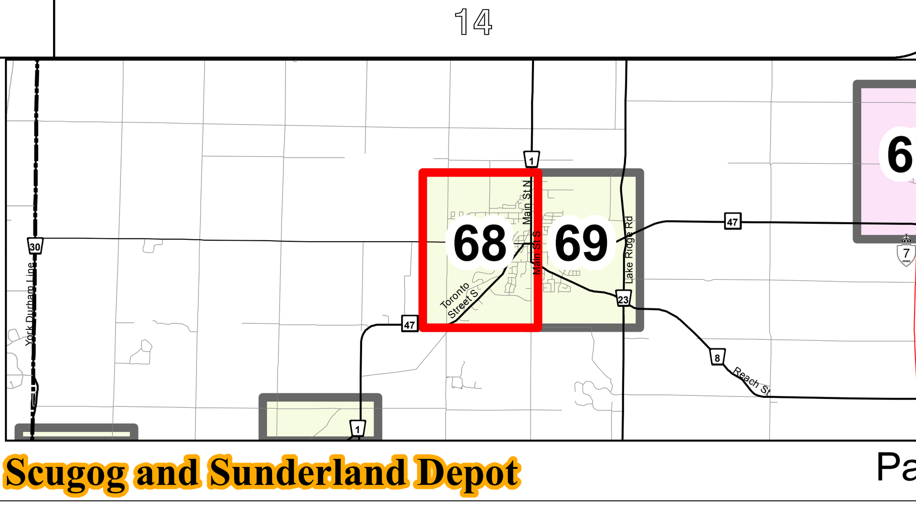
Township of Uxbridge
Uxbridge West

- Water Main - Assumed or In Service
- Water Main - Maintenance
- Water Main - Issued for Construction
- Water Main - Not In Service
- Feeder Main - Assumed or In Service
- Feeder Main - Maintenance
- Feeder Main - Issued for Construction
- Fireline
- Service
- Pressure Zone Edge
- Underground Pipelines
- Municipal Boundary

- Hydrant
- Flushing Hydrant
- Hydrant with Anti-tampering Device
- Flushing Hydrant with Anti-tampering Device
- Temporary Flushing Hydrant
- Temporary Flushing Hydrant with Anti-tampering Device
- Private Hydrant
- Water Pumping Station - Proposed
- Water Pumping Station - Not in Service
- Water Pumping Station - Not Applicable
- Water Pumping Station - Assumed/In Service/Maintenance
- Water Pumping Station - Abandoned

- Easement (Water)
- Easement (Combined)
- Regional Property

- Control Valve
- Curbstop Non Residential
- Zone Valve
- Blow Off
- Air Release, Check, Drain or Pressure Relief
- Municipal Well - In Service
- Municipal Well - Abandoned
- Municipal Well - Not in Service
- Municipal Well - Not Applicable
- Reservoir - In Service
- Reservoir - Not in Service
- Storage Tank - In Service
- Wet Well - Assumed



printed Friday, March 22, 2019

APPENDIX C

HYDROLOGY MODELLING

SCS consulting group ltd	**EXISTING CONDITIONS** **VO6 MODEL SCHEMATIC**	Project Name:Centre Road Project No.: 2099 Date: December 2020 Designer: C.M.D.

Existing Conditions
VO Parameter Summary

7370 Centre Road
Project Number: 2099
Date: November 2020
Designer Initials: C.M.D.

NASHYD

Number	101	102
Description		
DT(min)	2	2
Area (ha)	40.26	1.07
CN*	86.0	86.0
IA(mm)	8.0	8.0
TP Method	Uplands	Uplands
TP (hr)	0.44	0.07

Site Soils: (per Geotechnical Investigation Report prepared by Soil Engineers Ltd. dated February 16, 2018)

Soil Type	**Hydrologic Soil Group**
Silty Clay	C

TABLE OF CURVE NUMBERS (CN's)**

Land Use	Hydrologic Soil Type							Manning's	Source
	A	AB	B	BC	C	CD	D	'n'	
Meadow "Good"	30	44	58	64.5	71	74.5	78	0.40	MTO
Woodlot "Fair"	36	48	60	66.5	73	76	79	0.40	MTO
Gravel	76	80.5	85	87	89	90	91	0.30	USDA
Lawns "Good"	39	50	61	67.5	74	77	80	0.25	USDA
Pasture/Range	58	61.5	65	70.5	76	78.5	81	0.17	MTO
Crop	66	70	74	78	82	84	86	0.13	MTO
Fallow (Bare)	77	82	86	89	91	93	94	0.05	MTO
Low Density Residences	57	64.5	72	76.5	81	83.5	86	0.25	USDA
Streets, paved	98	98	98	98	98	98	98	0.01	USDA

1. MTO Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
2. USDA (1986), Urban Hydrology for Small Watersheds, Table 2.2-Runoff Curve Numbers for Urban Areas

HYDROLOGIC SOIL TYPE (%)

Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
101					100			100
102					100			100

LAND USE (%)

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
101	0.5	3.3				95.3			0.9	100.0
102		0.9				99.1				100.0

Note: Where STANDHYD command used (shaded), impervious fraction is not considered in CN determination, since %Imp directly input in STANDHYD command

CURVE NUMBER (CN)

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Weighted CN
101	0.4	2.4	0.0	0.0	0.0	78.1	0.0	0.0	0.9	82
102	0.0	0.7	0.0	0.0	0.0	81.2	0.0	0.0	0.0	82

** AMC II assumed

SCS consulting group ltd

Existing Conditions
CN Calculations

Input Values

Step				
	Subcatchment:	101		102
1	**CN (AMC II):**	**82**		**82**
2	CN (AMC III) =	92		92
3	100 Year Precipitation, P =	104.07	mm	104.07

$$Q = \frac{(P - Ia)^2}{(P - Ia) + S} \qquad S = \frac{(P - Ia)^2}{Q} - (P - Ia)$$

Q = rainfall excess or runoff, mm
S = potential maximum retention or available storage, mm

$$CN = \frac{25400}{S + 254} \qquad S = \frac{25400}{CN} - 254$$

CN* = modified SCS curve # that better reflects Ia conditions in Ontario

Output Values

Step				
	Subcatchment:	101		102
	S_{III} =	22.09	mm	22.09
	SCS Assumption of 0.2 S = Ia =	4.42	mm	4.42
4	Q_{III} =	81.57	mm	81.57
	Preferred Initial Abstraction, Ia =	8.0	mm	8.0
5	S^*_{III} =	17.06	mm	17.05
6	CN^*_{III} =	93.71	mm	93.71
	CN^*_{III}=	**94**	Rounded	**94**
7	**CN^*_{II}=**	**86**	convert	**86**

Explanation of Procedure

1 Determine CN based on typical AMC II conditions (attached)
2 Convert CN from AMC II to AMC III conditions (standard SCS tables)
3 Get precipitation depth P for 100 year storm
4 Using CN_{III} with Ia = 0.2S, compute Q_{III} for 100 year precipitation
5 For the same Q_{III}, compute S^*_{III} using Ia=1.5mm (or otherwise determined)
6 Compute CN^*_{III} using S^*_{III}
7 Calculate CN^*_{II} using SCS conversion table

Existing Conditions
IA Calculations

LAND USE (%) - Existing Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
101	0.5	3.3				95.3			0.9	100.0
102		0.9				99.1				100.0

IA VALUES (mm) - Existing Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
IA (mm)	8	10	2	5	8	8	3	2	2	
101	0.0	0.3				7.6			0.0	8.0
102		0.1				7.9				8.0

* IA values based on LSRCA guidelines

SCS consulting group ltd

Existing Conditions
Time to Peak Calculations

7370 Centre Road
Project Number: 2099
Date: November 2020
Designer Initials: C.M.D.

Uplands Method:

Catchment ID	High Elevation	Low Elevation	Length (m)	Slope (%)	Land Cover Type	Velocity (m/s)	Time of Concentration (s)	Time of Concentration (hr)	Time to Peak (hr)
101a	335.65	333.25	257	0.93	Cultivated Straight Row	0.27	951.0	0.26	0.18
101b	333.25	322.75	119	8.82	Cultivated Straight Row	0.83	144.2	0.04	0.03
101c	322.75	310.08	265	4.78	Cultivated Straight Row	0.61	435.4	0.12	0.08
101d	310.08	302.25	128	6.12	Woodland	0.37	343.0	0.10	0.06
101e	302.25	298.22	127	3.17	Woodland	0.27	472.2	0.13	0.09
101									**0.44**
102a	303.75	293.42	140	7.38	Cultivated Straight Row	0.76	185.4	0.05	0.03
102b	293.42	287.29	126	4.87	Cultivated Straight Row	0.61	205.2	0.06	0.04
102									**0.07**

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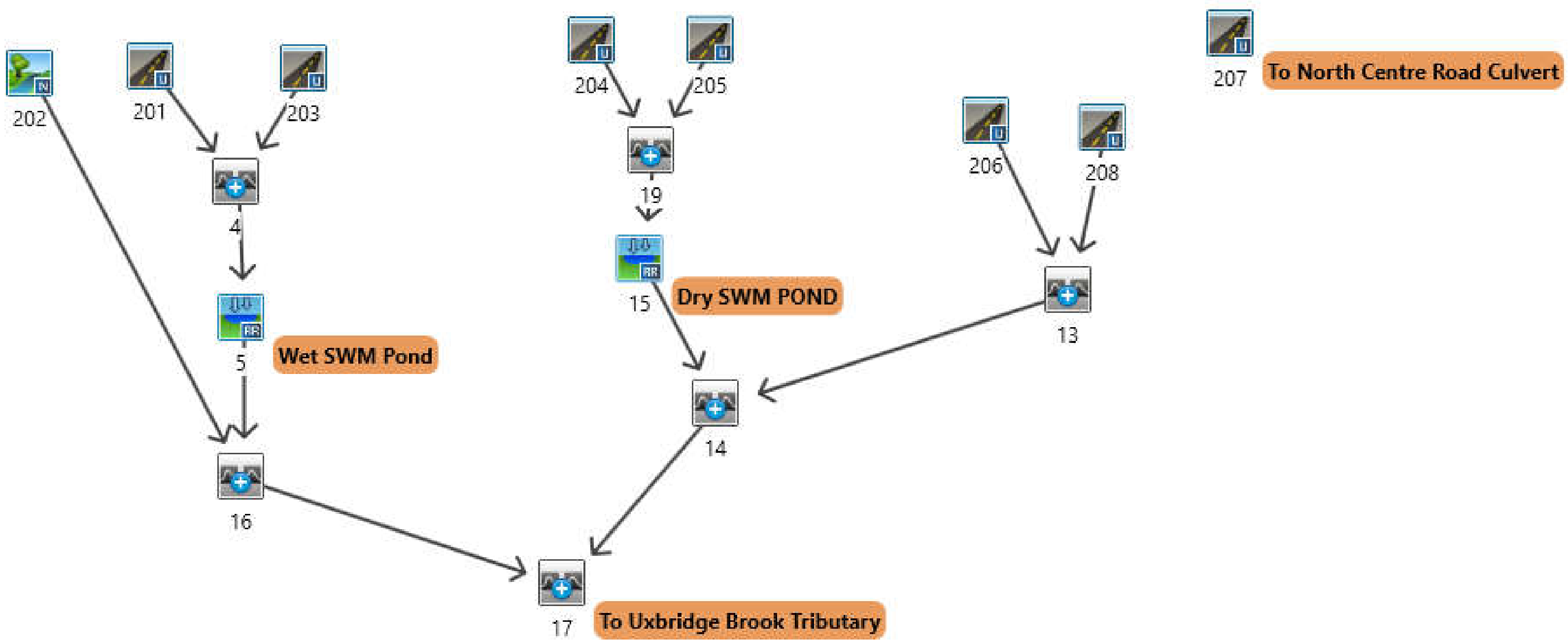
PROPOSED CONDITIONS
VO6 MODEL SCHEMATIC

Project Name:Centre Road
Project No.: 2099
Date: February 2021
Designer: C.M.D.



7370 Centre Road
Project Number: 2099
Date: December 2020
Designer Initials: C.M.D.

Proposed Conditions
VO Parameter Summary

NASHYD

Number	202
Description	
DT(min)	2
Area (ha)	7.26
CN*	86.0
IA(mm)	8.1
TP Method	Uplands
TP (hr)	0.41

STANDHYD

Number	201	203	204	205	206	207	208
Description							
DT(min)	2	2	2	2	2	2	2
Area (ha)	25.52	1.74	5.61	0.63	0.07	0.3	0.19
XIMP[1,2]	0.26	0.45	0.23	0.40	0.01	0.01	0.01
TIMP[2]	0.59	0.50	0.62	0.49	0.47	0.47	0.47
CN*	73.0	73.0	73.0	73.0	73.0	73.0	73.0
IA(mm)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
SLPP(%)	5	2	5	2	2	2	2
LGP(m)	40	40	40	40	40	40	40
MNP	0.25	0.25	0.25	0.25	0.25	0.25	0.25
DPSI (mm)	2.0	2.0	2.0	2.0	2.0	2.0	2.0
SLPI(%)	5	2	5	2	2	2	1
LGI(m)	412.47	107.70	193.39	64.81	21.60	44.72	35.59
MNI	0.013	0.013	0.013	0.013	0.013	0.013	0.013

[1]Note that where there is NO directly connected area (ie: roof runoff to grassed areas), the hydrology program does not accept XIMP=0%, therefore, XIMP = 1% has been used
[2]Note that where there is NO pervious area, the hydrology program does not accept TIMP and XIMP=100%, therefore, TIMP and XIMP = 99% has been usec

SCS consulting group ltd

Proposed Conditions
CN Calculations

7370 Centre Road
Project Number: 2099
Date: December 2020
Designer Initials: C.M.D.

Site Soils: (per Geotechnical Investigation Report prepared by Soil Engineers Ltd. dated February 16, 2018)

Soil Type	Hydrologic Soil Group
Silty Clay	C

TABLE OF CURVE NUMBERS (CN's)**										
Land Use	Hydrologic Soil Type							Manning's 'n'	Source
	A	AB	B	BC	C	CD	D		
Meadow "Good"	30	44	58	64.5	71	74.5	78	0.40	MTO
Woodlot "Fair"	36	48	60	66.5	73	76	79	0.40	MTO
Gravel	76	80.5	85	87	89	90	91	0.30	USDA
Lawns "Good"	39	50	61	67.5	74	77	80	0.25	USDA
Pasture/Range	58	61.5	65	70.5	76	78.5	81	0.17	MTO
Crop	66	70	74	78	82	84	86	0.13	MTO
Fallow (Bare)	77	82	86	89	91	93	94	0.05	MTO
Low Density Residences	57	64.5	72	76.5	81	83.5	86	0.25	USDA
Streets, paved	98	98	98	98	98	98	98	0.01	USDA

1. MTO Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
2. USDA (1986), Urban Hydrology for Small Watersheds, Table 2.2-Runoff Curve Numbers for Urban Areas

HYDROLOGIC SOIL TYPE (%)								
	Hydrologic Soil Type							
Catchment	A	AB	B	BC	C	CD	D	TOTAL
202					100			100
201					100			100
203					100			100
204					100			100
205					100			100
206					100			100
207					100			100
208					100			100

LAND USE (%)										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
202	0.0	17.4	0.0	0.0	0.0	78.2	0.0	0.0	4.4	100.0
201	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
203	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
204	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
205	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
206	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
207	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
208	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0

Note: Where STANDHYD command used (shaded), impervious fraction is not considered in CN determination, since %Imp directly input in STANDHYD command

CURVE NUMBER (CN)										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Weighted CN
202	0.0	12.7	0.0	0.0	0.0	64.2	0.0	0.0	4.3	81
201	0.0	0.0	0.0	74.0	0.0	0.0	0.0	0.0	0.0	74
203	0.0	0.0	0.0	74.0	0.0	0.0	0.0	0.0	0.0	74
204	0.0	0.0	0.0	74.0	0.0	0.0	0.0	0.0	0.0	74
205	0.0	0.0	0.0	74.0	0.0	0.0	0.0	0.0	0.0	74
206	0.0	0.0	0.0	74.0	0.0	0.0	0.0	0.0	0.0	74
207	0.0	0.0	0.0	74.0	0.0	0.0	0.0	0.0	0.0	74
208	0.0	0.0	0.0	74.0	0.0	0.0	0.0	0.0	0.0	74

** AMC II assumed

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Proposed Conditions
CN Calculations

7370 Centre Road
Project Number: 2099
Date: December 2020
Designer Initials: C.M.D.

Step	Input Values									
	Subcatchment:	202		201	203	204	205	206	207	208
1	**CN (AMC II):**	**81**		**74**	**74**	**74**	**74**	**74**	**74**	**74**
2	CN (AMC III) =	92		88	88	88	88	88	88	88
3	100 Year Precipitation, P =	104.07	mm	104.07	104.07	104.07	104.07	104.07	104.07	104.07

$$Q = \frac{(P - Ia)^2}{(P - Ia) + S} \qquad S = \frac{(P - Ia)^2}{Q} - (P - Ia)$$

Q = rainfall excess or runoff, mm
S = potential maximum retention or available storage, mm

$$CN = \frac{25400}{S + 254} \qquad S = \frac{25400}{CN} - 254$$

CN* = modified SCS curve # that better reflects Ia conditions in Ontario

Step	Output Values									
	Subcatchment:	202		201	203	204	205	206	207	208
	S_{III} =	22.09	mm	34.64	34.64	34.64	34.64	34.64	34.64	34.64
	SCS Assumption of 0.2 S = Ia =	4.42	mm	6.93	6.93	6.93	6.93	6.93	6.93	6.93
4	Q_{III} =	81.57	mm	71.61	71.61	71.61	71.61	71.61	71.61	71.61
	Preferred Initial Abstraction, Ia =	8.1	mm	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5	S^*_{III} =	16.96	mm	37.99	37.99	37.99	37.99	37.99	37.99	37.99
6	CN^*_{III} =	93.74	mm	86.99	86.99	86.99	86.99	86.99	86.99	86.99
	CN^*_{III}=	**94**	Rounded	**87**	**87**	**87**	**87**	**87**	**87**	**87**
7	**CN^*_{II}=**	**86**	convert	**73**	**73**	**73**	**73**	**73**	**73**	**73**

Explanation of Procedure

1 Determine CN based on typical AMC II conditions (attached)
2 Convert CN from AMC II to AMC III conditions (standard SCS tables)
3 Get precipitation depth P for 100 year storm
4 Using CN_{III} with Ia = 0.2S, compute Q_{III} for 100 year precipitation
5 For the same Q_{III}, compute S^*_{III} using Ia=1.5mm (or otherwise determined)
6 Compute CN^*_{III} using S^*_{III}
7 Calculate CN^*_{II} using SCS conversion table

SCS consulting group ltd

Proposed Conditions
IA Calculations

7370 Centre Road
Project Number: 2099
Date: December 2020
Designer Initials: C.M.D.

LAND USE (%)										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
202		17.4				78.2			4.4	100.0
201				100.0						100.0
203				100.0						100.0
204				100.0						100.0
205				100.0						100.0
206				100.0						100.0
207				100.0						100.0
208				100.0						100.0

IA VALUES (mm)										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
IA (mm)	8	10	2	5	8	8	3	2	2	
202		1.7				6.3			0.1	8.1
201				5.0						5.0
203				5.0						5.0
204				5.0						5.0
205				5.0						5.0
206				5.0						5.0
207				5.0						5.0
208				5.0						5.0

* IA values based on LRSCA guidelines

Proposed Conditions
Time to Peak Calculations

7370 Centre Road
Project Number: 2099
Date: December 2020
Designer Initials: C.M.D.

Uplands Method:

Catchment ID	High Elevation	Low Elevation	Length (m)	Slope (%)	Land Cover Type	Velocity (m/s)	Time of Concentration (s)	Time of Concentration (hr)	Time to Peak (hr)
202a	335.65	333.25	257	0.93	Cultivated Straight Row	0.27	951.0	0.26	0.18
202b	333.25	322.75	119	8.82	Cultivated Straight Row	0.83	144.2	0.04	0.03
202c	322.75	310.08	265	4.78	Cultivated Straight Row	0.61	435.4	0.12	0.08
202d	310.08	302.25	128	6.12	Woodland	0.37	343.0	0.10	0.06
202e	302.25	299.27	90	3.31	Woodland	0.27	327.6	0.09	0.06
202									**0.41**

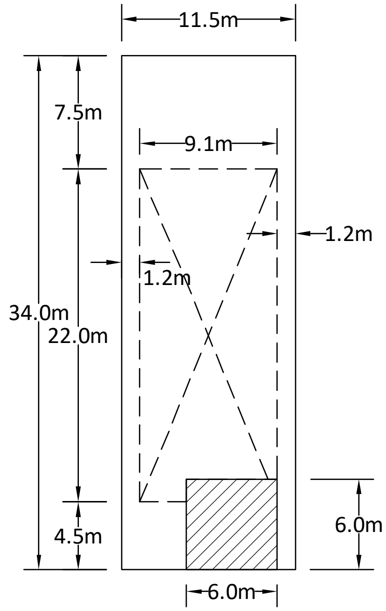
7370 Centre Road
Project Number: 2099
Date: December 2020
Designer Initials: C.M.D.

Proposed Conditions
Percent Impervious Calculations

			StandHyd IDs						
			201	203	204	205	206	207	208
Catchment Area (ha)			25.52	1.74	5.61	0.63	0.07	0.30	0.19
Land Use Areas	**Timp**	**Ximp**							
SWM Pond	50%	50%		1.55		0.51			
Park	15%	0%	1.70						
11.5m Frontage - Single Detached 1[1]	58%	9%	4.77		2.42				
11.5m Frontage - Single Detached 1 (Front Half)[1]	71%	20%	0.49		0.50				
11.5m Frontage - Single Detached 1 (Rear Half)[1]	47%	0%		0.19		0.12	0.07	0.30	0.19
11.0m Frontage - Links[1]	60%	10%	2.00		1.01				
10.4m Frontage - Single Detached 2[1]	58%	12%	7.08						
Laneway Townhouse[1]	86%	45%	0.89						
Townhouse Fronting Standard R.O.W.	62%	29%	0.39						
20.0m R.O.W.	60%	45%	6.75		1.43				
6.0m Laneway R.O.W.	100%	100%	0.22						
Single Detached Driveways Within R.O.W.	100%	100%	1.04		0.25				
Townhouse Driveways Within R.O.W.	100%	100%	0.01						
Existing 6th Concession Road Imperviousness	100%	100%	0.18						
		Total Land Use =	25.52	1.74	5.61	0.63	0.07	0.30	0.19
		Timp =	59%	50%	62%	49%	47%	47%	47%
		Ximp =	26%	45%	23%	40%	0%	0%	0%

[1]Lot percent impervious (TIMP & XIMP) calculations per Figures C.1 - C.3.

TYPICAL 11.5m x 34.0m SINGLE DETACHED 1

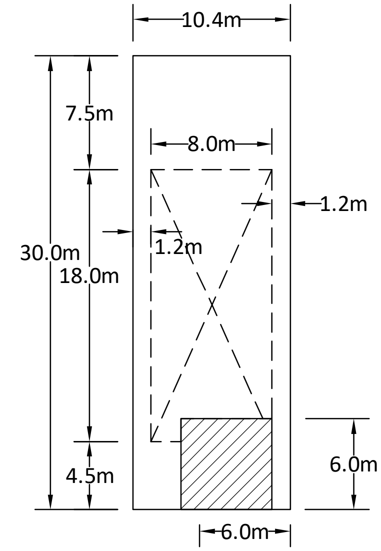


FRONT DRAINAGE AREA = 178.3 m²
FRONT DRAINAGE ROOF AREA = 91.1 m²
DRIVEWAY AREA = 36.0 m²
FRONT DRAINAGE PERCENT IMPERVIOUS = 71%
FRONT DRAINAGE DIRECTLY CONNECTED IMPERVIOUS= 20%

REAR DRAINAGE AREA = 212.8 m²
REAR DRAINAGE ROOF AREA = 100.1 m²
REAR DRAINAGE PERCENT IMPERVIOUS = 47%
REAR DRAINAGE DIRECTLY CONNECTED IMPERVIOUS= 0%

TOTAL DRAINAGE AREA = 391.0 m²
TOTAL ROOF AREA = 191.2 m²
TOTAL DRIVEWAY AREA = 36.0 m²
TOTAL AREA PERCENT IMPERVIOUS = 58%
TOTAL AREA DIRECTLY CONNECTED IMPERVIOUS = 9%

TYPICAL 10.4m x 30.0m SINGLE DETACHED 2



FRONT DRAINAGE AREA = 140.4 m²
FRONT DRAINAGE ROOF AREA = 63.0 m²
DRIVEWAY AREA = 36.0 m²
FRONT DRAINAGE PERCENT IMPERVIOUS = 71%
FRONT DRAINAGE DIRECTLY CONNECTED IMPERVIOUS= 26%

REAR DRAINAGE AREA = 171.6 m²
REAR DRAINAGE ROOF AREA = 72.0 m²
REAR DRAINAGE PERCENT IMPERVIOUS = 42%
REAR DRAINAGE DIRECTLY CONNECTED IMPERVIOUS= 0%

TOTAL DRAINAGE AREA = 312.0 m²
TOTAL ROOF AREA = 144.0 m²
TOTAL DRIVEWAY AREA = 36.0 m²
TOTAL AREA PERCENT IMPERVIOUS = 58%
TOTAL AREA DIRECTLY CONNECTED IMPERVIOUS = 12%

*NOTE: ALL ROOF LEADERS TO BE DIRECTED TO PERVIOUS SURFACES.
*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

	7370 CENTRE ROAD UXBRIDGE		TYPICAL LAYOUT FOR SINGLE DETACHED DWELLING	
SCS consulting group ltd 30 CENTURIAN DRIVE, SUITE 100 MARKHAM, ONTARIO L3R 8B8 TEL: (905) 475-1900 FAX: (905) 475-8335	DESIGNED BY: C.M.D.	CHECKED BY: N.D.M.	PROJECT No: 2099	FIGURE No: C-1
	SCALE: 1:500	DATE: MARCH 2021		

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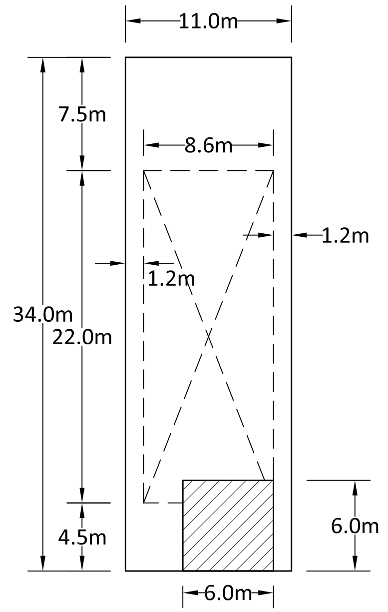
TYPICAL 11.0m x 34.0m LINKS

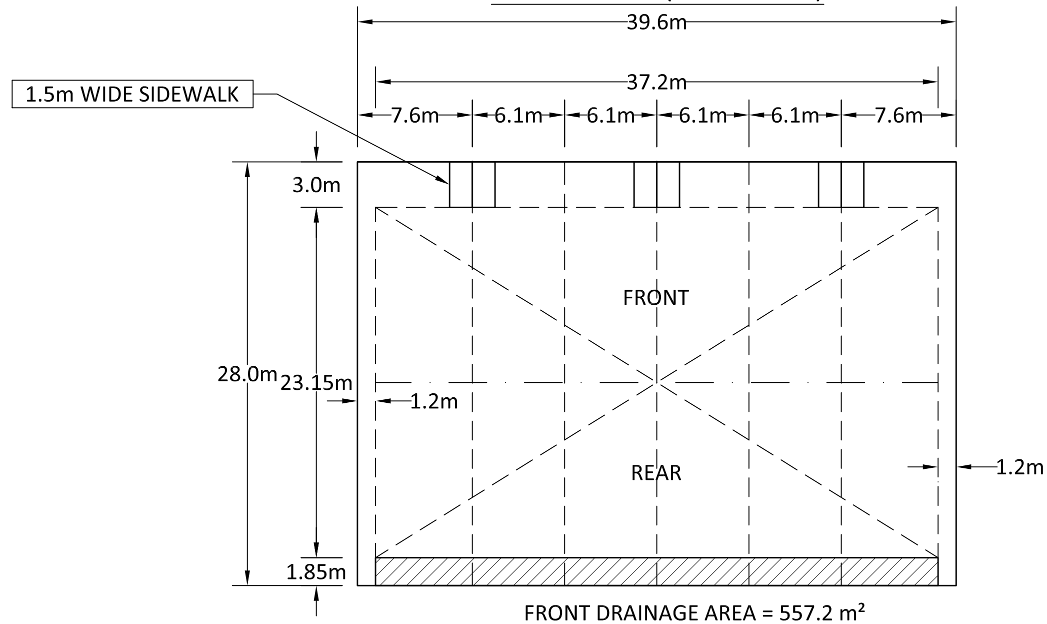


FRONT DRAINAGE AREA = 170.5 m²
FRONT DRAINAGE ROOF AREA = 85.6 m²
DRIVEWAY AREA = 36.0 m²
FRONT DRAINAGE PERCENT IMPERVIOUS = 71%
FRONT DRAINAGE DIRECTLY CONNECTED IMPERVIOUS= 21%

REAR DRAINAGE AREA = 203.5 m²
REAR DRAINAGE ROOF AREA = 94.6 m²
REAR DRAINAGE PERCENT IMPERVIOUS = 46%
REAR DRAINAGE DIRECTLY CONNECTED IMPERVIOUS= 0%

TOTAL DRAINAGE AREA = 374.0 m²
TOTAL ROOF AREA = 189.2 m²
TOTAL DRIVEWAY AREA = 36.0 m²
TOTAL AREA PERCENT IMPERVIOUS = 60%
TOTAL AREA DIRECTLY CONNECTED IMPERVIOUS = 10%

TYPICAL LANEWAY TOWNHOUSE (6.1m UNITS)



FRONT DRAINAGE AREA = 557.2 m²
FRONT DRAINAGE ROOF AREA = 430.6 m²
SIDEWALK AREA = 27.0 m²
FRONT DRAINAGE PERCENT IMPERVIOUS = 79%
FRONT DRAINAGE DIRECTLY CONNECTED IMPERVIOUS= 0%

REAR DRAINAGE AREA = 531.6 m²
REAR DRAINAGE ROOF AREA = 430.6 m²
DRIVEWAY AREA = 68.8 m²
REAR DRAINAGE PERCENT IMPERVIOUS = 94%
REAR DRAINAGE DIRECTLY CONNECTED IMPERVIOUS = 94%

TOTAL DRAINAGE AREA = 1,108.8 m²
TOTAL ROOF AREA = 861.2 m²
DIRECTLY CONNECTED TOTAL ROOF AREA = 430.6 m²
SIDEWALK AREA = 27.0 m²
DRIVEWAY AREA = 68.8 m²
TOTAL AREA PERCENT IMPERVIOUS = 86%
TOTAL AREA DIRECTLY CONNECTED IMPERVIOUS = 45%

*NOTE: ALL SINGLE DETACHED ROOF LEADERS TO BE DIRECTED TO PERVIOUS SURFACES.
*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

7370 CENTRE ROAD UXBRIDGE

TYPICAL LAYOUT FOR SINGLE DETACHED DWELLING AND LANEWAY TOWNHOUSE DWELLING

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

DESIGNED BY: C.M.D.	CHECKED BY: N.D.M.	PROJECT No: 2099	FIGURE No: C-2
SCALE: 1:500	DATE: MARCH 2021		

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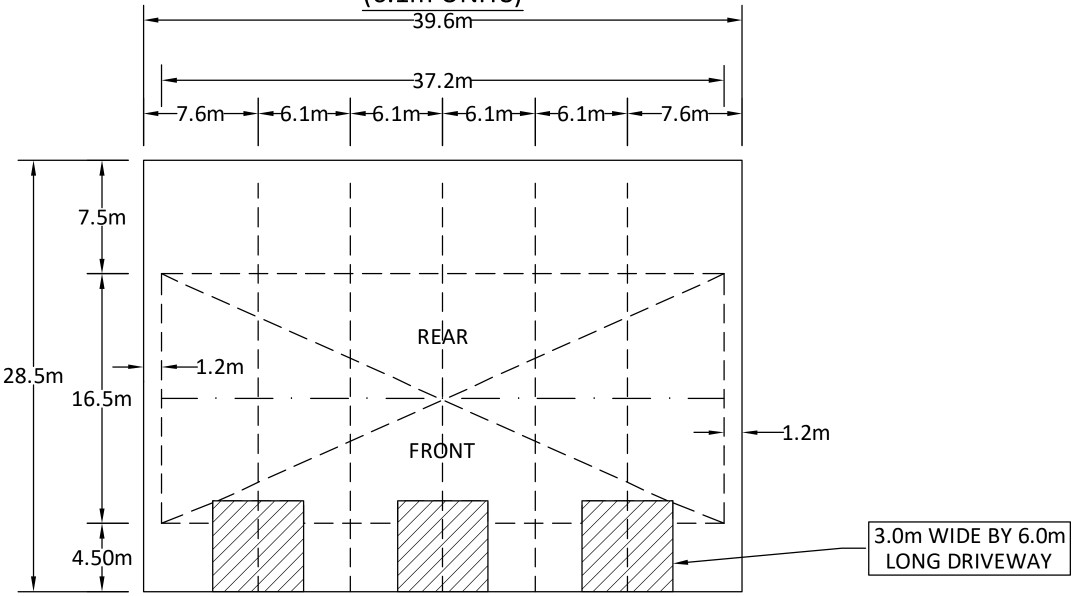
TYPICAL TOWNHOUSE
FRONTING STANDARD R.O.W.
(6.1m UNITS)



FRONT DRAINAGE AREA = 504.9 m²
FRONT DRAINAGE ROOF AREA = 279.9 m²
FRONT DIRECTLY CONNECTED ROOF AREA = 223.8 m²
DRIVEWAY AREA = 108.0 m²
FRONT DRAINAGE PERCENT IMPERVIOUS = 77%
FRONT DRAINAGE DIRECTLY CONNECTED IMPERVIOUS= 66%

REAR DRAINAGE AREA = 623.7 m²
REAR DRAINAGE ROOF AREA = 306.9 m²
REAR DRAINAGE PERCENT IMPERVIOUS = 49%
REAR DRAINAGE DIRECTLY CONNECTED IMPERVIOUS = 0%

TOTAL DRAINAGE AREA = 1128.6 m²
TOTAL ROOF AREA = 586.8 m²
DIRECTLY CONNECTED TOTAL ROOF AREA = 223.8 m²
DRIVEWAY AREA = 108.0 m²
TOTAL AREA PERCENT IMPERVIOUS = 62%
TOTAL AREA DIRECTLY CONNECTED IMPERVIOUS = 29%

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

7370 CENTRE ROAD UXBRIDGE

TYPICAL LAYOUT FOR TOWNHOUSE DWELLING

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

DESIGNED BY:	C.M.D.	CHECKED BY:	N.D.M.
SCALE:	1:500	DATE:	MARCH 2021

PROJECT No: 2099

FIGURE No: C-3

APPENDIX D

HYDRAULICS AND SWM FACILITY SIZING CALCULATIONS

Weighted Impervious Calculation

Catchment ID	Total Area	Imperviousness	Impervious Area
	(ha)	(%)	(ha)
201	25.52	59	15.06
203	1.74	50	0.87
Total	**27.26**	**58**	**15.93**

PERMANENT POOL

Level of Protection = Enhanced (Level 1)

Weighted Impervious = 58 %

Drainage Area = 27.26 ha

SWMP Type = 4. Wet Pond

Required Permanent Pool (including 40m^3/ha for extended detention)= 198.0 m^3/ha
Required Permanent Pool (minus 40m^3/ha for extended detention)= 158 m^3/ha

Required Permanent Pool = 4307 m^3

TABLE 3.2 - WATER QUALITY STORAGE REQUIREMENTS
(FROM MOE SWM PLANNING AND DESIGN MANUAL - 2003)

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	55%	70%	85%
Enhanced (Level 1)	1. Infiltration	25	30	35	40
	2. Wetlands	80	105	120	140
	3. Hybrid Wet Pond/Wetland	110	150	175	195
	4. Wet Pond	140	190	225	250
Normal (Level 2)	1. Infiltration	20	20	25	30
	2. Wetlands	60	70	80	90
	3. Hybrid Wet Pond/Wetland	75	90	105	120
	4. Wet Pond	90	110	130	150
Basic (Level 3)	1. Infiltration	20	20	20	20
	2. Wetlands	60	60	60	60
	3. Hybrid Wet Pond/Wetland	60	70	75	80
	4. Wet Pond	60	75	85	95
	5. Dry Pond (Continuous Flow)	90	150	200	240

Wet SWM Pond
Permanent Pool Sizing

Elevation (m)	Area (m^2)	Area (m^2)	H (m)	Vol (m^3)	Volume (m^3)	Storage (m^3)	Depth (m)	
294.00	2438				0		0	
		3119	1	3118.5				
295.00	3799				3119		1	
		4383	0.5	2191.5				
295.50	4967				5310		1.5	**N.W.L.**

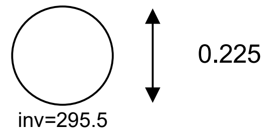
Permanent Pool Volume Required = 4307 m^3
Permanent Pool Volume Provided = 5310 m^3

CONTROL STRUCTURE SUMMARY
SWM POND

7370 Centre Road
Project Number: 2099
Date: December 2020
Designer Initials: C.M.D.

Orifice 1

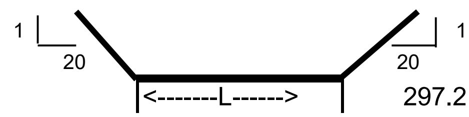
Invert =	295.50	m
Size =	0.225	m
Orifice Coefficient, C =	0.62	
Obvert =	295.725	m



Broad Crested Weir (Emergency Spillway)

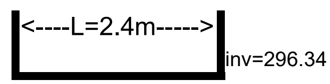
Length =	18.0	m
Elevation =	297.20	m
Crest Breadth =	5.2	m
Side Slope =	20	

(0 = vertical, 1 = 1H to 1V, 3 = 3H to 1 v)



Broad Crested Weir (Weir 1)

Length =	2.4	m
Elevation =	296.34	m
Crest Breadth =	0.2	m



SCS consulting group ltd

OUTFLOW SUMMARY
SWM POND

7370 Centre Road
Project Number: 2099
Date: December 2020
Designer Initials: C.M.D.

Starting Water Level (m) = 295.50
Elevation Increment (m) = 0.02

Shading represents Storage-Discharge pairings used in VO modelling

Upstream Elevation (m)	Orifice 1 Outflow (cms)	Emergency Spillway Outflow (cms)	Weir 1 Outflow (cms)	Stage (m)	Total Flow (cms)	Storage (m^3)	Detention Time (hrs)	4 Hour Chicago Storm	12 Hour SCS Storm
295.50	0.000	0.000	0.000	295.50	0.000	0	0.0	Orifice 1	
295.52	0.000	0.000	0.000	295.52	0.000	100	0.0		
295.54	0.002	0.000	0.000	295.54	0.002	201	0.0		
295.56	0.003	0.000	0.000	295.56	0.003	302	11.3		
295.58	0.006	0.000	0.000	295.58	0.006	405	17.4		
295.60	0.009	0.000	0.000	295.60	0.009	508	21.2		
295.62	0.009	0.000	0.000	295.62	0.009	613	24.4		
295.64	0.018	0.000	0.000	295.64	0.018	719	26.5		
295.66	0.024	0.000	0.000	295.66	0.024	825	27.9		
295.68	0.028	0.000	0.000	295.68	0.028	932	29.1		
295.70	0.032	0.000	0.000	295.70	0.032	1041	30.1		
295.72	0.036	0.000	0.000	295.72	0.036	1150	31.0		
295.74	0.039	0.000	0.000	295.74	0.039	1260	31.8		
295.76	0.042	0.000	0.000	295.76	0.042	1371	32.5		
295.78	0.045	0.000	0.000	295.78	0.045	1483	33.3		
295.80	0.047	0.000	0.000	295.80	0.047	1596	33.9		
295.82	0.050	0.000	0.000	295.82	0.050	1710	34.6		
295.84	0.052	0.000	0.000	295.84	0.052	1825	35.2		
295.86	0.054	0.000	0.000	295.86	0.054	1941	35.8		
295.88	0.056	0.000	0.000	295.88	0.056	2058	36.4		
295.90	0.059	0.000	0.000	295.90	0.059	2176	37.0		
295.92	0.061	0.000	0.000	295.92	0.061	2294	37.5		
295.94	0.062	0.000	0.000	295.94	0.062	2414	38.1		
295.96	0.064	0.000	0.000	295.96	0.064	2535	38.6		
295.98	0.066	0.000	0.000	295.98	0.066	2656	39.1		
296.00	0.068	0.000	0.000	296.00	0.068	2778	39.6		
296.02	0.070	0.000	0.000	296.02	0.070	2902	40.1		
296.04	0.071	0.000	0.000	296.04	0.071	3026	40.6		
296.06	0.073	0.000	0.000	296.06	0.073	3151	41.1		
296.08	0.075	0.000	0.000	296.08	0.075	3276	41.6		
296.10	0.076	0.000	0.000	296.10	0.076	3402	42.0		
296.12	0.078	0.000	0.000	296.12	0.078	3529	42.5		
296.14	0.079	0.000	0.000	296.14	0.079	3657	42.9		
296.16	0.081	0.000	0.000	296.16	0.081	3785	43.4		
296.18	0.082	0.000	0.000	296.18	0.082	3914	43.8	2 Year	
296.20	0.084	0.000	0.000	296.20	0.084	4044	44.3		
296.22	0.085	0.000	0.000	296.22	0.085	4175	44.7		
296.24	0.086	0.000	0.000	296.24	0.086	4306	45.1		
296.26	0.088	0.000	0.000	296.26	0.088	4438	45.5		
296.28	0.089	0.000	0.000	296.28	0.089	4571	46.0		
296.30	0.091	0.000	0.000	296.30	0.091	4704	46.4		
296.32	0.092	0.000	0.000	296.32	0.092	4839	46.8		2 Year
296.34	0.093	0.000	0.000	296.34	0.093	4974	47.2	Weir 1 - Extended Detention	
296.36	0.094	0.000	0.011	296.36	0.105	5109	47.6		
296.38	0.096	0.000	0.030	296.38	0.125	5246	47.9		
296.40	0.097	0.000	0.055	296.40	0.152	5383	48.2		
296.42	0.098	0.000	0.084	296.42	0.182	5521	48.4		
296.44	0.099	0.000	0.118	296.44	0.217	5659	48.6	5 Year	
296.46	0.101	0.000	0.155	296.46	0.255	5799	48.8		
296.48	0.102	0.000	0.195	296.48	0.297	5939	48.9		
296.50	0.103	0.000	0.238	296.50	0.341	6079	49.0		
296.52	0.104	0.000	0.284	296.52	0.388	6221	49.1		
296.54	0.105	0.000	0.343	296.54	0.449	6363	49.2	10 Year	5 Year
296.56	0.106	0.000	0.396	296.56	0.503	6506	49.3		
296.58	0.107	0.000	0.451	296.58	0.559	6649	49.4		
296.60	0.109	0.000	0.509	296.60	0.618	6793	49.4		
296.62	0.110	0.000	0.569	296.62	0.679	6938	49.5		
296.64	0.111	0.000	0.682	296.64	0.793	7083	49.6	25 Year	
296.66	0.112	0.000	0.752	296.66	0.863	7228	49.6		10 Year
296.68	0.113	0.000	0.823	296.68	0.936	7375	49.7		
296.70	0.114	0.000	0.897	296.70	1.011	7522	49.7		
296.72	0.115	0.000	0.973	296.72	1.088	7670	49.7		
296.74	0.116	0.000	1.093	296.74	1.209	7818	49.8		
296.76	0.117	0.000	1.176	296.76	1.293	7967	49.8		
296.78	0.118	0.000	1.261	296.78	1.379	8116	49.8		
296.80	0.119	0.000	1.348	296.80	1.467	8267	49.9		25 Year
296.82	0.120	0.000	1.437	296.82	1.557	8417	49.9		

OUTFLOW SUMMARY
SWM POND

Starting Water Level (m) = 295.50
Elevation Increment (m) = 0.02

Shading represents Storage-Discharge pairings used in VO modelling

Upstream Elevation (m)	Orifice 1 Outflow (cms)	Emergency Spillway Outflow (cms)	Weir 1 Outflow (cms)	Stage (m)	Total Flow (cms)	Storage (m^3)	Detention Time (hrs)	4 Hour Chicago Storm	12 Hour SCS Storm
296.84	0.121	0.000	1.544	296.84	1.665	8569	49.9		
296.86	0.122	0.000	1.638	296.86	1.760	8721	49.9		
296.88	0.123	0.000	1.733	296.88	1.856	8873	50.0	100 Year	
296.90	0.124	0.000	1.830	296.90	1.954	9027	50.0		
296.92	0.125	0.000	1.929	296.92	2.054	9180	50.0		
296.94	0.126	0.000	2.041	296.94	2.167	9335	50.0		
296.96	0.127	0.000	2.144	296.96	2.271	9490	50.1		
296.98	0.128	0.000	2.249	296.98	2.376	9646	50.1		
297.00	0.129	0.000	2.355	297.00	2.484	9802	50.1		
297.02	0.130	0.000	2.463	297.02	2.592	9959	50.1		
297.04	0.130	0.000	2.572	297.04	2.703	10117	50.1		100 Year
297.06	0.131	0.000	2.683	297.06	2.815	10275	50.1		
297.08	0.132	0.000	2.796	297.08	2.928	10434	50.2		
297.10	0.133	0.000	2.910	297.10	3.043	10593	50.2		
297.12	0.134	0.000	3.026	297.12	3.160	10754	50.2		
297.14	0.135	0.000	3.143	297.14	3.278	10914	50.2		
297.16	0.136	0.000	3.261	297.16	3.397	11076	50.2		
297.18	0.137	0.000	3.381	297.18	3.518	11238	50.2		
297.20	0.138	0.000	3.503	297.20	3.640	11400	50.2	Emergency Spillway	
297.22	0.138	0.078	3.626	297.22	3.842	11563	50.2		
297.24	0.139	0.224	3.750	297.24	4.113	11727	50.3		
297.26	0.140	0.420	3.876	297.26	4.436	11892	50.3		
297.28	0.141	0.661	4.003	297.28	4.805	12057	50.3		
297.30	0.142	0.942	4.131	297.30	5.215	12222	50.3		
297.32	0.143	1.264	4.261	297.32	5.667	12389	50.3		
297.34	0.144	1.623	4.392	297.34	6.159	12556	50.3		
297.36	0.144	2.022	4.524	297.36	6.690	12723	50.3		
297.38	0.145	2.458	4.658	297.38	7.261	12891	50.3		
297.40	0.146	2.932	4.793	297.40	7.871	13060	50.3		
297.42	0.147	3.444	4.929	297.42	8.520	13230	50.3		
297.44	0.148	3.994	5.067	297.44	9.209	13400	50.3		
297.46	0.148	4.583	5.206	297.46	9.937	13570	50.3		
297.48	0.149	5.210	5.346	297.48	10.705	13742	50.3		
297.50	0.150	5.718	5.487	297.50	11.355	13913	50.4		

Forebay

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
294.00	366				0	0
		599	1	599		
295.00	832				599	1
		1047	0.5	523		
295.50	1261				1,122	1.5

Total Permanent Pool

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
294.00	2438				0	0
		3119	1	3,119		
295.00	3799				3,119	1
		4383	0.5	2,192		
295.50	4967				5,310	1.5

Minimum Criteria (per MECP guidelines)

Forebay area is **25** % of total Permanent Pool area
Maximum Forebay area is **33** % of total Permanent Pool area
Therefore the minimum criteria per MECP guidelines is satisfied.

2. Forebay Settling Length

Dist = **$(r \times Q_p / V_s)^{0.5}$**

Dist = (2.56 * 0.09 / 0.0003)^0.5

Dist = 28.3

where:
Dist = forebay length (m)
r = length to width ratio
= 2.56
Q_p = peak flow rate from pond during design quality storm (m^3/s)
(total flow from SWM Pond at extended detention elevation)
= 0.094
V_s = settling velocity (m/s)*
= 0.0003

Minimum forebay length is (m)	**28.3**
Actual forebay length is (m)	**62.8**
	CRITERIA SATISFIED

3. Forebay Dispersion Length

Dist = **$(8 \times Q) / (d \times V_f)$**

Dist = (8 * 4.996) / (1.5 * 0.5)

Dist = 53.3

where:
Dist = forebay length (m)
Q = inlet flow rate (m^3/s) (full flow capacity of a 1500mm dia. pipe)
= 4.996
d = depth of permanent pool in forebay (m)
= 1.5
V_f = desired velocity in forebay (m/s)*
0.5

Minimum forebay length is (m)	**53.3**
Actual forebay length is (m)	**62.8**
	CRITERIA SATISFIED

4. Minimum Forebay Bottom Width

Width = Dist / 8

Width = 53.3 / 8

Width = 6.7

where:
Width = minimum forebay bottom width (m)
Dist = minimum forebay length (m)
= 53.3

Minimum bottom width is (m)	**6.7**
Actual bottom width is (m)	**11.1**
	CRITERIA SATISFIED

5. Maximum Velocity Check

V = Q/A

V = 4.996 / 38

V = 0.12

where:
V = velocity (m/s)
Q = inlet flow rate (m^3/s) (full flow capacity of a 1500mm dia. pipe)
= 4.996
A = average cross-sectional area of entire forebay (m^2)
(see **Page 3**)
= 40.3

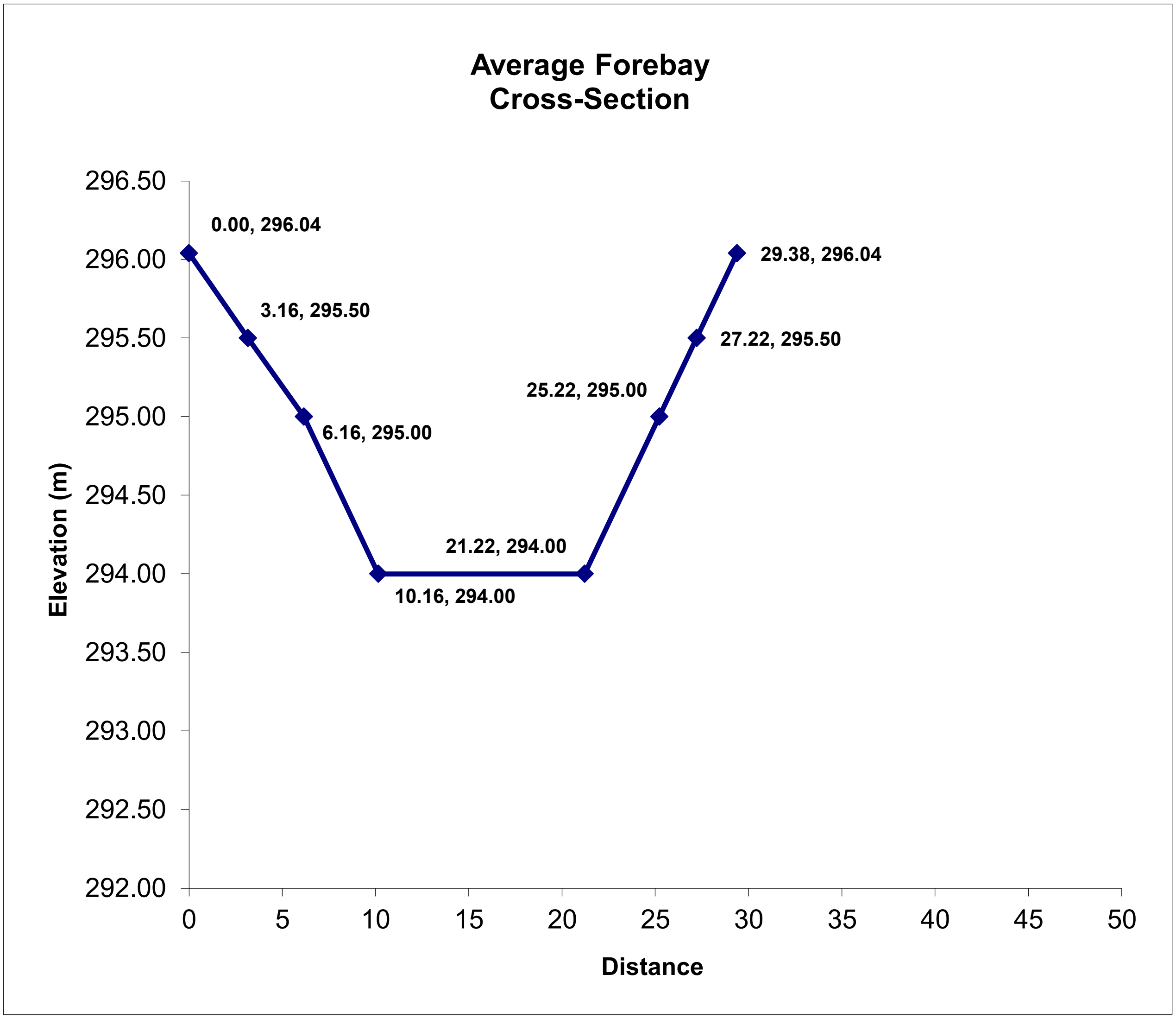
Maximum velocity permitted is (m/s)	**0.15**
Actual velocity is (m/s)	**0.12**
	CRITERIA SATISFIED

*Value recommended by the MECP Stormwater Management Planning & Design Manual

FOREBAY SIZING CALCULATIONS

Distance (m)	Elevation (m)	Depth (m)	Incremental Area (m^2)
0.00	296.04	0.00	--
3.16	295.50	0.54	0.85
6.16	295.00	1.04	2.37
10.16	294.00	2.04	6.16
21.22	294.00	2.04	22.56
25.22	295.00	1.04	6.16
27.22	295.50	0.54	1.58
29.38	296.04	0.00	0.58

Area (m^2) = 40.27



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CATCHMENT 204
REQUIRED QUALITY CONTROL VOLUME

Level of Protection = Enhanced (Level 1)

Weighted Impervious = 62 %

Drainage Area (Catchment 201 Only) = 5.61 ha

SWMP Type = 1. Infiltration

Required Infiltration/Filtration Volume = 32.3 m^3/ha

Required Infiltration/Filtration Volume = 181.4 m^3

TABLE 3.2 - WATER QUALITY STORAGE REQUIREMENTS
(FROM MOE SWM PLANNING AND DESIGN MANUAL - 2003)

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	55%	70%	85%
Enhanced (Level 1)	1. Infiltration	25	30	35	40
	2. Wetlands	80	105	120	140
	3. Hybrid Wet Pond/Wetland	110	150	175	195
	4. Wet Pond	140	190	225	250
Normal (Level 2)	1. Infiltration	20	20	25	30
	2. Wetlands	60	70	80	90
	3. Hybrid Wet Pond/Wetland	75	90	105	120
	4. Wet Pond	90	110	130	150
Basic (Level 3)	1. Infiltration	20	20	20	20
	2. Wetlands	60	60	60	60
	3. Hybrid Wet Pond/Wetland	60	70	75	80
	4. Wet Pond	60	75	85	95
	5. Dry Pond (Continuous Flow)	90	150	200	240

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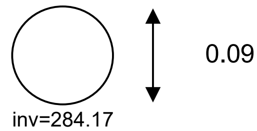
CONTROL STRUCTURE SUMMARY
DRY SWM POND 1

7370 Centre Road
Project Number: 2099
Date: December 2020
Designer Initials: C.M.D.

Orifice 1

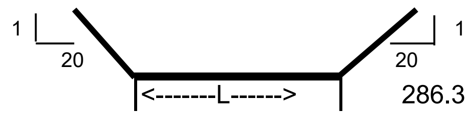
Invert =	284.17	m
Size =	0.090	m
Orifice Coefficient, C =	0.62	
Obvert =	284.26	m



Broad Crested Weir (Emergency Spillway)

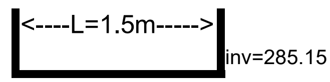
Length =	15.0	m
Elevation =	286.30	m
Crest Breadth =	2	m
Side Slope =	20	

(0 = vertical, 1 = 1H to 1V, 3 = 3H to 1 v)



Broad Crested Weir (Weir 1)

Length =	1.5	m
Elevation =	285.15	m
Crest Breadth =	0.2	m



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OUTFLOW SUMMARY
DRY SWM POND 1

7370 Centre Road
Project Number: 2099
Date: December 2020
Designer Initials: C.M.D.

Starting Water Level (m) = 284.17
Elevation Increment (m) = 0.02

Shading represents Storage-Discharge pairings used in VO modelling

Upstream Elevation (m)	Orifice 1 Outflow (cms)	Emergency Spillway Outflow (cms)	Weir 1 Outflow (cms)	Stage (m)	Total Flow (cms)	Storage (m^3)	Detention Time (hrs)	4 Hour Chicago Storm	12 Hour SCS Storm
284.17	0.000	0.000	0.000	284.17	0.000	0	0.0	Orifice 1	
284.19	0.000	0.000	0.000	284.19	0.000	0	0.0		
284.21	0.001	0.000	0.000	284.21	0.001	0	0.0		
284.23	0.002	0.000	0.000	284.23	0.002	0	0.0		
284.25	0.003	0.000	0.000	284.25	0.003	0	0.0		
284.27	0.004	0.000	0.000	284.27	0.004	0	0.0		
284.29	0.005	0.000	0.000	284.29	0.005	2	0.1		
284.31	0.005	0.000	0.000	284.31	0.005	4	0.3		
284.33	0.006	0.000	0.000	284.33	0.006	9	0.5		
284.35	0.006	0.000	0.000	284.35	0.006	17	0.9		
284.37	0.007	0.000	0.000	284.37	0.007	28	1.3		
284.39	0.007	0.000	0.000	284.39	0.007	42	1.8		
284.41	0.008	0.000	0.000	284.41	0.008	58	2.5		
284.43	0.008	0.000	0.000	284.43	0.008	77	3.1		
284.45	0.008	0.000	0.000	284.45	0.008	99	3.8		
284.47	0.009	0.000	0.000	284.47	0.009	123	4.6		
284.49	0.009	0.000	0.000	284.49	0.009	149	5.4		
284.51	0.009	0.000	0.000	284.51	0.009	177	6.2		
284.53	0.010	0.000	0.000	284.53	0.010	205	7.1		
284.55	0.010	0.000	0.000	284.55	0.010	234	7.9		
284.57	0.010	0.000	0.000	284.57	0.010	264	8.7		
284.59	0.011	0.000	0.000	284.59	0.011	293	9.5		
284.61	0.011	0.000	0.000	284.61	0.011	323	10.2		
284.63	0.011	0.000	0.000	284.63	0.011	353	11.0		
284.65	0.012	0.000	0.000	284.65	0.012	384	11.7		
284.67	0.012	0.000	0.000	284.67	0.012	414	12.4		
284.69	0.012	0.000	0.000	284.69	0.012	445	13.2		
284.71	0.012	0.000	0.000	284.71	0.012	477	13.9		
284.73	0.013	0.000	0.000	284.73	0.013	508	14.6		
284.75	0.013	0.000	0.000	284.75	0.013	540	15.3		
284.77	0.013	0.000	0.000	284.77	0.013	573	16.0		
284.79	0.013	0.000	0.000	284.79	0.013	605	16.7		
284.81	0.013	0.000	0.000	284.81	0.013	638	17.4		
284.83	0.014	0.000	0.000	284.83	0.014	671	18.0		
284.85	0.014	0.000	0.000	284.85	0.014	704	18.7		
284.87	0.014	0.000	0.000	284.87	0.014	738	19.4		
284.89	0.014	0.000	0.000	284.89	0.014	772	20.0		
284.91	0.015	0.000	0.000	284.91	0.015	806	20.7		
284.93	0.015	0.000	0.000	284.93	0.015	841	21.3		
284.95	0.015	0.000	0.000	284.95	0.015	875	22.0		
284.97	0.015	0.000	0.000	284.97	0.015	911	22.6	2 Year	
284.99	0.015	0.000	0.000	284.99	0.015	946	23.3		
285.01	0.016	0.000	0.000	285.01	0.016	982	23.9		
285.03	0.016	0.000	0.000	285.03	0.016	1018	24.6		
285.05	0.016	0.000	0.000	285.05	0.016	1054	25.2		
285.07	0.016	0.000	0.000	285.07	0.016	1090	25.8		2 Year
285.09	0.016	0.000	0.000	285.09	0.016	1127	26.5		
285.11	0.017	0.000	0.000	285.11	0.017	1164	27.1	Extended Detention	
285.13	0.017	0.000	0.000	285.13	0.017	1202	27.7		
285.15	0.017	0.000	0.000	285.15	0.017	1240	28.3	Weir 1	
285.17	0.017	0.000	0.007	285.17	0.024	1278	28.9		
285.19	0.017	0.000	0.019	285.19	0.036	1316	29.2	5 Year	
285.21	0.017	0.000	0.034	285.21	0.052	1355	29.5		
285.23	0.018	0.000	0.053	285.23	0.070	1393	29.6		
285.25	0.018	0.000	0.074	285.25	0.091	1433	29.8	10 Year	5 Year
285.27	0.018	0.000	0.097	285.27	0.115	1472	29.9		
285.29	0.018	0.000	0.122	285.29	0.140	1512	30.0		
285.31	0.018	0.000	0.149	285.31	0.167	1552	30.0		
285.33	0.018	0.000	0.178	285.33	0.196	1592	30.1	25 Year	
285.35	0.019	0.000	0.215	285.35	0.233	1633	30.2		10 Year
285.37	0.019	0.000	0.248	285.37	0.266	1674	30.2		
285.39	0.019	0.000	0.282	285.39	0.301	1715	30.2		
285.41	0.019	0.000	0.318	285.41	0.337	1757	30.3		
285.43	0.019	0.000	0.356	285.43	0.375	1798	30.3		25 Year
285.45	0.019	0.000	0.426	285.45	0.446	1841	30.3		
285.47	0.020	0.000	0.470	285.47	0.489	1883	30.4		
285.49	0.020	0.000	0.514	285.49	0.534	1926	30.4	100 Year	
285.51	0.020	0.000	0.561	285.51	0.580	1969	30.4		
285.53	0.020	0.000	0.608	285.53	0.628	2012	30.4		

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OUTFLOW SUMMARY
DRY SWM POND 1

7370 Centre Road
Project Number: 2099
Date: December 2020
Designer Initials: C.M.D.

Starting Water Level (m) = 284.17
Elevation Increment (m) = 0.02

Shading represents Storage-Discharge pairings used in VO modelling

Upstream Elevation (m)	Orifice 1 Outflow (cms)	Emergency Spillway Outflow (cms)	Weir 1 Outflow (cms)	Stage (m)	Total Flow (cms)	Storage (m^3)	Detention Time (hrs)	4 Hour Chicago Storm	12 Hour SCS Storm
285.55	0.020	0.000	0.683	285.55	0.703	2055	30.4	Orifice 1	
285.57	0.020	0.000	0.735	285.57	0.755	2099	30.5		
285.59	0.020	0.000	0.788	285.59	0.809	2143	30.5		100 Year
285.61	0.021	0.000	0.842	285.61	0.863	2188	30.5		
285.63	0.021	0.000	0.898	285.63	0.919	2232	30.5		
285.65	0.021	0.000	0.965	285.65	0.986	2278	30.5		
285.67	0.021	0.000	1.024	285.67	1.045	2323	30.5		
285.69	0.021	0.000	1.083	285.69	1.105	2368	30.5		
285.71	0.021	0.000	1.144	285.71	1.165	2414	30.6		
285.73	0.022	0.000	1.206	285.73	1.227	2460	30.6		
285.75	0.022	0.000	1.276	285.75	1.297	2507	30.6		
285.77	0.022	0.000	1.340	285.77	1.362	2554	30.6		
285.79	0.022	0.000	1.405	285.79	1.427	2601	30.6		
285.81	0.022	0.000	1.472	285.81	1.494	2648	30.6		
285.83	0.022	0.000	1.539	285.83	1.561	2696	30.6		
285.85	0.022	0.000	1.608	285.85	1.630	2744	30.6		
285.87	0.022	0.000	1.677	285.87	1.700	2792	30.6		
285.89	0.023	0.000	1.747	285.89	1.770	2840	30.6		
285.91	0.023	0.000	1.819	285.91	1.841	2889	30.6		
285.93	0.023	0.000	1.891	285.93	1.914	2938	30.7		
285.95	0.023	0.000	1.964	285.95	1.987	2988	30.7		
285.97	0.023	0.000	2.038	285.97	2.061	3037	30.7		
285.99	0.023	0.000	2.113	285.99	2.137	3087	30.7		
286.01	0.023	0.000	2.189	286.01	2.213	3137	30.7		
286.03	0.024	0.000	2.266	286.03	2.290	3188	30.7		
286.05	0.024	0.000	2.344	286.05	2.367	3239	30.7		
286.07	0.024	0.000	2.422	286.07	2.446	3290	30.7		
286.09	0.024	0.000	2.502	286.09	2.526	3341	30.7		
286.11	0.024	0.000	2.582	286.11	2.606	3393	30.7		
286.13	0.024	0.000	2.663	286.13	2.687	3445	30.7		
286.15	0.024	0.000	2.745	286.15	2.769	3497	30.7		
286.17	0.024	0.000	2.828	286.17	2.852	3550	30.7		
286.19	0.025	0.000	2.911	286.19	2.936	3603	30.7		
286.21	0.025	0.000	2.996	286.21	3.020	3656	30.7		
286.23	0.025	0.000	3.081	286.23	3.106	3709	30.7		
286.25	0.025	0.000	3.167	286.25	3.192	3763	30.7		
286.27	0.025	0.000	3.254	286.27	3.279	3817	30.7		
286.29	0.025	0.000	3.341	286.29	3.366	3871	30.8		
286.31	0.025	0.021	3.429	286.31	3.476	3926	30.8	Emergency Spillway Invert (286.30)	
286.33	0.025	0.112	3.519	286.33	3.656	3981	30.8		
286.35	0.026	0.247	3.608	286.35	3.881	4037	30.8		
286.37	0.026	0.419	3.699	286.37	4.144	4093	30.8		
286.39	0.026	0.626	3.790	286.39	4.442	4149	30.8		
286.41	0.026	0.866	3.882	286.41	4.774	4205	30.8		
286.43	0.026	1.138	3.975	286.43	5.140	4262	30.8		
286.45	0.026	1.443	4.069	286.45	5.538	4319	30.8		
286.47	0.026	1.780	4.163	286.47	5.969	4377	30.8	100 Year Uncontrolled	
286.49	0.026	2.149	4.258	286.49	6.433	4435	30.8		
286.51	0.026	2.753	4.354	286.51	7.133	4493	30.8		
286.53	0.027	3.221	4.450	286.53	7.698	4552	30.8		
286.55	0.027	3.725	4.547	286.55	8.299	4611	30.8		
286.57	0.027	4.264	4.645	286.57	8.936	4670	30.8		
286.59	0.027	4.840	4.743	286.59	9.610	4730	30.8		
286.61	0.027	5.416	4.843	286.61	10.285	4790	30.8		
286.63	0.027	6.060	4.942	286.63	11.030	4850	30.8		
286.65	0.027	6.742	5.043	286.65	11.812	4911	30.8		
286.67	0.027	7.461	5.144	286.67	12.633	4972	30.8		
286.69	0.027	8.219	5.246	286.69	13.492	5034	30.8		
286.71	0.028	8.892	5.348	286.71	14.268	5096	30.8		
286.73	0.028	9.716	5.452	286.73	15.195	5158	30.8		
286.75	0.028	10.577	5.555	286.75	16.161	5220	30.8		

5-Year Storm Design
7370 Centre Road, Uxbridge
Phase 1 & 2
Uxbridge

Rainfall Intensity (i) = $\frac{A}{(T_c+B)^c}$

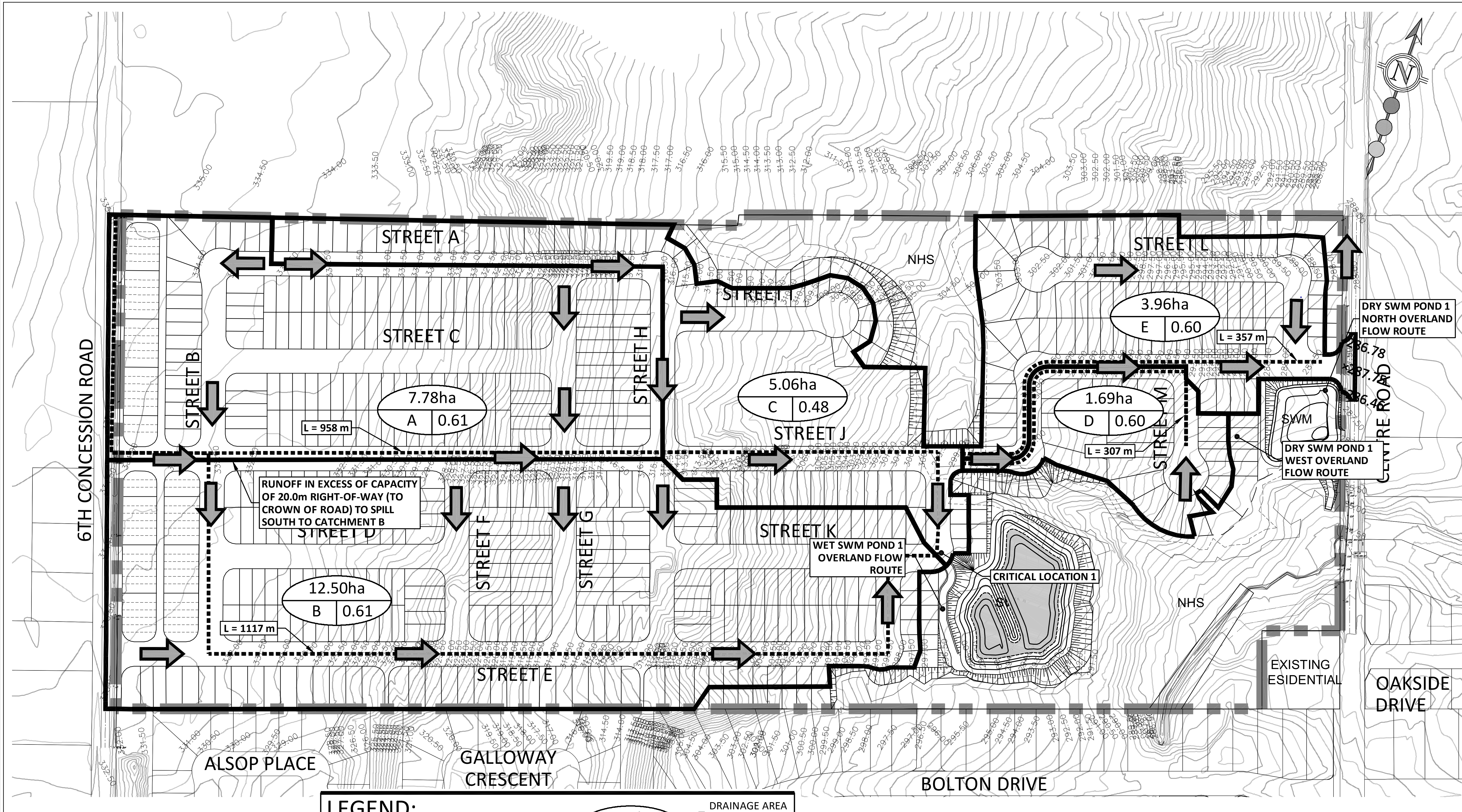
A= 904
B= 5
c= 0.788

Starting T_c (min)= 10

Project: 7370 Centre Road, Uxbridge
Project No. 2099
Date: 26-Feb-21
Designed By: C.M.D.
Reviewed By: N.D.M.

P:\2099 7370 Centre Road Uxbridge\Design\Pipe Design\Storm\[2099 - Storm Design Sheet.xlsm]Design

LOCATION			5 YEAR						EXTERNAL FLOWS				TOTAL FLOW	PIPE DATA						
STREET	MAINTENANCE HOLE FROM	MAINTENANCE HOLE TO	5-YEAR AREA (ha)	RUNOFF COEFF. (R)	"AR"	ACCUM. "AR"	RAINFALL INTENSITY (mm/hr)	ACCUM. FLOW (m3/s)	AREA (ha)	FLOW RATE (l/s/ha)	EXT. FLOW (m3/s)	ACCUM. EXT. FLOW (m3/s)	TOTAL (Qdes) (m3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (m3/s)	FULL FLOW VELOCITY (m/s)	TIME OF CONC. (min)	ACCUM. TIME OF CONC. (min)
To Wet SWM Pond	1	2	25.52	0.60	15.31	15.31	76.45	3.252	0.000	0.000	0.000	0.000	3.252	958.0	0.50	1350	3.772	2.637	6.06	24.04
To Dry SWM Pond	3	4	5.61	0.60	3.37	3.37	92.79	0.868	0.000	0.000	0.000	0.000	0.868	357.0	0.50	825	1.014	1.899	3.13	16.11



FSSR	7370 CENTRE ROAD UXBRIDGE		PROPOSED OVERLAND FLOW PLAN
DESIGNED BY: N.D.M.	CHECKED BY: L.C.M.	PROJECT No: 2099	FIGURE No: D.1
SCALE: 1:3000	DATE: MARCH 2021		

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

File: P:\2099 7370 Centre Road Uxbridge\Drawings\FSP\Fig\Report Figures\2099P-STRM-ROWC-D.1.dwg – Revised by <STAN> : Fri, Mar 05 2021 – 9:12am

Right-Of-Way Capacity Calculations
20.0m R.O.W. - Catchments A and B

Township of Uxbridge 5 Year (Rational Method)	
Area (ha) =	20.28
5 Year Runoff Coeff. =	0.61
T_c (min) =	19.31
a=	**904**
b=	**5**
c=	**0.788**
Intensity (mm/hr) =	73.15
Runoff (m^3/s)=	**2.519**

(Assumes initial Tc of 10 minutes and 1117m flowing at 2 m/s)

Catchment A and Catchment B			
Land Use	**Area (ha)**	**Runoff Coefficient**	**Weighted Runoff Coefficient**
Single Detached Lots	18.76	0.60	0.56
Laneway Townhomes	1.52	0.75	0.06
	20.28		0.61

(Refer to **Figure D.1**)

Township of Uxbridge 100 Year (Rational Method)	
Area (ha) =	20.28
100 Year Return Period Factor =	1.25
100 Year Runoff Coeff. =	0.76
T_c (min) =	19.31
a=	**1799**
b=	**5**
c=	**0.810**
Intensity (mm/hr) =	135.70
Runoff (m^3/s)=	**5.841**

Major System Peak Flow (Catchment B):

$Q_{Peak} = Q_{100yr} - Q_{5yr} =$ **3.322** m^3/s

Runoff from Catchment A in excess of the capacity of a half 20.0m R.O.W. section up to the crown will spill into Catchment B. The flow capacity has been calculated below (Q_{crown}).

Half of 20.0m R.O.W. @ 5.0% Flow Capacity

$Q_{crown} =$ **0.388** m^3/s

Required Flow Capacity at Critical Location 1:

$Q_{Peak} - Q_{crown} =$ **2.934** m^3/s

Major system capacity in 20.0 m R.O.W. at 1.0% road slope with 5.0% boulevards = 3.128m^3/s.
Therefore, the major system flows will be conveyed within the 20.0 m R.O.W.

Right-Of-Way Capacity Calculations
20.0m R.O.W. - Catchment C

Township of Uxbridge 5 Year (Rational Method)	
Area (ha) =	5.06
5 Year Runoff Coeff. =	0.48
T_c (min) =	17.98
a=	**904**
b=	**5**
c=	**0.788**
Intensity (mm/hr) =	76.45
Runoff (m^3/s)=	**0.518**

(Assumes initial Tc of 10 minutes and 958m flowing at 2 m/s)

Catchment C			
Land Use	**Area (ha)**	**Runoff Coefficient**	**Weighted Runoff Coefficient**
Single Detached Lots	3.35	0.60	0.40
Park	1.71	0.25	0.08
	5.06		0.48

(Refer to **Figure D.1**)

Township of Uxbridge 100 Year (Rational Method)	
Area (ha) =	5.06
100 Year Return Period Factor =	1.25
100 Year Runoff Coeff. =	0.60
T_c (min) =	17.98
a=	**1799**
b=	**5**
c=	**0.810**
Intensity (mm/hr) =	142.00
Runoff (m^3/s)=	**1.202**

Major System Peak Flow (Catchment C):

$Q_{Peak} = Q_{100yr} - Q_{5yr} =$ **0.684** m^3/s

Runoff from Catchment A in excess of the capacity of a half 20.0m R.O.W. section up to the crown will spill into Catchment B. The flow capacity has been calculated below (Q_{crown}).

Half of 20.0m R.O.W. @ 5.0% Flow Capacity

$Q_{crown} =$ **0.388** m^3/s

Required Flow Capacity at Critical Location 1:

$Q_{peak+} Q_{crown} =$ **1.072** m^3/s

Major system capacity in 20.0 m R.O.W. at 0.5% road slope = 2.043m^3/s.
Therefore, the major system flows will be conveyed within the 20.0 m R.O.W.

Right-Of-Way Capacity and West Overland Flow Route Calculations - Catchment D

Township of Uxbridge 5 Year (Rational Method)	
Area (ha) =	1.69
5 Year Runoff Coeff. =	0.60
T_c (min) =	12.56
a=	**904**
b=	**5**
c=	**0.788**
Intensity (mm/hr) =	94.52
Runoff (m^3/s)=	**0.266**

(Assumes initial Tc of 10 minutes and 307m flowing at 2 m/s)

Catchment D			
Land Use	**Area (ha)**	**Runoff Coefficient**	**Weighted Runoff Coefficient**
Single Detached Lots	1.69	0.60	0.60
	1.69		0.60

(Refer to **Figure D.1**)

Township of Uxbridge 100 Year (Rational Method)	
Area (ha) =	1.69
100 Year Return Period Factor =	1.25
100 Year Runoff Coeff. =	0.75
T_c (min) =	12.56
a=	**1799**
b=	**5**
c=	**0.810**
Intensity (mm/hr) =	176.60
Runoff (m^3/s)=	**0.622**

Major System Peak Flow (Catchment D):

$Q_{100yr} - Q_{5yr} =$ 0.356 m^3/s

Major system capacity in 20.0 m R.O.W. at 0.5% road slope = 2.043m^3/s.
Therefore, the major system flows will be conveyed within the 20.0 m R.O.W.
The west overland flow route into Dry SWM Pond 1 will convey the major system peak flow of 0.356m^3/s.

Right-Of-Way Capacity and North Overland Flow Route Calculations - Catchment E

Township of Uxbridge 5 Year (Rational Method)	
Area (ha) =	3.96
5 Year Runoff Coeff. =	0.60
T_c (min) =	12.98
a=	**904**
b=	**5**
c=	**0.788**
Intensity (mm/hr) =	92.79
Runoff (m^3/s)=	**0.612**

(Assumes initial Tc of 10 minutes and 357m flowing at 2 m/s)

Catchment E			
Land Use	**Area (ha)**	**Runoff Coefficient**	**Weighted Runoff Coefficient**
Single Detached Lots	3.96	0.60	0.60
	3.96		0.60

(Refer to **Figure D.1**)

Township of Uxbridge 100 Year (Rational Method)	
Area (ha) =	3.96
100 Year Return Period Factor =	1.25
100 Year Runoff Coeff. =	0.75
T_c (min) =	12.98
a=	**1799**
b=	**5**
c=	**0.810**
Intensity (mm/hr) =	173.28
Runoff (m^3/s)=	**1.430**

Major System Peak Flow (Catchment E):

$Q_{100yr} - Q_{5yr} =$ **0.817** m^3/s

Major system capacity in 20.0 m R.O.W. at 0.5% road slope = 2.043m^3/s.
Therefore, the major system flows will be conveyed within the 20.0 m R.O.W.
The north overland flow route into Dry SWM Pond 1 will convey the major system peak flow of 0.817m^3/s.

20.0m R.O.W. @ 0.5%

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.50	%
Normal Depth	0.26	m

Section Definitions

Station (m)	Elevation (m)
0+00.000	0.000
0+05.550	-0.111
0+05.700	-0.111
0+05.750	-0.261
0+06.050	-0.236
0+10.000	-0.157
0+13.950	-0.236
0+14.250	-0.261
0+14.300	-0.111
0+14.450	-0.111
0+18.200	-0.036
0+19.700	-0.006
0+20.000	0.000

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.000, 0.000)	(0+05.550, -0.111)	0.025
(0+05.550, -0.111)	(0+14.450, -0.111)	0.013
(0+14.450, -0.111)	(0+18.200, -0.036)	0.025
(0+18.200, -0.036)	(0+19.700, -0.006)	0.013
(0+19.700, -0.006)	(0+20.000, 0.000)	0.025

Results

Discharge	2.043	m³/s

20.0m R.O.W. @ 0.5%

Results

Elevation Range	-0.261 to 0.000 m	
Flow Area	2.37	m^2
Wetted Perimeter	20.222	m
Top Width	20.000	m
Normal Depth	0.26	m
Critical Depth	0.24	m
Critical Slope	0.00802	m/m
Velocity	0.86	m/s
Velocity Head	0.04	m
Specific Energy	0.30	m
Froude Number	0.80	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.000	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.26	m
Critical Depth	0.24	m
Channel Slope	0.00500	m/m
Critical Slope	0.00802	m/m

20.0m R.O.W. @ 0.5%

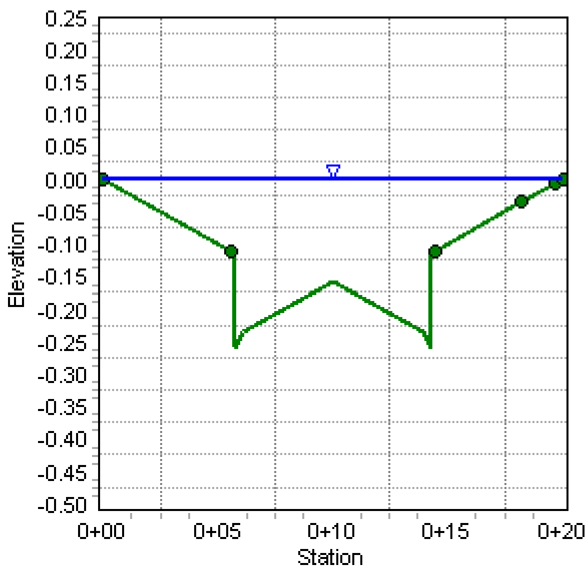
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.50	%
Normal Depth	0.26	m
Discharge	2.043	m³/s

Cross Section Image



20.0m R.O.W. 5% Boulevard @ 1.0%

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	1.00	%
Normal Depth	0.26	m
Section Definitions		

Station (m)	Elevation (m)
0+00.000	0.167
0+05.550	-0.111
0+05.700	-0.111
0+05.750	-0.261
0+06.050	-0.236
0+10.000	-0.157
0+13.950	-0.236
0+14.250	-0.261
0+14.300	-0.111
0+14.450	-0.111
0+18.200	0.077
0+19.700	0.152
0+20.000	0.167

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.000, 0.167)	(0+05.550, -0.111)	0.025
(0+05.550, -0.111)	(0+14.450, -0.111)	0.013
(0+14.450, -0.111)	(0+18.200, 0.077)	0.025
(0+18.200, 0.077)	(0+19.700, 0.152)	0.013
(0+19.700, 0.152)	(0+20.000, 0.167)	0.025

Results

Discharge	3.128	m^3/s

20.0m R.O.W. 5% Boulevard @ 1.0%

Results

Elevation Range	-0.261 to 0.167 m	
Flow Area	2.00	m²
Wetted Perimeter	13.556	m
Top Width	13.330	m
Normal Depth	0.26	m
Critical Depth	0.29	m
Critical Slope	0.00578	m/m
Velocity	1.56	m/s
Velocity Head	0.12	m
Specific Energy	0.39	m
Froude Number	1.29	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.000	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.26	m
Critical Depth	0.29	m
Channel Slope	0.01000	m/m
Critical Slope	0.00578	m/m

20.0m R.O.W. 5% Boulevard @ 1.0% Cross Section

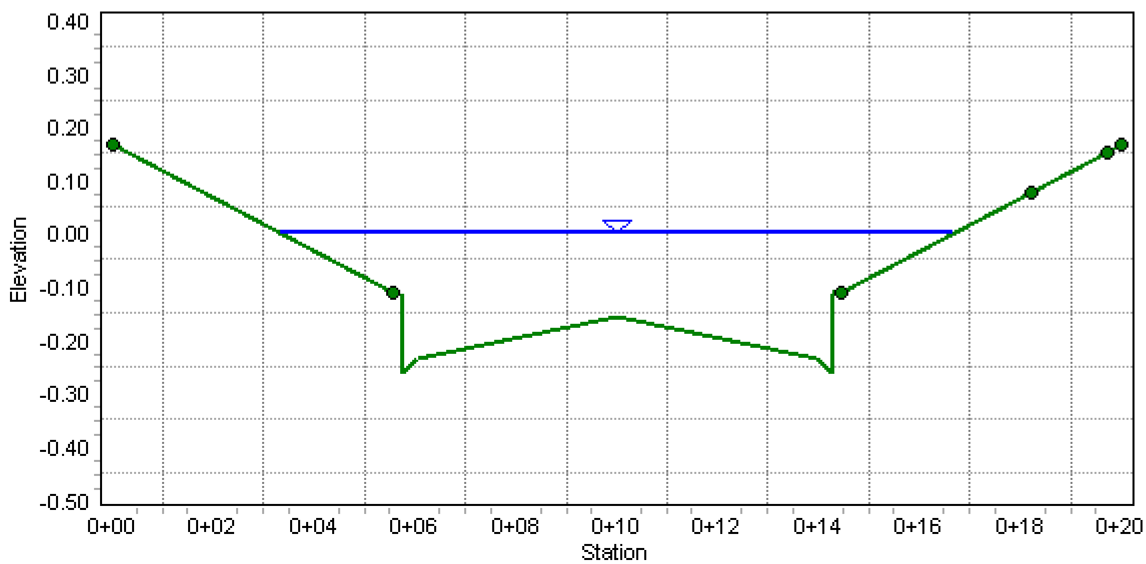
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	1.00	%
Normal Depth	0.26	m
Discharge	3.128	m³/s

Cross Section Image



20.0m R.O.W. @ 5.0%(Max Velocity)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.00	%
Discharge	2.934	m³/s
Section Definitions		

Station (m)	Elevation (m)
0+00.000	0.000
0+05.550	-0.111
0+05.700	-0.111
0+05.750	-0.261
0+06.050	-0.236
0+10.000	-0.157
0+13.950	-0.236
0+14.250	-0.261
0+14.300	-0.111
0+14.450	-0.111
0+18.200	-0.036
0+19.700	-0.006
0+20.000	0.000

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.000, 0.000)	(0+05.550, -0.111)	0.025
(0+05.550, -0.111)	(0+14.450, -0.111)	0.013
(0+14.450, -0.111)	(0+18.200, -0.036)	0.025
(0+18.200, -0.036)	(0+19.700, -0.006)	0.013
(0+19.700, -0.006)	(0+20.000, 0.000)	0.025

Results

Normal Depth	0.18	m

20.0m R.O.W. @ 5.0%(Max Velocity)

Results

Elevation Range	-0.261 to 0.000 m	
Flow Area	1.12	m²
Wetted Perimeter	12.439	m
Top Width	12.218	m
Normal Depth	0.18	m
Critical Depth	0.27	m
Critical Slope	0.00572	m/m
Velocity	2.63	m/s
Velocity Head	0.35	m
Specific Energy	0.54	m
Froude Number	2.78	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.000	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.18	m
Critical Depth	0.27	m
Channel Slope	0.05000	m/m
Critical Slope	0.00572	m/m

20.0m R.O.W. @ 5.0%(Max Velocity)

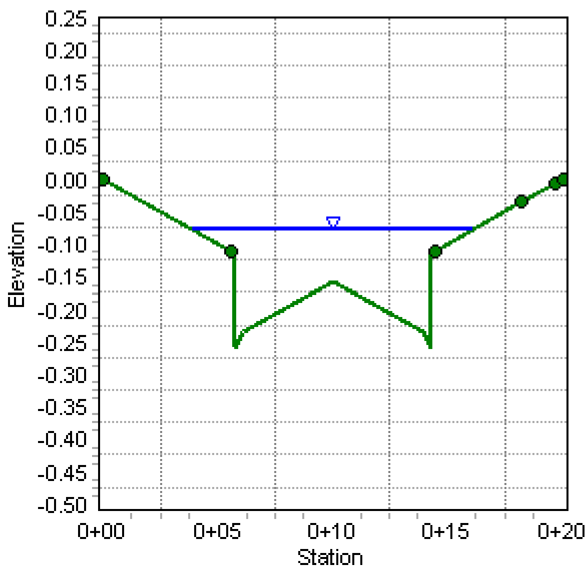
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.00	%
Normal Depth	0.18	m
Discharge	2.934	m³/s

Cross Section Image



Half of 20.0m R.O.W. @ 5.0%

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	5.00	%
Normal Depth	0.10	m
Section Definitions		

Station (m)	Elevation (m)
0+00.000	0.000
0+00.300	-0.006
0+01.800	-0.036
0+05.550	-0.111
0+05.700	-0.111
0+05.750	-0.261
0+06.050	-0.236
0+10.000	-0.157

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.000, 0.000)	(0+05.550, -0.111)	0.025
(0+05.550, -0.111)	(0+10.000, -0.157)	0.013

Results

Discharge	0.388	m^3/s
Elevation Range	-0.261 to 0.000 m	
Flow Area	0.19	m^2
Wetted Perimeter	4.361	m
Top Width	4.285	m
Normal Depth	0.10	m
Critical Depth	0.16	m
Critical Slope	0.00392	m/m
Velocity	2.09	m/s

Half of 20.0m R.O.W. @ 5.0%

Results

Velocity Head		0.22	m
Specific Energy		0.33	m
Froude Number		3.22	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	m
Length	0.000	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.10	m
Critical Depth	0.16	m
Channel Slope	0.05000	m/m
Critical Slope	0.00392	m/m

Half of 20.0m R.O.W. @ 5.0%

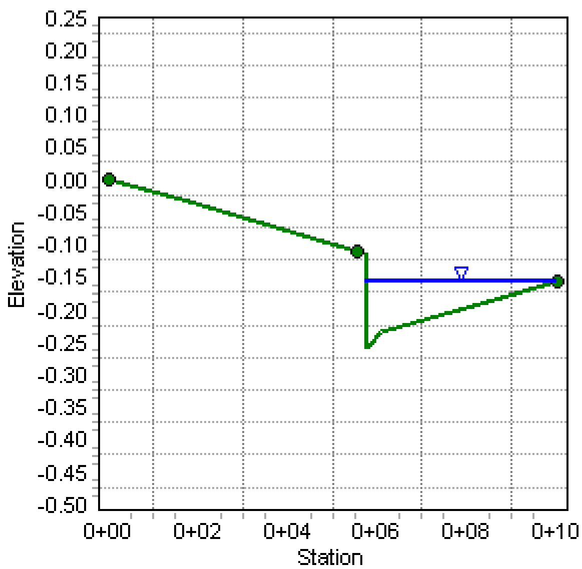
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	5.00	%
Normal Depth	0.10	m
Discharge	0.388	m³/s

Cross Section Image



Culvert Calculator Report
By-Pass Sewer Sizing

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	301.54	m	Headwater Depth/Height	2.38	
Computed Headwater Elevation	300.72	m	Discharge	0.9340	m3/s
Inlet Control HW Elev.	300.72	m	Tailwater Elevation	0.00	m
Outlet Control HW Elev.	300.48	m	Control Type	Inlet Control	

Catchment 202 - Regional Storm Peak Flow

Grades

Upstream Invert	299.27	m	Downstream Invert	295.05	m
Length	109.00	m	Constructed Slope	0.038716	m/m

Hydraulic Profile

Profile	S2		Depth, Downstream	0.37	m
Slope Type	Steep		Normal Depth	0.37	m
Flow Regime	Supercritical		Critical Depth	0.58	m
Velocity Downstream	5.08	m/s	Critical Slope	0.015693	m/m

Section

Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	0.61	m
Section Size	600 mm		Rise	0.61	m
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	300.48	m	Upstream Velocity Head	0.53	m
Ke	0.20		Entrance Loss	0.11	m

Inlet Control Properties

Inlet Control HW Elev.	300.72	m	Flow Control	N/A	
Inlet Type	Groove end projecting		Area Full	0.3	m2
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

By-Pass Storm Sewer Sizing

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	3.87	%
Diameter	0.600	m
Discharge	0.934	m³/s

Catchment 202 - Regional Storm Peak Flow

Results

Normal Depth	0.37	m
Flow Area	0.19	m²
Wetted Perimeter	1.09	m
Top Width	0.58	m
Critical Depth	0.57	m
Percent Full	62.4	%
Critical Slope	0.01714	m/m
Velocity	5.03	m/s
Velocity Head	1.29	m
Specific Energy	1.66	m
Froude Number	2.84	
Maximum Discharge	1.41	m³/s
Discharge Full	1.31	m³/s
Slope Full	0.01972	m/m
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	62.45	%
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s

By-Pass Storm Sewer Sizing

GVF Output Data

Normal Depth	0.37	m
Critical Depth	0.57	m
Channel Slope	3.87	%
Critical Slope	0.01714	m/m

By-Pass Storm Sewer Sizing

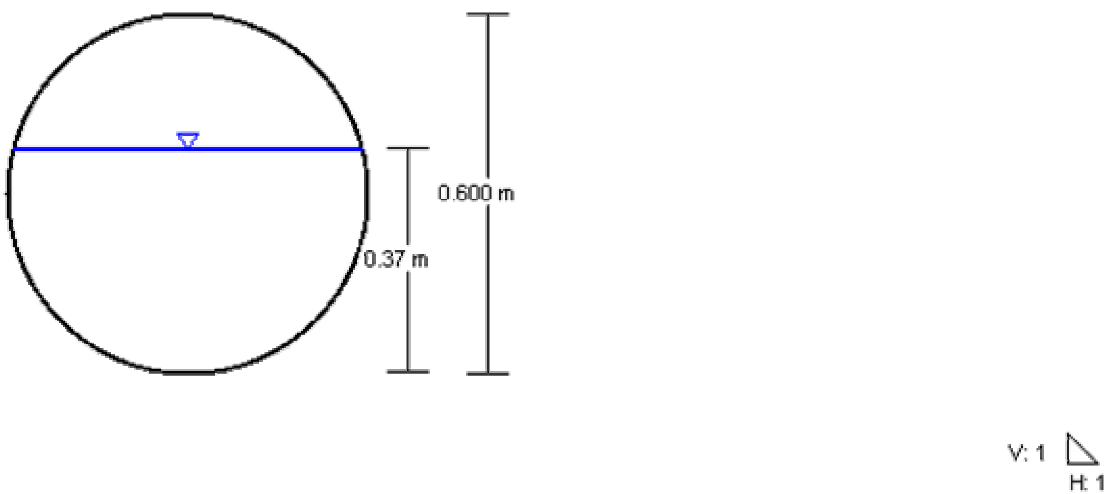
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	3.87	%
Normal Depth	0.37	m
Diameter	0.600	m
Discharge	0.934	m³/s

Cross Section Image



SCS consulting group ltd

West Overland Flow Route Required Capacity
Wet SWM Pond 1

West Block			
Land Use	**Area (ha)**	**Runoff Coefficient**	**Weighted Runoff Coefficient**
Single Detached Lots	22.11	0.60	0.52
Park	1.71	0.25	0.02
Laneway Townhomes	1.52	0.75	0.04
	25.34		0.59

Township of Uxbridge 5 Year (Rational Method)	
Area (ha) =	25.34
5 Year Runoff Coeff. =	0.59
T_c (min) =	18.89
a=	**904**
b=	**5**
c=	**0.788**
Intensity (mm/hr) =	74.15
Runoff (m^3/s)=	**3.055**

(Assumes initial Tc of 10 minutes and 1117m flowing at 2 m/s)

Township of Uxbridge 100 Year (Rational Method)	
Area (ha) =	25.34
5 Year Runoff Coeff. =	0.73
T_c (min) =	18.89
a=	**1799**
b=	**5**
c=	**0.810**
Intensity (mm/hr) =	137.61
Runoff (m^3/s)=	**7.088**

Required Overland Flow Route Capacity = 4.032 **m^3/s**

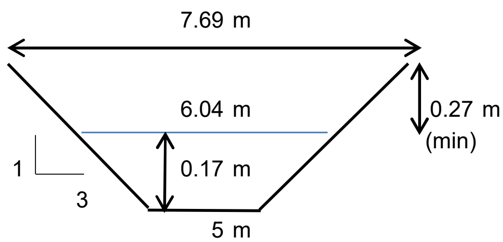
West Overland Flow Route
Sizing Calculations
Wet SWM Pond 1

7370 Centre Road
Project Number: 2099
Date: December 2020
Designer Initials: C.M.D.

Required Capacity = 4.032 m^3/s per calculations in this Appendix

Mannings' Equation for a Trapezoidal Channel

Access Road



Area =	0.961 m^2
Wetted Perimeter =	6.100 m
Channel Capacity =	**4.032 m^3/s**
Velocity =	4.20 m/s
Velocity X Depth =	0.73 m^2/s

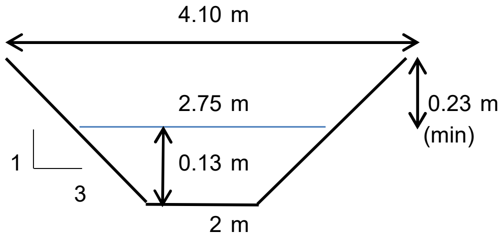
Slope = 3.5 %
Manning's n = 0.013

North Overland Flow Route Sizing Calculations DRY SWM POND 1

Required Capacity = 0.833 m^3/s per calculations in this Appendix

Mannings' Equation for a Trapezoidal Channel

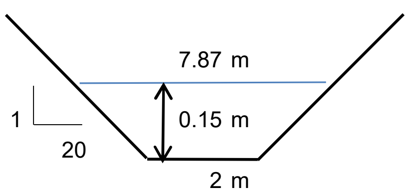
Grassed Swale



Area =	0.297 m^2
Wetted Perimeter =	2.791 m
Channel Capacity =	**1.540 m^3/s**
Velocity =	5.19 m/s
Velocity X Depth =	0.65 m^2/s

Slope = 33.33 %
Manning's n = 0.025

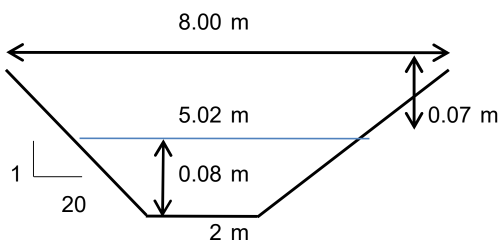
Boulevard



Area =	0.723 m^2
Wetted Perimeter =	7.873 m
Channel Capacity =	**0.833 m^3/s**
Velocity =	1.15 m/s
Velocity X Depth =	0.17 m^2/s

Slope = 2 %
Manning's n = 0.025

Sidewalk Spillway



Area =	0.266 m^2
Wetted Perimeter =	5.028 m
Channel Capacity =	**0.41 m^3/s**
Velocity =	1.53 m/s
Velocity X Depth =	0.12 m^2/s

Slope = 2 %
Manning's n = 0.013

Note: Velocity of flows in the overland flow route into the East Pond is greater than the maximum allowable flow over grass (1.5 m/s). Therefore, LP-P10 turf reinforcement matting is required.

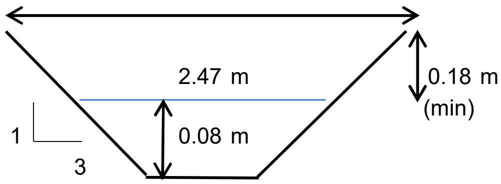
West Overland Flow Route
Sizing Calculations
DRY SWM POND 1

Required Capacity = 0.356 m^3/s per calculations in this Appendix

Mannings' Equation for a Trapezoidal Channel

Grassed Swale in Pond Block

3.53 m



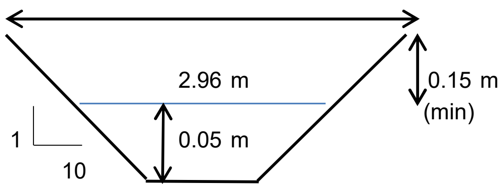
2 m

Area =	0.174 m^2
Wetted Perimeter =	2.492 m
Channel Capacity =	**0.680 m^3/s**
Velocity =	3.91 m/s
Velocity X Depth =	0.30 m^2/s

Slope = 33.33 %
Manning's n = 0.025

Access Road

5.92 m



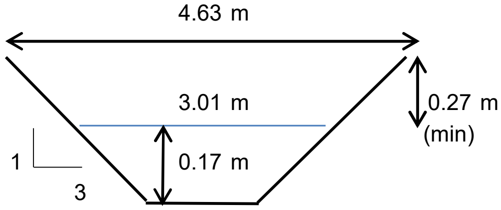
2 m

Area =	0.119 m^2
Wetted Perimeter =	2.963 m
Channel Capacity =	**0.151 m^3/s**
Velocity =	1.27 m/s
Velocity X Depth =	0.06 m^2/s

Slope = 2 %
Manning's n = 0.013

Grassed Swale in Servicing Block

4.63 m

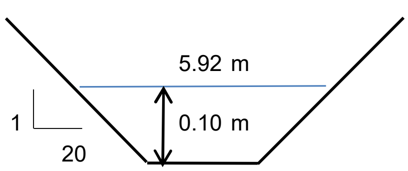


2 m

Area =	0.423 m^2
Wetted Perimeter =	3.068 m
Channel Capacity =	**1.011 m^3/s**
Velocity =	2.39 m/s
Velocity X Depth =	0.40 m^2/s

Slope = 5 %
Manning's n = 0.025

Boulevard



2 m

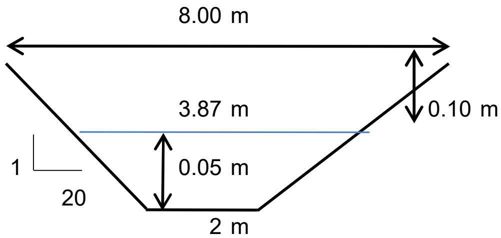
Area =	0.388 m^2
Wetted Perimeter =	5.924 m
Channel Capacity =	**0.356 m^3/s**
Velocity =	0.92 m/s
Velocity X Depth =	0.09 m^2/s

Slope = 2 %
Manning's n = 0.025

West Overland Flow Route
Sizing Calculations
DRY SWM POND 1

7370 Centre Road
Project Number: 2099
Date: December 2020
Designer Initials: E.S.D.

Sidewalk Spillway



Area =	0.137 m^2
Wetted Perimeter =	3.875 m
Channel Capacity =	**0.16 m^3/s**
Velocity =	1.17 m/s
Velocity X Depth =	0.05 m^2/s

Slope = 2 %
Manning's n = 0.013

Note: Velocity of flows in the overland flow route into the East Pond is greater than the maximum allowable flow over grass (1.5 m/s). Therefore, LP-P10 turf reinforcement matting is required.

APPENDIX E

BMP SIZING AND PHOSPHORUS BUDGET CALCULATIONS

48 Hour Drawdown Calculation		
Hydraulic Conductivity (Per Terrapex Hydrogeological Assessment)	$9.5x10^{-5}$	cm/s
I - Infiltration Rate (Per Table C1 of the TRCA and CVC LID SWM Planning and Design Guide, 2010)	49.0	mm/h
Design Infiltration Rate*	12.0	mm/h
n - Porosity	0.4	
t - Design Detention Time	48	h
SF - Safety Factor	2.5	
D - Maximum Depth of Infiltration Trench for 48 Hour Drawdown	0.6	m

* Conservative estimate based on Silty Clay soils until in-situ testing performed at detailed design

$$D = \frac{I * t}{SF * n * 1000}$$

Catchment 201

Catchbasin Filtration Trench Parameters		
Porosity Coefficient	0.4	
Depth	1.00	m
Width	1.00	m
Length of Filtration Trench	1095.0	m
Provided Stone Volume	1095.0	m^3
Provided Runoff Storage Volume	**438.0**	m^3

Catchbasin Infiltration Trench Parameters		
Porosity Coefficient	0.4	
Depth	0.60	m
Width	1.00	m
Length of Infiltration Trench	235.0	m
Provided Stone Volume	141.0	m^3
Provided Runoff Storage Volume	**56.4**	m^3
A - Infiltration Trench Bottom area	235.00	m^2

Rear Yard At-Surface Infiltration Trenches		
Drainage Area	3.10	ha
Imperviousness (Per Figure C-1 in Appendix C)	47	%
Total Roof Area to Rear Yard Infiltration Trench	1.46	ha
Runoff Depth	25	mm
Required Runoff Storage Volume to Infiltrate Runoff Depth	**364.3**	m^3
Number of Lots with Rear Yard Infiltration Trenches	182	
Total Length of Infiltration Trenches	1890	m
Depth	0.6	m
Average Width	0.9	m
Porosity	0.4	
Preliminary Runoff Storage Volume Provided	**385.6**	m^3

Total Provided Infiltration/Filtration Volume =	**858.7**	**m^3**
Catchmnent Area	25.52	ha
Imperviousness	59	%
Catchment Impervious Area	15.06	ha
Equivalent Depth of Rainfall Over Impervious Area (15.06 ha)	5.7	mm

Therefore, the proposed LIDs within Catchment 201 will provide an equivalent level of volume control for a rainfall depth of approximately 5.7 mm across the proposed impervious surfaces within Catchment 201.

Catchment 202

Rear Yard At-Surface Infiltration Trenches		
Lot Drainage Area	0.40	ha
Imperviousness (Per Figure C-1 in Appendix C)	47	%
Total Roof Area to Rear Yard Infiltration Trench	0.19	ha
Runoff Depth	25	mm
Required Runoff Storage Volume to Infiltrate Runoff Depth	**47.0**	m^3
Number of Lots with Rear Yard Infiltration Trenches	17	
Total Length of Infiltration Trenches	269	m
Depth	0.6	m
Average Width	0.75	m
Porosity	0.4	
Preliminary Runoff Storage Volume Provided	**48.4**	m^3

Therefore, the proposed LIDs within Catchment 202 will provide an equivalent level of volume control for a rainfall depth of 25 mm across the proposed impervious surfaces within Catchment 202.

Catchment 203

Rear Yard At-Surface Infiltration Trenches		
Lot Drainage Area	0.19	ha
Imperviousness (Per Figure C-1 in Appendix C)	47	%
Total Roof Area to Rear Yard Infiltration Trench	0.09	ha
Runoff Depth	25	mm
Required Runoff Storage Volume to Infiltrate Runoff Depth	**22.3**	m^3
Number of Lots with Rear Yard Infiltration Trenches	10	
Total Length of Infiltration Trenches	116	m
Depth	0.6	m
Average Width	0.85	m
Porosity	0.4	
Preliminary Runoff Storage Volume Provided	**23.7**	m^3

Therefore, the proposed LIDs within Rear Yard At-Surface Infiltration Trenches will provide an equivalent level of volume control for a rainfall depth of 25 mm across the proposed impervious surfaces within Rear Yard At-Surface Infiltration Trenches.

Catchment 204

Catchbasin Filtration Trench Parameters		
Porosity Coefficient	0.4	
Depth	1.00	m
Width	1.00	m
Length of Filtration Trench	470.0	m
Provided Stone Volume	470.0	m^3
Proposed Runoff Storage Volume	**188.0**	m^3
Required Runoff Storage Volume	181.4	m^3

Therefore, the proposed LIDs within Catchment 204 will provide a quality control volume of 188 cu.m., greater than 181.4 cu.m. required for quality control.

Rear Yard At-Surface Infiltration Trenches		
Drainage Area	0.46	ha
Imperviousness (Per Figure C-1 in Appendix C)	47	%
Total Roof Area to Rear Yard Infiltration Trench	0.22	ha
Runoff Depth	25	mm
Required Runoff Storage Volume to Infiltrate Runoff Depth	**54.1**	m^3
Number of Lots with Rear Yard Infiltration Trenches	22	
Total Length of Infiltration Trenches	273	m
Depth	0.6	m
Average Width	0.9	m
Porosity	0.4	
Preliminary Runoff Storage Volume Provided	**59.0**	m^3

Total Provided Infiltration/Filtration Volume =	**235.5**	**m^3**
Catchmnent Area	5.65	ha
Imperviousness	62	%
Catchment Impervious Area	3.50	ha
Equivalent Depth of Rainfall Over Impervious Area (3.5 ha)	6.7	mm

Therefore, the proposed LIDs within Catchment 204 will provide an equivalent level of volume control for a rainfall depth of approximately 6.7 mm across the proposed impervious surfaces within Catchment 204.

Catchment 205

Rear Yard At-Surface Infiltration Trenches		
Lot Drainage Area	0.26	ha
Imperviousness (Per Figure C-1 in Appendix C)	47	%
Total Roof Area to Rear Yard Infiltration Trench	0.12	ha
Runoff Depth	25	mm
Required Runoff Storage Volume to Infiltrate Runoff Depth	**30.6**	m^3
Number of Lots with Rear Yard Infiltration Trenches	7	
Total Length of Infiltration Trenches	116	m
Depth	0.6	m
Average Width	1.1	m
Porosity	0.4	
Preliminary Runoff Storage Volume Provided	**30.6**	m^3

Therefore, the proposed LIDs within Rear Yard At-Surface Infiltration Trenches will provide an equivalent level of volume control for a rainfall depth of 25 mm across the proposed impervious surfaces within Rear Yard At-Surface Infiltration Trenches.

Catchment 206

Rear Yard At-Surface Infiltration Trenches		
Drainage Area	0.07	ha
Imperviousness (Per Figure C-1 in Appendix C)	47	%
Total Roof Area to Rear Yard Infiltration Trench	0.03	ha
Runoff Depth	25	mm
Required Runoff Storage Volume to Infiltrate Runoff Depth	**8.2**	m^3
Number of Lots with Rear Yard Infiltration Trenches	4	
Total Length of Infiltration Trenches	42	m
Depth	0.6	m
Average Width	0.85	m
Porosity	0.4	
Preliminary Runoff Storage Volume Provided	**8.6**	m^3

Therefore, the proposed LIDs within Rear Yard At-Surface Infiltration Trenches will provide an equivalent level of volume control for a rainfall depth of 25 mm across the proposed impervious surfaces within Rear Yard At-Surface Infiltration Trenches.

Catchment 207

Rear Yard At-Surface Infiltration Trenches		
Drainage Area	0.30	ha
Imperviousness (Per Figure C-1 in Appendix C)	47	%
Total Roof Area to Rear Yard Infiltration Trench	0.14	ha
Runoff Depth	25	mm
Required Runoff Storage Volume to Infiltrate Runoff Depth	**35.3**	m^3
Number of Lots with Rear Yard Infiltration Trenches	11	
Total Length of Infiltration Trenches	184	m
Depth	0.6	m
Average Width	0.8	m
Porosity	0.4	
Preliminary Runoff Storage Volume Provided	**35.3**	m^3

Therefore, the proposed LIDs within Rear Yard At-Surface Infiltration Trenches will provide an equivalent level of volume control for a rainfall depth of 25 mm across the proposed impervious surfaces within Rear Yard At-Surface Infiltration Trenches.

Sitewide Summary

Volume Control Total		
Total Impervious Area	19.13	ha
Total Infiltration/Filtration Volume Provided (During 25mm Storm Event)	1237.5	m^3
Equivalent Depth of Rainfall over Impervious Area	6.5	mm

Therefore, the proposed LIDs within the site will provide an equivalent level of volume control for a rainfall depth of 6.5 mm across the proposed impervious surfaces within the site.

Areas from **Figure 2.6**, Existing Drainage Plan shown on **Figure 2.1**.

	Area (ha)	Land Use Type	Loading Rate (kg/ha/yr)	P_{load} (kg/year)
Wetland (Part of Catchment 101 & 102)	0.24	Wetland	0.04	0.01
Forest (Part of Catchment 101)	0.05	Forest	0.03	0.00
Cropland (Part of Catchment 101 & 102)	33.75	Cropland	0.11	3.71
Total	**34.04**		**Total**	3.72

Table 2. Land-Use Specific Phosphorus Export Coefficients (kg/ha/yr) for Lake Simcoe Subwatersheds

Subwatershed	Phosphorus Export (kg/ha/yr)											
				High Intensity Development								
	Cropland	Hay-Pasture	Sod Farm/Golf Course	Commercial /Industrial	Residential	Low Intensity Development	Quarry	Unpaved Road	Forest	Transition	Wetland	Open Water
Monitored Subwatersheds												
Beaver River	0.22	0.04	0.01	1.82	1.32	0.19	0.06	0.83	0.02	0.04	0.02	0.26
Black River	0.23	0.08	0.02	1.82	1.32	0.17	0.15	0.83	0.05	0.06	0.04	0.26
East Holland River	0.36	0.12	0.24	1.82	1.32	0.13	0.08	0.83	0.10	0.16	0.10	0.26
Hawkestone Creek	0.19	0.10	0.06	1.82	1.32	0.09	0.10	0.83	0.03	0.04	0.03	0.26
Lovers Creek	0.16	0.07	0.17	1.82	1.32	0.07	0.06	0.83	0.06	0.06	0.05	0.26
Pefferlaw/Uxbridge Brook	0.11	0.06	0.02	1.82	1.32	0.13	0.04	0.83	0.03	0.04	0.04	0.26
Whites Creek	0.23	0.10	0.42	1.82	1.32	0.15	0.08	0.83	0.10	0.11	0.09	0.26
Unmonitored Subwatersheds												
Barrie Creeks	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
GeorginaCreeks	0.36	0.12	0.24	1.82	1.32	0.13	0.08	0.83	0.10	0.16	0.10	0.26
Hewitts Creek	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Innisfil Creeks	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Maskinonge River	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Oro Creeks North	0.36	0.12	0.24	1.82	1.32	0.13	0.08	0.83	0.10	0.16	0.10	0.26
Oro Creeks South	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Ramara Creeks	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Talbot/Upper Talbot River	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
West Holland River	0.36	0.12	0.24	1.82	1.32	0.13	0.08	0.83	0.10	0.16	0.10	0.26

Proposed Phosphorous Budget

Areas from **Figure 2.7**, Proposed Drainage Plan shown on **Figure 2.2**.

	Area (ha)	Land Use Type	Loading Rate (kg/ha/yr)	BMP 1	Removal Efficiency	BMP 2	Removal Efficiency	BMP 3	Removal Efficiency	BMP 4	Removal Efficiency	Combined Removal Efficiency	Unmitigated P_{load} (kg/year)	Mitigated P_{load} (kg/year)
Park (Part of Catchment 201)	1.70	Low Intensity Residential	0.13	Wet Detention Pond	63%							63%	0.22	0.08
Residential (Part of Catchment 201)	1.13	High Intensity Residential	1.32	Rear Yard At-Surface Infiltration Trench	60%	Catchbasin Filtration Trench	45%	Wet Detention Pond	63%	Stream Buffer	65%	97%	1.49	0.04
Residential (Part of Catchment 201)	0.07	High Intensity Residential	1.32	Rear Yard At-Surface Infiltration Trench	60%	Catchbasin Infiltration Trench	87%	Wet Detention Pond	63%	Stream Buffer	65%	99%	0.09	0.00
Residential (Part of Catchment 201)	1.99	High Intensity Residential	1.32	Rear Yard At-Surface Infiltration Trench	60%	Wet Detention Pond	63%	Stream Buffer	65%			95%	2.63	0.14
Residential (Part of Catchment 201)	12.43	High Intensity Residential	1.32	Catchbasin Filtration Trench	45%	Wet Detention Pond	63%	Stream Buffer	65%			93%	16.41	1.17
Residential (Part of Catchment 201)	2.58	High Intensity Residential	1.32	Catchbasin Infiltration Trench	87%	Wet Detention Pond	63%	Stream Buffer	65%			98%	3.41	0.06
Residential (Part of Catchment 201)	5.27	High Intensity Residential	1.32	Wet Detention Pond	63%	Stream Buffer	65%					87%	6.96	0.90
Uncontrolled Rear Yard Pervious & Roof (Part of Catchment 202)	0.40	High Intensity Residential	1.32	Rear Yard At-Surface Infiltration Trench	60%	Stream Buffer	65%					86%	0.53	0.07
Rear Yard Pervious & Roof (Part of Catchment 203)	0.19	High Intensity Residential	1.32	Rear Yard At-Surface Infiltration Trench	60%	Wet Detention Pond	63%	Stream Buffer	65%			95%	0.25	0.01
SWM Facility (Part of Catchment 203)	1.55	Low Intensity Residential	0.13	Wet Detention Pond	63%	Stream Buffer	65%					87%	0.20	0.03
Residential (Catchment 204)	0.40	High Intensity Residential	1.32	Rear Yard At-Surface Infiltration Trench	60%	Catchbasin Filtration Trench	45%	Underground Storage	25%	Grassed Filter Strip	65%	94%	0.53	0.03
Residential (Catchment 204)	5.13	High Intensity Residential	1.32	Catchbasin Filtration Trench	45%	Dry SWM Pond	10%	Grassed Filter Strip	65%			83%	6.77	1.17
Residential (Part of Catchment 205)	0.10	High Intensity Residential	1.32	Rear Yard At-Surface Infiltration Trench	60%	Stream Buffer/Grassed Filter Strip	65%					86%	0.13	0.02
SWM Facility (Part of Catchment 205)	0.54	Low Intensity Residential	0.13	Stream Buffer/Grassed Filter Strip	65%							65%	0.07	0.02
Uncontrolled Rear Yard Pervious & Roof (Catchment 206)	0.07	High Intensity Residential	1.32	Rear Yard At-Surface Infiltration Trench	60%	Enhanced Grass Swale	25%					70%	0.09	0.03
Uncontrolled Rear Yard Pervious & Roof (Catchment 207)	0.30	High Intensity Residential	1.32	Rear Yard At-Surface Infiltration Trench	60%	Enhanced Grass Swale	25%					70%	0.40	0.12
Uncontrolled Rear Yard Pervious & Roof (Catchment 208)	0.19	High Intensity Residential	1.32	Rear Yard At-Surface Infiltration Trench	60%	Enhanced Grass Swale	25%					70%	0.25	0.08
Total	**34.04**											**Total**	40.42	3.97
													Removal Rate	**90.2%**

Table 2. Land-Use Specific Phosphorus Export Coefficients (kg/ha/yr) for Lake Simcoe Subwatersheds

Subwatershed	Phosphorus Export (kg/ha/yr)											
	Cropland	Hay-Pasture	Sod Farm/Golf Course	High Intensity Development		Low Intensity Development	Quarry	Unpaved Road	Forest	Transition	Wetland	Open Water
				Commercial /Industrial	Residential							
Monitored Subwatersheds												
Beaver River	0.22	0.04	0.01	1.82	1.32	0.19	0.06	0.83	0.02	0.04	0.02	0.26
Black River	0.23	0.08	0.02	1.82	1.32	0.17	0.15	0.83	0.05	0.06	0.04	0.26
East Holland River	0.36	0.12	0.24	1.82	1.32	0.13	0.08	0.83	0.10	0.16	0.10	0.26
Hawkestone Creek	0.19	0.10	0.06	1.82	1.32	0.09	0.10	0.83	0.03	0.04	0.03	0.26
Lovers Creek	0.16	0.07	0.17	1.82	1.32	0.07	0.06	0.83	0.06	0.06	0.05	0.26
Pefferlaw/Uxbridge Brook	0.11	0.06	0.02	1.82	1.32	0.13	0.04	0.83	0.03	0.04	0.04	0.26
Whites Creek	0.23	0.10	0.42	1.82	1.32	0.15	0.08	0.83	0.10	0.11	0.09	0.26
Unmonitored Subwatersheds												
Barrie Creeks	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
GeorginaCreeks	0.36	0.12	0.24	1.82	1.32	0.13	0.08	0.83	0.10	0.16	0.10	0.26
Hewitts Creek	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Innisfil Creeks	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Maskinonge River	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Oro Creeks North	0.36	0.12	0.24	1.82	1.32	0.13	0.08	0.83	0.10	0.16	0.10	0.26
Oro Creeks South	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Ramara Creeks	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Talbot/Upper Talbot River	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
West Holland River	0.36	0.12	0.24	1.82	1.32	0.13	0.08	0.83	0.10	0.16	0.10	0.26

APPENDIX F

PRELIMINARY VORTECH SIZING CALCULATIONS

scs consulting group ltd

VORTECHS SYSTEM® ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON AN AVERAGE PARTICLE SIZE OF 80 MICRONS
7370 CENTRE RD
UXBRIDGE, ON
MODEL PC1421 OFF-LINE
SITE DESIGNATION OGS1

CONTECH ENGINEERED SOLUTIONS

Design Ratio[1] = $\frac{(25.52 \text{ hectares}) \times (0.6) \times (2.775)}{(14.3 \text{ m2})}$ **= 2.96**

Bypass occurs at an elevation of 0.91m (at approximately 19 l/s/m2)

Rainfall Intensity mm/hr	Operating Rate[2] % of capacity	Flow Treated (l/s)	% Total Rainfall Volume[3]	Rmvl. Effcy[4] (%)	Rel. Effcy (%)
0.5	2.2	21.5	9.9%	98.0%	9.7%
1.0	4.3	43.0	10.7%	98.0%	10.5%
1.5	6.5	64.6	9.8%	98.0%	9.6%
2.0	8.7	86.1	8.9%	96.9%	8.6%
2.5	10.9	107.6	7.2%	96.0%	6.9%
3.0	13.0	129.1	6.1%	93.8%	5.7%
3.5	15.2	150.7	3.4%	91.8%	3.1%
4.0	17.4	172.2	5.0%	89.9%	4.5%
4.5	19.5	193.7	4.2%	88.0%	3.7%
5.0	21.7	215.2	3.2%	86.8%	2.8%
6.0	26.1	258.3	5.4%	84.3%	4.6%
7.0	30.4	301.3	4.2%	82.0%	3.4%
8.0	34.7	344.3	3.8%	80.0%	3.0%
9.0	39.1	387.4	2.2%	76.8%	1.7%
10.0	43.4	430.4	2.3%	72.8%	1.7%
15.0	65.1	645.6	4.3%	54.0%	2.3%
20.0	86.9	860.9	1.7%	24.4%	0.4%
25.0	108.6	1076.1	1.1%	8.0%	0.1%
30.0	130.3	1291.3	0.5%	8.0%	0.0%
35.0	152.0	1506.5	0.1%	8.0%	0.0%
40.0	173.7	1721.7	0.3%	8.0%	0.0%
					82.3%

Predicted Annual Runoff Volume Treated =	94.2%
Assumed removal efficiency for bypassed flows =	0.0%
Estimated reduction in efficiency[5] =	0.0%
Predicted Net Annual Load Removal Efficiency =	**82%**

1 - Design Ratio = (Total Drainage Area) x (Runoff Coefficient) x (Rational Method Conversion) / Grit Chamber Area
- The Total Drainage Area and Runoff Coefficient are specified by the site engineer.
- The rational method conversion based on the units in the above equation is 2.775.

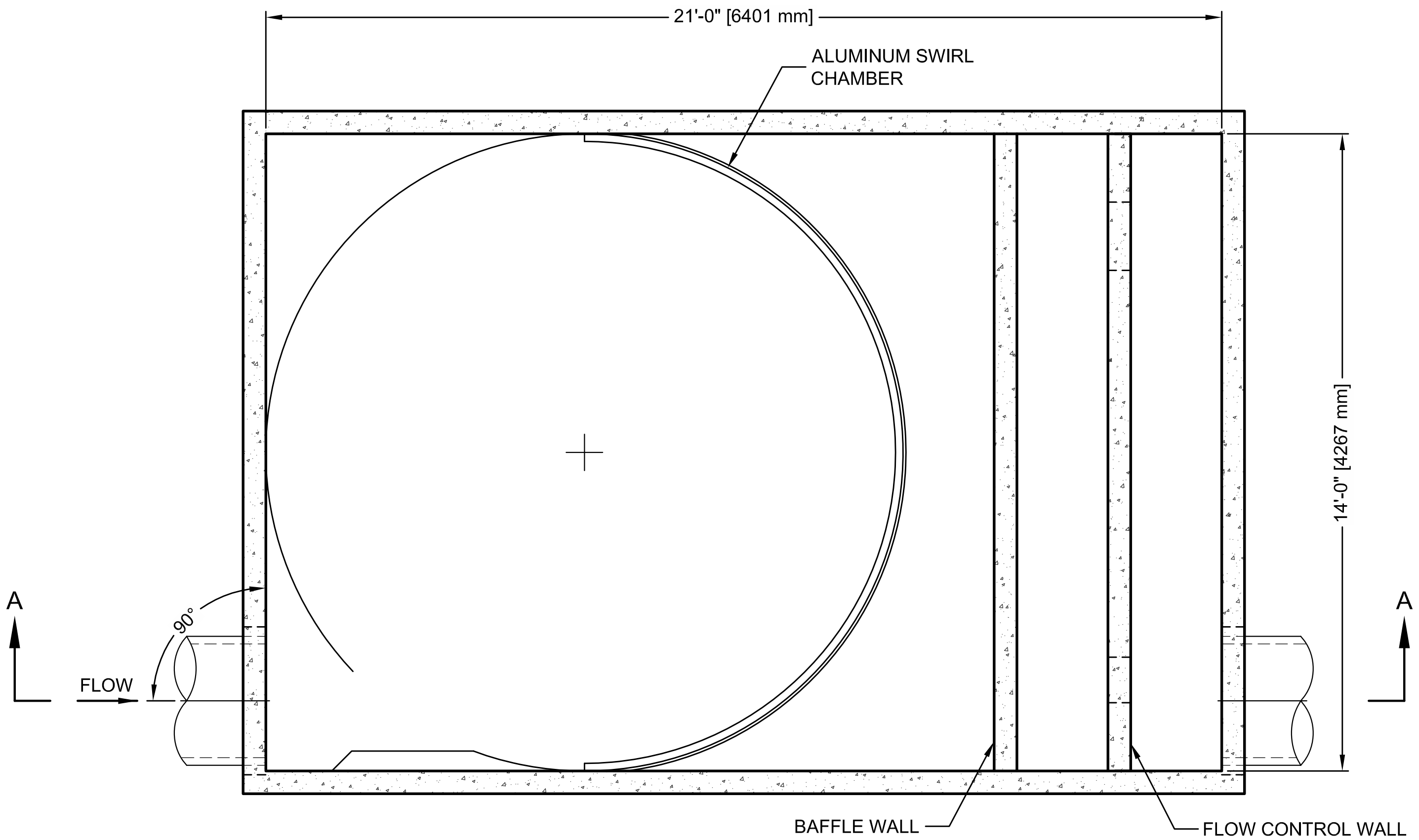
2 - Operating Rate (% of capacity) = percentage of peak operating rate of 68 l/s/m^2.
3 - Based on 65 years of hourly rainfall data from Canadian Station 6158350, Toronto ON (Bloor)
4 - Based on Contech Construction Products laboratory verified removal of an average particle size of TYPICAL microns (see Technical Bulletin #1).
5- Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Calculated by:	JAK	12/22	Checked by:

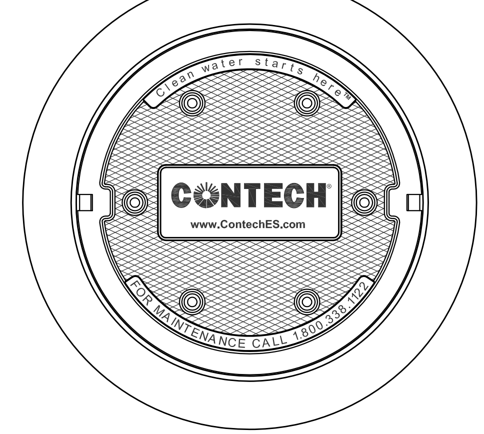
VORTECHS PC1421 DESIGN NOTES

VORTECHS PC1421 RATED TREATMENT CAPACITY IS 34 CFS, OR PER LOCAL REGULATIONS. IF THE SITE CONDITIONS EXCEED RATED TREATMENT CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

THE STANDARD INLET/OUTLET CONFIGURATION IS SHOWN. FOR OTHER CONFIGURATION OPTIONS , PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS, LLC REPRESENTATIVE. www.ContechES.com



SECTION B-B



FRAME AND COVER

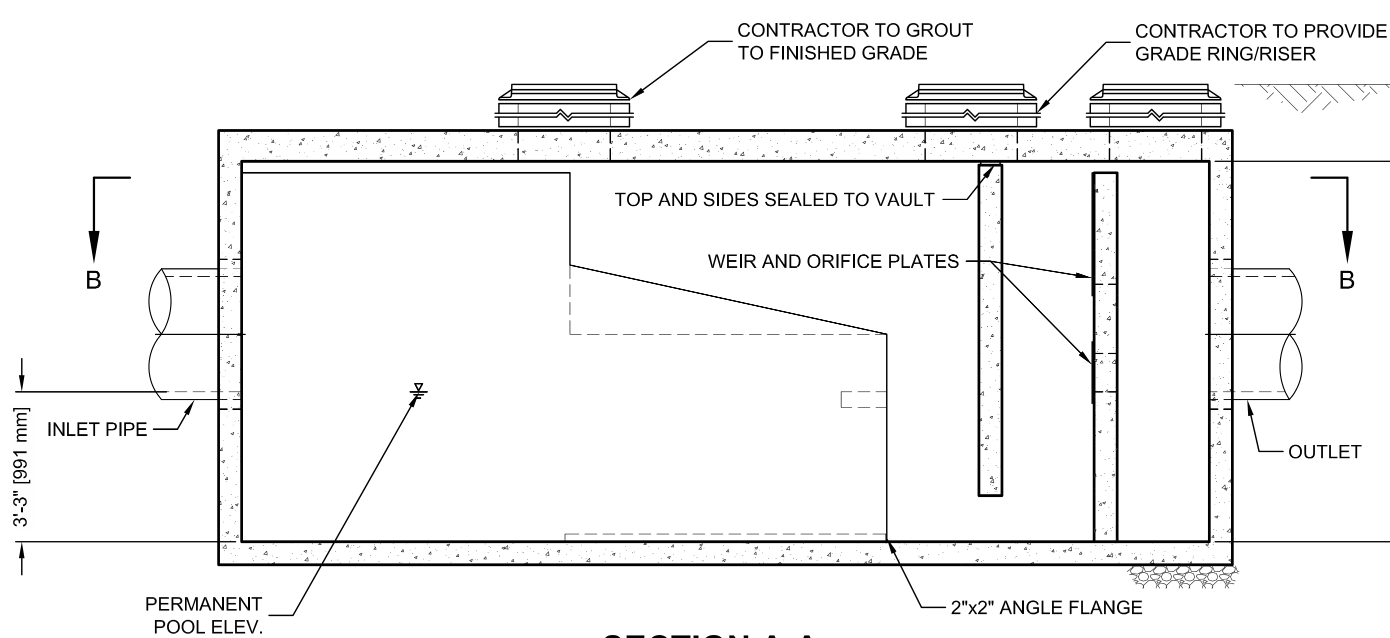
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			*
WATER QUALITY FLOW RATE (CFS)			*
PEAK FLOW RATE (CFS)			*
RETURN PERIOD OF PEAK FLOW (YRS)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD



SECTION A-A

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS, LLC REPRESENTATIVE. www.ContechES.com
4. VORTECHS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET AASHTO M306 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. INLET PIPE(S) MUST BE PERPEDICULAR TO THE VAULT AND AT THE CORNER TO INTRODUCE THE FLOW TANGENTIALLY TO THE SWIRL CHAMBER. DUAL INLETS NOT TO HAVE OPPOSING TANGENTIAL FLOW DIRECTIONS.
7. OUTLET PIPE(S) MUST BE DOWN STREAM OF THE FLOW CONTROL BAFFLE AND MAY BE LOCATED ON THE SIDE OR END OF THE VAULT. THE FLOW CONTROL WALL MAY BE TURNED TO ACCOMODATE OUTLET PIPE KNOCKOUTS ON THE SIDE OF THE VAULT.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE VORTECHS STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

Vortechs®

CONTECH®
ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

VORTECHS PC1421
STANDARD DETAIL

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VORTECHS SYSTEM® ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON AN AVERAGE PARTICLE SIZE OF 80 MICRONS
7370 CENTRE RD
UXBRIDGE, ON
MODEL 7000 OFF-LINE
SITE DESIGNATION OGS2

CONTECH ENGINEERED SOLUTIONS

Design Ratio[1] = $\dfrac{(5.61 \text{ hectares}) \times (0.6) \times (2.775)}{(4.7 \text{ m2})}$ **= 1.99**

Bypass occurs at an elevation of 0.98m (at approximately 47 l/s/m2)

Rainfall Intensity mm/hr	Operating Rate[2] % of capacity	Flow Treated (l/s)	% Total Rainfall Volume[3]	Rmvl. Effcy[4] (%)	Rel. Effcy (%)
0.5	1.5	4.6	9.9%	98.0%	9.7%
1.0	2.9	9.1	10.7%	98.0%	10.5%
1.5	4.4	13.7	9.8%	98.0%	9.6%
2.0	5.8	18.2	8.9%	98.0%	8.7%
2.5	7.3	22.8	7.2%	97.6%	7.0%
3.0	8.8	27.3	6.1%	96.9%	5.9%
3.5	10.2	31.9	3.4%	96.0%	3.3%
4.0	11.7	36.4	5.0%	95.3%	4.8%
4.5	13.1	41.0	4.2%	93.8%	3.9%
5.0	14.6	45.5	3.2%	92.8%	3.0%
6.0	17.5	54.6	5.4%	89.9%	4.9%
7.0	20.4	63.7	4.2%	87.3%	3.6%
8.0	23.4	72.8	4.0%	85.7%	3.4%
9.0	26.3	81.9	2.4%	84.3%	2.0%
10.0	29.2	91.0	2.7%	82.6%	2.2%
15.0	43.8	136.5	6.1%	72.8%	4.4%
20.0	58.4	182.0	2.8%	59.3%	1.7%
25.0	73.0	227.5	1.9%	45.6%	0.8%
30.0	87.6	273.0	0.9%	22.7%	0.2%
35.0	102.2	318.5	0.2%	8.0%	0.0%
40.0	116.9	364.0	0.5%	8.0%	0.0%
					89.7%

Predicted Annual Runoff Volume Treated =	92.9%
Assumed removal efficiency for bypassed flows =	0.0%
Estimated reduction in efficiency[5] =	6.5%
Predicted Net Annual Load Removal Efficiency =	**83%**

1 - Design Ratio = (Total Drainage Area) x (Runoff Coefficient) x (Rational Method Conversion) / Grit Chamber Area
- The Total Drainage Area and Runoff Coefficient are specified by the site engineer.
- The rational method conversion based on the units in the above equation is 2.775.

2 - Operating Rate (% of capacity) = percentage of peak operating rate of 68 l/s/m^2.

3 - Based on 65 years of hourly rainfall data from Canadian Station 6158350, Toronto ON (Bloor)

4 - Based on Contech Construction Products laboratory verified removal of an average particle size of TYPICAL microns (see Technical Bulletin #1).

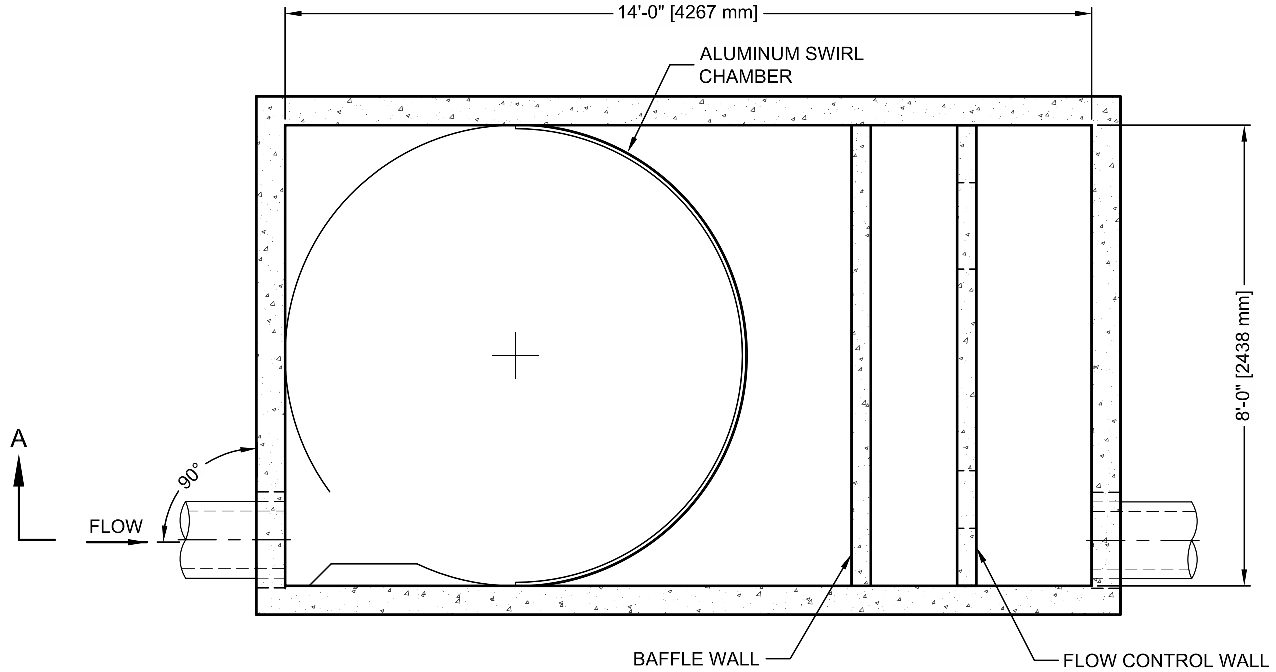
5- Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Calculated by:	JAK	2/26	Checked by:

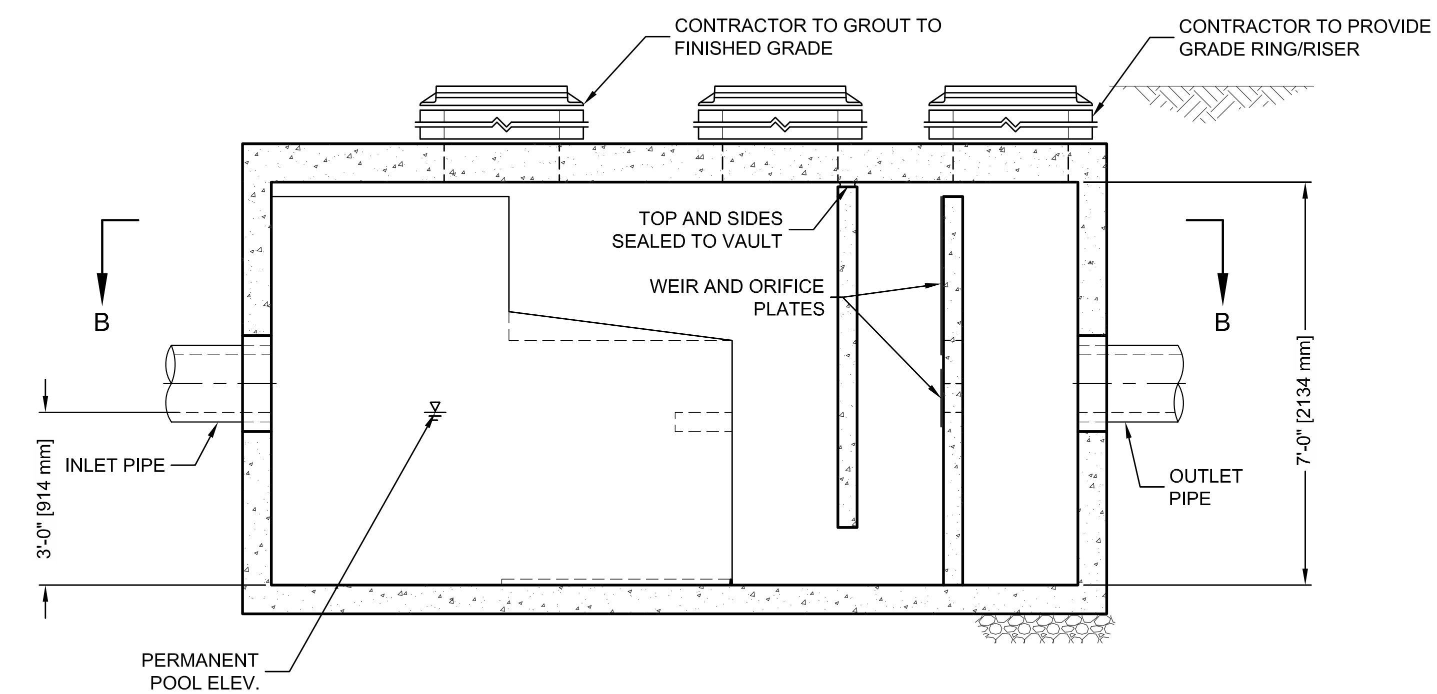
VORTECHS 7000 DESIGN NOTES

VORTECHS 7000 RATED TREATMENT CAPACITY IS 11 CFS, OR PER LOCAL REGULATIONS. IF THE SITE CONDITIONS EXCEED RATED TREATMENT CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

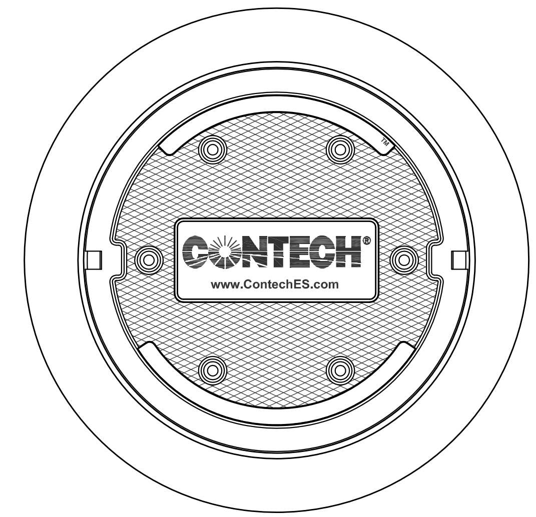
THE STANDARD INLET/OUTLET CONFIGURATION IS SHOWN. FOR OTHER CONFIGURATION OPTIONS , PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com



SECTION B-B



SECTION A-A



FRAME AND COVER

(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (CFS)	*
PEAK FLOW RATE (CFS)	*
RETURN PERIOD OF PEAK FLOW (YRS)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
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800-338-1122 513-645-7000 513-645-7993 FAX

VORTECHS 7000
STANDARD DETAIL

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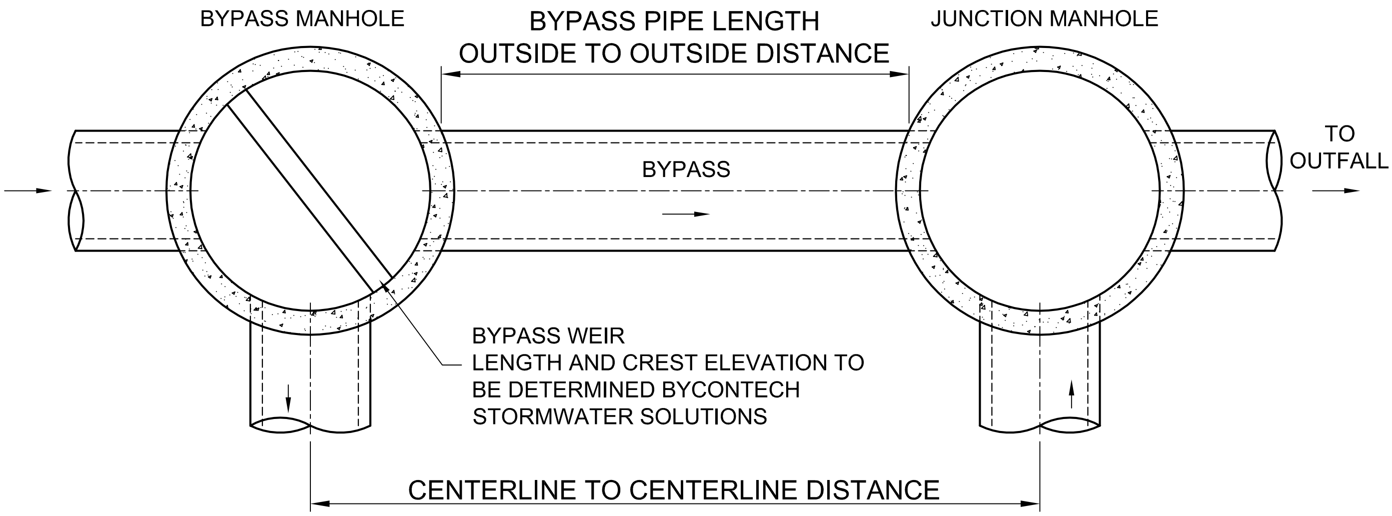
FOR INFORMATIONAL PURPOSES ONLY
NOT INTENDED AS A CONSTRUCTION DOCUMENT
-BYPASS AND JUNCTION STRUCTURES NOT SUPPLIED BY CONTECH STORMWATER SOLUTIONS-



NOTE: BYPASS AND JUNCTION MANHOLE DIAMETERS ARE ASSUMED BASED ON THE TREATMENT CAPACITY OF THE VORTECHS SYSTEM. THESE DIAMETERS MAY CHANGE DEPENDING ON SPECIFIC SITE CONDITIONS. CONTACT YOUR CONTECH STORMWATER SOLUTIONS DESIGN ENGINEER.

Vortechs Model Size	Vortechs Dims		Recommended Pipe Size Diameter in / mm	Typical Bypass Manhole Diameter	Typical Junction Manhole Diameter	Approximate Center to Center Distance ft / mm	Approximate Bypass Pipe Length Outside ft / mm
	Length ft / mm	Width ft / mm					
1000	9 / 2743	3 / 914	10 / 250	4 / 1200	4 / 1200	7.5 / 2286	3.5 / 1067
2000	10 / 3048	4 / 1219	12 / 300	4 / 1200	4 / 1200	8.5 / 2591	4.42 / 1347
3000	11 / 3353	5 / 1524	15 / 375	5 / 1500	4 / 1200	9.25 / 2819	4.75 / 1448
4000	12 / 3658	6 / 1829	15 / 375	5 / 1500	4 / 1200	10.25 / 3124	5.75 / 1753
5000	13 / 3962	7 / 2134	18 / 450	6 / 1800	5 / 1500	11.17 / 3405	5.67 / 1728
7000	14 / 4267	8 / 2438	18 / 450	6 / 1800	5 / 1500	12.17 / 3709	6.67 / 2033
9000	15 / 4572	9 / 2743	21 / 525	6 / 1800	6 / 1800	11.83 / 3606	5.83 / 1777
11000	16 / 4877	10 / 3048	24 / 600	6 / 1800	6 / 1800	12.67 / 3862	6.67 / 2033
16000	18 / 5486	12 / 3658	27 / 675	6 / 1800	6 / 1800	14.58 / 4444	8.58 / 2615

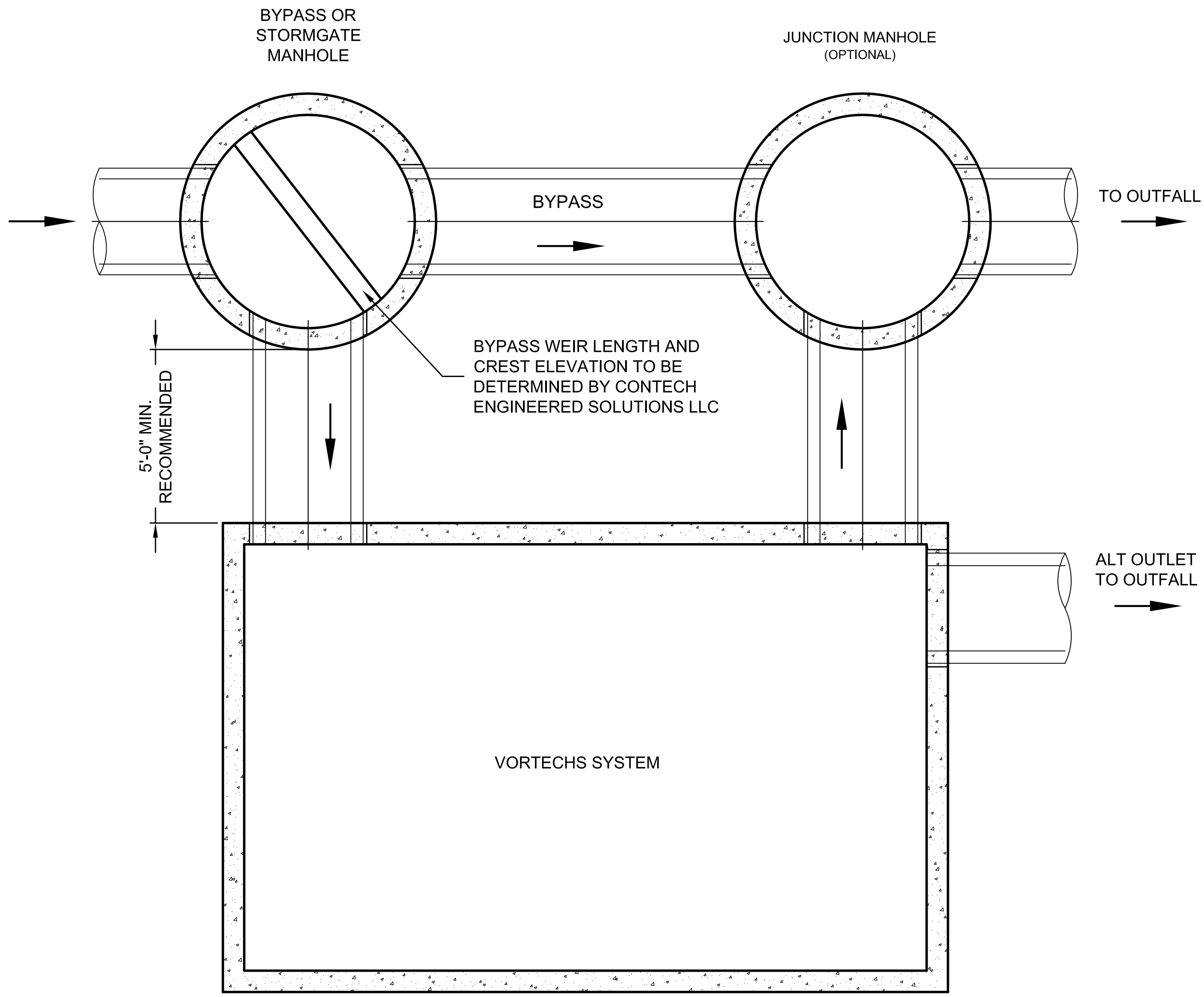
CONTECH® STORMWATER SOLUTIONS INC.
contechstormwater.com

TYPICAL BYPASS & JUNCTION MANHOLE LAYOUT
WITH SPECIFICATIONS TABLE FOR
VORTECHS® STORMWATER TREATMENT SYSTEM

DATE: 1/24/07	SCALE: NONE	FILE NAME: TYPTBLVXBPRmet	DRAWN: GMC	CHECKED: NDG

FOR INFORMATIONAL PURPOSES ONLY
NOT INTENDED AS A CONSTRUCTION DOCUMENT

- BYPASS AND JUNCTION STRUCTURES MAY OR MAY NOT BE SUPPLIED BY CONTECH -



ACTUAL ORIENTATION AND LAYOUT MAY VARY DUE TO SITE SPECIFIC CONSIDERATIONS

THIS PRODUCT MAY BE PROTECTED BY THE FOLLOWING U.S. PATENT: 5,759,415; RELATED FOREIGN PATENTS.

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
200 Enterprise Drive, Scarborough, ME 04074
877-907-8676 207-885-9830 207-885-9825 FAX

TYPICAL BYPASS LAYOUT
VORTECHS® STORMWATER TREATMENT SYSTEM

DATE:3/8/13	SCALE: NONE	PROJECT No.:TYPVXBPLOR	SEQ. No.: N/A	DRAWN: SCF	CHECKED: NDG

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APPENDIX G

SANITARY FLOW CALCULATIONS

SCS consulting group ltd

Sanitary Design Sheet
7370 Centre Road Uxbridge
FSR
Uxbridge, Ontario

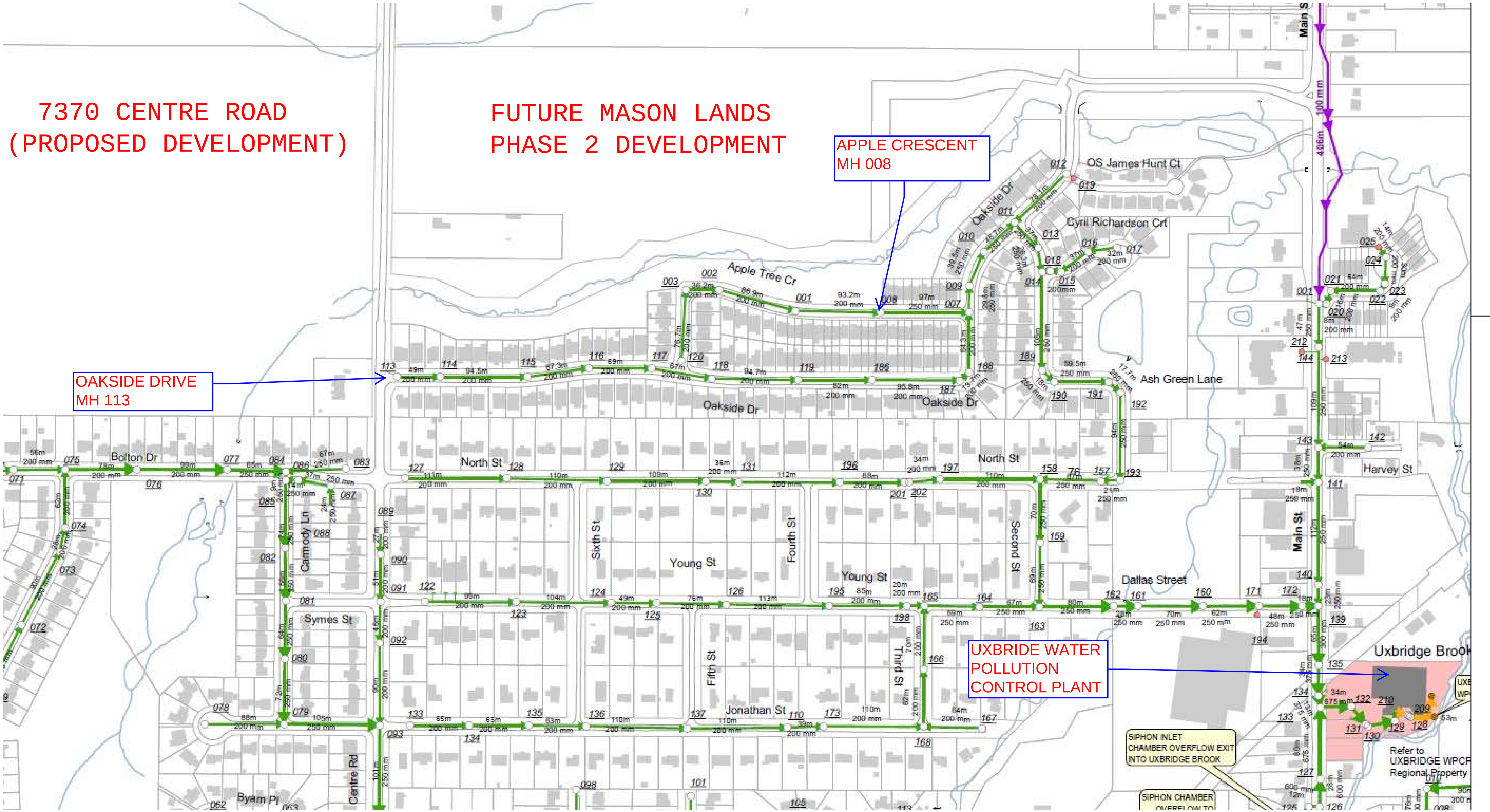
Minimum Sewer Diameter (mm) = 200 | Avg. Domestic Flow (l/cap/day) = 364
Mannings n = 0.013 | Infiltration Rate (l/s/ha) = 0.26
Minimum Velocity (m/s) = 0.60 | Max. Harmon Peaking Factor = 3.8
Maximum Velocity (m/s) = 3.65 | Min. Harmon Peaking Factor = 1.5
Minimum Pipe Slope (%) = 0.50 | NOMINAL PIPE SIZE USED

Project: 7370 Centre Road Uxbridge
Project No. 2099
Date: 29-Nov-20
Designed By: R.B.
Reviewed By: N.D.M.

P:\2099 7370 Centre Road Uxbridge\Design\Pipe Design\Sanitary\2020 11(Nov) 27 - FSR Sanitary Design Updated\[2099 - Preliminary Sanitary Design Sheet.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 FROM	MANHOLE TO	AREA (ha)	ACCUM. AREA (ha)	UNITS (#)	DENSITY PER UNIT (p/unit)	DENSITY PER HA (p/ha)	RESIDENTIAL POPULATION	ACCUM. RESIDENTIAL POPULATION	AREA (ha)	ACCUM. AREA (ha)	POPULATION DENSITY (p/ha)	FLOW RATE (l/s/ha)	ACCUM. EQUIV. POPULATION	INFILTRATION (L/s)	TOTAL ACCUM. POPULATION	AVG. DOMESTIC FLOW (L/s)	ACCUM. AVG. DOMESTIC FLOW (L/s)	PEAKING FACTOR	PEAKED RESIDENTIAL FLOW (L/s)	ICI FLOW (L/s)	TOTAL FLOW (L/s)	LENGTH (m)	PIPE DIAMETER (mm)	SLOPE (%)	FULL FLOW CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	ACTUAL VELOCITY (m/s)
Street X - Townhouse	1	2	0	0	27	3		81	81	0	0	0	0	0	0.0	81	0.3	0.3	3.80	1.3	0.0	1.3	178.1	200	0.50	23.2	0.74	0.40
Street J - Single Detached	2	3	13.86	13.86	222	3.5		777	858	0	0	0	0	0	3.6	858	3.3	3.6	3.80	13.7	0.0	17.3	630.7	200	0.50	23.2	0.74	0.81
Street Y - Townhouse	4	5	0	0	42	3		126	126	0	0	0	0	0	0.0	126	0.5	0.5	3.80	2.0	0.0	2.0	141.1	200	0.50	23.2	0.74	0.44
Street E - Single Detached	5	3	11.76	11.76	196	3.5		686	812	0	0	0	0	0	3.1	812	2.9	3.4	3.80	13.0	0.0	16.1	791.0	200	0.50	23.2	0.74	0.80
Street J - Conveyance	3	6	0	25.62	0			0	1670	0	0	0	0	0	6.7	1670	0.0	7.0	3.65	25.6	0.0	32.3	81.5	200	1.50	40.1	1.28	1.42
Street J - Single Detached	6	7	6.19	31.81	103	3.5		360.5	2030.5	0	0	0	0	0	8.3	2030.5	1.5	8.6	3.58	30.6	0.0	38.9	330.5	200	1.50	40.1	1.28	1.46



EXCERPT FROM TOWNSHIP OF UXBRIDGE SANITARY
SEWERAGE SYSTEM MAP (DATED MARCH 22, 2019)

SCS consulting group ltd

Sanitary Design Sheet
7370 Centre Road
Option 1 - Phase 1 Proposed Development to Oakside Drive
Uxbridge, Ontario

Minimum Sewer Diameter (mm) =	**200**	**Avg. Domestic Flow (l/cap/day) =**	**364**
Mannings n =	**0.013**	**Infiltration Rate (l/s/ha) =**	**0.26**
Minimum Velocity (m/s) =	**0.60**	**Max. Harmon Peaking Factor =**	**3.8**
Maximum Velocity (m/s) =	**3.65**	**Min. Harmon Peaking Factor =**	**1.5**
Minimum Pipe Slope (%) =	**0.50**	**NOMINAL PIPE SIZE USED**	

Project: 7370 Centre Road
Project No. 2099
Date: 2-Dec-20
Designed By: N.D.M.
Reviewed By: 0

P:\2099 7370 Centre Road Uxbridge\Design\Pipe Design\Sanitary\2020 11(Nov) 30 - Sanitary Capacity Sensitivity\Phase 1 MDTR Through Oakside\[2099-Sanitary Design Sheet (Phase 1 MDTR Through Oakside).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 FROM	MANHOLE TO	AREA	ACCUM. AREA	UNITS	DENSITY PER UNIT	DENSITY PER HA	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
			(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)
7370 Centre Road (Single Detached)	2	MH21A	6.19	6.19	103	3.5		360.5	360.5	0	0	0	0	0	1.6	360.5	1.5	1.5	3.80	5.8	0.0	7.4	330.5	200	2.00	46.4	1.48	1.06
Oakside Drive	MH21A	MH20A	0.54	6.73	6	3.5	38.9	21	381.5	0	0	0	0	0	1.7	381.5	0.1	1.6	3.80	6.1	0.0	7.9	49.0	200	2.00	46.4	1.48	1.08
Oakside Drive	MH20A	MH19A	0.813	7.543	11	3.5454545	48.0	39	420.5	0	0	0	0	0	2.0	420.5	0.2	1.8	3.80	6.7	0.0	8.7	94.5	200	1.10	34.4	1.09	0.91
Oakside Drive	MH19A	MH18A	0.595	8.138	8	3.5	47.1	28	448.5	0	0	0	0	0	2.1	448.5	0.1	1.9	3.80	7.2	0.0	9.3	67.3	200	0.60	25.4	0.81	0.74
Oakside Drive	MH18A	MH17A	0.64	8.778	8	3.5	43.8	28	476.5	0	0	0	0	0	2.3	476.5	0.1	2.0	3.80	7.6	0.0	9.9	69.0	200	0.60	25.4	0.81	0.76
Oakside Drive	MH17A	MH16A	0.474	9.252	5	3.6	38.0	18	494.5	0	0	0	0	0	2.4	494.5	0.1	2.1	3.80	7.9	0.0	10.3	67.4	200	1.92	45.4	1.45	1.16
Oakside Drive	MH16A	MH15A	0.815	10.067	13	3.4615385	55.2	45	539.5	0	0	0	0	0	2.6	539.5	0.2	2.3	3.80	8.6	0.0	11.3	94.7	200	3.68	62.9	2.00	1.50
Oakside Drive	MH15A	MH14A	0.612	10.679	12	3.3333333	65.4	40	579.5	0	0	0	0	0	2.8	579.5	0.2	2.4	3.80	9.3	0.0	12.1	82.0	200	2.93	56.1	1.79	1.41
Oakside Drive	MH14A	MH13A	0.789	11.468	15	3.3333333	63.4	50	629.5	0	0	0	0	0	3.0	629.5	0.2	2.7	3.80	10.1	0.0	13.1	95.8	200	1.24	36.5	1.16	1.06
Oakside Drive	MH13A	MH12A	0.22	11.688	2	3.5	31.8	7	636.5	0	0	0	0	0	3.0	636.5	0.0	2.7	3.80	10.2	0.0	13.2	13.7	200	2.48	51.6	1.64	1.36
Oakside Drive	MH12A	MH11A	0.378	12.066	5	3.6	47.6	18	654.5	0	0	0	0	0	3.1	654.5	0.1	2.8	3.80	10.5	0.0	13.6	64.3	200	0.47	22.5	0.72	0.75
Apple Tree Crescent	MH11-5A	MH11-4A	0.564	0.564	9	3.5555556	56.7	32	32	0	0	0	0	0	0.1	32	0.1	0.1	3.80	0.5	0.0	0.7	76.7	200	3.02	57.0	1.81	0.58
Apple Tree Crescent	MH11-4A	MH11-3A	0	0.564	0			0	32	0	0	0	0	0	0.1	32	0.0	0.1	3.80	0.5	0.0	0.7	36.2	200	1.80	44.0	1.40	0.49
Apple Tree Crescent	MH11-3A	MH11-2A	0.43	0.994	6	3.5	48.8	21	53	0	0	0	0	0	0.3	53	0.1	0.2	3.80	0.8	0.0	1.1	86.9	200	3.40	60.4	1.92	0.72
Apple Tree Crescent	MH11-2A	MH11-1A	0.448	1.442	10	3.2	71.4	32	85	0	0	0	0	0	0.4	85	0.1	0.4	3.80	1.4	0.0	1.7	93.2	200	1.65	42.1	1.34	0.63
Apple Tree Crescent	MH11-1A	MH11A	0.622	2.064	16	3.25	83.6	52	137	0	0	0	0	0	0.5	137	0.2	0.6	3.80	2.2	0.0	2.7	96.8	250	0.43	39.0	0.79	0.44
Oakside Drive	MH11A	MH10A	0.088	14.218	1	4	45.5	4	795.5	0	0	0	0	0	3.7	795.5	0.0	3.4	3.80	12.7	0.0	16.4	29.8	250	0.47	40.7	0.83	0.78
Oakside Drive	MH10A	MHAH14-001	0.33	14.548	5	3.6	54.5	18	813.5	0	0	0	0	0	3.8	813.5	0.1	3.4	3.80	13.0	0.0	16.8	39.5	250	0.46	40.3	0.82	0.78
Oakside Drive	MHAH14-001	MHAH14-001	0.335	14.883	5	3.6	53.7	18	831.5	0	0	0	0	0	3.9	831.5	0.1	3.5	3.80	13.3	0.0	17.2	46.7	250	0.60	46.0	0.94	0.87
Oakside Drive	MHAH14-001	MHAH14-001	0.638	0.638	10	3.5	54.9	35	35	0	0	0	0	0	0.2	35	0.1	0.1	3.80	0.6	0.0	0.7	78.1	200	1.00	32.8	1.04	0.42
Ash Green Lane	MHAH14-001	MH7A	0.098	15.619	0			0	866.5	0	0	0	0	0	4.1	866.5	0.0	3.7	3.80	13.9	0.0	17.9	37.0	250	0.49	41.6	0.85	0.81
Ash Green Lane	MH7A	MH6A	0	15.619	0			0	866.5	0	0	0	0	0	4.1	866.5	0.0	3.7	3.80	13.9	0.0	17.9	26.3	250	0.65	47.9	0.98	0.90
Future Block 110	A5a	MH6A	1.151	1.151	14	4.2857143	52.1	60	60	0	0	0	0	0	0.3	60	0.3	0.3	3.80	1.0	0.0	1.3	12.7	250	0.55	44.1	0.90	0.38
Ash Green Lane	MH6A	MH5A	0.871	17.641	13	3.5384615	52.8	46	972.5	0	0	0	0	0	4.6	972.5	0.2	4.1	3.80	15.6	0.0	20.2	108.2	250	0.48	41.2	0.84	0.83
Ash Green Lane	MH5A	MH4A	0.28	17.921	3	3.6666667	39.3	11	983.5	0	0	0	0	0	4.7	983.5	0.0	4.1	3.80	15.7	0.0	20.4	18.2	250	0.50	42.0	0.86	0.85
Ash Green Lane	MH4A	MH3A	0.284	18.205	3	3.6666667	38.7	11	994.5	0	0	0	0	0	4.7	994.5	0.0	4.2	3.80	15.9	0.0	20.7	59.5	250	0.50	42.0	0.86	0.85
Ash Green Lane	MH3A	MH2A	0	18.205	0			0	994.5	0	0	0	0	0	4.7	994.5	0.0	4.2	3.80	15.9	0.0	20.7	17.7	250	0.62	46.8	0.95	0.92
Ash Green Lane	MH2A	MH1A	0.59	18.795	5	3.6	30.5	18	1012.5	0	0	0	0	0	4.9	1012.5	0.1	4.3	3.80	16.2	0.0	21.1	94.5	250	0.40	37.6	0.77	0.78
Ash Green Lane	MH1A	EXMH28-61	0	18.795	0			0	1012.5	0	0	0	0	0	4.9	1012.5	0.0	4.3	3.80	16.2	0.0	21.1	20.6	250	0.50	42.0	0.86	0.86
North Street	EXMH28-61	EXMH28-60	0.7899	19.5849	5	3.5	22.2	17.5	1030	0	0	0	0	0	5.1	1030	0.1	4.3	3.79	16.5	0.0	21.5	76.0	250	0.50	42.0	0.86	0.86
North Street	MHS22	MHS21	1.3566	1.3566	10	3.5	25.8	35	35	0	0	0	0	0	0.4	35	0.1	0.1	3.80	0.6	0.0	0.9	110.0	200	1.00	32.8	1.04	0.44
North Street	MHS21	MHS20	1.228	2.5846	8	3.5	22.8	28	63	0	0	0	0	0	0.7	63	0.1	0.3	3.80	1.0	0.0	1.7	110.0	200	0.50	23.2	0.74	0.43
North Street	MHS20	MHS19	1.1447	3.7293	7	3.5	21.4	24.5	87.5	0	0	0	0	0	1.0	87.5	0.1	0.4	3.80	1.4	0.0	2.4	110.0	200	0.90	31.1	0.99	0.57
North Street	MHS19	MHS18	0.3657	4.095	2	3.5	19.1	7	94.5	0	0	0	0	0	1.1	94.5	0.0	0.4	3.80	1.5	0.0	2.6	35.0	200	1.80	44.0	1.40	0.75
North Street	MHS18	MHS17	1.2374	5.3324	8	3.5	22.6	28	122.5	0	0	0	0	0	1.4	122.5	0.1	0.5	3.80	2.0	0.0	3.3	110.0	200	2.00	46.4	1.48	0.85
North Street	MHS17	MHS16	1.2162	6.5486	8	3.5	23.0	28	150.5	0	0	0	0	0	1.7	150.5	0.1	0.6	3.80	2.4	0.0	4.1	110.0	200	1.00	32.8	1.04	0.70
North Street	MHS16	EXMH28-60	1.2226	7.7712	8	3.5	22.9	28	178.5	0	0	0	0	0	2.0	178.5	0.1	0.8	3.80	2.9	0.0	4.9	110.0	200	1.00	32.8	1.04	0.75
Second Street	EXMH28-60	MH28-73	0.1753	27.5314	1	3.5	20.0	3.5	1212	0	0	0	0	0	7.2	1212	0.0	5.1	3.74	19.1	0.0	26.3	69.8	250	0.71	50.1	1.02	1.03
Second Street	MH28-73	MH28-64	0	27.5314	0	3.5		0	1212	0	0	0	0	0	7.2	1212	0.0	5.1	3.74	19.1	0.0	26.3	69.5	250	0.50	42.0	0.86	0.90
Dallas Street	MH28-64	MH28-65	18.8	46.3314	97	3.5	18.1	339.5	1551.5	0	0	0	0	0	12.0	1551.5	1.4	6.5	3.67	24.0	0.0	36.0	80.0	250	0.69	49.4	1.01	1.10

SCS consulting group ltd

Sanitary Design Sheet
7370 Centre Road
Option 1 - Phase 1 Proposed Development to Oakside Drive
Uxbridge, Ontario

Minimum Sewer Diameter (mm) = 200 **Avg. Domestic Flow (l/cap/day) =** 364
Mannings n = 0.013 **Infiltration Rate (l/s/ha) =** 0.26
Minimum Velocity (m/s) = 0.60 **Max. Harmon Peaking Factor =** 3.8
Maximum Velocity (m/s) = 3.65 **Min. Harmon Peaking Factor =** 1.5
Minimum Pipe Slope (%) = 0.50 **NOMINAL PIPE SIZE USED**

Project: 7370 Centre Road
Project No. 2099
Date: 2-Dec-20
Designed By: N.D.M.
Reviewed By: 0

P:\2099 7370 Centre Road Uxbridge\Design\Pipe Design\Sanitary\2020 11(Nov) 30 - Sanitary Capacity Sensitivity\Phase 1 MDTR Through Oakside\[2099-Sanitary Design Sheet (Phase 1 MDTR Through Oakside).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 FROM	MANHOLE TO	AREA	ACCUM. AREA	UNITS	DENSITY PER UNIT	DENSITY PER HA	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
			(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)
Dallas Street	MH28-65	MH28-66	0	46.3314	0	3.5		0	1551.5	0	0	0	0	0	12.0	1551.5	0.0	6.5	3.67	24.0	0.0	36.0	27.8	250	1.30	67.8	1.38	1.39
Dallas Street	MH28-66	MH28-67	0	46.3314	0	3.5		0	1551.5	0	0	0	0	0	12.0	1551.5	0.0	6.5	3.67	24.0	0.0	36.0	69.8	250	0.32	33.6	0.68	0.78
Dallas Street	MH28-67	MH28-9	0	46.3314	0	3.5		0	1551.5	0	0	0	0	0	12.0	1551.5	0.0	6.5	3.67	24.0	0.0	36.0	61.7	250	0.35	35.2	0.72	0.82
Dallas Street	MH28-9	EXMH28-11	0	46.3314	0	3.5		0	1551.5	0	0	0	0	0	12.0	1551.5	0.0	6.5	3.67	24.0	0.0	36.0	48.3	250	0.22	27.9	UNDER	#VALUE!
Dallas Street	EXMH28-11	EXMH28-12	0	46.3314	0	3.5		0	1551.5	0	0	0	0	0	12.0	1551.5	0.0	6.5	3.67	24.0	0.0	36.0	18.0	250	0.80	53.2	1.08	1.16

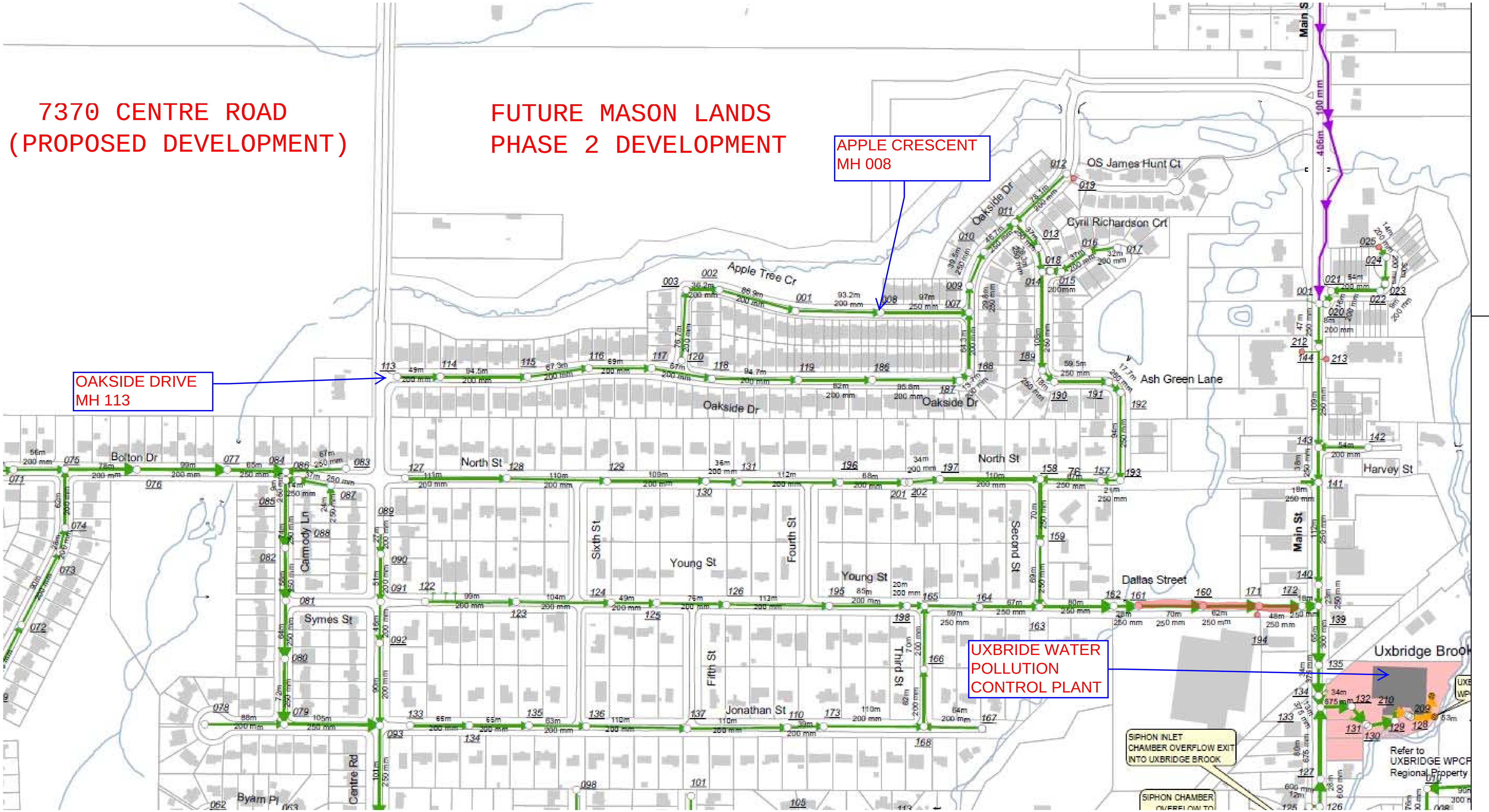
Hydraulic Grade Line Analysis
7370 Centre Road
Option 1 - Phase 1 Proposed Development to Oakside Drive
Uxbridge, Region of Durham

Project: 7370 Centre Road
Project No. 2099
Date: 26-Feb-21
Designed By: N.D.M.
Reviewed By: S.E.K.

EL. FROM STREETLINE TO BASEMENT (m)= 1.90
ALLOWABLE DISTANCE FROM BASEMENT TO HGL (m)= 0.50

P:\2099 7370 Centre Road Uxbridge\Design\Pipe Design\Sanitary\2020 11(Nov) 30 - Sanitary Capacity Sensitivity\Phase 1 MDTR Through Oakside\[Storm Design Sheet - (HGL Analysis).xlsm]Design

LOCATION			INVERTS		FLOW	PIPE DATA								PIPE LOSS CALCULATIONS					MH LOSS CALCULATIONS		TOTAL LOSS	HYDRAULIC GRADE LINE			HGL VS. BASEMENT SEPARATION			
STREET	FROM (U/S)	TO (D/S)	U/S (m)	D/S (m)	TOTAL PIPE FLOW (Qdes) (L/s)	PIPE DIAMETER (mm)	LENGTH (m)	MANNING's 'n'	PIPE AREA (m2)	HYD. RAD$^{2/5}$	SLOPE (%)	Qcap. (L/s)	Qdes/Qcap (%)	L/D	f	Vf	$V^2/2g$	TOTAL PIPE LOSS (m)	MH LOSS (m)	PIPE BEND LOSS (m)	TOTAL LOSS (m)	HGL (U/S) (m)	HGL SURCHARGE ABOVE U/S OBV. (m)	HGL (D/S) (m)	MH TOP (U/S) (m)	BASEMENT ELEV. (U/S) (m)	HGL TO BASEMENT (U/S) (m)	CHECK
Dallas Street	MH28-64	MH28-65	262.307	261.755	36.0	250	80.0	0.013	0.049	0.157	0.69	49.4	0.73	320.120	0.033	0.733	0.027	0.293	0.05	0.00	0.34	263.176	0.619	262.833	267.40	265.50	2.32	OK
Dallas Street	MH28-65	MH28-66	261.731	261.369	36.0	250	27.8	0.013	0.049	0.157	1.30	67.8	0.53	111.320	0.033	0.733	0.027	0.102	0.05	0.00	0.15	262.833	0.852	262.681	265.43	263.53	0.70	OK
Dallas Street	MH28-66	MH28-67	261.304	261.081	36.0	250	69.8	0.013	0.049	0.157	0.32	33.6	1.07	279.120	0.033	0.733	0.027	0.256	0.05	0.00	0.31	262.681	1.126	262.375	265.20	263.30	0.62	OK
Dallas Street	MH28-67	MH28-9	261.079	260.863	36.0	250	61.7	0.013	0.049	0.157	0.35	35.2	1.02	246.600	0.033	0.733	0.027	0.226	0.05	0.00	0.28	262.375	1.046	262.099	265.13	263.23	0.86	OK
Dallas Street	MH28-9	EXMH28-11	260.882	260.776	36.0	250	48.3	0.013	0.049	0.157	0.22	27.9	1.29	193.080	0.033	0.733	0.027	0.177	0.25	0.00	0.43	262.099	0.967	261.672	266.33	264.43	2.33	OK
Dallas Street	EXMH28-11	EXMH28-12	260.750	260.606	36.0	250	18.0	0.013	0.049	0.157	0.80	53.2	0.68	72.000	0.033	0.733	0.027	0.066	0.75	0.00	0.82	261.672	0.672	260.856	266.43	264.53	2.85	OK



OPTION 1 - PHASE 1 PROPOSED DEVELOPMENT TO OAKSIDE DRIVE CAPACITY ANALYSIS

SCS consulting group ltd

Sanitary Design Sheet
7370 Centre Road
Option 2 - Phase 1 Proposed Development to Mason Lands Phase 2
Uxbridge, Ontario

Minimum Sewer Diameter (mm) =	200	Avg. Domestic Flow (l/cap/day) =	364
Mannings n =	0.013	Infiltration Rate (l/s/ha) =	0.26
Minimum Velocity (m/s) =	0.60	Max. Harmon Peaking Factor =	3.8
Maximum Velocity (m/s) =	3.65	Min. Harmon Peaking Factor =	1.5
Minimum Pipe Slope (%) =	0.50	NOMINAL PIPE SIZE USED	

Project: 7370 Centre Road
Project No. 2099
Date: 2-Dec-20
Designed By: N.D.M.
Reviewed By: 0

P:\2099 7370 Centre Road Uxbridge\Design\Pipe Design\Sanitary\2020 11(Nov) 30 - Sanitary Capacity Sensitivity\Phase 1 MDTR Through Oakside\[2099-Sanitary Design Sheet (Phase 1 MDTR Through Oakside).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 FROM	MANHOLE TO	AREA (ha)	ACCUM. AREA (ha)	UNITS (#)	DENSITY PER UNIT (p/unit)	DENSITY PER HA (p/ha)	RESIDENTIAL POPULATION	ACCUM. RESIDENTIAL POPULATION	AREA (ha)	ACCUM. AREA (ha)	POPULATION DENSITY (p/ha)	FLOW RATE (l/s/ha)	ACCUM. EQUIV. POPULATION	INFILTRATION (L/s)	TOTAL ACCUM. POPULATION	AVG. DOMESTIC FLOW (L/s)	ACCUM. AVG. DOMESTIC FLOW (L/s)	PEAKING FACTOR	PEAKED RESIDENTIAL FLOW (L/s)	ICI FLOW (L/s)	TOTAL FLOW (L/s)	LENGTH (m)	PIPE DIAMETER (mm)	SLOPE (%)	FULL FLOW CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	ACTUAL VELOCITY (m/s)
7370 Centre Road (Single Detached)	2	3	6.19	6.19	103	3.5		360.5	360.5	0	0	0	0	0	1.6	360.5	1.5	1.5	3.80	5.8	0.0	7.4	330.5	200	2.00	46.4	1.48	1.06
Mason Phase 2	3	MH11-1A	12.8	18.99	200	4	62.5	800	1160.5	0	0	0	0	0	4.9	1160.5	3.4	4.9	3.76	18.4	0.0	23.3	9.3	200	2.00	46.4	1.48	1.48
Oakside Drive	MH21A	MH20A	0.54	0.54	6	3.5	38.9	21	21	0	0	0	0	0	0.1	21	0.1	0.1	3.80	0.3	0.0	0.5	49.0	200	2.00	46.4	1.48	0.47
Oakside Drive	MH20A	MH19A	0.813	1.353	11	3.5454545	48.0	39	60	0	0	0	0	0	0.4	60	0.2	0.3	3.80	1.0	0.0	1.3	94.5	200	1.10	34.4	1.09	0.52
Oakside Drive	MH19A	MH18A	0.595	1.948	8	3.5	47.1	28	88	0	0	0	0	0	0.5	88	0.1	0.4	3.80	1.4	0.0	1.9	67.3	200	0.60	25.4	0.81	0.47
Oakside Drive	MH18A	MH17A	0.64	2.588	8	3.5	43.8	28	116	0	0	0	0	0	0.7	116	0.1	0.5	3.80	1.9	0.0	2.5	69.0	200	0.60	25.4	0.81	0.51
Oakside Drive	MH17A	MH16A	0.474	3.062	5	3.6	38.0	18	134	0	0	0	0	0	0.8	134	0.1	0.6	3.80	2.1	0.0	2.9	67.4	200	1.92	45.4	1.45	0.81
Oakside Drive	MH16A	MH15A	0.815	3.877	13	3.4615385	55.2	45	179	0	0	0	0	0	1.0	179	0.2	0.8	3.80	2.9	0.0	3.9	94.7	200	3.68	62.9	2.00	1.08
Oakside Drive	MH15A	MH14A	0.612	4.489	12	3.3333333	65.4	40	219	0	0	0	0	0	1.2	219	0.2	0.9	3.80	3.5	0.0	4.7	82.0	200	2.93	56.1	1.79	1.07
Oakside Drive	MH14A	MH13A	0.789	5.278	15	3.3333333	63.4	50	269	0	0	0	0	0	1.4	269	0.2	1.1	3.80	4.3	0.0	5.7	95.8	200	1.24	36.5	1.16	0.83
Oakside Drive	MH13A	MH12A	0.22	5.498	2	3.5	31.8	7	276	0	0	0	0	0	1.4	276	0.0	1.2	3.80	4.4	0.0	5.8	13.7	200	2.48	51.6	1.64	1.07
Oakside Drive	MH12A	MH11A	0.378	5.876	5	3.6	47.6	18	294	0	0	0	0	0	1.5	294	0.1	1.2	3.80	4.7	0.0	6.2	64.3	200	0.47	22.5	0.72	0.61
Apple Tree Crescent	MH11-5A	MH11-4A	0.564	0.564	9	3.5555556	56.7	32	32	0	0	0	0	0	0.1	32	0.1	0.1	3.80	0.5	0.0	0.7	76.7	200	3.02	57.0	1.81	0.58
Apple Tree Crescent	MH11-4A	MH11-3A	0	0.564	0			0	32	0	0	0	0	0	0.1	32	0.0	0.1	3.80	0.5	0.0	0.7	36.2	200	1.80	44.0	1.40	0.49
Apple Tree Crescent	MH11-3A	MH11-2A	0.43	0.994	6	3.5	48.8	21	53	0	0	0	0	0	0.3	53	0.1	0.2	3.80	0.8	0.0	1.1	86.9	200	3.40	60.4	1.92	0.72
Apple Tree Crescent	MH11-2A	MH11-1A	0.448	1.442	10	3.2	71.4	32	85	0	0	0	0	0	0.4	85	0.1	0.4	3.80	1.4	0.0	1.7	93.2	200	1.65	42.1	1.34	0.63
Apple Tree Crescent	MH11-1A	MH11A	0.622	21.054	16	3.25	83.6	52	1297.5	0	0	0	0	0	5.5	1297.5	0.2	5.5	3.72	20.4	0.0	25.8	96.8	250	0.43	39.0	0.79	0.85
Oakside Drive	MH11A	MH10A	0.088	27.018	1	4	45.5	4	1595.5	0	0	0	0	0	7.0	1595.5	0.0	6.7	3.66	24.6	0.0	31.6	29.8	250	0.47	40.7	0.83	0.92
Oakside Drive	MH10A	MHAH14-001	0.33	27.348	5	3.6	54.5	18	1613.5	0	0	0	0	0	7.1	1613.5	0.1	6.8	3.66	24.9	0.0	32.0	39.5	250	0.46	40.3	0.82	0.91
Oakside Drive	MHAH14-001	MHAH14-001	0.335	27.683	5	3.6	53.7	18	1631.5	0	0	0	0	0	7.2	1631.5	0.1	6.9	3.65	25.1	0.0	32.3	46.7	250	0.60	46.0	0.94	1.01
Oakside Drive	MHAH14-001	MHAH14-001	0.638	0.638	10	3.5	54.9	35	35	0	0	0	0	0	0.2	35	0.1	0.1	3.80	0.6	0.0	0.7	78.1	200	1.00	32.8	1.04	0.42
Ash Green Lane	MHAH14-001	MH7A	0.098	28.419	0			0	1666.5	0	0	0	0	0	7.4	1666.5	0.0	7.0	3.65	25.6	0.0	33.0	37.0	250	0.49	41.6	0.85	0.94
Ash Green Lane	MH7A	MH6A	0	28.419	0			0	1666.5	0	0	0	0	0	7.4	1666.5	0.0	7.0	3.65	25.6	0.0	33.0	26.3	250	0.65	47.9	0.98	1.05
Future Block 110	A5a	MH6A	1.151	1.151	14	4.2857143	52.1	60	60	0	0	0	0	0	0.3	60	0.3	0.3	3.80	1.0	0.0	1.3	12.7	250	0.55	44.1	0.90	0.38
Ash Green Lane	MH6A	MH5A	0.871	30.441	13	3.5384615	52.8	46	1772.5	0	0	0	0	0	7.9	1772.5	0.2	7.5	3.63	27.1	0.0	35.0	108.2	250	0.48	41.2	0.84	0.94
Ash Green Lane	MH5A	MH4A	0.28	30.721	3	3.6666667	39.3	11	1783.5	0	0	0	0	0	8.0	1783.5	0.0	7.5	3.62	27.2	0.0	35.2	18.2	250	0.50	42.0	0.86	0.96
Ash Green Lane	MH4A	MH3A	0.284	31.005	3	3.6666667	38.7	11	1794.5	0	0	0	0	0	8.1	1794.5	0.0	7.6	3.62	27.4	0.0	35.4	59.5	250	0.50	42.0	0.86	0.96
Ash Green Lane	MH3A	MH2A	0	31.005	0			0	1794.5	0	0	0	0	0	8.1	1794.5	0.0	7.6	3.62	27.4	0.0	35.4	17.7	250	0.62	46.8	0.95	1.05
Ash Green Lane	MH2A	MH1A	0.59	31.595	5	3.6	30.5	18	1812.5	0	0	0	0	0	8.2	1812.5	0.1	7.6	3.62	27.6	0.0	35.8	94.5	250	0.40	37.6	0.77	0.87
Ash Green Lane	MH1A	EXMH28-61	0	31.595	0			0	1812.5	0	0	0	0	0	8.2	1812.5	0.0	7.6	3.62	27.6	0.0	35.8	20.6	250	0.50	42.0	0.86	0.96
North Street	EXMH28-61	EXMH28-60	0.7899	32.3849	5	3.5	22.2	17.5	1830	0	0	0	0	0	8.4	1830	0.1	7.7	3.62	27.9	0.0	36.3	76.0	250	0.50	42.0	0.86	0.96
North Street	MHS22	MHS21	1.3566	1.3566	10	3.5	25.8	35	35	0	0	0	0	0	0.4	35	0.1	0.1	3.80	0.6	0.0	0.9	110.0	200	1.00	32.8	1.04	0.44
North Street	MHS21	MHS20	1.228	2.5846	8	3.5	22.8	28	63	0	0	0	0	0	0.7	63	0.1	0.3	3.80	1.0	0.0	1.7	110.0	200	0.50	23.2	0.74	0.43
North Street	MHS20	MHS19	1.1447	3.7293	7	3.5	21.4	24.5	87.5	0	0	0	0	0	1.0	87.5	0.1	0.4	3.80	1.4	0.0	2.4	110.0	200	0.90	31.1	0.99	0.57
North Street	MHS19	MHS18	0.3657	4.095	2	3.5	19.1	7	94.5	0	0	0	0	0	1.1	94.5	0.0	0.4	3.80	1.5	0.0	2.6	35.0	200	1.80	44.0	1.40	0.75
North Street	MHS18	MHS17	1.2374	5.3324	8	3.5	22.6	28	122.5	0	0	0	0	0	1.4	122.5	0.1	0.5	3.80	2.0	0.0	3.3	110.0	200	2.00	46.4	1.48	0.85
North Street	MHS17	MHS16	1.2162	6.5486	8	3.5	23.0	28	150.5	0	0	0	0	0	1.7	150.5	0.1	0.6	3.80	2.4	0.0	4.1	110.0	200	1.00	32.8	1.04	0.70
North Street	MHS16	EXMH28-60	1.2226	7.7712	8	3.5	22.9	28	178.5	0	0	0	0	0	2.0	178.5	0.1	0.8	3.80	2.9	0.0	4.9	110.0	200	1.00	32.8	1.04	0.75
Second Street	EXMH28-60	MH28-73	0.1753	40.3314	1	3.5	20.0	3.5	2012	0	0	0	0	0	10.5	2012	0.0	8.5	3.58	30.4	0.0	40.9	69.8	250	0.71	50.1	1.02	1.13

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Sanitary Design Sheet
7370 Centre Road
Option 2 - Phase 1 Proposed Development to Mason Lands Phase 2
Uxbridge, Ontario

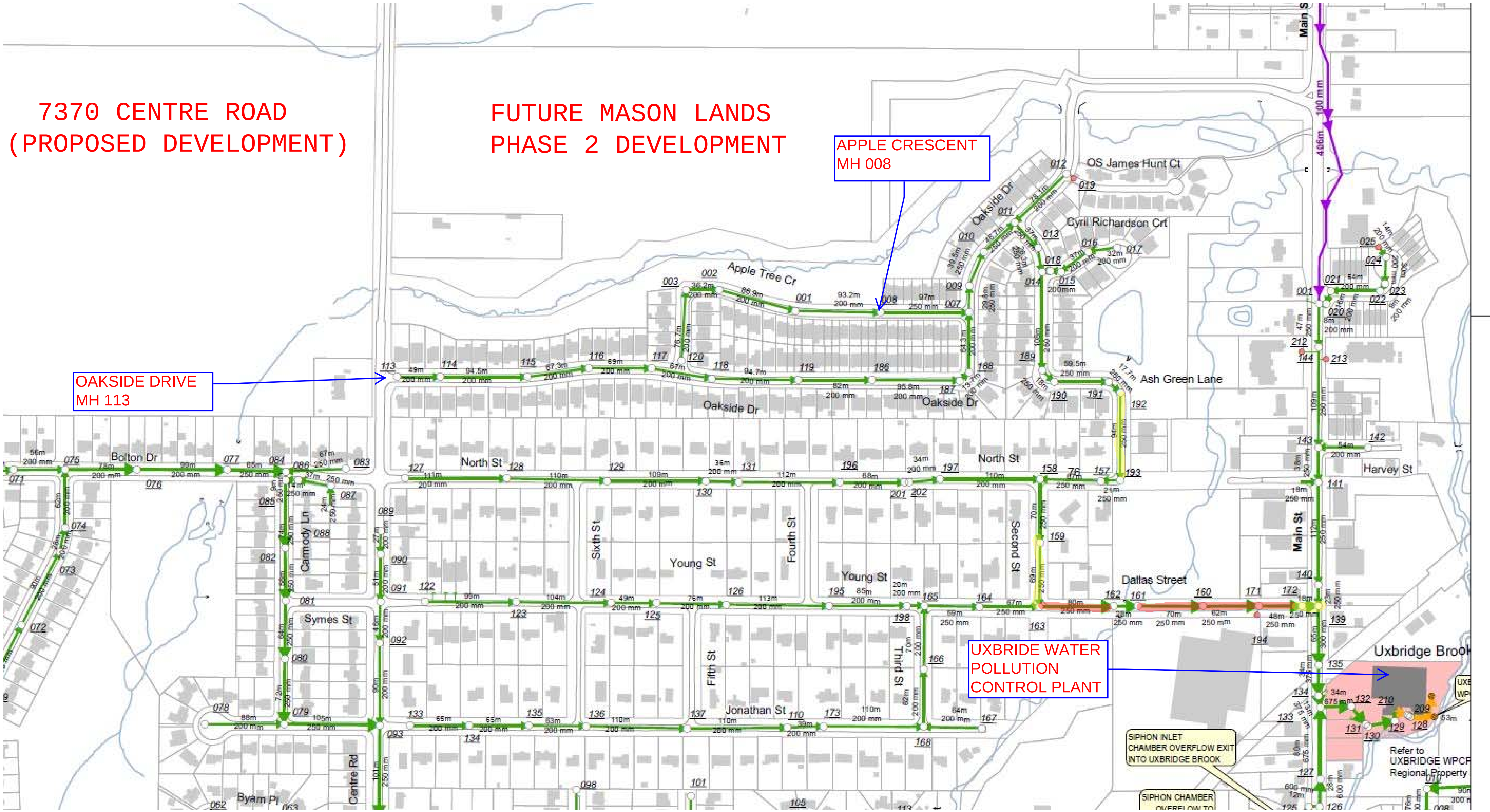
CONFIRM IF MUNICIPALITY REQUIRES ACTUAL VELOCITY TO BE SHOWN. HIDE COLUMN IF NOT REQUIRED

Minimum Sewer Diameter (mm) =	200	**Avg. Domestic Flow (l/cap/day) =**	364
Mannings n =	0.013	**Infiltration Rate (l/s/ha) =**	0.26
Minimum Velocity (m/s) =	0.60	**Max. Harmon Peaking Factor =**	3.8
Maximum Velocity (m/s) =	3.65	**Min. Harmon Peaking Factor =**	1.5
Minimum Pipe Slope (%) =	0.50	**NOMINAL PIPE SIZE USED**	

Project: 7370 Centre Road
Project No. 2099
Date: 2-Dec-20
Designed By: N.D.M.
Reviewed By: 0

P:\2099 7370 Centre Road Uxbridge\Design\Pipe Design\Sanitary\2020 11(Nov) 30 - Sanitary Capacity Sensitivity\Phase 1 MDTR Through Oakside\[2099-Sanitary Design Sheet (Phase 1 MDTR Through Oakside).xlsm]Design

LOCATION			RESIDENTIAL							INDUSTRIAL/COMMERCIAL/INSTITUTIONAL					FLOW CALCULATIONS								PIPE DATA					
STREET	MANHOLE FROM	MANHOLE TO	AREA (ha)	ACCUM. AREA (ha)	UNITS (#)	DENSITY PER UNIT (p/unit)	DENSITY PER HA (p/ha)	RESIDENTIAL POPULATION	ACCUM. RESIDENTIAL POPULATION	AREA (ha)	ACCUM. AREA (ha)	POPULATION DENSITY (p/ha)	FLOW RATE (l/s/ha)	ACCUM. EQUIV. POPULATION	INFILTRATION (L/s)	TOTAL ACCUM. POPULATION	AVG. DOMESTIC FLOW (L/s)	ACCUM. AVG. DOMESTIC FLOW (L/s)	PEAKING FACTOR	PEAKED RESIDENTIAL FLOW (L/s)	ICI FLOW (L/s)	TOTAL FLOW (L/s)	LENGTH (m)	PIPE DIAMETER (mm)	SLOPE (%)	FULL FLOW CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	ACTUAL VELOCITY (m/s)
Second Street	MH28-73	MH28-64	0	40.3314	0	3.5		0	2012	0	0	0	0	0	10.5	2012	0.0	8.5	3.58	30.4	0.0	40.9	69.5	250	0.50	42.0	0.86	0.98
Dallas Street	MH28-64	MH28-65	18.8	59.1314	97	3.5	18.1	339.5	2351.5	0	0	0	0	0	15.4	2351.5	1.4	9.9	3.53	35.0	0.0	50.3	80.0	250	0.69	49.4	1.01	1.15
Dallas Street	MH28-65	MH28-66	0	59.1314	0	3.5		0	2351.5	0	0	0	0	0	15.4	2351.5	0.0	9.9	3.53	35.0	0.0	50.3	27.8	250	1.30	67.8	1.38	1.51
Dallas Street	MH28-66	MH28-67	0	59.1314	0	3.5		0	2351.5	0	0	0	0	0	15.4	2351.5	0.0	9.9	3.53	35.0	0.0	50.3	69.8	250	0.32	33.6	0.68	0.78
Dallas Street	MH28-67	MH28-9	0	59.1314	0	3.5		0	2351.5	0	0	0	0	0	15.4	2351.5	0.0	9.9	3.53	35.0	0.0	50.3	61.7	250	0.35	35.2	0.72	0.82
Dallas Street	MH28-9	EXMH28-11	0	59.1314	0	3.5		0	2351.5	0	0	0	0	0	15.4	2351.5	0.0	9.9	3.53	35.0	0.0	50.3	48.3	250	0.22	27.9	UNDER	#VALUE!
Dallas Street	EXMH28-11	EXMH28-12	0	59.1314	0	3.5		0	2351.5	0	0	0	0	0	15.4	2351.5	0.0	9.9	3.53	35.0	0.0	50.3	18.0	250	0.80	53.2	1.08	1.23



OPTION 2 - PHASE 1 PROPOSED DEVELOPMENT TO MASON LANDS PHASE 2 CAPACITY ANALYSIS

SCS consulting group ltd

Sanitary Design Sheet
7370 Centre Road
Option 3 - Ultimate Proposed Development to Oakside Drive
Uxbridge, Ontario

Minimum Sewer Diameter (mm) =	200	Avg. Domestic Flow (l/cap/day) =	364
Mannings n =	0.013	Infiltration Rate (l/s/ha) =	0.26
Minimum Velocity (m/s) =	0.60	Max. Harmon Peaking Factor =	3.8
Maximum Velocity (m/s) =	3.65	Min. Harmon Peaking Factor =	1.5
Minimum Pipe Slope (%) =	0.50	NOMINAL PIPE SIZE USED	

Project: 7370 Centre Road
Project No. 2099
Date: 2-Dec-20
Designed By: N.D.M.
Reviewed By: 0

P:\2099 7370 Centre Road Uxbridge\Design\Pipe Design\Sanitary\2020 11(Nov) 30 - Sanitary Capacity Sensitivity\Ultimate MDTR Through Oakside\[2099-Sanitary Design Sheet (Ultimate MDTR Through Oakside).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 FROM	MANHOLE TO	AREA (ha)	ACCUM. AREA (ha)	UNITS (#)	DENSITY PER UNIT (p/unit)	DENSITY PER HA (p/ha)	RESIDENTIAL POPULATION	ACCUM. RESIDENTIAL POPULATION	AREA (ha)	ACCUM. AREA (ha)	POPULATION DENSITY (p/ha)	FLOW RATE (l/s/ha)	ACCUM. EQUIV. POPULATION	INFILTRATION (L/s)	TOTAL ACCUM. POPULATION	AVG. DOMESTIC FLOW (L/s)	ACCUM. AVG. DOMESTIC FLOW (L/s)	PEAKING FACTOR	PEAKED RESIDENTIAL FLOW (L/s)	ICI FLOW (L/s)	TOTAL FLOW (L/s)	LENGTH (m)	PIPE DIAMETER (mm)	SLOPE (%)	FULL FLOW CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	ACTUAL VELOCITY (m/s)
7370 Centre Road (Townhouse)	1	2	0	0	69	3		207	207	0	0	0	0	0	0.0	207	0.9	0.9	3.80	3.3	0.0	3.3	141.1	200	0.50	23.2	0.74	0.52
7370 Centre Road (Single Detached)	2	MH21A	31.81	31.81	521	3.5		1823.5	2030.5	0	0	0	0	0	8.3	2030.5	7.7	8.6	3.58	30.6	0.0	38.9	791.0	200	2.00	46.4	1.48	1.65
Oakside Drive	MH21A	MH20A	0.54	32.35	6	3.5	38.9	21	2051.5	0	0	0	0	0	8.4	2051.5	0.1	8.6	3.58	30.9	0.0	39.3	49.0	200	2.00	46.4	1.48	1.65
Oakside Drive	MH20A	MH19A	0.813	33.163	11	3.5454545	48.0	39	2090.5	0	0	0	0	0	8.6	2090.5	0.2	8.8	3.57	31.4	0.0	40.1	94.5	200	1.10	34.4	1.09	1.25
Oakside Drive	MH19A	MH18A	0.595	33.758	8	3.5	47.1	28	2118.5	0	0	0	0	0	8.8	2118.5	0.1	8.9	3.57	31.8	0.0	40.6	67.3	200	0.60	25.4	0.81	0.92
Oakside Drive	MH18A	MH17A	0.64	34.398	8	3.5	43.8	28	2146.5	0	0	0	0	0	8.9	2146.5	0.1	9.0	3.56	32.2	0.0	41.2	69.0	200	0.60	25.4	0.81	0.92
Oakside Drive	MH17A	MH16A	0.474	34.872	5	3.6	38.0	18	2164.5	0	0	0	0	0	9.1	2164.5	0.1	9.1	3.56	32.5	0.0	41.5	67.4	200	1.92	45.4	1.45	1.64
Oakside Drive	MH16A	MH15A	0.815	35.687	13	3.4615385	55.2	45	2209.5	0	0	0	0	0	9.3	2209.5	0.2	9.3	3.55	33.1	0.0	42.3	94.7	200	3.68	62.9	2.00	2.15
Oakside Drive	MH15A	MH14A	0.612	36.299	12	3.3333333	65.4	40	2249.5	0	0	0	0	0	9.4	2249.5	0.2	9.5	3.55	33.6	0.0	43.0	82.0	200	2.93	56.1	1.79	1.96
Oakside Drive	MH14A	MH13A	0.789	37.088	15	3.3333333	63.4	50	2299.5	0	0	0	0	0	9.6	2299.5	0.2	9.7	3.54	34.3	0.0	43.9	95.8	200	1.24	36.5	1.16	1.32
Oakside Drive	MH13A	MH12A	0.22	37.308	2	3.5	31.8	7	2306.5	0	0	0	0	0	9.7	2306.5	0.0	9.7	3.54	34.4	0.0	44.1	13.7	200	2.48	51.6	1.64	1.85
Oakside Drive	MH12A	MH11A	0.378	37.686	5	3.6	47.6	18	2324.5	0	0	0	0	0	9.8	2324.5	0.1	9.8	3.53	34.6	0.0	44.4	64.3	200	0.47	22.5	0.72	0.82
Apple Tree Crescent	MH11-5A	MH11-4A	0.564	0.564	9	3.5555556	56.7	32	32	0	0	0	0	0	0.1	32	0.1	0.1	3.80	0.5	0.0	0.7	76.7	200	3.02	57.0	1.81	0.58
Apple Tree Crescent	MH11-4A	MH11-3A	0	0.564	0			0	32	0	0	0	0	0	0.1	32	0.0	0.1	3.80	0.5	0.0	0.7	36.2	200	1.80	44.0	1.40	0.49
Apple Tree Crescent	MH11-3A	MH11-2A	0.43	0.994	6	3.5	48.8	21	53	0	0	0	0	0	0.3	53	0.1	0.2	3.80	0.8	0.0	1.1	86.9	200	3.40	60.4	1.92	0.72
Apple Tree Crescent	MH11-2A	MH11-1A	0.448	1.442	10	3.2	71.4	32	85	0	0	0	0	0	0.4	85	0.1	0.4	3.80	1.4	0.0	1.7	93.2	200	1.65	42.1	1.34	0.63
Apple Tree Crescent	MH11-1A	MH11A	0.622	2.064	16	3.25	83.6	52	137	0	0	0	0	0	0.5	137	0.2	0.6	3.80	2.2	0.0	2.7	96.8	250	0.43	39.0	0.79	0.44
Oakside Drive	MH11A	MH10A	0.088	39.838	1	4	45.5	4	2465.5	0	0	0	0	0	10.4	2465.5	0.0	10.4	3.51	36.5	0.0	46.9	29.8	250	0.47	40.7	0.83	0.95
Oakside Drive	MH10A	MHAH14-001	0.33	40.168	5	3.6	54.5	18	2483.5	0	0	0	0	0	10.4	2483.5	0.1	10.5	3.51	36.7	0.0	47.2	39.5	250	0.46	40.3	0.82	0.94
Oakside Drive	MHAH14-001	MHAH14-001	0.335	40.503	5	3.6	53.7	18	2501.5	0	0	0	0	0	10.5	2501.5	0.1	10.5	3.51	37.0	0.0	47.5	46.7	250	0.60	46.0	0.94	1.07
Oakside Drive	MHAH14-001	MHAH14-001	0.638	0.638	10	3.5	54.9	35	35	0	0	0	0	0	0.2	35	0.1	0.1	3.80	0.6	0.0	0.7	78.1	200	1.00	32.8	1.04	0.42
Ash Green Lane	MHAH14-001	MH7A	0.098	41.239	0			0	2536.5	0	0	0	0	0	10.7	2536.5	0.0	10.7	3.50	37.4	0.0	48.2	37.0	250	0.49	41.6	0.85	0.97
Ash Green Lane	MH7A	MH6A	0	41.239	0			0	2536.5	0	0	0	0	0	10.7	2536.5	0.0	10.7	3.50	37.4	0.0	48.2	26.3	250	0.65	47.9	0.98	1.11
Future Block 110	A5a	MH6A	1.151	1.151	14	4.2857143	52.1	60	60	0	0	0	0	0	0.3	60	0.3	0.3	3.80	1.0	0.0	1.3	12.7	250	0.55	44.1	0.90	0.38
Ash Green Lane	MH6A	MH5A	0.871	43.261	13	3.5384615	52.8	46	2642.5	0	0	0	0	0	11.2	2642.5	0.2	11.1	3.49	38.8	0.0	50.1	108.2	250	0.48	41.2	0.84	0.96
Ash Green Lane	MH5A	MH4A	0.28	43.541	3	3.6666667	39.3	11	2653.5	0	0	0	0	0	11.3	2653.5	0.0	11.2	3.49	39.0	0.0	50.3	18.2	250	0.50	42.0	0.86	0.98
Ash Green Lane	MH4A	MH3A	0.284	43.825	3	3.6666667	38.7	11	2664.5	0	0	0	0	0	11.4	2664.5	0.0	11.2	3.49	39.1	0.0	50.5	59.5	250	0.50	42.0	0.86	0.98
Ash Green Lane	MH3A	MH2A	0	43.825	0			0	2664.5	0	0	0	0	0	11.4	2664.5	0.0	11.2	3.49	39.1	0.0	50.5	17.7	250	0.62	46.8	0.95	1.09
Ash Green Lane	MH2A	MH1A	0.59	44.415	5	3.6	30.5	18	2682.5	0	0	0	0	0	11.5	2682.5	0.1	11.3	3.48	39.4	0.0	50.9	94.5	250	0.40	37.6	0.77	0.87
Ash Green Lane	MH1A	EXMH28-61	0	44.415	0			0	2682.5	0	0	0	0	0	11.5	2682.5	0.0	11.3	3.48	39.4	0.0	50.9	20.6	250	0.50	42.0	0.86	0.98
North Street	EXMH28-61	EXMH28-60	0.7899	45.2049	5	3.5	22.2	17.5	2700	0	0	0	0	0	11.8	2700	0.1	11.4	3.48	39.6	0.0	51.3	76.0	250	0.50	42.0	0.86	0.98
North Street	MHS22	MHS21	1.3566	1.3566	10	3.5	25.8	35	35	0	0	0	0	0	0.4	35	0.1	0.1	3.80	0.6	0.0	0.9	110.0	200	1.00	32.8	1.04	0.44
North Street	MHS21	MHS20	1.228	2.5846	8	3.5	22.8	28	63	0	0	0	0	0	0.7	63	0.1	0.3	3.80	1.0	0.0	1.7	110.0	200	0.50	23.2	0.74	0.43
North Street	MHS20	MHS19	1.1447	3.7293	7	3.5	21.4	24.5	87.5	0	0	0	0	0	1.0	87.5	0.1	0.4	3.80	1.4	0.0	2.4	110.0	200	0.90	31.1	0.99	0.57
North Street	MHS19	MHS18	0.3657	4.095	2	3.5	19.1	7	94.5	0	0	0	0	0	1.1	94.5	0.0	0.4	3.80	1.5	0.0	2.6	35.0	200	1.80	44.0	1.40	0.75
North Street	MHS18	MHS17	1.2374	5.3324	8	3.5	22.6	28	122.5	0	0	0	0	0	1.4	122.5	0.1	0.5	3.80	2.0	0.0	3.3	110.0	200	2.00	46.4	1.48	0.85
North Street	MHS17	MHS16	1.2162	6.5486	8	3.5	23.0	28	150.5	0	0	0	0	0	1.7	150.5	0.1	0.6	3.80	2.4	0.0	4.1	110.0	200	1.00	32.8	1.04	0.70
North Street	MHS16	EXMH28-60	1.2226	7.7712	8	3.5	22.9	28	178.5	0	0	0	0	0	2.0	178.5	0.1	0.8	3.80	2.9	0.0	4.9	110.0	200	1.00	32.8	1.04	0.75
Second Street	EXMH28-60	MH28-73	0.1753	53.1514	1	3.5	20.0	3.5	2882	0	0	0	0	0	13.8	2882	0.0	12.1	3.46	42.0	0.0	55.8	69.8	250	0.71	50.1	1.02	1.16
Second Street	MH28-73	MH28-64	0	53.1514	0	3.5		0	2882	0	0	0	0	0	13.8	2882	0.0	12.1	3.46	42.0	0.0	55.8	69.5	250	0.50	42.0	0.86	0.98

Sanitary Design Sheet
7370 Centre Road
Option 3 - Ultimate Proposed Development to Oakside Drive
Uxbridge, Ontario

Minimum Sewer Diameter (mm) = 200 **Avg. Domestic Flow (l/cap/day) =** 364
Mannings n = 0.013 **Infiltration Rate (l/s/ha) =** 0.26
Minimum Velocity (m/s) = 0.60 **Max. Harmon Peaking Factor =** 3.8
Maximum Velocity (m/s) = 3.65 **Min. Harmon Peaking Factor =** 1.5
Minimum Pipe Slope (%) = 0.50 **NOMINAL PIPE SIZE USED**

Project: 7370 Centre Road
Project No. 2099
Date: 2-Dec-20
Designed By: N.D.M.
Reviewed By: 0

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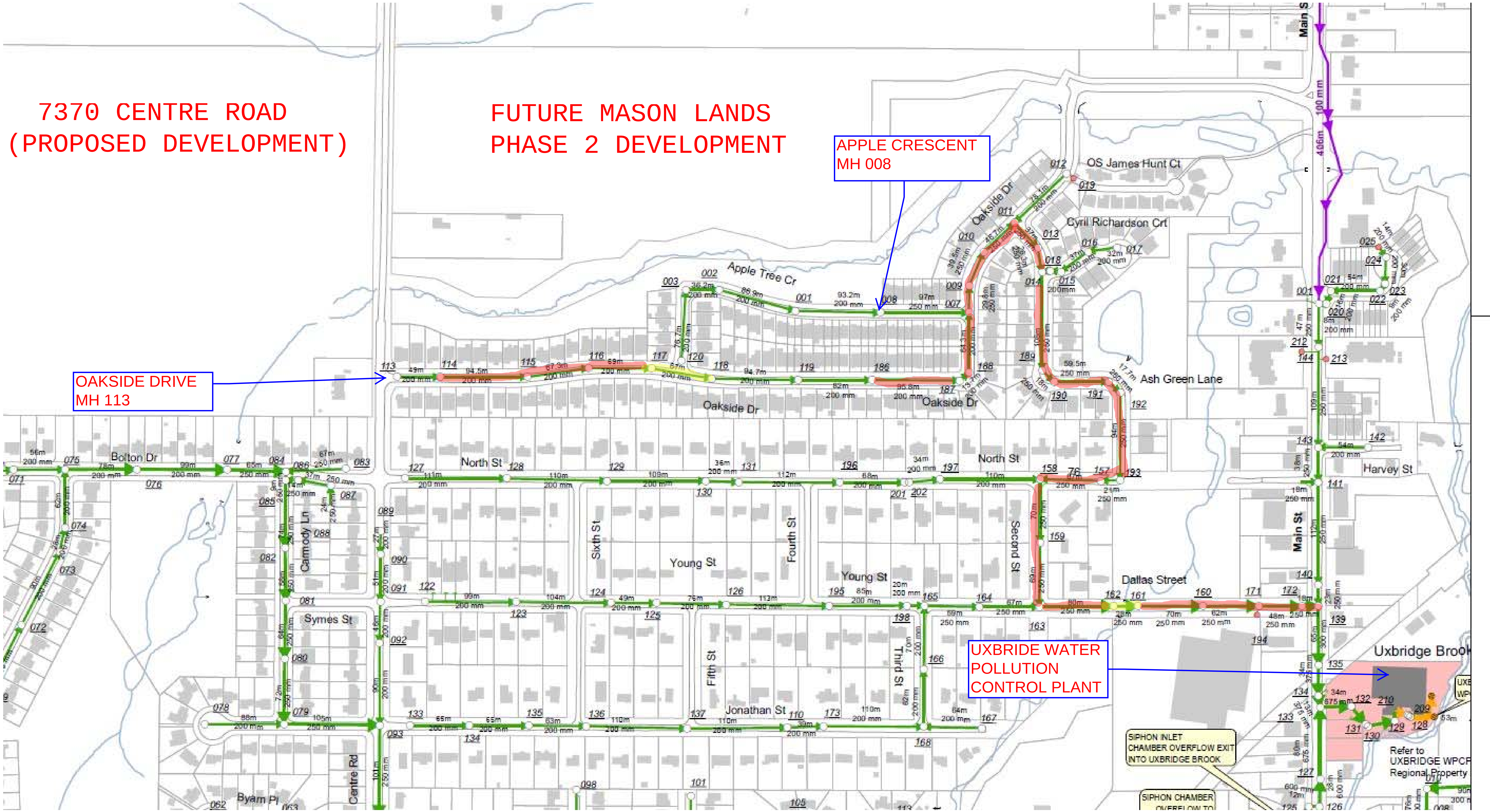
CONFIRM IF MUNICIPALITY REQUIRES ACTUAL VELOCITY TO BE SHOWN. HIDE COLUMN IF NOT REQUIRED

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	(ha)	(ha)	(#)	PER UNIT (p/unit)	PER HA (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)
Dallas Street	MH28-64	MH28-65	18.8	71.9514	97	3.5	18.1	339.5	3221.5	0	0	0	0	0	18.7	3221.5	1.4	13.6	3.42	46.4	0.0	65.1	80.0	250	0.69	49.4	1.01	1.15
Dallas Street	MH28-65	MH28-66	0	71.9514	0	3.5		0	3221.5	0	0	0	0	0	18.7	3221.5	0.0	13.6	3.42	46.4	0.0	65.1	27.8	250	1.30	67.8	1.38	1.57
Dallas Street	MH28-66	MH28-67	0	71.9514	0	3.5		0	3221.5	0	0	0	0	0	18.7	3221.5	0.0	13.6	3.42	46.4	0.0	65.1	69.8	250	0.32	33.6	0.68	0.78
Dallas Street	MH28-67	MH28-9	0	71.9514	0	3.5		0	3221.5	0	0	0	0	0	18.7	3221.5	0.0	13.6	3.42	46.4	0.0	65.1	61.7	250	0.35	35.2	0.72	0.82
Dallas Street	MH28-9	EXMH28-11	0	71.9514	0	3.5		0	3221.5	0	0	0	0	0	18.7	3221.5	0.0	13.6	3.42	46.4	0.0	65.1	48.3	250	0.22	27.9	UNDER	#VALUE!
Dallas Street	EXMH28-11	EXMH28-12	0	71.9514	0	3.5		0	3221.5	0	0	0	0	0	18.7	3221.5	0.0	13.6	3.42	46.4	0.0	65.1	18.0	250	0.80	53.2	1.08	1.23



OPTION 3 - ULTIMATE PROPOSED DEVELOPMENT TO OAKSIDE DRIVE CAPACITY ANALYSIS

SCS consulting group ltd

Sanitary Design Sheet
7370 Centre Road
Option 4 - Ultimate Proposed Development to Mason Lands Phase 2
Uxbridge, Ontario

Minimum Sewer Diameter (mm) = 200 **Avg. Domestic Flow (l/cap/day) =** 364
Mannings n = 0.013 **Infiltration Rate (l/s/ha) =** 0.26
Minimum Velocity (m/s) = 0.60 **Max. Harmon Peaking Factor =** 3.8
Maximum Velocity (m/s) = 3.65 **Min. Harmon Peaking Factor =** 1.5
Minimum Pipe Slope (%) = 0.50 **NOMINAL PIPE SIZE USED**

Project: 7370 Centre Road
Project No. 2099
Date: 2-Dec-20
Designed By: N.D.M.
Reviewed By: 0

P:\2099 7370 Centre Road Uxbridge\Design\Pipe Design\Sanitary\2020 11(Nov) 30 - Sanitary Capacity Sensitivity\Ultimate MDTR Through Mason Phase 2\[2099-Sanitary Design Sheet (Ultimate MDTR Through Mason Phase 2).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 FROM	MANHOLE TO	AREA (ha)	ACCUM. AREA (ha)	UNITS (#)	DENSITY PER UNIT (p/unit)	DENSITY PER HA (p/ha)	RESIDENTIAL POPULATION	ACCUM. RESIDENTIAL POPULATION	AREA (ha)	ACCUM. AREA (ha)	POPULATION DENSITY (p/ha)	FLOW RATE (l/s/ha)	ACCUM. EQUIV. POPULATION	INFILTRATION (L/s)	TOTAL ACCUM. POPULATION	AVG. DOMESTIC FLOW (L/s)	ACCUM. AVG. DOMESTIC FLOW (L/s)	PEAKING FACTOR	PEAKED RESIDENTIAL FLOW (L/s)	ICI FLOW (L/s)	TOTAL FLOW (L/s)	LENGTH (m)	PIPE DIAMETER (mm)	SLOPE (%)	FULL FLOW CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	ACTUAL VELOCITY (m/s)
7370 Centre Road (Townhouse)	1	2	0	0	69	3		207	207	0	0	0	0	0	0.0	207	0.9	0.9	3.80	3.3	0.0	3.3	141.1	200	0.50	23.2	0.74	0.52
7370 Centre Road (Single Detached)	2	3	31.81	31.81	521	3.5		1823.5	2030.5	0	0	0	0	0	8.3	2030.5	7.7	8.6	3.58	30.6	0.0	38.9	791.0	200	2.00	46.4	1.48	1.65
Mason Phase 2	3	MH11-1A	12.8	44.61	200	4	62.5	800	2830.5	0	0	0	0	0	11.6	2830.5	3.4	11.9	3.46	41.3	0.0	52.9	9.3	250	2.00	84.1	1.71	1.80
Oakside Drive	MH21A	MH20A	0.54	0.54	6	3.5	38.9	21	21	0	0	0	0	0	0.1	21	0.1	0.1	3.80	0.3	0.0	0.5	49.0	200	2.00	46.4	1.48	0.47
Oakside Drive	MH20A	MH19A	0.813	1.353	11	3.5454545	48.0	39	60	0	0	0	0	0	0.4	60	0.2	0.3	3.80	1.0	0.0	1.3	94.5	200	1.10	34.4	1.09	0.52
Oakside Drive	MH19A	MH18A	0.595	1.948	8	3.5	47.1	28	88	0	0	0	0	0	0.5	88	0.1	0.4	3.80	1.4	0.0	1.9	67.3	200	0.60	25.4	0.81	0.47
Oakside Drive	MH18A	MH17A	0.64	2.588	8	3.5	43.8	28	116	0	0	0	0	0	0.7	116	0.1	0.5	3.80	1.9	0.0	2.5	69.0	200	0.60	25.4	0.81	0.51
Oakside Drive	MH17A	MH16A	0.474	3.062	5	3.6	38.0	18	134	0	0	0	0	0	0.8	134	0.1	0.6	3.80	2.1	0.0	2.9	67.4	200	1.92	45.4	1.45	0.81
Oakside Drive	MH16A	MH15A	0.815	3.877	13	3.4615385	55.2	45	179	0	0	0	0	0	1.0	179	0.2	0.8	3.80	2.9	0.0	3.9	94.7	200	3.68	62.9	2.00	1.08
Oakside Drive	MH15A	MH14A	0.612	4.489	12	3.3333333	65.4	40	219	0	0	0	0	0	1.2	219	0.2	0.9	3.80	3.5	0.0	4.7	82.0	200	2.93	56.1	1.79	1.07
Oakside Drive	MH14A	MH13A	0.789	5.278	15	3.3333333	63.4	50	269	0	0	0	0	0	1.4	269	0.2	1.1	3.80	4.3	0.0	5.7	95.8	200	1.24	36.5	1.16	0.83
Oakside Drive	MH13A	MH12A	0.22	5.498	2	3.5	31.8	7	276	0	0	0	0	0	1.4	276	0.0	1.2	3.80	4.4	0.0	5.8	13.7	200	2.48	51.6	1.64	1.07
Oakside Drive	MH12A	MH11A	0.378	5.876	5	3.6	47.6	18	294	0	0	0	0	0	1.5	294	0.1	1.2	3.80	4.7	0.0	6.2	64.3	200	0.47	22.5	0.72	0.61
Apple Tree Crescent	MH11-5A	MH11-4A	0.564	0.564	9	3.5555556	56.7	32	32	0	0	0	0	0	0.1	32	0.1	0.1	3.80	0.5	0.0	0.7	76.7	200	3.02	57.0	1.81	0.58
Apple Tree Crescent	MH11-4A	MH11-3A	0	0.564	0			0	32	0	0	0	0	0	0.1	32	0.0	0.1	3.80	0.5	0.0	0.7	36.2	200	1.80	44.0	1.40	0.49
Apple Tree Crescent	MH11-3A	MH11-2A	0.43	0.994	6	3.5	48.8	21	53	0	0	0	0	0	0.3	53	0.1	0.2	3.80	0.8	0.0	1.1	86.9	200	3.40	60.4	1.92	0.72
Apple Tree Crescent	MH11-2A	MH11-1A	0.448	1.442	10	3.2	71.4	32	85	0	0	0	0	0	0.4	85	0.1	0.4	3.80	1.4	0.0	1.7	93.2	200	1.65	42.1	1.34	0.63
Apple Tree Crescent	MH11-1A	MH11A	0.622	46.674	16	3.25	83.6	52	2967.5	0	0	0	0	0	12.1	2967.5	0.2	12.5	3.45	43.1	0.0	55.2	96.8	250	0.43	39.0	0.79	0.91
Oakside Drive	MH11A	MH10A	0.088	52.638	1	4	45.5	4	3265.5	0	0	0	0	0	13.7	3265.5	0.0	13.8	3.41	46.9	0.0	60.6	29.8	250	0.47	40.7	0.83	0.95
Oakside Drive	MH10A	MHAH14-001	0.33	52.968	5	3.6	54.5	18	3283.5	0	0	0	0	0	13.8	3283.5	0.1	13.8	3.41	47.2	0.0	60.9	39.5	250	0.46	40.3	0.82	0.94
Oakside Drive	MHAH14-001	MHAH14-001	0.335	53.303	5	3.6	53.7	18	3301.5	0	0	0	0	0	13.9	3301.5	0.1	13.9	3.41	47.4	0.0	61.2	46.7	250	0.60	46.0	0.94	1.07
Oakside Drive	MHAH14-001	MHAH14-001	0.638	0.638	10	3.5	54.9	35	35	0	0	0	0	0	0.2	35	0.1	0.1	3.80	0.6	0.0	0.7	78.1	200	1.00	32.8	1.04	0.42
Ash Green Lane	MHAH14-001	MH7A	0.098	54.039	0			0	3336.5	0	0	0	0	0	14.1	3336.5	0.0	14.1	3.40	47.8	0.0	61.9	37.0	250	0.49	41.6	0.85	0.97
Ash Green Lane	MH7A	MH6A	0	54.039	0			0	3336.5	0	0	0	0	0	14.1	3336.5	0.0	14.1	3.40	47.8	0.0	61.9	26.3	250	0.65	47.9	0.98	1.11
Future Block 110	A5a	MH6A	1.151	1.151	14	4.2857143	52.1	60	60	0	0	0	0	0	0.3	60	0.3	0.3	3.80	1.0	0.0	1.3	12.7	250	0.55	44.1	0.90	0.38
Ash Green Lane	MH6A	MH5A	0.871	56.061	13	3.5384615	52.8	46	3442.5	0	0	0	0	0	14.6	3442.5	0.2	14.5	3.39	49.2	0.0	63.8	108.2	250	0.48	41.2	0.84	0.96
Ash Green Lane	MH5A	MH4A	0.28	56.341	3	3.6666667	39.3	11	3453.5	0	0	0	0	0	14.6	3453.5	0.0	14.5	3.39	49.3	0.0	64.0	18.2	250	0.50	42.0	0.86	0.98
Ash Green Lane	MH4A	MH3A	0.284	56.625	3	3.6666667	38.7	11	3464.5	0	0	0	0	0	14.7	3464.5	0.0	14.6	3.39	49.5	0.0	64.2	59.5	250	0.50	42.0	0.86	0.98
Ash Green Lane	MH3A	MH2A	0	56.625	0			0	3464.5	0	0	0	0	0	14.7	3464.5	0.0	14.6	3.39	49.5	0.0	64.2	17.7	250	0.62	46.8	0.95	1.09
Ash Green Lane	MH2A	MH1A	0.59	57.215	5	3.6	30.5	18	3482.5	0	0	0	0	0	14.9	3482.5	0.1	14.7	3.39	49.7	0.0	64.6	94.5	250	0.40	37.6	0.77	0.87
Ash Green Lane	MH1A	EXMH28-61	0	57.215	0			0	3482.5	0	0	0	0	0	14.9	3482.5	0.0	14.7	3.39	49.7	0.0	64.6	20.6	250	0.50	42.0	0.86	0.98
North Street	EXMH28-61	EXMH28-60	0.7899	58.0049	5	3.5	22.2	17.5	3500	0	0	0	0	0	15.1	3500	0.1	14.7	3.38	49.9	0.0	65.0	76.0	250	0.50	42.0	0.86	0.98
North Street	MHS22	MHS21	1.3566	1.3566	10	3.5	25.8	35	35	0	0	0	0	0	0.4	35	0.1	0.1	3.80	0.6	0.0	0.9	110.0	200	1.00	32.8	1.04	0.44
North Street	MHS21	MHS20	1.228	2.5846	8	3.5	22.8	28	63	0	0	0	0	0	0.7	63	0.1	0.3	3.80	1.0	0.0	1.7	110.0	200	0.50	23.2	0.74	0.43
North Street	MHS20	MHS19	1.1447	3.7293	7	3.5	21.4	24.5	87.5	0	0	0	0	0	1.0	87.5	0.1	0.4	3.80	1.4	0.0	2.4	110.0	200	0.90	31.1	0.99	0.57
North Street	MHS19	MHS18	0.3657	4.095	2	3.5	19.1	7	94.5	0	0	0	0	0	1.1	94.5	0.0	0.4	3.80	1.5	0.0	2.6	35.0	200	1.80	44.0	1.40	0.75
North Street	MHS18	MHS17	1.2374	5.3324	8	3.5	22.6	28	122.5	0	0	0	0	0	1.4	122.5	0.1	0.5	3.80	2.0	0.0	3.3	110.0	200	2.00	46.4	1.48	0.85
North Street	MHS17	MHS16	1.2162	6.5486	8	3.5	23.0	28	150.5	0	0	0	0	0	1.7	150.5	0.1	0.6	3.80	2.4	0.0	4.1	110.0	200	1.00	32.8	1.04	0.70
North Street	MHS16	EXMH28-60	1.2226	7.7712	8	3.5	22.9	28	178.5	0	0	0	0	0	2.0	178.5	0.1	0.8	3.80	2.9	0.0	4.9	110.0	200	1.00	32.8	1.04	0.75

Sanitary Design Sheet
7370 Centre Road
Option 4 - Ultimate Proposed Development to Mason Lands Phase 2
Uxbridge, Ontario

SCS consulting group ltd

Minimum Sewer Diameter (mm) = 200
Mannings n = 0.013
Minimum Velocity (m/s) = 0.60
Maximum Velocity (m/s) = 3.65
Minimum Pipe Slope (%) = 0.50

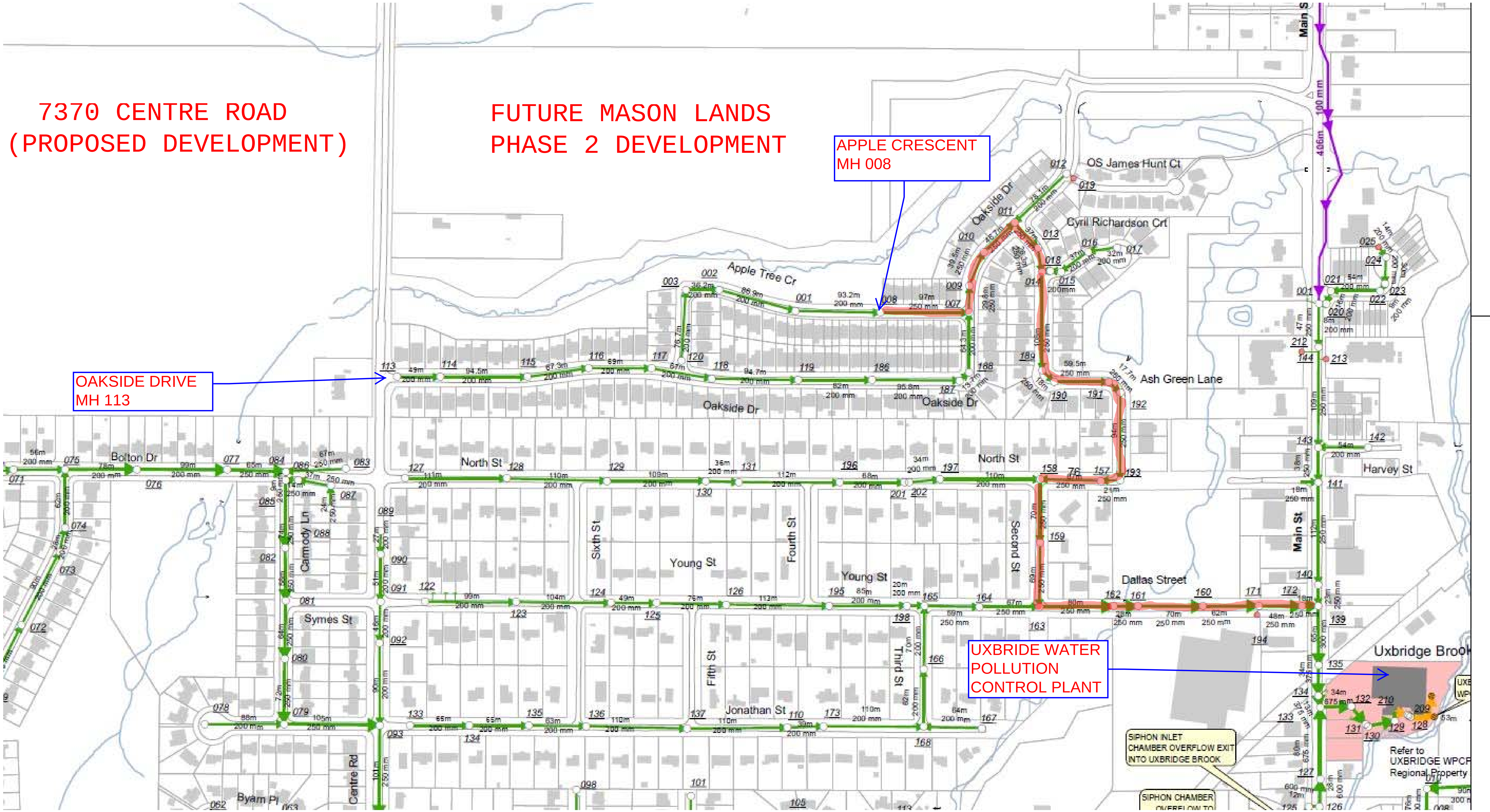
Avg. Domestic Flow (l/cap/day) = 364
Infiltration Rate (l/s/ha) = 0.26
Max. Harmon Peaking Factor = 3.8
Min. Harmon Peaking Factor = 1.5
NOMINAL PIPE SIZE USED

Project: 7370 Centre Road
Project No. 2099
Date: 2-Dec-20
Designed By: N.D.M.
Reviewed By: 0

P:\2099 7370 Centre Road Uxbridge\Design\Pipe Design\Sanitary\2020 11(Nov) 30 - Sanitary Capacity Sensitivity\Ultimate MDTR Through Mason Phase 2\[2099-Sanitary Design Sheet (Ultimate MDTR Through Mason Phase 2).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 FROM	MANHOLE TO	AREA (ha)	ACCUM. AREA (ha)	UNITS (#)	DENSITY PER UNIT (p/unit)	DENSITY PER HA (p/ha)	RESIDENTIAL POPULATION	ACCUM. RESIDENTIAL POPULATION	AREA (ha)	ACCUM. AREA (ha)	POPULATION DENSITY (p/ha)	FLOW RATE (l/s/ha)	ACCUM. EQUIV. POPULATION	INFILTRATION (L/s)	TOTAL ACCUM. POPULATION	AVG. DOMESTIC FLOW (L/s)	ACCUM. AVG. DOMESTIC FLOW (L/s)	PEAKING FACTOR	PEAKED RESIDENTIAL FLOW (L/s)	ICI FLOW (L/s)	TOTAL FLOW (L/s)	LENGTH (m)	PIPE DIAMETER (mm)	SLOPE (%)	FULL FLOW CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	ACTUAL VELOCITY (m/s)
Second Street	EXMH28-60	MH28-73	0.1753	65.9514	1	3.5	20.0	3.5	3682	0	0	0	0	0	17.1	3682	0.0	15.5	3.37	52.2	0.0	69.4	69.8	250	0.71	50.1	1.02	1.16
Second Street	MH28-73	MH28-64	0	65.9514	0	3.5		0	3682	0	0	0	0	0	17.1	3682	0.0	15.5	3.37	52.2	0.0	69.4	69.5	250	0.50	42.0	0.86	0.98
Dallas Street	MH28-64	MH28-65	18.8	84.7514	97	3.5	18.1	339.5	4021.5	0	0	0	0	0	22.0	4021.5	1.4	16.9	3.33	56.4	0.0	78.5	80.0	250	0.69	49.4	1.01	1.15
Dallas Street	MH28-65	MH28-66	0	84.7514	0	3.5		0	4021.5	0	0	0	0	0	22.0	4021.5	0.0	16.9	3.33	56.4	0.0	78.5	27.8	250	1.30	67.8	1.38	1.57
Dallas Street	MH28-66	MH28-67	0	84.7514	0	3.5		0	4021.5	0	0	0	0	0	22.0	4021.5	0.0	16.9	3.33	56.4	0.0	78.5	69.8	250	0.32	33.6	0.68	0.78
Dallas Street	MH28-67	MH28-9	0	84.7514	0	3.5		0	4021.5	0	0	0	0	0	22.0	4021.5	0.0	16.9	3.33	56.4	0.0	78.5	61.7	250	0.35	35.2	0.72	0.82
Dallas Street	MH28-9	EXMH28-11	0	84.7514	0	3.5		0	4021.5	0	0	0	0	0	22.0	4021.5	0.0	16.9	3.33	56.4	0.0	78.5	48.3	250	0.22	27.9	UNDER	#VALUE!
Dallas Street	EXMH28-11	EXMH28-12	0	84.7514	0	3.5		0	4021.5	0	0	0	0	0	22.0	4021.5	0.0	16.9	3.33	56.4	0.0	78.5	18.0	250	0.80	53.2	1.08	1.23



OPTION 4 - ULTIMATE PROPOSED DEVELOPMENT TO
MASON LANDS PHASE 2 CAPACITY ANALYSIS

APPENDIX H

WATER DISTRIBUTION ANALYSIS

SCS consulting group ltd

TECHNICAL MEMORANDUM

To: Nick McIntosh, P.Eng - SCS Consulting Group
From: Kristin St-Jean, P.Eng - Municipal Engineering Solutions
Date: December 21, 2020
Project: 17002-91
Re: 7370 Centre Road, Uxbridge
Hydraulic Analysis – Preliminary Findings

Please find attached the preliminary findings regarding the Hydraulic Analysis for the 7370 Centre Road Development in the Township of Uxbridge.

Development Background

The proposed development is located between 6th Concession Road and Centre Road, north of Bolton Drive in the Township of Uxbridge. The development is entirely residential and consists of 521 single family homes and 69 townhouses.

The development will be serviced across two pressure zones. Zone 1 at the east end of the development will be connected to the existing system at Centre Road and Oakside Drive, with a 300 mm watermain extending up Centre Road. Zone 1 services elevations up to approximately 300 m with an HGL of 330.6 m (High Water Level).

Zone 2 will be connected to the existing system at 6th Concession Road and Bolton Drive, with a 300 mm watermain extending up 6th Concession Road. Additional pumping capacity will be required at the Zone 2 pumping station to accommodate this development. It is anticipated that the Zone HGL will not change as a result of these upgrades (HGL approximately 360 m). Zone 2 services elevations up to approximately 330 m.

Demands

To calculate the equivalent population and water demand for this development MES used Region of Durham standard population densities as noted in the *"Design Specifications for Sanitary Sewers, April 2017"*. Water demand rates and peaking factors used for this analysis are based on the "*MECP Design Guidelines for Drinking Water Systems, 2008*". The calculated demands for the development are summarized in **Table 1**. Detailed water demand criteria and calculations are attached.

Table 1 – Water Demands

	Average Day Demand (L/s)	Minimum Hour Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Zone 2	8.83	4.00	19.93	29.87
Zone 1	1.76	0.80	3.97	5.96
TOTAL	10.59	4.80	23.90	35.83

The division of demands between Zone 1 and Zone 2 are based on the preliminary placement of the zone boundary and may change once the actual zone boundary has been determined.

Fire Flow

A minimum required Fire Flow of 75 L/s (4,500 L/min) was used in the analysis as outlined in the Region of Durham's *"Design Specifications for Watermains, April 2017"*. This minimum fire flow requirement has been used in the modelling for both single family homes and townhouses. It should be noted that the Region of Durham requires that the fire flow demands be calculated as outlined in the current edition of "Water Supply for Fire Protection, A Guide to Recommended Practice" issued by the Fire Underwriters Survey of the Insurance Bureau of Canada, unless otherwise approved by the Region of Durham. Once the detailed design data (specifics) for the proposed buildings are known the required fire flow for this development will need to be finalized and reviewed and confirmed by the Region.

Hydraulic Model

A hydraulic model was created using the results of the hydrant tests performed by the Region in November 2020 (attached). It should be noted that because the modelling is based on hydrant tests it is anticipated that pressures will be lower during peak hour and higher during minimum hour than indicated in the modeling. The hydrant tests used for the boundary conditions provide a snapshot of the system performance and do not capture the system variations as accurately as boundary information from a calibrated model or system monitoring.

Elevations in the development range from 288.2 m to 335.2 m. The elevation range in Zone 2 of the development is beyond the currently serviced elevations within the Township (335.2 m vs 330 m).

The Zone boundary was placed in the eastern portion of the development at an elevation of approximately 300 m. The zone boundary in the model is preliminary and the actual zone boundary will be determined once more detailed modelling has been completed and in consultation with the Region.

The results of the modelling indicate that the minimum required fire flow can be met at all areas within the development with adequately sized pipes. It should be noted that several areas just meet the Region's minimum fire flow requirement and will not likely meet FUS fire flow demands should those be required by the Township/Region.

Pipe sizes shown in the model are preliminary and must be reviewed once more accurate modelling information is available and the required fire flows for this site are known.

Zone 1

Pressures in the proposed Zone 1 area are below 275 kPa (40 psi) at the cul-de-sac where elevations exceed 300 m. Pressures are below 275 kPa when the HGL in the immediate area is below 329.5 m. While it would be possible to service this watermain loop from Zone 2, the resulting pressures at the east end of the loop would exceed 700 kPa (100 psi).

Zone 2

Pressures at the west end of the development are below 275 kPa (40 psi) for elevations exceeding 331.5 m. The hydrant test indicated that the current HGL of Zone 2 was approximately 362 m. After adding the development to the model, the HGL of the Zone 2 area decreased to between 360.6 and 360.8 m. No additional pumping capacity was added at the Zone 2 pumping station in the model.

The HGL of the western portion of Zone 2 area would need to be maintained above approximately 364 m to ensure that the minimum pressure of 275 kPa is met for all areas during peak hour conditions. This is above the current HGL of the pressure zone.

Servicing Constraints

Based on the preliminary modelling of the 7370 Centre Road Development several servicing constraints for the water servicing strategy have been identified as summarized below.

- The elevation range in the western portion of the development is beyond the current service elevations for Zone 2 (335.2 m vs 330 m). This leads to pressures below 275 kPa (40 psi) for elevations exceeding 331.5 m (approximately 95 units).
- The location of the zone boundary as proposed results in pressures below 275 kPa (40 psi) at the cul-de-sac where elevations exceed 300 m (10-15 units).
- Due to the elevation range within the eastern portion of the development (288.2 to 301.2 m) the ideal location of the zone boundary (300 m elevation) splits the watermain looping on these two streets, resulting in several dead ends.
- Future pumping capacity requirements, storage and water allocation were not investigated as part of this analysis.
- Preliminary results show that the estimated fire flow available is quite low and may be lower than ultimately required by the Township/Region.

Alternatives and Next Steps

The following alternatives and recommendations are provided to assist in planning the next steps in determining the optimal servicing strategy for this development.

- Due to the size of this development and the servicing constraints identified, it is recommended that modelling be completed with the Region's complete water model of the Township. The recommended servicing strategy for this development should take into account pressure variations not captured by the hydrant tests as well as the typical operation of the Township's water system.
- The location of the zone boundary within the development should be determined with additional pressure information (pressure variations during minimum hour and peak hour demand scenarios). The ideal location should minimize pressures below 275 kPa and above 700 kPa while still maintaining a looped watermain layout.
- It has already been determined that additional pumping capacity will be required for Zone 2 to service this development. It is anticipated that the Zone 2 HGL will not change as a result of these upgrades, however, the opportunity to raise the HGL of this pressure zone should be investigated. The HGL of Zone 2 would need to be raised by several meters (HGL of approximately 364 m or higher) to maintain pressures of 275 kPa at the higher elevations in the western portion of this development. Any changes to the HGL in Zone 2 must take into account the service pressures of all existing areas of Zone 2 to ensure that pressures within the system do not exceed 700 kPa in non-occupied areas and 550 kPa in occupied areas.
- If maintaining an HGL in Zone 2 sufficient to service elevations up to 335.2 m is not feasible, additional pumping at a higher HGL would be required. This alternative would mean creating a third pressure district in the Township.
- Future pumping capacity requirements, storage and water allocation were not investigated as part of this analysis and need to be confirmed with the Region.

- Fire flow requirements for this development must be confirmed with the Township/Region.

File Location: C:\Users\Acer\Documents\Projects\17002-91 7370 Centre Road Uxbridge\5.0 Report\Centre Road Uxbridge TM_Water System_20201221.docx

Attachments:

Design Criteria
Water Demands
Node IDs
Elevations
Hydrant Test Results
Available Fire Flow
Pressure Results

The Regional Municipality of Durham

Design Specifications for Watermains, April 2017 (unless otherwise stated)

Equivalent Population by Unit

Type of Development	Equivalent Population Density *(Person/Unit)*
Single Family or Semi-Detached	3.5
Townhouse	3.0

Water Design Factors

Average Daily Demand (L/person/day)	450
Minimum Hour Demand P.F.	0.45
Maximum Daily Demand P.F.	2.25
Maximum Hourly Demand P.F.	3.38

Note: Domestic Average Demand Rate and Peaking Factors taken from MECP Design Guidelines for Drinking Water Systems (2008). Peaking factors are for areas servicing 2001-3000 people.

Coefficient of Roughness

Size of Pipe (mm Dia.)	Coefficient of Roughness (C)
150	100
200-300	110
350-600	120
Over 600	130

Minimum Pipe Size

Type of Development	Size of Pipe (mm Dia.)
Residential	150
Commercial/Industrial/Institutional	300

Working Pressures

Parameter	Pressure
Normal Condition	
Minimum Max Hour Pressure	275 kPa (40 psi)
Maximum (Building Code)	550 kPa (80 psi)
Maximum recommended	700 kPa (100 psi)
Fire Flow Conditions	
Minimum Pressure	140 kPa (20 psi)

Municipal Engineering Solutions

Zone 2 Demands

Node	Type of Development		Equivalent Population	Demands			
	Single/Semi	Townhouse	Total Population	Average Day	Minimum Hour	Maximum Day	Peak Hour
	(units)	*(units)*	*(Residential)*	*(L/s)*	*(L/s)*	*(L/s)*	*(L/s)*
J-9		12	36	0.19	0.09	0.43	0.64
J-10		12	36	0.19	0.09	0.43	0.64
J-11		12	36	0.19	0.09	0.43	0.64
J-12		12	36	0.19	0.09	0.43	0.64
J-13	*12*		42	0.22	0.10	0.50	0.74
J-14	*18*		63	0.33	0.15	0.74	1.12
J-15	*10*		35	0.18	0.08	0.41	0.61
J-16	*11*		39	0.20	0.09	0.45	0.68
J-17	*9*		32	0.16	0.07	0.36	0.54
J-18	*17*		60	0.31	0.14	0.70	1.05
J-19	*9*		32	0.16	0.07	0.36	0.54
J-20	*9*		32	0.16	0.07	0.36	0.54
J-22	*25*		88	0.46	0.21	1.04	1.55
J-23	*11*		39	0.20	0.09	0.45	0.68
J-24	*8*		28	0.15	0.07	0.34	0.51
J-26	*9*		32	0.16	0.07	0.36	0.54
J-27	*6*		21	0.11	0.05	0.25	0.37
J-28	*4*		14	0.07	0.03	0.16	0.24
J-29		21	63	0.33	0.15	0.74	1.12
J-30	*17*		60	0.31	0.14	0.70	1.05
J-31	*28*		98	0.51	0.23	1.15	1.72
J-32	*14*		49	0.26	0.12	0.59	0.88
J-33	*17*		60	0.31	0.14	0.70	1.05
J-34	*18*		63	0.33	0.15	0.74	1.12
J-35	*12*		42	0.22	0.10	0.50	0.74
J-36	*17*		60	0.31	0.14	0.70	1.05
J-37	*18*		63	0.33	0.15	0.74	1.12
J-38	*17*		60	0.31	0.14	0.70	1.05

Water Demand
7370 Center Road Development, Uxbridge
December 2020

Municipal Engineering Solutions

Zone 2 Demands

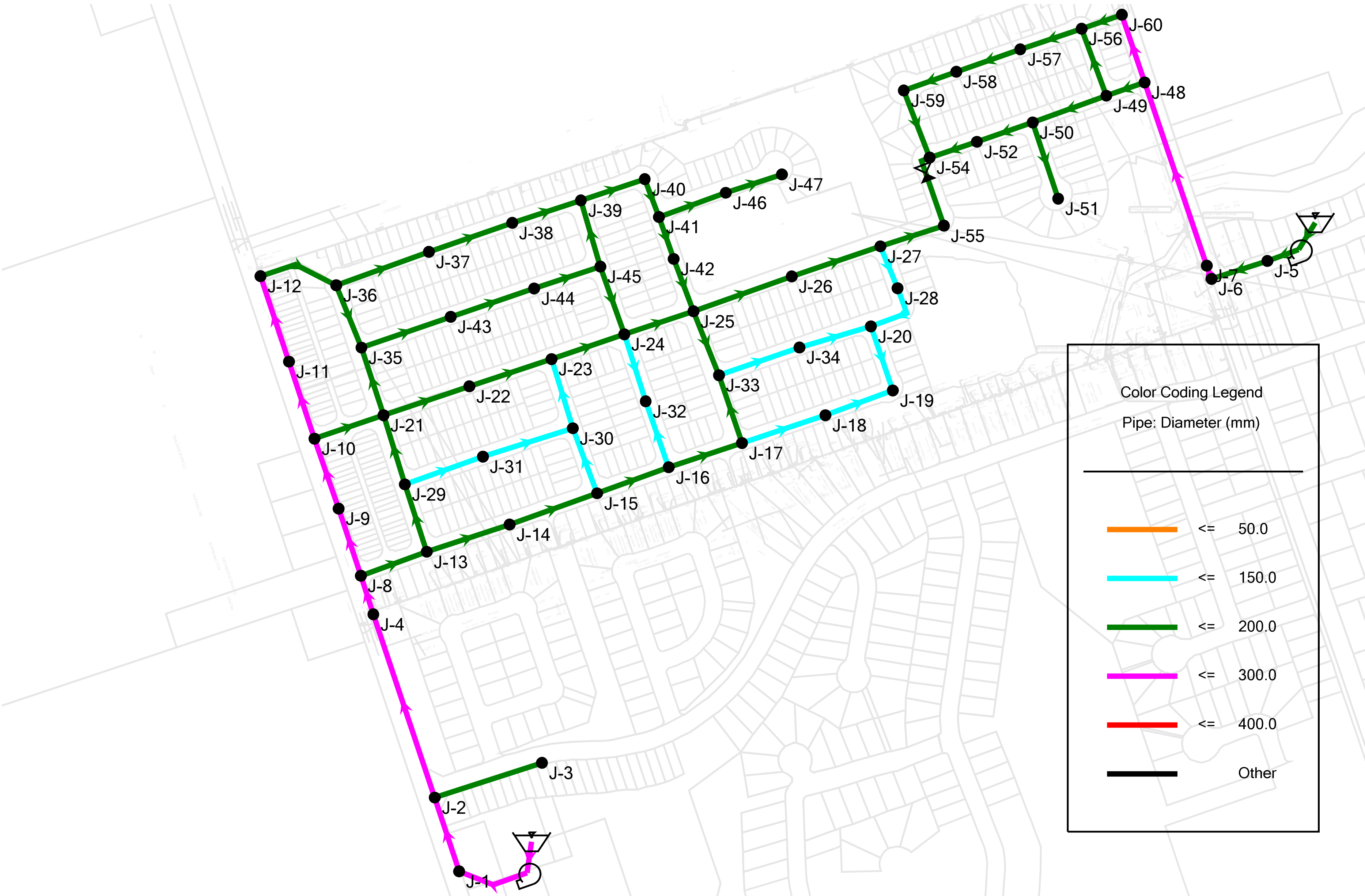
Node	Type of Development		Equivalent Population	Demands			
	Single/Semi	Townhouse	Total Population	Average Day	Minimum Hour	Maximum Day	Peak Hour
	(units)	*(units)*	*(Residential)*	*(L/s)*	*(L/s)*	*(L/s)*	*(L/s)*
J-39	*10*		35	0.18	0.08	0.41	0.61
J-40	*10*		35	0.18	0.08	0.41	0.61
J-42	*9*		32	0.16	0.07	0.36	0.54
J-43	*21*		74	0.38	0.17	0.86	1.28
J-44	*20*		70	0.36	0.16	0.81	1.22
J-45	*17*		60	0.31	0.14	0.70	1.05
J-46	*7*		25	0.13	0.06	0.29	0.44
J-47	*8*		28	0.15	0.07	0.34	0.51
J-55	*7*		25	0.13	0.06	0.29	0.44
TOTAL	**425**	**69**	**1695**	**8.83**	**4.00**	**19.93**	**29.87**

Zone 1 Demands

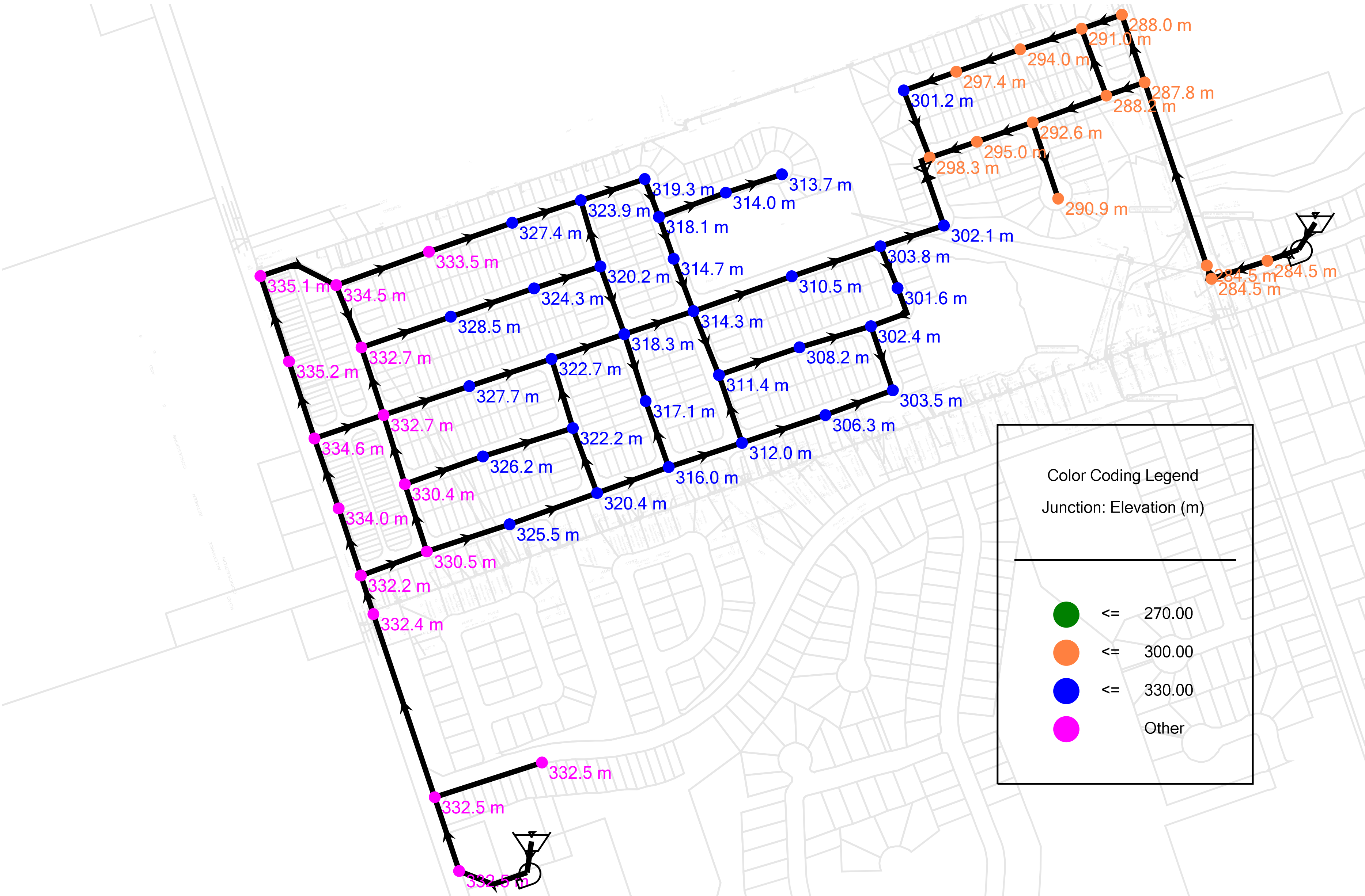
Node	Type of Development		Equivalent Population	Demands			
	Single/Semi	Townhouse	Total Population	Average Day	Minimum Hour	Maximum Day	Peak Hour
	(units)	*(units)*	*(Residential)*	*(L/s)*	*(L/s)*	*(L/s)*	*(L/s)*
J-50	*13*		46	0.24	0.11	0.54	0.81
J-51	*16*		56	0.29	0.13	0.65	0.98
J-52	*11*		39	0.20	0.09	0.45	0.68
J-54	*8*		28	0.15	0.07	0.34	0.51
J-56	*9*		32	0.16	0.07	0.36	0.54
J-57	*14*		49	0.26	0.12	0.59	0.88
J-58	*14*		49	0.26	0.12	0.59	0.88
J-59	*11*		39	0.20	0.09	0.45	0.68
TOTAL	**96**	**0**	**336**	**1.76**	**0.80**	**3.97**	**5.96**

	Type of Development		Equivalent Population	Demands			
	Single/Semi	Townhouse	Total Population	Average Day	Minimum Hour	Maximum Day	Peak Hour
	(units)	*(units)*	*(Residential)*	*(L/s)*	*(L/s)*	*(L/s)*	*(L/s)*
TOTAL	**521**	**69**	**2031**	**10.59**	**4.80**	**23.90**	**35.83**

PRELIMINARY
Node IDs



PRELIMINARY
Elevations



THE REGIONAL MUNICIPALITY OF DURHAM

WORKS DEPARTMENT

FLOW TEST SUMMARY AND RESULTS

Requested by: Andrew Dunlop, CRS, CAN-CISEC
Account No.:
Company: SCS Consulting Group Ltd.
Address: 30 Centurian Drive, Suite 100
Markham, ON, L3R 8B8
Telephone: 905.475.1900 Ext. 2355
Email: adunlop@scsconsultinggroup.com

Test Location: 1 Oakside Dr
Municipality: Township of Uxbridge

Date: 26-Nov-20 Time: 10:00am Conducted by: K.J

Flow Hydrant: 393
Monitoring Hydrant: 392

Nozzle Size (in.)	Residual Pressure (p.s.i.)		Pitot Guage	
	Field Reading @ Monitoring Hydrant	Actual @ Flow Hydrant (adjusted)*	Pressure (p.s.i.)	Flow (i.g.p.m.)
STATIC	63.2	63.3		0.0
1-1/2	61.6	61.7	60.4	431.9
1-3/4	60.9	61.0	57.7	574.6
2-1/2	57.9	58.0	53.2	1021.1
2 x 2-1/2		0.1		0.0

* Calculation based on gain/loss in pressure due to elevation difference between flow & monitoring hydrants

Hydrant Elevations (ft.)	
Flow Hydrant:	86.6
Static Hydrant:	86.9
Difference:	-0.3
Pressure Diff. (p.s.i.):	-0.1

Comments:

Flow for 1-1/2 & 1-3/4 nozzle calculated using Discharge of smooth nozzles

Flow for 2-1/2 nozzle calculated using Discharge for circular outlets

Results

Static Pressure	63.3
Flow at 20 p.s.i. (I.g.p.m.):	3176 (approx.)

Checked by:

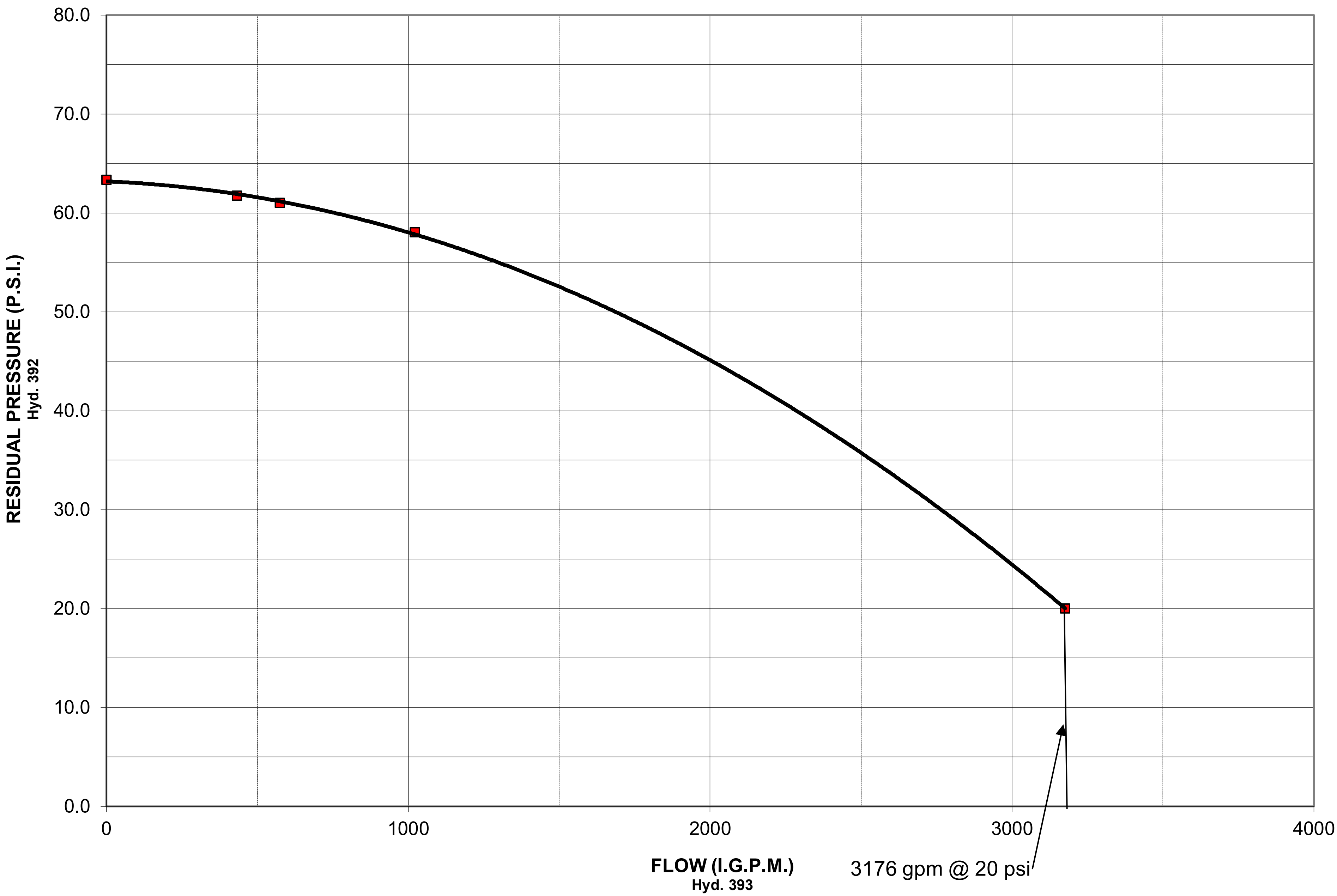
Disclaimer for Fire Flow Tests

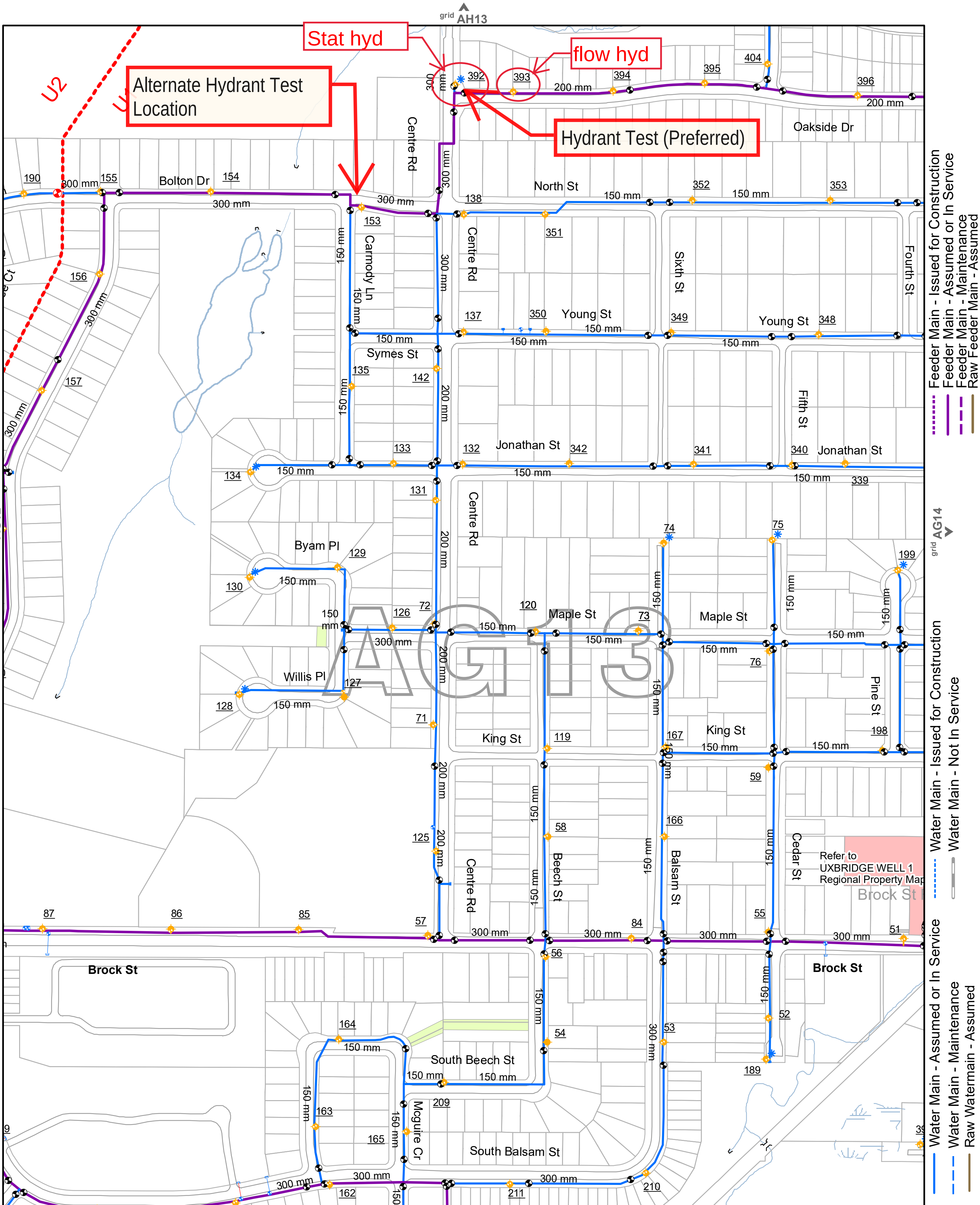
G:\Misc\Fireflow\1 Oakside Dr_Uxbridge.xlsx

Location: 1 Oakside Dr
Municipality: Township of Uxbridge
Date: Nov. 26, 2020

FIRE FLOW TEST

(Graph of Residual Pressure vs. Hydrant Flow)





The Regional Municipality of Durham
Works Department
Water Supply System

DURHAM REGION

UXBRIDGE (Uxbridge)

1:5,000

0 25 50 100 150 200 Meters

All dimensions are in mm unless otherwise noted.

Friday, February 21, 2020

Servicing Note:
THIS MAP DEPICTS LOCAL PROXIMITY OF SERVICES ONLY. IT IS NOT TO BE USED TO DETERMINE INDIVIDUAL SITE SERVICING AVAILABILITY OR AVAILABILITY OF CAPACITY WITHIN THE SYSTEM. FOR DETAILED SITE SERVICING INFORMATION PLEASE CONTACT THE DEVELOPMENT APPROVALS SECTION OF THE WORKS DEPARTMENT.

THE REGIONAL MUNICIPALITY OF DURHAM

WORKS DEPARTMENT

FLOW TEST SUMMARY AND RESULTS

Requested by: Andrew Dunlop, CRS, CAN-CISEC   Account No.:

Company: SCS Consulting Group Ltd.

Address: 30 Centurian Drive, Suite 100   Telephone: 905.475.1900 Ext. 2355

Markham, ON, L3R 8B8   Email: adunlop@scsconsultinggroup.com

Test Location: 124 Bolton Dr

Municipality: Township of Uxbridge

Date: 26-Nov-20   Time: 9:30am   Conducted by: K.J

Flow Hydrant: 294

Monitoring Hydrant: 299

Nozzle Size (in.)	Residual Pressure (p.s.i.)		Pitot Guage	
	Field Reading @ Monitoring Hydrant	Actual @ Flow Hydrant (adjusted)*	Pressure (p.s.i.)	Flow (i.g.p.m.)
STATIC	41.0	41.9		0.0
1-1/2	34.6	35.5	44.4	370.3
1-3/4	31.8	32.7	42.8	494.9
2-1/2	31.5	32.4	40.7	893.2
2 x 2-1/2		0.9		0.0

* Calculation based on gain/loss in pressure due to elevation difference between flow & monitoring hydrants

Hydrant Elevations (ft.)	
Flow Hydrant:	98.8
Static Hydrant:	100.9
Difference:	-2.1
Pressure Diff. (p.s.i.):	-0.9

Comments:

Flow for 1-1/2 & 1-3/4 nozzle calculated using Discharge of smooth nozzles

Flow for 2-1/2 nozzle calculated using Discharge for circular outlets

Results

Static Pressure: 41.9

Flow at 20 p.s.i. (I.g.p.m.): 1402 (approx.)

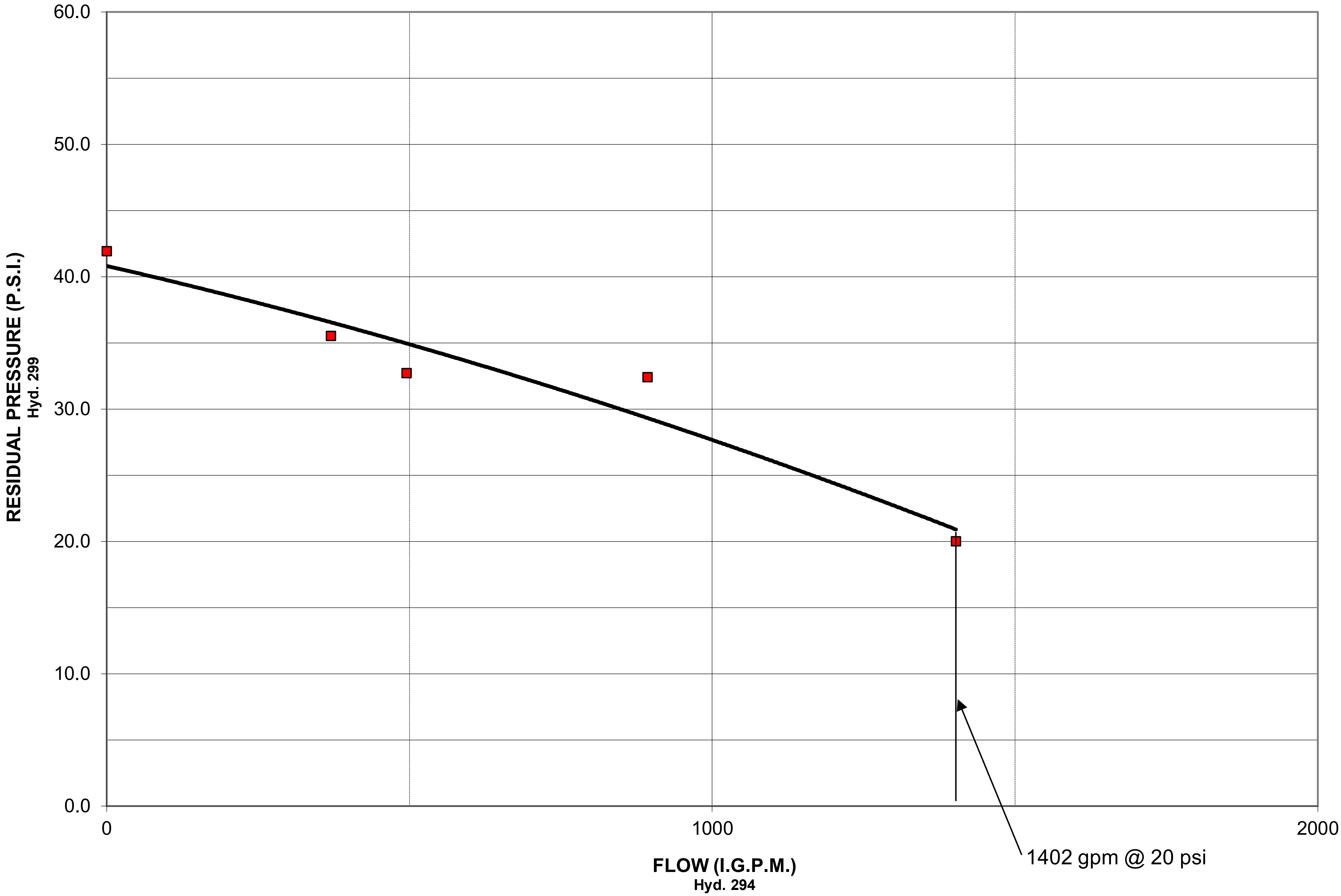
Checked by:

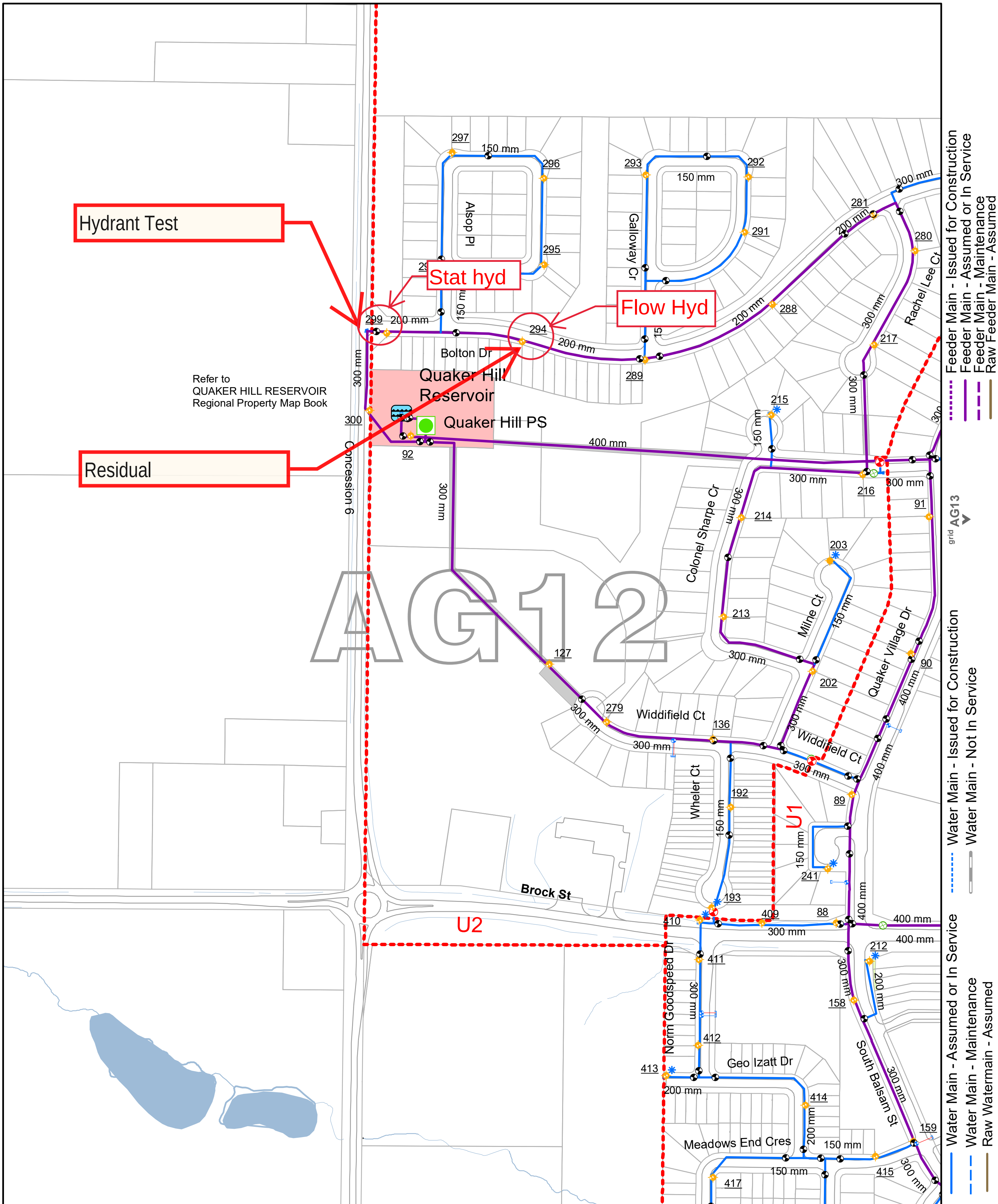
G:\Misc\Fireflow\124 Bolton Dr_Uxbridge.xlsx

Location: 124 Bolton Dr
Municipality: Township of Uxbridge
Date: Nov. 26, 2020

FIRE FLOW TEST

(Graph of Residual Pressure vs. Hydrant Flow)





grid AF12

The Regional Municipality of Durham
Works Department
Water Supply System

DURHAM REGION

UXBRIDGE (Uxbridge)

1:5,000

0 25 50 100 150 200 Meters

All dimensions are in mm unless otherwise noted.

Friday, February 21, 2020

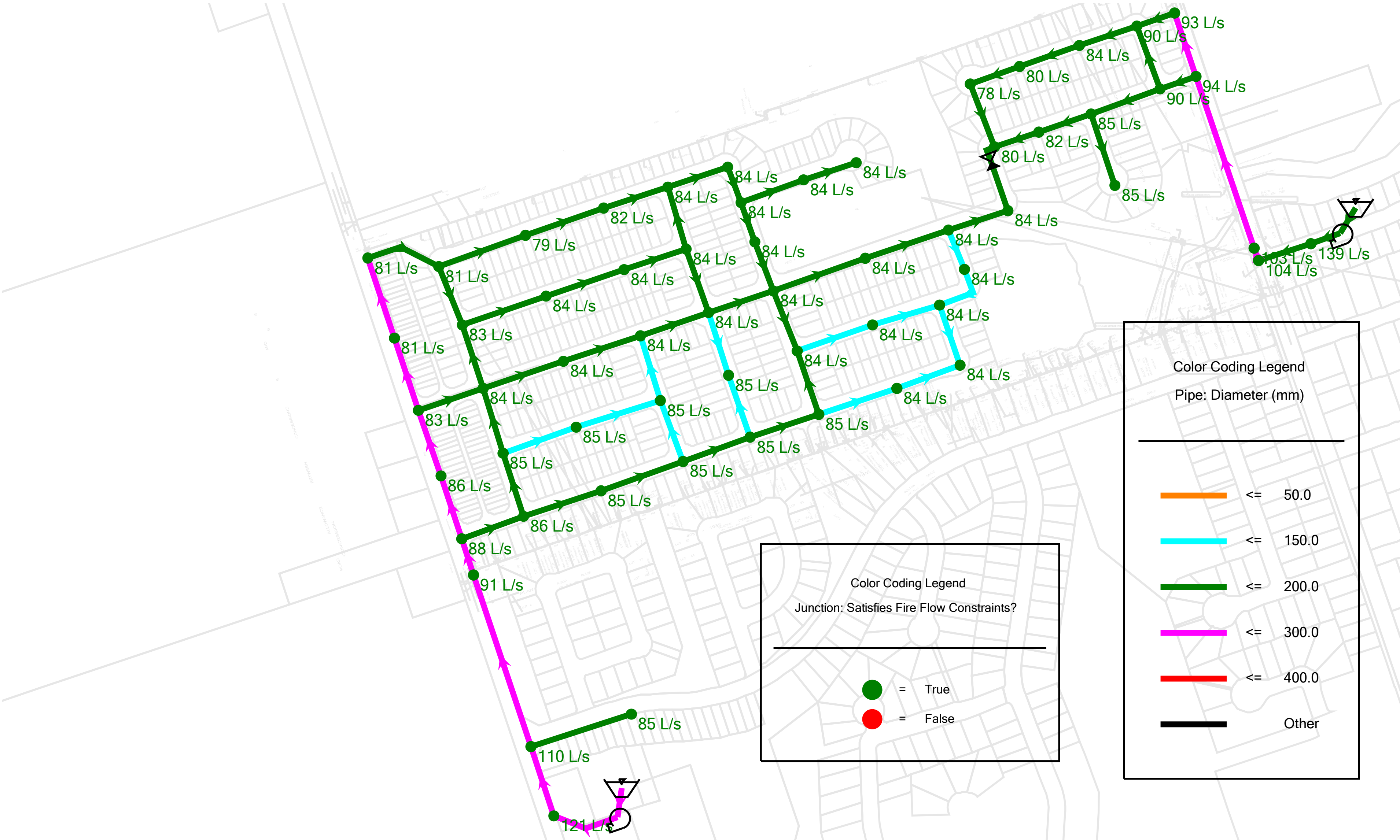
Servicing Note:
THIS MAP DEPICTS LOCAL PROXIMITY OF SERVICES ONLY. IT IS NOT TO BE USED TO DETERMINE INDIVIDUAL SITE SERVICING AVAILABILITY OR AVAILABILITY OF CAPACITY WITHIN THE SYSTEM. FOR DETAILED SITE SERVICING INFORMATION PLEASE CONTACT THE DEVELOPMENT APPROVALS SECTION OF THE WORKS DEPARTMENT.

	AH13
AG12	AG13
AF12	AF13

PRELIMINARY

Scenario: Maximum Day

Available Fire Flow

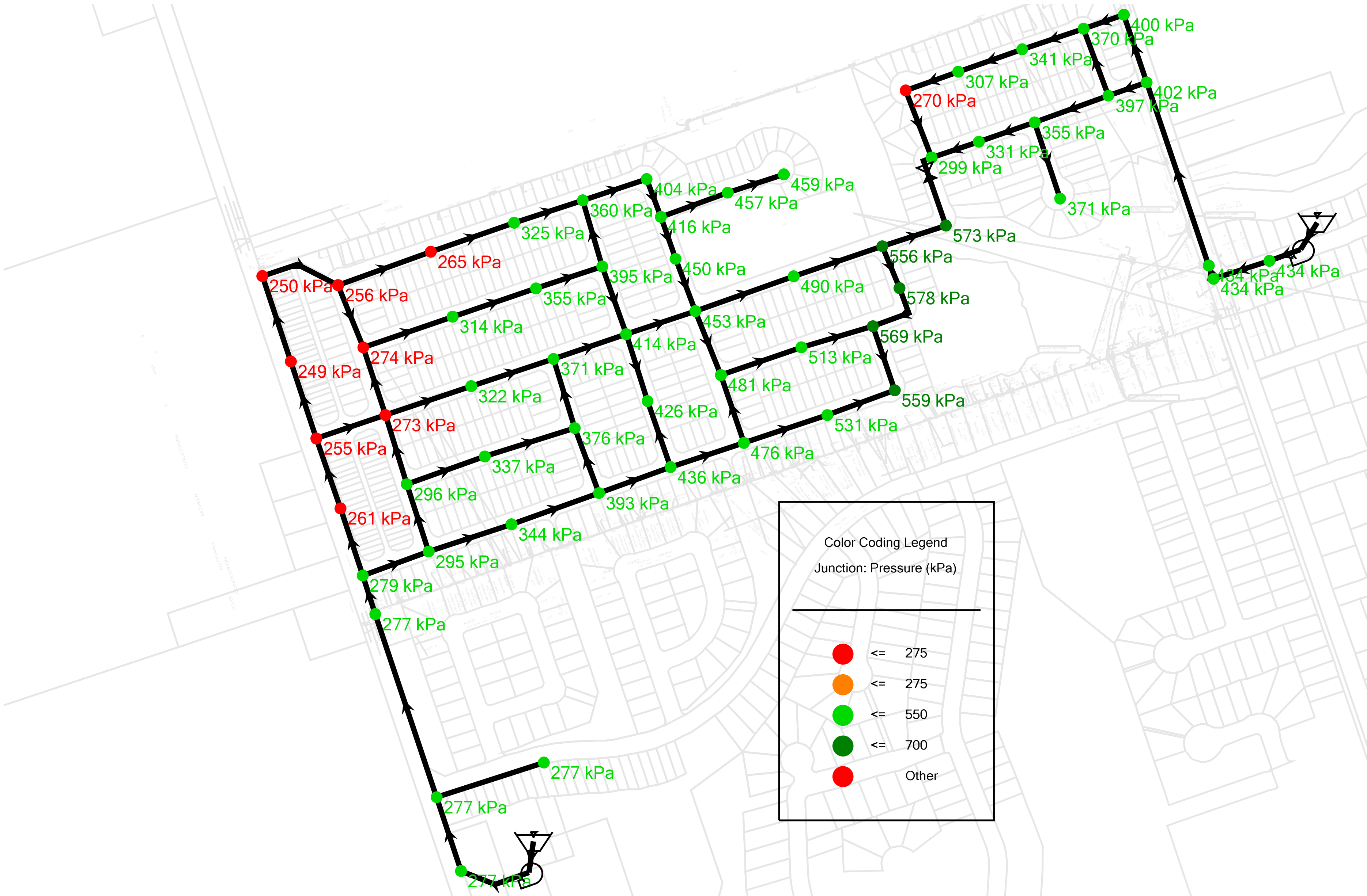


Center Road Uxbridge (Dec 21 2020).wtg

2020-12-21

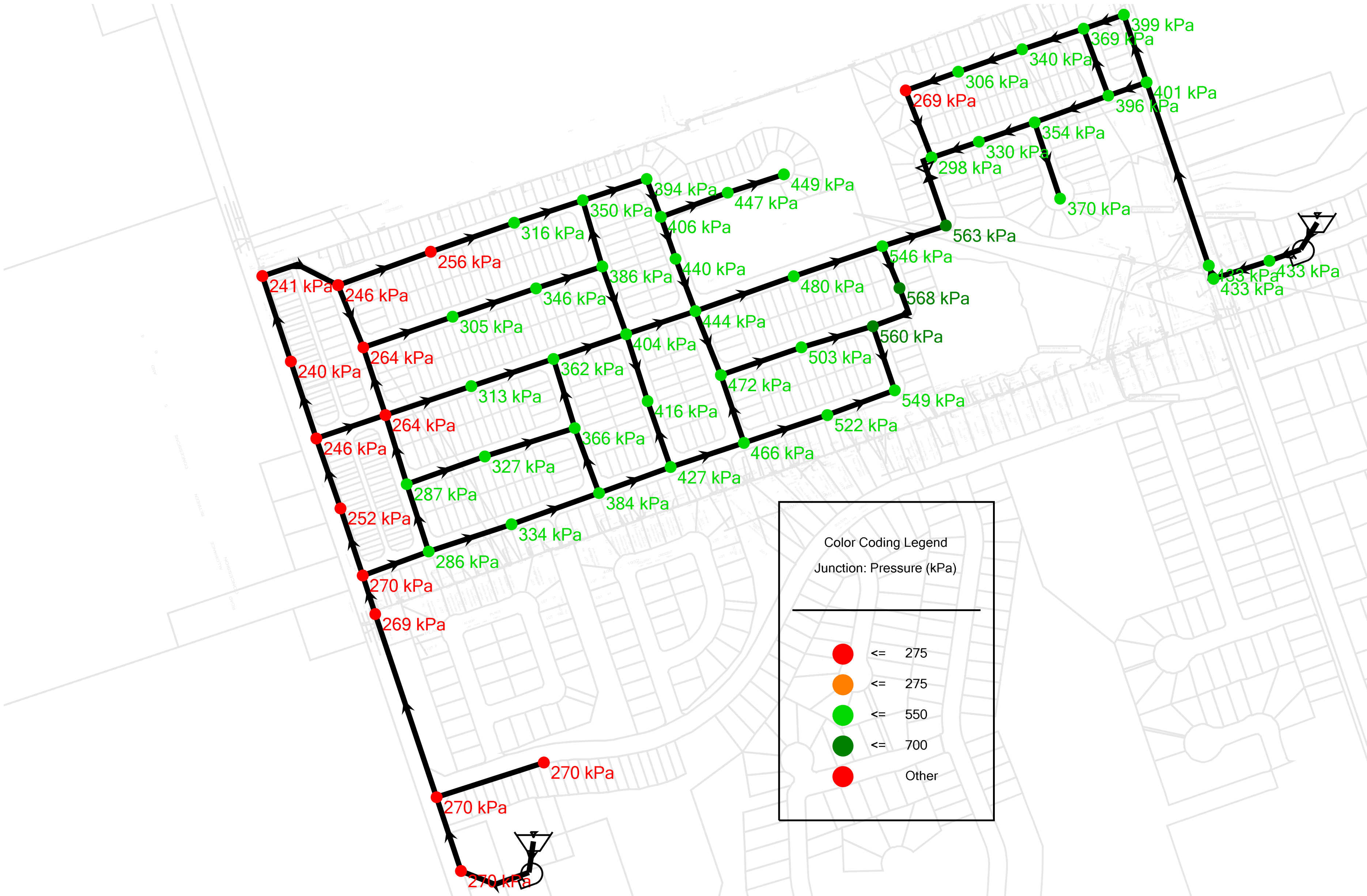
PRELIMINARY

Scenario: Maximum Day



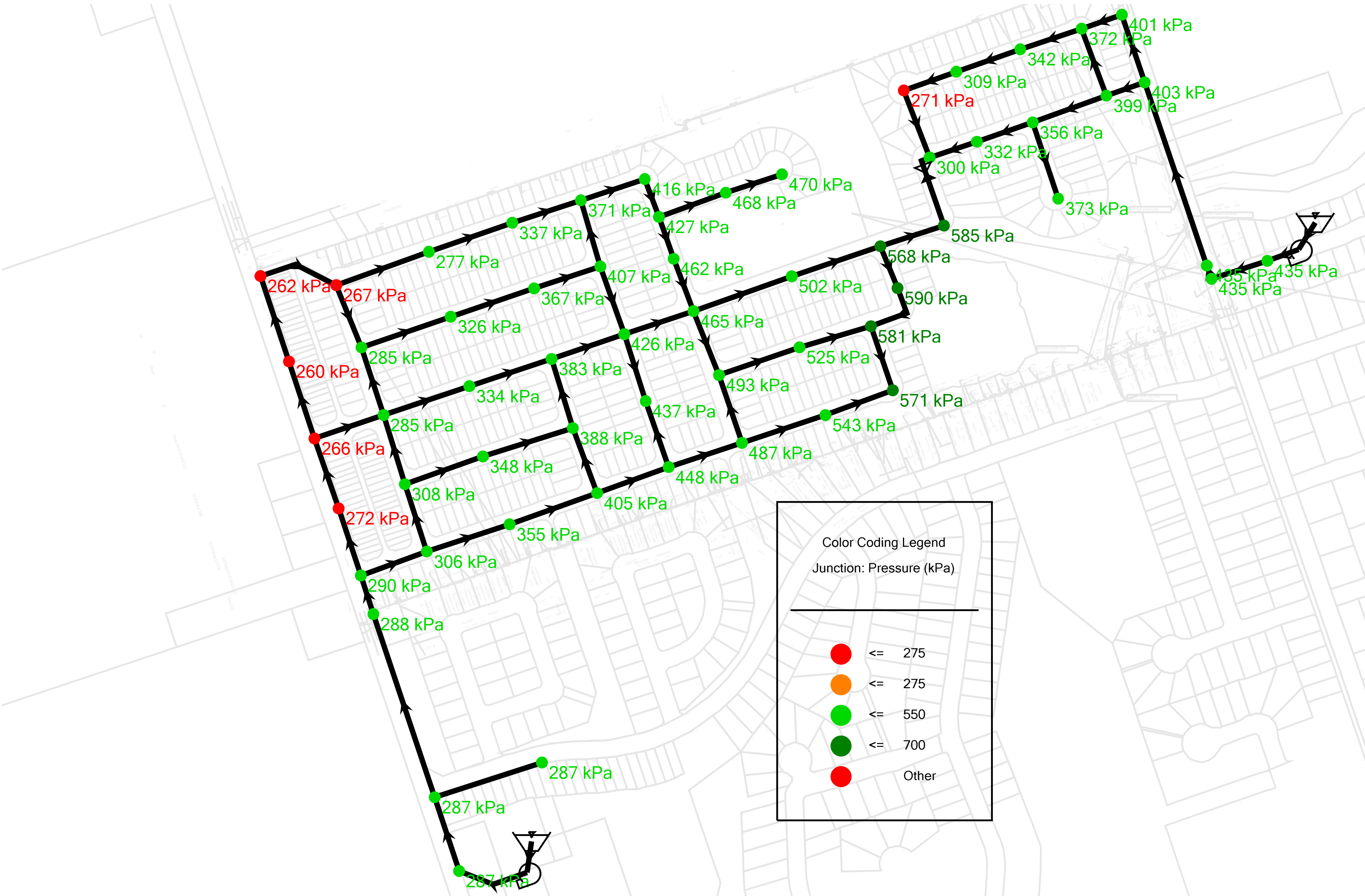
PRELIMINARY

Scenario: Peak Hour



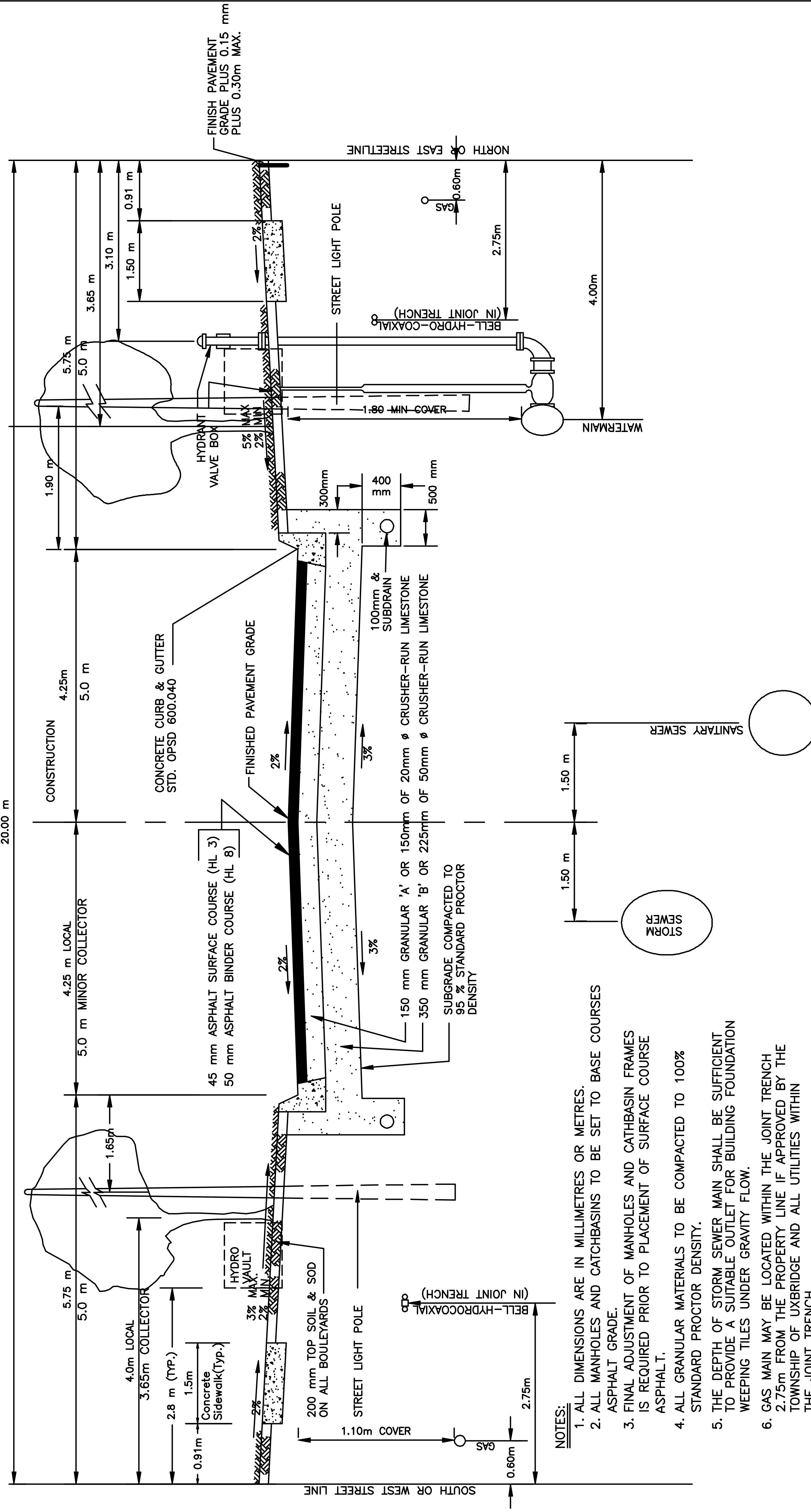
PRELIMINARY

Scenario: Minimum Hour



APPENDIX I

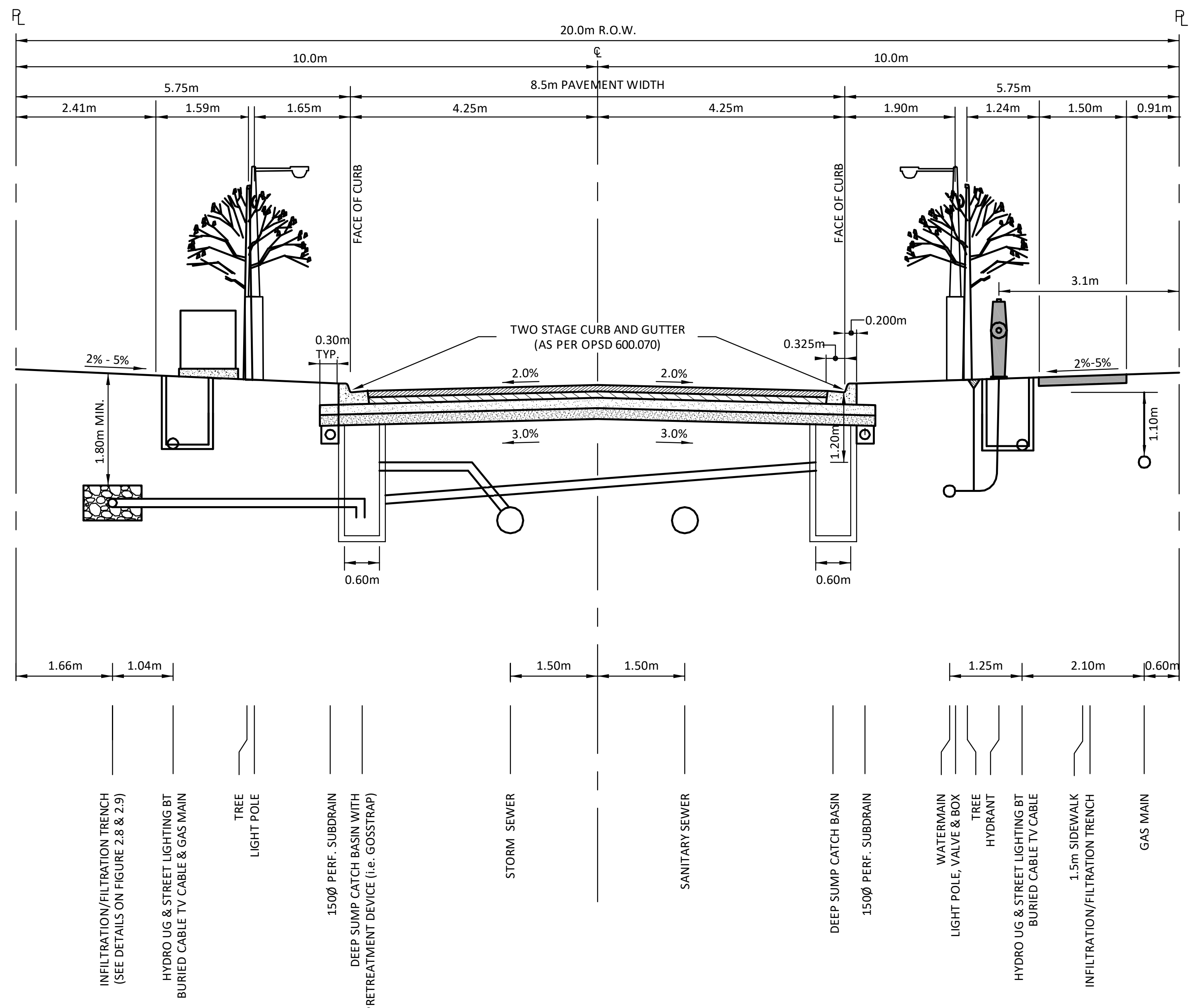
RIGHT-OF-WAY CONCEPTS



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES OR METRES.
2. ALL MANHOLES AND CATCHBASINS TO BE SET TO BASE COURSES ASPHALT GRADE.
3. FINAL ADJUSTMENT OF MANHOLES AND CATHBASIN FRAMES IS REQUIRED PRIOR TO PLACEMENT OF SURFACE COURSE ASPHALT.
4. ALL GRANULAR MATERIALS TO BE COMPACTED TO 100% STANDARD PROCTOR DENSITY.
5. THE DEPTH OF STORM SEWER MAIN SHALL BE SUFFICIENT TO PROVIDE A SUITABLE OUTLET FOR BUILDING FOUNDATION WEEPING TILES UNDER GRAVITY FLOW.
6. GAS MAIN MAY BE LOCATED WITHIN THE JOINT TRENCH 2.75m FROM THE PROPERTY LINE IF APPROVED BY THE TOWNSHIP OF UXBRIDGE AND ALL UTILITIES WITHIN THE JOINT TRENCH.

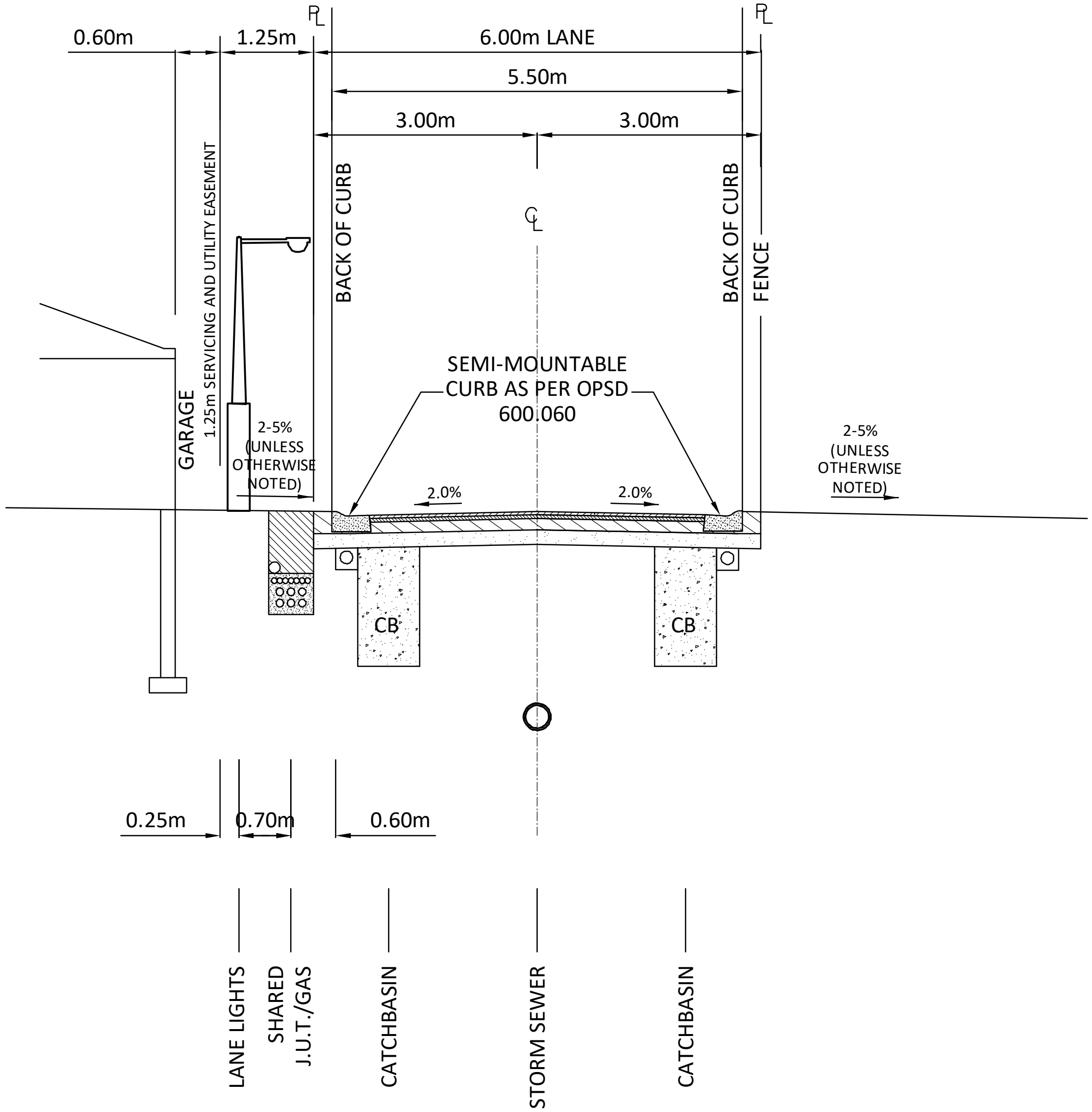
APPROVED	TOWNSHIP OF UXBRIDGE	DATE OF ISSUE JANUARY 1980
REVISION 1	8.50 m LOCALROADWAY 10.0 m MINOR COLLECTOR ROADWAY	DRAWING No. US-205
DATE OF REVISION MAY, 2005		



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

FSSR	LEGEND:	7370 CENTRE ROAD UXBRIDGE	MODIFIED URBAN RESIDENTIAL MAJOR LOCAL 20m R.O.W.
SCS consulting group ltd 30 CENTURIAN DRIVE, SUITE 100 MARKHAM, ONTARIO L3R 8B8 TEL: (905) 475-1900 FAX: (905) 475-8335		DESIGNED BY: N.D.M. CHECKED BY: L.C.M. SCALE: 1:100 DATE: MARCH 2021	PROJECT No: 2099 FIGURE No: I.1

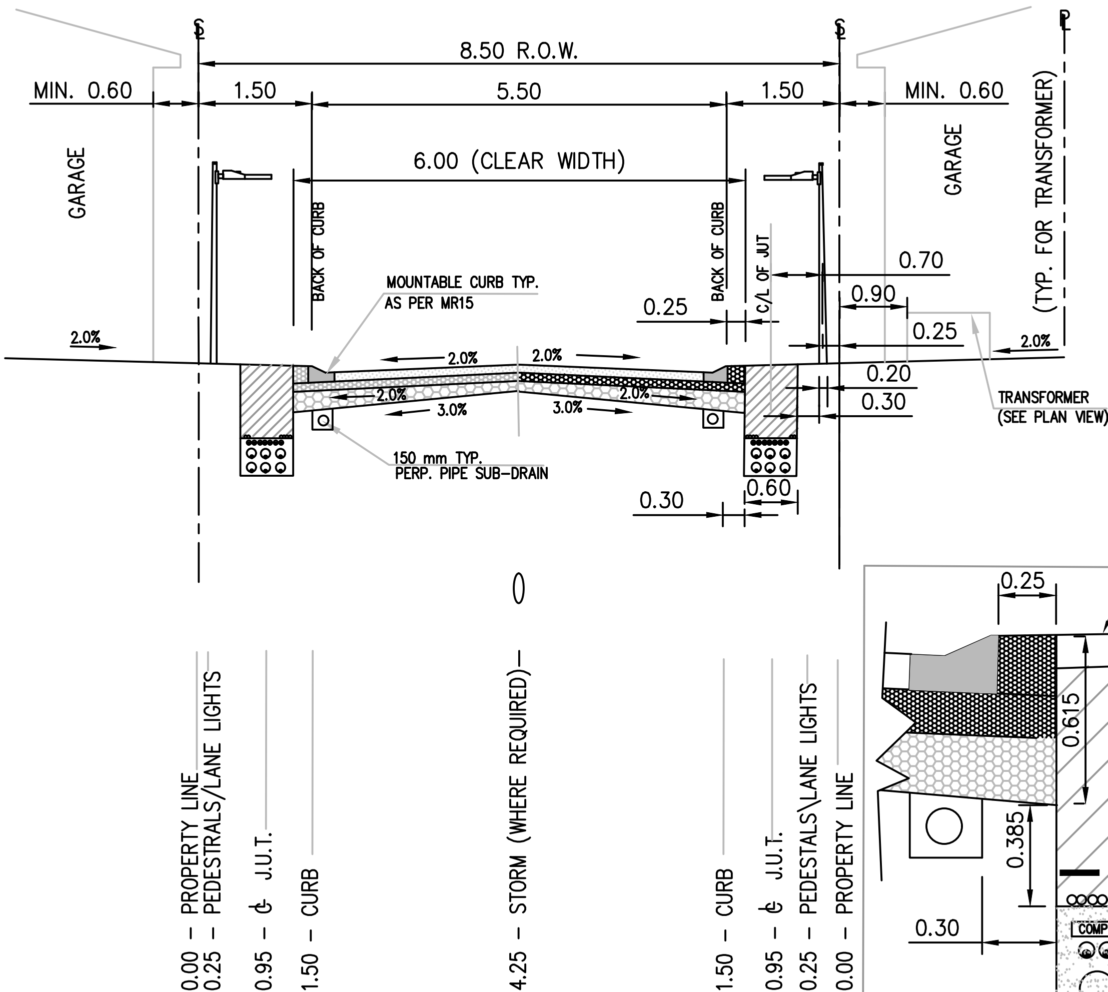
File: P:\2099 7370 Centre Road Uxbridge\Drawings\FSP\Fig\Report Figures\2099P-XSEC-I.1.dwg – Revised by <STAN> : Fri, Mar 05 2021 – 9:11am



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

FSSR	7370 CENTRE ROAD UXBRIDGE		6.0m RESIDENTIAL PRIVATE LANEWAY	
SCS consulting group ltd 30 CENTURIAN DRIVE, SUITE 100 MARKHAM, ONTARIO L3R 8B8 TEL: (905) 475-1900 FAX: (905) 475-8335	DESIGNED BY: C.M.D.	CHECKED BY: N.D.M.	PROJECT No: 2099	FIGURE No: I.2
	SCALE: N.T.S.	DATE: MARCH 2021		

File: P:\2099 7370 Centre Road Uxbridge\Drawings\FSP\Fig\Report Figures\2099P-6.0ROW-I.2.dwg - Revised by <STAN> : Fri, Mar 05 2021 - 9:13am

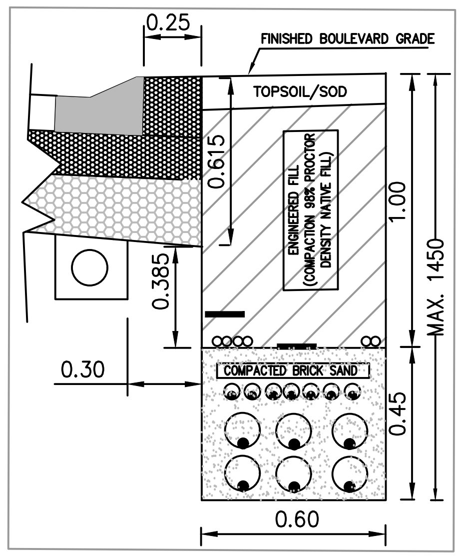


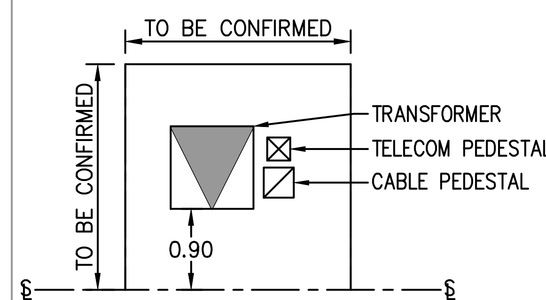
CRITERIA FOR LANE WAYS

1. MAXIMUM LENGTH OF LANE SHALL BE 120.0 m FOR SINGLES AND 90.0 m FOR TOWNHOUSES.
2. LANES SHALL NOT INTERSECT LANES, EXCEPT APPROVED BY THE DIRECTOR OF ENGINEERING.
3. LANES SHALL START AND END ON ROADS.
4. LANES SHALL PREFERABLY BE STRAIGHT OR WITH SLIGHT CURVATURE. MINIMUM CENTRE LINE RADIUS SHALL BE 12.0 m.
5. ROADS SHALL NOT START OR END AT A LANE.
6. MINIMUM DRIVEWAY APRON SHALL BE 4% AND MAXIMUM 8%.

NOTES:

1. LANE R.O.W. TO BE WIDENED PERIODICALLY TO ACCOMMODATE TRANSFORMERS, SWITCH GEARS, UTILITY PEDESTALS, AND HYDRANTS, WHERE NECESSARY.
2. BELL AND CABLE TV PEDESTALS TO BE INSTALLED WITHIN TRANSFORMER NOTCHES.
3. GARAGES TO BE SET BACK MIN. 0.60 m FROM STREETLINE. EAVES MAY EXTEND INTO SET BACK, BUT EAVES OR GARAGE FOUNDATION SHALL NOT ENCROACH ONTO R.O.W..
4. PUBLIC LANE LIGHTING TO BE PROVIDED.
5. 6.0 m (CLEAR WIDTH) TO BE DESIGNED TO SUPPORT WEIGHT OF FIRE TRUCK.
6. TYP. MINIMUM DEPTH FOR UTILITY CROSSING SHALL BE 1.0 m (TO CLEAR SUB-DRAINS).





PLAN VIEW FOR TRANSFORMER CUTOUT

ALL DIMENSIONS ARE IN METRES, UNLESS OTHERWISE SHOWN.

MARKHAM	ENGINEERING DEPARTMENT, CITY OF MARKHAM	REV. 3	SEP. 2019
	8.5 m RESIDENTIAL LANE (WITH UTILITIES)	MR10	
		N.T.S.	

SCS Consulting Group Ltd
30 Centurian Drive, Suite 100
Markham, ON, L3R 8B8
Phone 905 475 1900
Fax 905 475 8335