Highfair Investments Inc.
Town of Aurora

Functional Servicing and Stormwater Management Report

August 2021

SUBMISSION No. 1

Submitted by:

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SUBMISSION HISTORY

Submission	Date	In Support Of	Distributed To
1st	August 2021	Re Zoning, Draft Plan Approval	Town of Aurora, LSRCA, York Region, Highfair Investments Inc.

1.0 INTRODUCTION

SCS Consulting Group Ltd. has been retained by Highfair Investments Inc. to prepare a Functional Servicing and Stormwater Management Report for a proposed development located in the Town of Aurora.

1.1 Purpose of the Functional Servicing Report

The Functional Servicing and Stormwater Management Report (FSSR) has been prepared in support of a Zoning Bylaw Amendment and Draft Plan of Subdivision applications 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,
- open space,
- woodlot, and
- proposed roads.

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

1.2 Study Area

The study area is approximately 12.34 ha in size and is bound by Bayview Avenue to the east, Vandorf Sideroad to the south, and existing woodlot to the west and wetland to the north (see **Figure 1.1**).

The existing subject lands are comprised of low-density estate lots, woodlot, and a wetland area. The proposed development is located within the East Holland River watershed in the Town of Aurora.

1.3 Background Servicing Information

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

- Town of Aurora Design Criteria Manual for Engineering Plans (Revised November 2020);
- Technical Guidelines for Stormwater Management Submissions, Lake Simcoe Region Conservation Authority (September, 2016);
- Phosphorus Offsetting Policy, Lake Simcoe Region Conservation Authority (May 2019);
- Water Budget Offsetting Policy, Lake Simcoe Region Conservation Authority (May 2019);
- Lake Simcoe Protection Plan (LSPP) (July 2009); and
- Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning and Design Manual (March 2003).

The servicing and SWM strategies in this report are based on information included in the following reports:

- Highfair Investments Inc. Development, Water Distribution Modelling, Town of Aurora, Region of York, prepared by Municipal Engineering Services, August 4, 2021;
- Preliminary Geotechnical Investigation, Residential Subdivision Development, 5 to 65 Archerhill Court, Aurora, Ontario, prepared by EXP Services Inc., dated January 22, 2021;
- Archerhill Court Hydrogeological Investigation, prepared by RJ Burnside, dated August 2021;

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

- Bayview Hills Estates General Plan As-Constructed Drawing No. 1, January 1991, prepared by Bryan Thomas & Associates Inc.;
- Aurora Forcemain Twinning – Stage 2 As-Recorded Sheets 18-19, April, 2000, prepared by Totten Sims Hubicki Associates;
- Bayview Vandorf Residential Subdivision As-built Sheet 55 and 58, May 1999, prepared by Marshall Macklin Monaghan;
- Cattail Subdivision Plan and Profiles As-Constructed Drawing No. 18-20, 27, and 31, May 1998, prepared by Cosburn Patterson Mather Ltd.;
- Cattail Subdivision Easement Trunk Sewer Plan and Profile Drawing No. 6, August 1994, prepared by Cosburn Patterson Wardman Ltd.;
- Vandorf Sideroad Plan and Profile Sheet No. 6, March 2021, prepared by The Municipal Infrastructure Group;
- Vandorf Sideroad Watermain and Sanitary Forcemain Construction As-built, December 1996, prepared by Marshall Macklin Monaghan;
- Wycliffe / Diamond Homestead Site Servicing Sheet 1-2, April 2002, prepared by URS Canada Inc.;
- The Chateaus on Bayview Sanitary Drainage Area Plan As-Built, July 2016, prepared by JSW and Associates;
- Stonebridge Development Sanitary Drainage Plan, September 1998, prepared by Marshall Macklin Monaghan;
- Cattail Subdivision Sanitary Drainage Plan Drawing No. 9-10 and 12, March 1994, prepared by Cosburn Patterson Wardman Ltd.;
- Brookvalley Development Sanitary Tributary Area As-Built, February 2016, prepared by Schaeffers Consulting Engineers; and
- Bayview Vandorf Residential Subdivision Sanitary Drainage Plan As-built, April 2000, prepared by Marshall Macklin Monaghan;

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

A pre-application consultation meeting with the Town of Aurora and LSRCA was held on December 14, 2020. The meeting minutes as well as comments from the LSRCA are included in **Appendix B**.

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	Peak Flow: Control proposed peak flows to existing peak flows for the 2 through 100 year storm events. (Town, LSRCA) Volume Control: Proposed runoff volume from a 25 mm rainfall event over the total impervious area shall be captured and retained/treated on-site or in accordance with LRCA's Flexible Treatment guidelines if full compliance with the 25 mm guideline is not possible. (LSRCA)
Quality Control	Total Suspended Solids: MECP Enhanced Level Protection (80% TSS Removal). (MECP, LSRCA, Town) Phosphorus: Per Lake Simcoe Protection Plan, a Phosphorus Loading Study is to be done to determine the existing and proposed phosphorus loading rates. Per the LSPOP, target 100% control and net-zero phosphorus export. (LSRCA)
Erosion Control	Detention of the 25 mm rainfall runoff for a minimum of 24 hours. (LSRCA)
Water Budget	As the majority of the site is within a Wellhead Protection Area (WHPA) Q1/Q2, maintain the existing water budget through the use of best management practices such as Low Impact Development measures. (LSPP 4.8-DP)

2.2 Existing Drainage

The subject lands are located in the East Holland subwatershed within the Lake Simcoe watershed. As shown on **Figure 2.1**, drainage from the site generally flows south to north towards a Tributary of East Holland River eventually into Cook's Bay and Lake Simcoe.

Runoff from approximately 2.38 ha of land (Catchment 101) currently drains west via overland flow into a tributary of the East Holland River. This area is mainly a mix of woodlot and rear yards.

Runoff from approximately 9.96 ha of land (Catchment 102) currently drains north via sheet flow, the Archerhill Court roadside ditches, and overland flow over the open areas and lawns

into the Tributary of the East Holland River to the north. Drainage from Archerhill Court is conveyed by an overland flow channel and discharges to the north via a gabion stone drop structure. A channel through the woodlot to the north has formed between the gabion stone drop structure and the wetland to the north, refer to photos in **Appendix B.** Refer to the Archerhill Court General Plan in **Appendix B**.

Runoff from approximately 0.71 ha of land (Catchment 201) is external drainage from Vandorf Sideroad and Bayview Avenue that currently drains north and into the Archerhill Court roadside ditch via an existing 600 mm diameter CSP culvert. In July 2021, the Town of Aurora initiated reconstruction of Vandorf Sideroad, which includes replacing the culvert with a new 600 mm diameter CSP culvert (refer to Vandorf Sideroad Reconstruction drawings in **Appendix B**).

Refer to existing drainage plan **Figure 2.1**.

2.2.1 Existing Site Characterization

The soil classifications were identified using the MTO Drainage Manual and land uses visible in recent aerial photography and site reconnaissance. Based on the geotechnical investigation conducted by EXP, the predominant soil type is silty clay. As per the MTO Drainage Management Manual (1997) Design Chart 1.08, these soil types typically are a Hydrologic Soil Group C or D. A Hydrologic Soil Group CD was selected.

R.J. Burnside completed in-situ infiltration testing which found an infiltration rate of 12 mm/hr. Applying a safety correction factor yields a design infiltration rate of 4.8 mm/hr. Groundwater monitoring is ongoing and will continue to ensure the spring high groundwater level is observed. Refer to **Appendix B** for excerpts from the Hydrogeological Assessment for the infiltration test results and groundwater monitoring results.

2.2.2 Existing Hydrologic Modelling

An existing drainage plan was prepared for the study area. The drainage boundaries were determined using ground based topographic survey by Rady-Pentek Edward. The existing drainage plan is shown in **Figure 2.1.**

Hydrologic modelling was undertaken using the Visual Otthymo Version 6.0 software (VO6) based on the 4-hour Chicago, 12-hour SCS Type II, and 24-hour SCS Type II Distribution methods. The IDF rainfall information was obtained from the Town of Aurora Design Criteria Manual to determine the existing peak flows to outlet locations. The existing flows from the study area to the outlet locations are summarized in **Table 2.2**.

Table 2.2: Summary of Existing Flows

Return Period Storm	North Outlet (Catchment 102 + 201) (m^3/s)			West Outlet (Catchment 101) (m^3/s)			Overall Site (Total) (m^3/s)		
	4-Hour Chi.	12-Hour SCS II	24-Hour SCS II	4-Hour Chi.	12-Hour SCS II	24-Hour SCS II	4-Hour Chi.	12-Hour SCS II	24-Hour SCS II
2 Year	0.369	0.589	0.640	0.112	0.148	0.159	0.432	0.713	0.777
5 Year	0.688	0.949	0.996	0.224	0.242	0.250	0.815	1.155	1.216
10 Year	0.940	1.247	1.313	0.318	0.321	0.332	1.129	1.525	1.609
25 Year	1.230	1.573	1.660	0.428	0.407	0.423	1.487	1.928	2.041
50 Year	1.570	1.819	1.861	0.549	0.472	0.475	1.898	2.235	2.291
100 Year	1.873	2.072	2.077	0.652	0.538	0.531	2.262	2.550	2.560

A summary of modelling parameters and an existing VO6 schematic are provided in **Appendix C**. A file transfer link is also provided containing the VO6 hydrology model for download in **Appendix C**.

2.3 Proposed Storm Drainage

The proposed storm drainage plan is shown on **Figure 2.2**, while the proposed storm and sanitary servicing plan is shown on **Figure 2.3**. Impervious coverage was estimated based on the maximum impervious areas using the anticipated zoning, and is illustrated on **Figure 2.4**.

Lot Level Drainage

Split draining lots will use a shallow rear yard infiltration trench to infiltrate runoff from the back half of the roofs via overland flow, where groundwater elevations throughout the site permit.

Front draining lots will use a deeper rear yard infiltration trench to infiltrate runoff from the back half of the roofs via an underground roof leader, where groundwater elevations throughout the site permit.

Infiltration measures are required by the Ontario Building Code to be a minimum of 5 m from a foundation. The front yard setbacks are 3.0 m per the zoning bylaw which eliminates the possibility for infiltration measures in the front yard for runoff from the front half of the roofs and driveways. Therefore, infiltration measures for the front half of the roofs and driveways can only be located in the road right-of-way or end-of-pipe.

All roof downspouts, apart from those that are connected directly to the deeper rear yard infiltration trenches, are to drain to grassed areas.

Conveyance and End-of-Pipe Drainage

Runoff from approximately 8.15 ha (Catchment 202) will be captured by the proposed storm sewer system, controlled to the stormwater runoff control criteria using low impact development (LID) measures within the municipal road right-of-way and superpipes and

conveyed to the north outlet via a storm sewer and headwall discharging to the existing outlet channel. Where groundwater elevations permit, the proposed LID measures will provide infiltration.

Major and minor system runoff from the 0.71 ha external road area (Catchment 201) will be directed into the local storm sewer system, and will be controlled to the relevant stormwater runoff control criteria by the proposed superpipe.

Runoff from Catchment 103 and Catchment 104 (2.57 ha and 1.61 ha respectively) will drain directly toward the Tributaries of the East Holland River via overland flow. The rear lots in Catchments 103 and 104 will first drain to rear yard infiltration trenches for water quality treatment before continuing to drain to the East Holland River.

2.4 Best Management Practices

In accordance with the Ministry of Environment Stormwater Management Planning and Design Manual (2003) and LSRCA objectives, a review of stormwater management LID measures and best management practices (BMP) was completed. The review included a focus on the treatment train approach, evaluating lot level, conveyance system and end-of-pipe practices.

Table 2.3 summarizes the suitability of the various stormwater management controls identified for the proposed development, when taking grading and groundwater constraints into consideration.

Table 2.3 - Recommended Stormwater BMP's

STORMWATER MANAGEMENT PRACTICE	RECOMMENDED (Yes/No)
Increased Topsoil Depth	Yes
Passive Landscaping/Bio-Retention	No
Roof Leader to Rear Yard Infiltration Trenches	Yes
Roof Runoff to Retention Cisterns	No
Green Roofs	No
Rooftop and/or Parking Lot Detention Storage	No
Roof overflow to Grassed Areas	Yes
Pervious Pavement	No
Vegetated Filter Strips	No
Bioswale/Rain Garden	Yes
Exfiltration at Rear Lot Catchbasins	No

STORMWATER MANAGEMENT PRACTICE	RECOMMENDED (Yes/No)
Street Catchbasin Infiltration/ Filtration System	Yes
Stormwater Detention Facility (Superpipe)	Yes
Wet Ponds, Wetlands, Dry Ponds	No

Increased Topsoil Depth – A minimum topsoil restoration depth of 0.3 meters is proposed in all landscaped areas.

Roof overflow to Grassed Areas –Roof leaders can be directed to grassed areas where there is grass.

Bioswale/Rain Garden – A grassed swale in the boulevard to receive street runoff is proposed running parallel to roads without driveway access.

Roof Runoff to Rear Yard Infiltration Trenches – Directing roof runoff to subsurface infiltration trenches can be used to promote infiltration. By promoting infiltration water quality and quantity control is provided for the volume of water retained. Infiltration of roof runoff can provide significant SWM benefits as part of the overall treatment train approach for the proposed development. All lots will use a rear yard infiltration trenches to infiltrate runoff from the back half of the roofs, where groundwater elevations permit. Infiltration measures are required by the Ontario Building Code to be a minimum of 5 m from a foundation. The front yard setbacks are 3.0 m per the zoning bylaw which eliminates the possibility for infiltration measures in the front yard for runoff from the front half of the roofs and driveways.

Street Catchbasin Infiltration/Filtration System – Proposed to treat runoff from the street, there will be a connection from the street catchbasins to an infiltration or filtration trench (groundwater dependent) located in the road boulevard. Where feasible, the infiltration/filtration trenches will be sized for the volume control or water quality control criteria, whichever is a greater volume. Preliminary sizing is discussed further in **Section 2.6**.

Superpipes – To meet quantity and erosion control targets, stormwater storage will be provided by the use of superpipes prior to discharging to the drainage outlets.

The locations of the proposed LID measures are shown on **Figure 2.5**

2.5 Proposed Stormwater Management Plan

2.5.1 Quantity Control

Peak Flow

The proposed superpipe system will control proposed flows from the site to existing flow rates for the 2 to 100 year storm events. The preliminary design of these facilities and a comparison of the proposed and existing peak flow rates are discussed further in following sections.

Volume

The proposed development targets a volume control criteria to capture and treat or retain the runoff volume from the 25 mm rainfall event from new and/or fully reconstructed impervious areas. Proposed LIDs and BMPs have been sized to provide this storage volume where feasible. The preliminary design of these facilities are discussed further in following sections.

2.5.2 Quality Control

Quality control to provide TSS and phosphorus removal will be provided by a treatment train of LID techniques which will include additional topsoil depth on all grassed areas, reduced lot grading where possible, rear yard infiltration trenches, bioswales, a street filtration system, and an end-of-pipe underground storage system. The preliminary design requirements of the SWM infrastructure to provide the water quality treatment and a detailed phosphorus budget are provided in following sections.

2.5.3 Erosion Control

The erosion control criteria is to provide a minimum of 24 hour extended detention of the runoff from a 25 mm rainfall event and will be provided in the superpipe for Catchments 201 and 202. The preliminary design requirements of the superpipe are discussed further in **Section 2.10**.

2.5.4 Water Balance

Where feasible, measures to minimize impacts on the water balance will be incorporated into the development design. As noted in the Archerhill Court Hydrogeological Investigation prepared by RJ Burnside and dated August 2021 (**Appendix B**), the estimated existing infiltration volume on the proposed development is approximately 12,259 m^3. Without mitigation the proposed development infiltration volume is approximately 8,030 m^3.

Low impact development measures will be implemented as previously described to maintain or increase existing infiltration rates. Per the Archerhill Court Hydrogeological Investigation, it is anticipated that a proposed infiltration volume of approximately 21,437 m^3 can be achieved through the proposed mitigation measures.

As per LSRCA's water balance offsetting policy, an offsetting fee is not required, due to the proposed recharge being greater than existing.

2.6 Phosphorus Budget

Under the Lake Simcoe Protection Plan, a stormwater management plan must demonstrate how phosphorus loadings are minimized between existing and proposed conditions. Furthermore, LSRCA's Lake Simcoe Phosphorus Offsetting Policy (September 2017) states that:

> *"The phosphorous load from the proposed development on the property will be zero. In situations where the phosphorous load cannot be met or demonstrated in a post-development scenario to achieve the Zero Phosphorous, the developer or proponent shall be required to provide phosphorous off setting to the LSRCA."*

Due to the complex treatment train provided by the SWM measures outlined above, a spreadsheet based on the MECP database application *Lake Simcoe Phosphorus Loading Development Tool* (v2, 01-April-2012 update) was developed to determine the existing and proposed conditions phosphorus budgets.

Existing Phosphorus Loadings

The existing phosphorus loading is based on the land uses as outlined in the MECP Phosphorus Tool guidance document, prepared by Hutchinson Environmental Sciences Ltd. The existing land uses are shown on **Figure 2.6**. Using the aforementioned spreadsheet, the existing annual phosphorus loadings were calculated to be 1.187 kg/year. Refer to **Appendix D** for the existing phosphorus budget calculations.

Proposed Phosphorus Loadings

The proposed land uses for the proposed development are shown on **Figure 2.7**. The proposed residential development is considered high intensity development according to the MECP Phosphorus Tool. The proposed phosphorus loading with no best management practices (BMPs) was calculated to be 12.050 kg/yr (refer to **Appendix D**).

The proposed phosphorus loading with BMPs was calculated to be 2.222 kg/yr (see **Appendix D**). **Table 2.4** provides a summary of the land use, BMP, and phosphorus removal efficiencies for the proposed condition.

Table 2.4: Phosphorus Budget Summary

Phosphorus Loading (kg/yr)		
Existing	**Proposed without BMPs**	**Proposed with BMPs**
1.187	12.050	2.222

As per LSRCA's Phosphorus Offsetting Policy, the increase in phosphorus loading will be offset at a rate of $35,000/kg/year, at a 2.5:1 ratio. The cost of the phosphorous offsetting will total $223,599.58, which includes a 15% administration cost.

2.7 Rear Yard Infiltration Trenches

Where sufficient separation to the high groundwater level permits, rear yard infiltration trenches are proposed to receive runoff from the back half of the roofs. For split draining lots, the trenches will be located beneath the rear yard swales and will receive runoff from the back half of the roofs by overland runoff from roof leaders directed to the rear yard swales. For front draining lots, a roof leader will convey runoff from the back half of the roof directly to a deeper infiltration trench. The trenches will be composed of washed clear stone with approximate dimensions of 0.6 m deep and 1.1 m wide, which will capture a minimum of 25 mm of runoff from the back half of the roofs. The length of the trench will vary depending on the size of the lots. Based on the design infiltration rate of 12 mm/hr, the runoff storage volume in the trench

can be infiltrated within 48 hours. Refer to **Figure 2.8** and **Figure 2.9** for details. Calculations are provided in **Appendix E**.

2.8 Bioswales

The proposed bioswale will collect runoff from half of the road right-of-way via proposed curb cuts to facilitate retention and filtration via the proposed engineered soil media and stone base. The curb cuts are proposed along the length of the respective bioswale to maximize conveyed drainage area. Curb cuts are proposed upstream of catchbasins to ensure runoff is conveyed to the bioswale prior to discharging to the proposed storm sewers. In storm events where the capacity of the bioswale is exceeded, runoff will discharge back to the road where it will be captured by catchbasins located immediately downstream of the lowest curb cut.

The bioswales are sized for the greater of the water quality treatment volume per Table 3.2 of the MECP SWM Planning and Design Manual or the 25 mm volume from impervious surfaces. The bioswales provide storage for 13.3 mm/impervious area. Right-of-way cross sections and the details are discussed further in **Section 6.0** and calculations are provided in **Appendix E**.

2.9 Catchbasin Infiltration/Filtration Trench

Catchbasin infiltration and filtration trenches are proposed to provide quality control for the municipal road right-of-way and lots draining to the catchbasins. Runoff entering a catchbasin will be directed through a catchbasin pretreatment device (e.g. “goss trap” and sump) 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 boulevard. However, they can only fit in one side of the right-of-way due to conflicts with the watermain separation. Therefore, any catchbasin which isn’t directly connected to a trench will have its lead connected to a catchbasin that is directly connected to a trench. The proposed road right-of-way cross section with the catchbasin infiltration/filtration system is discussed further in **Section 6.0**.

Typically, where there is a minimum of 1.0 m of separation to the seasonally high groundwater level to the bottom of the trench, the system will be designed to infiltrate. However, no trenches proposed on the site have the required separation to groundwater. Therefore, all of the systems will be designed as filter trenches with an impermeable liner to prevent groundwater inflow and a subdrain returning water back to the storm sewer. Depth to groundwater contours on the site are shown on **Figure 2.10**.

The catchbasin filtration trenches will be composed of washed clear stone with approximate dimensions of 0.8 m deep and 1.25 m wide on top of 0.4 m of brick sand. A perforated drain within the brick sand layer connected to the minor system will be provided at the downstream end of the filtration facility. **Figure 2.11** shows a detail of the catchbasin filtration trench. The proposed road right-of-way cross section with the catchbasin filtration system is discussed further in **Section 6.0**.

The filtration trenches are sized for a minimum of the water quality treatment volume per Table 3.2 of the MECP SWM Planning and Design Manual. Due to potential conflicts with the service laterals, other utilities in the boulevard, and potential future maintenance, it is not feasible to

achieve the 25 mm volume from impervious surfaces. The trenches all provide a minimum of the water quality treatment volume. The trenches provide the following volume from the contributing impervious areas:

- Half of 18 m road right-of-way, half of a split draining lot: 23.1 mm/impervious area, and
- Full 18 m road right-of-way, one front draining lot, and two halves of split draining lots: 7.9 mm/impervious area

Calculations are provided in **Appendix E**.

2.10 Superpipe

Runoff from Catchment 202 will be controlled for erosion and quantity control by superpipe storage.

2.10.1 Extended Detention

The attenuation of the extended detention volume in the underground storage system will provide erosion protection for the downstream watercourse. The extended detention volume will be sized based on the detention of the 25 mm - 4 hour Chicago rainfall event. The volume calculated for the extended detention will be attenuated for a minimum of 24 hours. The required extended detention volume is 1073 m^3 (see **Appendix F**). The peak release rate for the extended detention volume is approximately 0.019 m^3/s.

2.10.2 Quantity Control: Peak Flow

The proposed superpipe will control proposed 2 - 100 year flows from the site to the existing peak flow rates. Proposed hydrology modelling was completed using the VO6 model to determine the required detention storage volume. Refer to the File Safe Cloud Link provided in **Appendix C** to download the VO6 hydrology model files. A summary of the resulting storage requirements for the superpipe is provided in **Table 2.5**.

Table 2.5: Superpipe Storage Requirements – Catchment 202

Return Period Storm	4 Hour Chicago		12 Hour SCS Type II		24 Hour SCS Type II	
	Discharge (m^3/s)	Storage (m^3)	Discharge (m^3/s)	Storage (m^3)	Discharge (m^3/s)	Storage (m^3)
2 Year	0.088	1188	0.172	1308	0.215	**1339**
5 Year	0.315	1388	0.541	1499	0.617	**1532**
10 Year	0.528	1491	0.879	1640	0.976	**1678**
25 Year	0.776	1597	1.143	1755	1.197	**1779**
50 Year	1.109	1739	1.371	1849	1.420	**1870**
100 Year	1.407	1865	1.642	1930	1.663	**1930**

Note: Bold values indicate the more conservative (higher) proposed storage volumes

2.11 Comparison of Existing Targets and Proposed Flows

The proposed development was designed to control proposed runoff to the existing levels. **Table 2.6**, **Table 2.7**, and **Table 2.8** provides a comparison of existing and proposed flows at the outlet locations.

Table 2.6: Comparison of Existing Targets and Proposed Flows – 4-Hour Chicago

Return Period Storm	North Outlet (m^3/s)		West Outlet (m^3/s)		Overall (m^3/s)	
	Pre	Post	Pre	Post	Pre	Post
2 Year	0.369	0.122	0.112	0.064	0.432	0.185
5 Year	0.688	0.356	0.224	0.136	0.815	0.381
10 Year	0.940	0.595	0.318	0.198	1.129	0.638
25 Year	1.230	0.875	0.428	0.270	1.487	0.937
50 Year	1.570	1.279	0.549	0.350	1.898	1.394
100 Year	1.873	1.635	0.652	0.419	2.262	1.798

Table 2.7: Comparison of Existing Targets and Proposed Flows – 12-Hour SCS Type II

Return Period Storm	North Outlet (m^3/s)		West Outlet (m^3/s)		Overall Site (m^3/s)	
	Pre	Post	Pre	Post	Pre	Post
2 Year	0.589	0.195	0.148	0.105	0.713	0.293
5 Year	0.949	0.589	0.242	0.172	1.155	0.620
10 Year	1.247	0.980	0.321	0.229	1.525	1.098
25 Year	1.573	1.382	0.407	0.290	1.928	1.621
50 Year	1.819	1.694	0.472	0.336	2.235	1.970
100 Year	2.072	2.020	0.538	0.383	2.550	2.335

Table 2.8: Comparison of Existing Targets and Proposed Flows - 24-Hour SCS Type II

Return Period Storm	North Outlet (m^3/s)		West Outlet (m^3/s)		Overall Site (m^3/s)	
	Pre	Post	Pre	Post	Pre	Post
2 Year	0.640	0.244	0.159	0.113	0.777	0.315
5 Year	0.996	0.670	0.250	0.179	1.216	0.705
10 Year	1.313	1.138	0.332	0.238	1.609	1.324
25 Year	1.660	1.500	0.423	0.302	2.041	1.765
50 Year	1.861	1.786	0.475	0.340	2.291	2.089
100 Year	2.077	2.053	0.531	0.379	2.560	2.377

As shown in **Table 2.6**, **Table 2.7**, and **Table 2.8**, the proposed flows are less than or equal to the existing flows for the 2 through 100 year storm events for the entire site.

2.12 Storm Servicing

The storm sewer system (minor system) will be designed for the 5 year return storm as per the Town of Aurora standards.

The major system drainage (up to the 100 year storm event) will generally be conveyed overland along the road right-of-ways (ROW).

The storm sewer system will typically be designed with grades between 0.5% and 2.0%. Throughout the site, the storm sewer will be constructed at a minimum depth of 1.5 m to provide frost protection and 2.8 m to service basements. It is anticipated that all storm sewers will be able to be provided deep enough to service basements by gravity, however due to the superpipe storage, it is anticipated that portions of the site will require sump pumps due to the hydraulic grade line in the sewer relative to the foundation drain elevations.

The storm drainage system will be designed in accordance with the Town of Aurora 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: 0.45 m/s for first run, 0.6 m/s for second to fourth run, 0.75 m/s for subsequent runs; and
- Minimum Pipe Depth: 1.5 m to obvert, 2.8 m to obvert to service basements.

The rainfall intensity will be calculated based on Town of Aurora parameters listed below in **Table 2.9**:

Table 2.9 – Rainfall Intensity Parameters

Return Period Storm	A	B	C
2 Year	647.7	4	0.784
5 Year	929.8	4	0.798
10 Year	1021	3	0.787
25 Year	1100	2	0.776
50 Year	1448	3	0.803
100 Year	1770	4	0.820

2.13 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 to 100 year capture points. At detailed design, the 100 year capture points will be designed to capture the 100 year flows assuming 50% blockage at a depth not exceeding the maximum ponding depth per Town of Aurora criteria.

3.0 SANITARY SERVICING

3.1 Existing Sanitary Sewer System

The existing dwellings have individual on-site sanitary sewage disposal via septic systems.

There is existing sanitary sewer infrastructure surrounding the subject lands comprising of the following and illustrated on **Figure 3.1**.

- A 300 mm diameter PVC sanitary sewer on Bayview Avenue flowing north;
- The Bayview/Vandorf Pumping Station, located south of Vandorf Sideroad opposite the west limit of the subject lands;
- A 200 mm diameter PVC sanitary forcemain on Vandorf Sideroad, conveying sewage from the Bayview/Vandorf Pumping Station to the 300 mm diameter sanitary sewer on Bayview Avenue; and
- A 1050 mm diameter CPP sanitary forcemain on the east side of Bayview Avenue.

An existing sanitary sewer network is located in the Cattail Subdivision north of the site. The 300 mm diameter sanitary sewer on Bayview Avenue drains north and enters the Cattail Subdivision at Stone Road. The sanitary sewer then drains through the Cattail Subdivision to a sanitary trunk sewer located in the hydro corridor.

A downstream analysis of this existing system to the trunk sewer trunk is provided in **Appendix G**. The sanitary drainage plans for the existing surrounding developments are included in **Appendix B**. The results show that several runs of the sanitary sewer system are between 82% (Stone Road) and 91% capacity (October Lane) based on theoretical design flows.

3.2 Proposed Sanitary Sewer System

It is proposed to discharge sanitary sewage to the 300 mm diameter sanitary sewer on Bayview Avenue. Due to the elevation of the site and the Bayview Avenue sanitary sewer, it is not possible to drain the entire subject lands by gravity. As much of the proposed development lands will drain to the Bayview Avenue sanitary sewer as possible, and approximately 78 lots will require a sanitary sewage pumping solution. Two feasible sanitary servicing options have been considered: 1) Municipal sanitary pumping station, and 2) Low pressure sanitary (LPS) system.

The LPS system comprises of private grinder pumps located on the individual lots that pump sewage to a municipal low pressure forcemain in the road right-of-way. A comparison of the considerations between a LPS system and a sanitary pumping station is provided in **Table 3.1**. Based on these considerations, there are advantages to using an LPS system and therefore, it is the proposed solution. The Town of Aurora was consulted regarding the use of an LPS system and provided feedback, which is addressed in **Table 3.2**.

Table 3.1 – Sanitary Pumping Options Comparison

Consideration	LPS	Municipal Sanitary Pumping Station
Municipal infrastructure / maintenance responsibility	Minimizes municipal infrastructure (forcemain only, no maintenance holes)	Larger municipal infrastructure (pumping station, sewers, maintenance holes)
Sewage generation rate	Can accommodate low flow rates from fewer units	Low number of lots produces low generation rate and longer detention time in pumping station and potential odour and corrosion issues
Land requirement	Does not require additional land	Requires a block for pumping station reducing the number of lots
System failure provisions	Alarms within individual dwelling to alert homeowners to a failure, able to react quickly to stop water usage	Alarms to Town operator only and not able to alert individual home owners to stop using water. Backup and emergency storage provisions required.
Capital Cost	Lower capital cost	Higher capital cost, passed on to prospective home buyers through higher home prices
Operating Cost	Minimal operational costs since this is a closed forcemain system with no access points. Pumps are privately operated and maintained.	Town of Aurora/taxpayer responsibility. Higher annual operating and long term replacement cost than LPS.

Table 3.2 – Town Comments and Responses to LPS

Town of Aurora Feedback (March 8, 2021, via email from Mr. Jim Tree)	Response
Residents who are on municipal services should not be expected to maintain private sewage disposal equipment unless they are residing in a location that is not served by municipal services.	The existing dwellings on Archerhill Court are serviced with on-site septic systems because municipal services are not available. The advantages of the LPS system out-weigh those of the municipal sanitary pumping station in order to bring municipal services to the proposed development. Prospective buyers will be notified of the LPS equipment that is required to service the dwelling. It is not

Town of Aurora Feedback (March 8, 2021, via email from Mr. Jim Tree)	Response
	uncommon for infill development to require private sanitary pumping solutions based on the constraints of the existing surrounding infrastructure. For example, the Genview Phase 2 subdivision located on the east side of Bayview Ave adjacent to the subject site proposed and received approval for an LPS system to service their lots.
Inevitably these pumps will need to be replaced /serviced or repaired.	To assist homeowners with understanding the maintenance requirements, they will be provided with an owner's manual for the equipment which will describe the maintenance requirements. This is common for mechanical equipment that services a dwelling (such as furnaces, air-conditioners, water heaters, heat recovery units, heat pumps, water treatment/softener units, etc.), all of which require maintenance and end-of-life replacement.
Residents purchasing these homes may not even be fully aware of the fact that they have this type of system in the home. Unless this is spelled out specifically in all purchase and sales agreement in bold print very few people will understand these systems.	Prospective buyers will be notified of the LPS equipment that is required to service the dwelling as well as being provided an owner's manual. A clause in the purchase and sale agreement mentioning this equipment can be included. We suggest adding this requirement to the Conditions of Draft Plan Approval.
[The Town's] preference will always be a municipally operated lift station that is funded by the general tax levy and one that places no burden on individual taxpayers.	The LPS system will be less operating cost to the Town compared to a municipal sanitary pumping station, which benefits all Aurora taxpayers and not only the units serviced by a pumping station. Prospective homebuyers will be made aware of the equipment and can consider the additional mechanical equipment in their purchase offer.

The preliminary layout for the proposed sanitary drainage system within the subject lands is provided on **Figure 3.2**.

The sanitary sewers within the proposed development will have slopes ranging between 0.5% and 2% (typically) and will be provided at 3 m to 5 m deep.

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

- Residential Sanitary Generation Rate: 400 l/c/d,
- Population Density:
  - 3.8 people/unit (Single Family)
  - 3.5 people/unit (Townhouse)
  - 2.5 people/unit (Apartment)
  - 0.30 persons/student (School)
- Peaking Factor: Harmon (Min. 2.0, Max. 4.0),
- Infiltration Rate: 0.26 L/s/ha,
- Minimum Pipe Size: 200 mm diameter,
- Minimum Pipe Cover: 2.8 m,
- Minimum Full Flow Velocity: 0.60 m/s, and
- Maximum Velocity: 3.0 m/s.

The downstream analysis to the trunk sewer was updated to add the proposed development flows. The proposed development includes 9.18 ha and an equivalent population of 566. Refer to **Appendix G**, for the sanitary sewer design sheet. The results show that with the addition of the proposed development, that one (1) 300 mm diameter sewer run on October Lane would theoretically be at 107% capacity. A hydraulic grade line (HGL) analysis was performed to further investigate the aforementioned sewer on October Lane. It was found that the HGL will not impact the connected basements. Design sheets and the hydraulic grade line analysis are provided in **Appendix G**.

4.0 WATER SUPPLY AND DISTRIBUTION

4.1 Existing Water Distribution

In the existing condition, the dwellings are serviced by an existing 150 mm diameter ductile iron cement lined municipal watermain on Archerhill Court, which connects to the existing 300 mm diameter municipal watermain on Vandorf Sideroad. A 100 mm diameter and 400 mm diameter municipal watermain also exist on Bayview Avenue. The existing watermain system is illustrated on **Figure 4.1**.

4.2 Proposed Water System

The site is proposed to be serviced by two watermain connections, one to the 300 mm diameter watermain on Vandorf Sideroad, and the other to the 400 mm diameter watermain on Bayview Avenue. As outlined in the Water Distribution Analysis prepared by MES (**Appendix B**), a 200 mm diameter watermain is proposed throughout the site to meet the water supply requirements. Individual pressure reducing valves will be required within the future homes in order to comply with the Ontario Building Code maximum pressure criteria. The preliminary layout for the proposed watermain system is provided on **Figure 4.1.**

The watermain system will designed in accordance with the Town of Aurora and MECP criteria including:

- Residential water usage rate: 390 l/c/d,
- Population Density:
  - 3.8 people/unit (Single Family)
  - 3.5 people/unit (Townhouse)
  - 2.5 people/unit (Apartment)
- Minimum Pipe Size: 150 mm diameter,
- Minimum Pipe Depth: 1.7m, and
- Maximum Hydrant Spacing: 125m.

5.0 GRADING

5.1 Existing Grading Conditions

Under existing conditions, the majority of the site slopes north towards the adjacent watercourse.

The existing topography has slopes in the range of 2% to 10%. The ground surface elevations through the study area range from approximately 280 m in the southeast corner to approximately 265 m at the north end of the site.

5.2 Proposed Grading Concept

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

- Satisfy the Town of Aurora lot and road grading criteria including:
  - Minimum Road Grade: 0.5%
  - Maximum Road Grade: 6.0%
  - Minimum Lot Grade: 2%
  - Maximum Lot Grade: 5%
- 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**. 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.

The grading interface between the proposed development and Bayview Avenue is shown using cross sections in **Figure 5.2**. The proposed acoustic berm is included in these cross sections.

6.0 RIGHT-OF-WAYS AND SIDEWALKS

The proposed 18m right-of-way cross-section is provided in **Appendix H**. The section has been developed to facilitate the LID measures in the boulevard, while still maintaining the general geometric layout of the pavement and street furniture per the Town's standard cross-section for an 18 m right-of-way as close as possible.

The proposed sidewalk location plan is provided on **Figure 6.1**. For the areas where sidewalk will be provided along one side of the street, sidewalks will be typically be located on north or east side of the boulevard or the boulevard side where the larger number of frontages can be serviced.

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 Stormwater Management Technical Guidelines document (LSRCA, 2016). A detailed erosion and sediment control plan will be prepared for review and approval by the Town of Aurora and LSRCA 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 watercourse and properties are minimized both during and following construction.

8.0 UTILITY CONSIDERATIONS

The utility companies (hydro, natural gas, and telecommunications) have been contacted to circulate the proposed draft plan of subdivision to confirm whether there is sufficient servicing capacity. Correspondence received thus far is included in **Appendix I**.

8.1 Hydro

Alectra Utilities is the local hydro distributor and has confirmed that there is sufficient capacity in the existing infrastructure to service the proposed development.

8.2 Gas

Enbridge Gas is the local natural gas distributor and has confirmed that there is a 100 mm diameter PE main on Vandorf Sideroad and a 6" PE main on Bayview Avenue. They have indicated that these should be sufficient to service the proposed development, but will be confirmed in the future considering development in the next few years.

8.3 Bell

Bell Canada has stated that there are no known issues at this point in servicing the proposed development. However, further coordination will be required to confirm service availability.

8.4 Cable

Rogers Communications has confirmed that there is sufficient existing capacity to service the proposed development.

9.0 SUMMARY

This Functional Servicing and Stormwater Management Report has been prepared in support of the Zoning Bylaw Amendment and Draft Plan of Subdivision applications for the proposed development in the Town of Aurora. This report outlines the means by which the proposed development can be graded and serviced in accordance with the Town of Aurora, Lake Simcoe Region Conservation Authority, Lake Simcoe Protection Plan, and the Ministry of Environment, Conservation and Parks design criteria and policies.

General Information

- The existing land use is estate residential;
- The proposed development is located in the East Holland River subwatershed in the Lake Simcoe Watershed; and
- The proposed development consists of low density residential units, open space, and proposed roads.

Stormwater Management and Storm Servicing

- Quantity, Peak Flow Control: Peak flow control will be provided by superpipes to control proposed runoff rates in the 2 through 100 year storm events;
- Quantity, Volume Control: The on-site retention/detention of the 25 mm rainfall runoff will be provided to the extent feasible by a treatment train of LIDs and BMPs through the use of rear yard infiltration trenches, bioswales, and catchbasin filtration trenches in the right-of-way boulevard;
- Quality Control, TSS: MECP Enhanced (Level 1) water quality protection will be provided using a treatment train of LIDs and BMPs including catchbasin sumps and "goss traps", rear yard infiltration trenches, bioswales, catchbasin filtration trenches in the right-of-way boulevard;
- Quality Control, Phosphorus: A phosphorus budget analysis was completed using the MECP phosphorus budget tool, which shows that the proposed phosphorus export will be approximately 2.222 kg/yr. The phosphorus export is being mitigated through the use of rear yard infiltration trenches, bioswales, and catchbasin filtration trenches in the right-of-way boulevard. An offsetting fee will also be paid to LSRCA in lieu of meeting the zero export criteria;
- Erosion Control: The runoff volume from a 25 mm rainfall event will be detained over 24 hours, to the extent feasible by the superpipes;
- Water Budget: RJ Burnside has completed a water budget analysis to demonstrate that the proposed annual infiltration rates will not be less than existing rates;
- Storm Servicing:
  - Storm runoff will be conveyed by storm sewers designed in accordance with Municipality 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 municipal storm sewer.

Sanitary Servicing

- There is an existing 300 mm diameter sanitary sewer on Bayview Avenue discharges to the sanitary sewer system in the Cattail Subdivision, ultimately discharging to a trunk sanitary sewer in the hydro corridor to the north;
- A downstream sanitary sewer system analysis has been completed;
- Approximately 78 lots are proposed to be serviced with a low pressure sanitary system; and
- An existing sanitary sewer on October Lane will theoretically flow slightly above 100% capacity, however, a hydraulic grade line analysis has been completed that demonstrates that the surcharging will not negatively affect any existing service connections.

Water Supply and Distribution

- There is an existing 300 mm diameter municipal watermain on Vandorf Sideroad and a 400 mm diameter municipal watermain on Bayview Avenue;
- The development is proposed to be serviced with one connection to each of the Vandorf Sideroad and Bayview Avenue watermains;
- A watermain hydraulic analysis has been completed that demonstrates that there will be sufficient domestic and fire flows to service the development;
- Individual pressure reducing valves are required; 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; and
- The lot grading will be subject to further grading design at the architectural design stage prior to the building permit applications.

Right-of-Ways and Sidewalks

- Site specific right-of-way cross sections are proposed to facilitate the low impact development measures in the boulevard.

Erosion and Sediment Control during Construction

- An erosion and sediment control plan will be prepared at the detailed engineering stage, in accordance with the Stormwater Management Technical Guidelines document (LSRCA, 2016).

Utility Considerations

- The utility companies have been contacted to confirm whether there is sufficient servicing capacity.
- There are no known issues with capacity at this point, however, further coordination will take place at detailed design.

Respectfully Submitted:

SCS Consulting Group Ltd.

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Erich Knechtel, P. Eng.
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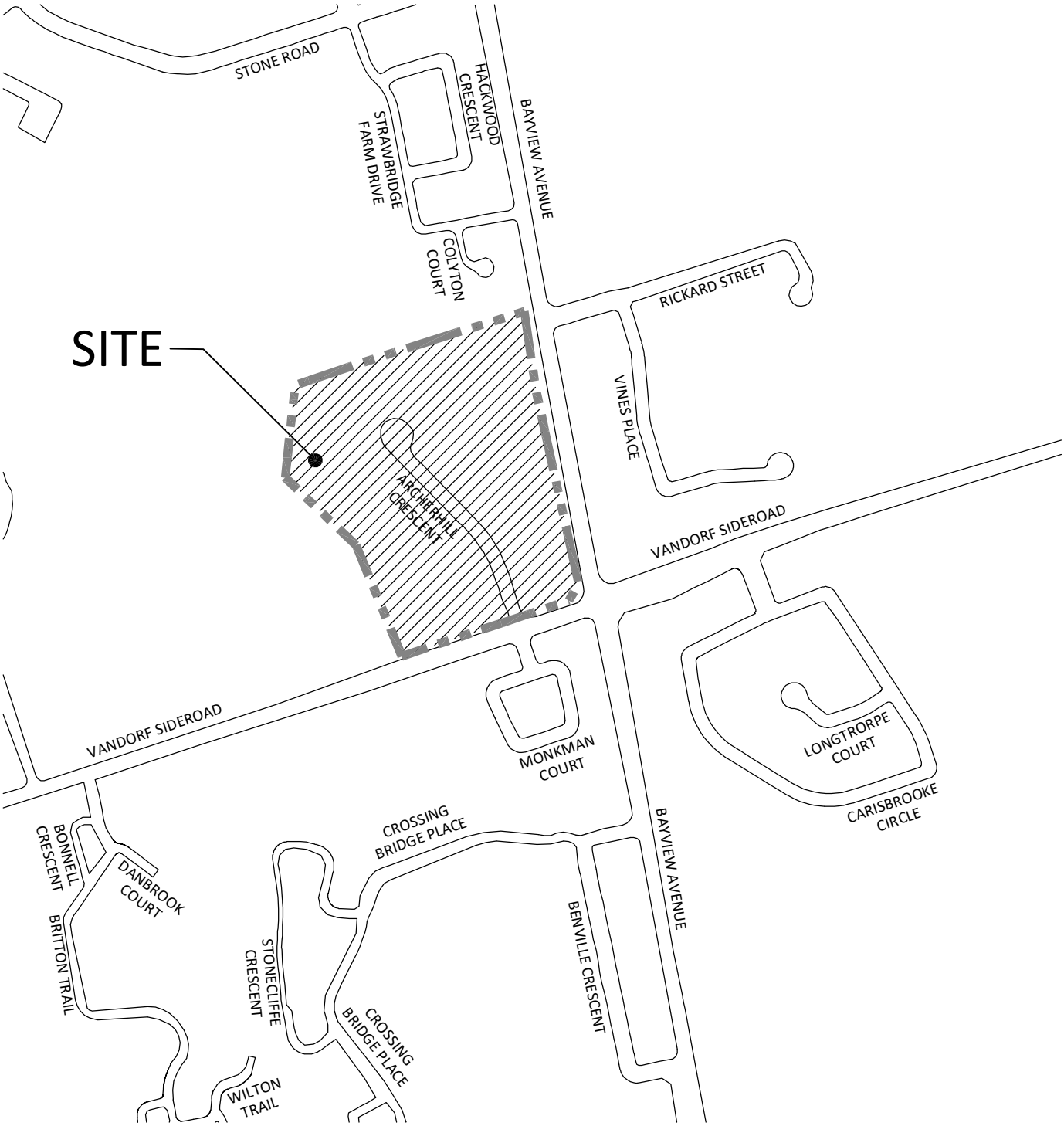

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

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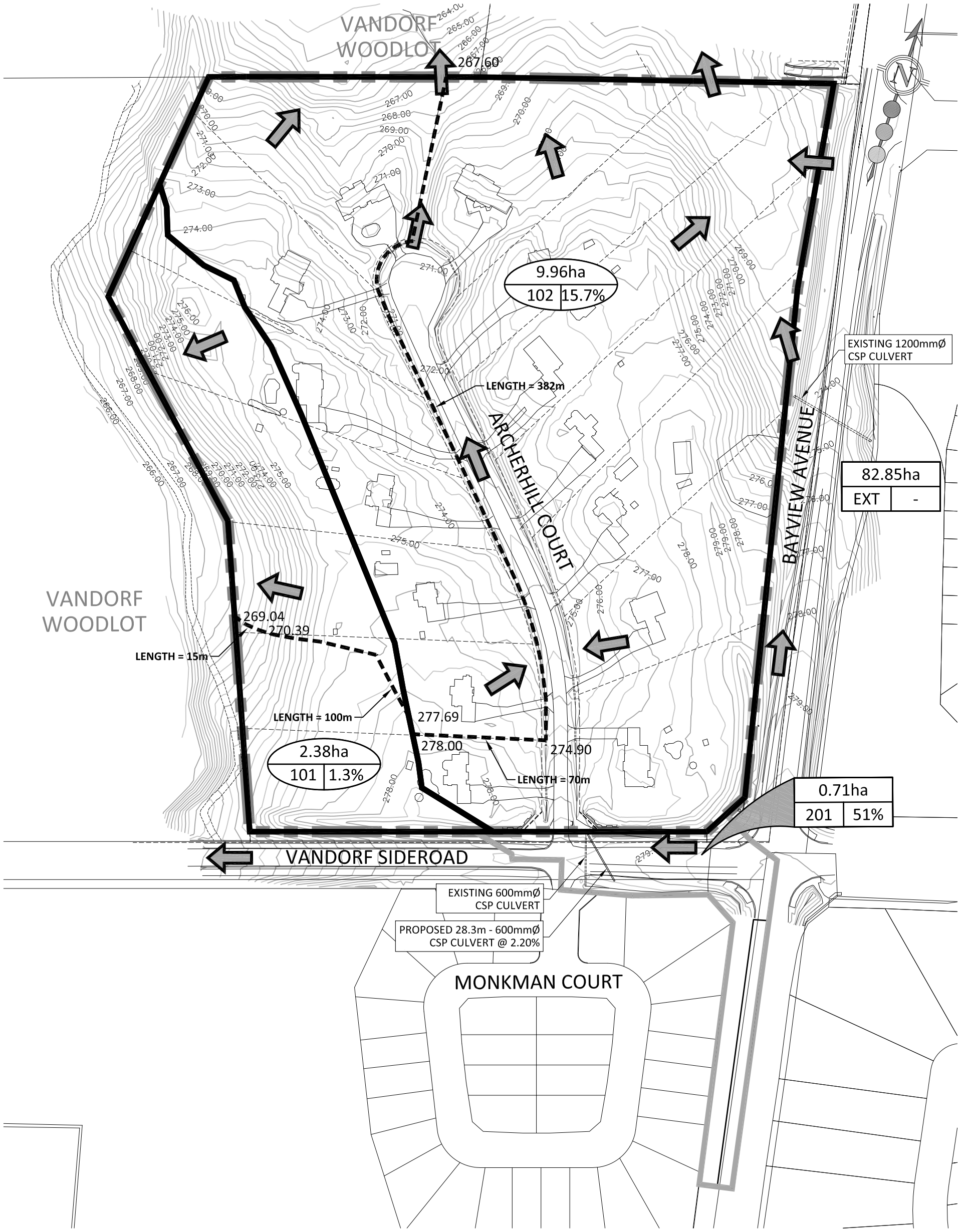
FSSR

SITE LOCATION PLAN

DESIGNED BY: E.A.S.	CHECKED BY: S.M.S.	PROJECT No: 2301	FIGURE No: 1.1
SCALE: N.T.S.	DATE: AUGUST 2021		



LEGEND:

- LIMIT OF PROPERTY
- STORM DRAINAGE BOUNDARY
- EXTERNAL STORM DRAINAGE BOUNDARY
- 223.91 — EXISTING CONTOUR AND ELEVATION
- TIME TO PEAK FLOW PATH
- 223.91 — TIME TO PEAK ELEVATION
- 9.84ha / 102 | 13.6% — DRAINAGE AREA (HECTARES); PERCENT (%) IMPERVIOUS; CATCHMENT ID
- MAJOR SYSTEM FLOW DIRECTION
- 0.71ha / 201 | 51% — EXTERNAL STORM DRAINAGE AREA (HECTARES); PERCENT (%) IMPERVIOUS; CATCHMENT ID

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EXISTING STORM DRAINAGE PLAN

DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	1:2000	DATE:	AUGUST 2021

PROJECT No: 2301

FIGURE No: 2.1

VANDORF WOODLOT

PROPOSED HEADWALL

267.50

2.57ha
103 | 11%

STREET A

LENGTH = 103m

8.15ha
202 | 64%

STREET D

STREET A

268.5

LENGTH = 74m

EXISTING 1200mmØ CSP CULVERT

LENGTH = 26m

LENGTH = 37m

274.40

275.94

269.72

LENGTH = 27m

270.80

276.16

BAYVIEW AVENUE

1.61ha
104 | 11.3%

82.85ha
EXT | -

STREET A

STREET C

STREET B

STREET A

STREET A

VANDORF WOODLOT

0.71ha
201 | 51%

VANDORF SIDEROAD

EXISTING 600mmØ CSP CULVERT

PROPOSED 28.3m - 600mmØ CSP CULVERT @ 2.20%

MONKMAN COURT

LEGEND:

- 100YR CAPTURE
- LIMIT OF PROPERTY
- LIMIT OF DEVELOPMENT
- STORM DRAINAGE BOUNDARY
- EXTERNAL STORM DRAINAGE BOUNDARY
- 223.91 EXISTING CONTOUR AND ELEVATION
- TIME TO PEAK FLOW PATH
- 223.91 TIME TO PEAK ELEVATION
- PROPOSED STORM SEWER
- 9.84ha / 102 | 13.6% DRAINAGE AREA (HECTARES), PERCENT (%) IMPERVIOUS, CATCHMENT ID
- MAJOR SYSTEM FLOW DIRECTION
- 0.71ha / 201 | 51% EXTERNAL STORM DRAINAGE AREA (HECTARES), PERCENT (%) IMPERVIOUS, CATCHMENT ID

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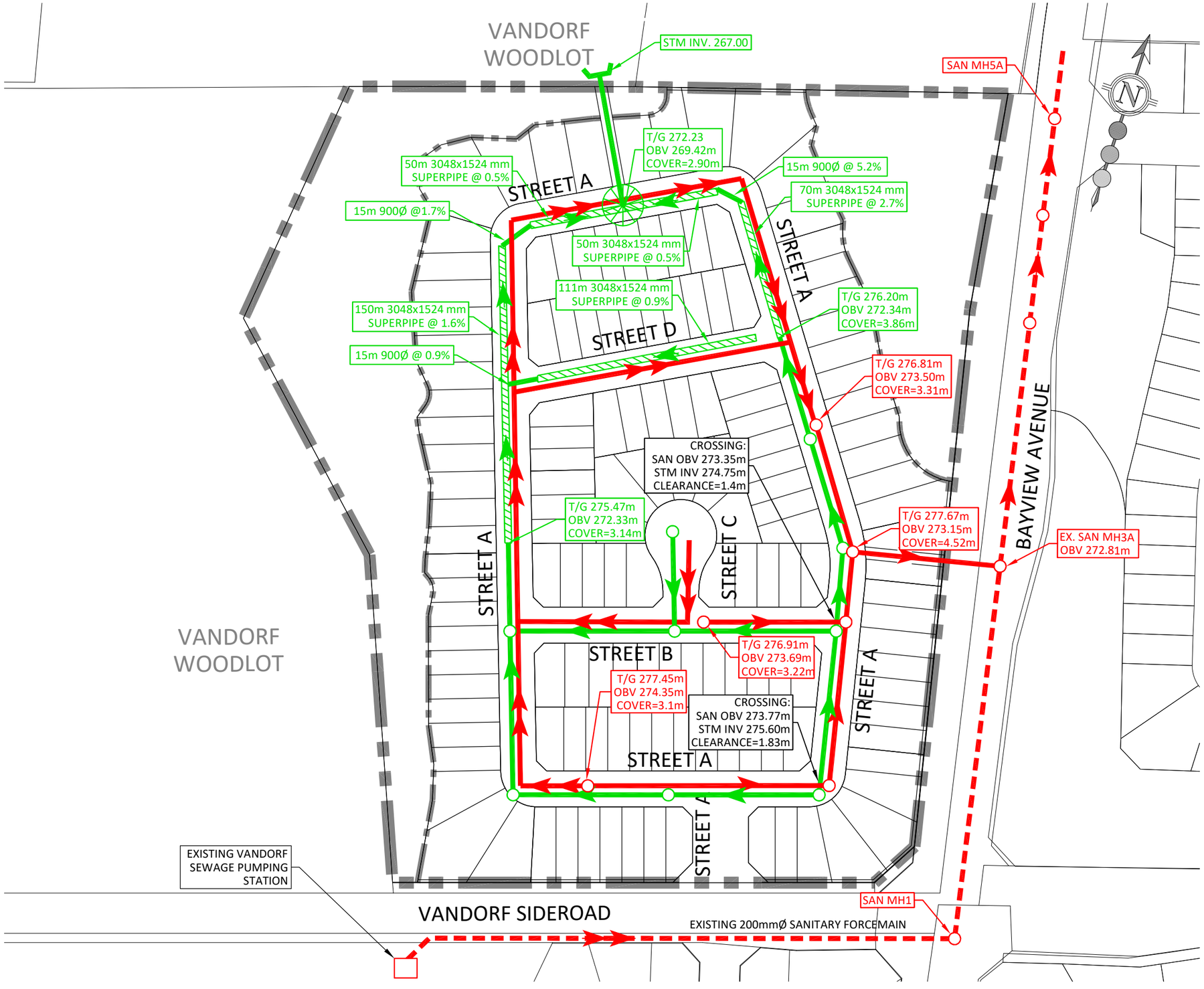
PROPOSED STORM DRAINAGE PLAN

DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	1:2000	DATE:	AUGUST 2021

PROJECT No: 2301

FIGURE No: 2.2



LEGEND:

- LIMIT OF PROPERTY
- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED SANITARY SEWER AND MANHOLE
- EXISTING SANITARY SEWER AND MANHOLE
- PROPOSED LOW PRESSURE SANITARY FORCEMAIN
- SUPERPIPE STORM SEWER
- 100YR CAPTURE

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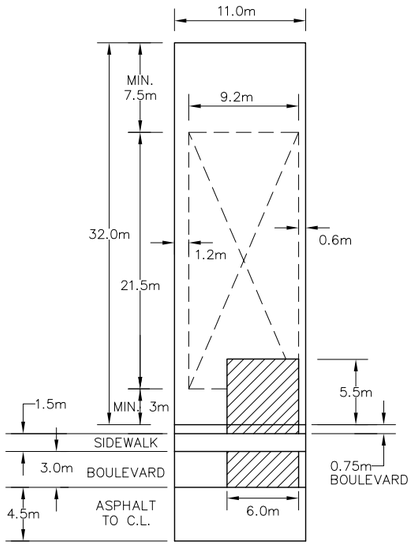
PRELIMINARY STORM AND SANITARY SERVICING PLAN

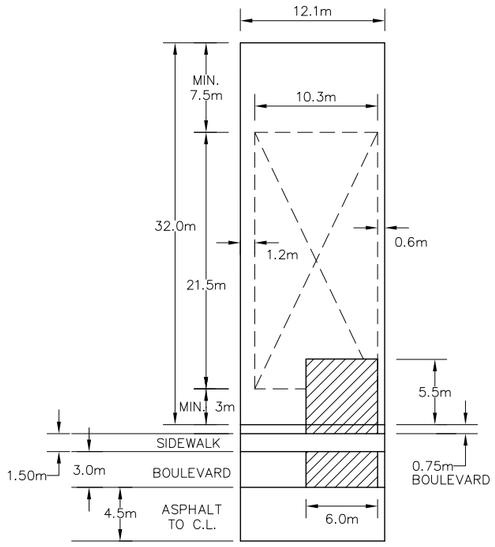
DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	1:2000	DATE:	AUGUST 2021
PROJECT No:	2301	FIGURE No:	2.3

TYPICAL 11.0m X 32m SINGLE DETACHED DWELLING



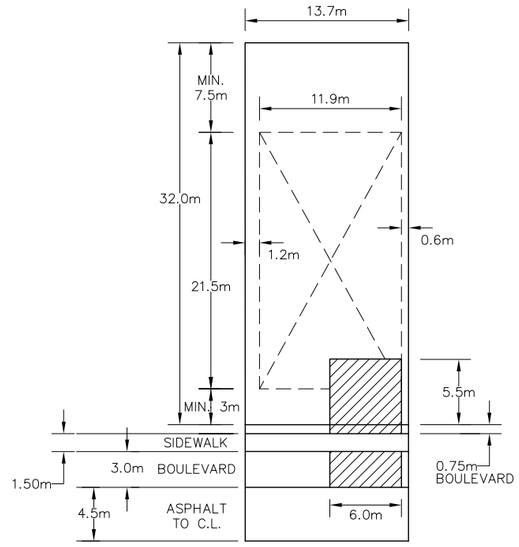
CALCULATED PERCENT IMPERVIOUS = 63%

TYPICAL 12.1m X 32m SINGLE DETACHED DWELLING



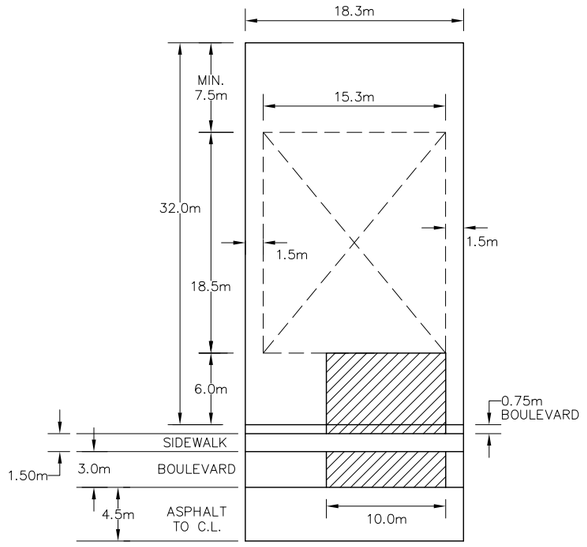
CALCULATED PERCENT IMPERVIOUS = 62%

TYPICAL 13.7m X 32m SINGLE DETACHED DWELLING



CALCULATED PERCENT IMPERVIOUS = 62%

TYPICAL 18.3m X 32m SINGLE DETACHED DWELLING



CALCULATED PERCENT IMPERVIOUS = 63%

NOTES:
- SETBACKS PER ZONING
- SIDEWALK IS ONLY ON ONE SIDE OF THE RIGHT-OF-WAY
- MAXIMUM BUILDING COVERAGE = 50% PER ZONING BYLAW

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

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LEGEND:

DRIVEWAY

BUILDING ENVELOPE

HIGHFAIR INVESTMENTS INC. FSSR

TYPICAL IMPERVIOUS COVERAGE

DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	1:500	DATE:	AUGUST 2021

PROJECT No: 2301

FIGURE No: 2.4

LEGEND:

- LIMIT OF PROPERTY
- STORM DRAINAGE BOUNDARY
- ROW BIOSWALE
- ROW BIOSWALE DRAINAGE AREA
- CATCHBASIN FILTRATION SYSTEM
- CATCHBASIN FILTRATION SYSTEM DRAINAGE AREA
- REAR YARD SHALLOW INFILTRATION TRENCH DRAINAGE AREA
- REAR YARD SOAKAWAY (INFILTRATION) DRAINAGE AREA

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PROPOSED LID PLAN

DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	1:2000	DATE:	AUGUST 2021
PROJECT No:	2301	FIGURE No:	2.5

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EXISTING LAND USE	TOTAL AREA (ha)
LOW INTENSITY RESIDENTIAL	9.13

LEGEND:

- LIMIT OF PROPERTY
- LIMIT OF DEVELOPMENT

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EXISTING PHOSPHORUS BUDGET PLAN

DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	1:2000	DATE:	AUGUST 2021
PROJECT No:	2301	FIGURE No:	2.6

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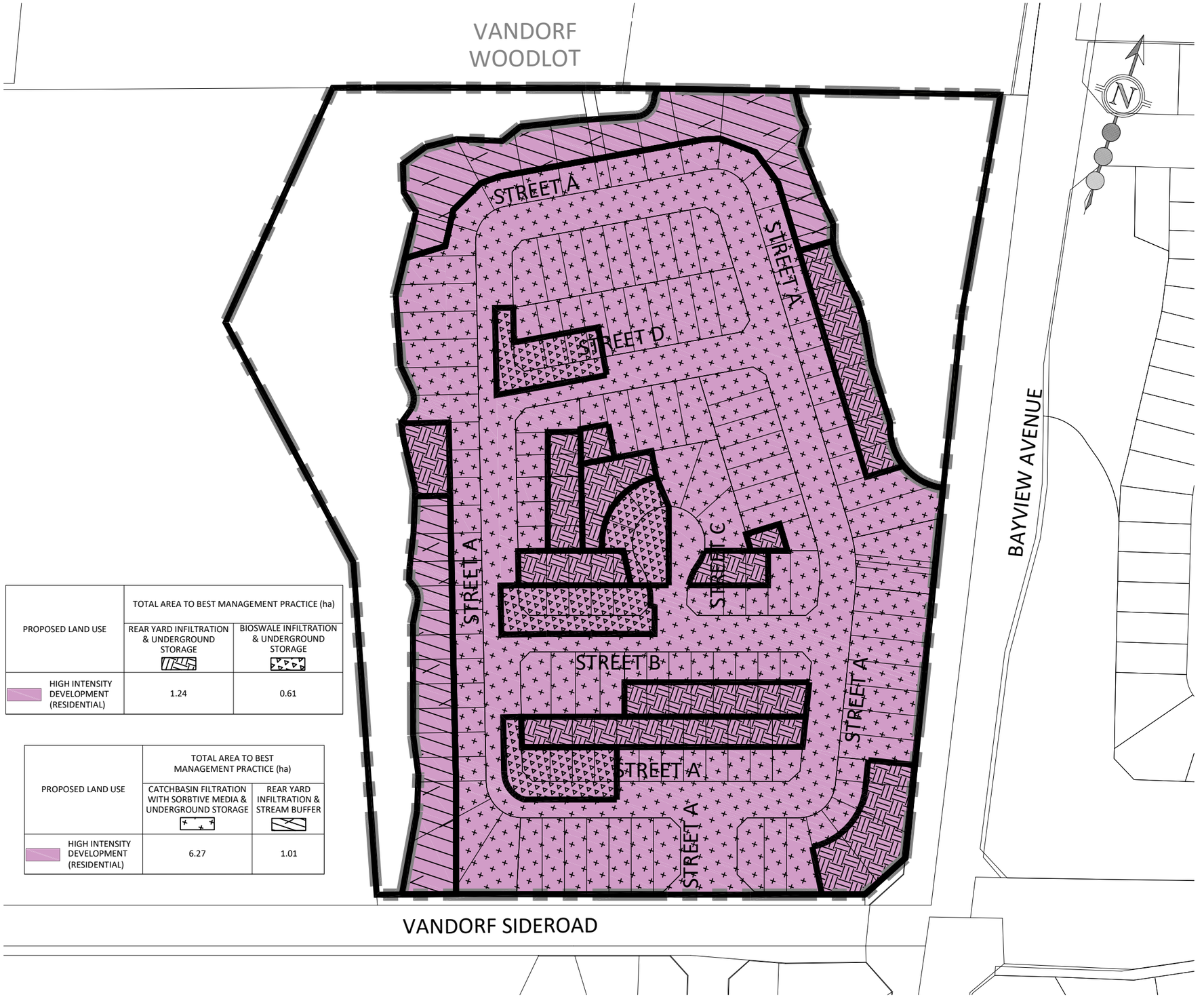

PROPOSED LAND USE	TOTAL AREA TO BEST MANAGEMENT PRACTICE (ha)	
	REAR YARD INFILTRATION & UNDERGROUND STORAGE	BIOSWALE INFILTRATION & UNDERGROUND STORAGE
HIGH INTENSITY DEVELOPMENT (RESIDENTIAL)	1.24	0.61

PROPOSED LAND USE	TOTAL AREA TO BEST MANAGEMENT PRACTICE (ha)	
	CATCHBASIN FILTRATION WITH SORBTIVE MEDIA & UNDERGROUND STORAGE	REAR YARD INFILTRATION & STREAM BUFFER
HIGH INTENSITY DEVELOPMENT (RESIDENTIAL)	6.27	1.01

LEGEND:

- LIMIT OF PROPERTY
- LIMIT OF DEVELOPMENT
- STORM DRAINAGE BOUNDARY

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TEL: (416) 987-5500
FAX: (905) 326-3600

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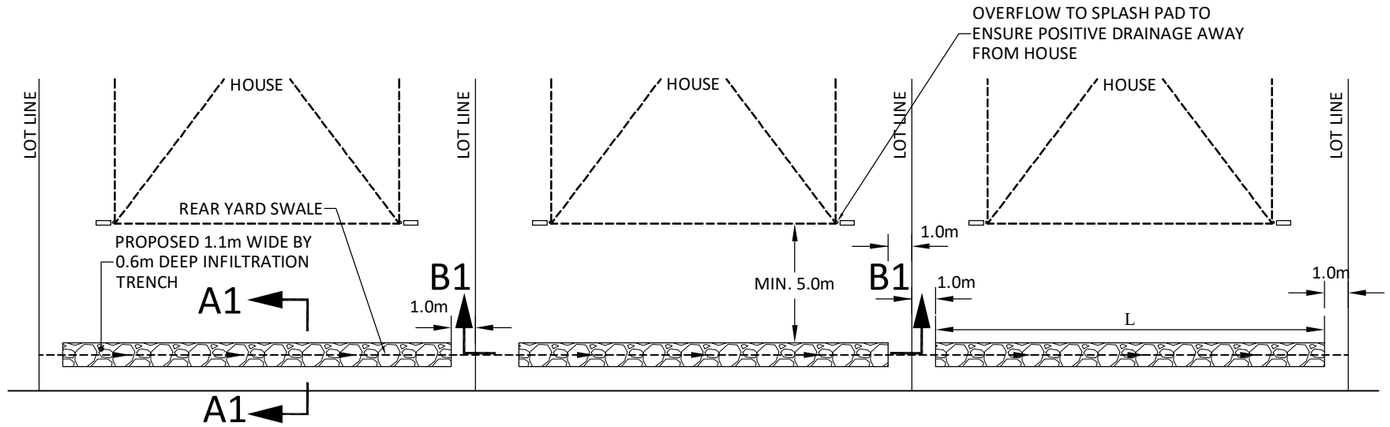
FSSR

PROPOSED PHOSPHORUS BUDGET PLAN

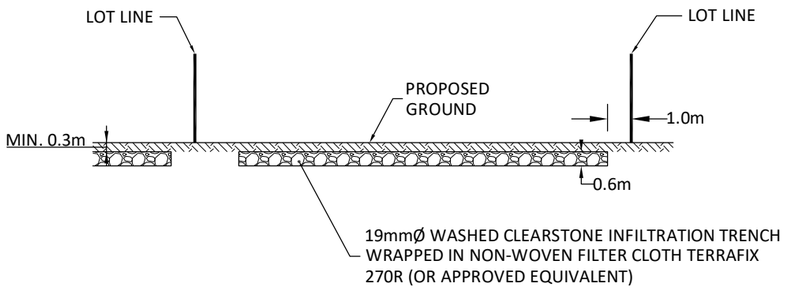
DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	1:2000	DATE:	AUGUST 2021
PROJECT No:	2301	FIGURE No:	2.7

File: P:\2301 Archer Hill, Aurora\Drawings\FSP\Fig\Report Figures\2301P-PHSB-PROP-2.7.dwg – Revised by <ESIRRS> : Sat, Aug 07 2021 – 11:17am



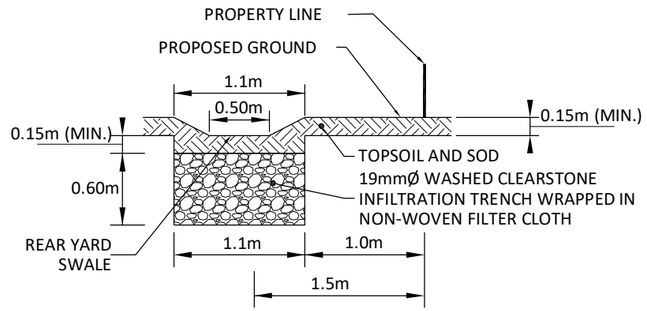
SPLIT DRAINING LOTS PLAN

SCALE 1:250



SECTION B1-B1

SCALE 1:250



SECTION A1-A1 INFILTRATION TRENCH ASSEMBLY

SCALE 1:50

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

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

LEGEND:

HIGHFAIR INVESTMENTS INC.
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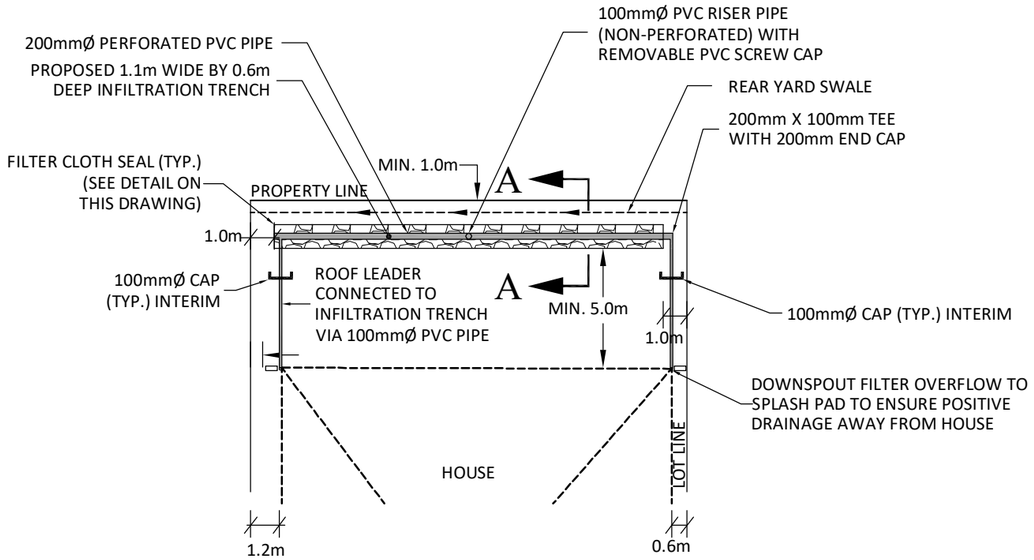
DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	AS SHOWN	DATE:	AUGUST 2021

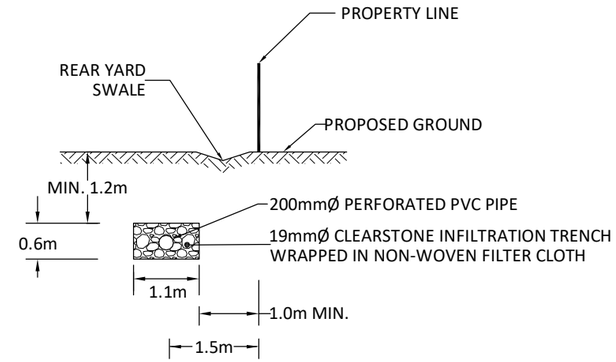
REAR YARD INFILTRATION TRENCH DETAIL - SPLITS

PROJECT No:	FIGURE No:
2301	2.8

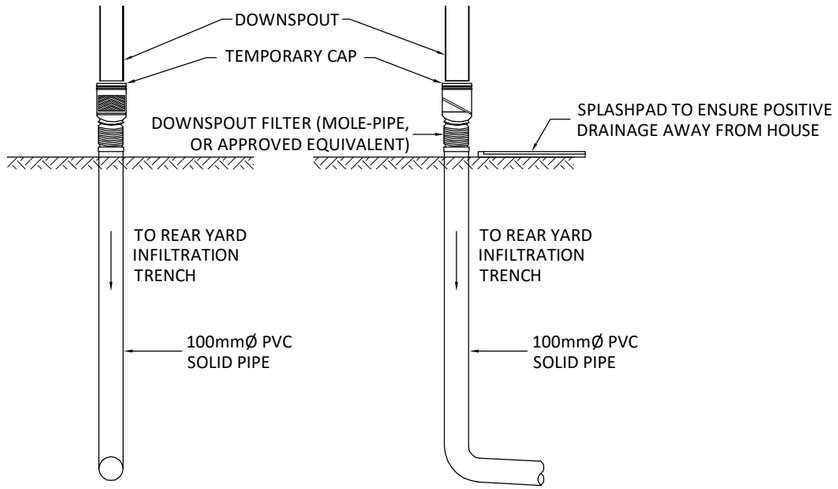
File: P:\2301 Archer Hill, Aurora\Drawings\FSP\Fig\Report Figures\2301P-FIGS-DETL-REAR-YARD-INFL-2.8.dwg – Revised by <STAN> : Tue, Aug 03 2021 – 10:16am



PLAN
SCALE 1:250



SECTION A-A
INFILTRATION TRENCH ASSEMBLY
SCALE 1:100

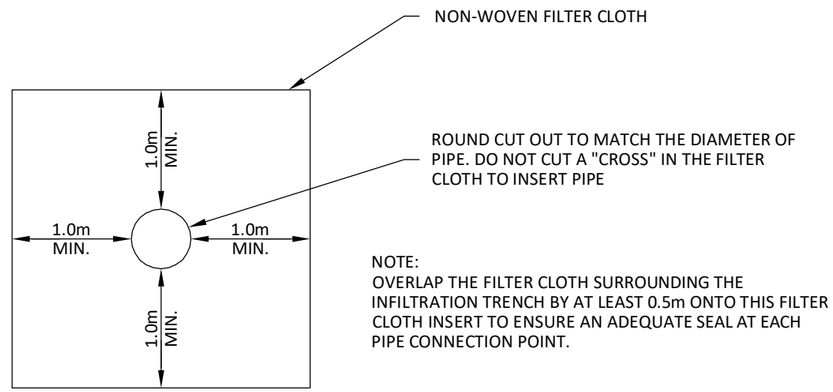


FRONT VIEW
SCALE 1:25

SIDE VIEW
SCALE 1:25

NOTE:
CAPPED INLET TO THE INFILTRATION TRENCH TO BE PLUGGED UNTIL THE ENTIRE DRAINAGE AREA IS FULLY RESTORED AND STABLE.

OVERFLOW DETAIL



NOTE:
OVERLAP THE FILTER CLOTH SURROUNDING THE INFILTRATION TRENCH BY AT LEAST 0.5m ONTO THIS FILTER CLOTH INSERT TO ENSURE AN ADEQUATE SEAL AT EACH PIPE CONNECTION POINT.

FILTER CLOTH SEAL FOR ALL PIPES EXTENDING FROM THE REAR LOT INFILTRATION TRENCHES
SCALE: 1:50

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

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FAX: (905) 475-8335

LEGEND:

HIGHFAIR INVESTMENTS INC.
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REAR YARD INFILTRATION TRENCH DETAIL - FRONTS

DESIGNED BY: E.A.S.	CHECKED BY: S.M.S.	PROJECT No: 2301	FIGURE No: 2.9
SCALE: AS SHOWN	DATE: AUGUST 2021		

File: P:\2301 Archer Hill, Aurora\Drawings\FSP\Fig\Report Figures\2301P-FIGS-DETL-REAR-YARD-INFL-2.9.dwg – Revised by <STAN> : Tue, Aug 03 2021 – 10:20am

LEGEND:

- LIMIT OF PROPERTY
- LIMIT OF DEVELOPMENT
- 270.00 — INTERPRETED GROUNDWATER CONTOUR (RJ BURNSIDE, 2021)
- BH2 — MONITORING WELL (EXP, 2021)
- PZ1s/d — DRIVEPOINT PIEZOMETER (RJ BURNSIDE, 2021)

WATER TABLE DEPTH

- <0m ABOVE PROPOSED ELEVATION
- 0m TO 1m BELOW PROPOSED ELEVATION
- 1m TO 2m BELOW PROPOSED ELEVATION
- 2m TO 3m BELOW PROPOSED ELEVATION
- >3m BELOW PROPOSED ELEVATION

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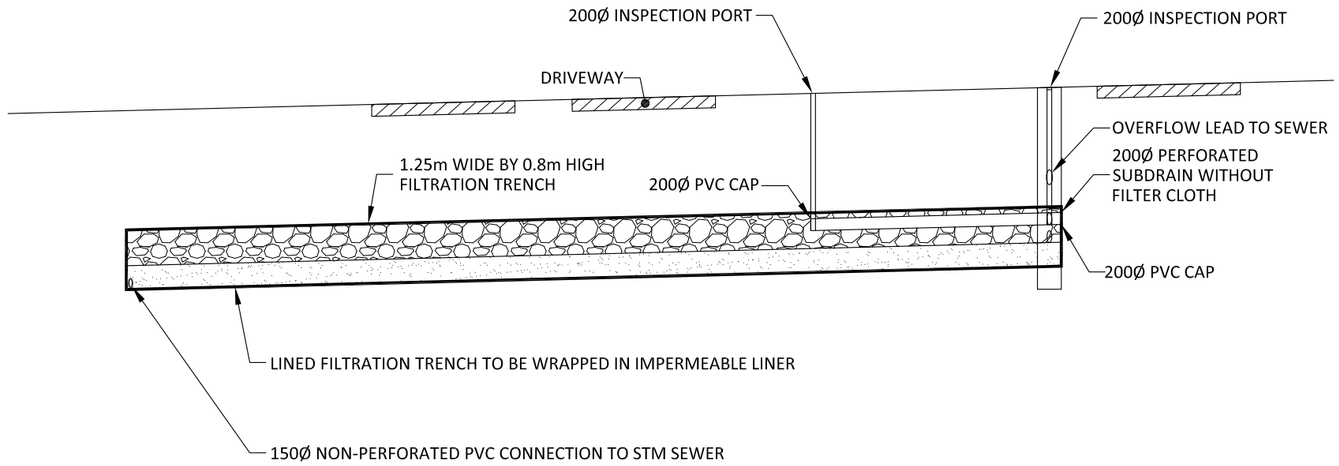
GROUNDWATER DEPTH MAP

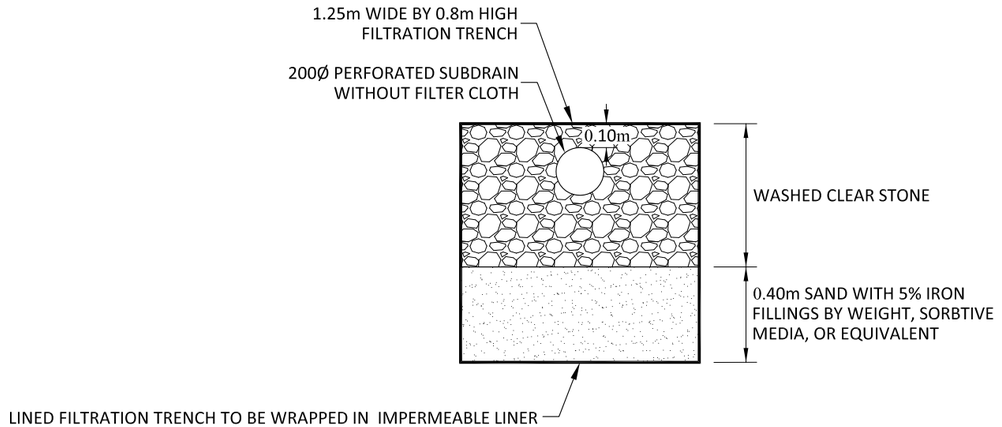
DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	1:2000	DATE:	AUGUST 2021
PROJECT No:	2301	FIGURE No:	2.10

File: P:\2301 Archer Hill, Aurora\Drawings\FSP\Fig\Report Figures\2301P-GRND-WATR-2.10.dwg – Revised by <STAN> : Tue, Aug 03 2021 – 10:24am



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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LEGEND:

HIGHFAIR INVESTMENTS INC.
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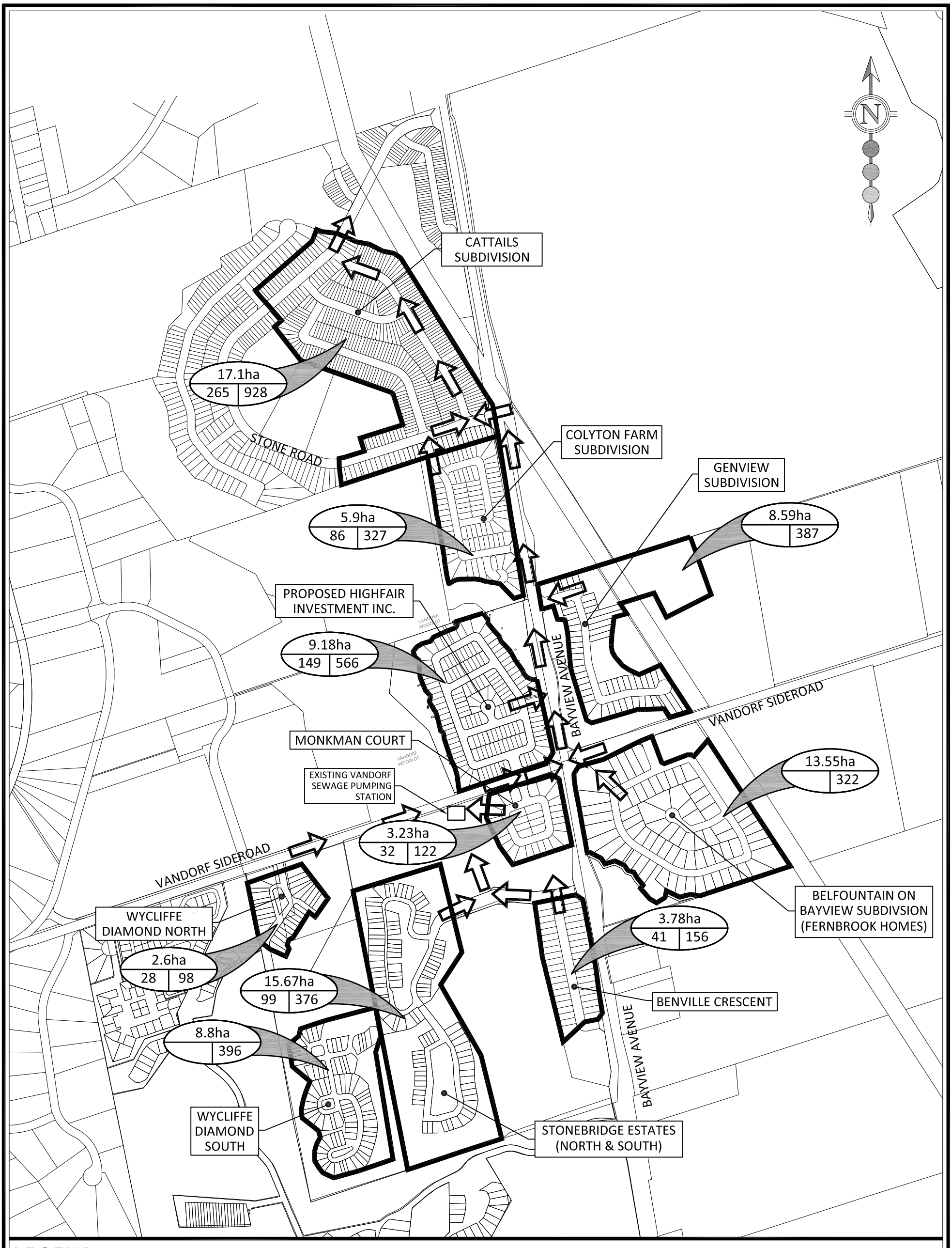
DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	AS SHOWN	DATE:	AUGUST 2021

CATCHBASIN FILTRATION TRENCH DETAIL

PROJECT No:	FIGURE No:
2301	2.11

File: P:\2301 Archer Hill, Aurora\Drawings\FSP\Fig\Report Figures\2301P-FIGS-DETL-CSBN-FILT-2.11.dwg – Revised by <STAN> : Tue, Aug 03 2021 – 10:18am



LEGEND:

SANITARY DRAINAGE BOUNDARY

SANITARY FLOW DIRECTION

15.67ha
99 | 376

CATCHMENT AREA (HECTARES)

NUMBER OF PERSONS

NUMBER OF UNITS

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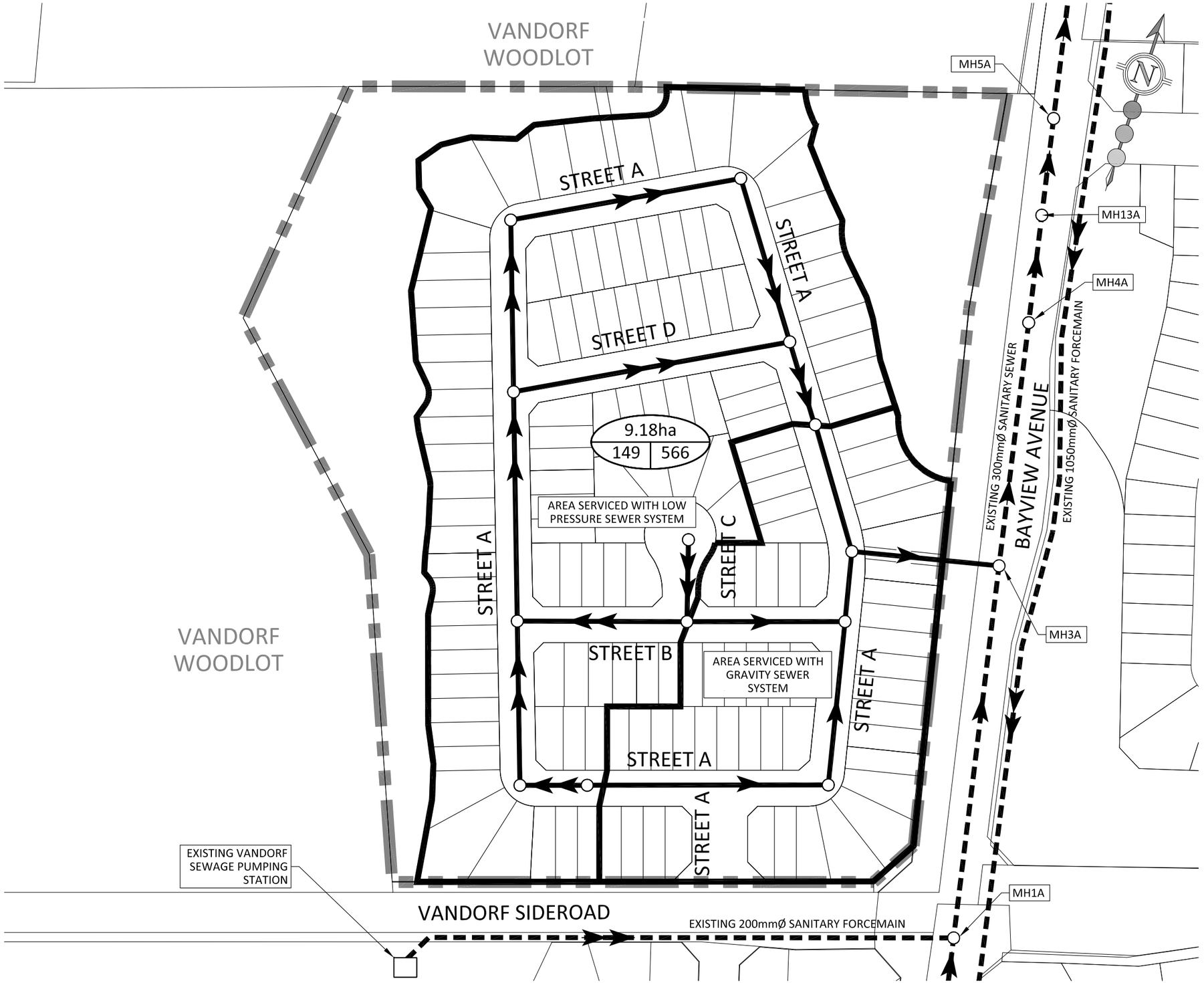
EXTERNAL SANITARY DRAINAGE PLAN

DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	AS SHOWN	DATE:	AUGUST 2021

PROJECT No: 2301

FIGURE No: 3.1



LEGEND:

- LIMIT OF PROPERTY
- SANITARY DRAINAGE BOUNDARY
- PROPOSED SANITARY SEWER AND MANHOLE
- EXISTING SANITARY SEWER AND MANHOLE
- PROPOSED LOW PRESSURE SANITARY FORCEMAIN
- EXISTING SANITARY FORCEMAIN
- 14.17ha — CATCHMENT AREA (HECTARES)
- 199 | 697 — NUMBER OF PERSONS / NUMBER OF UNITS

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

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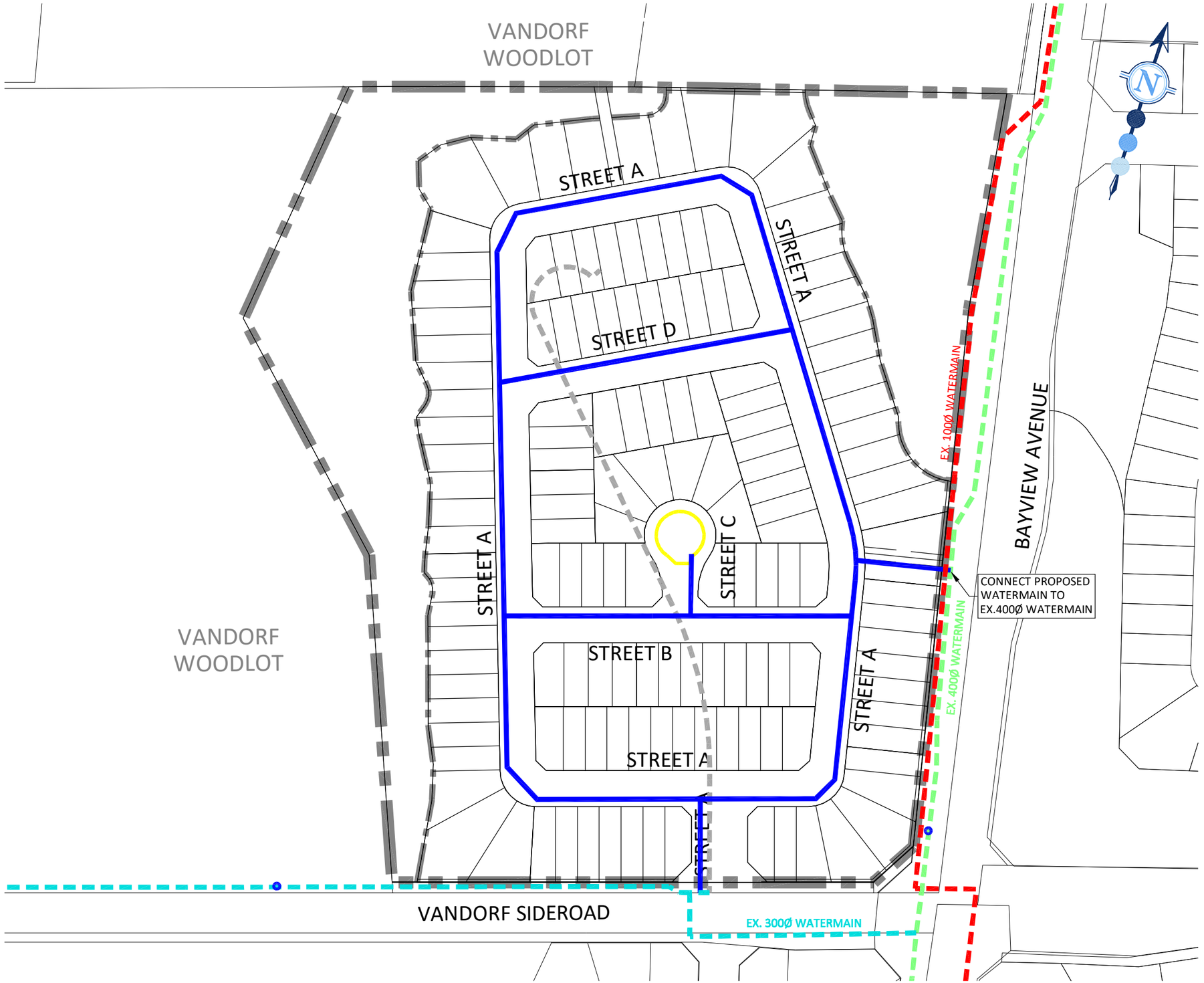
SANITARY DRAINAGE PLAN

DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	1:2000	DATE:	AUGUST 2021
PROJECT No:	2301	FIGURE No:	3.2

File: P:\2301 Archer Hill, Aurora\Drawings\FSP\Fig\Report Figures\2301P-SANI-3.2.dwg – Revised by <STAN> : Tue, Aug 03 2021 – 10:33am



LEGEND:

- LIMIT OF PHASE
- 200Ø PROPOSED WATERMAIN
- 50Ø PROPOSED WATERMAIN
- 100Ø EXISTING WATERMAIN
- 300Ø EXISTING WATERMAIN
- 400Ø EXISTING WATERMAIN
- EXISTING WATERMAIN TO BE REMOVED
- EXISTING HYDRANT

PRESSURE REDUCING VALVES
REQUIRED ON INDIVIDUAL SERVICES

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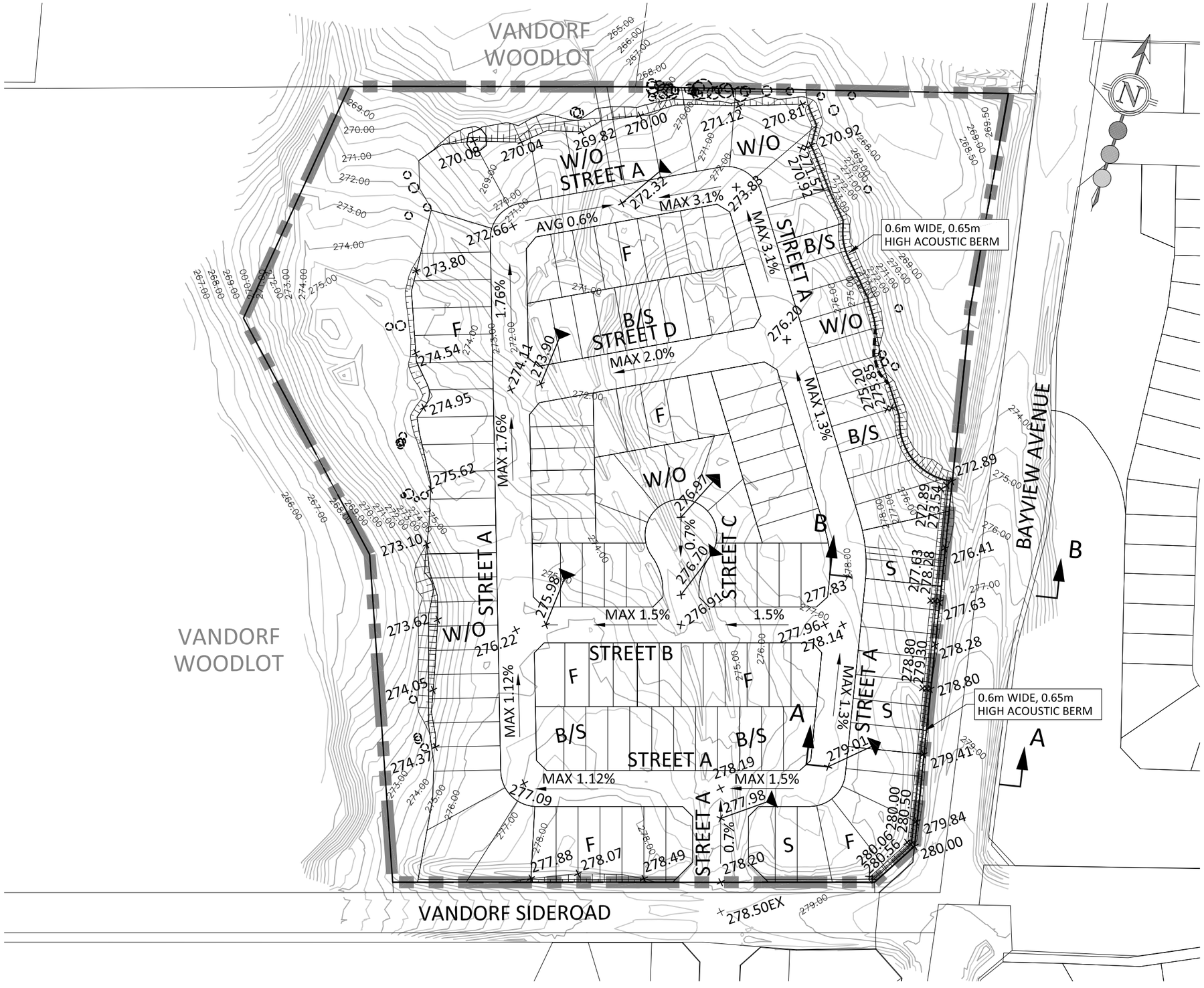
WATER DISTRIBUTION PLAN

DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	1:2000	DATE:	AUGUST 2021
PROJECT No:	2301	FIGURE No:	4.1

File: P:\2301 Archer Hill, Aurora\Drawings\FSP\Fig\Report Figures\2301P-WTRM-DIST-4.1.dwg – Revised by <STAN> : Tue, Aug 03 2021 – 10:42am



LEGEND:

- LIMIT OF PROPERTY
- 223.91 — EXISTING CONTOUR AND ELEVATION
- × 270.92 — PROPOSED ELEVATION
- × 269.39EX — EXISTING ELEVATION
- 276.97 — HIGH POINT
- 272.32 — LOW POINT
- 0.5% — ROAD GRADE
- CRITICAL ROOT ZONE (DILLON)
- EMBANKMENT (MAX 3:1)
- PRIVATE LANDSCAPE WALL

TRANSITION GRADES: 1% GRADE CHANGE OVER MINIMUM 6m TANGENT.

REFER TO ACOUSTIC ANALYSIS PREPARED BY VALCOUSTICS FOR ACOUSTIC BARRIER REQUIREMENTS

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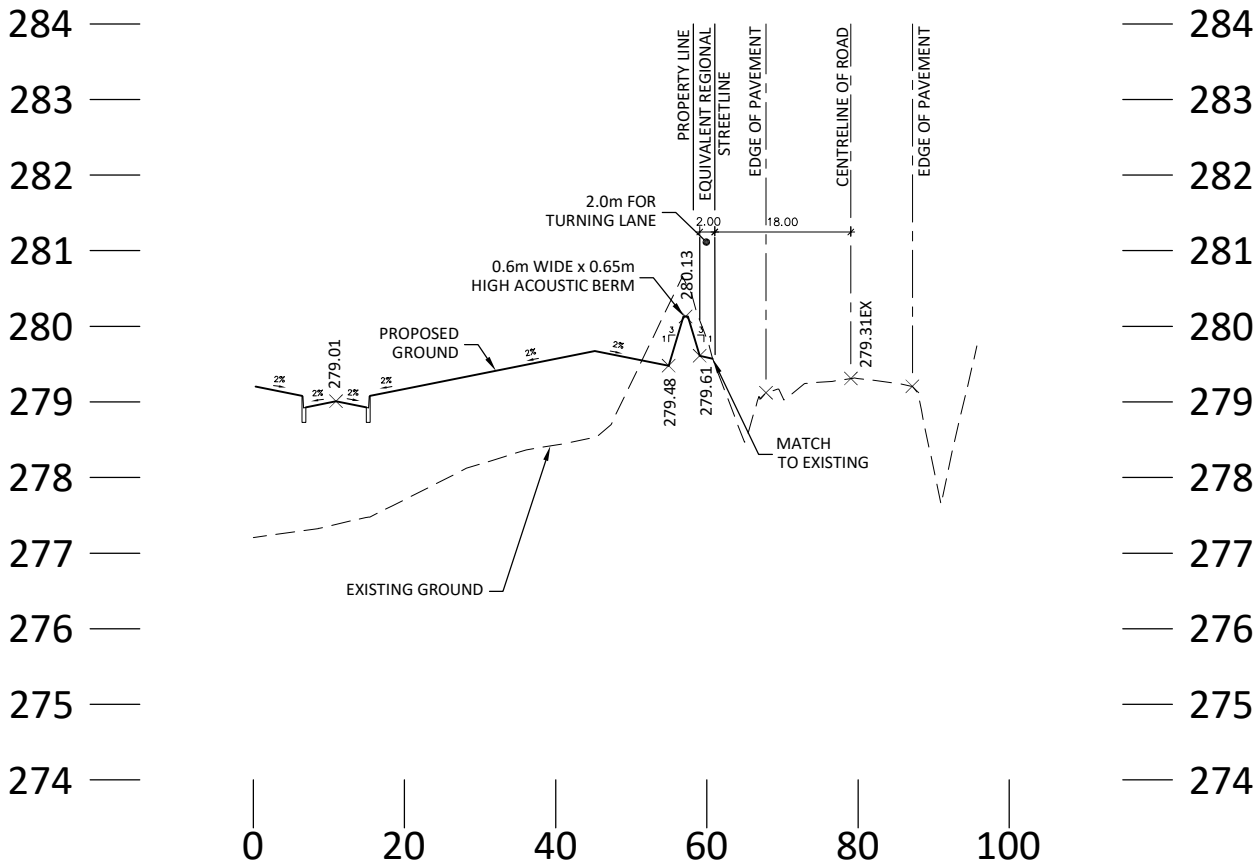
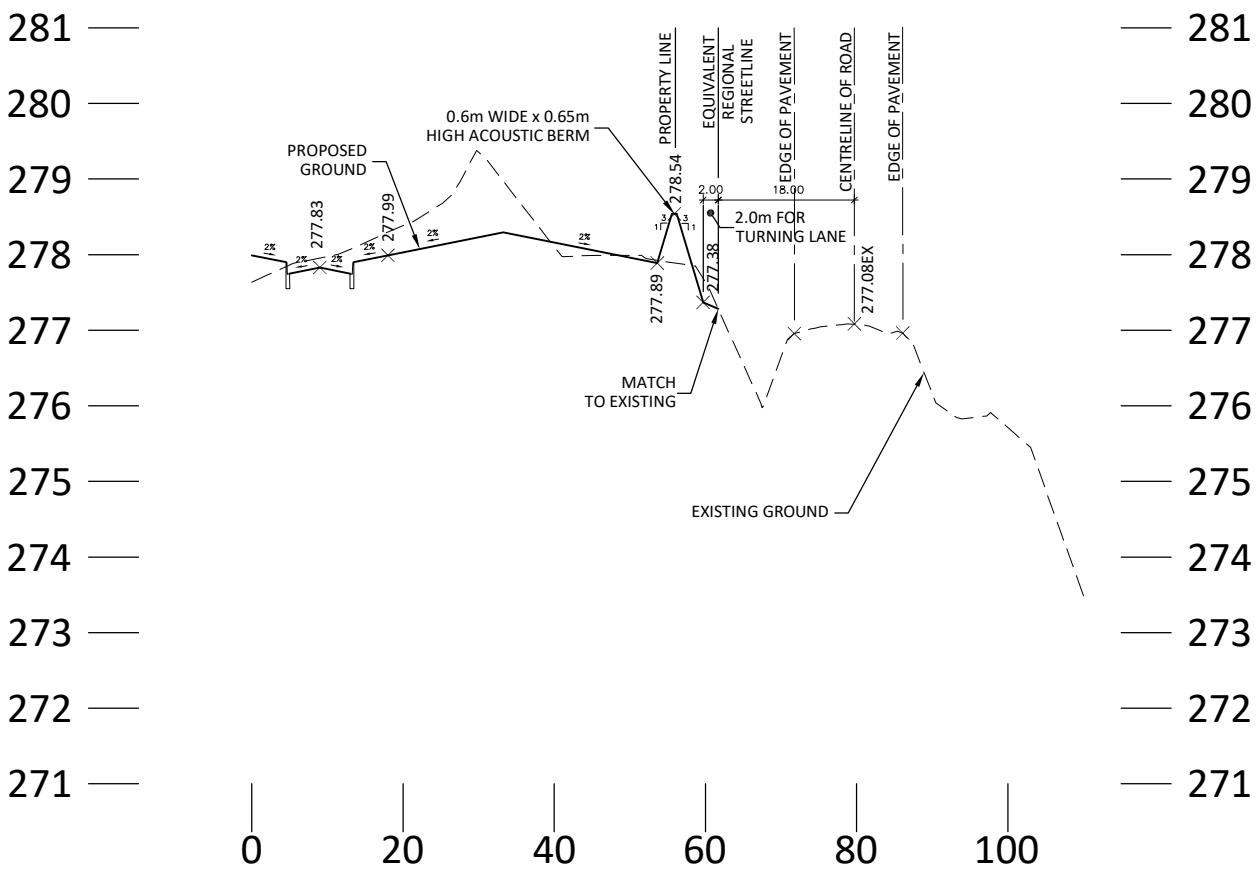
PRELIMINARY GRADING PLAN

DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	1:2000	DATE:	AUGUST 2021
PROJECT No:	2301	FIGURE No:	5.1



CROSS SECTION A-A

H=1:1000
V=1:100



CROSS SECTION B-B

H=1:1000
V=1:100

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

LEGEND:

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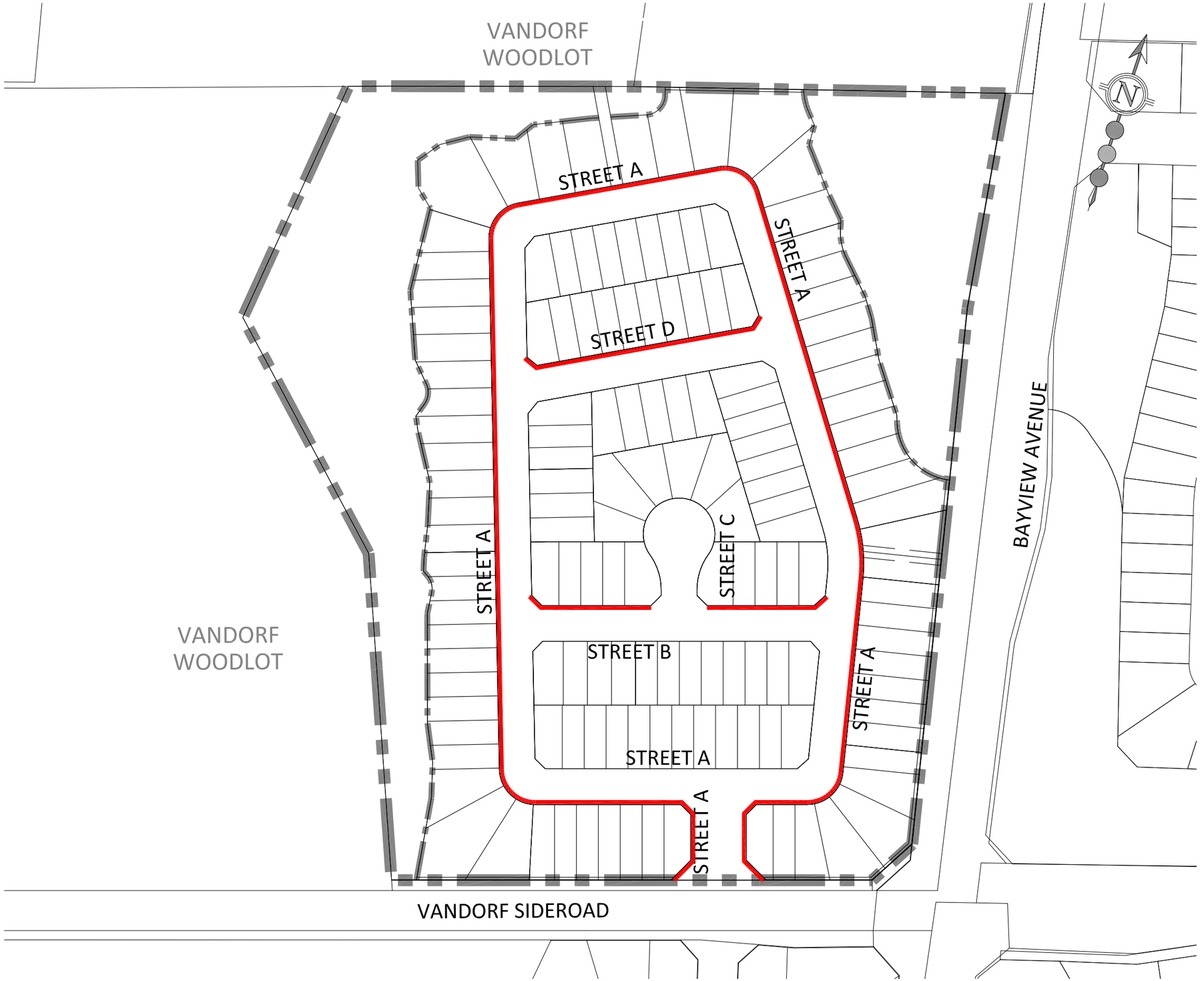
BAYVIEW AVENUE
CROSS SECTIONS

DESIGNED BY: E.A.S.	CHECKED BY: S.M.S.	PROJECT No: 2301	FIGURE No: 5.2
SCALE: AS SHOWN	DATE: AUGUST 2021		



LEGEND:

LIMIT OF PROPERTY

PROPOSD SIDEWALK

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TEL: (905) 475-1900
FAX: (905) 475-8335

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TEL: (416) 987-5500
FAX: (905) 326-3600

HIGHFAIR INVESTMENTS INC.
FSSR

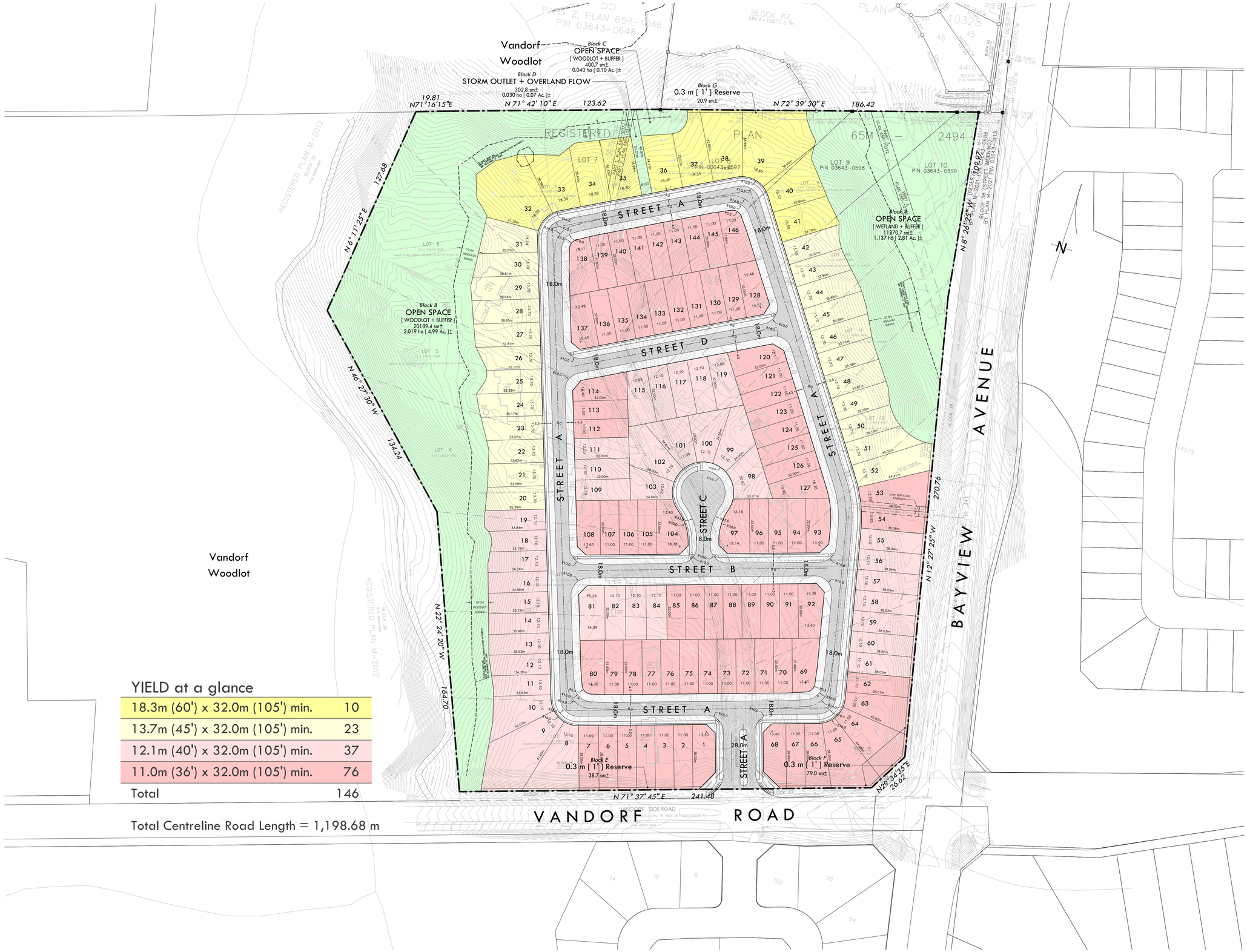
SIDEWALK LOCATION PLAN

DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	1:2000	DATE:	AUGUST 2021
PROJECT No:	2301	FIGURE No:	6.1

File: P:\2301 Archer Hill, Aurora\Drawings\FSP\Fig\Report Figures\2301P-SDWK-6.1.dwg – Revised by <STAN> : Tue, Aug 03 2021 – 10:40am

APPENDIX A

DRAFT PLAN OF SUBDIVISION



Vandorf
Woodlot

YIELD at a glance

18.3m (60') x 32.0m (105') min.	10
13.7m (45') x 32.0m (105') min.	23
12.1m (40') x 32.0m (105') min.	37
11.0m (36') x 32.0m (105') min.	76
Total	146

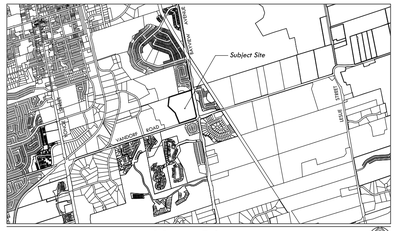
Total Centreline Road Length = 1,198.68 m

DRAWING

Draft Plan of Subdivision

19T(R)-

Treasure Hill Homes



Key Plan 1 : 40 000

Schedule of Land Use

PROPOSED LAND USE Legend	REFERENCE Lots / Blocks / Streets	YIELD Units	Blocks	AREA ha	[Ac.]	%
1) Single Detached Lots 18.3m (60') min.	Lots 32-41.	10	.	0.834	[2.06]	6.8
2) Single Detached Lots 13.7m (45') min.	Lots 20-31, 42-52.	23	.	1.138	[2.81]	9.2
3) Single Detached Lots 12.1m (40') min.	Lots 8-19, 53-61, 81-86, 98-102, 109-111, 115-119.	37	.	1.768	[4.37]	14.3
4) Single Detached Lots 11.0m (36') min.	Lot 1-7, 53-54, 62-80, 87-97, 104-108, 112-114, 120-126.	76	.	3.067	[7.58]	24.9
5) Open Space	Blocks A - C	.	3	3.196	[7.90]	25.9
6) Storm Outlet + Overland Flow	Block D	.	1	0.030	[0.07]	0.2
7) 0.3 m [1'] Reserve	Blocks E - G	.	3	0.014	[0.03]	0.1
8) Roads *	Streets A - D	.	.	2.287	[5.66]	18.6
TOTALS		146	7	12.334	[30.48]	100

* Proposed Curbing and Sidewalks have been constructed based on Town of Aurora - Design Criteria Manual for Engineering Plans (August 15, 2019) Appendix 'D' Town of Aurora Standard Drawings R-201, R-203, R-206, R-209.

Additional Information

REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT

a	Shown on Draft Plan and Surveyor's Certificate	Shown on Draft and Key Plans	g
b	Shown on Draft and Key Plans	Municipal Water Supply will be provided	h
c	Shown on Key Plan	Soil is _____	i
d	Land to be used in accordance with Land Use Schedule	Shown on Draft Plan	j
e	Shown on Draft Plan	Full Municipal Services will be provided	k
f	Shown on Draft Plan	Shown on Draft Plan	l

Owner's Authorization

I/We, being the Registered Owner of the Subject Lands, hereby Authorize Treasure Hill Homes to prepare and submit this Draft Plan of Subdivision for Approval.

Signed _____ Date _____
Joran Weiner, Vice-President
Treasure Hill Homes

Surveyor's Certificate

I hereby Certify that the Boundaries of the Subject Lands and their relationship to the Adjacent Lands are accurately and correctly shown on this Plan.

Signed _____ Date _____
S. Goonewardena, O.L.S.
R-PE Surveying Ltd., Ontario Land Surveyors

No.	PLAN	REVISION	BY	DATE
02	...	...	...	...
01	01	Submission.	mvs	2020-09-25

REVISIONS

SOURCES

Base information comprised of Plan of Survey by R-PE Surveying Ltd. O.L.S., Job No. 20-298, dated 2021. Parcel Mapping obtained from Teranet - LRO65 York and York Insights Open Data GIS. Aerial Photography has been taken from YorkMaps.

The Contractor shall verify and be responsible for all dimensions. Do not scale the drawing; any errors or omissions shall be reported to Treasure Hill Homes without delay. The Copyrights to all designs and drawings are the property of Treasure Hill Homes. Reproduction or use for any purpose other than that authorized by Treasure Hill Homes is forbidden.

DRAFT PLAN of Subdivision

All of Lots 1 to 14, both inclusive,
All of Blocks 15 (0.30 Reserve), 16 (0.30 Reserve) and 19 (0.30 Reserve)
All of Archerhill Court, Plan 65M-2494
TOWN OF AURORA
REGIONAL MUNICIPALITY OF YORK

0 25 50m
1 : 1000

seal prepared for north

Treasure Hill

miCAD inc.
359 Park Avenue
Newmarket, ON L3Y 1V4
437-996-4223
437-99-MICAD
www.micadinc.com

PROJECT	SCALE
20049	1:1000
DESIGN	DATE
miCAD	2021-05-26
DRAWN	DRAWING
mvs	05a
CHECKED	
JW	

APPENDIX B

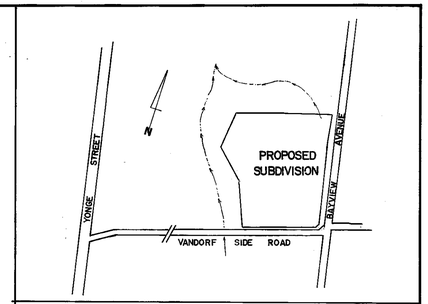
RELEVANT BACKGROUND INFORMATION

APPENDIX B-1

DRAWINGS

SCS consulting group ltd

44-2-1



KEY PLAN SCALE : 1 : 10000

N72° 15'30"E 19·810 N 72° 41' 30" E 123·610 N 73° 38' 00" E 186·440

GABION DROP

END OF 150mmø SUBDRAIN

127·640

N 07° 09' 30" E

7 8 6 9 10 5 11 4 12 3 13 2 14 1

6·0m EASEMENT OUTFALL DITCH

5·0m EASEMENT

150ø HYDRANT TEE PLUGGED AND TAPPED FOR 50ø COPPER WATERMAIN & 50ø V. & B.

HYD.& V.

A= 10·081

A= 18·974 R= 15·240

3·0m BETWEEN V&B AND HYDRANT

51·000

18·288

10·0m BETWEEN V&B AND HYDRANT

N 45° 28' 40" W

134·260

℄ CREEK

COURT

ARCHERHILL

169·955

N 2° 24' 50" W

HYD.BY.

START OF 150mmø SUBDRAIN

STREET NAME & STOP SIGN LOCATION

NO EXIT SIGN

START OF 150mmø SUBDRAIN

450mmø CMP

BLOCK 17 (STREET WIDENING)

BLOCK 16 (0·30m RESERVE)

EX. HYD.& V. TO BE ADJUSTED TO SUIT NEW RD GRADES

BLOCK 15 (0·30m RESERVE)

BLOCK 18 (STREET WIDENING)

4·50m

10.0m BETWEEN V&B AND HYDRANT

300 ø D.I. CEMENT LINED WATERMAIN

BOOSTER PUMPING STATION

℄ DITCH

℄ GRAVEL ROAD

1200ø CSP CULVERT

ROAD SIGN "HIDDEN INTERSECTION"

VANDORF SIDE ROAD

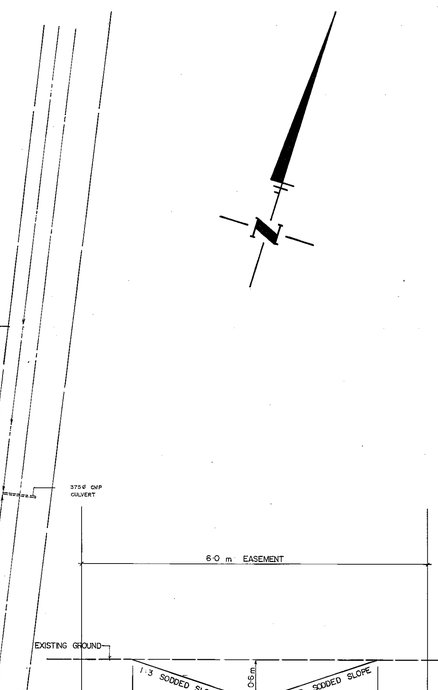
DRIVEWAY

450 ø CMP CULVERT

BAYVIEW AVENUE

℄ BAYVIEW ROAD

900 ø CSP CULVERT



TYPICAL DETAIL OF GRASS LINED CHANNEL

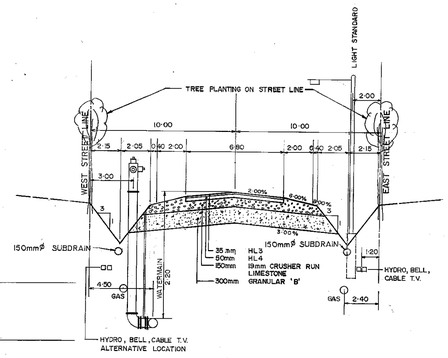
SCALE : 1 : 50

BENCH MARK

TOWN OF AURORA BM. Nº 20

CUT CROSS IN CONCRETE BASE 0·200 m EAST OF FLAGPOLE AT SOUTH-EAST CORNER OF AURORA FIRE DEPARTMENT Nº 1.

ELEVATION 270·560 m



TYPICAL ROAD CROSS SECTION

SCALE : HORI 1:200 VERT. 1:50

No.	DESCRIPTION	DATE	BY
1	"AS CONSTRUCTED"	JAN. 1991	G.G.

REVISIONS

TOWN OF AURORA

BAYVIEW HILLS ESTATES

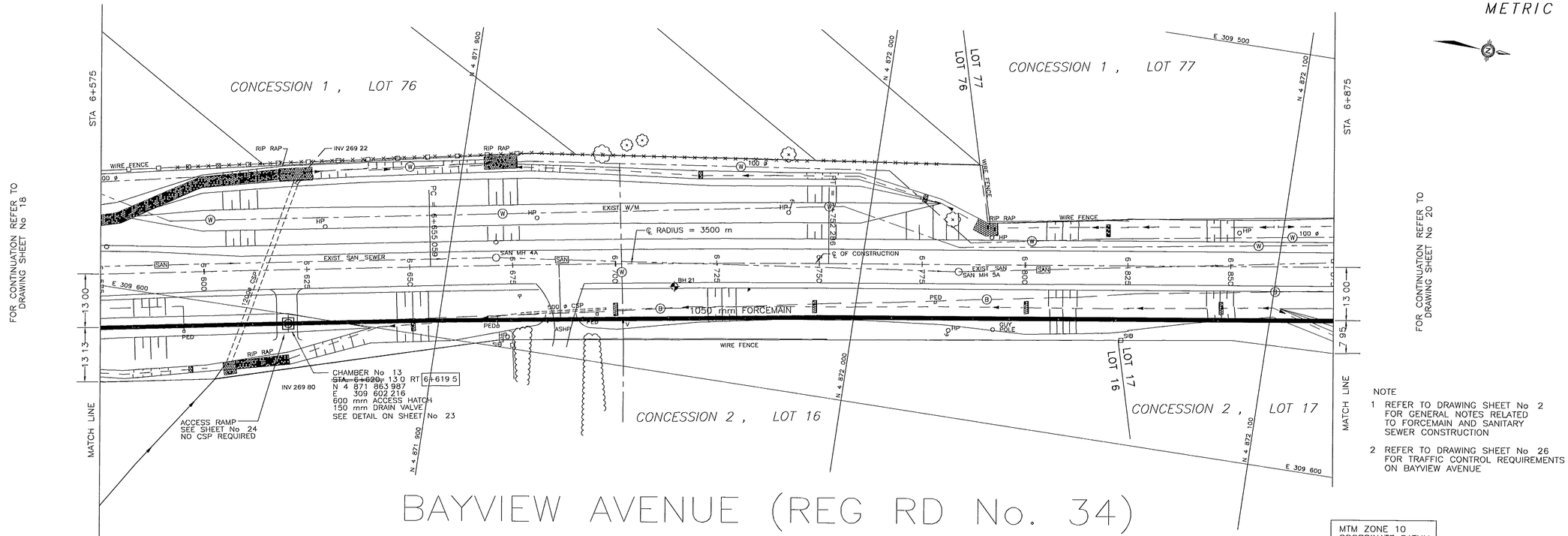
GENERAL PLAN

REGISTERED PROFESSIONAL ENGINEER B. THOMAS PROVINCE OF ONTARIO

BRYAN THOMAS & ASSOCIATES INC.
CONSULTING ENGINEERS
28 CONNIE CRES. UNIT 12A, CONCORD, ONT. L4K 1L4

DESIGN BY : J. D.	CHECKED BY : B. T.	PROJECT No.	
DRAWN BY : J. D	CHECKED BY : B. T.	E79 - 53	
SCALE : 1 : 1000	DATE : NOVEMBER, 1985		
APPROVED William D. Walker DIRECTOR OF PUBLIC WORKS		DRAWING No.	
DATE : August 21st 1986		1	

METRIC



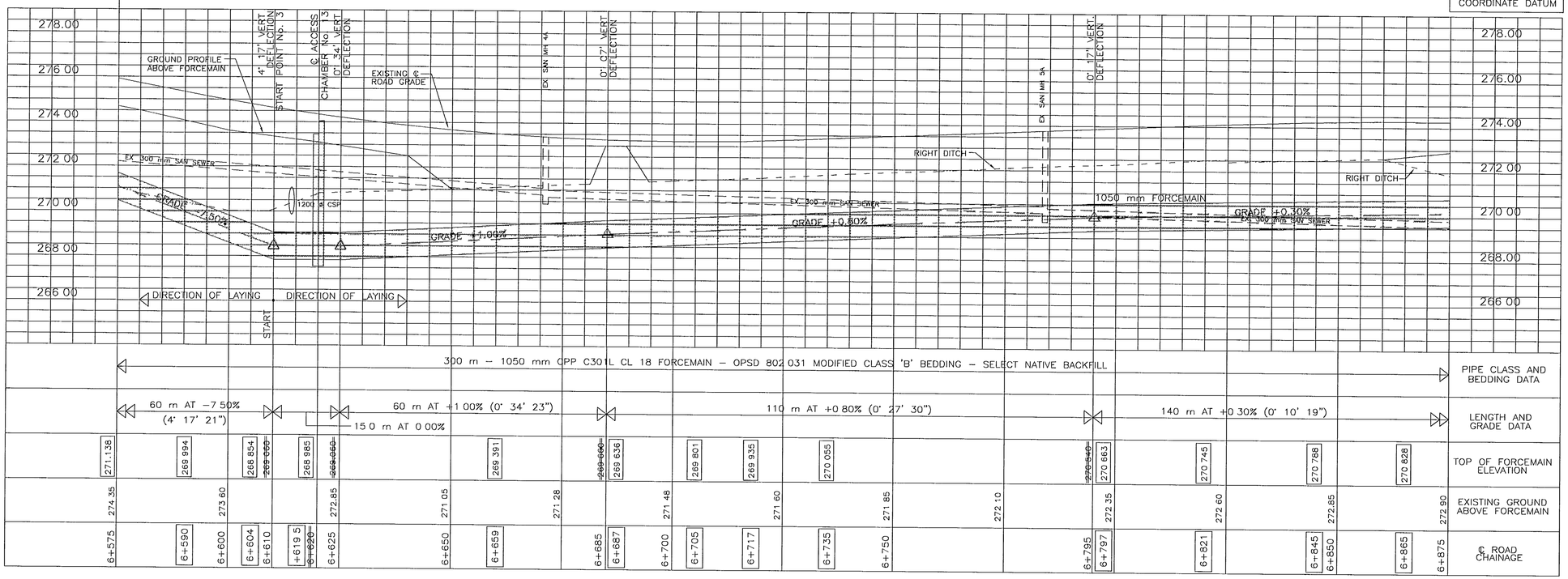
BAYVIEW AVENUE (REG RD No. 34)

NOTE

1 REFER TO DRAWING SHEET No 2 FOR GENERAL NOTES RELATED TO FORCEMAIN AND SANITARY SEWER CONSTRUCTION

2 REFER TO DRAWING SHEET No 26 FOR TRAFFIC CONTROL REQUIREMENTS ON BAYVIEW AVENUE

MTM ZONE 10
COORDINATE DATUM



RECORD DRAWING

CONTRACTOR
PACHINO CONSTRUCTION LTD

COMMENCED OCT , 1999

COMPLETED: APRIL, 2000

ORIGINAL DESIGN DWG SIGNED AND SEALED BY L D PARR AUGUST 19, 1999

SCALES

5m 0 10m
Horizontal

1m 0 2m
Vertical

NOTE:
THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

totten sims hubicki associates
ENGINEERS ARCHITECTS AND PLANNERS
PROJECT No 52-20951 DATE APRIL 1999

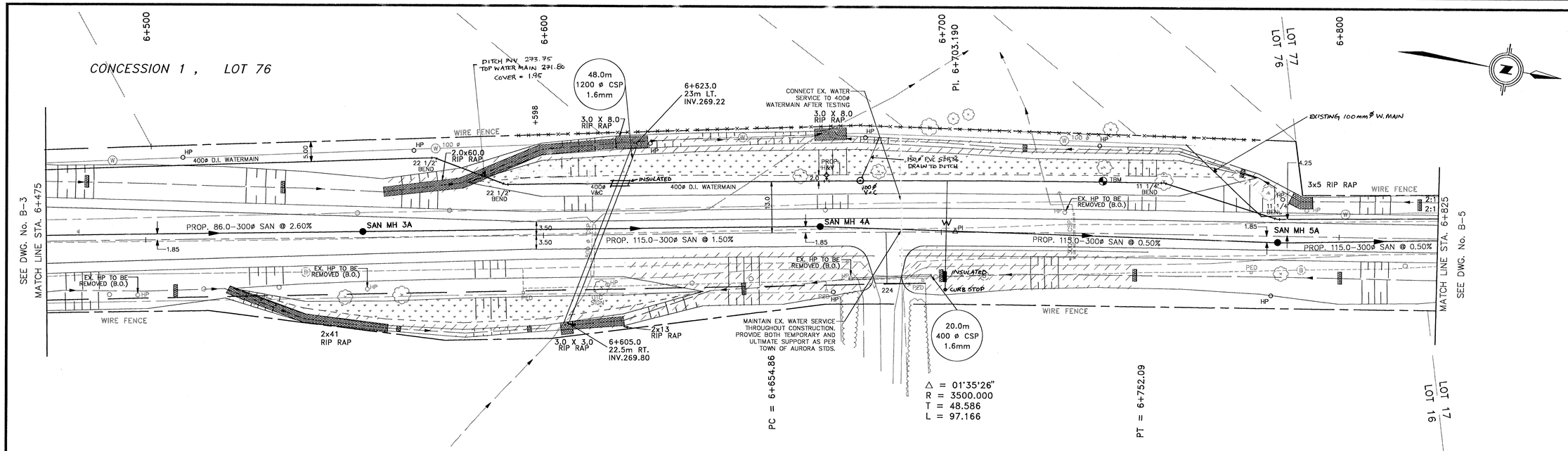
No.	DATE	REVISIONS	BY
1	04 13 00	AS RECORDED	TSH

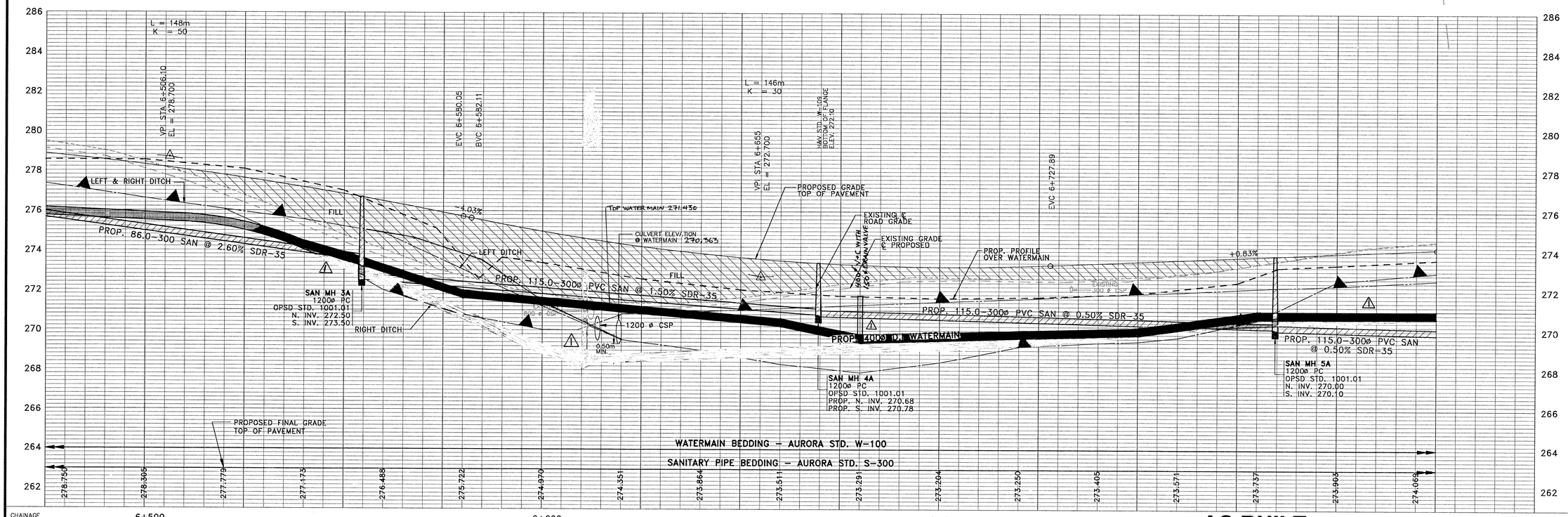
York Region Transportation and Works

DESIGN R.M.P.	AURORA FORCEMAIN TWINNING – STAGE 2 BLOOMINGTON ROAD AND BAYVIEW AVENUE
DRAWN N.C.S.	BAYVIEW AVENUE FROM 197 m N OF VANDORF ROAD TO 370 m S OF STONE ROAD
CHECKED L D P.	

DWG. NO. 18
CONT NO. T-99-34
SHEET NO. 19

5AY-D9AR.DWG 06/02/00 14:34





CHAINAGE	6+500						6+600						6+700						6+800
TOP OF WATERMAIN ELEVATION	276.12	275.95	275.35	275.38	275.27	274.55	273.73	271.98	271.65	271.25	270.70	270.45	269.80	269.90	270.00	270.00	270.10	270.60	271.15	271.10	271.00

AS BUILT

GENERAL NOTES

No.	REVISIONS	DATE	APPROVED
1	REVISED FOR AS BUILT	17/5/99	JSM
	ISSUED FOR TENDER	4/7/95	

BAYVIEW VANDORF
RESIDENTIAL SUBDIVISION
999556 ONTARIO LIMITED
EXTERNAL SERVICES

LICENSED PROFESSIONAL ENGINEER
JEFFREY R. KING
PROVINCE OF ONTARIO

TOWN OF AURORA
REVIEWED
DATE June 7 19 95
DIRECTOR OF PUBLIC WORKS

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

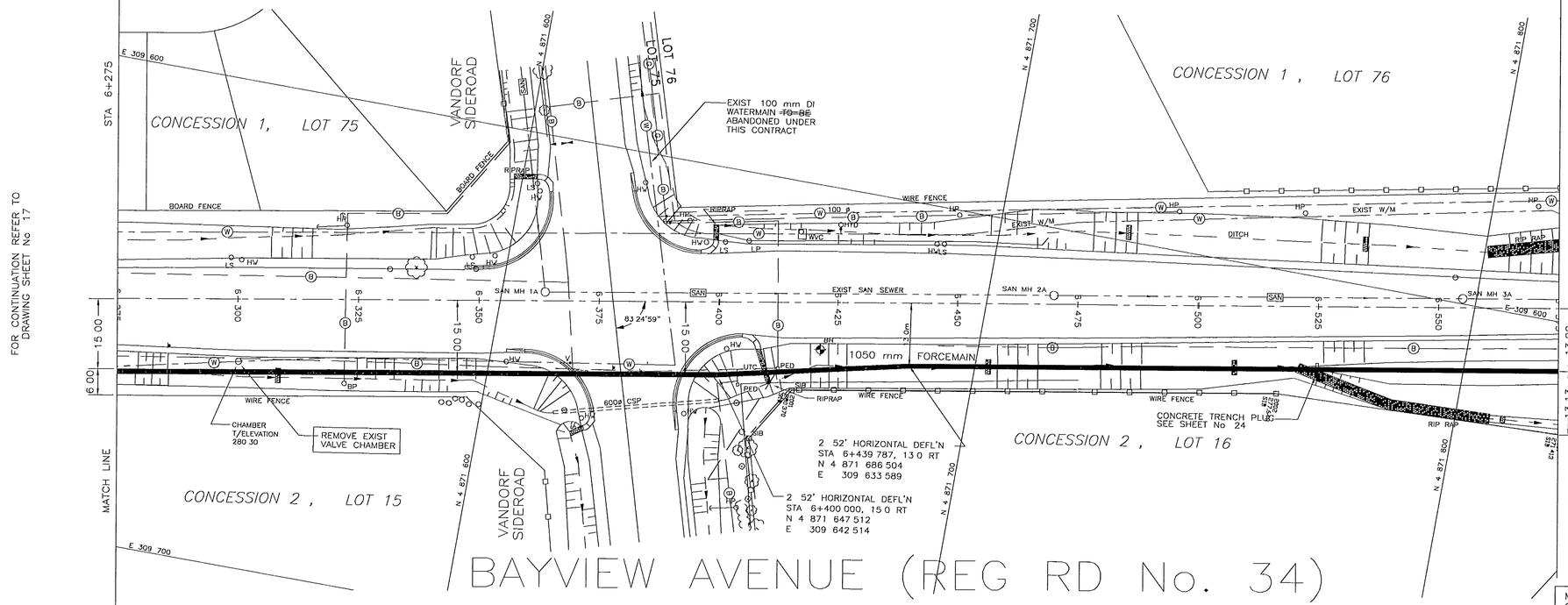
BAYVIEW AVENUE
STA. 6+475 TO STA 6+825

REGION OF YORK
CONTRACT No. 95-101

TOWN OF AURORA
ENGINEERING DEPARTMENT

DESIGN R.K.G.	SCALE HOR. 1:500	VERT. 1:100	
DRAWN CAD	REVIEWED J.C.K.	DRAWING NO. B-4	
DATE APRIL 1995	SHEET NO. 55	30-92038	

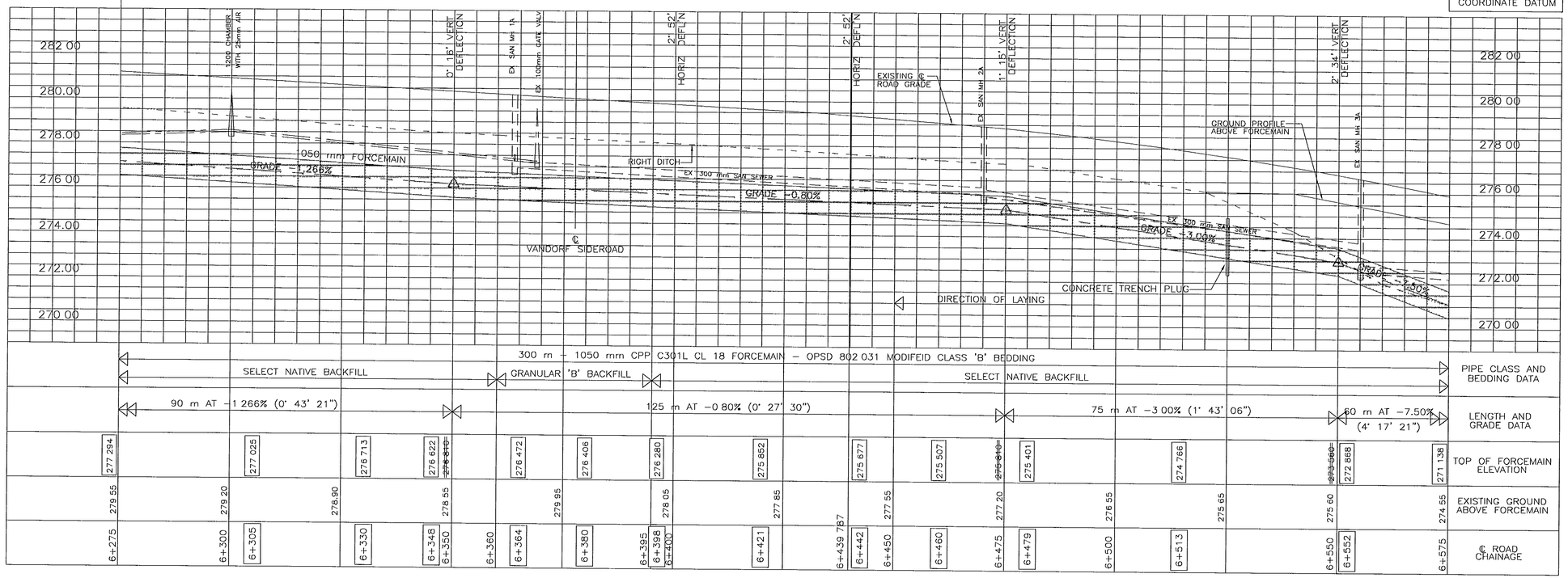
METRIC



NOTE

1. REFER TO DRAWING SHEET No 2 FOR GENERAL NOTES RELATED TO FORCEMAIN AND SANITARY SEWER CONSTRUCTION.
2. REFER TO DRAWING SHEET No. 26 FOR TRAFFIC CONTROL REQUIREMENTS ON BAYVIEW AVENUE

MTM ZONE 10
COORDINATE DATUM



300 m – 1050 mm CPP C301L CL 18 FORCEMAIN – OPSD 802 031 MODIFEID CLASS 'B' BEDDING																									PIPE CLASS AND BEDDING DATA
SELECT NATIVE BACKFILL						GRANULAR 'B' BACKFILL									SELECT NATIVE BACKFILL										
90 m AT –1 266% (0° 43' 21")						125 m AT –0 80% (0° 27' 30")									75 m AT –3 00% (1° 43' 06")								60 m AT –7.50% (4° 17' 21")			LENGTH AND GRADE DATA
277 284		277 025		276 713	276 622	276 810	276 472	276 406	276 280		275 852		275 677		275 507	275 810	275 401		274 766		275 666	272 868		271 138	TOP OF FORCEMAIN ELEVATION
279 55	279 20		278 90		278 55		279 95		278 05		277 85	277 87		277 55		277 20		276 55	275 65		275 60		274 55		EXISTING GROUND ABOVE FORCEMAIN
6+275	6+300	6+305	6+330	6+348	6+350	6+360	6+364	6+380	6+395	6+398	6+400	6+421	6+439 787	6+442	6+450	6+460	6+475	6+479	6+500	6+513	6+550	6+552	6+575		℄ ROAD CHAINAGE

RECORD DRAWING

CONTRACTOR
PACHINO CONSTRUCTION LTD

COMMENCED OCT , 1999

COMPLETED APRIL, 2000

ORIGINAL DESIGN DWG SIGNED AND SEALED BY L D. PARR AUGUST 19, 1999

SCALES

5m 0 10m
Horizontal

1m 0 2m
Vertical

NOTE.
THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION

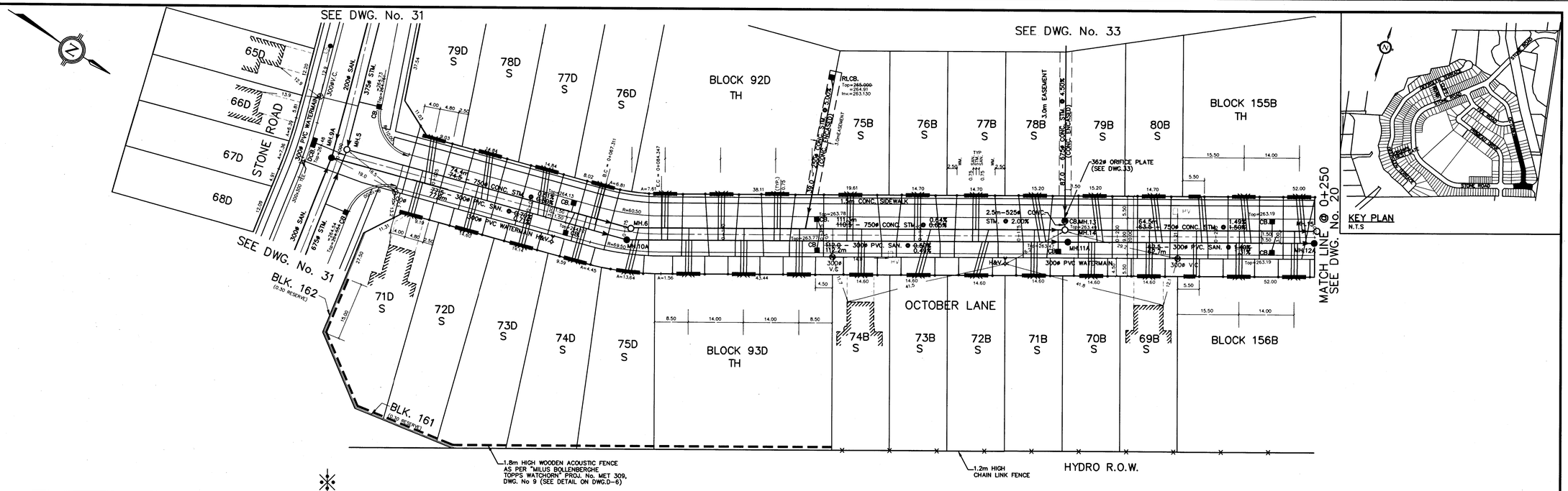
totten sims hubicki associates
ENGINEERS ARCHITECTS AND PLANNERS
PROJECT No 52–20951 DATE APRIL 1999

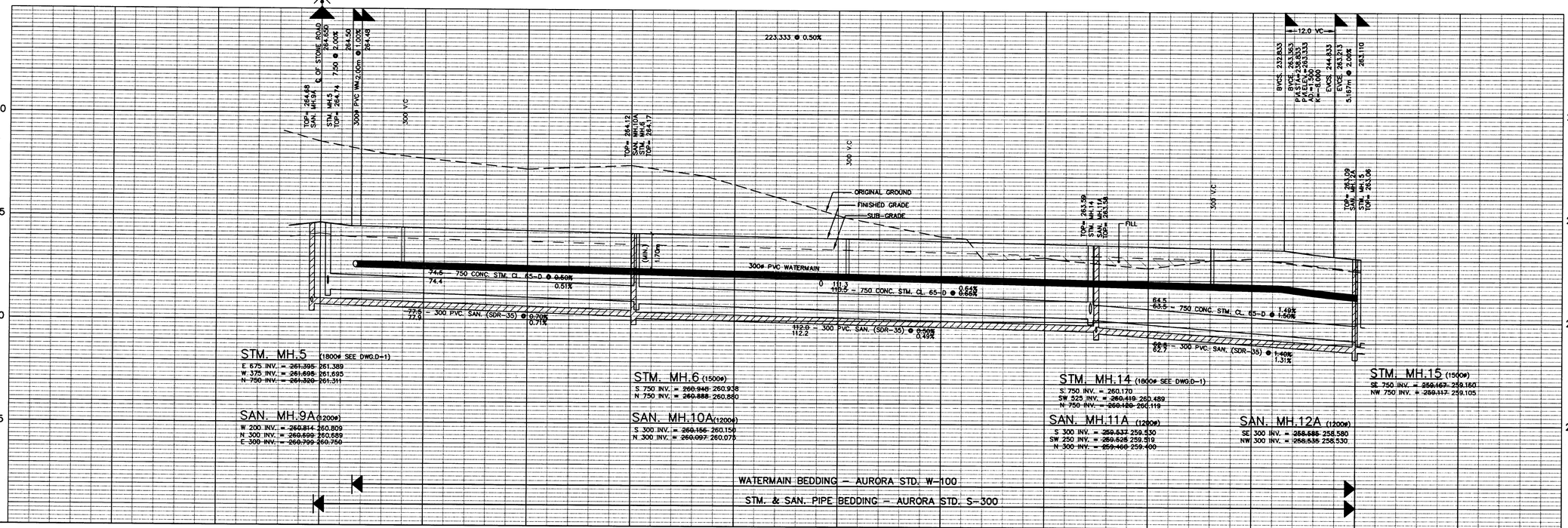
No.	DATE	REVISIONS	BY
1	04 13 00	AS RECORDED	TSH

York Region Transportation and Works

DESIGN R.M.P.	AURORA FORCEMAIN TWINNING – STAGE 2 BLOOMINGTON ROAD AND BAYVIEW AVENUE	DWG. NO. 17
DRAWN N.C S	BAYVIEW AVENUE FROM 103 m S OF VANDORF SIDEROAD TO 197 m N OF VANDORF SIDEROAD	CONT. NO T–99–34
CHECKED L.D.P.		SHEET NO. 18

BAY-DSHR.DWG 08/02/00 14:30





EXISTING ELEV.	269.00	268.60	267.80	267.30	267.50	266.59	265.12	264.10	263.10	262.60	263.10	262.50
CHAINAGE		0+000	0+025	0+050	0+075	0+100	0+125	0+150	0+175	0+200	0+225	0+250

GENERAL NOTES

BENCH MARK BM 126 AURORA ELEV. 247.648

TOP OF MOST NORTHERLY BOLT ON BOTTOM FLANGE OF FIRE HYDRANT ON ST. JOHN'S SIDEROAD AT EAST CORNER OF PUMPING STATION.

No.	REVISIONS	DATE	BY	TOWN APPROVAL
1	ISSUED FOR CONSTRUCTION	11.19.93		
2	LOT NUMBERS/WATERMAIN MATERIAL	03.30.94	J.F.M	
3	ADDED AS CONSTRUCTED	05.27.98	M.W.D.	

COSBURN PATTERSON MATHER LTD.
CONSULTING ENGINEERS 7270 WOODBINE AVE, SUITE 300 MARKHAM, ONT. L3R – 4B9 TELEPHONE: (905) 474-0455

CATTAIL SUBDIVISION

TOWN OF AURORA
REVIEWED
DATE ..... 19 .....
DATE ORIGINALLY SIGNED APRIL 27, 1994
DIRECTOR OF PUBLIC WORKS

OCTOBER LANE
(STREET D)
STA. 0+000 TO 0+250

TOWN OF AURORA
ENGINEERING DEPARTMENT

DESIGN J.F.M., G.M.P.	SCALE HOR. 1:500	VERT. 1:100	
DRAWN L.T.\J.P.L	REVIEWED	DRAWING NO.	19
DATE APRIL, 1993	SHEET NO.	PROJECT No.	89623

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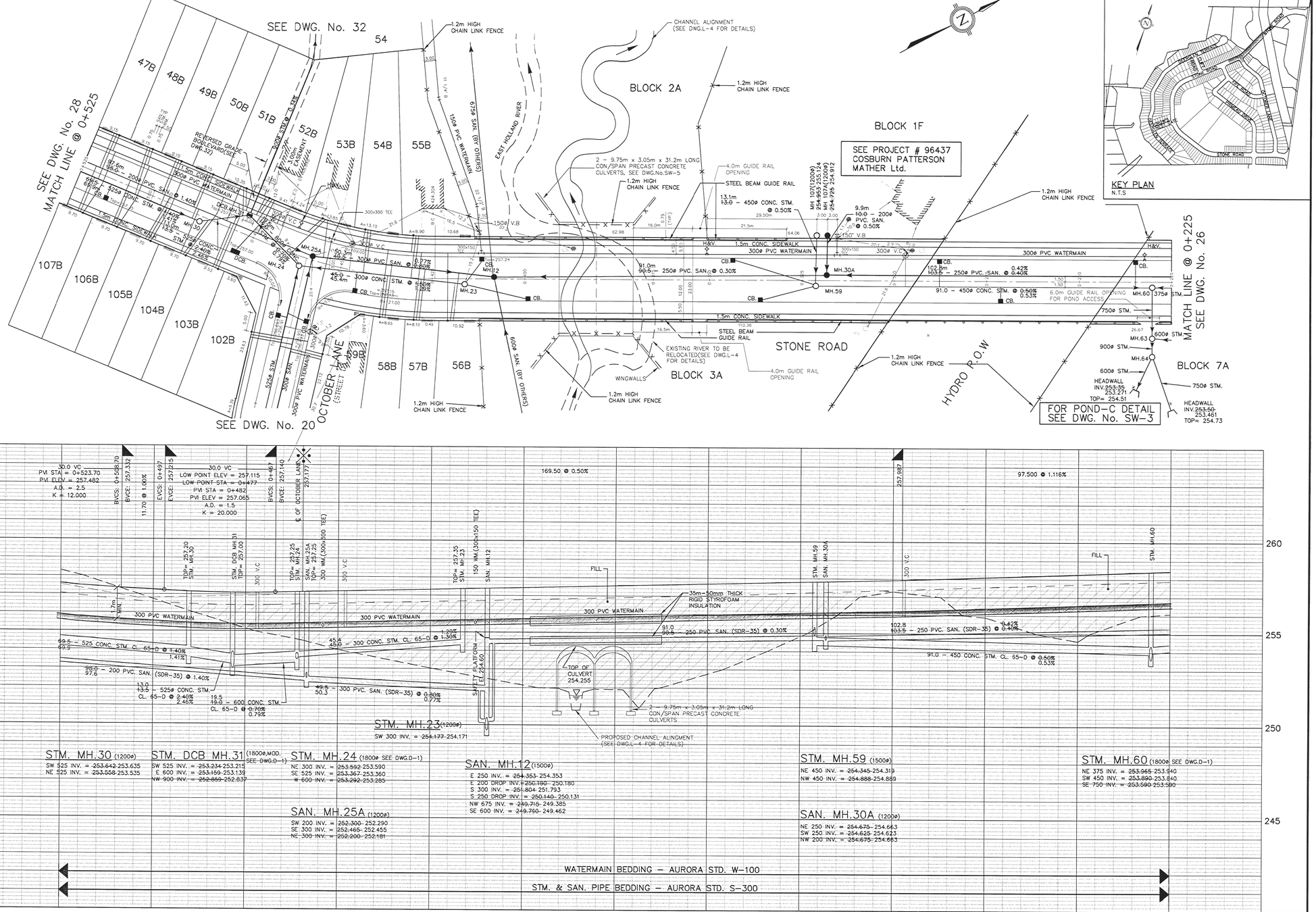

GENERAL NOTES

BENCH MARK BM 126 AURORA ELEV. 247.648

TOP OF MOST NORTHERLY BOLT ON BOTTOM FLANGE OF FIRE HYDRANT ON ST. JOHN'S SIDEROAD AT EAST CORNER OF PUMPING STATION.

No.	REVISIONS	DATE	BY	TOWN APPROVAL
1	ISSUED FOR CONSTRUCTION	11.19.93		
2	LOT NUMBERS/WATERMAIN MATERIAL	03.30.94	J.F.M	
3	ADDED AS CONSTRUCTED	05.27.98	M.W.D.	

COSBURN PATTERSON MATHER LTD.
CONSULTING ENGINEERS 7270 WOODBINE AVE, SUITE 300 MARKHAM, ONT. L3R - 4B9 TELEPHONE: (905) 474-0455

CATTAIL SUBDIVISION

TOWN OF AURORA
REVIEWED
DATE 19
DATE ORIGINALLY SIGNED APRIL 27, 1994
DIRECTOR OF PUBLIC WORKS

STONE ROAD
(STREET G)
STA. 0+225 TO 0+525

TOWN OF AURORA
ENGINEERING DEPARTMENT

DESIGN J.F.M. , G.M.P.	SCALE HOR. 1:500	VERT. 1:100	
DRAWN L.T.\J.P.L	REVIEWED	DRAWING NO.	27
DATE APRIL, 1993	SHEET NO.	PROJECT No.	89623

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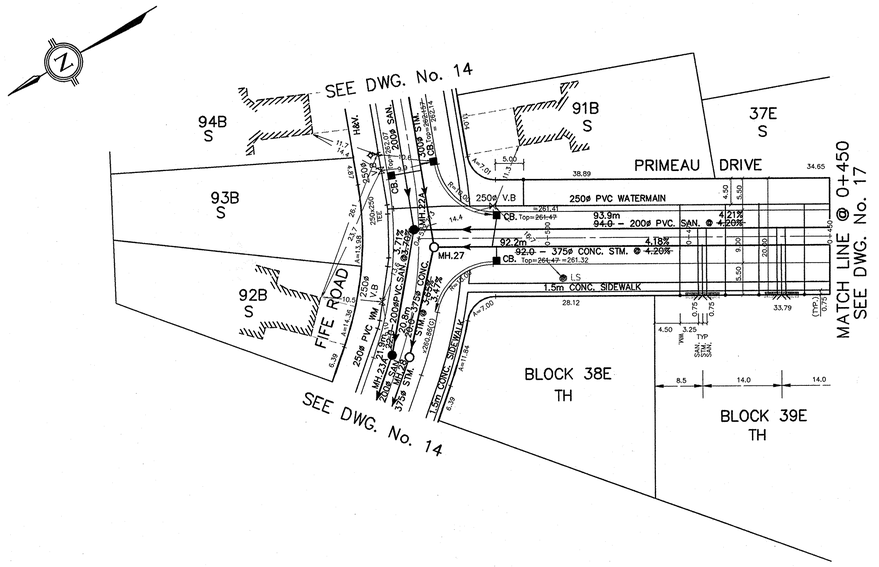
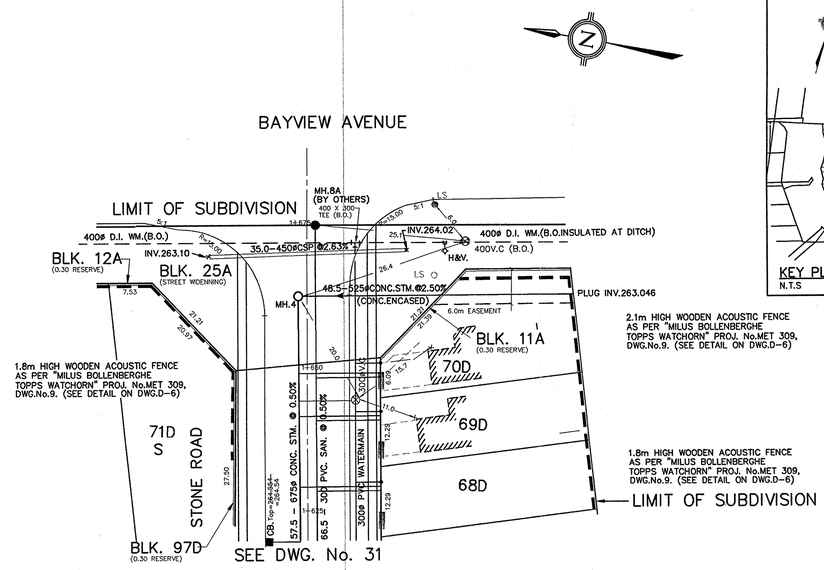
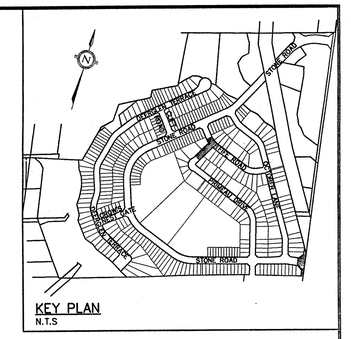
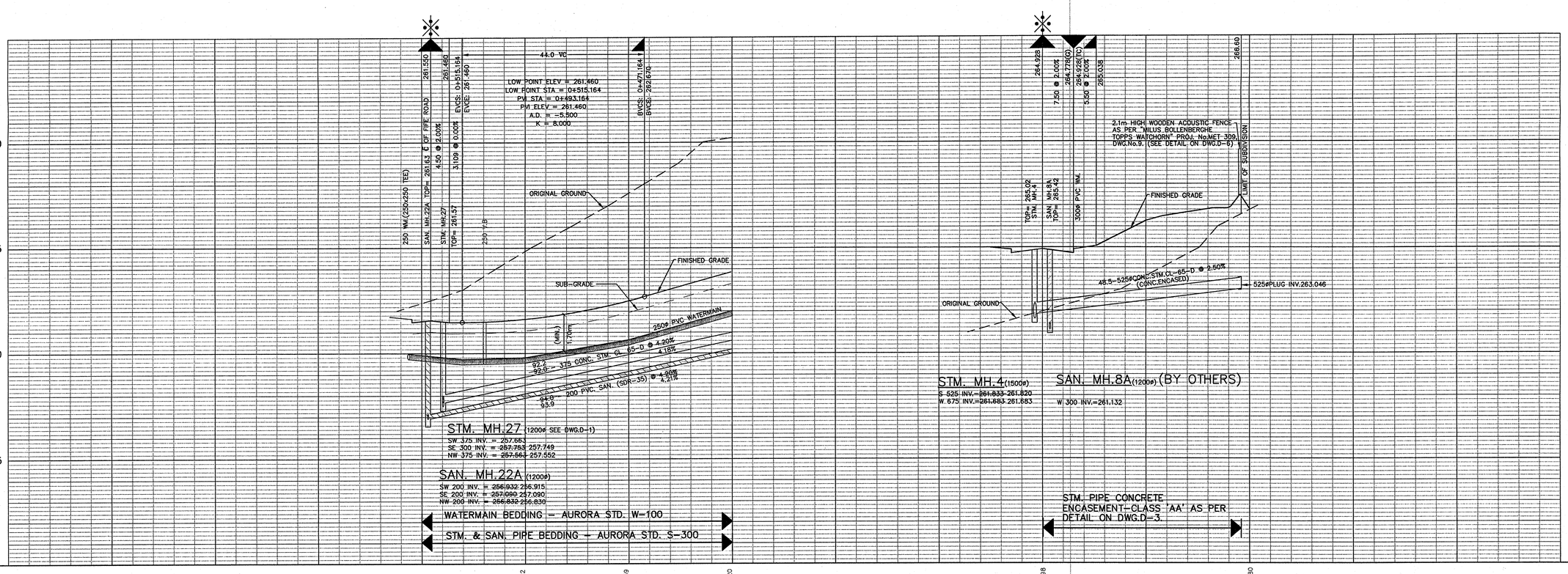
2235-1-2









GENERAL NOTES

BENCH MARK BM 126 AURORA ELEV. 247.648

TOP OF MOST NORTHERLY BOLT ON BOTTOM FLANGE OF FIRE HYDRANT ON ST. JOHN'S SIDEROAD AT EAST CORNER OF PUMPING STATION.

No.	REVISIONS	DATE	BY	TOWN APPROVAL
1	ISSUED FOR CONSTRUCTION	11.19.93		
2	LOT NUMBERS/WATERMAIN MATERIAL	03.30.94	J.F.M	
3	ADDED AS CONSTRUCTED	05.27.98	M.W.D.	

COSBURN PATTERSON MATHER LTD.
CONSULTING ENGINEERS 7270 WOODBINE AVE, SUITE 300 MARKHAM, ONT. L3R – 4B9 TELEPHONE: (905) 474–0455

CATTAIL SUBDIVISION

TOWN OF AURORA
REVIEWED
DATE . . . . . 19 . . . .
DATE ORIGINALLY SIGNED APRIL 27, 1994
DIRECTOR OF PUBLIC WORKS

PRIMEAU DRIVE (STREET C)
STA. 0+450 TO 0+522.773

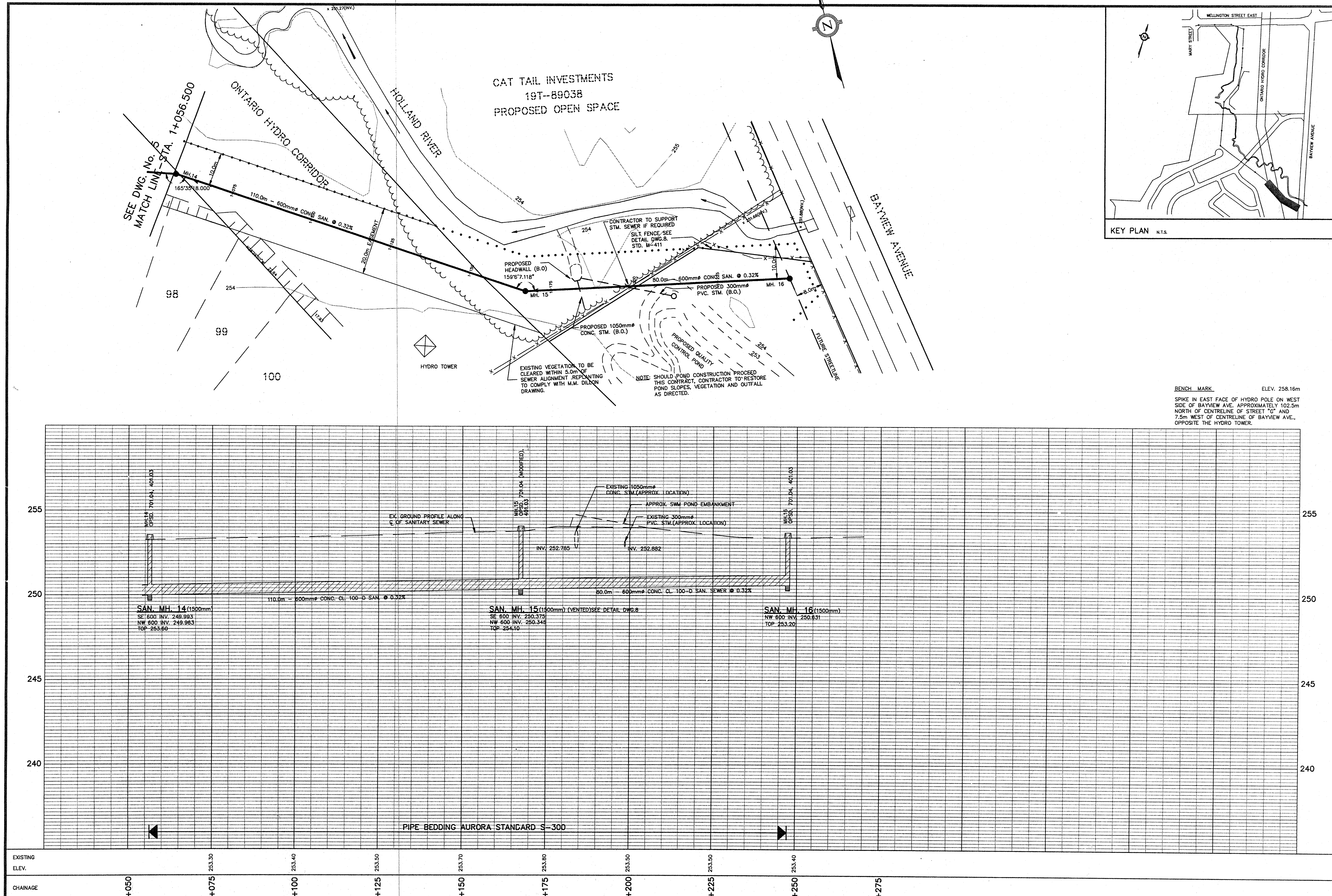
STORM & SANITARY EASEMENT AT LOT 1
STA. 0+000 TO 0+047.0612

TOWN OF AURORA
ENGINEERING DEPARTMENT

DESIGN J.F.M. , G.M.P.	SCALE HOR. 1:500	VERT. 1:100	
DRAWN L.T.\J.P.L	REVIEWED	DRAWING NO. 18	
DATE APRIL, 1993	SHEET NO.	PROJECT No. 89623	

File: R:\89\623\Drawings\As-builts\Rady\C3.dwg – Last Revised: Thu, Mar 11 1999 – 7:55pm

Storm Easement @ Stone Rd / Bayview Ave



GENERAL NOTES
- FOR CONSTRUCTION NOTES SEE DWG. No. 8.
- FOR SILT FENCE DETAIL SEE STD. M-411.

No.	REVISIONS	DATE	BY	TOWN APPROVAL
1	ISSUED FOR TENDER	8/4/94	JFM	
2	ISSUED FOR CONSTRUCTION	1/5/94	JFM	
3	NOTE ADDED RE: SWM POND	8/4/94	JFM	

COSBURN PATTERSON WARDMAN LTD.
CONSULTING ENGINEERS
7270 WOODBINE AVE, SUITE 201
MARKHAM, ONT. L3R - 4B9
TELEPHONE: (905) 474-0455

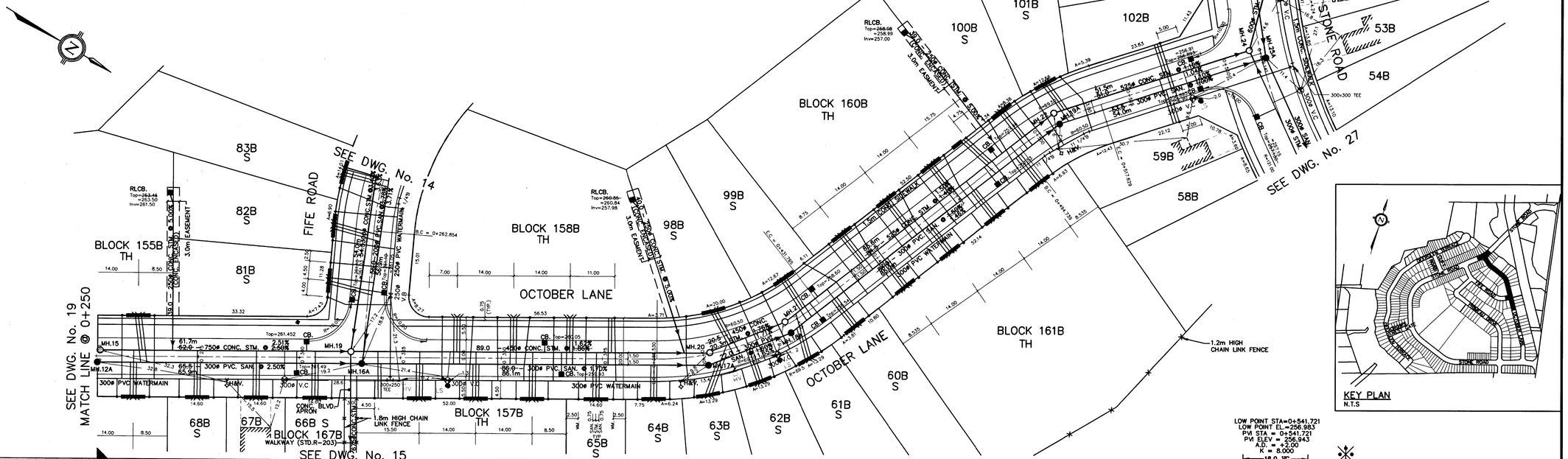
TOWN OF AURORA
REVIEWED
DATE May 5 1994
DIRECTOR OF PUBLIC WORKS

EASEMENT TRUNK SEWER
STA. 1+056.500 to 1+246.500

TOWN OF AURORA
ENGINEERING DEPARTMENT

DESIGN J.M.	SCALE HOR. 1:500 VERT. 1:100		
DRAWN L.T.	REVIEWED	DRAWING NO. 6	
DATE SEPT.,1992	SHEET NO.	PROJECT No. 89623	

TRUNK SAN EASEMENT



GENERAL NOTES

BENCH MARK BM 126 AURORA ELEV. 247.648

TOP OF MOST NORTHERLY BOLT ON BOTTOM FLANGE OF FIRE HYDRANT ON ST. JOHN'S SIDEROAD AT EAST CORNER OF PUMPING STATION.

No.	REVISIONS	DATE	BY	TOWN APPROVAL
1	BLK. 158B,160B & 161B DRIVEWAYS & SERVICES CONNECTION REVISED.	11.19.93	G.M.P	
2	ISSUED FOR CONSTRUCTION	11.19.93		
3	LOT NUMBERS\WATERMAIN MATERIAL	03.30.94	J.F.M.	
4	ADDED AS CONSTRUCTED	05.27.98	M.W.D.	

COSBURN PATTERSON WARDMAN LTD.
CONSULTING ENGINEERS 7270 WOODBINE AVE,SUITE 201 MARKHAM, ONT. L3R - 4B9 TELEPHONE: (905) 474-0455

CATTAIL SUBDIVISION

TOWN OF AURORA
REVIEWED
DATE ..... 19 ....
DIRECTOR OF PUBLIC WORKS

OCTOBER LANE
(STREET D)
STA. 0+250 TO 0+559.141

TOWN OF AURORA
ENGINEERING DEPARTMENT

DESIGN J.F.M., G.M.P.	SCALE HOR. 1:500	VERT. 1:100	
DRAWN L.T.\J.P.L.	REVIEWED	DRAWING NO. 20	
DATE APRIL, 1993	SHEET NO.	PROJECT No. 89623	

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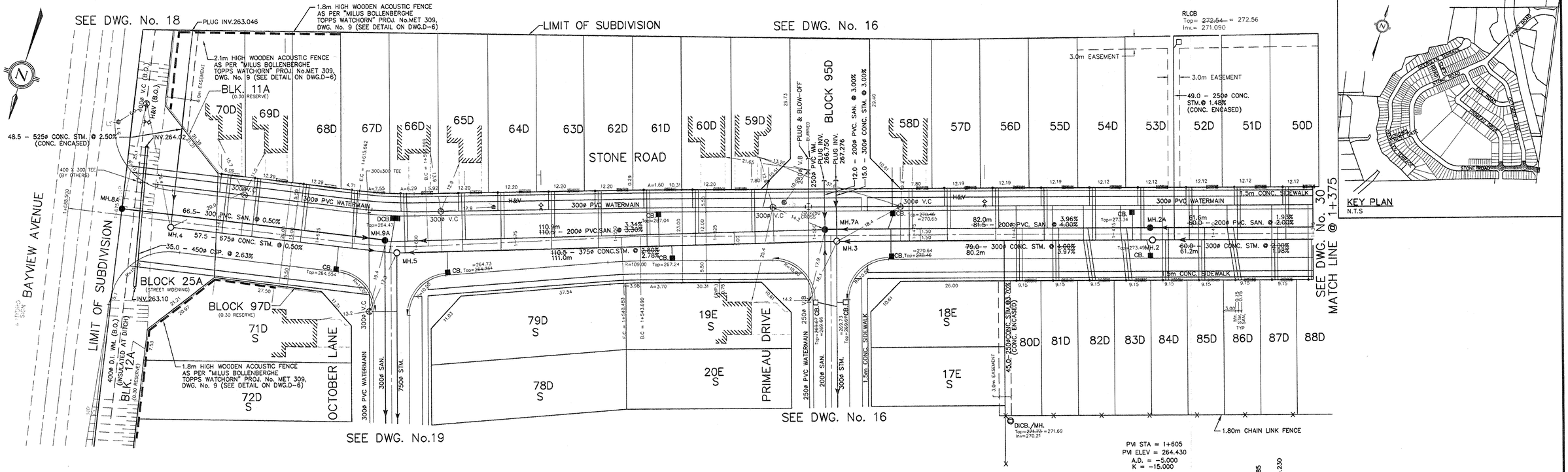
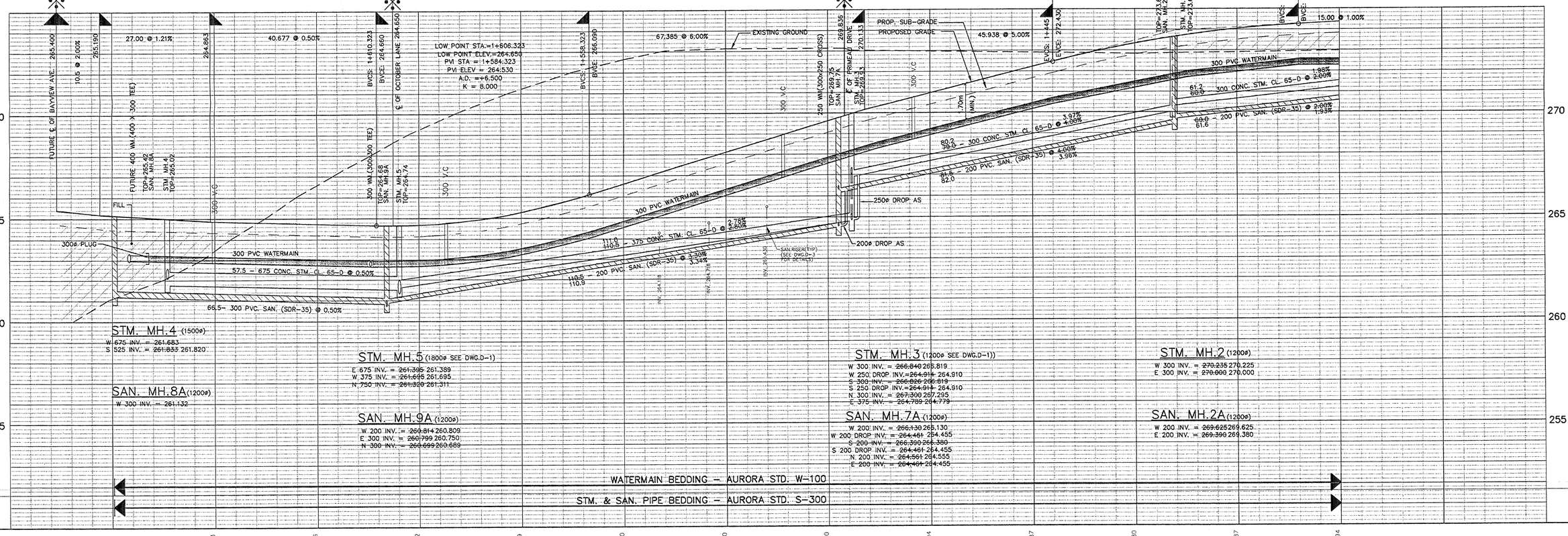




GENERAL NOTES

BENCH MARK BM 126 AURORA ELEV. 247.648

TOP OF MOST NORTHERLY BOLT ON BOTTOM FLANGE OF FIRE HYDRANT ON ST. JOHN'S SIDEROAD AT EAST CORNER OF PUMPING STATION.

No.	REVISIONS	DATE	BY	TOWN APPROVAL
1	ISSUED FOR CONSTRUCTION	11.19.93		
2	LOT NUMBERS/WATERMAIN MATERIAL	03.30.94	J.F.M	
3	ADDED AS CONSTRUCTED	05.27.98	M.W.D.	

COSBURN PATTERSON MATHER LTD.
CONSULTING ENGINEERS 7270 WOODBINE AVE, SUITE 300 MARKHAM, ONT. L3R - 4B9 TELEPHONE: (905) 474-0455

CATTAIL SUBDIVISION

TOWN OF AURORA
REVIEWED
DATE . . . . . 19 . . .
DATE ORIGINALLY SIGNED APRIL 27, 1994
DIRECTOR OF PUBLIC WORKS

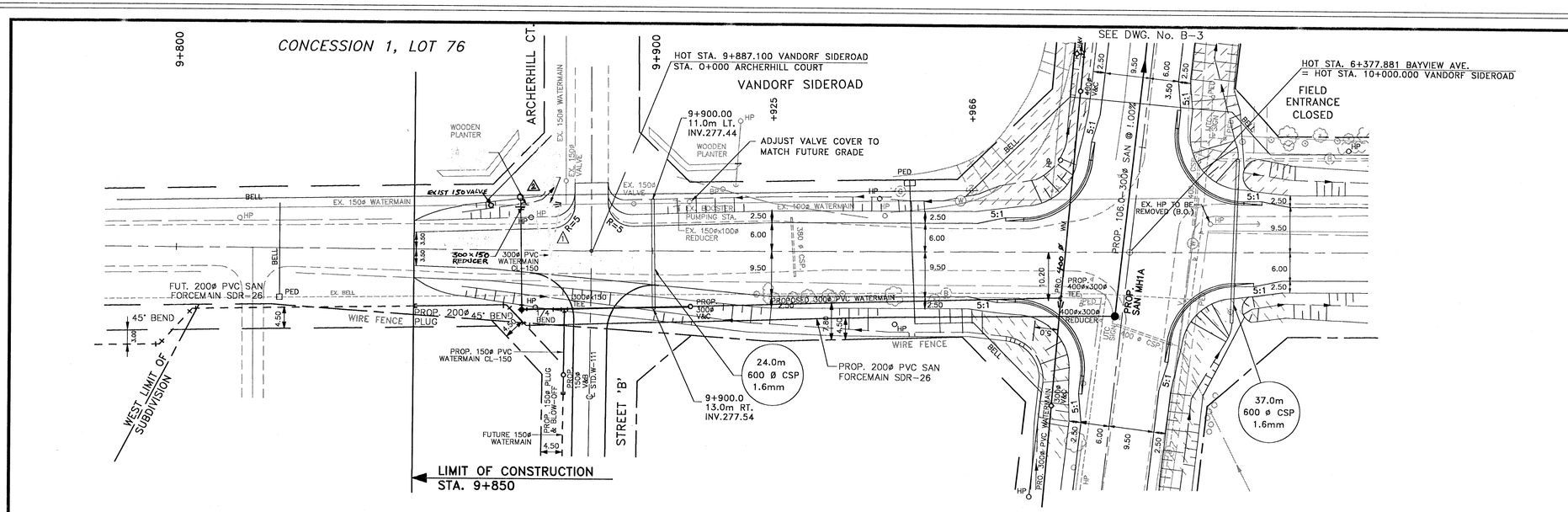
STONE ROAD
(STREET G)
STA. 1+375 TO 1+684.602

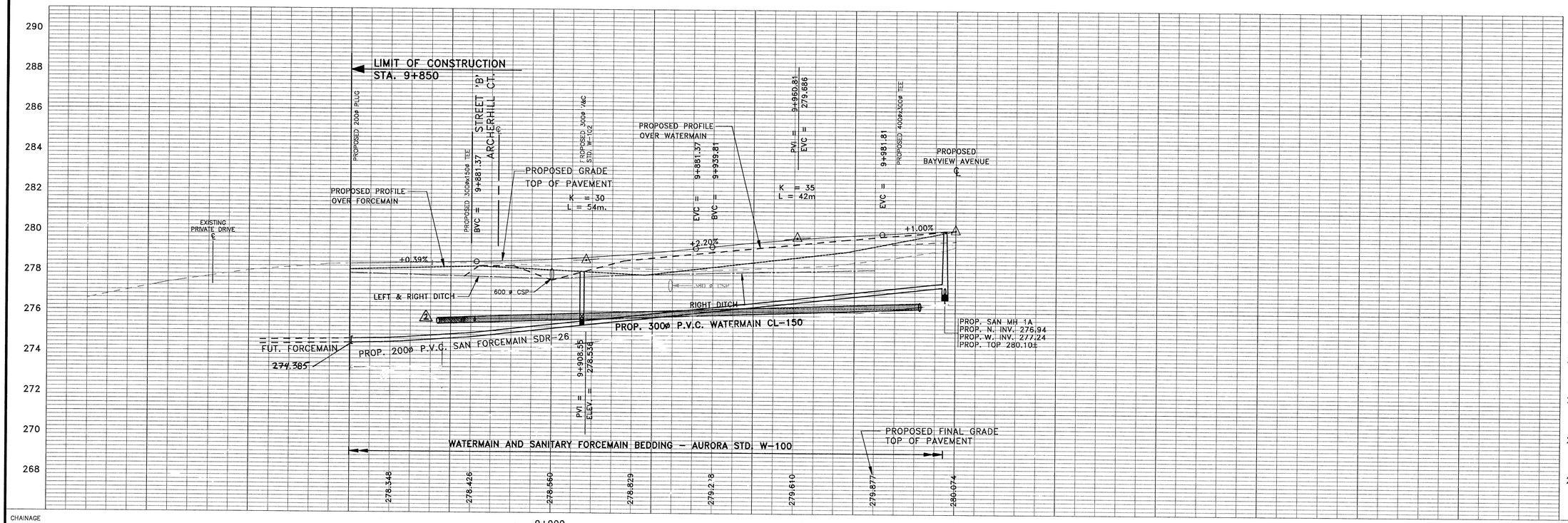
TOWN OF AURORA
ENGINEERING DEPARTMENT

DESIGN J.F.M. , G.M.P.	SCALE HOR. 1:500	VERT. 1:100	
DRAWN L.T.\J.P.L	REVIEWED	DRAWING NO.	31
DATE APRIL, 1993	SHEET NO.	PROJECT No.	89623

File: R:\89\623\Drawings\As-builts\Rady\G6.dwg - Last Revised: Thu, Mar 11 1999 - 11:41pm

STONE ROAD





CHAINAGE	9+900						10+000		10+100
TOP OF WATERMAIN ELEVATION	275.70	275.73	275.89	276.06	276.23	276.39	276.56	276.65	

GENERAL NOTES

No.	REVISIONS	DATE	APPROVED
2	REVISED FOR AS BUILT	17/5/99	JSM
1	CONNECTION TO WATERMAIN AT ARCHERHILL CT.	4/20/95	J.C.K.
	ISSUED FOR TENDER	4/7/95	

BAYVIEW VANDORF
RESIDENTIAL SUBDIVISION
999556 ONTARIO LIMITED
EXTERNAL SERVICES

LICENSED PROFESSIONAL ENGINEER
JEFFREY C. KING
PROVINCE OF ONTARIO

TOWN OF AURORA
REVIEWED
DATE June 2 1995
DIRECTOR OF PUBLIC WORKS

AS BUILT

REGION OF YORK
CONTRACT No. 95-101

Marshall Macklin Monaghan
CONSULTING ENGINEERS · SURVEYORS · PLANNERS

VANDORF AVENUE
STA. 9+850 TO STA 10+000

TOWN OF AURORA
ENGINEERING DEPARTMENT

DESIGN	R.K.G.	SCALE HOR.	1:500 VERT. 1:100
DRAWN	CAD	REVIEWED	J.C.K.
DATE	APRIL 1995	SHEET NO.	58
		DRAWING NO.	V-1
			30-92038

PRINTED ON: Thursday 06/01/1995 02:32:37 PM FILE NAME: H:\30-92038\PROFILES\V2038P28.DWG

FOR VANDORF S.R. CROSS-SECTION SEE DRAWING No. 30-92038-M1

RESTORATION OF VANDORF SIDEROAD NORTH BOULEVARD TO INCLUDE FINE GRADING 100mm TOPSOIL AND SEED.

LIMIT OF VANDORF SIDEROAD WATERMAIN RECONSTRUCTION

CONCESSION 1, LOT 76

VANDORF SIDEROAD

ISOLATE EXISTING 150ø WATERMAIN FROM STA. 9+330 TO STA. 9+875. REMOVE EXISTING 150ø AND INSTALL PROPOSED 300ø WATERMAIN IN SAME TRENCH.

ARCHERHILL COURT

REMOVE EX. REDUCER AND CONNECT TO EX. 300ø WATERMAIN

REMOVE EX.V&S

INSTALL SILTATION CONTROL FENCE

FOR WATERMAIN CROSSING SEE CROSS-SECTION DETAIL ON DWG. No.30-92038-V-3

200ø PVC SDR-35 @ 2.00% DRAIN TO DITCH

PROTECT, SUPPORT AND MAINTAIN EX. HYDRO POLES ALONG VANDORF SIDEROAD (TYP.)

SEE DWG. No. V-3 MATCH LINE STA. 9+620

PROP. 300ø WATERMAIN

EX. 300ø WATERMAIN

H&V

3.0 300øx50ø TEE

±4.5 TO SHOULDER

PROP. 300ø WATERMAIN

EX. GAS

300ø V&C WITH DRAIN

ROCK CHECK DAM

FUTURE 200ø SAN

FUTURE SAN MH

OUTLET SUBDRAIN TO DITCH INVERT

ROCK CHECK DAMS

ASPHALT (BY OTHERS)

PROPOSED DITCH (BY OTHERS)

300ø V&C

300ø BLOW OFF

500 x 150 REDUCER

APPROX. LOCATION OF BOREHOLE #9 REPORT #95298 JULY 17/96 BY TERRAPROBE LTD.

BLOCK 37

6.0 WATER BOX

MATCH TOP OF SLOPE TO EXISTING (BY OTHERS)

200ø PVC SAN FORCEMAIN

REMOVE EX. PLUG AND CONNECT

EX. BELL PLANT TO BE RELOCATED (BY OTHERS)

0.30m RESERVE

PROTECT, SUPPORT AND MAINTAIN EX. BELL PLANT DURING DRIVEWAY CONSTRUCTION.

CONCESSION 1, LOT 75

SEE DWG. No. P7

REGRADE BOULEVARD AND DITCH AS PER DETAIL DWG. No.30-92038-M1 (BY OTHERS)

LIMIT OF VANDORF S.R. SANITARY FORCEMAIN CONSTRUCTION

BLOCK 34

RESTORATION OF VANDORF SIDEROAD SOUTH BOULEVARD TO EXISTING GRADE ONLY. FINE GRADING, 100mm TOPSOIL AND SEED ARE BY OTHERS.

FUTURE SAN MH (BY OTHERS)

MH-PS

250ø SAN (BY OTHERS)

250ø PVC PLUG

MH103A

WORKING AREA FOR PUMPING STATION

200ø SAN (BY OTHERS)

22

23

24

(PARK) BLK 33

(STREET 'B')

N59°08'00"W 14.48

N15°30'00"W 24.77

N15°30'00"W 22.83

N20°51'50"E 13.80

MONKMAN COURT

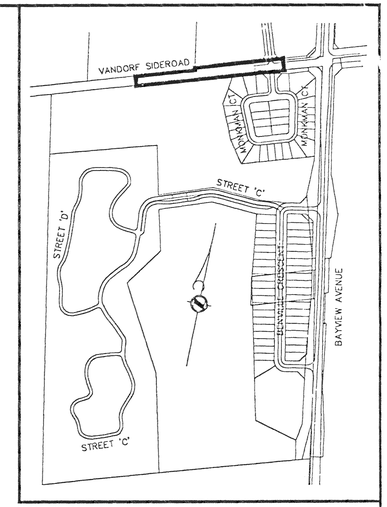
MH15

300ø STM

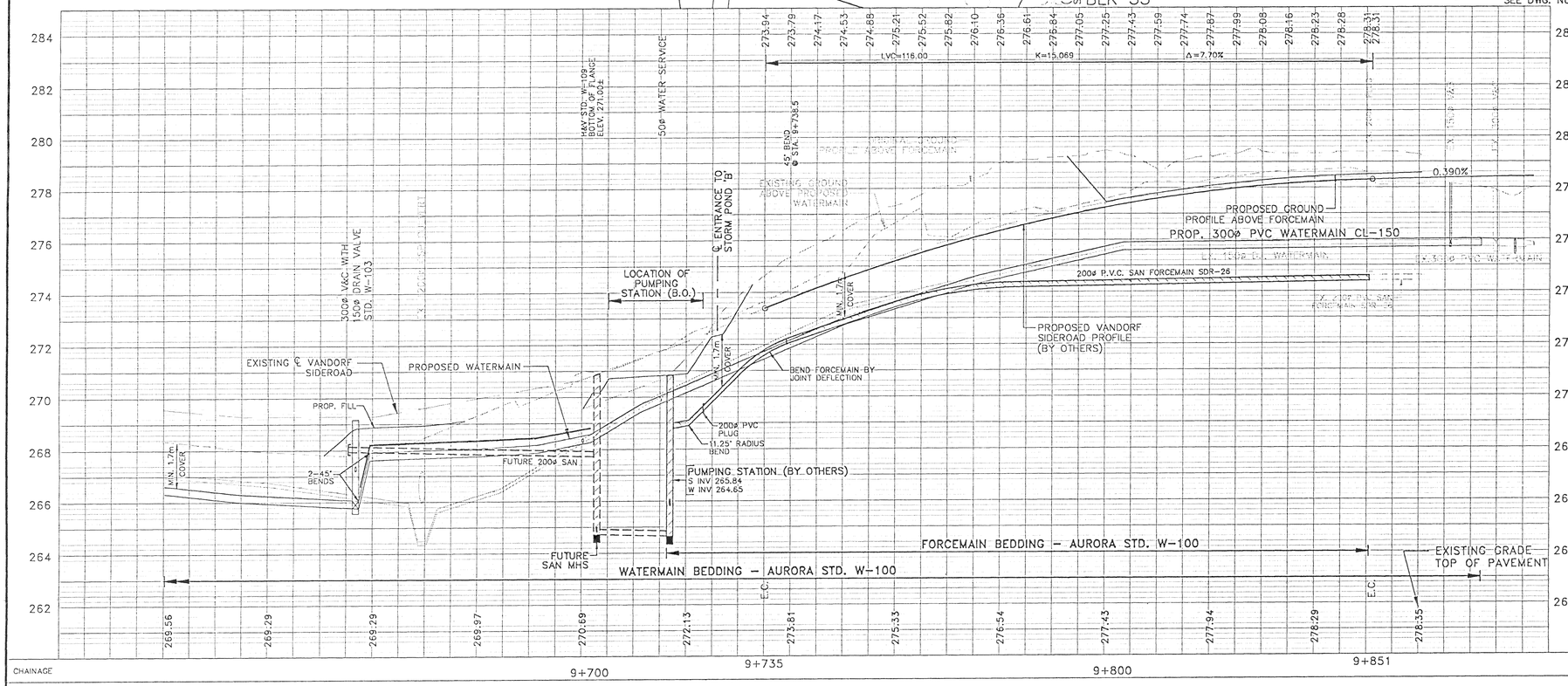
DEPRESSED CURB

150mm CONC. SIDEWALK

SEE DWG. No. P4

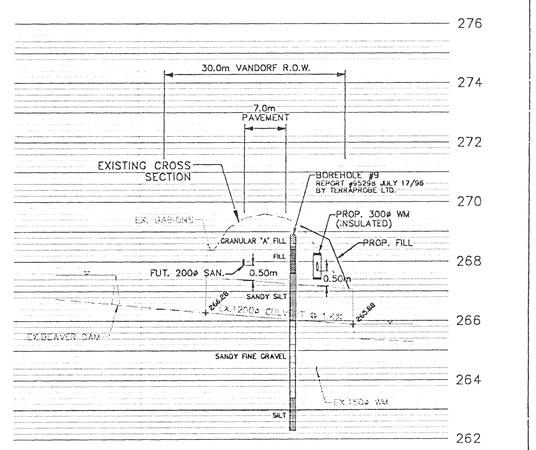


KEY PLAN N.T.S.



DETAIL OF VANDORF SIDEROAD CULVERT CROSSING

N.T.S.



GENERAL NOTES

ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.

ALL PIPES SIZES ARE IN MILLIMETRES.

SEE DWG. No. 30-92038-INDEX FOR LIST OF DRAWINGS, BENCHMARKS, GENERAL NOTES, AND LEGEND.

FOR CROSS SECTIONS SEE DWG No. 30-92038-M1.

No.	REVISIONS	DATE	APPROVED
7	AS CONSTRUCTED	DEC 96	
6	ADD FORCEMAIN ELEVATIONS, V&C DRAIN & EX. GAS AS PER TOWN COMMENTS	09/30/96	
5	ISSUED FOR TOWN OF AURORA APPROVAL	08/07/96	
4	REVISED WATERMAIN TO CROSS ABOVE CULVERT	08/07/96	
3	ADD HYDRANTS AND CHANGE 50ø SLEEVE TO TEE	07/17/96	
2	ISSUED FOR TENDER	07/10/96	
1	ISSUED FOR APPROVAL, NOT FOR CONSTRUCTION	7/10/96	

BAYVIEW VANDORF RESIDENTIAL SUBDIVISION
999556 ONTARIO LIMITED

Marshall Macklin Monaghan
CONSULTING ENGINEERS · SURVEYORS · PLANNERS

LICENCED PROFESSIONAL ENGINEER JEFFREY C. KING PROVINCE OF ONTARIO

TOWN OF AURORA
REVIEWED
DATE Aug 9 1996
Brian Conlin
DIRECTOR OF PUBLIC WORKS

WATERMAIN AND SANITARY FORCEMAIN CONSTRUCTION
VANDORF SIDEROAD
STA. 9+620 TO STA 9+850

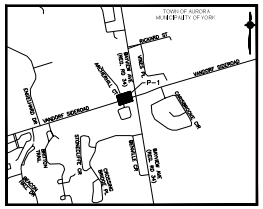
TOWN OF AURORA
CONTRACT No. 1996-21

TOWN OF AURORA
ENGINEERING DEPARTMENT

DESIGN	R.K.C.	SCALE	HOR. 1:500	VERT. 1:100	
DRAWN	CAD	REVIEWED	J.C.K.	DRAWING NO.	2190-9-2
DATE	NOVEMBER 1995	SHEET NO.			30-92038

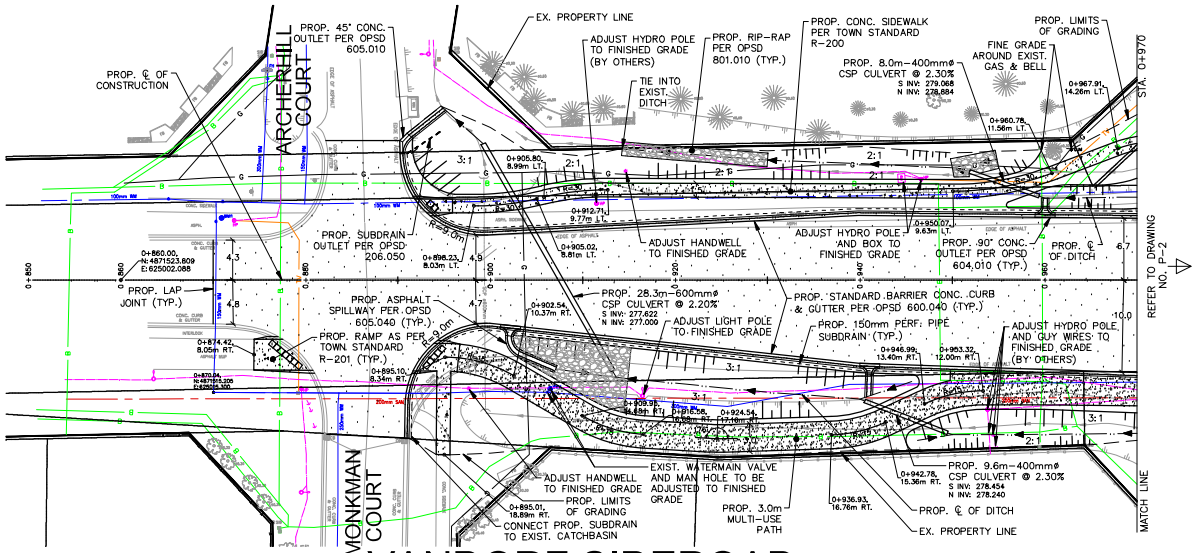
PLOTTED ON Tuesday, 17/09/1996 10:43:41 AM FILE NAME = I:\30-92038\PROF-ES\92038D02.DWG

KEY MAP (N.T.S.)

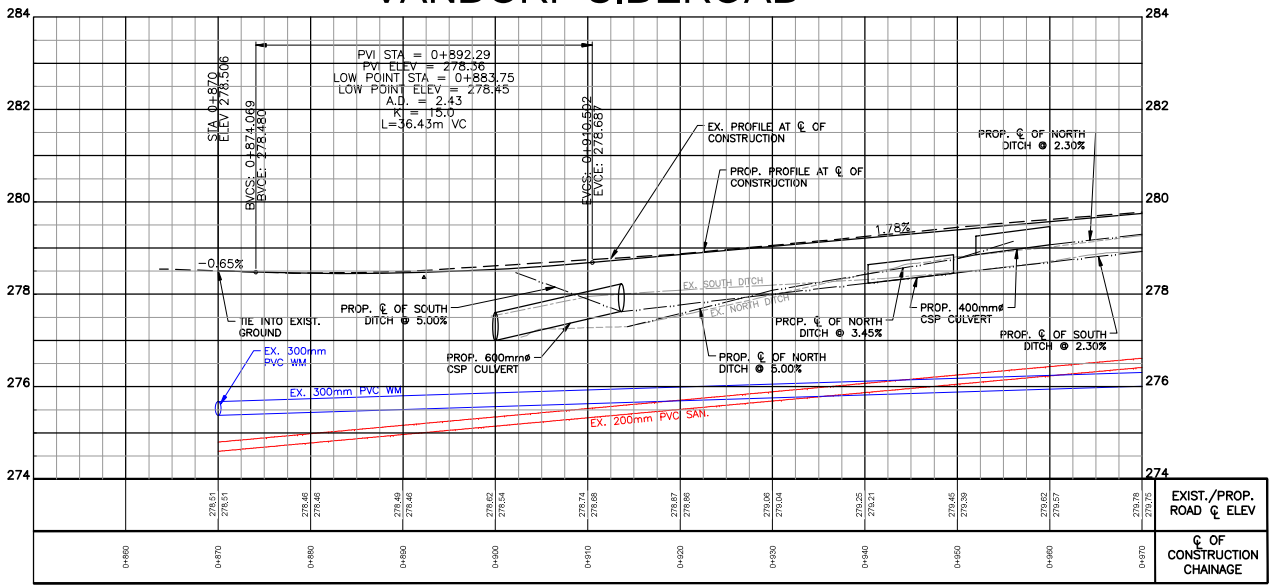


LEGEND

- REMOVE, REMOVE ITEM
- PROP. ASPHALT
- PROP. ASPHALT MUP
- PROP. SIDEWALK
- PROP. TACTILE PLATES
- PROP. RIP-RAP



VANDORF SIDEROAD



NOTE: RESTORATION OF DISTURBED AND DAMAGED AREAS AND ITEMS
ALL AREAS AND ITEMS DISTURBED OR DAMAGED AS A RESULT OF CONSTRUCTION ACTIVITIES SHALL BE RESTORED TO THE SATISFACTION OF THE TOWN.

NOTE: PROTECTION OF TREES
THE CONTRACTOR SHALL ADHERE TO THE TREE PROTECTION REQUIREMENTS SET OUT IN THE CONTRACT SPECIAL PROVISIONS AND WORK IN A MANNER THAT MINIMIZES DISTURBANCES TO TREES. THIS INCLUDES USING HYDROVAC FOR EXCAVATIONS WITHIN ROOT ZONES, NEATLY TRIMMING ROOTS, ETC.

NOTE: LOCATION, PROTECTION AND SUPPORT OF UTILITIES & INFRASTRUCTURE
THE CONTRACTOR IS REQUIRED TO OBTAIN UTILITY LOCATES AND CONFIRM THE LOCATION OF ALL UTILITIES AND INFRASTRUCTURE PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL ALSO DAYLIGHT, PROTECT AND SUPPORT EXISTING UTILITIES AND INFRASTRUCTURE AS REQUIRED IN ORDER TO CARRY OUT THE ALL OF THE WORKS UNDER THIS PROJECT, AND IN ACCORDANCE WITH THE REQUIREMENTS OF THE APPROPRIATE UTILITY COMPANIES AND AUTHORITIES.

DRAWING DISCLAIMER: EXISTING TOPOGRAPHIC AND SERVICING INFORMATION
ALL EXISTING TOPOGRAPHIC INFORMATION AND LINEWORK SHOWN ON THIS PLAN IS APPROXIMATE, HAS BEEN LIMITED TO THE RIGHT-OF-WAY, AND HAS BEEN COMPILED FROM SATELLITE AND GOOGLE STREETVIEW IMAGERY. THIS PLAN DOES NOT NECESSARILY SHOW ALL SURFACE FEATURES AND ABOVEGROUND INFRASTRUCTURE LOCATED WITHIN THE RIGHT-OF-WAY. THE ONLY UNDERGROUND INFRASTRUCTURE SHOWN ON THIS PLAN INCLUDES WATERMAINS AND MAIN-LINE STORM AND SANITARY SEWERS WHICH ARE APPROXIMATE AND HAVE BEEN COMPILED FROM G.I.S. DATA. NO SEWER SERVICES, WATER SERVICES OR UNDERGROUND UTILITIES ARE SHOWN. IT IS THE BIDDERS RESPONSIBILITY TO REVIEW THE SITE IN DETAIL AND DETERMINE ALL EXISTING SURFACE FEATURES AND ABOVE AND UNDERGROUND INFRASTRUCTURE THAT MAY IMPACT, OR BE IMPACTED BY, THE PROPOSED WORK.

No.	REVISION	DATE	REVIEWED
1.	ISSUED FOR TENDER	03.17.21	C.G.

TMIG — A TYLIN INTERNATIONAL COMPANY

LICENSED PROFESSIONAL ENGINEER — D. DI TATA — MAR. 17 / 21 — PROVINCE OF ONTARIO

TOWN OF AURORA
REVIEWED
DATE: 22 MARCH 2021
DIRECTOR OF PLANNING AND DEVELOPMENT SERVICES

Tender 2021-40 PDS-ENG
Rehabilitation of Various Roadway Segments

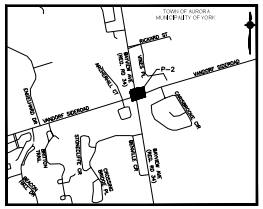
VANDORF SIDEROAD
PLAN AND PROFILES
FROM STA. 0+860.00 TO STA. 0+970.00

AURORA — You're in Good Company

TOWN OF AURORA
PLANNING AND DEVELOPMENT SERVICES

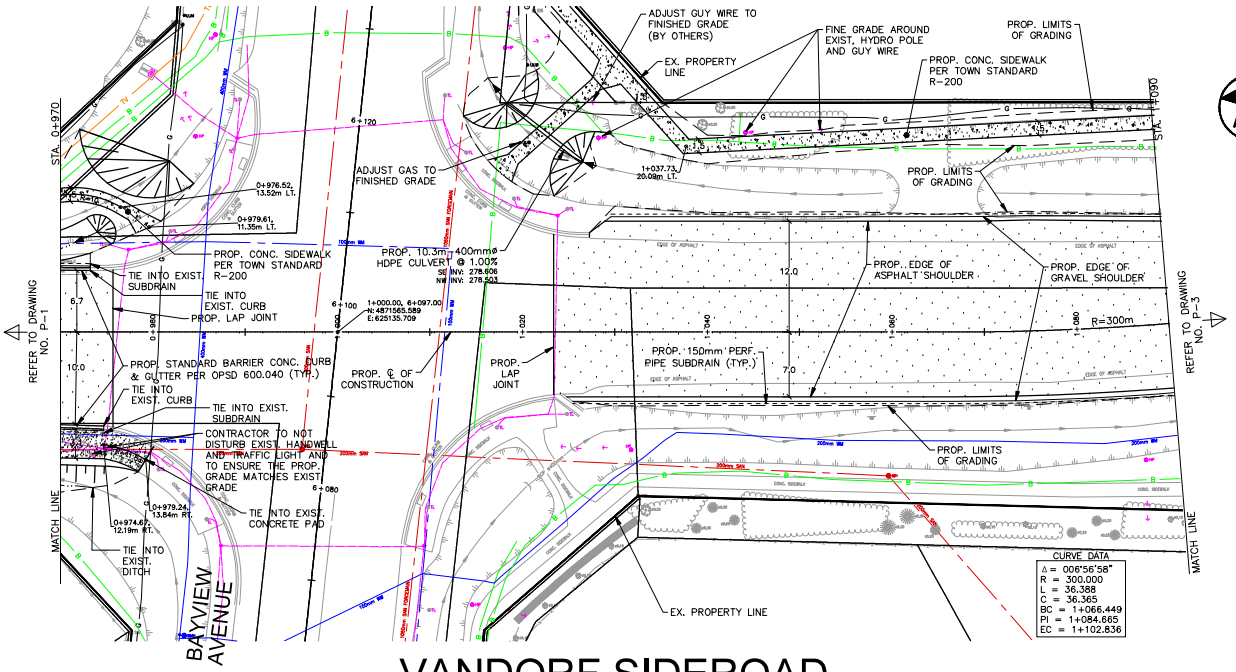
DESIGN: CG	SCALE: HORZ.=1:250 VERT.=1:50	PROJECT NO. 302-40PDS-ENG	
DRAWN: GD	REVIEWED:	DRAWING NO. P-1	
DATE: AUGUST 2020	SHEET NO. 6	TMIG\TYLIPROJECT NO. 20111	

KEY MAP (N.T.S.)

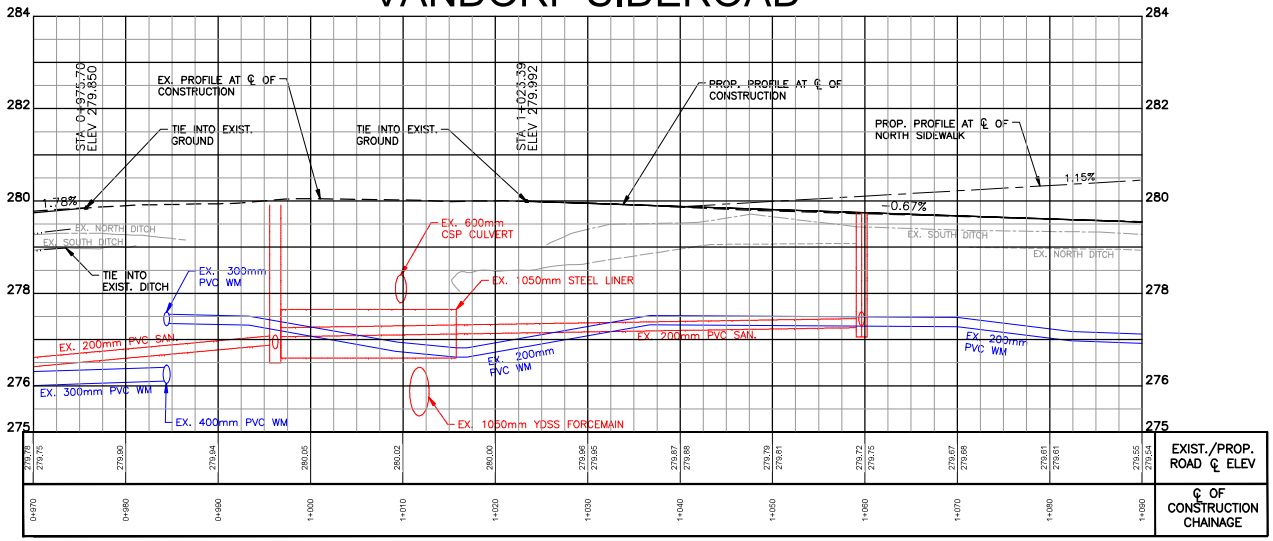


LEGEND

- REMOVE, REMOVE ITEM
- PROP. ASPHALT
- PROP. ASPHALT MUP
- PROP. SIDEWALK
- PROP. TACTILE PLATES
- PROP. RIP-RAP



VANDORF SIDEROAD



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No.	REVISION	DATE	REVIEWED
1.	ISSUED FOR TENDER	03.17.21	C.G.

TMIG — A TYLIN INTERNATIONAL COMPANY

LICENSED PROFESSIONAL ENGINEER — D. DI TATA — MAR. 17 / 21 — PROVINCE OF ONTARIO

TOWN OF AURORA
REVIEWED
DATE: 22 MARCH 2021
DIRECTOR OF PLANNING AND DEVELOPMENT SERVICES

Tender 2021-40 PDS-ENG
Rehabilitation of Various Roadway Segments

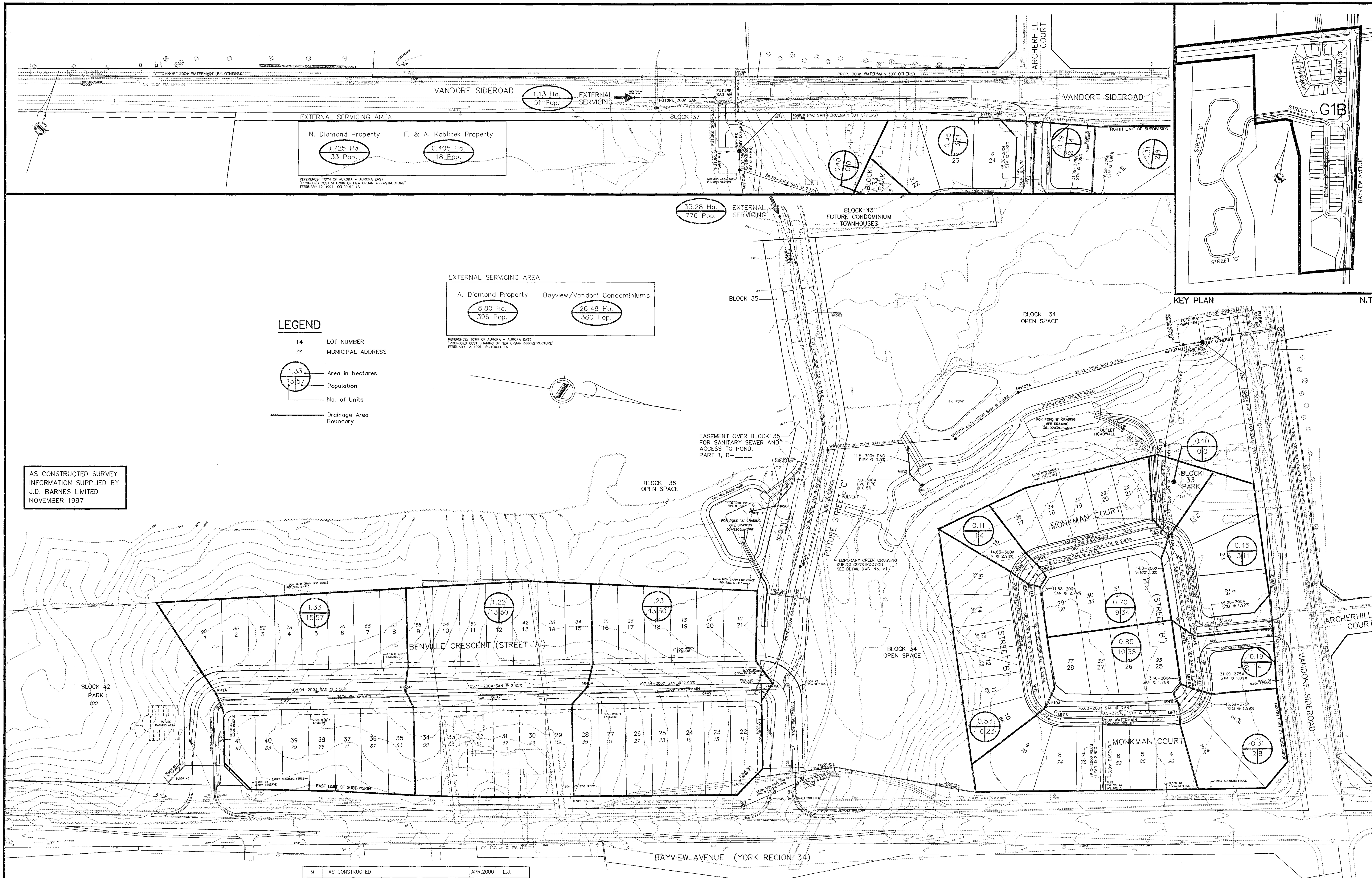
VANDORF SIDEROAD
PLAN AND PROFILES
FROM STA. 0+970.00 TO STA. 1+090.00

AURORA — You're in Good Company

TOWN OF AURORA
PLANNING AND DEVELOPMENT SERVICES

DESIGN: CG	SCALE: HORIZ.=1:250 VERT.=1:50	PROJECT NO. 322-40PDS-ENG	
DRAWN: GD	REVIEWED:	DRAWING NO. P-2	
DATE: AUGUST 2020	SHEET NO. 7	TMIG/TYLI PROJECT NO. 20111	

Plotted: — March 17, 2021 Thu. G:\Projects\2020\20111 — Aurora — Vandorf Sideroad Reconstruction\Drawings\20111 — Plan & Profile.dwg



9	AS CONSTRUCTED	APR.2000	L.J.
8	REVISED AS PER REGION'S COMMENT	03/27/97	J.C.K.
No.	REVISIONS	DATE	APPROVED
7	REVISED BLOCK & RESERVE NUMBERING	NOV 18/96	J.C.K.
6	APPROVED FOR UNDERGROUND SERVICING ONLY	JUL 15/96	B.T.C.
5	ADDED WATER SERVICE AND V&C W/DRAIN ON VANDORF	JUN 24/96	J.C.K.
4	REVISED PAVEMENT WIDTHS AT INTERSECTION	JUN 21/96	J.C.K.
3	REPLACE EX. 150ø WM WITH 250ø WM	JUN 18/96	J.C.K.
2	ISSUED FOR TENDER	JUN 17/96	
1	ISSUED FOR APPROVAL, NOT FOR CONSTRUCTION	AUG/95	

GENERAL NOTES

ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.

ALL PIPES SIZES ARE IN MILLIMETRES.

SEE DWG. No. 30-92038-INDEX FOR LIST OF DRAWINGS, BENCHMARKS, GENERAL NOTES, AND LEGEND.

FOR CROSS SECTIONS SEE DWG No. 30-92038-M1.

BAYVIEW VANDORF RESIDENTIAL SUBDIVISION 999556 ONTARIO LIMITED

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

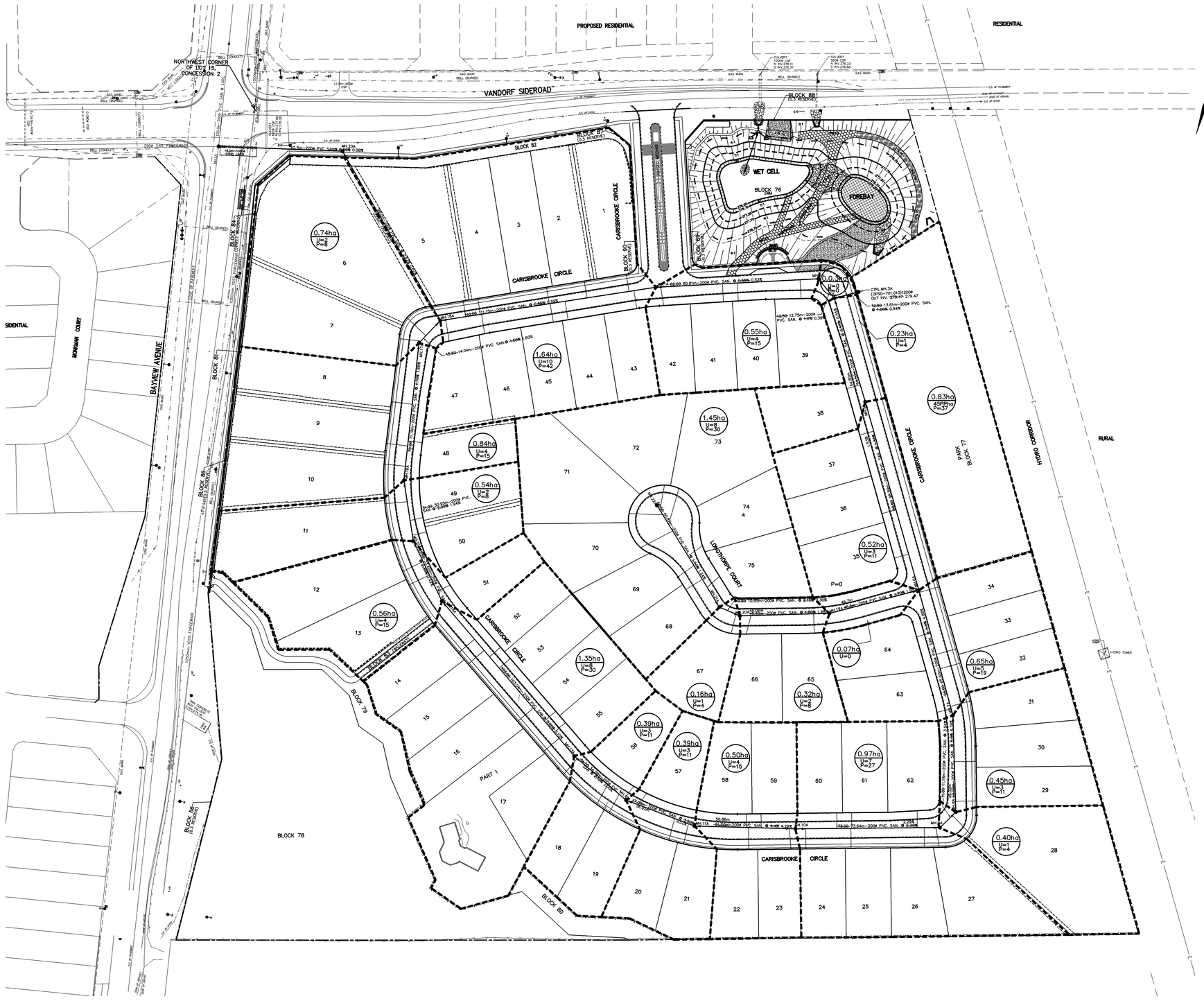
ORIGINAL SIGNED BY:
J.C. KING, P.Eng.
DATE: MAR. 31/97

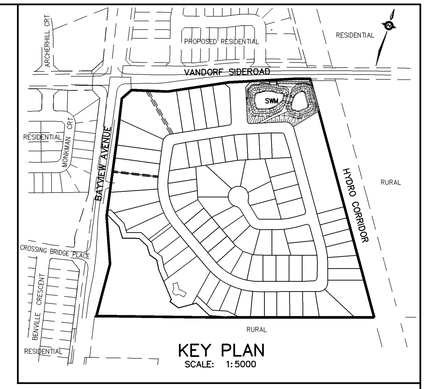
TOWN OF AURORA
REVIEWED
DATE OCT. 21 1996
BRIAN CONLIN
DIRECTOR OF PUBLIC WORKS

GENERAL PLAN
65M-3123 AND 65M-3169
AND SANITARY DRAINAGE PLAN

TOWN OF AURORA
ENGINEERING DEPARTMENT

DESIGN	R.K.G.	SCALE	1:1000		
DRAWN	T.B.Z.	REVIEWED	J.C.K.	DRAWING NO.	G1B
DATE	AUGUST 1995	SHEET NO.			30-92038





KEY PLAN
SCALE: 1:5000

LEGEND

- 1.45ha / U=3 / P=11 — DENOTES AREA IN HECTARES, DENOTES NUMBER OF UNITS, DENOTES POPULATION
- 0.83ha / 45PPHa / P=37 — DENOTES AREA IN HECTARES, DENOTES PERSONS PER HECTARES, DENOTES POPULATION
- DENOTES SANITARY TRIBUTARY AREA BOUNDARY

B.M.#2275
278.038
BRASS PLAQUE IN TOP OF CONCRETE MONUMENT AT S.W.CORNER OF BENVILLE CRES. AND CROSSING BRIDGE PLACE. MONUMENT IS 43.0m WEST OF CENTERLINE OF BENVILLE CRES. AND 20.1m SOUTH OF CENTERLINE CROSSING BRIDGE PLACE.

No.	REVISIONS	DATE	APPROVED
1	AS CONSTRUCTED	FEB.2016	

SCHAEFFERS CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100
Fax: (905) 738-6875
E-mail: design@schaeffers.com

REGISTERED PROFESSIONAL ENGINEER H. O. TOZCU JULY 29 2008 PROVINCE OF ONTARIO

TOWN OF AURORA
REVIEWED
DATE AUG. 24, 2007.
SIGNED
DIRECTOR OF PUBLIC WORKS

BROOKVALLEY DEVELOPMENT

SANITARY TRIBUTARY AREA

TOWN OF AURORA
ENGINEERING DEPARTMENT
D12-05-2A

DESIGN	T.A.	SCALE 1:1000	
DRAWN	I.V.	REVIEWED H.T.	DRAWING NO. TA-2
DATE	DEC. 2006	SHEET NO.	PROJECT No. 2005-2805

H:\As Constructed\2805-AC\2805AC TA-2(SAN).dwg, 10/18/2016 2:32:12 PM, mkhan, User 2 (900.00 x 600.00 MM), 1:1

SEE DWG.No.9

SEE DWG.No.9

SEE DWG.No.12

BLOCK 87C
(SEPARATE SCHOOL)

BLOCK 88C
(PARK)

BLOCK 94D
(PUBLIC SCHOOL)

BLOCK 38E TH

BLOCK 39E TH
0.41ha
24.5

BLOCK 40E TH
1.26ha
108.5

BLOCK 41E TH
1.14ha
98

BLOCK 42E TH

BLOCK 43E TH
1.06ha
112

BLOCK 44E TH

BLOCK 45E TH

BLOCK 154B TH
0.43ha
38.5

BLOCK 155B TH

BLOCK 156B TH
0.84ha
77

BLOCK 157B TH
0.79ha
70

BLOCK 158B TH

BLOCK 159B TH
0.84ha
73.5

BLOCK 92D TH

BLOCK 93D TH
1.20ha
112

BLOCK 95D TH

BLOCK 97D

FIFE ROAD (STREET 'B')

PRIMEAU DRIVE (STREET 'C')

OCTOBER LANE (STREET 'D')

STONE ROAD (STREET 'E')

BLOCK 3F (TOWNHOUSES)

BLOCK 8A (OPEN SPACE)

BLOCK 9A (STORM WATER MANAGEMENT)

BLOCK 10A

BLOCK 11A (0.3m RESERVE)

BLOCK 12A (0.3m RESERVE)

BLOCK 13A

BLOCK 14A

BLOCK 15A

BLOCK 16A

BLOCK 24A

BLOCK 25A

BAYVIEW AVENUE

ONTARIO HYDRO CORRIDOR

LIMIT OF SUBDIVISION

0.30ha
21

0.27ha
21

0.41ha
28

0.32ha
21

0.42ha
35

0.32ha
28

3.00ha
2.187L/s

0.58ha
42

0.59ha
28

0.52ha
17.5

0.61ha
31.5

0.64ha
28

0.78ha
56

0.36ha
14

0.50ha
22.5

54.9ha
2470.5
EXTERNAL

1.8m HIGH CHAIN LINK FENCE

1.2m HIGH CHAIN LINK FENCE

1.8m HIGH ACOUSTIC FENCE

2.1m HIGH ACOUSTIC FENCE

3.0m EASEMENT

3.0m WIDE ACCESS ROAD

POST & CABLE BARRIER (TYP.)

HYDRO ACCESS (BY OTHERS)

FOR ACCESS ROAD, SEE PLAN AND PROFILE ON DWG.No.24

LEGEND

DRAINAGE AREA BOUNDARY

0.98ha / 38.5 DRAINAGE AREA (ha) POPULATION

KEY PLAN N.T.S.

GENERAL NOTES

BENCH MARK BM 128 AURORA ELEV. 247.648

TOP OF MOST NORTHERLY BOLT ON BOTTOM FLANGE OF FIRE HYDRANT ON ST. JOHN'S SIDEROAD AT EAST CORNER OF PUMPING STATION.

No.	REVISIONS	DATE	BY	TOWN APPROVAL
1	ISSUED FOR CONSTRUCTION	11.19.93		
2	LOT NUMBERS/WATERMAIN MATERIAL	03.30.94	J.F.M.	

COSBURN PATTERSON WARDMAN LTD.
CONSULTING ENGINEERS
7270 WOODBINE AVE, SUITE 201
MARKHAM, ONT. L3R - 4B9
TELEPHONE: (905) 474-0455

CATTAIL SUBDIVISION

TOWN OF AURORA
REVIEWED
DATE Apr. 27, 1994
DIRECTOR OF PUBLIC WORKS

SANITARY DRAINAGE PLAN

TOWN OF AURORA
ENGINEERING DEPARTMENT

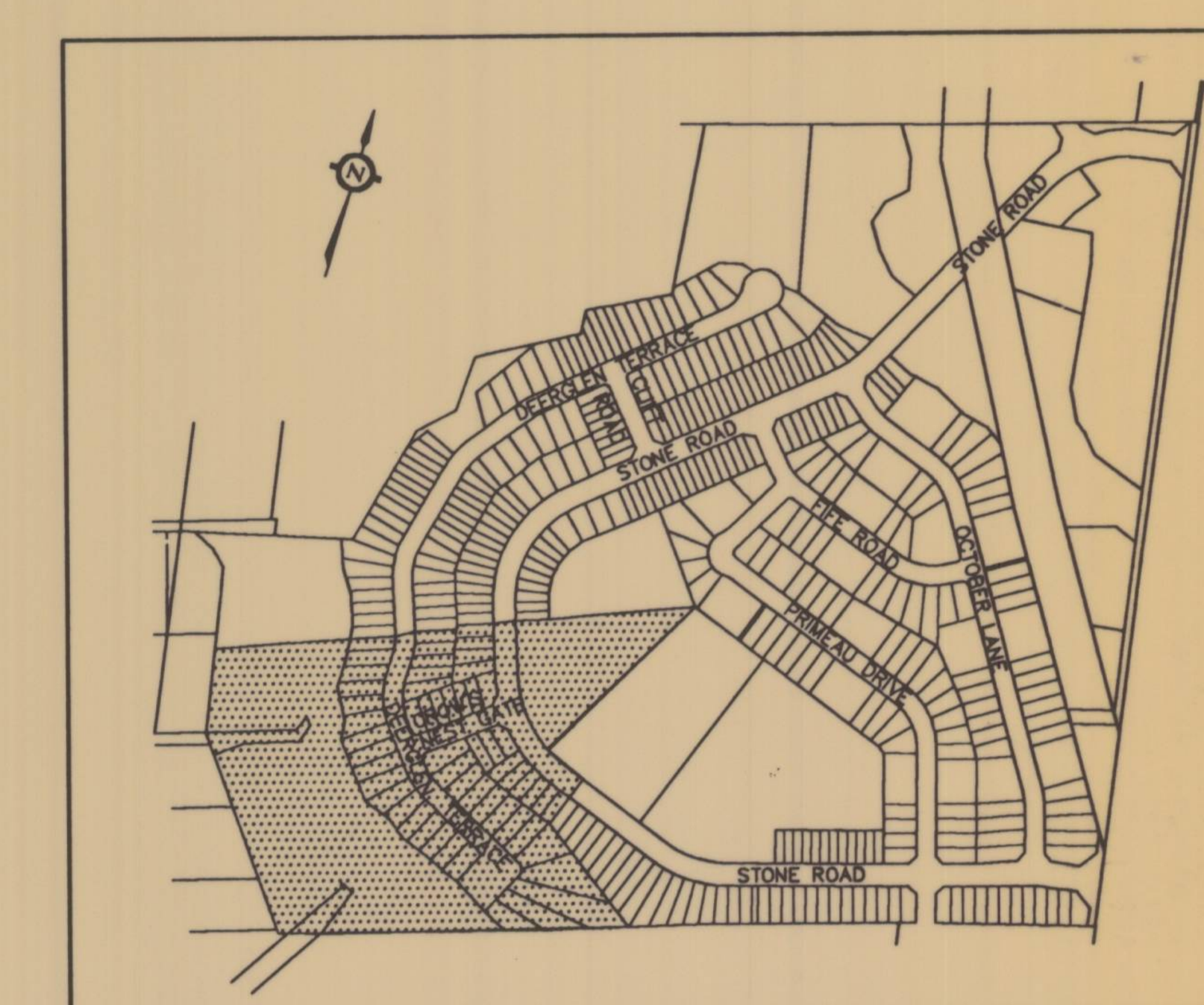
DESIGN	J.F.M\G.M.P	SCALE	1 : 1000
DRAWN	V.N.	REVIEWED	J.D.P.
DATE	APRIL 1993	SHEET NO.	

DRAWING NO. 10
PROJECT No. 89623

LEGEND

DRAINAGE AREA BOUNDARY

0.98ha / 38.5 — DRAINAGE AREA (ha) / POPULATION



KEY PLAN N.T.S.

GENERAL NOTES

BENCH MARK BM 126 AURORA ELEV. 247.648

TOP OF MOST NORTHERLY BOLT ON BOTTOM FLANGE OF FIRE HYDRANT ON ST. JOHN'S SIDEROAD AT EAST CORNER OF PUMPING STATION.

No.	REVISIONS	DATE	BY	TOWN APPROVAL
1	ISSUED FOR CONSTRUCTION	11.19.93		
2	LOT NUMBERS/WATERMAIN MATERIAL	03.30.94	J.F.M.	[illegible]

COSBURN PATTERSON WARDMAN LTD.

CONSULTING ENGINEERS 7270 WOODBINE AVE, SUITE 201 MARKHAM, ONT. L3R - 4B9 TELEPHONE: (905) 474-0455

CATTAIL SUBDIVISION

LICENSED PROFESSIONAL ENGINEER J.D. PATTERSON PROVINCE OF ONTARIO

TOWN OF AURORA
REVIEWED
DATE Apr 27 1994
DIRECTOR OF PUBLIC WORKS

SANITARY DRAINAGE PLAN

TOWN OF AURORA

ENGINEERING DEPARTMENT

DESIGN	J.F.M.\G.M.P	SCALE	1 : 1000		
DRAWN	V.N.	REVIEWED	J.D.P.	DRAWING NO.	12
DATE	APRIL 1993	SHEET NO.		PROJECT No.	89623

LIMIT OF SUBDIVISION

BLOCK 1A
(STORM WATER MANAGEMENT)

BLOCK 2A
(OPEN SPACE)

EAST HOLLAND RIVER

BLOCK 1F
(TOWNHOUSES)
1.33ha
60

BLOCK 2F
(TOWNHOUSES)
0.85ha
38

BLOCK 20A

BLOCK 4A
(FUTURE EXPANSION)

BLOCK 18A
(0.30m RESERVE)

0.87ha
39

BLOCK 5A

BLOCK 19A
(0.30m RESERVE)
TEMPORARY ASPHALT CURB

BLOCK 24A
(ROAD WIDENING)
TEMPORARY ASPHALT CURB

BLOCK 17A
(0.30m RESERVE)

BLOCK 16A
(0.30m RESERVE)

TERMINATE CURB & GUTTER AS PER OPSD 808.01

ASPHALT SPILLWAY OPSD 805.04

STREET H

DEAD END BARRICADE AS PER OPSD 808.01

FUTURE EXTENSION

STONE ROAD
(STREET G)

BLOCK 6A
(TOWNHOUSES)

2.81ha
126.5

ORIGINAL ROAD ALLOWANCE

EXISTING EDGE OF TRAVELLED PORTION OF ROADWAY

BAYVIEW AVENUE

BLOCK 7A
(STORM WATER MANAGEMENT)

BLOCK 3F
(TOWNHOUSES)

ONTARIO HYDRO CORRIDOR

BLOCK 8A
(OPEN SPACE)

BLOCK 3A
(OPEN SPACE)

BLOCK 161B
TH
0.92ha
73.5

BLOCK 160B
TH

BLOCK 140
TH

OCTOBER LANE
(STREET D)

FIFE ROAD
(STREET B)

CLIFT ROAD
(STREET F)

DEERGLEN TERRACE
(STREET E)

0.88ha
45.5

0.98ha
38.5

0.17ha
3.5

0.38ha
21

0.98ha
73.5

0.76ha
52.5

0.29ha
14

0.40ha
24.5

0.41ha
28

134B S
150B S
151B S
153B S

SEE DWG.No.11

SEE DWG.No.10

MH.9
MH.10
MH.11
MH.12A
MH.13
MH.13A
MH.14
MH.15
MH.16
MH.17
MH.17A
MH.18A
MH.19
MH.20A
MH.21
MH.22A
MH.23
MH.24
MH.24A
MH.25
MH.26
MH.27
MH.28
MH.29
MH.30
MH.102A
MH.110A
MH.111A

1.2m HIGH CHAIN LINK FENCE

2.0m EASEMENT

3.0m EASEMENT

STEEL BEAM GUIDE RAIL AS PER OPSD 902.03

PROPOSED CHANNEL ALIGNMENT (SEE DWG. L-4 FOR DETAILS)

1.2m HIGH CHAIN LINK FENCE C/W GATE AS PER OPSD 800.04

WINGWALLS

2 – 9.75m x 3.05m x 31.2m LONG CON/SPAN PRECAST CONCRETE CULVERTS, SEE DWG. No. SW-5

1.2m HIGH CHAIN LINK FENCE AS PER OPSD 800.04

1.8m HIGH CHAIN LINK FENCE

HEADWALL

600ϕCONC.SAN.(BY OTHERS)

EX.400ϕCSP

LEGEND

DRAINAGE AREA BOUNDARY

0.98ha
38.5
DRAINAGE AREA (ha)
POPULATION

KEY PLAN N.T.S.

GENERAL NOTES

BENCH MARK BM 126 AURORA ELEV. 247.648

TOP OF MOST NORTHERLY BOLT ON BOTTOM FLANGE OF FIRE HYDRANT ON ST. JOHN'S SIDEROAD AT EAST CORNER OF PUMPING STATION.

No.	REVISIONS	DATE	BY	TOWN APPROVAL
1	ISSUED FOR CONSTRUCTION	11.19.93		
2	LOT NUMBERS/WATERMAIN MATERIAL	03.30.94	J.F.M.	

COSBURN PATTERSON WARDMAN LTD.
CONSULTING ENGINEERS
7270 WOODBINE AVE.,SUITE 201
MARKHAM, ONT. L3R - 4B9
TELEPHONE: (905) 474-0455

CATTAIL SUBDIVISION

LICENSED PROFESSIONAL ENGINEER J.D. PATTERSON 1815 PROVINCE OF ONTARIO

TOWN OF AURORA
REVIEWED
DATE Apr 27 19 94
DIRECTOR OF PUBLIC WORKS

SANITARY DRAINAGE PLAN

TOWN OF AURORA
ENGINEERING DEPARTMENT

DESIGN	J.F.M\G.M.P	SCALE	1 : 1000
DRAWN	V.N.	REVIEWED	J.D.P.
DATE	APRIL 1993	SHEET NO.	
		DRAWING NO.	9
		PROJECT No.	89623

EXISTING MONKMAN COURT

EXISTING BENVILLE CRESCENT

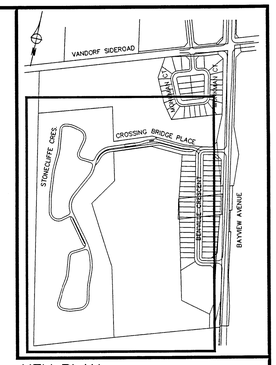
EXISTING OPEN SPACE
BLOCK 34
65M-3123

EXISTING OPEN SPACE
BLOCK 36
65M-3123

PART 1 , PLAN 65R-787

PART 2 , PLAN 65R-13305

PART 2 , PLAN 65R-16677



KEY PLAN N.T.S.

LEGEND:

NUMBER OF UNITS — 0.45 / 3P1 — AREA IN ha. / POPULATION

SANITARY DRAINAGE BOUNDARY

SUBMISSION
1st _____ 2nd _____
PRE. SERV. _____
INTERIM _____
FINAL OCT 23 1998

GENERAL NOTES
ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.
ALL PIPES SIZES ARE IN MILLIMETRES.
SEE INDEX FOR LIST OF DRAWINGS, BENCHMARKS AND GENERAL NOTES.
SEE DRAWINGS 10-97040-M1 TO M3 FOR CROSS-SECTIONS AND DETAILS.

No.	REVISIONS	DATE	APPROVED
3	3rd SUBMISSION	SEP/98	
2	2nd SUBMISSION	JUL/98	
1	ISSUED FOR APPROVAL, NOT FOR CONSTRUCTION	FEB/98	

STONEBRIDGE DEVELOPMENT

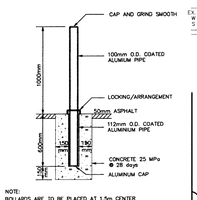
Marshall Macklin Monaghan
CONSULTING ENGINEERS · SURVEYORS · PLANNERS

LICENSED PROFESSIONAL ENGINEER
R. G. KNIGHT
PROVINCE OF ONTARIO

SANITARY DRAINAGE PLAN

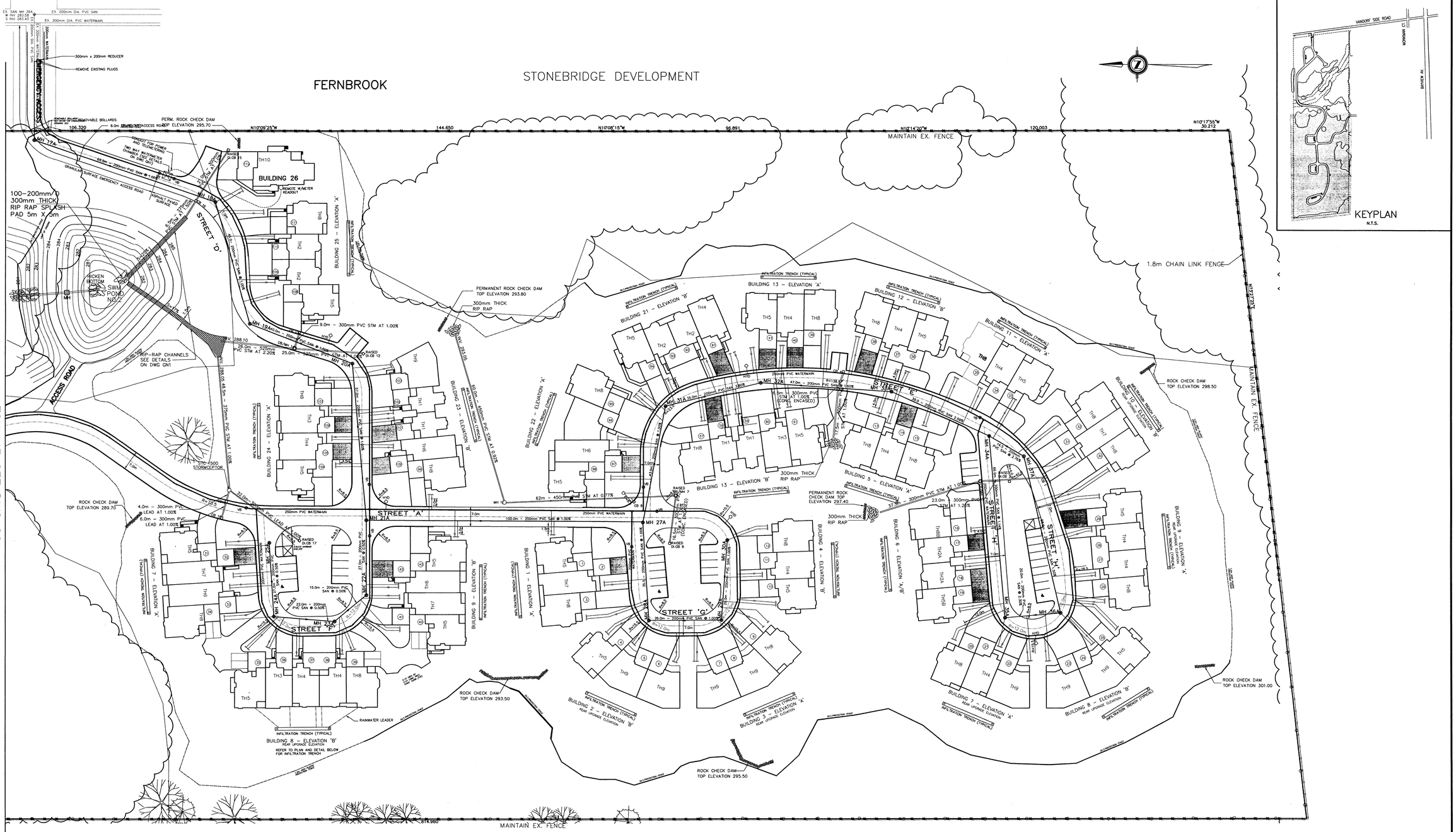
DESIGN	R.G.K.	SCALE HOR 1:750	
DRAWN	R.M.M.	REVIEWED J.C.K.	DRAWING NO. SA1
DATE	FEBRUARY 1998	SHEET NO.	10-97040

PRINTED ON Wednesday, 28 OCTOBER 1998 09:45:43 AM FILE NAME: S:\10-97040\DWG\SA1_750.dwg



NOTE:
BOLLARDS ARE TO BE PLACED AT 1.5m CENTER

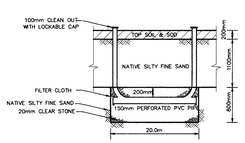
REMOVABLE BOLLARD DETAIL
SCALE 1:25



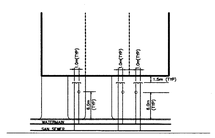
STORM DRAINAGE CB/MH CHART

STR. No.	TYPE	TOP EL (m)	INLET INVERT (m)	OUTLET INVERT (m)
CB 1	OPSD 705.010	300.61	–	299.20
DICB 2	OPSD 705.030	299.90	–	299.01
CB/MH 3	OPSD 701.010	300.36	298.91	298.86
CB 4	OPSD 705.010	298.61	–	297.75
CB 5	OPSD 705.010	298.51	297.68	297.63
DICB 6	OPSD 705.030	295.40	–	294.30
CB/MH 7	OPSD 701.010	295.80	294.15	294.05
CB 8	OPSD 705.010	295.50	–	294.05
MH 11	OPSD 701.010	294.80	S 293.67	293.60
DICB 12	OPSD 705.030	292.70	–	289.95
CB 13	OPSD 705.010	292.15	–	290.74
CB/MH 14	OPSD 701.010	292.15	N 289.70 E 290.65	289.65
DICB 15	OPSD 705.030	290.40	–	289.00
CB 16	OPSD 705.010	290.25	288.80	288.60
DICB 17	OPSD 705.030	291.40	–	288.97
CB 18	OPSD 705.010	290.16	–	288.80
CB 19	OPSD 701.010	290.16	N 288.69 S 288.74	288.66
STORMSEPTOR	STC 1500	290.50	N 288.65 S 288.65	288.54

INFILTRATION TRENCH DETAIL
PLAN VIEW
SEE TYPICAL CROSS SECTION DETAIL ON DWG GN1



INFILTRATION TRENCH DETAIL
PROFILE
NTS
REFER TO DRAWING GN1 FOR INFILTRATION TRENCH TYPICAL CROSS SECTION



TYPICAL SERVICE LOCATIONS

SANITARY SEWER MAINTENANCE HOLE CHART

MH No.	TYPE	TOP EL	INVERT	INVERT	INVERT	INVERT
17A	1200mm DIA	290.25	SW 200mm 285.96	SW DROP 200mm 284.07	E 200mm 284.02	
18A	1200mm DIA	290.48	SW 200mm 286.71	NE 200mm 286.66		
19A	1200mm DIA	291.46	SW 200mm 287.22	NE 200mm 287.17		
20A	1200mm DIA	293.10	W 200mm 287.67	NE 200mm 287.62		
21A	1200mm DIA	293.35	S 200mm 290.75	W 200mm 288.29	S DROP 200mm 288.29	E 200mm 288.24
22A	1200mm DIA	293.42	NW 200mm 288.39	E 200mm 288.34		
23A	1200mm DIA	293.20	N 200mm 288.51	SE 200mm 288.46		
24A	1200mm DIA	292.40	E 200mm 288.67	S 200mm 288.62		
25A	1200mm DIA	291.37	W 200mm 288.80			
27A	1200mm DIA	295.63	NE 200mm 293.63	NE DROP 200mm 291.80	W 200mm 291.80	N 200mm 291.75
28A	1200mm DIA	295.65	S 200mm 292.20	W 200mm 292.15		
29A	1200mm DIA	295.88	W 200mm 292.51	N 200mm 292.46		
30A	1200mm DIA	296.23	W 200mm 292.80			
31A	1200mm DIA	297.05	SW 200mm 294.11	NW 200mm 294.06		
32A	1200mm DIA	297.90	SW 200mm 295.49	NE 200mm 295.44		
33A	1200mm DIA	299.02	SW 200mm 296.29	NE 200mm 296.24		
34A	1200mm DIA	299.85	W 200mm 297.35	SW 200mm 297.35	NE 200mm 297.30	
35A	1200mm DIA	300.66	S 200mm 298.15	E 200mm 298.10		
36A	1200mm DIA	301.15	N 200mm 298.65	E 200mm 298.67		
37A	1200mm DIA	300.28	W 200mm 297.80	NE 200mm 297.75		

NOTES:

1. GENERAL
   - FOR GENERAL NOTES AND DETAILS REFER TO DWG GN1
   - FOR POND DETAILS REFER TO DWG GR1
   - FOR TYPICAL ROAD CROSS SECTIONS REFER TO DWG SS1
2. STORMWATER MANAGEMENT POND
   - ALL POND CONSTRUCTION TO BE APPROVED BY GEOTECHNICAL ENGINEER.

LEGEND:

- SWALE
- CATCHBASIN
- CULVERT
- INFILTRATION TRENCH
- RIP RAP CHANNEL
- HYDRANT
- VALVE CHAMBER
- WATERBOX

GENERAL NOTES

No.	REVISIONS	DATE	REVIEWED
	THIRD SUBMISSION	06/09/00	
	FOURTH SUBMISSION	01/02/01	
	FIFTH SUBMISSION	MAR.23,01	
	L.S.C.A. REVISION	MAY 1,01	
	REVISED SITE PLAN	APR.10,01	

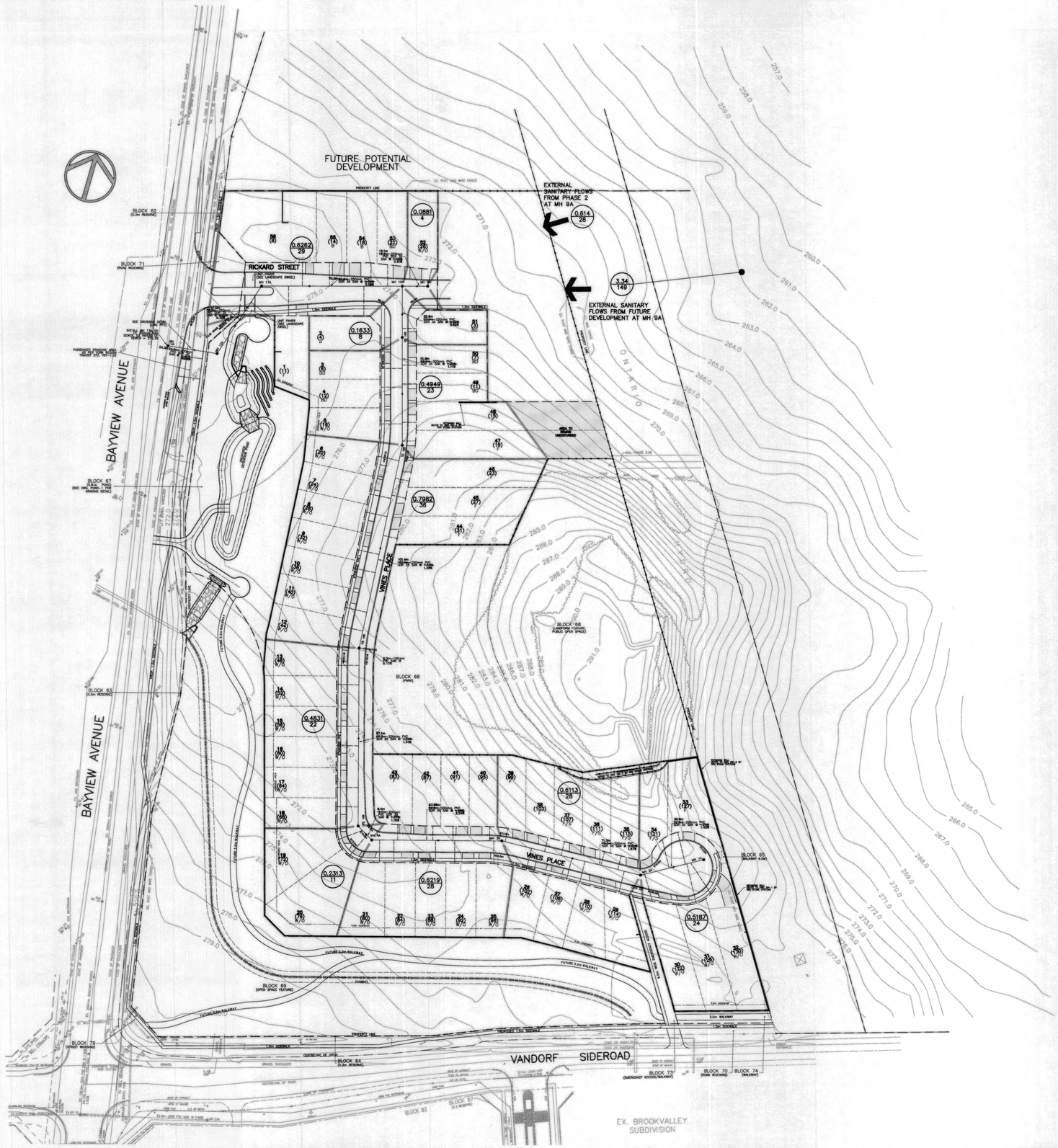
URS
URS Canada Inc
75 Commerce Valley Drive East
Markham, Ontario L3T 7N9
TEL: (905)882-4401 FAX:(905)882-4399

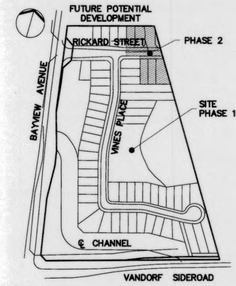
LICENSED PROFESSIONAL ENGINEER
W. F. DURRELL
PROVINCE OF ONTARIO

WYCLIFFE / DIAMOND HOMESTEAD

SITE SERVICING
SHEET 2 OF 2

DESIGN M.B.	SCALE 1:500		
DRAWN L.R.	REVIEWED	DRAWING NO.	SS2
DATE APRIL 2002	SHEET NO.	PROJECT No.	99324





KEY PLAN

1:10000

BENCHMARK

ELEVATION = 287.412m

ELEVATIONS ARE DERIVED FROM AURORA BENCH MARK No. 2155 HAVING AN ELEVATION OF 287.412 METRES.

NOTES

1. SEE NOTES AND LEGEND AT FRONT OF THIS DRAWING SET.
2. SEE CONSTRUCTION DETAIL SHEETS AT BACK OF THIS DRAWING SET.
3. WHERE NEW WATERMAINS ARE TO BE CONSTRUCTED IN FILL ZONES, RESTRAINING JOINTS MUST BE USED
4. WATERMAIN PIPE DEFLECTION SHALL BE AS PER MANUFACTURER'S RECOMMENDATIONS.
5. ALL ROAD CATCH BASINS TO BE FITTED WITH INLET CONTROL DEVICES (SEE TABLE ON GN-1)

LEGEND

0.233 / 7 — SIZE OF DRAINAGE AREA (ha.) / POPULATION IN AREA (BASED ON 45 pphа)

DRAINAGE AREA BOUNDARY

No.	By	Date	Revision	Chk'd
8.	J.B.	25/07/2016	AS-CONSTRUCTED	B.S.
7.	J.L.	12/10/2010	ISSUED FOR APPROVAL	J.R.
6.	J.L.	07/13/2010	ISSUED FOR PRE-SERVICING AGREEMENT	J.R.
5.	J.L.	06/09/2010	AS PER REGION COMMENTS	J.R.
4.	J.L.	03/31/2010	AS PER REGION COMMENTS	J.R.
3.	J.L.	10/06/2009	AS PER TOWN COMMENTS	J.R.
2.	J.L.	06/24/2009	AS PER TOWN COMMENTS	J.R.
1.	B.S.	10/17/2008	AS PER TOWN COMMENTS	J.R.

AURORA — TOWN OF AURORA

York Region — REGIONAL MUNICIPALITY OF YORK

2164437 ONTARIO INC.

JSW+ associates — CONSULTING ENGINEERS LANDSCAPE ARCHITECTS PLANNERS
Tel: (905)889-8100 Fax: (905)889-6616 email: design@jsw.ca

LICENSED PROFESSIONAL ENGINEER B.E. SCHUKNECHT PROVINCE OF ONTARIO

TOWN OF AURORA

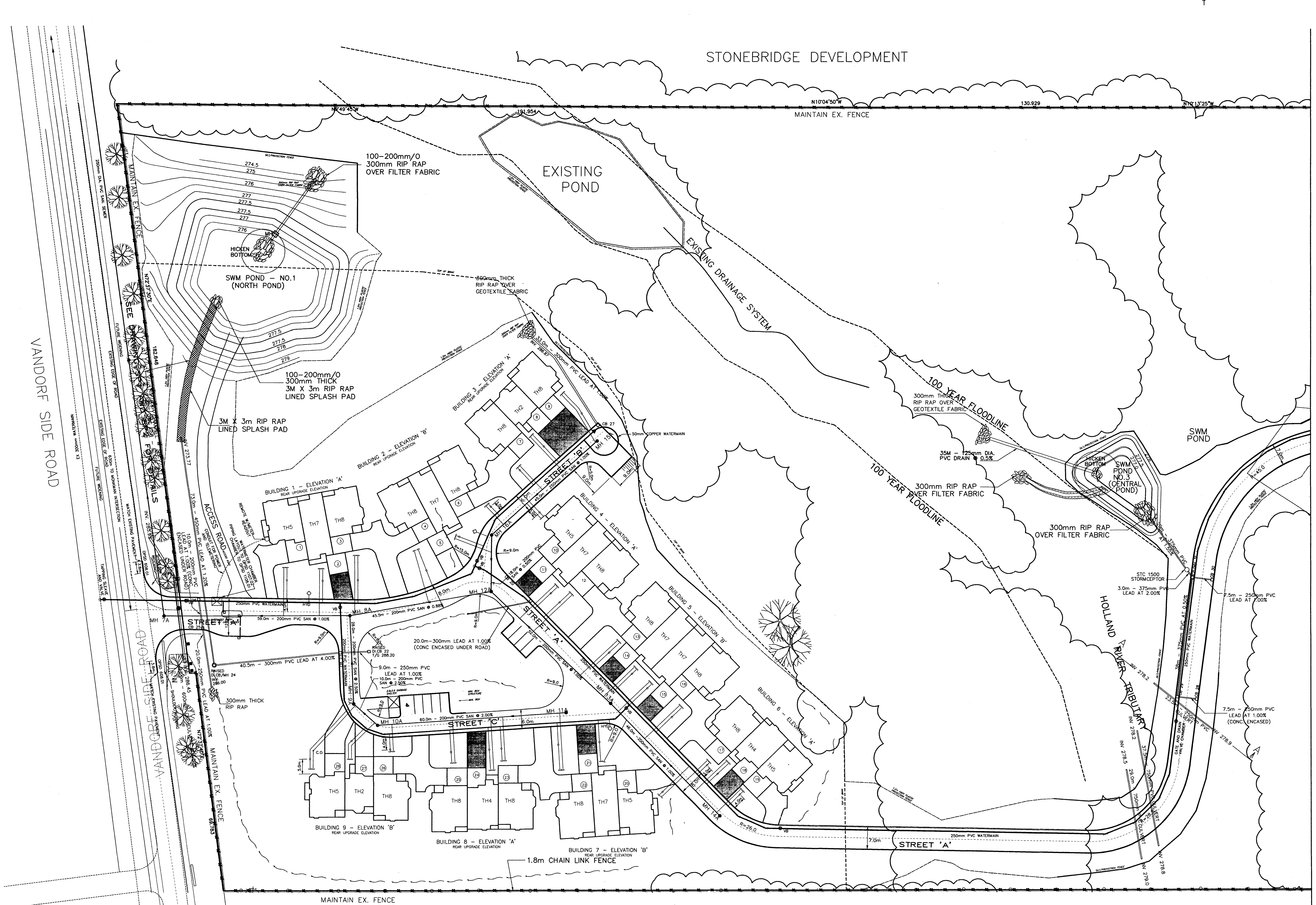
ILMAR SIMANOVSKIS
DIRECTOR OF PUBLIC WORKS

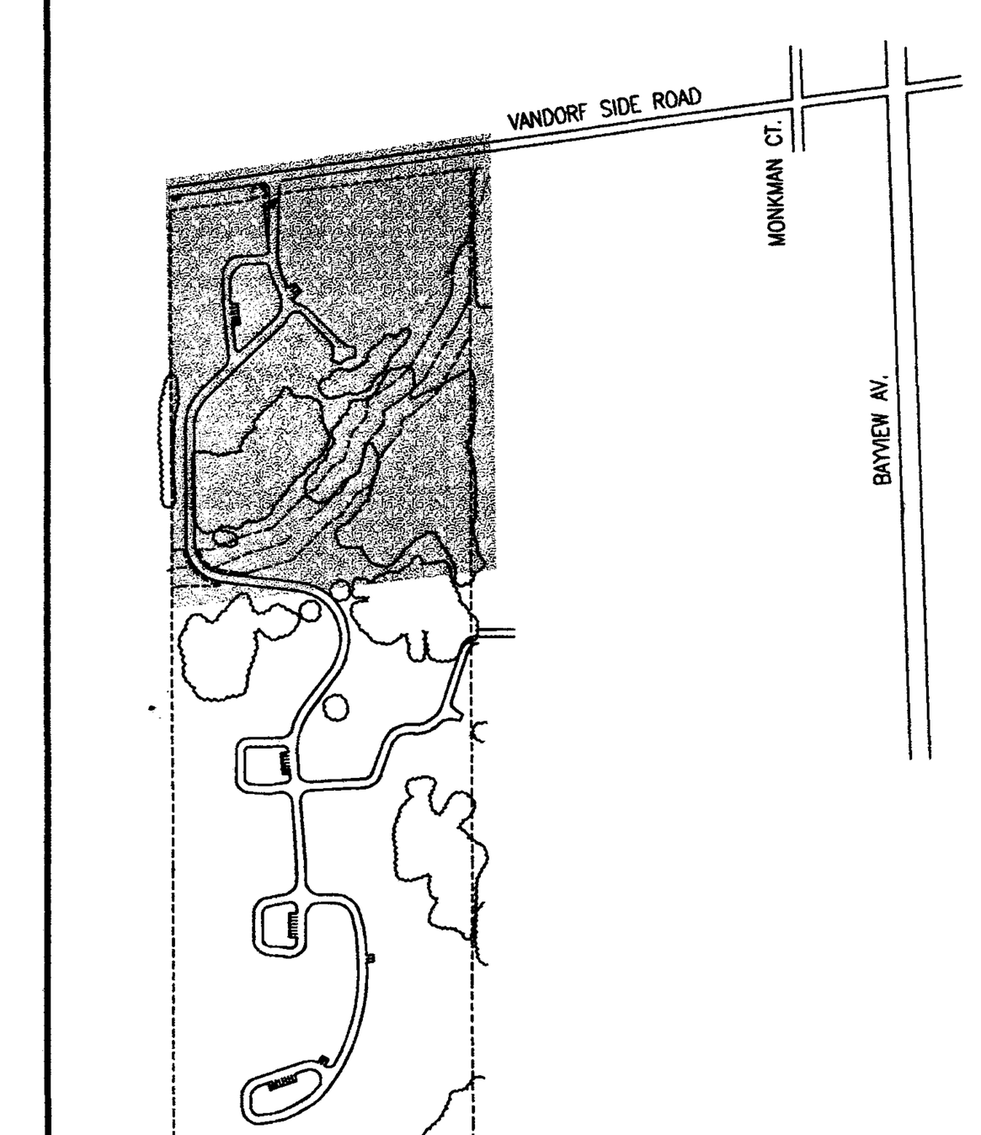
DATE:

THE CHATEAUS ON BAYVIEW
14575 BAYVIEW AVENUE
SANITARY DRAINAGE AREA PLAN

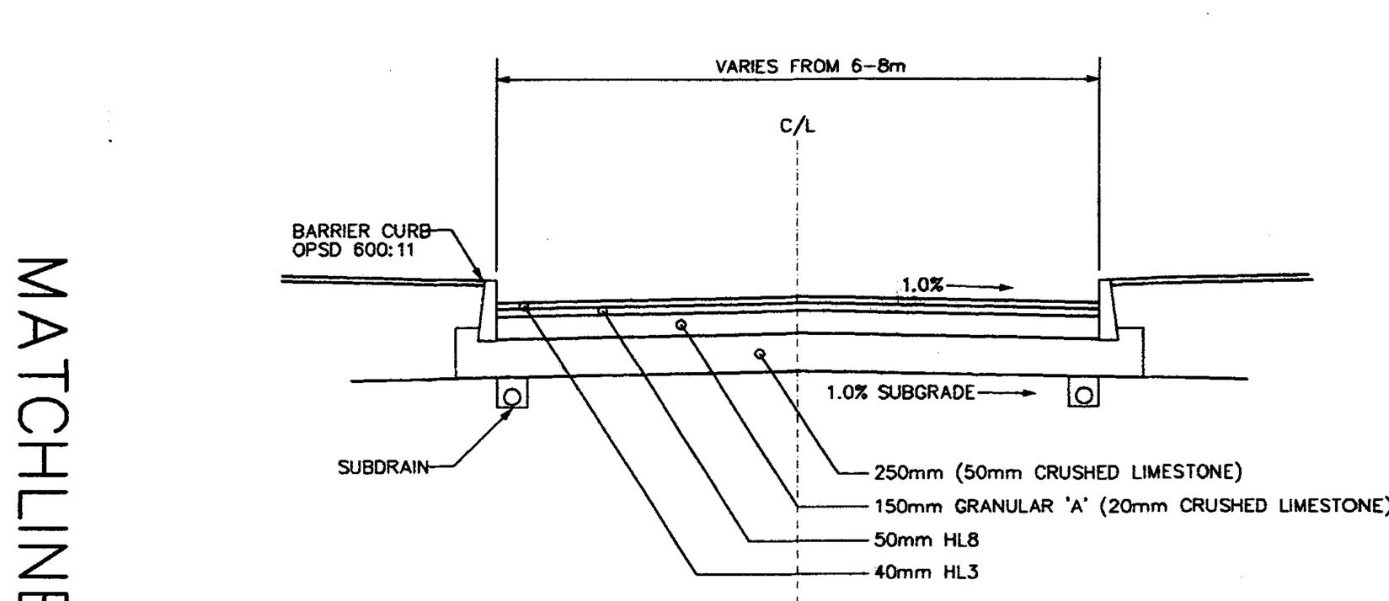
Drawn By	J.L.	Checked By	B.S.	Registered Plan	
Designed By	B.S.	Checked By	J.J.R.	Project No. 08-20	Sheet No. SAN-1
Scale	1:1000	Date Issued	JULY 2008		

Drawing File: 06 SAN-1 Sanitary Drainage Area Plan.dwg (SAN1) Plotted: Monday 17 October 2016 @ 4:04 pm



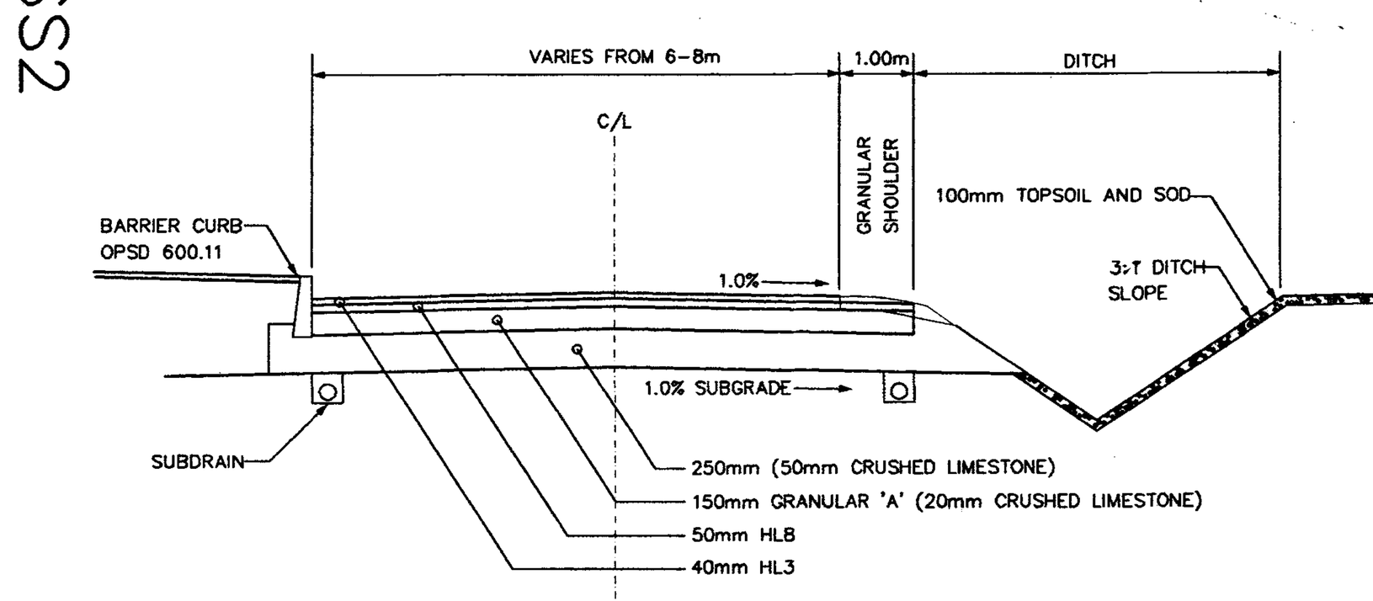


KEYPLAN
N.T.S.



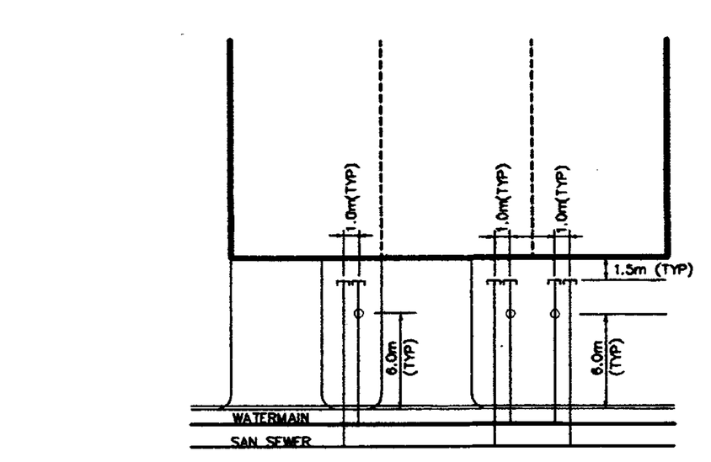
TYPICAL URBAN CROSS SECTION

SCALE: HOR. 1:100 VER. 1:50



TYPICAL SEMI-URBAN CROSS SECTION

SCALE: HOR. 1:100 VER. 1:50



TYPICAL SERVICE LOCATIONS

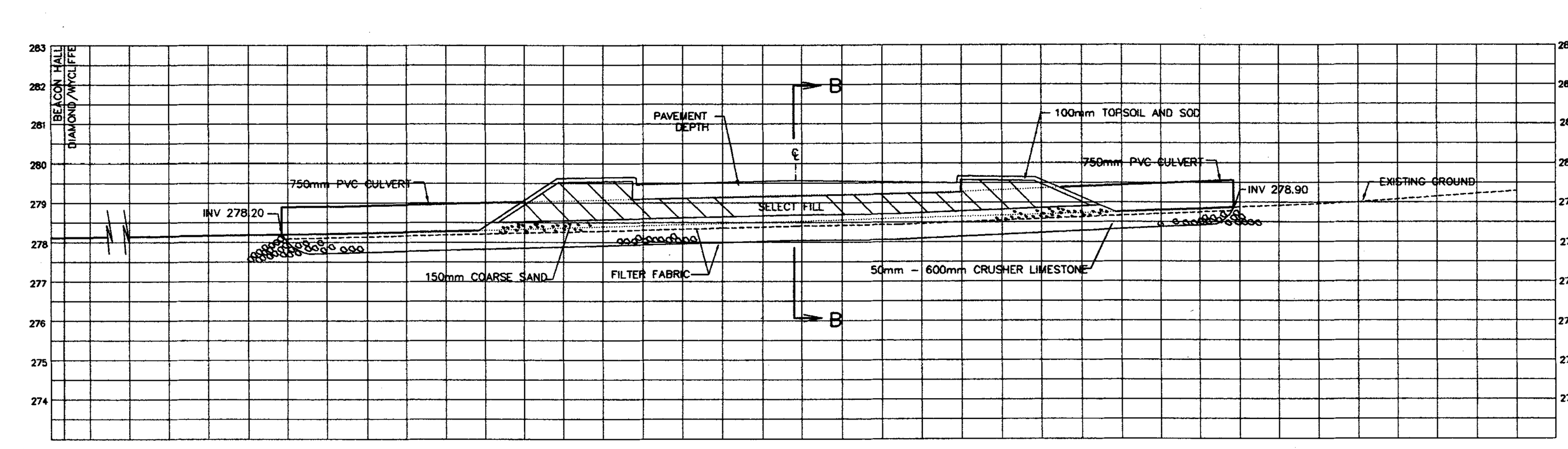
NOTES:

1. GENERAL
   FOR GENERAL NOTES AND DETAILS REFER TO DWG GN1
   FOR POND DETAILS REFER TO DWG GR1
2. STORMWATER MANAGEMENT POND
   ALL POND CONSTRUCTION TO BE APPROVED BY GEOTECHNICAL ENGINEER.

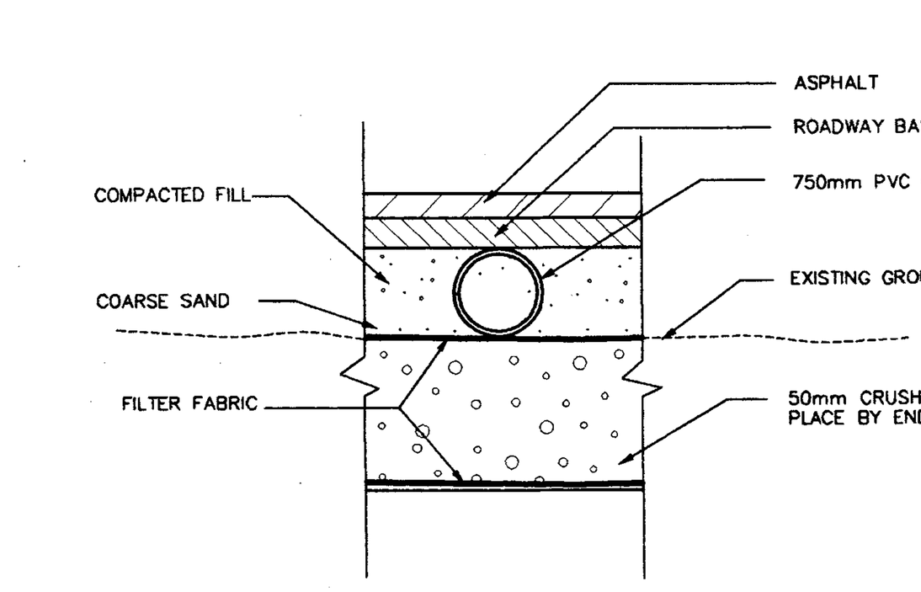
STORM DRAINAGE CB/MH CHART				
STR. No.	TYPE	TOP EL (m)	INLET INVERT (m)	OUTLET INVERT (m)
CB 20	OPSD 705.010	290.74	–	290.10
DICB 22	OPSD 705.030	288.20	–	286.60
CB 23	OPSD 705.010	289.03	286.51	286.41
DICB/MH24	OPSD 701.010	286.08	284.80	284.65
CB 25	OPSD 705.010	287.22	286.25	286.20
CB 26	OPSD 705.010	287.24		286.32
CB 27	OPSD 705.010	288.12	–	287.20
CB 28	OPSD 705.010	279.30	–	278.47
CB 29	OPSD 705.010	279.30	278.39	278.27
CB 30	OPSD 705.010	279.45	–	278.23
CB/MH 31	OPSD 701.010	279.45	W 278.08 S 278.08	278.05
STORMCEPTOR	STC 1500	279.50	278.04	278.01

PHASE 2 ↑
PHASE 1 ↓

SANITARY SEWER MAINTENANCE HOLE CHART						
MH No.	TYPE	TOP EL	INVERT	INVERT	INVERT	INVERT
7A	1200mm DIA	287.10	S 200mm 284.02	E 250mm 283.90		
8A	1200mm DIA	288.94	W 200mm 286.40	W DROP 200mm 284.66	S 200mm 284.66	N 200mm 284.61
9A	1200mm DIA	289.65	SW 200mm 287.15	E 200mm 287.10		
10A	1200mm DIA	290.00	S 200mm 287.50	NE 200mm 287.40		
11A	1200mm DIA	291.46	N 200mm 288.70			
12A	1200mm DIA	290.47	SW 200mm 287.90	SW DROP 200mm 285.16	E 200mm 285.16	N 200mm 285.06
13A	1200mm DIA	291.50	SW 200mm 288.54	NE 200mm 288.49		
14A	1200mm DIA	291.12	NE 200mm 289.00			
15A	1200mm DIA	288.17	NW 200mm 285.75			
16A	1200mm DIA	289.85	S 200mm 285.30	NW 200mm 285.25		



TYPICAL FILL EMBANKMENT
VALLEY CROSSING
SECTION A–A
SCALE 1:125



TYPICAL FILL EMBANKMENT
SECTION B–B

LEGEND:

- SWALE
- CATCHBASIN
- CULVERT
- RIP RAP CHANNEL
- HYDRANT
- VALVE CHAMBER
- WATERBOX

GENERAL NOTES

No.	REVISIONS	DATE	REVIEWED
	THIRD SUBMISSION	08/09/00	
	FOUTH SUBMISSION	01/02/01	
	FIFTH SUBMISSION	MAR.23.01	
	L.S.C.A. REVISION	MAY 1. 01	
	REVISED SITE PLAN	APR.10.02	

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URS Canada Inc
75 Commerce Valley Drive East
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LICENSED PROFESSIONAL ENGINEER
W. F. DURRELL
PROVINCE OF ONTARIO

WYCLIFFE / DIAMOND HOMESTEAD

SITE SERVICING
SHEET 1 OF 2

DESIGN M.B.	SCALE 1:500		
DRAWN L.R.	REVIEWED	DRAWING NO. SS1	
DATE APRIL 2002	SHEET NO.	PROJECT No. 99324	

APPENDIX B-2

GEOTECHNICAL REPORT
PREPARED BY EXP, DATED JANUARY 2021

Vistaview Management Ltd.

Preliminary Geotechnical Investigation
Residential Subdivision Development
5 to 65 Archerhill Court
Aurora, Ontario

Project Number
BRM-21000267-A0

Prepared By:

EXP Services Inc.
1595 Clark Boulevard
Brampton Ontario
L6T 4V1
Canada

Date Submitted
January 22, 2021

3. Fieldwork

The fieldwork comprised drilling of seven (7) sampled boreholes designated Boreholes 1 to 7. The fieldwork was carried out on January 7 and 8, 2021. All seven (7) sampled boreholes were drilled to a depth of approximately 8.2 m below existing grade at the approximate locations shown on the attached Borehole Location Plan (Drawing No. 1).

The boreholes were advanced using continuous flight hollow stem auger equipment owned and operated by a specialist drilling contractor. In each borehole, samples were recovered using conventional split spoon equipment in conjunction with the standard penetration test method.

Water levels were observed in the open boreholes during the course of the fieldwork. In addition, 50 mm diameter monitoring wells were installed Boreholes 2, 5 and 6 for subsequent groundwater level measurement.

The fieldwork was supervised throughout by an EXP Services Inc. (EXP) geotechnical technologist who directed the drilling and sampling operations, prepared borehole logs, made groundwater observations during and upon completion of drilling, and processed the recovered samples. In the laboratory, the samples were classified as to their visual and textural characteristics. Natural moisture content tests were carried out for selected recovered samples, with results presented on the Log of Borehole sheets.

The locations of the boreholes were established in the field by EXP personnel. The tops of borehole elevations were surveyed by EXP utilizing a Sokkia GCS3 Global Navigation Satellite System (GNSS) receiver based on information derived from the TopNET Live Network Service Global Positioning System (GPS). The accuracy of the instrument was checked against a Town of Aurora benchmark described as follows:

B.M. #2155: BRONZE PLATE ON TOP OF CONCRETE MONUMENT LOCATED AT THE NORTH-WEST CORNER OF VANDORF ROAD & ENGLEHARD DR. BEING 4.5 M WEST OF CONCRETE CURB OF ENGLEHARD DR.

Elevation: 287.412 m (Geodetic)

5. Subsurface Conditions

5.1 Soil

The detailed profiles encountered in each borehole and the results of laboratory moisture content are indicated on the attached borehole logs. It should be noted that the soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect transition zones, for the purpose of geotechnical design and should not be interpreted as exact planes of geological change. The "Notes on Sample Description" preceding the borehole logs are an integral part of and should be read in conjunction with this report.

The stratigraphy encountered at the site, as revealed in the boreholes comprises topsoil overlying fill followed by a native deposit of silty clay.

A brief description of the soil profiles in order of depth, follows.

Topsoil

A surficial layer of topsoil 125 to 225 mm thick was encountered in all boreholes.

With respect to topsoil, it should be noted that topsoil measurements were carried out at the borehole locations only and could differ at other locations on the site. Consequently, topsoil quantities should not be established from the information provided at the borehole locations. If required, a more detailed test pit program should be carried out to more accurately quantify the amount of topsoil to be removed for construction purposes.

Fill

Fill underlies the topsoil in Boreholes 1, 3, 6 and 7. The fill extends to depths of approximately 0.7 to 3.6 m (~Elevation 268.5 to 276.8 m). The fill comprises brown to dark silty clay with trace sand, trace gravel and occasional rootlets. Moisture contents in the fill ranged from approximately 16 to 29 percent.

Buried Topsoil

A discontinuous layer of buried topsoil approximately 700 mm thick was encountered below the fill in Borehole 1. The buried topsoil extends to approximately 4.3 m depth (~Elevation 267.8 m) at this location. The moisture content of the buried topsoil was recorded at approximately 32 percent.

Silty Clay

Silty clay was intersected below the buried topsoil in Borehole 1, the surficial topsoil in Boreholes 2, 4 and 5 and the fill in Boreholes 3, 6 and 7. The silty clay extends to termination depths of approximately 8.2 to 8.3 m (~Elevation 263.8 to 269.8 m). The silty clay contains trace sand, silt partings and localized layering (varved structure). The silty clay is brown in colour becoming grey below depths of approximately 3.0 to 7.2 m (~Elevation 266.4 to 273.7 m). The consistency of the silty clay is stiff to hard in its upper regions becoming soft to firm at depth. Moisture contents in the silty clay were recorded between approximately 17 and 28 percent.

5.2 Groundwater

Groundwater conditions were observed in the open boreholes during the course of the fieldwork and in the monitoring wells installed in three (3) selected boreholes for subsequent groundwater measurements. Upon completion of drilling free groundwater was observed in Boreholes 1, 5 and 6 at depths of approximately 3.1 to 7.0 m below existing grades. The remaining boreholes were dry upon completion of drilling. Subsequently, groundwater levels in the monitoring wells installed in Boreholes 2 5 and 6 were measured and recorded, with the results summarized in the following Table 1.

Table 1: Groundwater Level Readings

Borehole No.	Elapsed Time	Water Level (m)	Elevation (m)
2	After 12 Days	2.2	273.4
5	After 13 Days	0.7	277.3
6	After 13 Days	3.6	272.8

Based on the information observed in the boreholes, the groundwater originates from the wet silt partings in the lower levels of the silty clay deposit on the site. The soil colour changes from brown to grey at depths ranging from about 3 to 6 m below existing grade. The brown colour indicates the soil has oxidized in the zone where seasonal fluctuations of ground water resulting from infiltrated precipitation occurs. The permanent groundwater regime is inferred to occur in the grey soils.

The groundwater elevations reflect the conditions at the time of the investigation. Groundwater elevations are subject to seasonal fluctuations.

The monitoring wells were installed in general accordance with the Ontario Water Resources Act-R.R.O. 1990, Regulation 903 – Amended to O. Reg. 128/03 by CSD, by a licensed well contractor. When the use of the monitoring wells is no longer required, they must be decommissioned in accordance with the procedure outlined in the Ontario Water Resources Act – R.R.O. 1990, Regulation 903 – Amended to O. Reg. 128/03.

7. General Comments

EXP should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, EXP will assume no responsibility for interpretation of the recommendations in the report.

The comments given in this report are intended only for the guidance of design engineers. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc. could be greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

More specific information with respect to the conditions between samples, or the lateral and vertical extent of materials may become apparent during excavation operations. The interpretation of the borehole information must, therefore, be validated during excavation operations. Consequently, during the future development of the property, conditions not observed during this investigation may become apparent; should this occur, EXP should be contacted to assess the situation, and additional testing and reporting may be required. EXP has qualified personnel to provide assistance in regards to future geotechnical and environmental issues related to this property.

Yours truly,

EXP Services Inc.

LICENSED PROFESSIONAL ENGINEER
D. H. DENNISON
Jan. 22/21
PROVINCE OF ONTARIO

David Dennison, P.Eng.
Senior Project Manager
Geotechnical Division

Peter T.L. Chan, P. Eng.
Vice President, Central Ontario
Geotechnical Services

Drawings:
Borehole Location Plan
Notes on Sample Description
Borehole Logs

KEY PLAN

PROPOSED LOTS	YIELD
18.3m (60') x 45.8m (150') min.	15
13.7m (45') x 32.0m (105') min.	0
12.1m (40') x 32.0m (105') min.	54
11.0m (36') x 32.0m (105') min.	77
Total	146

LEGEND:

Borehole Location (Approx.)

Monitoring Well Location (Approx.)

Scale (m)

0 32 64 96

Note:

1. The boundaries and soil types have been established only at the borehole locations. Between boreholes the boundaries are assumed and may be subject to considerable error.
2. Soil samples will be retained in storage for 3 months and then destroyed unless the client advises otherwise.
3. Topsoil quantities and/or volumes of unsuitable fill should not be established from the information provided at the borehole locations.
4. Borehole elevations should not be used to design building(s), or floor slab(s), or parking lot(s) grades.
5. This drawing to be read with subject report, project number as shown below.
6. See report text for site datum.
7. Borehole locations are approximate.
8. Dimensions shown on this drawing are in metric units, unless otherwise noted.

exp.

DRAWN: AA
CHECKED: DD
P.M.: DD
SCALE: ~ As Shown
PAPER SIZE: 11x17

Borehole Location Plan
Proposed Residential Subdivision Development
5 to 65 Archerhill Court
Aurora, Ontario

Reference: BRM-21000267-A0

Drawing: 1

I:\2003-Brampton\Projects\Geotechnical Engineering\21000000\21000000\21000200\21000267-A0 - Archerhill Court, Aurora\Report\Borehole Location Plan.doc

Notes on Sample Descriptions and Soil Types — Drawing 1A

1. All sample descriptions included in this report follow the Canadian Foundations Engineering Manual soil classification system. This system follows the standard proposed by the International Society for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by EXP also follow the same system. Others may use different classification systems; one such system is the Unified Soil Classification. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		

0.002 0.006 0.02 0.06 0.2 0.6 2.0 6.0 20 60 200

EQUIVALENT GRAIN DIAMETER IN MILLIMETERS

CLAY (PLASTIC) TO	FINE	MEDIUM	COARSE	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of

till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

4. Excerpt from “OHSA Regulations for Construction Projects,” Part III, Section 226:

- **Soil Types**

Type 1 Soil

a) is hard, very dense and only able to be penetrated with difficulty by a small sharp object;
b) has a low natural moisture content and a high degree of internal strength;
c) has no signs of water seepage; and
d) can be excavated only by mechanical equipment.

Type 2 Soil

a) is very stiff, dense and can be penetrated with moderate difficulty by a small sharp object;
b) has a low to medium natural moisture content and a medium degree of internal strength; and
c) has a damp appearance after it is excavated.

Type 3 Soil

a) is stiff to firm and compact to loose in consistency or is previously excavated soil;
b) exhibits signs of surface cracking;
c) exhibits signs of water seepage;
d) if it is dry, may run easily into a well-defined conical pile; and
e) has a low degree of internal strength.

Type 4 Soil

a) is soft to very soft and very loose in consistency, very sensitive and upon disturbance is significantly reduced in natural strength;
b) runs easily or flows, unless it is completely supported before excavating procedures;
c) has almost no internal strength;
d) is wet or muddy; and
e) exerts substantial fluid pressure on its supporting system. O. Reg. 213/91, s. 226.

Log of Borehole 1

Project No. BRM-21000267-A0 | Drawing No. 2

Project: Geotechnical Investigation | Sheet No. 1 of 1

Location: Archerhill Court, Aurora

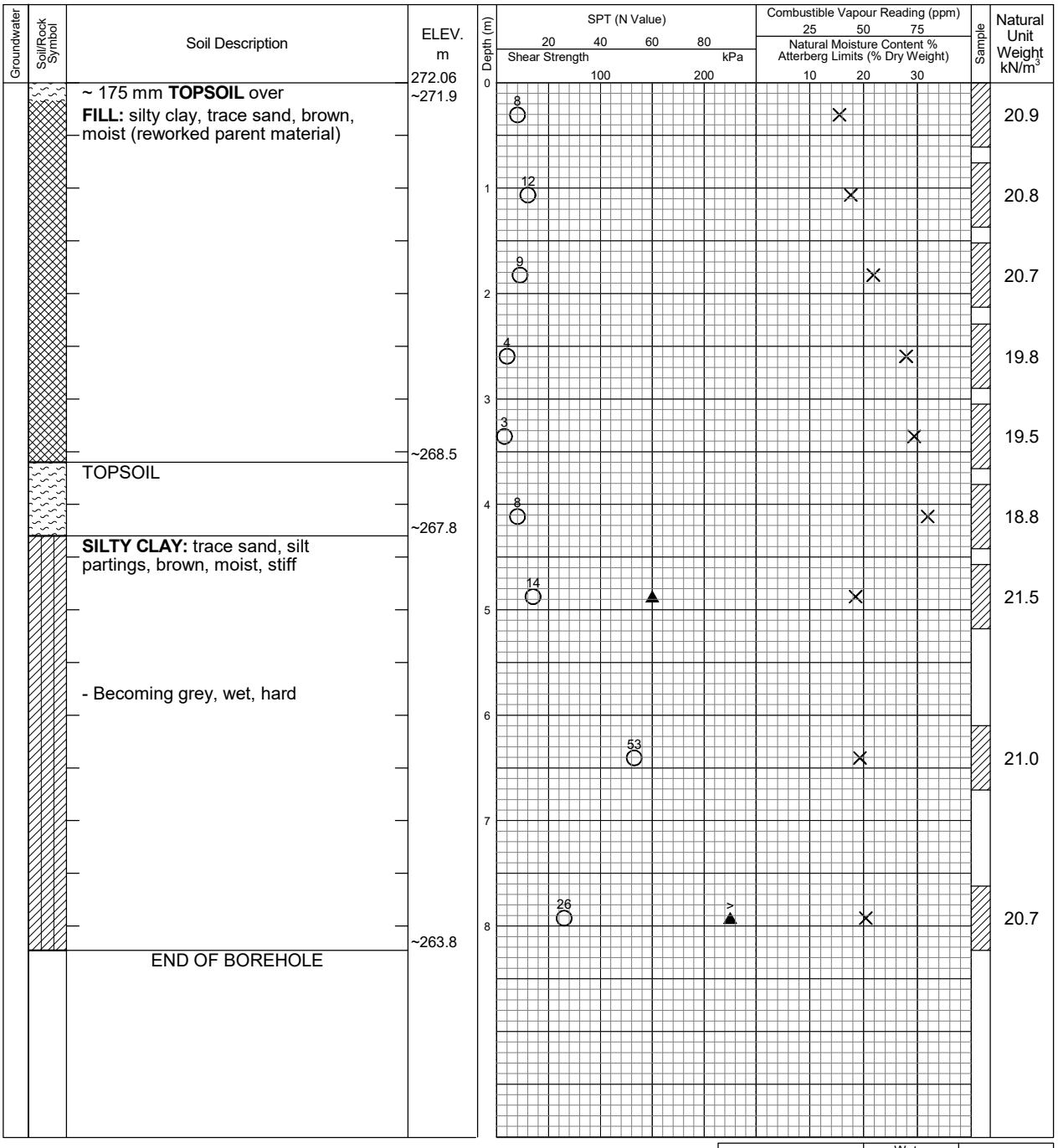
Date Drilled: January 8, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 1/21/21

Date	Water Level (m)	Hole Open to (m)
On Completion	3.05	Open

Log of Borehole 2

Project No. BRM-21000267-A0

Drawing No. 3

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: Archerhill Court, Aurora

Date Drilled: January 8, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test (S)

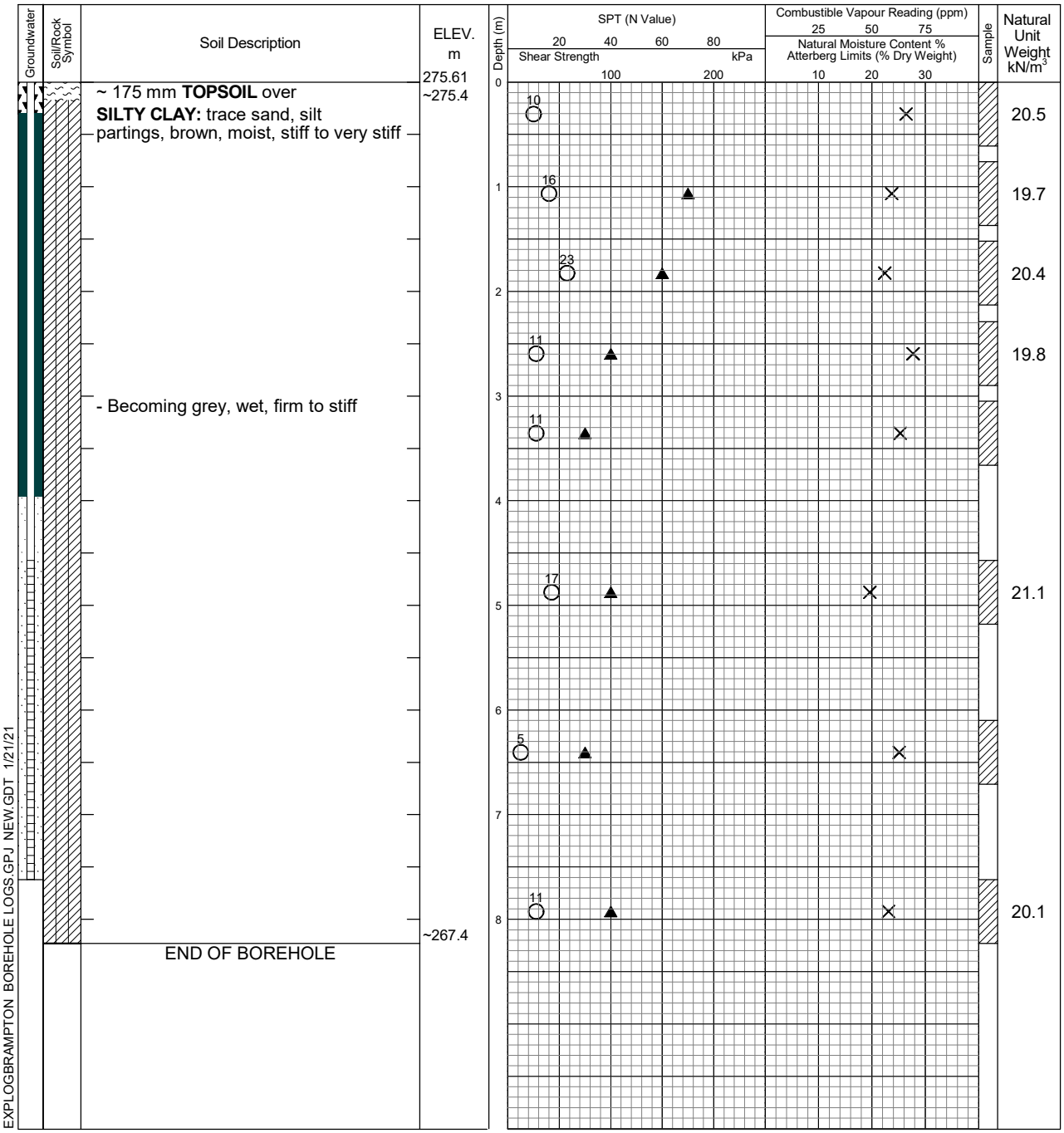
Combustible Vapour Reading

Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at % Strain at Failure

Penetrometer



EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 1/21/21

Date	Water Level (m)	Hole Open to (m)
On Completion	Dry	Open
January 20, 2021	2.24	

Log of Borehole 3

Project No. BRM-21000267-A0 | Drawing No. 4

Project: Geotechnical Investigation | Sheet No. 1 of 1

Location: Archerhill Court, Aurora

Date Drilled: January 8, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test ——
Shelby Tube ■
Field Vane Test ✚ S

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit ⊢—○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

Soil Description	ELEV. m	Depth (m)	SPT (N Value) / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	Natural Unit Weight kN/m³
~ 125 mm **TOPSOIL** over **FILL:** brown silty clay, trace sand, trace gravel, occasional rootlets, moist	275.28 ~275.2	0	6		20.6
		1	4		21.5
		2	6		
	~273.1				
SILTY CLAY: trace sand, silt partings, brown, moist, stiff		2	10		19.8
		3	6		20.4
		4			
		5	13		20.2
- Becoming wet, firm		6	11		20.0
		7			
- Becoming grey, soft		8	6		
	~267.1				
END OF BOREHOLE					

Date	Water Level (m)	Hole Open to (m)

EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 1/21/21

Log of Borehole 4

Project No. BRM-21000267-A0 | Drawing No. 5

Project: Geotechnical Investigation | Sheet No. 1 of 1

Location: Archerhill Court, Aurora

Date Drilled: January 7, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test ——
Shelby Tube ■
Field Vane Test ✚ S

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit ⊢—○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

Soil Description	ELEV. m	Depth (m)	Natural Unit Weight kN/m³
~ 125 mm **TOPSOIL** over	275.63	0	21.6
SILTY CLAY: trace sand, silt partings, brown, moist, stiff to very stiff	~275.5		
- Trace gravel		1	20.4
		2	21.8
			20.5
- Becoming grey		3	20.8
		4	
		5	21.1
- Becoming wet		6	
		7	
- Becoming firm		8	19.6
	~267.4		
END OF BOREHOLE			

SPT (N Value): 20 40 60 80 — Shear Strength: 100 200 kPa

Combustible Vapour Reading (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

Date	Water Level (m)	Hole Open to (m)
On Completion	Dry	Open

EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 1/21/21

Log of Borehole 5

Project No. BRM-21000267-A0

Drawing No. 6

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: Archerhill Court, Aurora

Date Drilled: January 7, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test (S)

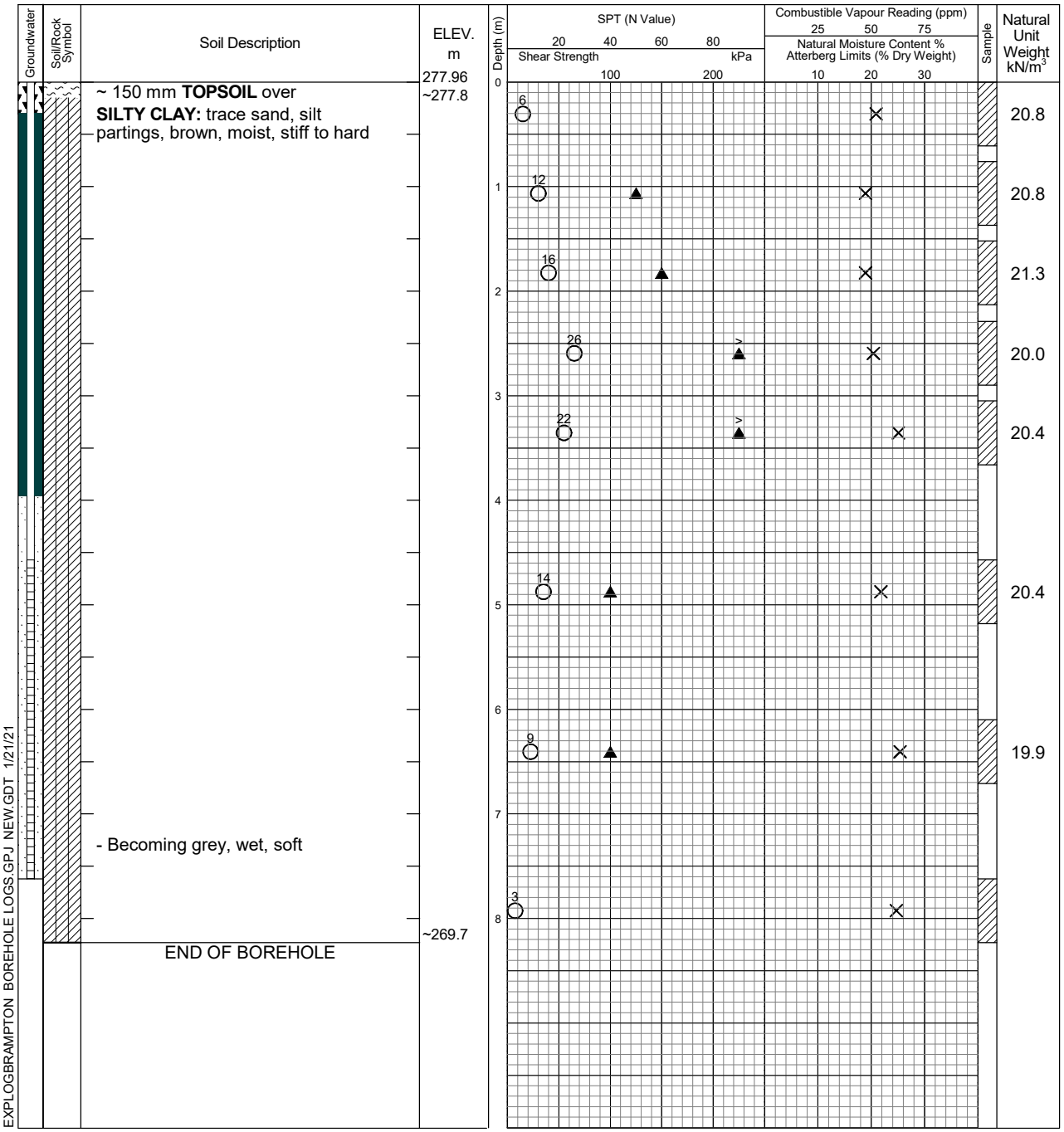
Combustible Vapour Reading

Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at % Strain at Failure

Penetrometer



Date	Water Level (m)	Hole Open to (m)
On Completion	4.27	Open
January 20, 2021	0.67	

EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 1/21/21

Log of Borehole 6

Project No. BRM-21000267-A0 | Drawing No. 7

Project: Geotechnical Investigation | Sheet No. 1 of 1

Location: Archerhill Court, Aurora

Date Drilled: January 7, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

Soil Description	ELEV. m	Depth (m)	SPT (N Value) / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	Natural Unit Weight kN/m³
	276.34	0			
~ 175 mm **TOPSOIL** over **FILL:** ~ 100 mm brown silty sand over brown silty clay (reworked parent material), moist	~276.2		7		20.0
	~275.6	1	14		20.5
SILTY CLAY: trace sand, silt partings, brown, moist, stiff to very stiff		2	18		2.2
			22		21.3
		3	14		20.8
- Becoming grey, wet		4			
		5	15		20.7
- Becoming firm		6			
			10		20.8
		7			
		8	15		20.9
	~268.1				
END OF BOREHOLE					

Date	Water Level (m)	Hole Open to (m)
On Completion	7.01	Open
January 20, 2021	3.55	

EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 1/21/21

Log of Borehole 7

Project No. BRM-21000267-A0

Drawing No. 8

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: Archerhill Court, Aurora

Date Drilled: January 7, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at % Strain at Failure

Penetrometer

Soil Description	ELEV. m
~ 225 mm **TOPSOIL** over	277.88
FILL: mix of silty clay and topsoil, brown to dark brown, moist	~277.7
SILTY CLAY: trace sand, silt partings, brown, moist stiff to hard	~276.8
- Becoming grey, wet, firm	
END OF BOREHOLE	~269.7

SPT (N Value): 20 40 60 80

Shear Strength: 100 200 kPa

Combustible Vapour Reading (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

Depth (m): 0 1 2 3 4 5 6 7 8

SPT values: 6, 12, 20, >, 24, >, 11, 13, 13

Natural Unit Weight kN/m³: 20.0, 19.0, 20.0, 21.1, 20.5, 21.0

Date	Water Level (m)	Hole Open to (m)
On Completion	Dry	Open

EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 1/21/21

APPENDIX B-3

HYDROGEOLOGICAL REPORT
PREPARED BY RJ BURNSIDE, DATED AUGUST 2021

Archerhill Court Hydrogeological Assessment

Highfair Investments Inc.
Aurora, Ontario

R.J. Burnside & Associates Limited
6990 Creditview Road, Unit 2
Mississauga ON L5N 8R9 CANADA

August 2021
300052893.0000

Distribution List

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Record of Revisions

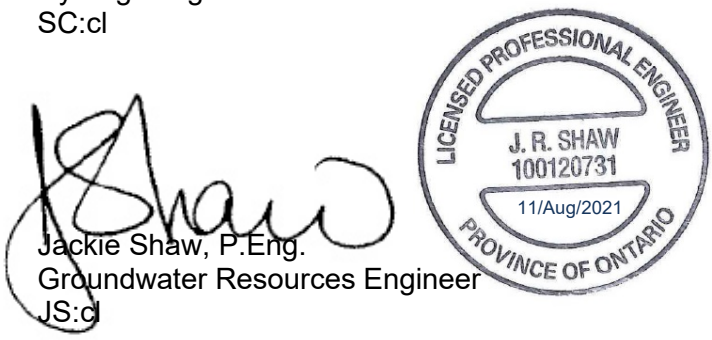
Revision	Date	Description
-	August 11, 2021	Initial Submission to Highfair Investments Inc.

R.J. Burnside & Associates Limited

Report Prepared By:

Stephanie Charity, P.Geo.
Hydrogeologist
SC:cl

Report Reviewed By:



Jackie Shaw, P.Eng.
Groundwater Resources Engineer
JS:cl

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2.4 Surficial Geology

Regional surficial geology mapping published by the Ontario Geological Survey (2003) shows that the entire property is covered by low permeability clay and silt glaciolacustrine deposits (Figure 4). Ice-contact stratified deposits are mapped south of the subject lands and modern alluvial deposits are mapped along the West Tributary.

Drilling investigations on the subject lands included nine boreholes (Figure 5) with depths ranging from 6.7 m to 20 m below ground surface (bgs). The borehole logs from the drilling investigations (Appendix A) confirm the regional surficial geology mapping. The logs show the subject lands are underlain by silty clay with a thickness of up to 20 m. Fill was encountered at some of the boreholes overtop of the native sediments with thicknesses of 0.5 m to 3.6 m.

To characterize the surficial sediments in the wetland area in the northeast corner of the subject lands, Burnside completed three hand augured holes along the feature referred to as AG1, AG2 and AG3 (locations are shown on Figure 5). The holes were augured to depths of 1 m to 1.48 m bgs. The sediments encountered were generally fine grained clayey silt with some sand. At AG1, the soils were grey wet clayey silt with some sand to 1 m. At AG2, there was 0.4 m of topsoil overlying clayey silt with some sand to 1.0 m. A sand lense was encountered at AG2 from 1.0 m to 1.1 m. At AG3, sandy silt with trace clay was encountered from 0.18 m to 0.4 m and brown clayey silt from 0.4 m bgs to 1.48 m bgs. Both AG2 and AG3 were dry at completion.

2.5 Bedrock Geology

Bedrock mapping of the region shows that the subject lands are underlain by shale bedrock of the Blue Mountain Formation. Bedrock topography mapping of the area (Holden, et al, 1992) shows that the bedrock surface generally slopes from the east to the west in the area and that the top of bedrock is at an elevation of approximately 100 masl at the property, or more than 150 m below ground surface. A review of MECP well records in the vicinity of the subject lands indicates that the bedrock is approximately 100 m below ground surface.

2.6 Stratigraphy

To illustrate the geological conditions, two schematic cross-sections through the subject lands have been prepared using the information from the borehole logs and MECP well records (refer to Appendix A and B). The cross-section locations are shown on Figure 5 and the interpreted cross-sections are shown on Figures 6 and 7. On the cross-sections, an interpretation of the major layers or stratigraphic units has been made based on the overall sediment characteristics. The cross-sections show that the subject lands are underlain by a thick layer of low permeability silty clay sediments. A sand

layer is encountered at elevations from 250 masl to 230 masl. As discussed below in Section 3.1, this sand layer is interpreted to be part of the Thorncliffe Aquifer.

2.7 Hydraulic Conductivity

There are various methods that may be applied to assess soil hydraulic conductivity, i.e., the ability of the soil to transmit groundwater. Grainsize data and soil characteristics can be utilized to provide a general estimate of hydraulic conductivity. Single well response tests, such as bail-down and slug tests, are used in groundwater monitoring wells to assess in situ hydraulic conductivity of the soils represented across the screened interval of the well. The estimated hydraulic conductivity values may then be used to estimate infiltration rates based on their approximate relationship (as presented in the TRCA Stormwater Management Criteria, 2012). It is also possible to directly assess soil infiltration rates at surface using infiltrometer tests.

2.7.1 Soil Grainsize Analysis

During drilling completed by Burnside in April 2021, three representative soil samples were collected and submitted to a laboratory for grainsize distribution (Appendix C).

To estimate hydraulic conductivity based on grainsize analysis, an empirical formula method known as the Hazen estimation is used. This method is an approximation of hydraulic conductivity based on grainsize curves for sandy soils. The approximation does not strictly apply to finer grained materials however, it is still considered useful in some cases to provide a general indication of the range of the hydraulic conductivity values. Grainsize distribution data were available for three samples obtained from on-site wells and the grainsize distribution graphs are provided in Appendix C. The results confirm that the sediments within the overburden are fine grained and comprised of 85% to 99% fines. The greater amounts of fines within a deposit impacts the ability of the material to transmit water and generally lowers the overall hydraulic conductivity. Groundwater flow is generally limited by fine grained sediments with lower hydraulic conductivity. The hydraulic conductivity based on grainsize analyses for the sediments is estimated in the range of 10^{-6} cm/sec or less.

2.7.2 In Situ Well Tests

To estimate the in situ, saturated hydraulic conductivity of the overburden sediments, single well response tests were completed in April and June 2021. The results of the single well response tests are included in Appendix C and summarized in Table 1 below.

Table 1: Estimated Hydraulic Conductivity and Infiltration Rate from In Situ Tests

Location	Soil Description	Well Screen Depth (m bgs)	Hydraulic Conductivity (cm/sec) In Situ Test	Estimated Infiltration Rate* (mm/hr)
BH2s	Silty Clay	4 – 7.6	2.9×10^{-6}	12
BH5	Silty Clay	4 – 7.2	1.8×10^{-4}	50
BH6	Silty Clay	4 – 7.5	9.4×10^{-7}	12
BH2d	Silty Clay	10.4 – 12.2	8.2×10^{-6}	12
MW1	Topsoil and Silty Clay	4.3 – 6.1	1.0×10^{-3}	75

*From Table C2 in Appendix C: Toronto and Region Conservation Authority Stormwater Management Criteria, 2012.

The results show that the fine-grained silty clay soils on the subject lands generally have low hydraulic conductivity in the range of 10^{-6} to 10^{-7} cm/sec, however, more moderate values were found at BH5 and MW1, where the calculated hydraulic conductivity values were in the range of 10^{-3} to 10^{-4} cm/sec. The higher hydraulic conductivity value observed at BH5 may be due to fractures in the silty clay deposits. At MW1, the well screen and sand pack intersect the topsoil layer with overlying fill.

3.0 Hydrogeology

3.1 Local Aquifers

Regional cross-sections are provided in the East Holland River Subwatershed Plan. These cross-sections show three major overburden aquifer systems within the East Holland Watershed. These are described in order of increasing depth as the Oak Ridges Aquifer Complex (upper aquifer), the Thorncliffe Formation (middle aquifer) and the Scarborough Formation (lower aquifer). The elevation ranges for these aquifers in the vicinity of the subject property are as follows:

- Oak Ridges Aquifer Complex: 270 masl – 280 masl
- Thorncliffe Formation: 230 masl – 255 masl
- Scarborough Formation: 150 masl – 160 masl

Based on these general elevation ranges and the interpretation of the local well record information as shown on Figures 6 and 7, it is concluded that the sandy layer mapped below the subject property represents the Thorncliffe Aquifer and the Oak Ridges Aquifer Complex is not present.

3.2 Local Groundwater Use

The municipal water supply for the Town of Aurora is obtained from groundwater supply wells completed in the deep Yonge Street Aquifer. Aurora supply wells No. 1, 2, 3 and 4 are located about 2.2 km northwest of the subject lands, near Yonge Street and Wellington Street East (Figure 11). The subject lands are located within the wellhead protection areas WHPA-D (25 year capture zone) and WHPA-Q1/Q2 for Aurora Wells No. 1, 2, 3 and 4 (Figure 11).

Although, the proposed development will be municipally serviced, there may be properties in the vicinity of the subject lands that use private water supply wells. A review of MECP water well records (Appendix A) within 500 m of the subject lands identified 12 water supply well records, 12 abandonment records, and 13 monitoring and test wells (Figure 8). The water supply wells range in depths from 14.6 m to 54.9 m and are overburden wells. The area immediately surrounding the subject lands is now serviced with municipal water, and as a consequence, the published well records no longer imply groundwater usage in the area.

A door-to-door survey was conducted in 2011 as part of the hydrogeology study for the Colyton Farm property north of the subject lands (Burnside, 2011) to verify that all of the local residents are on municipal water. The survey confirmed that there were no private wells in use within 500 m of the property.

3.3 Groundwater Monitoring

Six groundwater monitoring wells, including one “nest” of two wells installed adjacent to each other at different depths, are located on the subject lands (refer to Appendix B for the well logs and Figure 2 for the well locations). Groundwater levels have been collected at the groundwater monitoring wells monthly from March 2021 to July 2021. Groundwater levels from January 2021 reported by Exp have also been included in our analysis. The groundwater levels from the monitoring wells are provided in Table D-1 in Appendix D and plotted on hydrographs as Figures D-1 to D-5, Appendix D. The groundwater monitoring data show the following (refer to Figure 2 for the monitoring locations and hydrographs in Appendix D):

- The groundwater table is interpreted to be dependent on the topography and local geological conditions. From January 2021 to July 2021, groundwater elevations in the monitoring wells ranged from 269.0 masl to 277.4 masl and the groundwater levels depths ranged from above ground to 5.8 m bgs. The interpreted depth to the seasonally high groundwater levels across the subject lands is shown on Figure 13. This figure shows that shallow (i.e., within 1 m of existing ground surface) groundwater levels are found in the northeastern, central and western portions of the subject lands. Groundwater levels are deeper (i.e., more than 2 m below existing

ground surface) in the northwestern, north central and southern portions of the subject lands.

- BH101 is screened at a depth of 16 m bgs to 19.5 m bgs within the silty clay layer within a topographic low. Water levels at this well in the spring exhibited potentiometric (pressure) heads that are near or above grade (Figure D-5, Appendix D). A drop of 5.4 m in water levels at the well occurred in July 2021. The rapid drop in water level is likely related to the on-going construction being completed at the intersection of Vandorf Sideroad and Bayview Avenue immediately south of the subject lands.

- Typically, in shallow wells in southern Ontario, a seasonal groundwater level pattern is apparent with highest levels occurring in the spring, declining throughout the summer and early fall and then rising again in the late fall/early winter. The data collected to date show water levels highest during the spring months of March and April and water levels declining from May to July. Seasonal variations range from 1 m up to 6 m.

- One well nest was installed on the subject lands (BH2s/d) in order to determine the vertical hydraulic gradient. The water level measurements in the nested well location show that the water elevations in BH2s are higher than in the deeper BH2d (Figure D-2, Appendix D). These data indicate a downward hydraulic gradient and groundwater recharge conditions.

3.3.1 Groundwater/Surface Water Interactions

To assess shallow groundwater conditions and gradients near the North Tributary and surrounding wetlands, two drive-point piezometer nests were monitored. Piezometer nest PZ1s/d is located near SS1 within the wetland on the northeast corner of the subject lands (Figure 2). Water levels in the deep piezometer are higher than in the shallow piezometer and above grade suggesting an upward gradient and potential for discharge conditions (Figure D-6, Appendix D). PZ2s/d is located north of the subject lands along the North Tributary. Monitoring at PZ2s/d also shows higher levels in the deep piezometer and an upward gradient at this location (Figure D-7, Appendix D).

3.4 Groundwater Flow

Groundwater elevation data obtained from the monitoring wells are shown on Figure 9, along with the interpreted groundwater elevation contours for the area. Arrows perpendicular to the groundwater elevation contours illustrate the interpreted direction of the shallow groundwater movement.

The interpretation is that the water table reflects the general surface topography, i.e., the shallow groundwater flow patterns will mimic the surface water flow patterns. There is a

Quality Objectives (PWQO). The laboratory results are summarized in Table F-2, Appendix F.

- The results show that the surface water sample met all of the Provincial Water Quality Objectives.

- A chloride concentration of 558 mg/L was reported at SS3 suggesting that the water has been affected by road salt.

- Total phosphorus, nitrate, nitrite and ammonia were not detected in the surface water sample.

5.0 Water Balance

A water balance is an accounting of the water resources within a given area. As a concept, the water balance is relatively simple and may be estimated from the following equation:

$$P = S + ET + R + I$$

where:

	P	=	precipitation
	S	=	change in groundwater storage
	ET	=	evapotranspiration/evaporation
	R	=	surface water runoff
	I	=	infiltration

The components of the water balance vary in space and time and depend on climatic conditions as well as the soil and land cover conditions (i.e., rainfall intensity, land slope, soil hydraulic conductivity and vegetation). Runoff, for example, occurs particularly during periods of snowmelt when the ground is frozen, or during intense rainfall events. Precise measurement of the water balance components is difficult and as such, approximations and simplifications are made to characterize the water balance of a study area. Field observations of the drainage conditions, land cover and soil types, groundwater levels and local climatic records are important input considerations for the water balance calculations. The water balance components for the subject lands are discussed below:

Precipitation (P)

The long-term average annual precipitation for the area is 786 mm based on data from the Environment Canada King Smoke Tree climate station (Station 6154141 - 44°01’00.000” N, 79°31’00.000” W, elevation 352 masl) for the period between 1981 and 2010. The climate station is located 6.6 km northwest of the subject lands. Average monthly records of precipitation and temperature from this station have

been used for the water balance component calculations in this study (Tables G-1 and G-2, Appendix G).

Storage (S)

Although there are groundwater storage gains and losses on a short-term basis, the net change in groundwater storage on a long-term basis is assumed to be zero so this term is dropped from the equation.

Evapotranspiration (ET)/Evaporation (E)

Evapotranspiration and evaporation components vary based on the characteristics of the land surface cover (i.e., type of vegetation, soil moisture conditions, perviousness of surfaces, etc.). Potential evapotranspiration (PET) refers to the water loss from a vegetated surface to the atmosphere under conditions of an unlimited water supply. The actual rate of evapotranspiration (AET) is often less than the PET under dry conditions (i.e., during the summer when there is a soil moisture deficit). In this report, the monthly PET and AET have been calculated using a soil-moisture balance approach, using average temperature data and climate information adjusted to the local latitude (refer to Tables G-1 and G-2, Appendix G).

Water Surplus (R + I)

The difference between the mean annual P and the mean annual ET is referred to as the water surplus. Part of the water surplus travels across the surface of the soil as surface or overland runoff and the remainder infiltrates the surficial soil.

The infiltration is comprised of two end member components: One component that moves vertically downward to the groundwater table (typically referred to as percolation, deep infiltration or net recharge) and a second component that moves laterally through the shallow soils as interflow that re-emerges locally to surface (i.e., as runoff) at some short time following cessation of precipitation. As opposed to the “direct” component of surface runoff that occurs overland during precipitation or snowmelt events, shallow interflow becomes an “indirect” component of runoff. The interflow component of surface water runoff is not accounted for in the water balance equation cited above since it is often difficult to distinguish between interflow and direct (overland) runoff, but both interflow and direct runoff contribute to the overall surface water runoff component.

5.1 Approach and Methodology

Water balance calculations were completed for the subject lands using a soil-moisture balance approach, which assumes that soils do not release water as potential recharge while a soil moisture deficit exists. During wetter periods, any excess of precipitation

over evapotranspiration first goes to restore soil moisture. Once the soil moisture deficit is overcome, any further excess water can then pass through the soil as infiltration.

A soil moisture storage capacity of 125 mm was selected as a representative value for residential lawns and soil conditions and a soil moisture storage capacity of 400 mm was selected for the wooded and wetland areas within the subject lands. Table G-1 (for 125 mm retention) and Table G-2 (for 400 mm retention) in Appendix G detail the monthly potential evapotranspiration calculations accounting for latitude and climate, and then calculates the actual evapotranspiration and water surplus components of the water balance based on the monthly precipitation and soil moisture conditions.

The MECP SWM Planning and Design Manual (2003) methodology for calculating total infiltration based on topography, soil type and land cover was used and a corresponding runoff component was calculated for the soil moisture storage conditions. The calculated water balance components from this table were then used to estimate the pre-development infiltration and runoff volumes for the subject lands.

5.2 Water Balance Components

The monthly water balance calculations show that a water surplus is generally available from January to May (Tables G-1 and G-2, Appendix G). Infiltration occurs during periods when there is sufficient water available to overcome the soil moisture storage requirements. In winter climates, frozen conditions may affect when the actual infiltration will occur, however, the monthly balance calculations show the potential volumes available for this water balance component. The monthly calculations are summed to provide estimates of the annual water balance component values (Tables G-1 and G-2, Appendix G). A summary of these values is provided in Table 2.

Table 2: Water Balance Component Values

Water Balance Component	Urban Lawn	Wooded/Wetland Area
Average Precipitation	858 mm/year	858 mm/year
Actual Evapotranspiration	592 mm/year	592 mm/year
Water Surplus	226 mm/year	226 mm/year
Infiltration	106 mm/year	133 mm/year
Runoff	160 mm/year	133 mm/year

Single values are used for the water balance calculations however, the infiltration rates are dependent upon the hydraulic conductivity of the surficial soils which may vary over several orders of magnitude. As such, the margins of error for the calculated infiltration and runoff component values are potentially quite large. These margins of error are recognized; however, 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.

5.3 Pre-Development Water Balance (Existing Conditions)

The subject lands have been divided into catchment areas that drain to surface water features as illustrated in Figure 3. Based on the water balance component values calculated in Tables G-1 and G-2 (Appendix G), an estimate of the total pre-development groundwater infiltration volume for each catchment within the subject lands area was calculated as presented in Tables G-3, G-4 and G-5, Appendix G. In order to assess the runoff volumes, the runoff volumes from the subject lands draining to the West Tributary were calculated as presented in Table G-6, Appendix G. For the North Tributary and northeast wetland area runoff from the portion of the surface water catchment west of Bayview Avenue (extending outside of the subject lands) (Figure 3) was calculated as presented in Tables G-7 and G-8. The summary of the pre-development infiltration and runoff volumes are provided below in Table 3.

Table 3: Summary of Pre-Development Infiltration Values

Surface Water (Catchment)	Infiltration Catchment Area (ha)	Pre-Development Infiltration Volume (m^3/year)	Runoff Catchment Area (ha)*	Pre-Development Runoff Volume (m^3/year)
West Tributary (101)	2.37	2,928	2.38	3,540
North Tributary (102)	8.16	7,162	11.35	27,438
NE Wetland (103)	1.75	2,169	3.27	6,987

"*" the runoff catchment includes all upstream catchment area to the feature

5.4 Potential Urban Development Impacts to Water Balance

Development of an area affects the natural water balance. The most significant difference is the addition of impervious surfaces as a type of surface cover (i.e., roads, parking lots, driveways, and rooftops). Impervious surfaces prevent infiltration of water into the soils and the removal of the vegetation removes the evapotranspiration component of the natural water balance. The evaporation component from impervious surfaces is relatively minor (estimated to be 10% to 20% of precipitation) compared to the evapotranspiration component that occurs with vegetation (about 69% of precipitation in the study area). So, the net effect of the construction of impervious surfaces is that most of the precipitation that falls onto impervious surfaces becomes surplus water and direct runoff, and the infiltration is reduced.

A calculation of the potential water surplus for impervious areas is shown at the bottom of Table G-1 (Appendix G). For the purposes of the calculations in this study, the evaporation from impervious surfaces has been estimated to be 15% of precipitation. The remaining 85% of the precipitation that falls on impervious surfaces is assumed to become runoff. Therefore, assuming an evaporation/loss from impervious surfaces of

15% of the precipitation, there is a potential water surplus from impervious areas of 729 mm/year.

It is noted that the proposed development will be serviced by municipal water supply and waste water services. Therefore, there will be no impact on the water balance and local groundwater or surface water quantity and quality conditions related to any on-site groundwater supply pumping or disposal of septic effluent.

5.5 Post-Development Water Balance with No Mitigation

In order to assess the potential development impact on infiltration and runoff, the post-development infiltration volumes have been calculated for the catchment areas for the West Tributary (Catchment 101), the northern Tributary (Catchment 102) and the northeast wetland (Catchment 103) on Tables G-3, G-4 and G-5, respectively. For these calculations, it was assumed that the post-development groundwater catchment to these features would not change from the pre-development catchments. Refer to Figure 3 for pre-development catchment areas used overlain on the development concept plan. In order to calculate the post-development runoff volumes, the post-development drainage catchments were used, as shown on Figure 12. The post development runoff volumes have been calculated for the same features on Tables G-6, G-7 and G-9, respectively. These calculations assume no LID measures for stormwater management are in place.

The total areas for the proposed land use in each catchment have been estimated based on the proposed redevelopment concept. The infiltration and runoff components for the post-development land uses have been calculated using the MECP SWM Planning and Design Manual (2003) methodology based on topography, soil type and land cover as shown on Tables G-1 and G-2 in Appendix G. The total calculated post-development infiltration and runoff volumes (without mitigation) and percent change from the pre-development scenario are summarized in Table 4 below.

Table 4: Summary of Post-Development Infiltration and Runoff Volumes Without Mitigation

Surface Water Catchment	Estimated Infiltration Volume (m^3/year)	% Change from Pre-Development	Estimated Runoff Volume (m^3/year)	% Change from Pre-Development
West Tributary	2,261	-23%	3,479	-2%
North Tributary	3,624	-49%	52,151	190%
NE Wetland	2,145	-1%	5,949	-15%

5.6 Water Balance Mitigation Strategies

The proposed LID measures were developed in conjunction with SCS and are indicated in the Functional Servicing and Stormwater Management Report (2021) for the subject

lands. Based on preliminary design information from SCS, it is our understanding that the proposed LID measures will include, but may not be limited to:

- Directing roof leaders from select detached homes to grassed areas;
- Rear yard infiltration trenches; and
- Bioswales.

The depth to groundwater table below existing ground based on seasonal high groundwater elevations is shown on Figure 13. It is noted that the interpreted groundwater conditions show the seasonally high groundwater levels to be quite shallow in the topographic lows on the subject lands. The depth to groundwater should be re-evaluated based on detailed final grading plans. Also, as discussed in Section 3.3, seasonal groundwater level fluctuations ranging between about 1 m and 5 m have been observed. As such, trenches may be feasible in most areas recognizing that their function may be seasonal.

The trenches will be completed in silty clay, which, as discussed in Section 2.6 is expected to have a hydraulic conductivity of 10^{-6} cm/s to 10^{-7} cm/s, which corresponds with an infiltration rate of 12 mm/hour (based on Table C1 in Appendix C: Credit Valley Conservation and Toronto and Region Conservation Authority Low Impact Development Stormwater Management Planning and Design Guide document, 2010).

Based on the preliminary LID strategy provided by SCS calculations have been completed to assess the potential effectiveness of the proposed LID measures on reducing the infiltration deficit as shown on Tables G-9 (West Tributary), G-10 (North Tributary) and G-11 (NE Wetland) in Appendix G. Comparing the pre-development infiltration volumes to the post-development infiltration volumes with LID measures in place, the calculations suggest that the pre-development infiltration volumes for the catchments within the subject lands may be maintained or exceeded by implementing the proposed LID strategy. The estimated infiltration volumes with the implementation of the proposed LID strategy are summarized below in Table 5.

Table 5: Summary of Pre- and Post-Development Infiltration (with LID Measures)

Surface Water Catchment	Estimated Infiltration Volume (m^3/year)		Change in Infiltration (m^3/year)
	Existing	Post-Development	
West Tributary (101)	2,928	4,611	+1,683
North Tributary (102)	7,162	14,288	+7,126
NE Wetland (103)	2,169	2,538	+370

Calculations have also been completed to assess the impact of the proposed LID measures on runoff to the features as shown on Tables G-12 (West Tributary) and G-13

(North Tributary) in Appendix G. There are no LID measures proposed for the NE wetland post-development Catchment 103.

The estimated runoff volumes for the surface water catchments with the implementation of the proposed LID strategy are summarized below in Table 6.

Table 6: Summary of Pre- and Post-Development Runoff (with LID Measures)

Surface Water Catchment	Estimated Runoff Volume (m^3/year)		Change in Runoff (m^3/year)	Change in Runoff (%)
	Existing	Post-Development		
West Tributary	3,540	1,941	-1,599	-45%
North Tributary	27,438	39,524	+12,086	144%
NE Wetland	6,987	5,949	-1,038	-15%

Comparing the pre-development runoff volumes to the post-development runoff volumes with LID measures in place, indicate a decrease in runoff to the West Tributary and NE Wetland and an increase in runoff to the North Tributary.

6.0 Development Considerations

6.1 Construction Below the Water Table

Based on groundwater level data collected as part of this study, the water table on the subject lands ranges from above grade to greater than 4 m below ground surface. Should excavations during construction of servicing extend below the water table the local soils may need to be dewatered. Due to the low hydraulic conductivity of the surficial soils significant groundwater flows are not anticipated.

The construction of buried services below the water table has the potential to capture and redirect groundwater flow through more permeable fill materials typically placed in the base of excavations. Groundwater may also infiltrate into joints in storm sewers and manholes. Over the long-term, these impacts can lower the groundwater table across the development area. To mitigate this effect, services to be installed below the water table should be constructed to prevent redirection of groundwater flow. This will involve the use of anti-seepage collars or clay plugs surrounding the pipes to provide barriers to flow and prevent groundwater flow along granular bedding material and erosion of the backfill materials.

Should excavations below the water table be required during construction, dewatering of may be required. The undertaking of dewatering according to industry standards and in accordance with a MECP processes will ensure that adequate attention is paid to potential adverse impacts to the environment. Currently the MECP allows for construction dewatering of less than 400,000 L/d to proceed under the Environmental Activity Sector Registry (EASR) process. If dewatering is to be above this threshold,

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Figures

LEGEND

- SUBJECT LANDS
- WATERCOURSE
- MONITORING WELL (RJB, 2021)
- MONITORING WELL (EXP, 2021)
- DRIVEPOINT PIEZOMETER
- SURFACE WATER MONITORING LOCATION

0 25 50 100 150 200
Meters

N

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HIGHFAIR INVESTMENTS INC
AURORA, ONTARIO

HYDROGEOLOGICAL ASSESSMENT

Figure Title:

MONITORING LOCATIONS

Drawn	Checked	Date	Figure No.
SK	JS	AUGUST 2021	2
Scale		Project No.	
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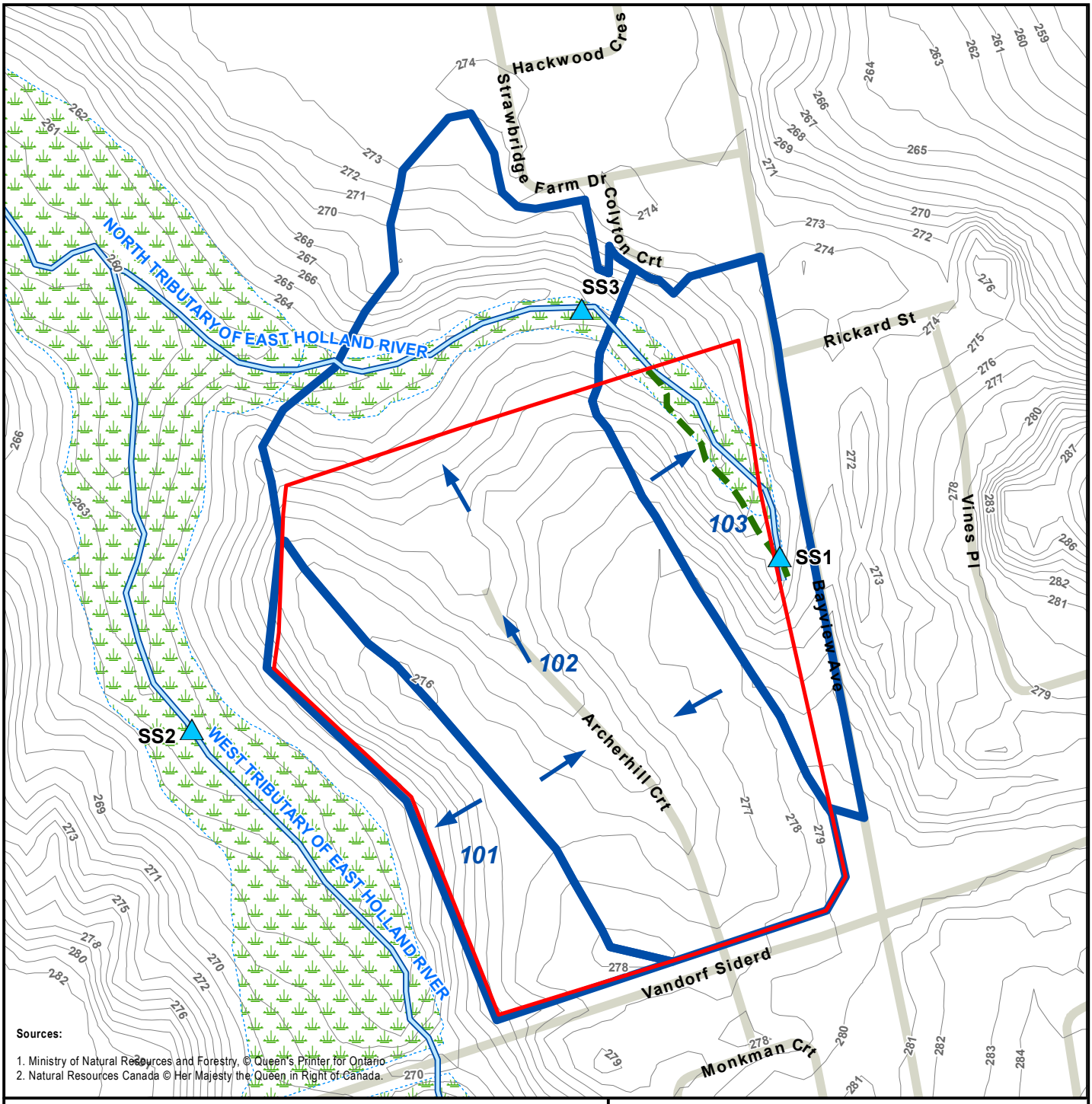
File Path: Nigel/Shared Work Areas/052893 Archerhill/06_GIS/052893 Monitoring Locations.mxd



LEGEND

- SUBJECT LANDS
- PRE-DEVELOPMENT DRAINAGE BOUNDARY
- WATERCOURSE
- CONTOUR (1m intervals - masl)
- ROADWAY
- WETLAND
- STAKED WETLAND (LSRCA, 2020)
- SURFACE WATER MONITORING LOCATION
- SURFACE WATER FLOW DIRECTION

0 25 50 100 150 200 250 300
Meters

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HYDROGEOLOGICAL ASSESSMENT

Figure Title:

TOPOGRAPHY AND DRAINAGE

Drawn	Checked	Date	Figure No.
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Scale		Project No.	
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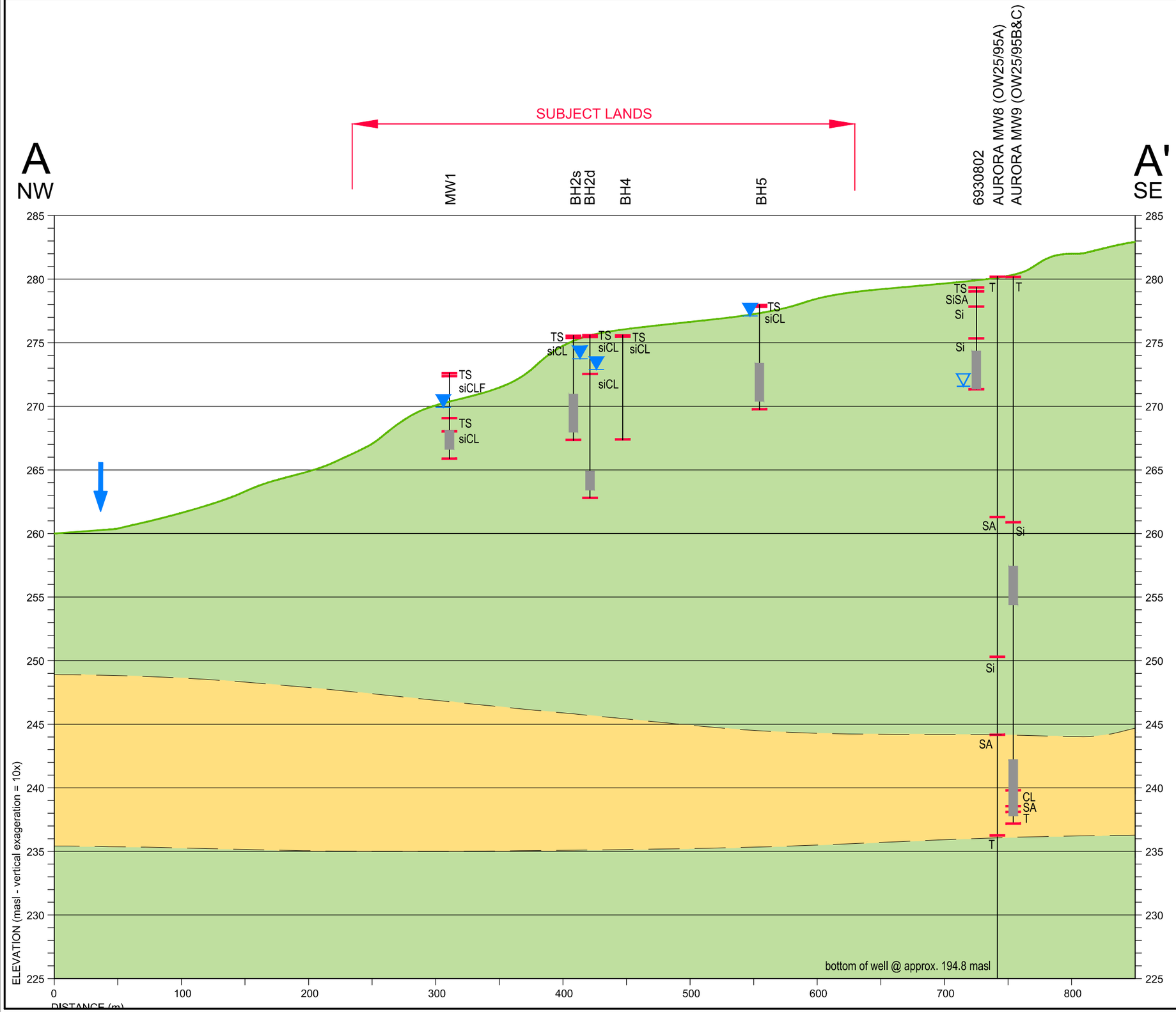

LEGEND

- BH1 — WELL NUMBER / ID
- EXISTING GROUND PROFILE
- GEOLOGICAL CONTACT
- MEASURED WATER LEVEL (MAY, 2021)
- STATIC WATER LEVEL (MECP WELL RECORD)
- WELL SCREEN

si	SILTY
sa	SANDY
cl	CLAYEY
GR	GRAVEL
TS	TOPSOIL
T	TILL
F	FILL
PRDG	PREDUG
SA	SAND
Si	SILT
CL	CLAY

- WATERCOURSE CROSSING
- INTERPRETED STRATIGRAPHY
- SAND / SILT / GRAVEL
- SILT CLAY TILL

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HYDROGEOLOGICAL ASSESSMENT

Figure Title

INTERPRETED GEOLOGICAL CROSS-SECTION A-A'

Drawn	Checked	Date	Figure No.
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Scale		Project No.	
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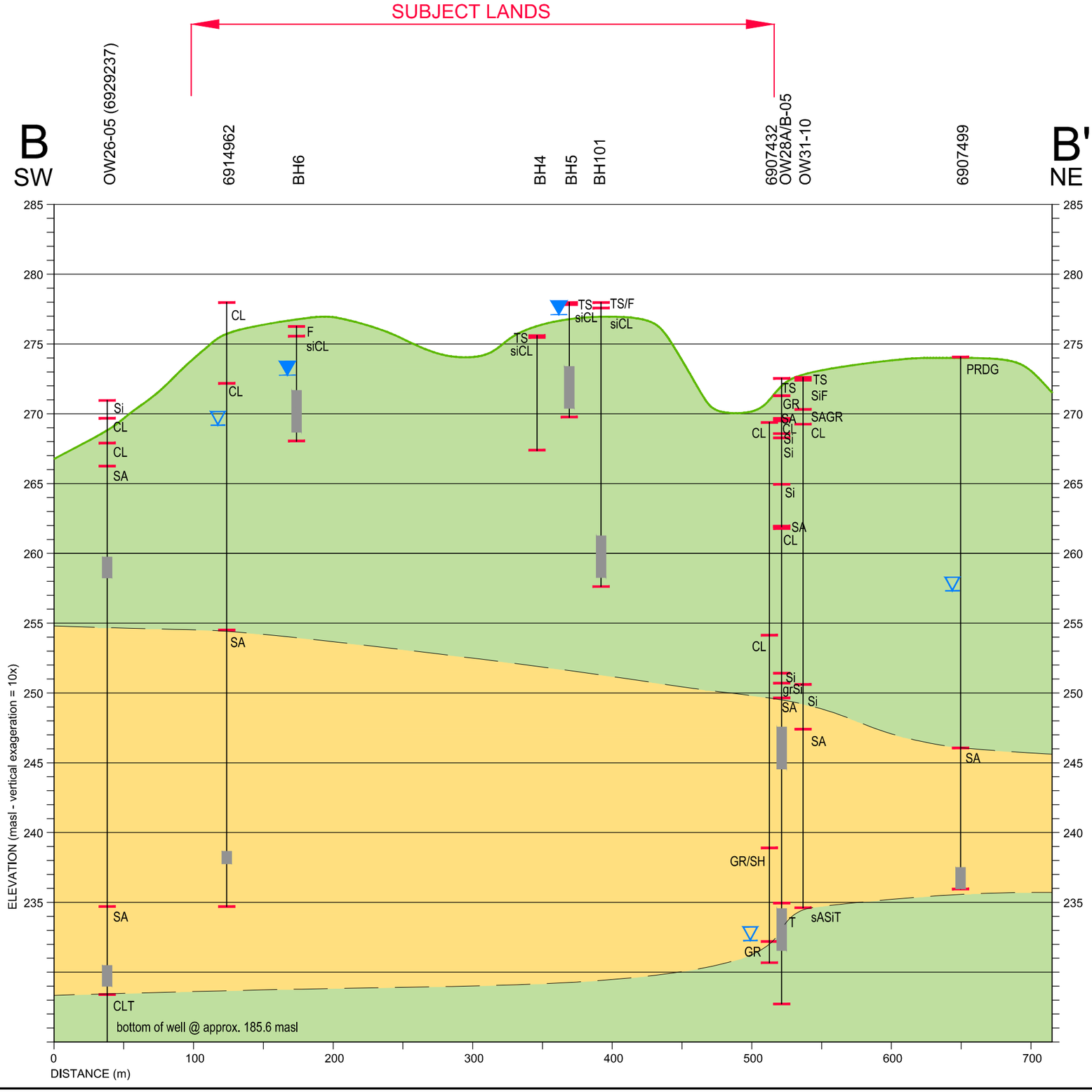

LEGEND

BH1 — WELL NUMBER / ID

EXISTING GROUND PROFILE

GEOLOGICAL CONTACT

MEASURED WATER LEVEL (MAY, 2021)

STATIC WATER LEVEL (MECP WELL RECORD)

WELL SCREEN

si	SILTY
sa	SANDY
cl	CLAYEY
GR	GRAVEL
TS	TOPSOIL
T	TILL
F	FILL
PRDG	PREDUG
SA	SAND
Si	SILT
CL	CLAY

WATERCOURSE CROSSING

INTERPRETED STRATIGRAPHY

SAND / SILT / GRAVEL

SILT CLAY TILL

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HYDROGEOLOGICAL ASSESSMENT

Figure Title

INTERPRETED GEOLOGICAL CROSS-SECTION B-B'

Drawn	Checked	Date	Figure No.
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Scale		Project No.	
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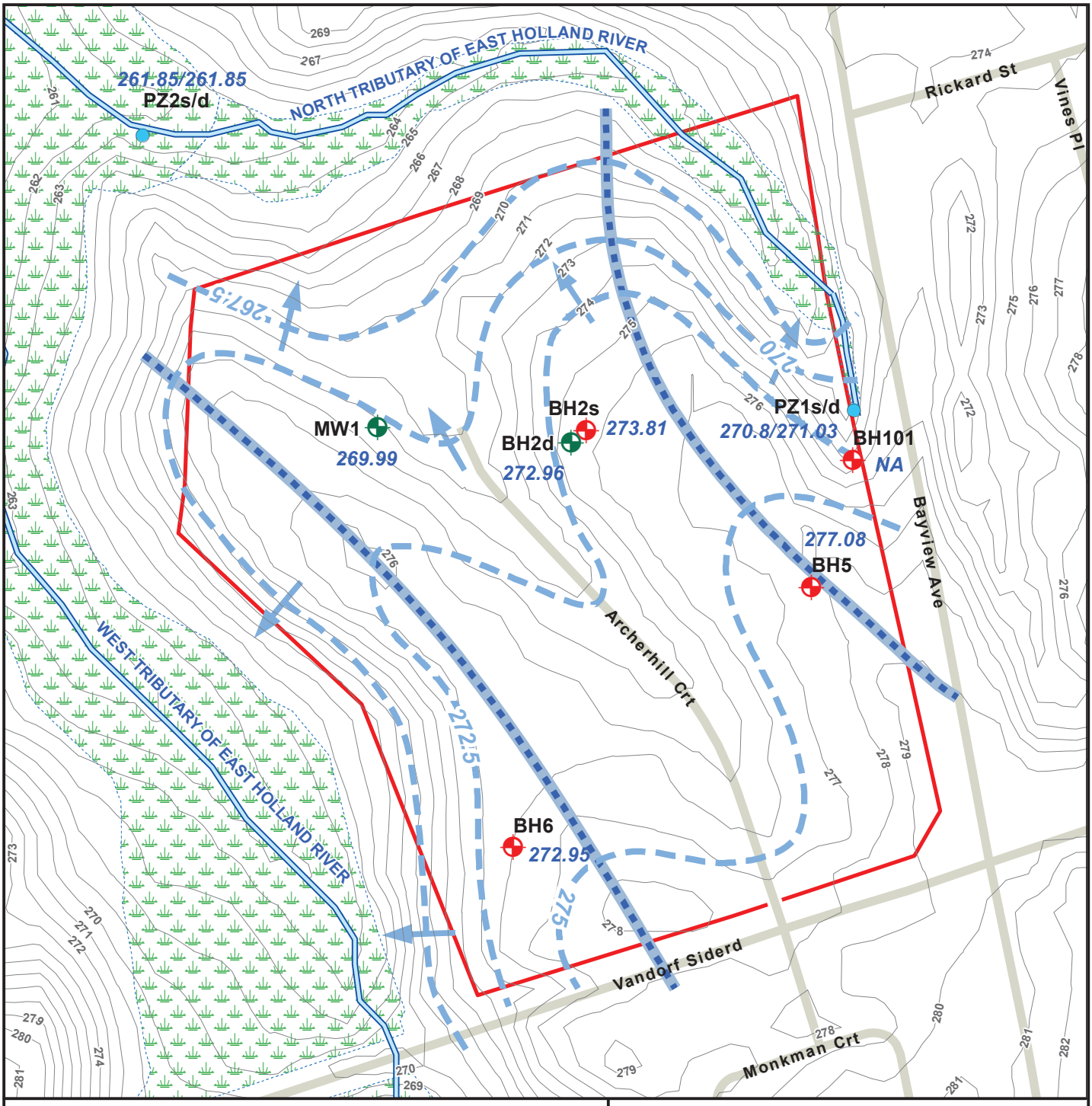

LEGEND

- SUBJECT LANDS
- ROADWAY
- CONTOUR (1m intervals - masl)
- WATERCOURSE
- WETLAND (MNRF, 2017)
- MONITORING WELL (RJB, 2021)
- MONITORING WELL (EXP, 2021)
- DRIVEPOINT PIEZOMETER
- INTERPRETED GROUNDWATER DIVIDE
- INTERPRETED GROUNDWATER CONTOUR (masl)
- INTERPRETED GROUNDWATER FLOW DIRECTION
- 177.95 MEASURED WATER LEVEL (MAY, 2021)

0 25 50 100 150 200
Meters

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HYDROGEOLOGICAL ASSESSMENT

Figure Title:

INTERPRETED GROUNDWATER FLOW

Drawn	Checked	Date	Figure No.
SK	JS	AUGUST 2021	9
Scale		Project No.	
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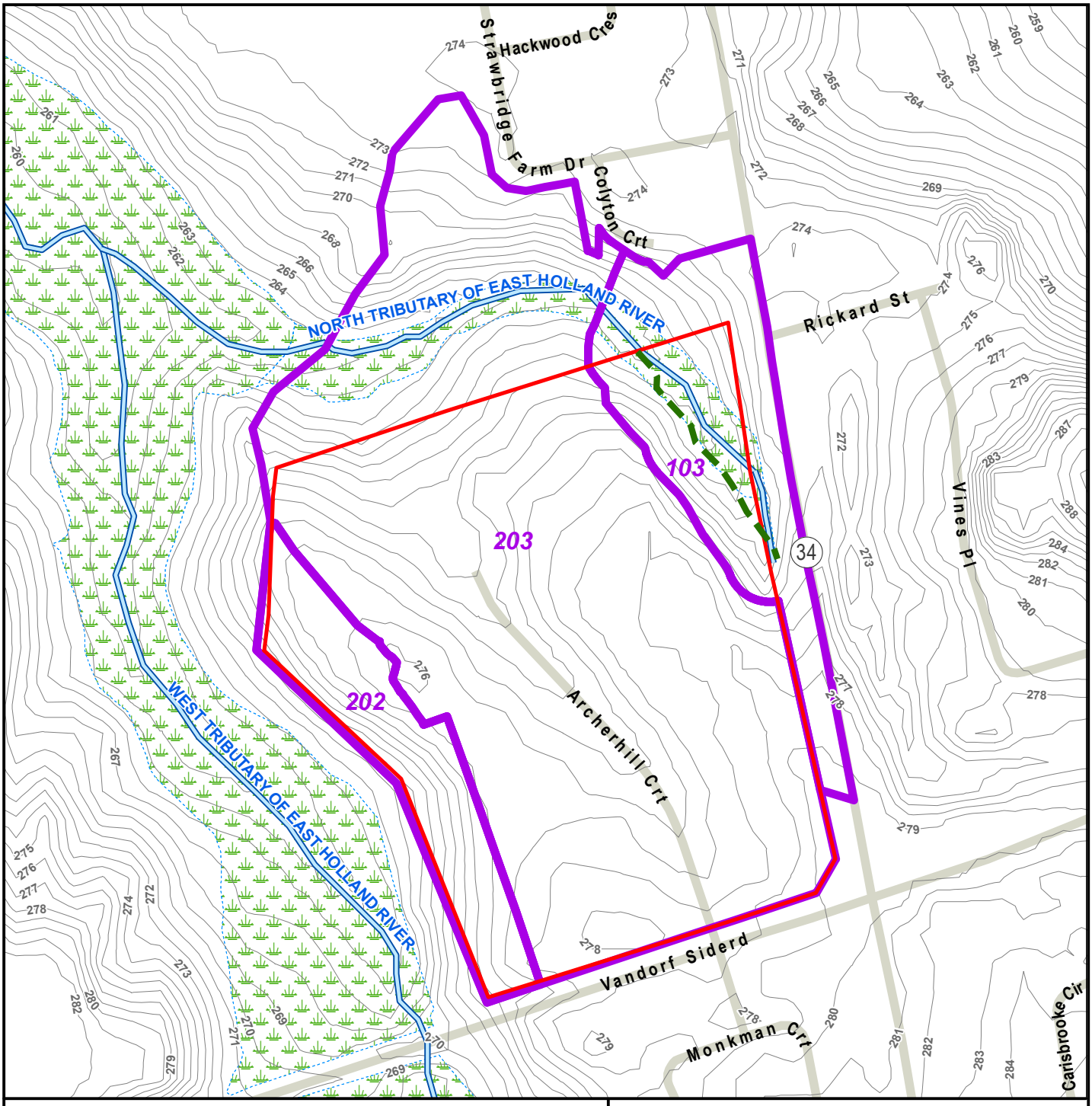
File Path: Nigel/Shared Work Areas/052893 Archerhill/06_GIS/052893 Groundwater Flow.mxd



LEGEND

- SUBJECT LANDS
- POST-DEVELOPMENT DRAINAGE BOUNDARY
- WATERCOURSE
- CONTOUR (1m intervals - masl)
- ROADWAY
- WETLAND (MNRF, 2017)
- STAKED WETLAND (LSRCA, 2020)

0 25 50 100 150 200 250 300
Meters

N

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AURORA, ONTARIO

HYDROGEOLOGICAL ASSESSMENT

Figure Title:

POST-DEVELOPMENT CATCHMENTS

Drawn	Checked	Date	Figure No.
SK	JS	AUGUST 2021	12
Scale		Project No.	
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File Path: Nigel/Shared Work Areas/052893 Archerhill/06_GIS/052893 Post-Development Catchments.mxd

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Appendix A

Borehole Logs

Log of Borehole 1

Project No. BRM-21000267-A0 | Drawing No. 2

Project: Geotechnical Investigation | Sheet No. 1 of 1

Location: Archerhill Court, Aurora

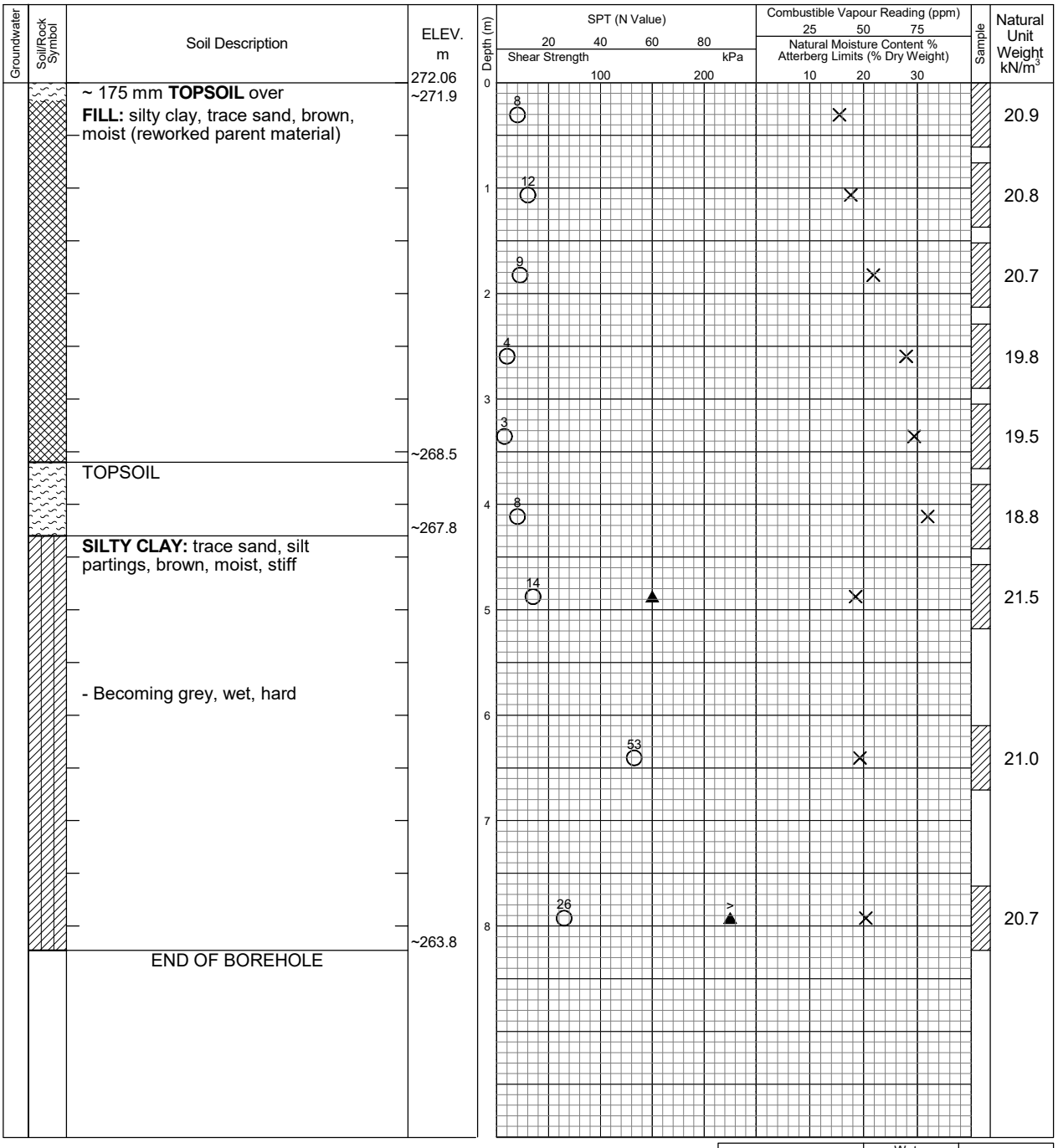
Date Drilled: January 8, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 1/21/21

Date	Water Level (m)	Hole Open to (m)
On Completion	3.05	Open

Log of Borehole 2

Project No. BRM-21000267-A0

Drawing No. 3

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: Archerhill Court, Aurora

Date Drilled: January 8, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test (S)

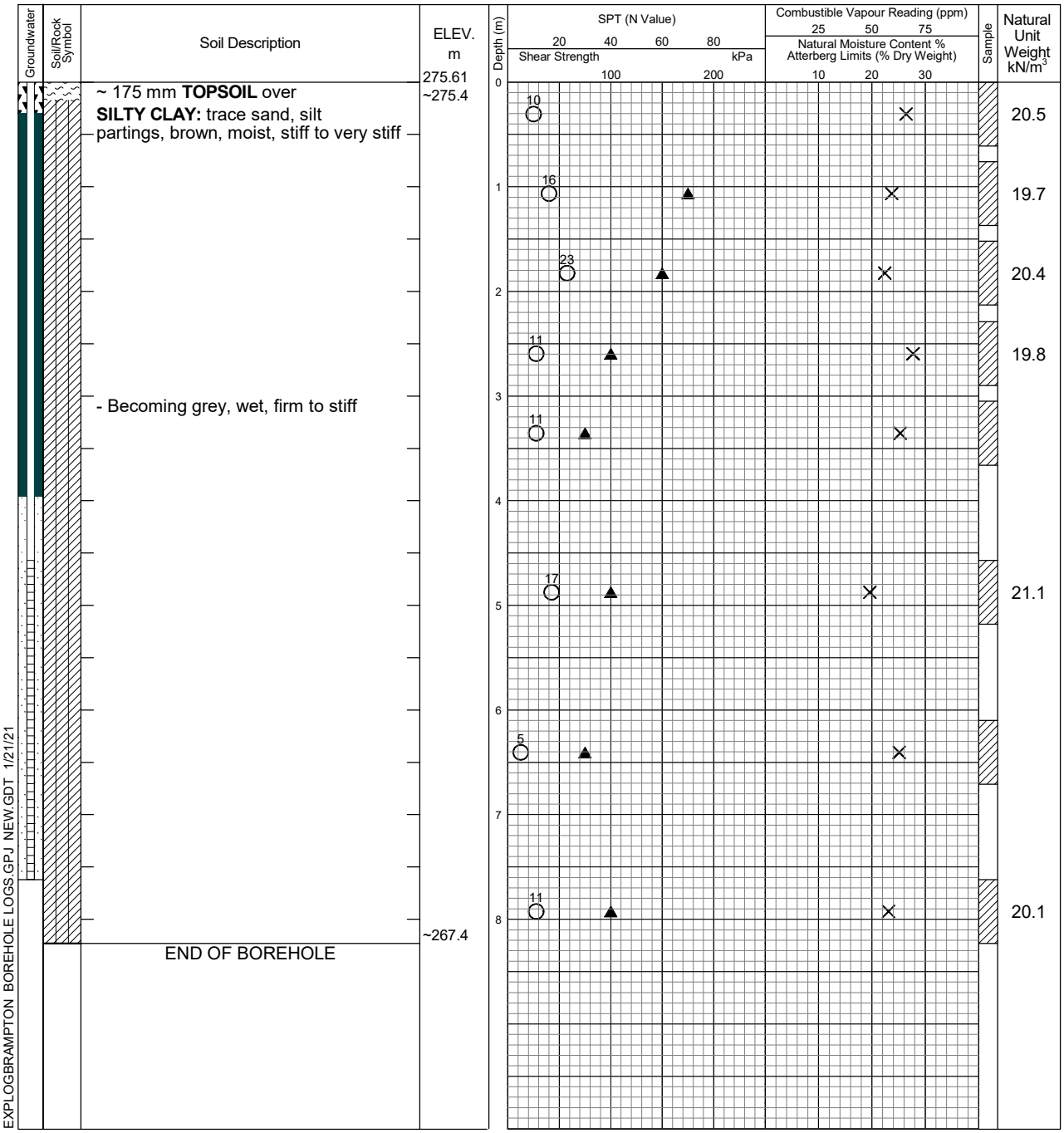
Combustible Vapour Reading

Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at % Strain at Failure

Penetrometer



EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 1/21/21

Date	Water Level (m)	Hole Open to (m)
On Completion	Dry	Open
January 20, 2021	2.24	

Log of Borehole 3

Project No. BRM-21000267-A0 | Drawing No. 4

Project: Geotechnical Investigation | Sheet No. 1 of 1

Location: Archerhill Court, Aurora

Date Drilled: January 8, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test ——
Shelby Tube ■
Field Vane Test ✚ S

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit ⊢—○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

Soil Description	ELEV. m	Depth (m)	SPT (N Value) / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	Natural Unit Weight kN/m³
~ 125 mm **TOPSOIL** over **FILL:** brown silty clay, trace sand, trace gravel, occasional rootlets, moist	275.28 ~275.2	0	6		20.6
		1	4		21.5
		2	6		
	~273.1				
SILTY CLAY: trace sand, silt partings, brown, moist, stiff		2	10		19.8
		3	6		20.4
		4			
		5	13		20.2
- Becoming wet, firm		6	11		20.0
		7			
- Becoming grey, soft		8	6		
	~267.1				
END OF BOREHOLE					

Date	Water Level (m)	Hole Open to (m)

EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 1/21/21

Log of Borehole 4

Project No. BRM-21000267-A0 | Drawing No. 5

Project: Geotechnical Investigation | Sheet No. 1 of 1

Location: Archerhill Court, Aurora

Date Drilled: January 7, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test ——
Shelby Tube ■
Field Vane Test ✚ S

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit ⊢—○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

Soil Description	ELEV. m	Depth (m)	Natural Unit Weight kN/m³
~ 125 mm **TOPSOIL** over	275.63	0	21.6
SILTY CLAY: trace sand, silt partings, brown, moist, stiff to very stiff	~275.5		
- Trace gravel		1	20.4
		2	21.8
			20.5
- Becoming grey		3	20.8
		4	
		5	21.1
- Becoming wet		6	
		7	
- Becoming firm		8	19.6
	~267.4		
END OF BOREHOLE			

SPT (N Value): 20 40 60 80 — Shear Strength: 100 200 kPa

Combustible Vapour Reading (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

Date	Water Level (m)	Hole Open to (m)
On Completion	Dry	Open

EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 1/21/21

Log of Borehole 5

Project No. BRM-21000267-A0

Drawing No. 6

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: Archerhill Court, Aurora

Date Drilled: January 7, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test (S)

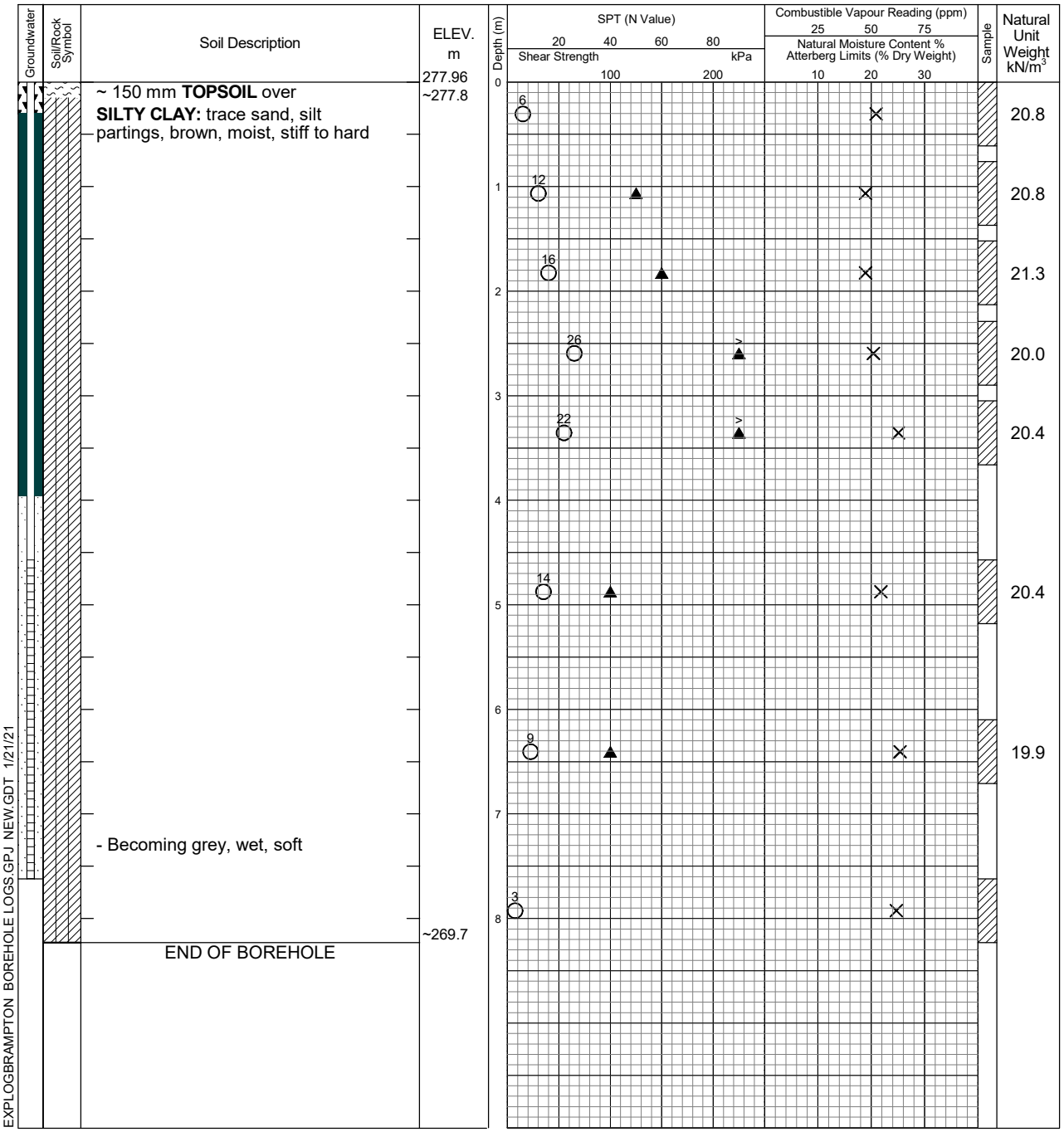
Combustible Vapour Reading

Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at % Strain at Failure

Penetrometer



Date	Water Level (m)	Hole Open to (m)
On Completion	4.27	Open
January 20, 2021	0.67	

EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 1/21/21

Log of Borehole 6

Project No. BRM-21000267-A0 | Drawing No. 7

Project: Geotechnical Investigation | Sheet No. 1 of 1

Location: Archerhill Court, Aurora

Date Drilled: January 7, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

Soil Description	ELEV. m	Depth (m)	SPT (N Value) / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	Natural Unit Weight kN/m³
	276.34	0			
~ 175 mm **TOPSOIL** over **FILL:** ~ 100 mm brown silty sand over brown silty clay (reworked parent material), moist	~276.2		7		20.0
	~275.6	1	14		20.5
SILTY CLAY: trace sand, silt partings, brown, moist, stiff to very stiff		2	18		2.2
			22		21.3
		3	14		20.8
- Becoming grey, wet		4			
		5	15		20.7
- Becoming firm		6			
			10		20.8
		7			
		8	15		20.9
	~268.1				
END OF BOREHOLE					

Date	Water Level (m)	Hole Open to (m)
On Completion	7.01	Open
January 20, 2021	3.55	

EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 1/21/21

Log of Borehole 7

Project No. BRM-21000267-A0

Drawing No. 8

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: Archerhill Court, Aurora

Date Drilled: January 7, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at % Strain at Failure

Penetrometer

Soil Description	ELEV. m
~ 225 mm **TOPSOIL** over	277.88
FILL: mix of silty clay and topsoil, brown to dark brown, moist	~277.7
SILTY CLAY: trace sand, silt partings, brown, moist stiff to hard	~276.8
- Becoming grey, wet, firm	
END OF BOREHOLE	~269.7

SPT (N Value): 20 40 60 80

Shear Strength: 100 200 kPa

Combustible Vapour Reading (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

Depth (m): 0 1 2 3 4 5 6 7 8

SPT values: 6, 12, 20, >, 24, >, 11, 13, 13

Natural Unit Weight kN/m³: 20.0, 19.0, 20.0, 21.1, 20.5, 21.0

Date	Water Level (m)	Hole Open to (m)
On Completion	Dry	Open

EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 1/21/21

Log of Borehole 101

Project No. BRM-21000267-A0 | Drawing No. 9

Project: Geotechnical Investigation | Sheet No. 1 of 2

Location: Archerhill Court, Aurora

Date Drilled: April 15, 2021

Drill Type: CME 75 Track

Datum: Geodetic

Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Field Vane Test (S)

Combustible Vapour Reading | Natural Moisture | Plastic and Liquid Limit | Undrained Triaxial at % Strain at Failure | Penetrometer

Soil Description	ELEV. m	Depth (m)	SPT (N Value) / Shear Strength kPa	Natural Moisture Content % / Atterberg Limits (% Dry Weight)	Natural Unit Weight kN/m³
TOPSOIL: ~ 250 mm	277.99	0	5		
FILL: clayey silt to silty clay, trace sand, brown, moist (reworked parent material)	~277.7				
	~277.5				
SILTY CLAY: trace sand, trace gravel, brown, moist, firm to very stiff	~277.2	1	12		22.5
		2	18		20.5
- grey, wet			21		21.3
		3	17		20.9
		4	4		
		5	3.0		
		6	9		20.1
		7			
		8	8		
			2.0		
		9			
		10	6		

Continued Next Page

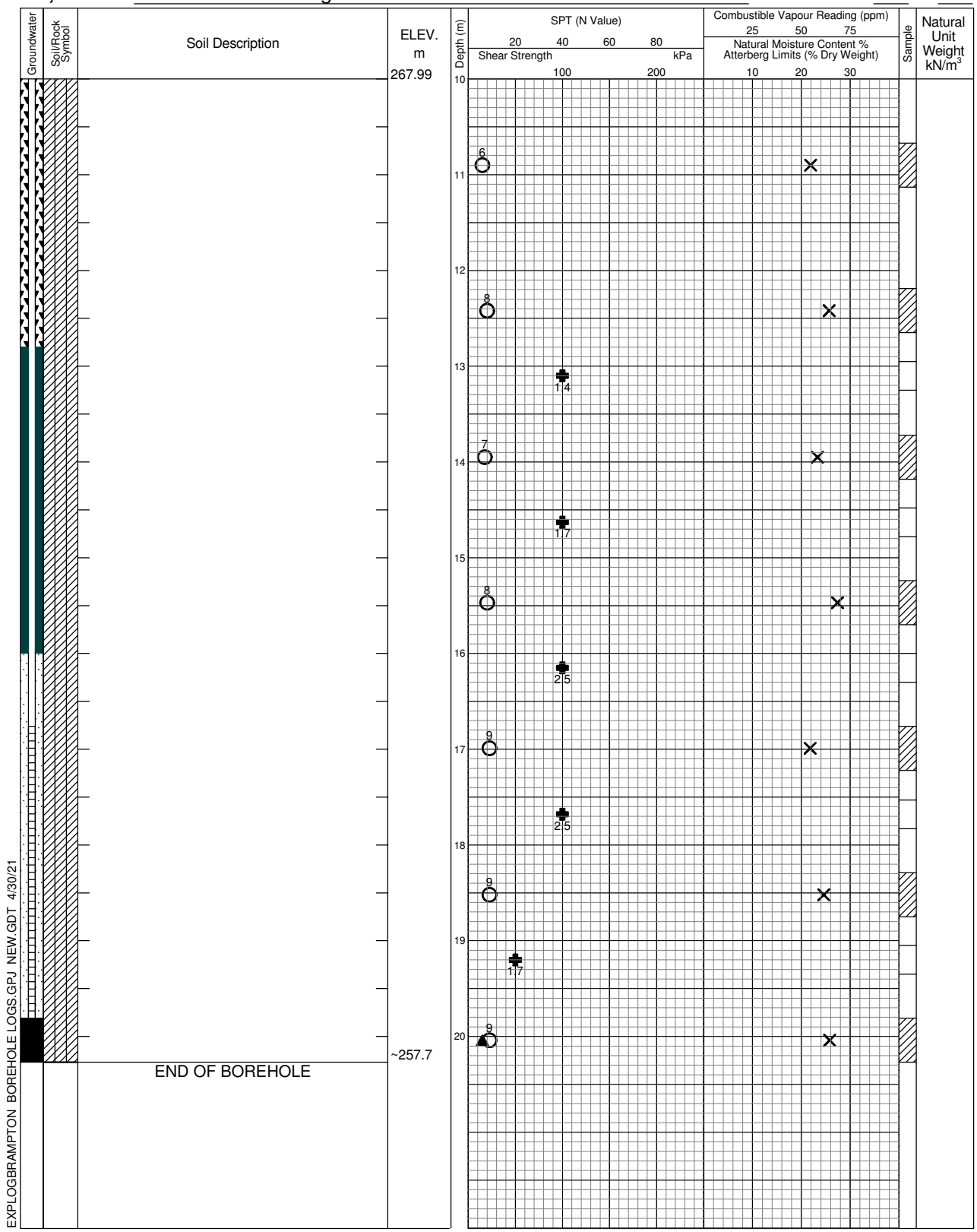
Date	Water Level (m)	Hole Open to (m)
April 23, 2021	0.83	

EXPLOGBRAMPTON BOREHOLE LOGS.GPJ NEW.GDT 4/30/21

Log of Borehole 101

Project No. BRM-21000267-A0 Drawing No. 9

Project: Geotechnical Investigation Sheet No. 2 of 2



Date	Water Level (m)	Hole Open to (m)
April 23, 2021	0.83	

LOG OF DRILLING OPERATIONS

BH2d

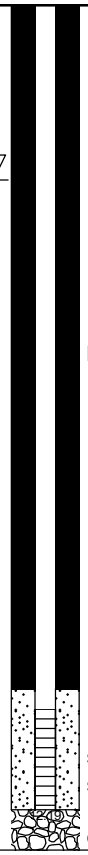
R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Guelph, Ontario N1H 1C4
telephone (519) 823-4995 fax (519) 836-5477

Client: **Highfair Investments Inc.**	Project Name: **ArcherHill Court**	Logged by: **A.Brock**
Project No.: **300052893.0000**	Location: **ArcherHill Court, Aurora Ontario**	Ground (m amsl): **275.61**
Drilling Co.: **Geo-Environmental Drilling Inc.**	Date Started: **4/28/2021**	Static Water Level Depth (m): **2.65**
Drilling Method: **Hollow Stem Auger**	Date Completed: **4/28/2021**	Sand Pack Depth (m) : **10.39-12.19**

Surface Elevation (m): **275.61**

Depth Scale (ft)	Depth Scale (m)	Stratigraphic Description	Depth (m)
		TOPSOIL Dark brown, moist, roots and organics	0.15
5.0	1.0		
	2.0	SILTY CLAY Brown, moist, soft to firm, trace sand, some oxidation	
10.0	3.0	Turning Grey @ 2.80m	2.80 3.05
	4.0		
15.0	5.0		
20.0	6.0		
	7.0		
25.0	8.0		
30.0	9.0		
	10.0		
35.0	11.0		
40.0	12.0	SILTY CLAY Grey, wet, very soft, medium to high plasticity	12.80
		End of Hole	

Strat. Plot



SAMPLE

Num.	Type	Int.		Depth Scale (ft)	Depth Scale (m)
1	SS		10		
2	SS		13		
3	SS		18		
4	SS		9		
5	SS		8		
6	SS		9		
7	SS		7		
8	SS		10		
9	SS		15		
10	SS		10		
11	SS		5		

Prepared By: **A. Brock** Checked By: Date Prepared: **6/1/2021**

This borehole log was prepared for hydrogeological and/or environmental purposes and does not necessarily contain information suitable for a geotechnical assessment of the subsurface conditions. Borehole data requires interpretation by R. J. Burnside & Associates Limited personnel before use by others.

LEGEND
- Water found @ time of drilling
- Static Water Level -

MONITORING WELL DATA
- Pipe: **51 mm dia. PVC**
- Screen: **51 mm dia. PVC #10 slot**

SAMPLE TYPE
- AC Auger Cutting
- CS Continuous
- RC Rock Core
- SS Split Spoon
- AR Air Rotary
- WC Wash Cuttings

BHLOG ORANGEVILLE C:\USERS\ABROCK\ONEDRIVE - RJB\PROJECTS\ARCHERHILL\ARCHERHILL COURT BH LOGS.GPJ RJB_BOREHOLE1.GDT 6/4/21

LOG OF DRILLING OPERATIONS

MW1

BURNSIDE

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Guelph, Ontario N1H 1C4
telephone (519) 823-4995 fax (519) 836-5477

Client: **Highfair Investments Inc.**	Project Name: **ArcherHill Court**	Logged by: **A.Brock**
Project No.: **300052893.0000**	Location: **ArcherHill Court, Aurora Ontario**	Ground (m amsl): **272.06**
Drilling Co.: **Geo-Environmental Drilling Inc.**	Date Started: **4/28/2021**	Static Water Level Depth (m): **2.07**
Drilling Method: **Hollow Stem Auger**	Date Completed: **4/28/2021**	Sand Pack Depth (m) : **4.27-6.10**

Depth Scale (ft)	Depth Scale (m)	Stratigraphic Description (Surface Elevation (m): 272.06)	Strat. Plot	Depth (m)		SAMPLE Num.	Type	Int.		Depth Scale (ft)	Depth Scale (m)
		TOPSOIL Dark Brown, moist, roots and organics		0.23		1	SS		9		
5.0	1.0					2	SS		13		
	2.0	SILTY CLAY FILL Brown, some grey, moist, trace gravel, firm to stiff			bentonite seal	3	SS		9	5.0	2.0
10.0	3.0	Turns Grey @3.05m		3.05		4	SS		3		
	4.0	TOPSOIL Dark brown, moist, grass and organics		3.53		5	SS		3	10.0	3.0
15.0	5.0			4.57	silica sand pack screen	6	SS		21	15.0	4.0
20.0	6.0	SILTY CLAY Grey, wet, medium plasticity, stiff to hard			cave	7	SS		35		5.0
		End of Hole		6.71						20.0	6.0

Prepared By: **A. Brock** Checked By: Date Prepared: **6/1/2021**

This borehole log was prepared for hydrogeological and/or environmental purposes and does not necessarily contain information suitable for a geotechnical assessment of the subsurface conditions. Borehole data requires interpretation by R. J. Burnside & Associates Limited personnel before use by others.

LEGEND
- Water found @ time of drilling
- Static Water Level -

MONITORING WELL DATA
- Pipe: **51 mm dia. PVC**
- Screen: **51 mm dia. PVC #10 slot**

SAMPLE TYPE
- AC Auger Cutting
- CS Continuous
- RC Rock Core
- SS Split Spoon
- AR Air Rotary
- WC Wash Cuttings

BURNSIDE

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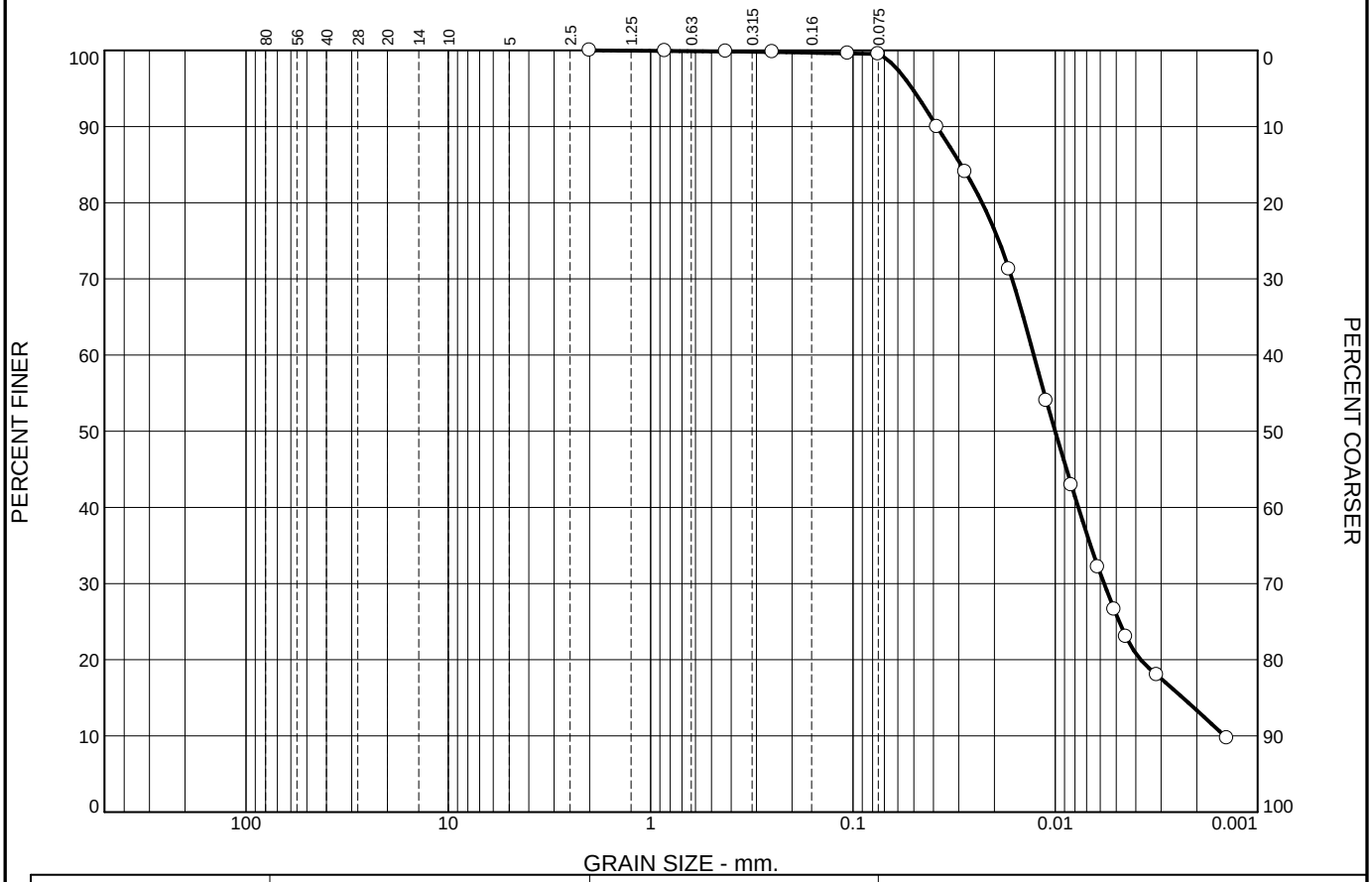
Appendix C

Hydraulic Conductivity

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0.0	0.0	0.1	0.4	86.1	13.4

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.0293	0.0128	0.0100	0.0057	0.0023	0.0015	1.77	8.77

Material Description	USCS	AASHTO
○ SILT some clay trace sand		

Project No. CA20069 **Client:** R. J. Burnside & Associates Ltd

Project: Laboratory Testing RJB # 300052893

○ **Sample Number:** MW1, SS6

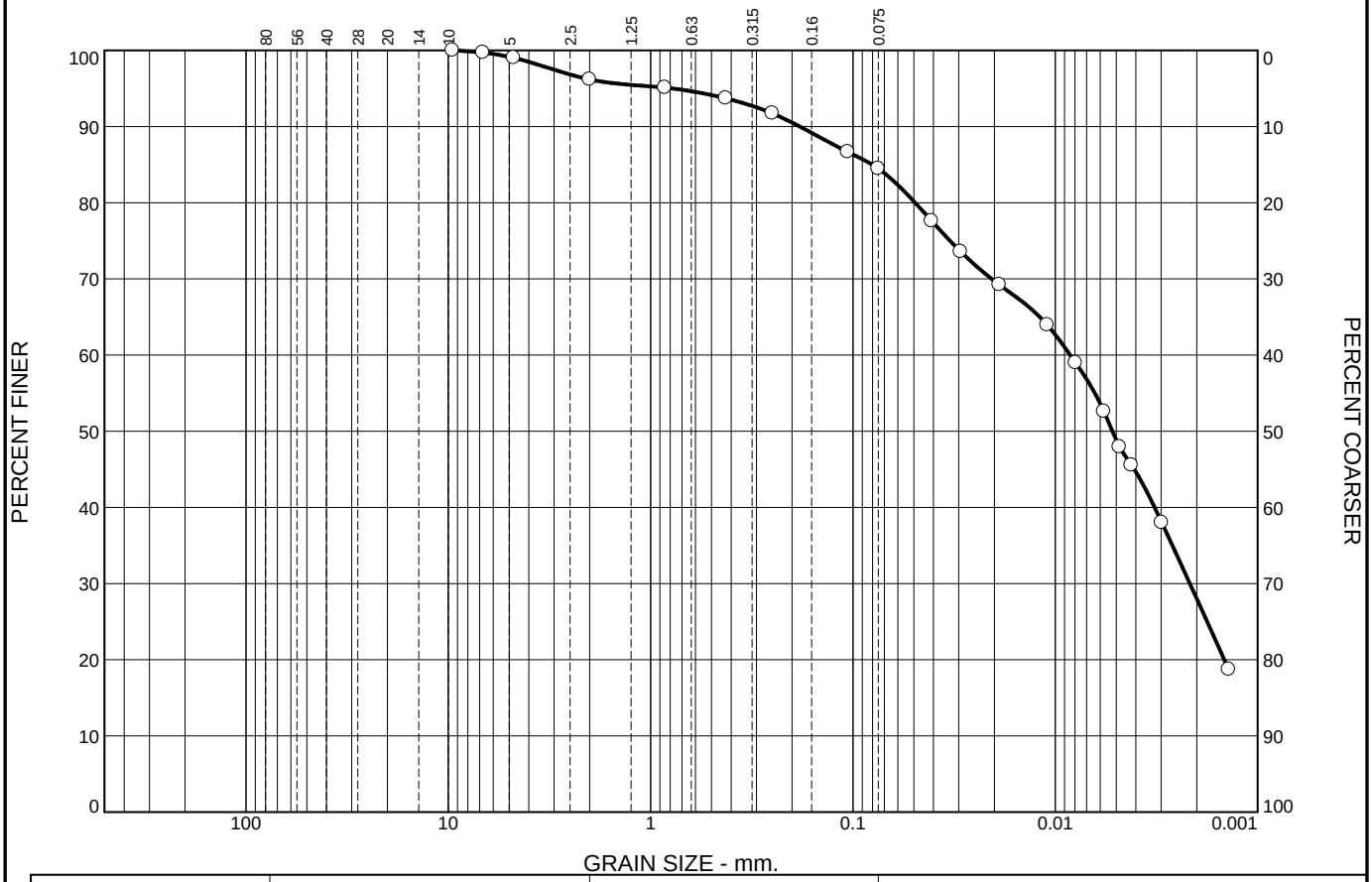
Remarks:

Terrapex

Figure 1

Tested By: AM **Checked By:** DM

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0.0	3.8	2.5	9.2	56.5	28.0

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.0803	0.0084	0.0052	0.0022				

Material Description	USCS	AASHTO
○ CLAYEY SILT some sand trace gravel		

Project No. CA20069 **Client:** R. J. Burnside & Associates Ltd

Project: Laboratory Testing RJB # 300052893

○ **Sample Number:** BH2d, SS3

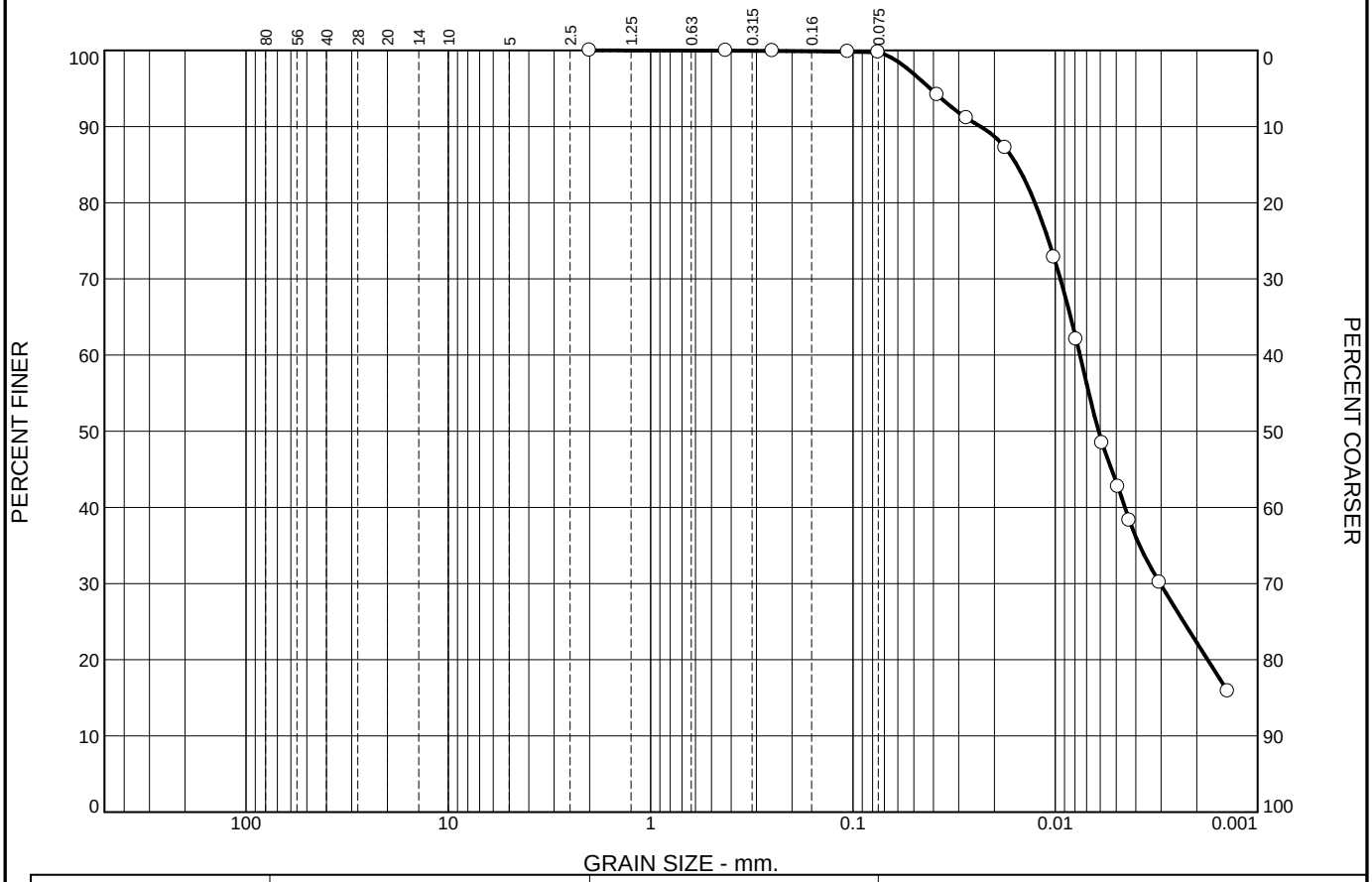
Remarks:

Terrapex

Figure 2

Tested By: AM **Checked By:** DM

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0.0	0.0	0.0	0.2	77.5	22.3

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.0155	0.0076	0.0061	0.0030				

Material Description	USCS	AASHTO
○ CLAYEY SILT trace sand		

Project No. CA20069 **Client:** R. J. Burnside & Associates Ltd

Project: Laboratory Testing RJB # 300052893

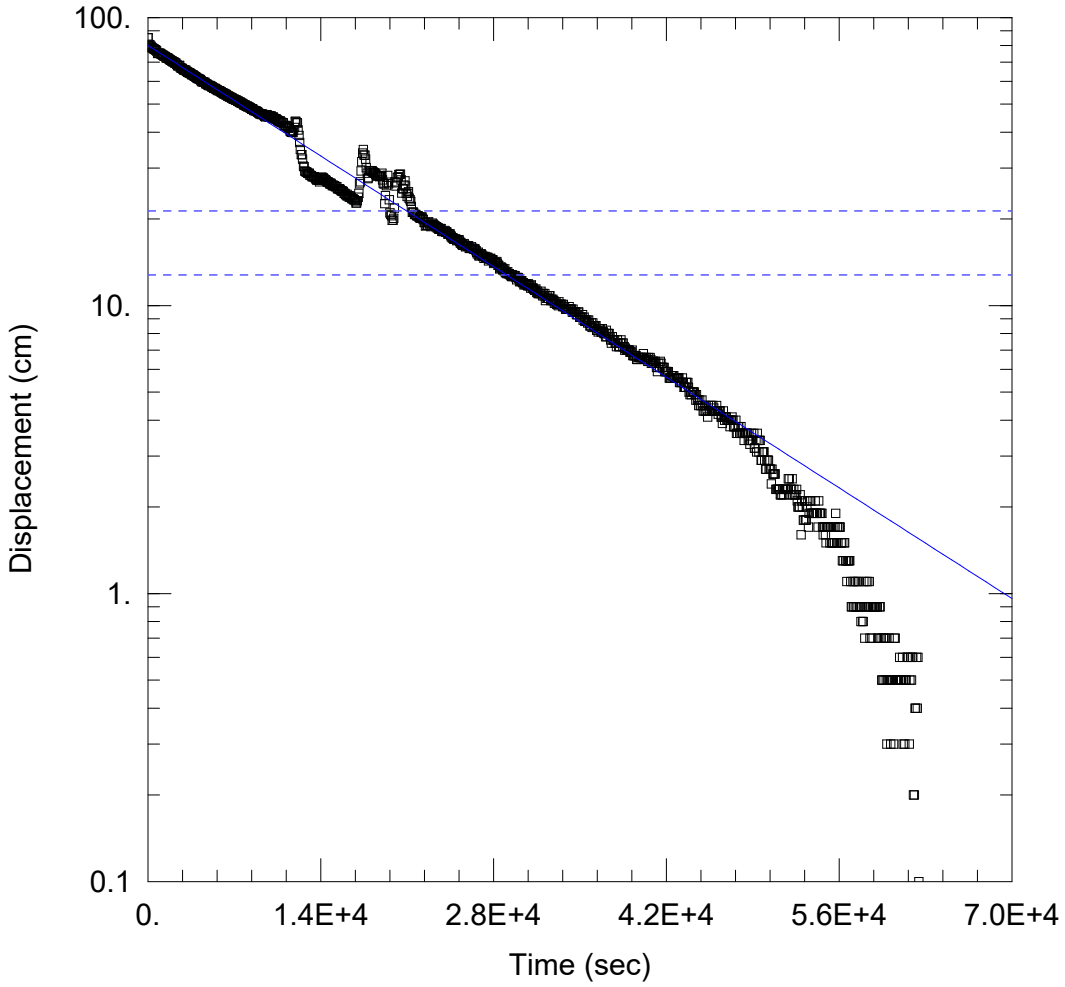
○ **Sample Number:** BH2d, SS10

Remarks:

Terrapex

Figure 3

Tested By: AM **Checked By:** DM



HYDRAULIC CONDUCTIVITY TEST AT BH2S- SCREENED IN SILTY CLAY

PROJECT INFORMATION

Company: R.J Burnside & Associates Ltd.
Project: 300052893
Location: Archerhill Court, Aurora
Test Well: BH2s
Test Date: April 27, 2021

AQUIFER DATA

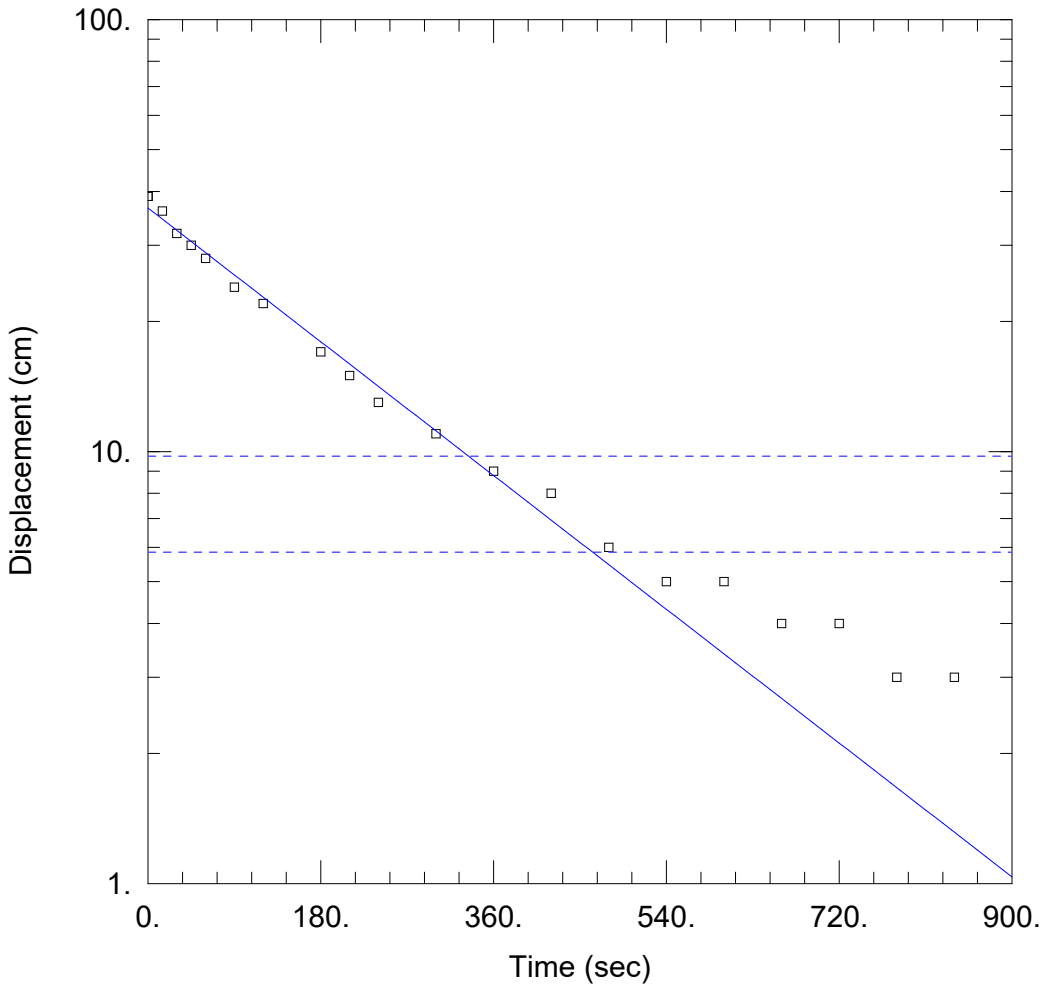
Saturated Thickness: 594. cm
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH2)

Initial Displacement: 85.1 cm
Total Well Penetration Depth: 594. cm
Casing Radius: 2.54 cm
Static Water Column Height: 594. cm
Screen Length: 304. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 2.936E-6 cm/sec
y0 = 80.04 cm



HYDRAULIC CONDUCTIVITY TEST AT BH5- SCREENED IN SILTY CLAY

PROJECT INFORMATION

Company: R.J Burnside & Associates Ltd.
Project: 300052893
Location: Archerhill Court, Aurora
Test Well: BH5
Test Date: April 27, 2021

AQUIFER DATA

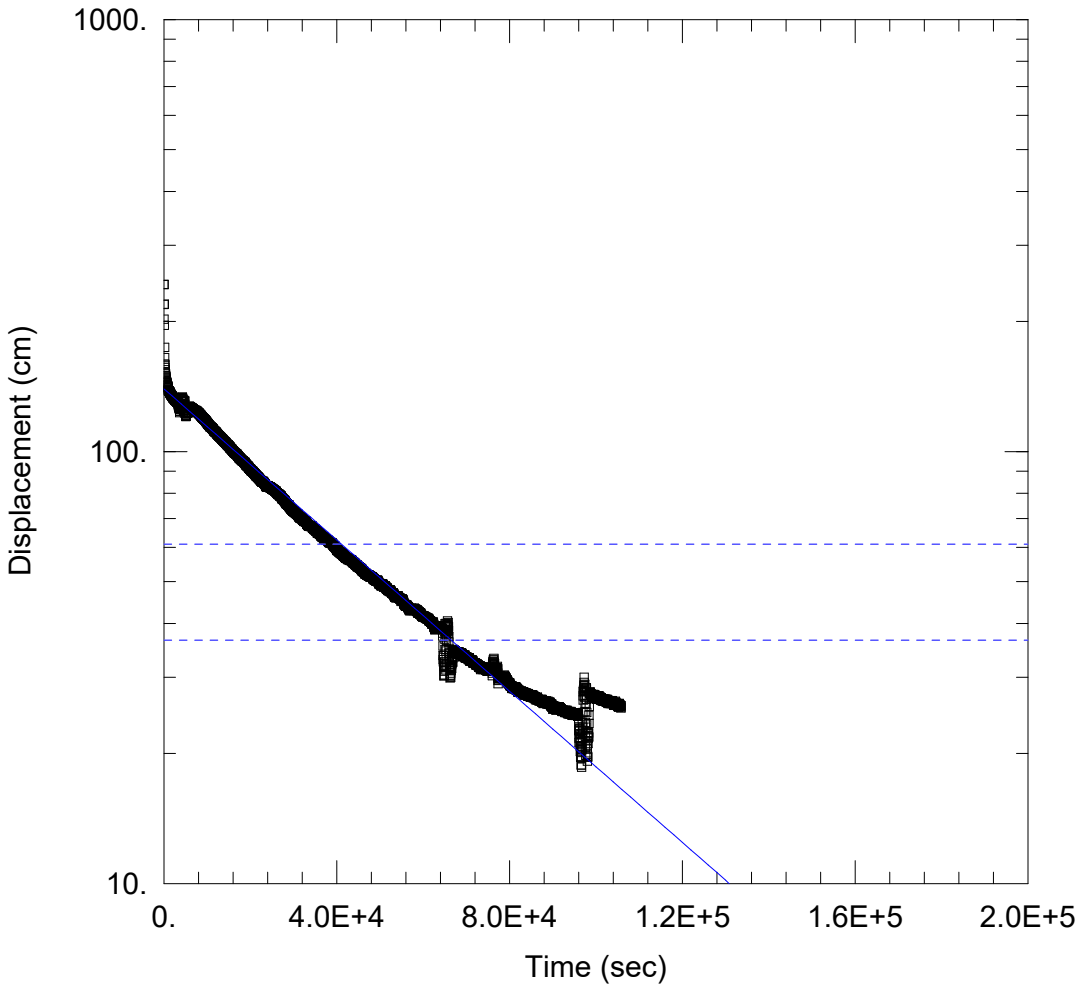
Saturated Thickness: 697. cm
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH5)

Initial Displacement: 39. cm
Total Well Penetration Depth: 697. cm
Casing Radius: 2.54 cm
Static Water Column Height: 697. cm
Screen Length: 304. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
K = 0.0001841 cm/sec
Solution Method: Hvorslev
y0 = 36.62 cm



HYDRAULIC CONDUCTIVITY TEST AT BH6- SCREENED IN SILTY CLAY

PROJECT INFORMATION

Company: R.J Burnside & Associates Ltd.
Project: 300052893
Location: Archerhill Court, Aurora
Test Well: BH6
Test Date: April 27, 2021

AQUIFER DATA

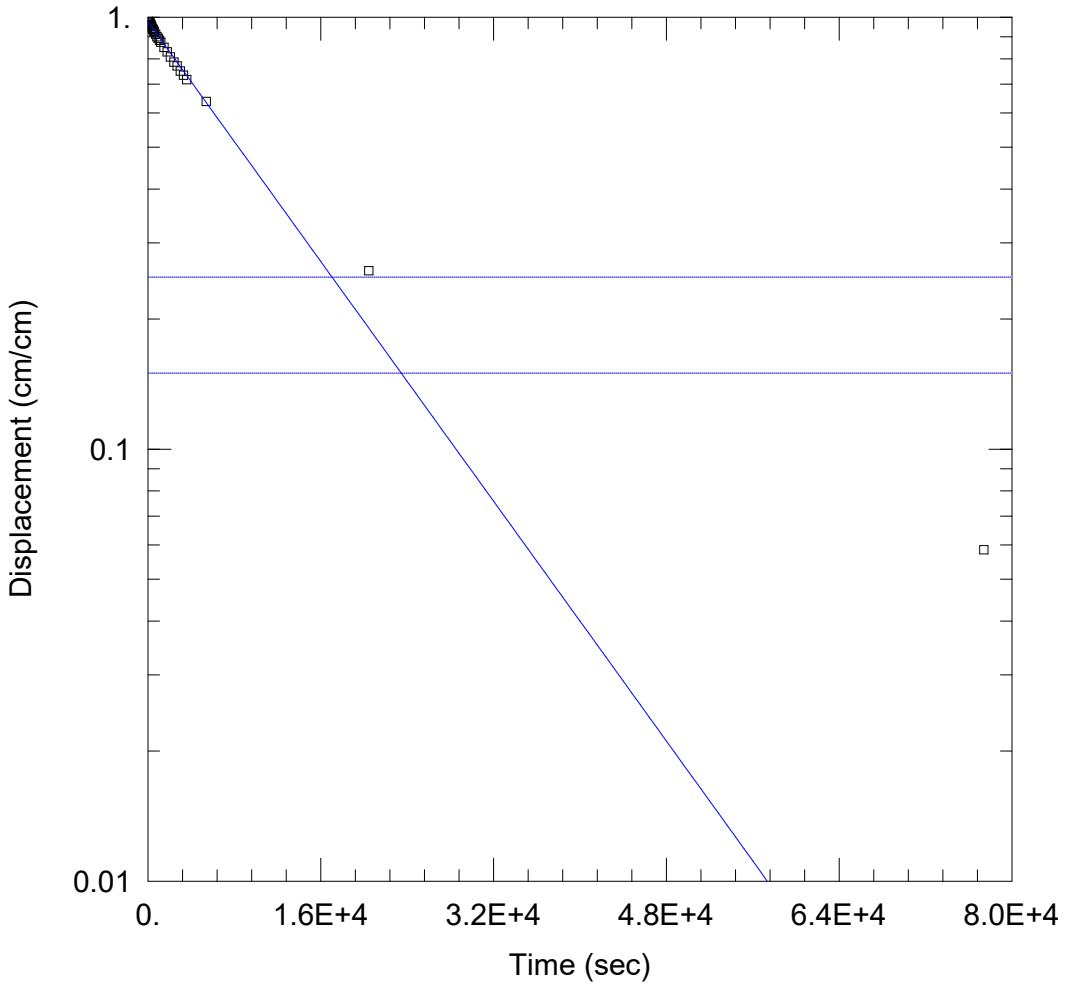
Saturated Thickness: 427. cm
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH6)

Initial Displacement: 244. cm
Total Well Penetration Depth: 427. cm
Casing Radius: 2.54 cm
Static Water Column Height: 427. cm
Screen Length: 304. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 9.362E-7 cm/sec
y0 = 139.7 cm



HYDRAULIC CONDUCTIVITY TEST AT BH2D - SCREENED IN SILTY CLAY

PROJECT INFORMATION

Company: R.J. Burnside & Associates
Client: Archerhill
Project: 300052893
Location: Aurora, ON
Test Well: BH2d
Test Date: June 2, 2021

AQUIFER DATA

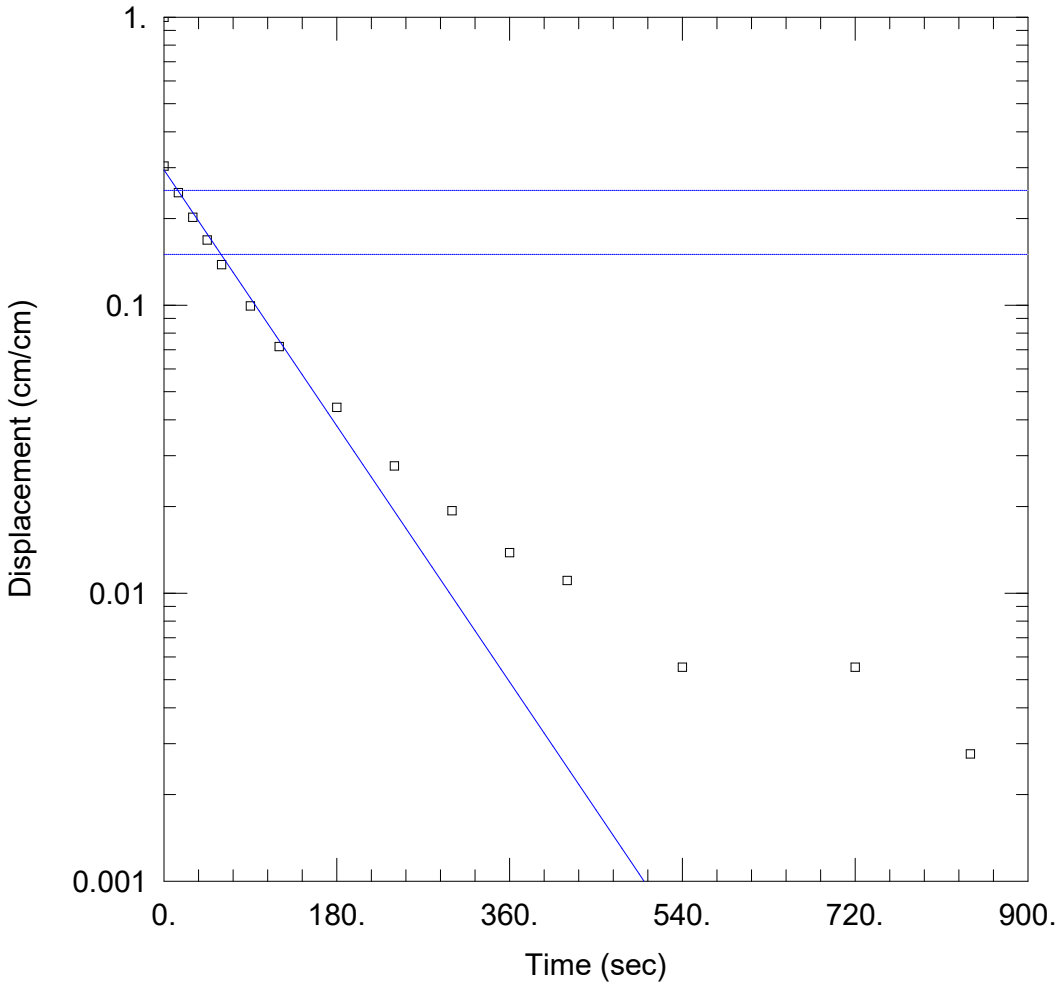
Saturated Thickness: 851. cm
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH2d)

Initial Displacement: 564. cm
Total Well Penetration Depth: 851. cm
Casing Radius: 2.54 cm
Static Water Column Height: 851. cm
Screen Length: 152. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 8.2E-6 cm/sec
y0 = 550.3 cm



HYDAULIC CONDUCTIVITY TEST AT MW1 - SCREENED IN SILTY CLAY

PROJECT INFORMATION

Company: R.J. Burnside & Associates
Client: Archerhill
Project: 300052893
Location: Aurora, ON
Test Well: MW1
Test Date: June 2, 2021

AQUIFER DATA

Saturated Thickness: 906. cm
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW1)

Initial Displacement: 362. cm
Total Well Penetration Depth: 759. cm
Casing Radius: 2.54 cm
Static Water Column Height: 907. cm
Screen Length: 152. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
K = 0.001 cm/sec
Solution Method: Hvorslev
y0 = 106.7 cm

BURNSIDE

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Appendix D

Groundwater Levels

Table D-1:
Groundwater Elevations

Monitoring Well/ Piezometer	Well Depth (mbgl)	Ground Elevation (masl)	20-Jan-21		15-Mar-21		15-Apr-21		12-May-21		02-Jun-21		16-Jul-21	
			Water Level Depth (mbgl)	Water Elevation (masl)	Water Level Depth (mbgl)	Water Elevation (masl)	Water Level Depth (mbgl)	Water Elevation (masl)	Water Level Depth (mbgl)	Water Elevation (masl)	Water Level Depth (mbgl)	Water Elevation (masl)	Water Level Depth (mbgl)	Water Elevation (masl)
MW1	6.01	271.98	-	-	-	-	-	-	2.07	269.91	2.53	269.45	2.50	269.48
BH2s	7.55	275.69	2.24	273.45	2.49	273.20	1.62	274.07	1.80	273.89	2.80	272.89	4.32	271.37
BH2d	11.94	275.61	-	-	-	-	-	-	2.65	272.96	3.24	272.37	4.37	271.24
BH5	7.19	277.96	0.67	277.29	0.44	277.52	0.56	277.40	0.88	277.08	1.91	276.05	5.25	272.71
BH6	7.54	276.34	3.55	272.79	1.59	274.75	3.17	273.17	3.39	272.95	3.79	272.55	5.35	270.99
BH101	16.93	277.99	-	-	-	-	-	-	-	-	-0.40	278.39	5.76	272.23
PZ1s	1.17	269.91	-	-	-	-	0.85	269.06	0.20	269.71	0.05	269.86	-0.07	269.98
PZ1d	1.76	269.91	-	-	-	-	1.15	268.76	-0.03	269.94	-0.02	269.93	-0.12	270.03
PZ2s	1.06	261.35	-	-	-	-	1.06	260.29	0.15	261.20	0.22	261.13	0.30	261.05
PZ2d	1.24	261.31	-	-	-	-	1.24	260.07	0.15	261.16	0.15	261.16	0.08	261.23

Notes:

mbgl - metres below ground level

masl - metres above sea level

"-" data unavailable

Underlined - elevations from Exp. borehole logs

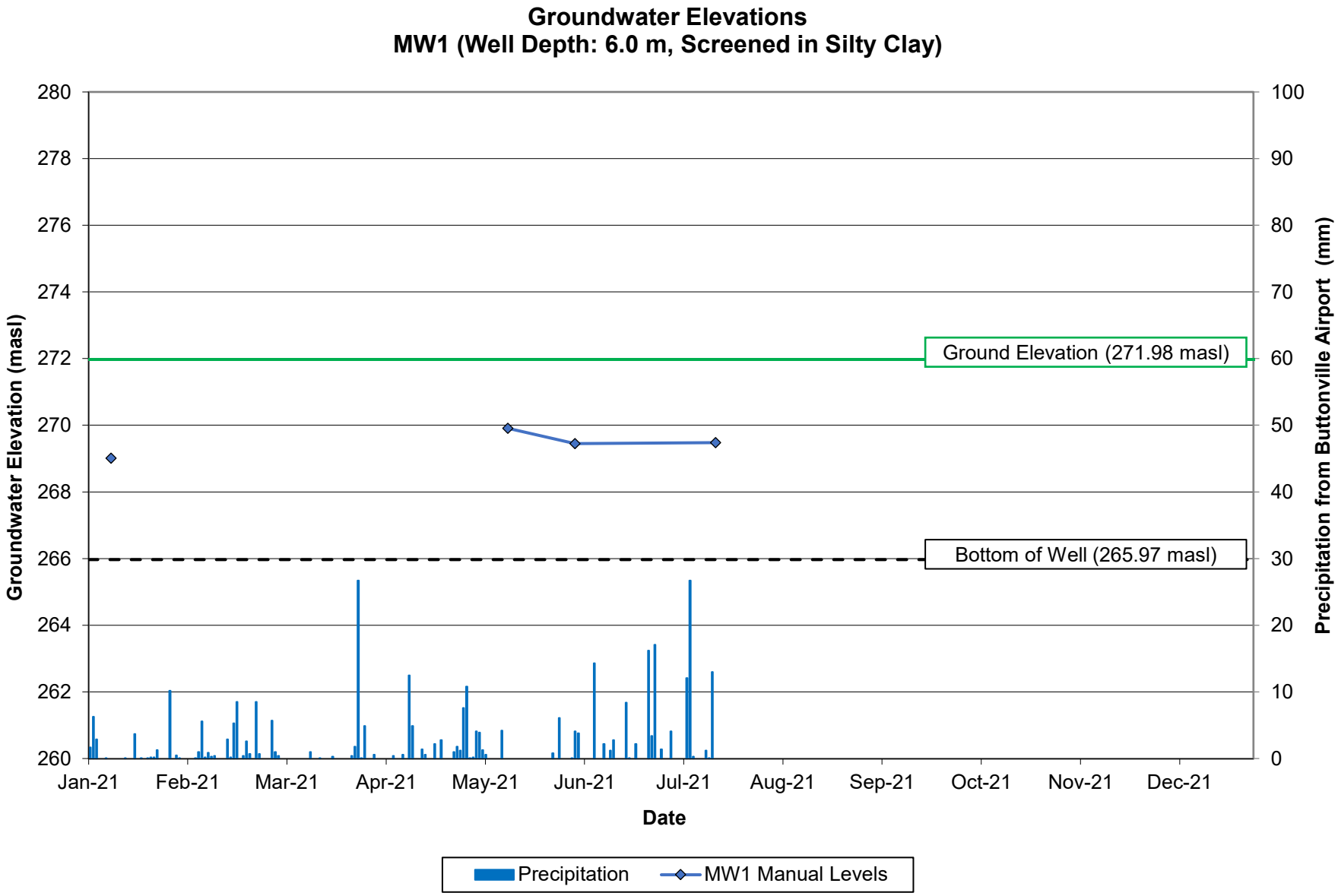

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Figure D-1

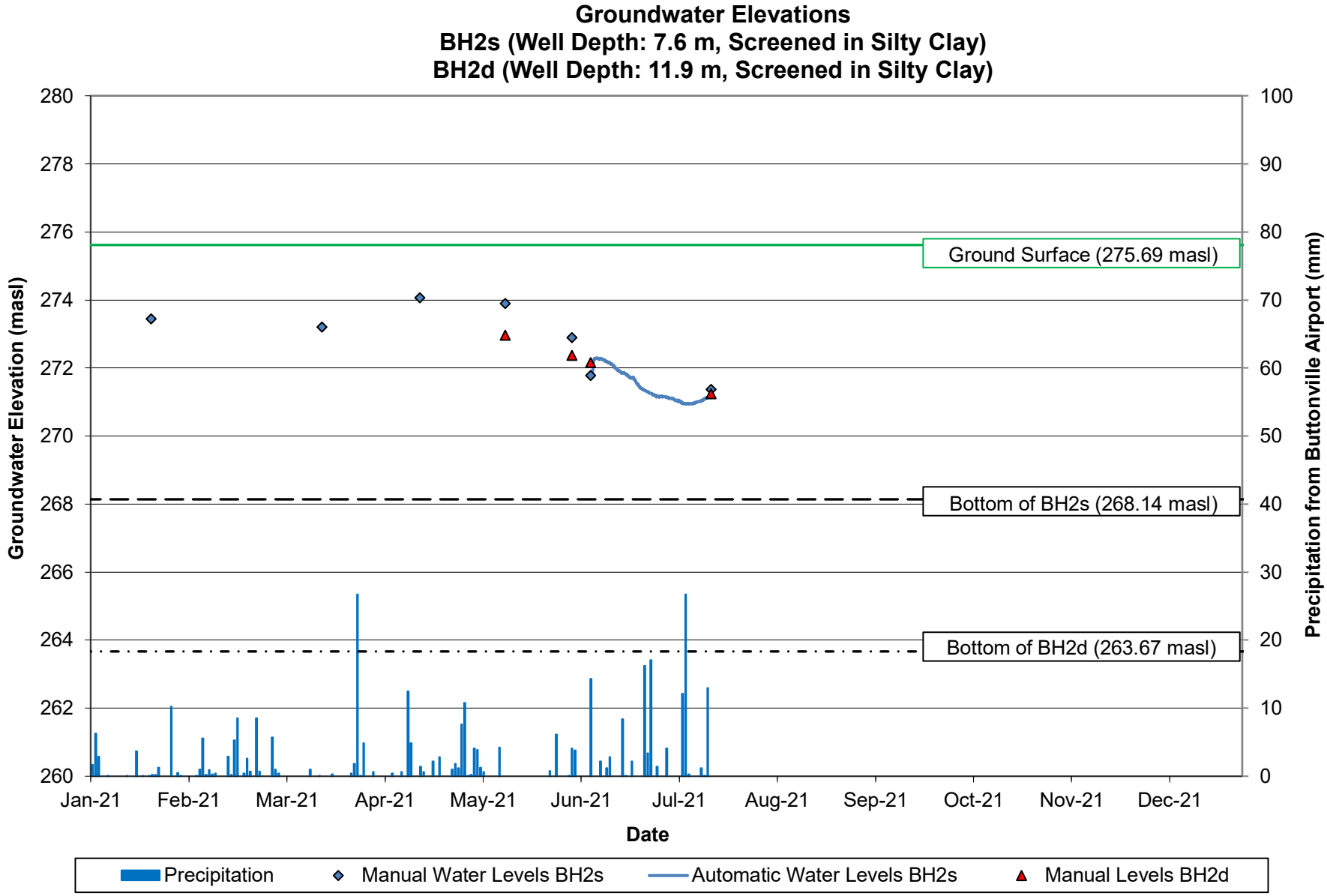

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Figure D-2

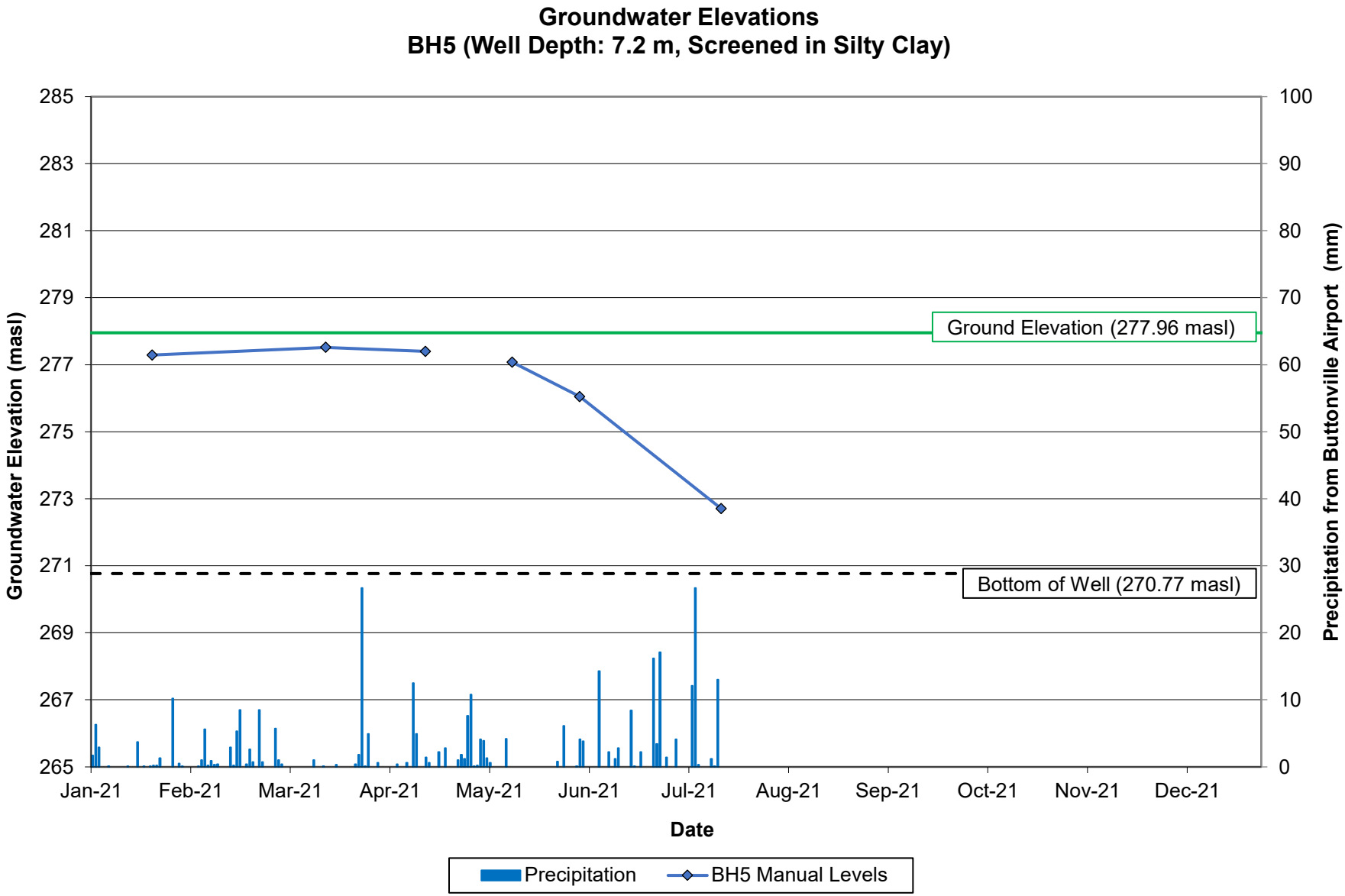

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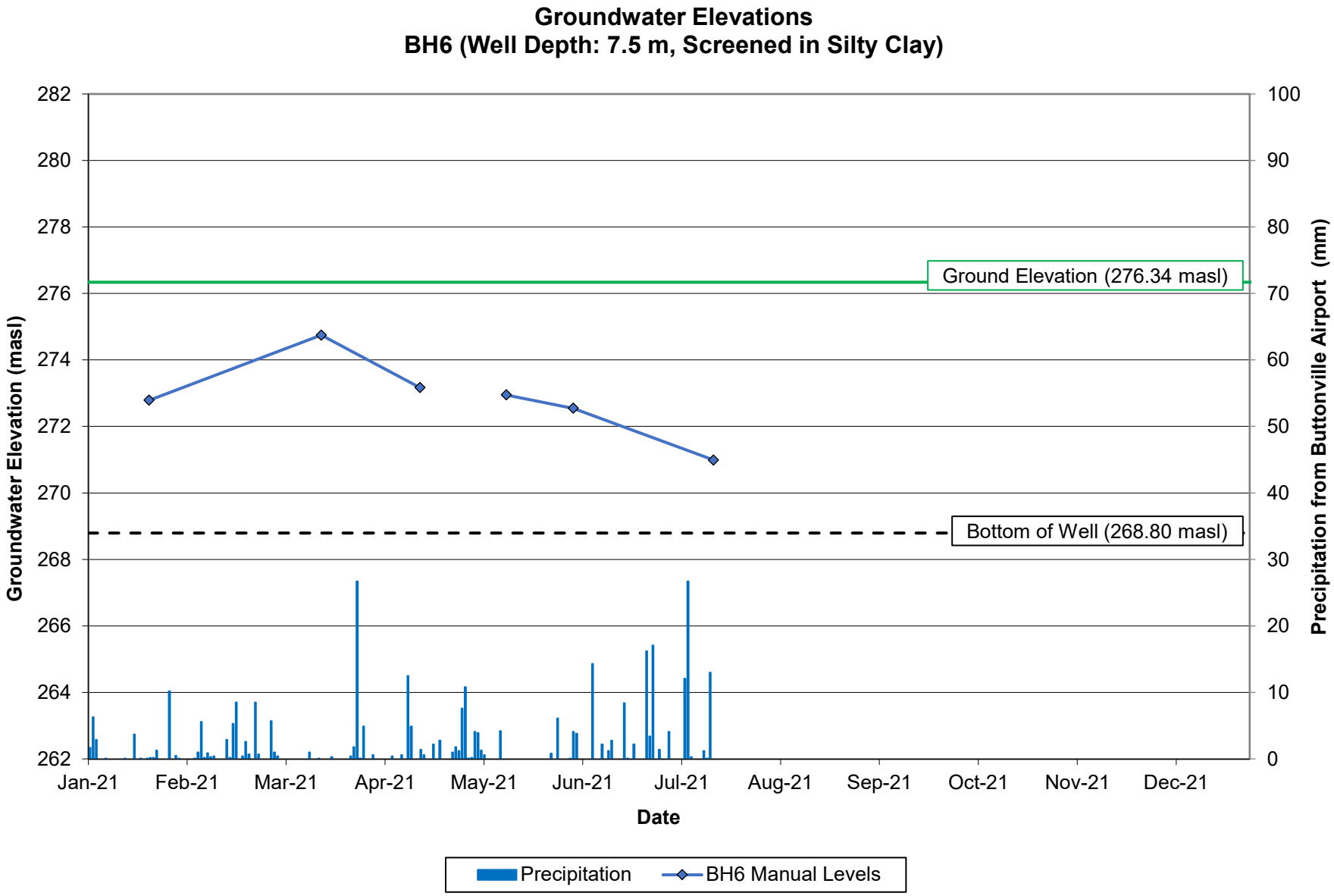
Figure D-3


Groundwater Elevations
BH6 (Well Depth: 7.5 m, Screened in Silty Clay)
Groundwater Elevation (masl)
Precipitation from Buttonville Airport (mm)
Ground Elevation (276.34 masl)
Bottom of Well (268.80 masl)
282
280
278
276
274
272
270
268
266
264
262
100
90
80
70
60
50
40
30
20
10
0
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
Precipitation
BH6 Manual Levels

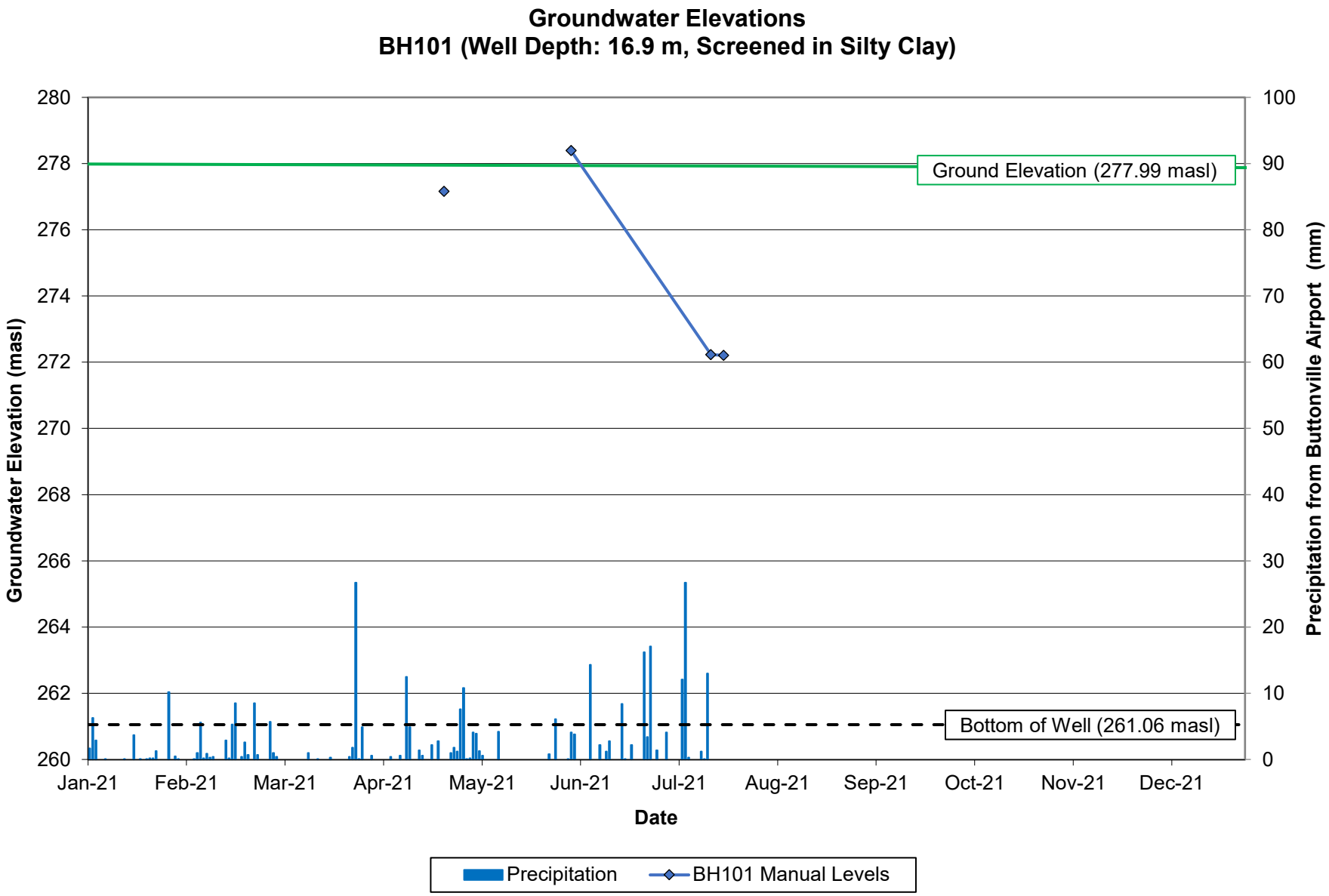


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Figure D-5

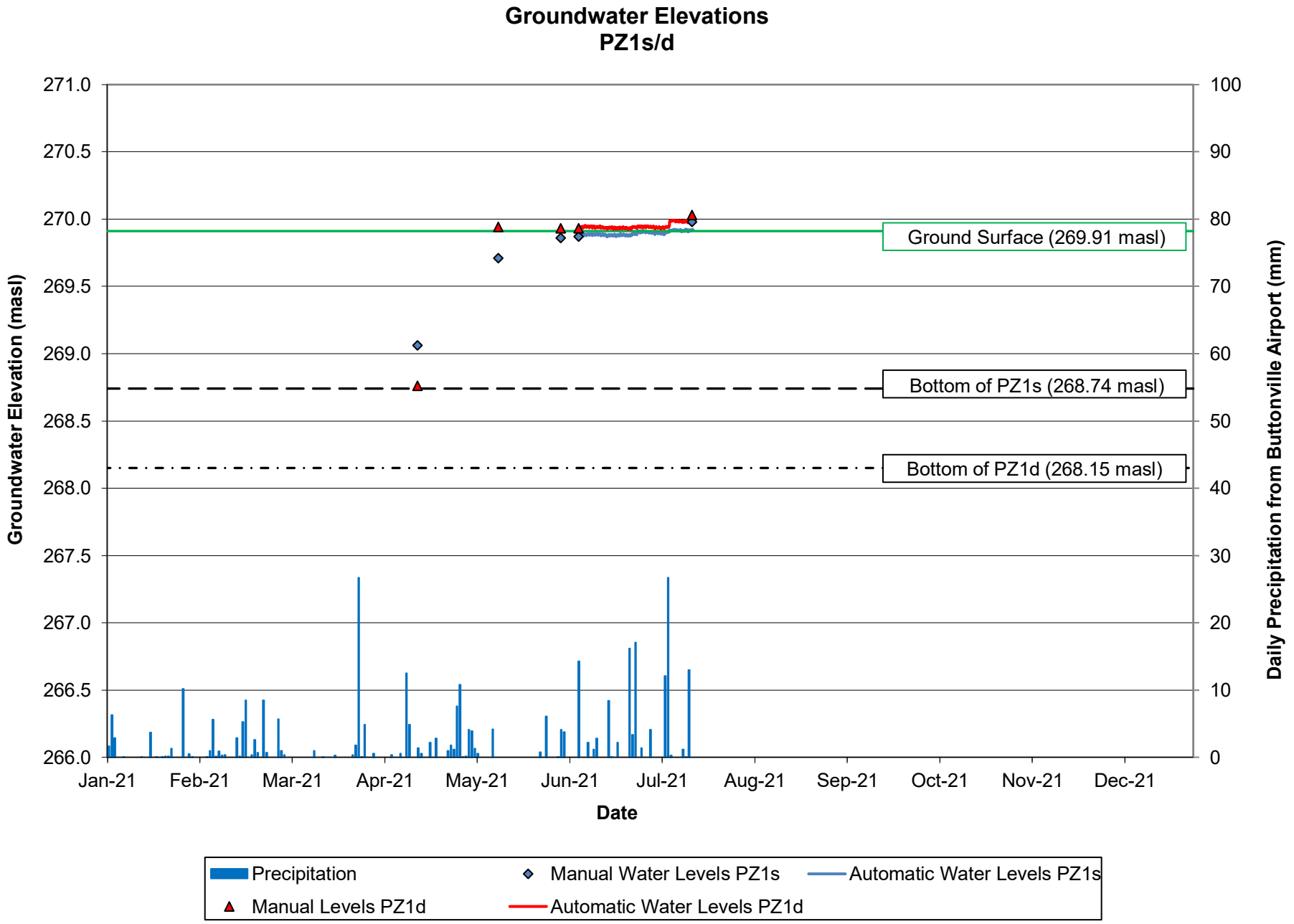

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Figure D-6

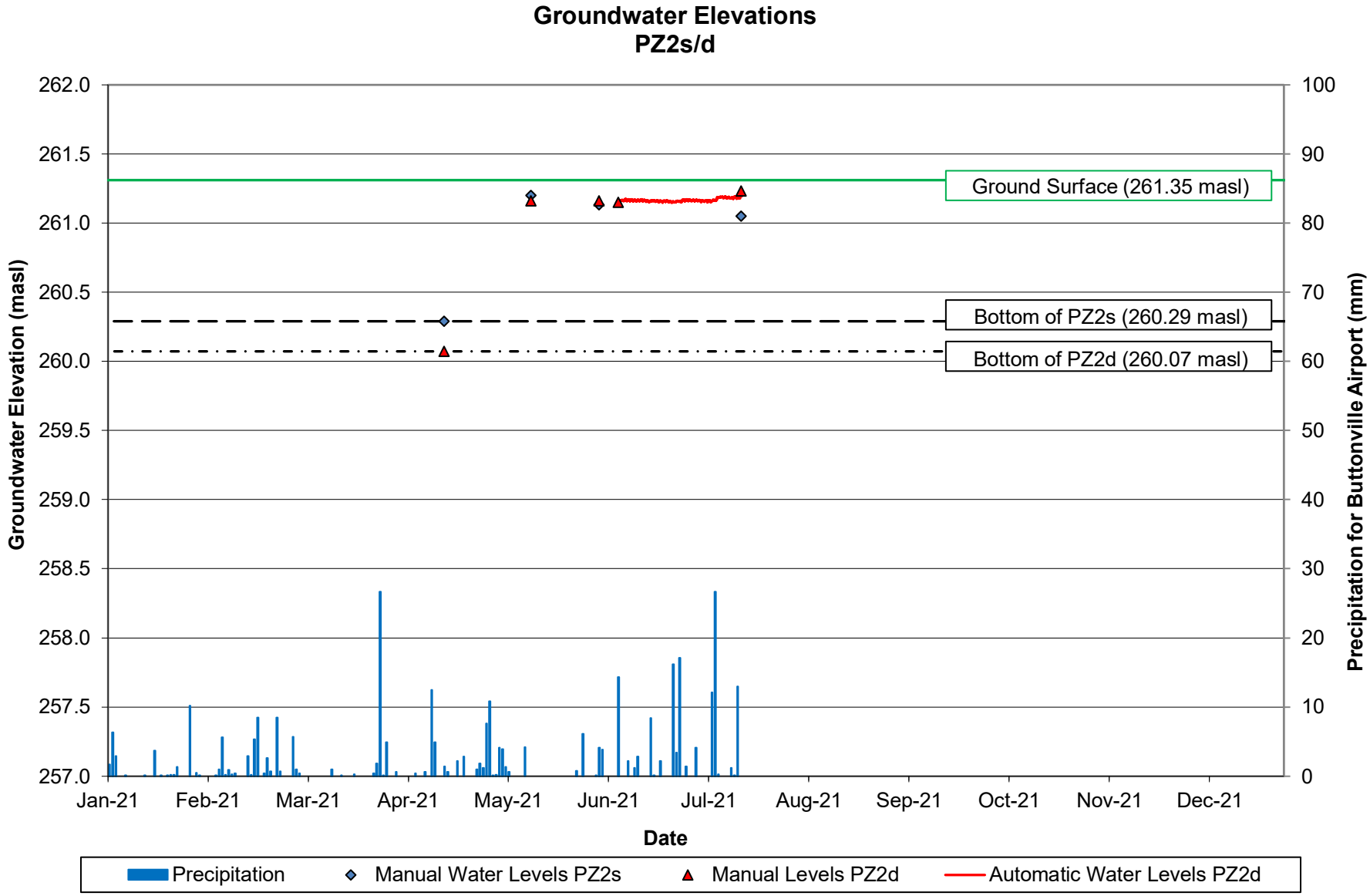

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Figure D-7

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[THE DIFFERENCE IS OUR PEOPLE]

Appendix G

Water Balance

WATER BALANCE CALCULATIONS
Highfair Investments Inc.
Archerhill Court
Aurora, Ontario
Project #: 300052893

TABLE G-1

Pre- and Post-Development Monthly Water Balance Components

Based on Thornthwaite's Soil Moisture Balance Approach with a Soil Moisture Retention of 125 mm (urban lawn in silt loam soils)

Climate data from King Smoke Tree Climate Station (1981 - 2010)

Potential Evapotranspiration Calculation	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Average Temperature (Degree C)	-7.4	-6.1	-1.5	6	12.5	17.7	20.5	19.6	15.3	8.6	2.2	-3.7	**7.0**
Heat index: $i = (t/5)^{1.514}$	0.00	0.00	0.00	1.32	4.00	6.78	8.47	7.91	5.44	2.27	0.29	0.00	**36.5**
Unadjusted Daily Potential Evapotranspiration U (mm)	0.00	0.00	0.00	27.29	59.98	87.11	101.97	97.18	74.50	40.15	9.30	0.00	**497**
Adjusting Factor for U (Latitude 44° 01' N)	0.81	0.82	1.02	1.13	1.27	1.29	1.3	1.2	1.04	0.95	0.8	0.76	
Adjusted Potential Evapotranspiration PET (mm)	0	0	0	31	76	112	133	117	77	38	7	0	**592**
COMPONENTS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Precipitation (P)	52	46	51	65	87	85	86	88	84	73	85	56	**858**
Potential Evapotranspiration (PET)	0	0	0	31	76	112	133	117	77	38	7	0	**592**
P - PET	52	46	51	34	11	-28	-46	-28	7	35	77	56	**266**
Change in Soil Moisture Storage	0	0	0	0	0	-28	-46	-28	7	35	60	0	**0**
Soil Moisture Storage max 125 mm	125	125	125	125	125	97	51	23	30	65	125	125	
Actual Evapotranspiration (AET)	0	0	0	31	76	112	133	117	77	38	7	0	**592**
Soil Moisture Deficit max 125 mm	0	0	0	0	0	28	74	102	95	60	0	0	
Water Surplus - available for infiltration or runoff	52	46	51	34	11	0	0	0	0	0	17	56	**266**
Potential Infiltration (based on MOE metholodogy*; independent of temperature)	21	18	20	14	4	0	0	0	0	0	7	22	**106**
Potential Direct Surface Water Runoff (independent of temperature)	31	28	31	20	7	0	0	0	0	0	10	33	**160**
IMPERVIOUS AREA WATER SURPLUS													
Precipitation (P)	858	mm/year											
Potential Evaporation (PE) from impervious areas (assume 15%)	129	mm/year											
P-PE (surplus available for runoff from impervious areas)	729	mm/year											

Assume January storage is 100% of Soil Moisture Storage

Soil Moisture Storage	125 mm	<-- See "Water Holding Capacity" values in Table 3.1, MOE SWMPDM, 2003

*MOE SWM infiltration calculations

topography - hilly land	0.1	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
soils - silt loam soils	0.2	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
cover - urban lawn	0.1	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
Infiltration factor	**0.4**	

Latitude of site (or climate station) 44 ° N.

WATER BALANCE CALCULATIONS
Highfair Investments Inc.
Archerhill Court
Aurora, Ontario
Project #: 300052893

TABLE G-2

Pre- and Post-Development Monthly Water Balance Components

Based on Thornthwaite's Soil Moisture Balance Approach with a Soil Moisture Retention of 400 mm (woodland in silt loam soils)

Climate data from King Smoke Tree Climate Station (1981 - 2010)

Potential Evapotranspiration Calculation	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Average Temperature (Degree C)	-7.4	-6.1	-1.5	6	12.5	17.7	20.5	19.6	15.3	8.6	2.2	-3.7	**7.0**
Heat index: $i = (t/5)^{1.514}$	0.00	0.00	0.00	1.32	4.00	6.78	8.47	7.91	5.44	2.27	0.29	0.00	**36.5**
Unadjusted Daily Potential Evapotranspiration U (mm)	0.00	0.00	0.00	27.29	59.98	87.11	101.97	97.18	74.50	40.15	9.30	0.00	**497**
Adjusting Factor for U (Latitude 44° 01' N)	0.81	0.82	1.02	1.13	1.27	1.29	1.3	1.2	1.04	0.95	0.8	0.76	
Adjusted Potential Evapotranspiration PET (mm)	0	0	0	31	76	112	133	117	77	38	7	0	**592**
COMPONENTS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Precipitation (P)	52	46	51	65	87	85	86	88	84	73	85	56	**858**
Potential Evapotranspiration (PET)	0	0	0	31	76	112	133	117	77	38	7	0	**592**
P - PET	52	46	51	34	11	-28	-46	-28	7	35	77	56	**266**
Change in Soil Moisture Storage	0	0	0	0	0	-28	-46	-28	7	35	60	0	**0**
Soil Moisture Storage max 400 mm	400	400	400	400	400	372	326	298	305	340	400	400	
Actual Evapotranspiration (AET)	0	0	0	31	76	112	133	117	77	38	7	0	**592**
Soil Moisture Deficit max 400 mm	0	0	0	0	0	28	74	102	95	60	0	0	
Water Surplus - available for infiltration or runoff	52	46	51	34	11	0	0	0	0	0	17	56	**266**
Potential Infiltration (based on MOE metholodogy*; independent of temperature)	26	23	26	17	5	0	0	0	0	0	8	28	**133**
Potential Direct Surface Water Runoff (independent of temperature)	26	23	26	17	5	0	0	0	0	0	8	28	**133**
IMPERVIOUS AREA WATER SURPLUS													
Precipitation (P)	858	mm/year											
Potential Evaporation (PE) from impervious areas (assume 15%)	129	mm/year											
P-PE (surplus available for runoff from impervious areas)	729	mm/year											

Assume January storage is 100% of Soil Moisture Storage
Soil Moisture Storage 400 mm <-- See "Water Holding Capacity" values in Table 3.1, MOE SWMPDM, 2003

*MOE SWM infiltration calculations

topography - hilly land	0.1	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
soils - silt loam soils	0.2	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
cover - woodland	0.2	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
Infiltration factor	**0.5**	

Latitude of site (or climate station) 44 ° N.

WATER BALANCE CALCULATIONS
Highfair Investments Inc.
Archerhill Court
Aurora, Ontario
Project #: 300052893

TABLE G-3

Water Balance - Existing Conditions and Post-Development (with no SWM/LID measures in place)
West Tributary (Catchment 101)

	Approx. Land Area* (m^2)	Estimated Impervious Fraction for Land Use*	Estimated Impervious Area (m^2)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Infiltration Volume (m^3/a)
Existing Land Use											
Residential	7,690	0.04	300	0.729	219	7,390	0.160	1,180	0.106	787	787
NHS	16,100	0.00	0	0.729	0	16,100	0.133	2,142	0.133	2,142	2,142
TOTAL PRE-DEVELOPMENT	**23,790**		**300**		**219**	**23,490**		**3,322**		**2,928**	**2,928**
Post-Development Land Use											
Residential	11,590	0.48	5,600	0.729	4,083	5,990	0.160	956	0.106	638	638
NHS	12,200	0.00	0	0.729	0	12,200	0.133	1,623	0.133	1,623	1,623
TOTAL POST-DEVELOPMENT	**23,790**		**5,600**		**4,083**	**18,190**		**2,579**		**2,261**	**2,261**
									% Change from Pre to Post		23
									Effect of development (with no mitigation)		23% reduction in infiltration

* data provided by SCS Consulting

** figures from Tables G-1 and G-2

To balance pre- to post-,
the infiltration target (m^3/a)= **668** **m^3/a**

WATER BALANCE CALCULATIONS
Highfair Investments Inc.
Archerhill Court
Aurora, Ontario
Project #: 300052893

TABLE G-4

Water Balance - Existing Conditions and Post-Development (with no SWM/LID measures in place)
North Tributary (Catchment 102)

	Approx. Land Area* (m^2)	Estimated Impervious Fraction for Land Use*	Estimated Impervious Area (m^2)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Infiltration Volume (m^3/a)
Existing Land Use											
Residential	76,300	0.20	15,630	0.729	11,395	60,670	0.160	9,686	0.106	6,457	6,457
NHS	5,300	0.00	0	0.729	0	5,300	0.133	705	0.133	705	705
TOTAL PRE-DEVELOPMENT	**81,600**		**15,630**		**11,395**	**65,970**		**10,391**		**7,162**	**7,162**
Post-Development Land Use											
Residential	72,950	0.68	49,710	0.729	36,241	23,240	0.160	3,710	0.106	2,473	2,473
NHS	8,650	0.00	0	0.729	0	8,650	0.133	1,151	0.133	1,151	1,151
TOTAL POST-DEVELOPMENT	**81,600**		**49,710**		**36,241**	**31,890**		**4,861**		**3,624**	**3,624**
									% Change from Pre to Post		49
									Effect of development (with no mitigation)		49% reduction in infiltration

* data provided by SCS Consulting

** figures from Tables G-1 and G-2

To balance pre- to post-,
the infiltration target (m^3/a)= **3,538** **m^3/a**

WATER BALANCE CALCULATIONS
Highfair Investments Inc.
Archerhill Court
Aurora, Ontario
Project #: 300052893

TABLE G-5

Water Balance - Existing Conditions and Post-Development (with no SWM/LID measures in place)
North East Wetland (Catchment 103)

	Approx. Land Area* (m^2)	Estimated Impervious Fraction for Land Use*	Estimated Impervious Area (m^2)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Infiltration Volume (m^3/a)
Existing Land Use											
Residential	6,000	0.00	0	0.729	0	6,000	0.160	958	0.106	639	639
NHS	11,500	0.00	0	0.729	0	11,500	0.133	1,530	0.133	1,530	1,530
TOTAL PRE-DEVELOPMENT	**17,500**		**0**		**0**	**17,500**		**2,488**		**2,169**	**2,169**
Post-Development Land Use											
Residential	6,100	0.03	200	0.729	146	5,900	0.160	942	0.106	628	628
NHS	11,400	0.00	0	0.729	0	11,400	0.133	1,517	0.133	1,517	1,517
TOTAL POST-DEVELOPMENT	**17,500**		**200**		**146**	**17,300**		**2,459**		**2,145**	**2,145**
										% Change from Pre to Post	1.1
										Effect of development (with no mitigation)	1% reduction in infiltration

* data provided by SCS Consulting

** figures from Tables G-1 and G-2

To balance pre- to post-,
the infiltration target (m^3/a)= **24** **m^3/a**

WATER BALANCE CALCULATIONS
Highfair Investments Inc.
Archerhill Court
Aurora, Ontario
Project #: 300052893

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TABLE G-6

Water Balance - Existing Conditions and Post-Development with Mitigation
West Tributary (Surface Water Catchments 101 and 202)

	Approx. Land Area* (m^2)	Estimated Impervious Fraction for Land Use*	Estimated Impervious Area (m^2)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Runoff Volume (m^3/a)
Existing Land Use - Catchment 101											
Residential	7,690	0.04	300	0.729	219	7,390	0.160	1,180	0.106	787	1,399
NHS	16,100	0.00	0	0.729	0	16,100	0.133	2,142	0.133	2,142	2,142
TOTAL PRE-DEVELOPMENT	**23,790**		**300**		**219**	**23,490**		**3,322**		**2,928**	**3,540**
Post-Development Land Use - Catchment 202											
Residential	5,100	0.36	1,830	0.729	1,334	3,270	0.160	522	0.106	348	1,856
NHS	12,200	0.00	0	0.729	0	12,200	0.133	1,623	0.133	1,623	1,623
TOTAL POST-DEVELOPMENT	**17,300**		**1,830**		**1,334**	**15,470**		**2,145**		**1,971**	**3,479**
									% Change from Pre to Post		2
									Effect of development (with no mitigation)		2% reduction in runoff

* data provided by SCS Consulting

** figures from Tables G-1 and G-2

Change in runoff (m^3/a)= **-61**

WATER BALANCE CALCULATIONS
Highfair Investments Inc.
Archerhill Court
Aurora, Ontario
Project #: 300052893

TABLE G-7

Water Balance - Existing Conditions and Post-Development (with no SWM/LID measures in place)
North Tributary (Surface Water Catchments 102 and 203)

	Approx. Land Area* (m^2)	Estimated Impervious Fraction for Land Use**	Estimated Impervious Area (m^2)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Runoff Volume (m^3/a)
Existing Land Use - Catchment 102											
Residential	76,300	0.20	15,630	0.729	11,395	60,670	0.160	9,686	0.106	6,457	21,081
NHS	31,800	0.00	0	0.729	0	31,800	0.133	4,231	0.133	4,231	4,231
Residential - North Development	5,400	0.41	2,220	0.729	1,618	3,180	0.160	508	0.106	338	2,126
TOTAL PRE-DEVELOPMENT	**113,500**		**17,850**		**13,013**	**95,650**		**14,424**		**11,026**	**27,438**
Post-Development Land Use - Catchment 203											
Residential	86,050	0.65	55,540	0.729	40,491	30,510	0.160	4,871	0.106	3,247	45,362
NHS	35,050	0.00	0	0.729	0	35,050	0.133	4,663	0.133	4,663	4,663
Residential - North Development	5,400	0.41	2,220	0.729	1,618	3,180	0.160	508	0.106	338	2,126
TOTAL POST-DEVELOPMENT	**126,500**		**57,760**		**42,110**	**68,740**		**10,042**		**8,249**	**52,151**
									% Change from Pre to Post		190
									Effect of development (with no mitigation)		1.9 times increase in runoff

* data provided by SCS Consulting

** figures from Tables G-1 and G-2

Change in runoff (m^3/a)= **24,714**

WATER BALANCE CALCULATIONS
Highfair Investments Inc.
Archerhill Court
Aurora, Ontario
Project #: 300052893

TABLE G-8

Water Balance - Existing Conditions and Post-Development (with no SWM/LID measures in place)
North East Wetland (Surface Water Catchments 103)

	Approx. Land Area* (m^2)	Estimated Impervious Fraction for Land Use*	Estimated Impervious Area (m^2)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Runoff Volume (m^3/a)
Existing Land Use - Pre-Catchment 103											
Residential	6,000	0.00	0	0.729	0	6,000	0.160	958	0.106	639	958
NHS	21,130	0.00	0	0.729	0	21,130	0.133	2,811	0.133	2,811	2,811
Residential - North Development	2,100	0.30	620	0.729	452	1,480	0.160	236	0.106	158	688
Bayview Road	3,470	1.00	3,470	0.729	2,530	0	0.160	0	0.106	0	2,530
TOTAL PRE-DEVELOPMENT	**32,700**		**4,090**		**2,982**	**28,610**		**4,005**		**3,607**	**6,987**
Post-Development Land Use - Post-Catchment 103											
Residential	0	0.00	0	0.729	0	0	0.160	0	0.106	0	0
NHS	20,530	0.00	0	0.729	0	20,530	0.133	2,731	0.133	2,731	2,731
Bayview Road	3,470	1.00	3,470	0.729	2,530	0	0.160	0	0.106	0	2,530
Residential - North Development	2,100	0.30	620	0.729	452	1,480	0.160	236	0.106	158	688
TOTAL POST-DEVELOPMENT	**26,100**		**4,090**		**2,982**	**22,010**		**2,968**		**2,889**	**5,949**
									% Change from Pre to Post		15
									Effect of development (with no mitigation)		15% reduction in runoff

* data provided by SCS Consulting

** figures from Tables G-1 and G-2

Change in runoff (m^3/a)= **-1,038**

WATER BALANCE CALCULATIONS
Highfair Investments Inc.
Archerhill Court
Aurora, Ontario
Project #: 300052893

BURNSIDE

TABLE G-9

Water Balance - Existing Conditions and Post-Development with Mitigation
West Tributary (Catchment 101)

		Approx. Land Area* (m^2)	Estimated Impervious Fraction for Land Use*	Estimated Impervious Area (m^2)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Infiltration Volume (m^3/a)
Existing Land Use												
Residential		7,690	0.04	300	0.729	219	7,390	0.160	1,180	0.106	787	787
NHS		16,100	0.00	0	0.729	0	16,100	0.133	2,142	0.133	2,142	2,142
TOTAL PRE-DEVELOPMENT		**23,790**		**300**		**219**	**23,490**		**3,322**		**2,928**	**2,928**
Post-Development Land Use												
Residential	Directly Connected Impervious	2,000	1.00	2,000	0.729	1,458	0	0.160	0	0.106	0	0
	Roofs (directed to pervious areas) - silt and clay/till soils (assume 25% of runoff volume infiltrates[a]; excess runoff to storm)	550	1.00	550	0.729	401	0	0.160	0	0.106	0	100
	Impervious to Bioswale	500	1.00	500	0.729	365	0	0.160	0	0.106	0	0
	Pervious to Bioswale	180	0.00	0	0.729	0	180	0.160	29	0.106	19	19
	Bioswale - assume designed to accommodate 17.2 mm storm; 17.2 mm storms account for approximately 85% of total rainfall[b] (73% of total precipitation); so assume 73% of runoff total from areas directed to bioswale will infiltrate)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	287	287
	Impervious to Rear Yard Infiltration Trench	2,400	1.00	2,400	0.729	1,750	0	0.160	0	0.106	0	0
	Pervious to Rear Yard Infiltration Trench	4,100	0.00	0	0.729	0	4,100	0.160	655	0.106	436	436
	Rear Yard Infiltration Trench - assume designed to accommodate 25 mm storm ; 25 mm storms account for approximately 95% of total rainfall[b] (81% of total precipitation); so assume 81% of runoff total from areas directed to infiltration trench will infiltrate)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,947	1,947
	Remaining Pervious	1,860	0.00	0	0.729	0	1,860	0.160	297	0.106	198	198
NHS		12,200	0.00	0	0.729	0	12,200	0.133	1,623	0.133	1,623	1,623
TOTAL POST-DEVELOPMENT		**23,790**		**5,450**		**3,973**	**18,340**		**2,603**		**4,511**	**4,611**
											% Change from Pre to Post	-57
											Effect of development (with no mitigation)	57% increase in infiltration

* data provided by SCS Consulting

** figures from Tables G-1 and G-2

[a] based on estimation in the LID SWM Planning and Design Guide (CVC & TRCA, 2010) for hydrologic groups C & D

[b] based on the Toronto Wet Weather Flow Management Guidelines (City of Toronto, 2006)

Increase in infiltration with LIDs (m^3/a)= **1,683**

WATER BALANCE CALCULATIONS
Highfair Investments Inc.
Archerhill Court
Aurora, Ontario
Project #: 300052893

BURNSIDE

TABLE G-10

Water Balance - Existing Conditions and Post-Development with Mitigation
North Tributary (Catchments 102)

		Approx. Land Area* (m^2)	Estimated Impervious Fraction for Land Use*	Estimated Impervious Area (m^2)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Infiltration Volume (m^3/a)
Existing Land Use												
Residential		76,300	0.20	15,630	0.729	11,395	60,670	0.160	9,686	0.106	6,457	6,457
NHS		5,300	0.00	0	0.729	0	5,300	0.133	705	0.133	705	705
TOTAL PRE-DEVELOPMENT		**81,600**		**15,630**		**11,395**	**65,970**		**10,391**		**7,162**	**7,162**
Post-Development Land Use												
Residential	Directly Connected Impervious	19,090	1.00	19,090	0.729	13,917	0	0.160	0	0.106	0	0
	Roofs (directed to pervious areas) - silt and clay/till soils (assume 25% of runoff volume infiltrates[a]; excess runoff to storm)	20,570	1.00	20,570	0.729	14,996	0	0.160	0	0.106	0	3,749
	Impervious to Bioswale	2,500	1.00	2,500	0.729	1,823	0	0.160	0	0.106	0	0
	Pervious to Bioswale	2,900	0.00	0	0.729	0	2,900	0.160	463	0.106	309	309
	Bioswale - assume designed to accommodate 17.2 mm storm; 17.2 mm storms account for approximately 85% of total rainfall[b] (73% of total precipitation); so assume 73% of runoff total from areas directed to bioswale will infiltrate)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,668	1,668
	Impervious to Rear Yard Infiltration Trench	7,980	1.00	7,980	0.729	5,818	0	0.160	0	0.106	0	0
	Pervious to Rear Yard Infiltration Trench	4,480	0.00	0	0.729	0	4,480	0.160	715	0.106	477	477
	Rear Yard Infiltration Trench - assume designed to accommodate 25 mm storm ; 25 mm storms account for approximately 95% of total rainfall[b] (81% of total precipitation); so assume 81% of runoff total from areas directed to infiltration trench will infiltrate)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5,292	5,292
	Remaining Pervious	15,430	0.00	0	0.729	0	15,430	0.160	2,463	0.106	1,642	1,642
NHS		8,650	0.00	0	0.729	0	8,650	0.133	1,151	0.133	1,151	1,151
TOTAL POST-DEVELOPMENT		**81,600**		**50,140**		**36,554**	**31,460**		**4,792**		**10,539**	**14,288**
											% Change from Pre to Post	-99
											Effect of development (with no mitigation)	99% increase in infiltration

* data provided by SCS Consulting

** figures from Tables G-1 and G-2

[a] based on estimation in the LID SWM Planning and Design Guide (CVC & TRCA, 2010) for hydrologic groups C & D

[b] based on the Toronto Wet Weather Flow Management Guidelines (City of Toronto, 2006)

Increase in infiltration with LIDs (m^3/a)= **7,126**

WATER BALANCE CALCULATIONS
Highfair Investments Inc.
Archerhill Court
Aurora, Ontario
Project #: 300052893

BURNSIDE

TABLE G-11

Water Balance - Existing Conditions and Post-Development with Mitigation
North East Wetland (Catchment 103)

		Approx. Land Area* (m^2)	Estimated Impervious Fraction for Land Use*	Estimated Impervious Area (m^2)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Infiltration Volume (m^3/a)
Existing Land Use												
Residential		6,000	0.00	0	0.729	0	6,000	0.160	958	0.106	639	639
NHS		11,500	0.00	0	0.729	0	11,500	0.133	1,530	0.133	1,530	1,530
TOTAL PRE-DEVELOPMENT		**17,500**		**0**		**0**	**17,500**		**2,488**		**2,169**	**2,169**
Post-Development Land Use												
Residential	Directly Connected Impervious	190	1.00	190	0.729	139	0	0.160	0	0.106	0	0
	Roofs (directed to pervious areas) - silt and clay/till soils (assume 25% of runoff volume infiltrates[a]; excess runoff to storm)	0	1.00	0	0.729	0	0	0.160	0	0.106	0	0
	Impervious to Bioswale	0	1.00	0	0.729	0	0	0.160	0	0.106	0	0
	Pervious to Bioswale	0	0.00	0	0.729	0	0	0.160	0	0.106	0	0
	Bioswale - assume designed to accommodate 17.2 mm storm; 17.2 mm storms account for approximately 85% of total rainfall[b] (73% of total precipitation); so assume 73% of runoff total from areas directed to bioswale will infiltrate)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0
	Impervious to Rear Yard Infiltration Trench	10	1.00	10	0.729	7	0	0.160	0	0.106	0	0
	Pervious to Rear Yard Infiltration Trench	3,000	0.00	0	0.729	0	3,000	0.160	479	0.106	319	319
	Rear Yard Infiltration Trench - assume designed to accommodate 25 mm storm ; 25 mm storms account for approximately 95% of total rainfall[b] (81% of total precipitation); so assume 81% of runoff total from areas directed to infiltration trench will infiltrate)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	394	394
	Remaining Pervious	2,900	0.00	0	0.729	0	2,900	0.160	463	0.106	309	309
NHS		11,400	0.00	0	0.729	0	11,400	0.133	1,517	0.133	1,517	1,517
TOTAL POST-DEVELOPMENT		**17,500**		**200**		**146**	**17,300**		**2,459**		**2,538**	**2,538**
										% Change from Pre to Post		-17
										Effect of development (with no mitigation)		17% increase in infiltration

* data provided by SCS Consulting

** figures from Tables G-1 and G-2

[a] based on estimation in the LID SWM Planning and Design Guide (CVC & TRCA, 2010) for hydrologic groups C & D

[b] based on the Toronto Wet Weather Flow Management Guidelines (City of Toronto, 2006)

Increase in infiltration with LIDs (m^3/a)= **370**

WATER BALANCE CALCULATIONS
Highfair Investments Inc.
Archerhill Court
Aurora, Ontario
Project #: 300052893

TABLE G-12

Water Balance - Existing Conditions and Post-Development with Mitigation
West Tributary (Surface Water Catchments 101 and 202)

		Approx. Land Area* (m^2)	Estimated Impervious Fraction for Land Use*	Estimated Impervious Area (m^2)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Runoff Volume (m^3/a)
Existing Land Use - Catchment 101												
Residential		7,690	0.04	300	0.729	219	7,390	0.160	1,180	0.106	787	1,399
NHS		16,100	0.00	0	0.729	0	16,100	0.133	2,142	0.133	2,142	2,142
TOTAL PRE-DEVELOPMENT		**23,790**		**300**		**219**	**23,490**		**3,322**		**2,928**	**3,540**
Post-Development Land Use - Catchment 202												
Residential	Impervious to Rear Yard Infiltration Trench	1,830	1.00	1,830	0.729	1,334	0	0.160	0	0.106	0	253
	Pervious to Rear Yard Infiltration Trench	2,140	0.00	0	0.729	0	2,140	0.160	342	0.106	228	65
	Remaining Pervious	0	0.00	0	0.729	0	0	0.160	0	0.106	0	0
	Rear Yard Infiltration Trench - assume designed to accommodate 25 mm storm; 25 mm storms account for approximately 95% of total rainfall[a] (81% of total precipitation); so assume 81% of runoff total from areas directed to infiltration trench will infiltrate)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,065	N/A
NHS		12,200	0.00	0	0.729	0	12,200	0.133	1,623	0.133	1,623	1,623
TOTAL POST-DEVELOPMENT		**16,170**		**1,830**		**1,334**	**14,340**		**1,965**		**2,915**	**1,941**
											% Change from Pre to Post	45
											Effect of development (with no mitigation)	45% reduction in runoff

* data provided by SCS Consulting

** figures from Tables G-1 and G-2

[a] based on the Toronto Wet Weather Flow Management Guidelines (City of Toronto, 2006)

Change in runoff (m^3/a)= **-1,599**

WATER BALANCE CALCULATIONS
Highfair Investments Inc.
Archerhill Court
Aurora, Ontario
Project #: 300052893

BURNSIDE

TABLE G-13

Water Balance - Existing Conditions and Post-Development with Mitigation
North Tributary (Surface Water Catchments 102 and 203)

		Approx. Land Area* (m^2)	Estimated Impervious Fraction for Land Use*	Estimated Impervious Area (m^2)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Runoff Volume (m^3/a)
Existing Land Use - Catchment 102												
Residential		76,300	0.20	15,630	0.729	11,395	60,670	0.160	9,686	0.106	6,457	21,081
NHS		31,800	0.00	0	0.729	0	31,800	0.133	4,231	0.133	4,231	4,231
Residential - North Development		5,400	0.41	2,220	0.729	1,618	3,180	0.160	508	0.106	338	2,126
TOTAL PRE-DEVELOPMENT		**113,500**		**17,850**		**13,013**	**95,650**		**14,424**		**11,026**	**27,438**
Post-Development Land Use - Catchment 203												
Residential	Directly Connected Impervious	21,280	1.00	21,280	0.729	15,514	0	0.160	0	0.106	0	15,514
	Roofs (directed to pervious areas) - silt and clay/till soils (assume 25% of runoff volume infiltrates[a]; excess runoff to storm)	21,120	1.00	21,120	0.729	15,397	0	0.160	0	0.106	0	11,548
	Impervious to Bioswale	4,560	1.00	4,560	0.729	3,324	0	0.160	0	0.106	0	898
	Pervious to Bioswale	1,520	0.00	0	0.729	0	1,520	0.160	243	0.106	162	66
	Bioswale - assume designed to accommodate 17.2 mm storm; 17.2 mm storms account for approximately 85% of total rainfall[b] (73% of total precipitation); so assume 73% of runoff total from areas directed to bioswale will infiltrate)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2,604	N/A
	Impervious to Rear Yard Infiltration Trench	8,560	1.00	8,560	0.729	6,241	0	0.160	0	0.106	0	1,186
	Pervious to Rear Yard Infiltration Trench	10,050	0.00	0	0.729	0	10,050	0.160	1,604	0.106	1,070	305
	Rear Yard Infiltration Trench - assume designed to accommodate 25 mm storm ; 25 mm storms account for approximately 95% of total rainfall[b] (81% of total precipitation); so assume 81% of runoff total from areas directed to infiltration trench will infiltrate)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6,355	N/A
	Remaining Pervious	20,160	0.00	0	0.729	0	20,160	0.160	3,218	0.106	2,146	3,218
NHS		35,050	0.00	0	0.729	0	35,050	0.133	4,663	0.133	4,663	4,663
Residential - North Development		5,400	0.41	2,220	0.729	1,618	3,180	0.160	508	0.106	338	2,126
TOTAL POST-DEVELOPMENT		**127,700**		**57,740**		**42,095**	**69,960**		**10,236**		**17,337**	**39,524**
											% Change from Pre to Post	144
											Effect of development (with no mitigation)	1.4 times increase in runoff

* data provided by SCS Consulting

** figures from Tables G-1 and G-2

[a] based on estimation in the LID SWM Planning and Design Guide (CVC & TRCA, 2010) for hydrologic groups C & D

[b] based on the Toronto Wet Weather Flow Management Guidelines (City of Toronto, 2006)

Change in runoff (m^3/a)= **12,086**

APPENDIX B-4

WATERMAIN ANALYSIS
PREPARED BY MES, DATED AUGUST 2021

Municipal Engineering Solutions

August 4, 2021 Project No. 17002-104

Sent via email
Highfair Investments Inc.
c/o Treasure Hill
Attn: Ms. Farah Ibrahim
1-1681 Langstaff Road
Vaughan, ON L4K 5T3

Subject: Highfair Investments Inc. Development
Water Distribution Modeling
Town of Aurora, Region of York

Dear Ms. Ibrahim,

We are pleased to submit our report entitled "Highfair Investments Inc. Development Watermain Analysis" outlining the results of our water distribution analysis for the proposed residential development in the Town of Aurora, Region of York.

A WaterCAD model of the immediate area was developed utilizing the design information provided to Municipal Engineering Solutions and a hydrant test performed by the Ontario Clean Water Agency in June 2021. The findings of our analysis are summarized in the following report.

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

Yours truly,

Municipal Engineering Solutions

Kristin St-Jean, P.Eng.

/KS

File Location: C:\Users\krist\Documents\Projects\17002-104 Archerhill (Highfair), Aurora\5.0 Report\17002-104 Highfair Development Watermain Analysis_20210804.docx

55 Gilbank Drive, Aurora, Ontario L4G 6H9
Tel: 905.726.1016 Cell: 416.434.0186 Fax: 905.726.1225

HIGHFAIR INVESTMENTS INC. DEVELOPMENT

WATERMAIN ANALYSIS

PREPARED BY:

MUNICIPAL ENGINEERING SOLUTIONS

FOR:

HIGHFAIR INVESTMENTS INC.
August 2021

Project Number: 17002-104

TABLE OF CONTENTS

APPENDICES

Section 1 – INTRODUCTION

Municipal Engineering Solutions ("MES") was retained by Highfair Investments Inc. to conduct a hydraulic water analysis for the proposed development located on Archerhill Court, north of Vandorf Sideroad and west of Bayview Avenue in the Town of Aurora (Region of York). As part of this hydraulic assessment MES was requested to undertake the following:

1. Calculate/verify water demands for the proposed development using Town of Aurora, provincial and industry design standards;
2. Add the subject watermains/development to the development water model;
3. Run the model to size the subject mains to achieve service criteria during Average Day, Peak Hour and fire flow during Maximum Day demand; and
4. Prepare a Report summarizing the modeling results for agency review and design purposes.

1.1 Development Background

The development site is located north of Vandorf Sideroad, and replaces the existing development on Archerhill Court in the Town of Aurora. The proposed development is made up of 146 single family homes. The breakdown of the units is shown in **Appendix A**. The proposed development is shown below on **Figure 1**.

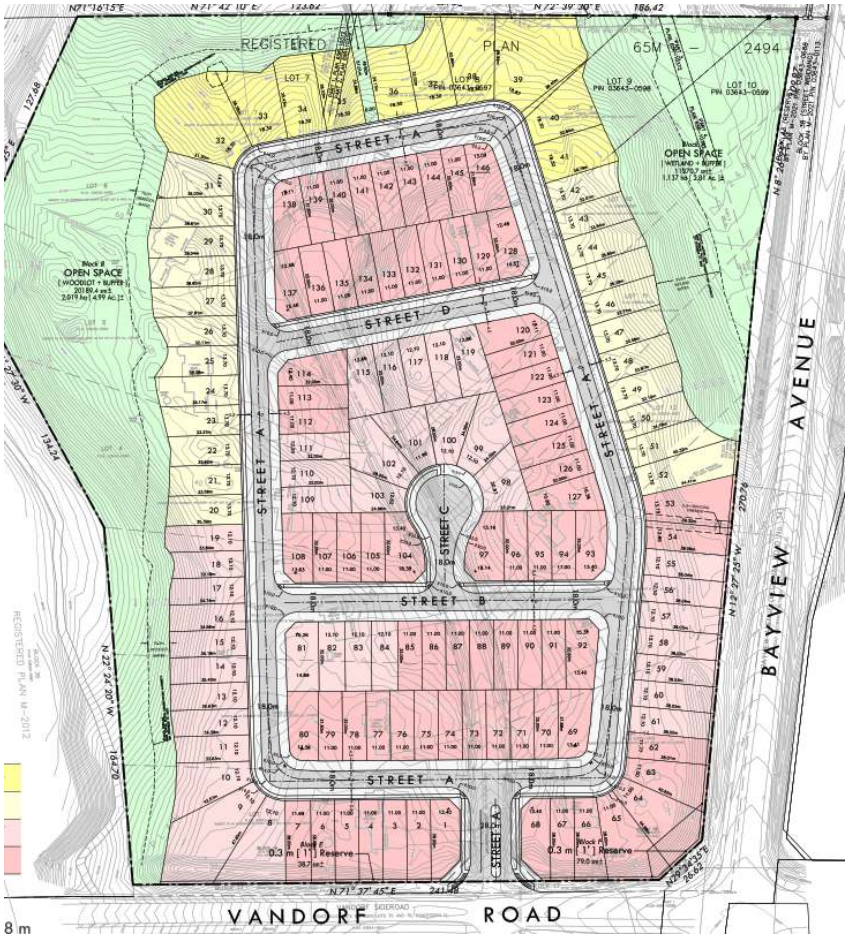


Figure 1 – Proposed Highfair Investments Inc. Development

Section 2 – WATERMAIN DESIGN CRITERIA

The design criteria utilized to estimate the water demands for the hydraulic water model follows general industry standards and is calculated using the design criteria and guidelines outlined in the Town of Aurora Design Criteria and the Ministry of the Environment, Conservation and Parks (MECP) Watermain Design Criteria.

The following sections summarize the specific design criteria used to carry out the hydraulic watermain assessment for this development.

2.1 Equivalent Population Densities & Water Design Factors

To calculate the equivalent population and water design factors for this development MES used Town of Aurora standard residential population densities as noted in the *Design Criteria Manual for Engineering Plans (November 2020)*. **Table 1** summarizes the residential population densities and **Table 2** summarizes the average daily demand and peaking factors used for the calculations.

Table 1 – Equivalent Population Density

Type of Development	Equivalent Population (Persons/Unit)
Single Family Homes	3.8

Source: Town of Aurora Design Criteria Manual, Nov 2020

Table 2 - Water Design Factors

Type of Development	Average Daily Demand	Maximum Daily Demand Peaking Factor	Peak Hourly Demand Peaking Factor
Residential	400 l/capita/day	2.0	3.0

Source: Town of Aurora Design Criteria Manual, Nov 2020

Section 3 –FLOW DEMANDS

Utilizing the demand criteria and the Average Day, Maximum Day and Peak Hour peaking factors from Table 2 the water demands for this development were calculated.

3.1 Equivalent Population Flow Demands

The calculated demands for the development are summarized in **Table 3**. For additional details on the development water demands and assigned demand nodes used in the water model see **Appendix A**.

Table 3 – Water Demand for the Highfair Investments Inc. Development

	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Demands	2.58	5.16	7.74

3.2 Fire Flow Demands

The fire demands for the development were taken from the Town of Aurora *Design Criteria Manual for Engineering Plans (November 2020)*. The minimum required fire flow was assumed to be 117 L/s for single family (detached) homes as outlined in the Design Criteria. The minimum required fire flow assumed for this development is summarized in **Table 4**.

Table 4 - Fire Flow Requirements

Type of Development	Fire Flow (L/s)
Single Family Homes	117

Source: Town of Aurora Design Criteria Manual, Nov 2020

The fire flow utilized in this analysis is based on the Town's minimum fire flow requirements. The fire flow noted in Table 4 must be reviewed and confirmed by the appropriate designer (architect) with detailed design data (floor area and type of construction) for these buildings prior to implementation and construction. Regardless, the buildings will need to be designed to suit the available flow and pressure. Any design/criteria changes are to be reported to MES.

Section 4 – OTHER SYSTEM REQUIREMENTS

4.1 System Pressure Requirements

In addition to meeting the various flow requirements, the system must also satisfy minimum and maximum pressure requirements as outlined by the Town. The Town's pressure requirements are outlined in the Design Criteria and stipulate the following:

1. The pressure range during maximum daily demand shall be 350 kPa to 620 kPa (50 to 90 psi)
2. The maximum system pressure under static load or during minimum hourly demand shall be 700 kPa (100 psi).
3. The minimum pressure during peak hourly demand shall be 275 kPa (40 psi).
4. The minimum system pressure when the system is tested for fire flow during maximum day demands shall be 140 kPa (20 psi).

To comply with the Ontario Building Code, reduction of pressures to 550 kPa (80 psi) is required, normally by having reducing valves installed on individual services.

4.2 Watermain Sizing

The Town of Aurora stipulates a minimum pipe size of 200 mm diameter for residential areas and 250 mm diameter for industrial and commercial areas. All watermains are to be adequately sized to maintain demand flows at the required pressures without causing excessive energy loss or result in water quality decay. The watermain system must therefore be designed to accommodate the greater of the following:

- Maximum day plus fire demand
- Peak hour demand

For distribution systems providing fire protection the minimum pipe size shall be 150 mm diameter in accordance with Ministry of the Environment, Conservation and Parks (MECP) and NFPA requirements.

To provide appropriate fire protection, reliable supply and pressures the water distribution system should be looped wherever possible to improve supply security and water quality.

4.3 Watermain C-Factor

In designing and modeling of the pipes the Coefficient of Roughness (C-Factor) factors from the Town's Design Criteria were utilized. The Coefficient of Roughness assigned to each pipe size is summarized in **Table 5** below.

Table 5 - Hazen-Williams Coefficient of Roughness (C-Factors)

Size of Pipe (Diameter in mm)	Coefficient of Roughness (C)
150 mm	100
200 mm to 250 mm	110
300 mm	120
400 mm to 450 mm	130
600 mm or Greater	140

Source: Town of Aurora Design Criteria Manual, Nov 2020

Section 5 – ANALYSIS & MODELING RESULTS

In order to conduct the hydraulic water analysis for the proposed development the water demands were estimated by MES using the design criteria previously discussed and incorporated into a WaterCAD model created for the immediate area using boundary conditions from a hydrant test. The following sections discuss the model setup and results.

5.1 Model Setup

The development is located in the Aurora Zone 6 Pressure District which is serviced from a Water Booster Station on Vandorf Sideroad, west of the proposed development. The existing watermain on Archerhill Court will be decommissioned. The proposed development will connect to the existing 300mm diameter watermain on Vandorf Sideroad at Archerhill Court and to the existing 400mm diameter watermain on Bayview Avenue through a servicing easement.

A hydrant test was performed by the Ontario Clean Water Agency on June 1st, 2021. The hydrant test results are included in **Appendix B**. A model of the immediate area was created by using a dummy pump and reservoir to recreate the results of the hydrant test. To check the adequacy of the pump curve entered into the model, a simulated hydrant curve (modeled flow) at the location of the test was graphed against the data points of the actual hydrant tests. The comparison is included in **Appendix B**.

The development was modeled under the existing planning scenario only. Elevations within the development vary from approximately 272.7 to 279.0 m. Friction factor for all new pipes added to the model were assigned according to Table 5. Fire flows were based on the Town of Aurora Design Criteria.

5.2 Watermain Sizing and System Pressures

The analysis was conducted under existing servicing conditions for Average Day, Maximum Day, Peak Hour and Maximum day plus Fire demands to size the watermains and meet the pressure requirements. The pipe sizes and layout are shown in **Appendix A**.

Modeled service pressures for the development are summarized in **Table 6**. All pressures lie within the required operating range under average day, maximum day, maximum day plus fire flow and peak hour demands.

Detailed pipe and node tables for the various scenarios modeled are attached to this report in **Appendix C**.

Table 6 - Modeled Service Pressures

Scenario	Average Day	Maximum Day	Peak Hour	Max. Day + Fire
Existing	573 – 661 kPa (83.1 to 95.9 psi)	573 – 661 kPa (83.0 to 95.8 psi)	572 – 660 kPa (82.9 to 95.7 psi)	137 to 154 L/s @ 140 kPa

The modeling indicates that pressures are expected to exceed 550 kPa throughout the development. Pressure reducing valves will be required on the domestic services to comply with the Ontario Building Code.

Section 6 – CONCLUSIONS/RECOMMENDATIONS

The proposed watermain layout for the Highfair Investments Inc. Development can achieve hydraulic requirements as prescribed by the Town of Aurora watermain design criteria as summarized below.

- The service pressures from the proposed watermain layout are expected to range between 572 kPa and 661 kPa (82.9 psi to 95.9 psi).
- The available fire flow meets or exceeds the minimum fire flow demands utilized for this assessment at the minimum pressure of 140 kPa. Assumptions made within this report must be confirmed when additional building information becomes available.
- The modeling indicates that pressures are expected to exceed 550 kPa (80 psi) throughout the development. Pressure reducing valves will be required on individual services to comply with the Ontario Building Code.
- Once the building designs are completed and the specifics are known, the fire flow demands used in this analysis and summarized in Table 4, including all assumptions, must be reviewed and confirmed by the designer(s), architect and mechanical consultant to ensure the fire flows used within this report are still valid prior to implementation and construction and to confirm that the water supply is adequate.
- The fire flows utilized in this analysis are based on the Town's minimum fire flow requirements. Should it be determined, based on the final site and building design and/or through discussions with the Town, that a greater fire flow is required or that the fire flows need to be calculated using the Fire Underwriters Survey formula the pipe sizes may need to be upsized to suit the higher fire flows or the building construction designed to suit the flow available.
- The hydrant test used for the boundary conditions provides a snapshot of the system performance and does not capture the system variations as accurately as boundary information from a calibrated model or system monitoring. The Town of Aurora must confirm that the results presented in this report are in keeping with the pressures currently measured in the area.
- The hydrant test also indicated a wide range for the static pressure for the watermain tested. The large variation is likely a result of the timing of the pumps at the booster station and the lag between the pumps coming on and the recharging of the system. This pressure variation should also be reviewed and confirmed by the Town.
- This report, including all modeling assumptions used, is to be submitted to and reviewed by the water operating authority (municipality) to confirm that the modeling parameters used are acceptable to the operating authority and/or confirm if modified domestic or fire flow requirements are required or should be implemented for this particular development.

Appendix A

Demands

Equivalent Population by Unit

Type of Development	Equivalent Population Density *(Person/Unit)*
Single Family Homes/Semi-Detached	3.8
Townhouses	3.5
Apartments	2.5

Water Design Factors

Average Daily Demand (litres/capita/day)	400
Maximum Daily Demand P.F.	2.00
Peak Hourly Demand P.F.	3.00

Coefficient of Roughness

Size of Pipe (mm Dia.)	Coefficient of Roughness (C)
150	100
200-250	110
300	120
400-450	130
Over 600	140

Minimum Pipe Size

Type of Development	Size of Pipe (mm Dia.)
Residential	200
Industrial/Commercial/Institutional	250

(For cul-de-sacs only, a 150mm watermain may be permitted at the discretion of the Town.)

Working Pressures

Parameter	Pressure
Normal Condition	
Minimum Pressure (Maximum Day)	275 kPa (40 psi)
Normal Operating Pressure (Maximum Day)	350 kPa to 620 kPa (50 to 90 psi)
Maximum (Building Code)	550 kPa (80 psi)
Maximum recommended	700 kPa (100 psi)
Fire Flow Conditions	
Minimum Pressure	140 kPa (20 psi)

Fire Flow Demands

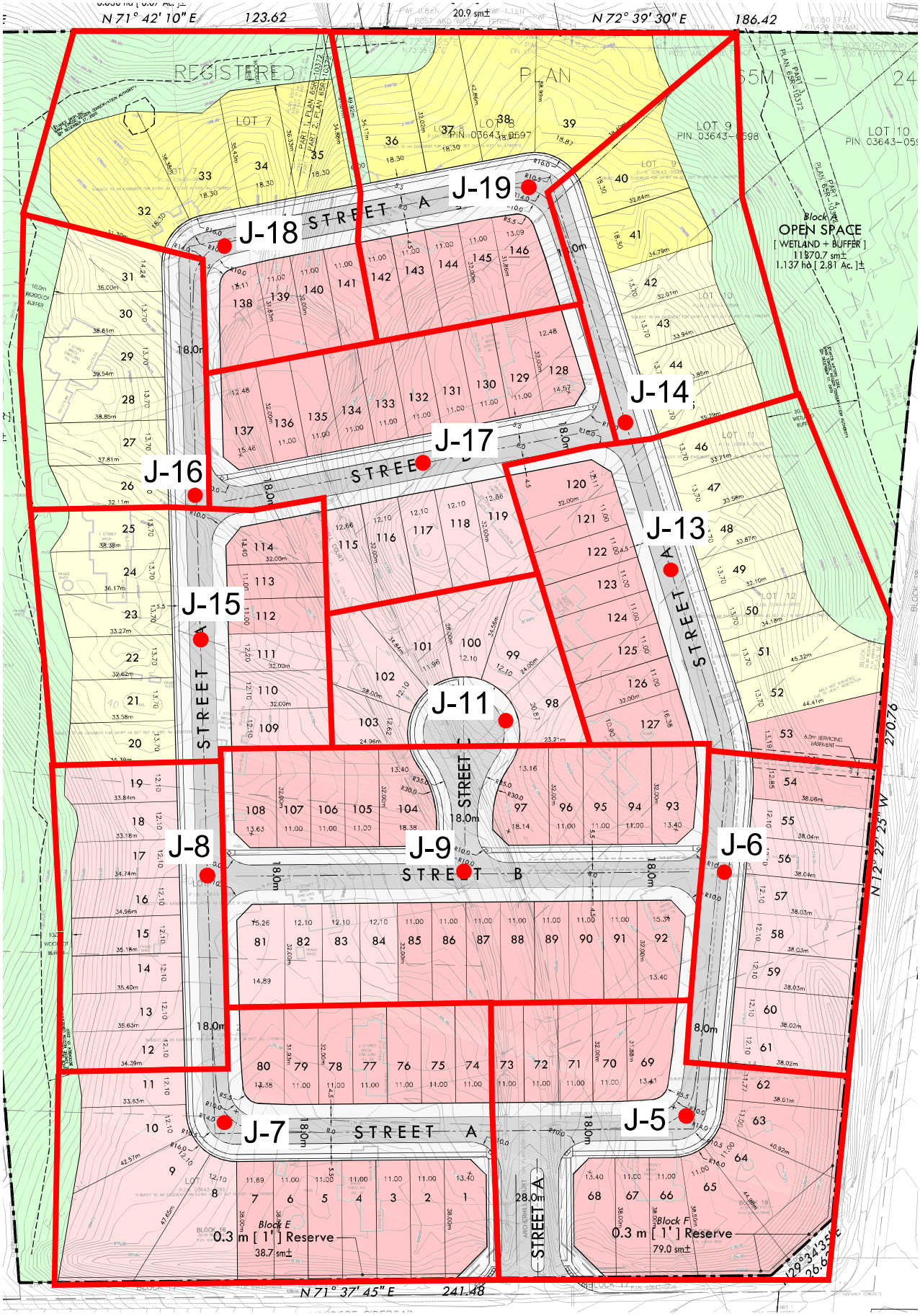
Type of Development	Fire Demand (L/s)
Single Family/Semi-Detached	117
Townhouse/Row House	125
Apartment	150
Commercial	200
Institutional/Industrial	250

Water Demands
Highfair Investments Inc. Development, Aurora
August 2021

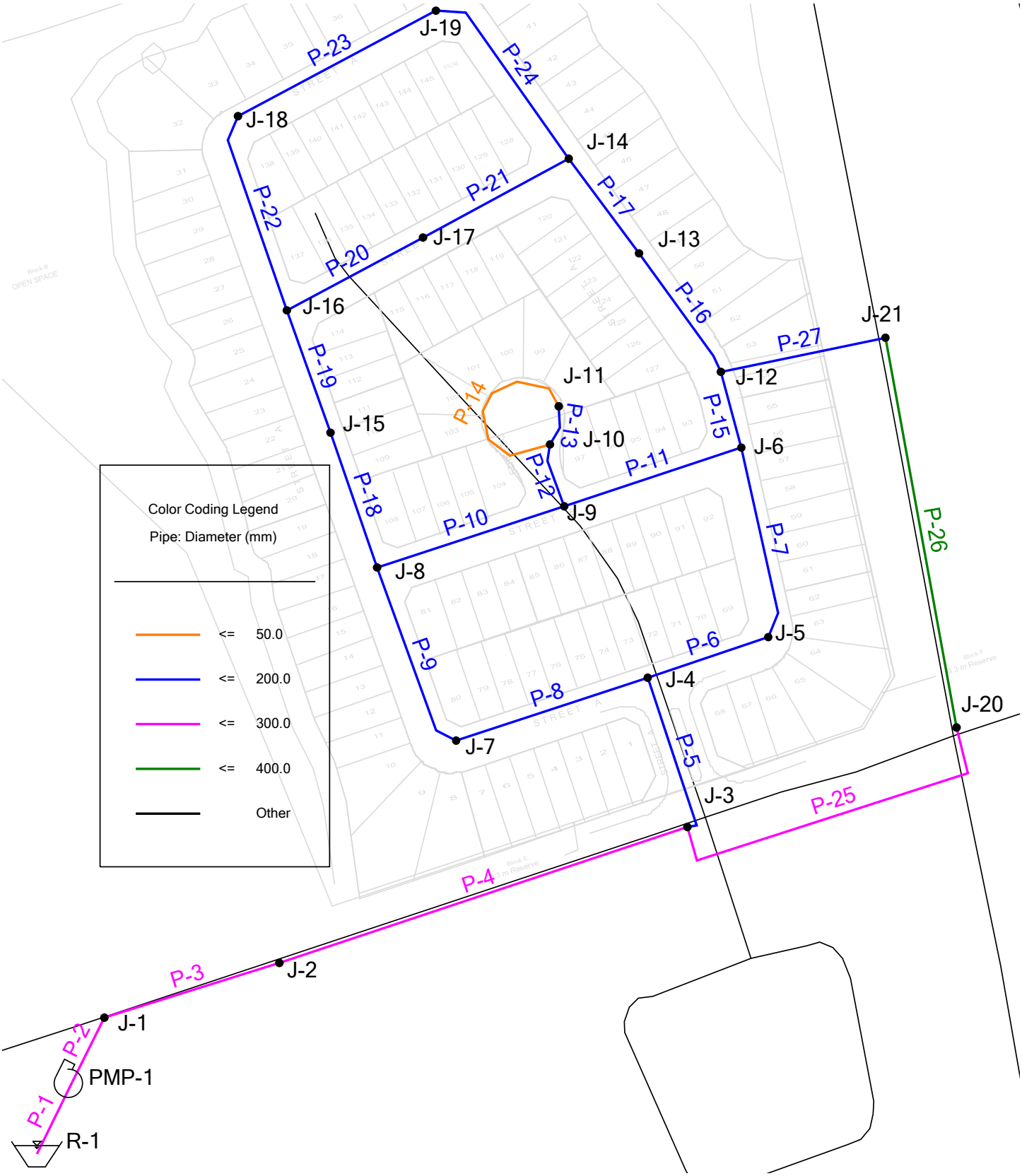
Municipal Engineering Solutions

Node	Type of Development			Equivalent Population	Demands		
	Detached	Semi-Detached	Townhouse	Total Population	Avg Day	Max Day	Peak Hour
	(units)	*(units)*	*(units)*	*(Residential)*	*(L/s)*	*(L/s)*	*(L/s)*
J-5	*12*			46	0.21	0.42	0.63
J-6	*8*			30	0.14	0.28	0.42
J-7	*18*			68	0.32	0.64	0.96
J-8	*8*			30	0.14	0.28	0.42
J-9	*22*			84	0.39	0.78	1.17
J-11	*6*			23	0.11	0.22	0.33
J-13	*16*			61	0.28	0.56	0.84
J-14	*6*			23	0.11	0.22	0.33
J-15	*12*			46	0.21	0.42	0.63
J-16	*6*			23	0.11	0.22	0.33
J-17	*15*			57	0.26	0.52	0.78
J-18	*8*			30	0.14	0.28	0.42
J-19	*9*			34	0.16	0.32	0.48
TOTAL	**146**	**0**	**0**	**555**	**2.58**	**5.16**	**7.74**

Demand Allocation
Highfair Investments Inc. Development



Pipe and Node IDs



Appendix B

Boundary Information

HYDRANT INSPECTION & FLOW REPORT

SUGGESTED NFPA RATING	
BLUE	CLASS AA
2961 gpm @ 20 psi (138 kPa)	

ONTARIO CLEAN WATER AGENCY
AGENCE ONTARIENNE DES EAUX

Prepared By: The Ontario Clean Water Agency
Prepared For: Farah Ibrahim
Residual Hyd Andrew Cruickshank
Flow Hydrant(s) Sergio Mailhos, Kurt Kahler

Date: 1-Jun-21 Time: 7:59 AM

HYDRANT DESCRIPTION

Hydrant ID:	2190-05	Side of Street:	NORTH	Make:	Canada Valve	Open Dir:	Left
Address:	380 Vandorf Sdrd			Model:	Century	Latitude:	
Location:	Aurora, Ontario			Year:	1996	Longitude:	

GENERAL INSPECTION

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

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

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

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

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

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

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

Comments:

Auxiliary Valve Location:

FLUSHING

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

Hydrant Operated	Clear Flow Obtained	Cl2 Residual	Time Flushed	Flow	Total Flow	Dechlorinated
Yes - Easily Operated	Yes	N/A	5 minutes	2350 gal	9788 gal	Yes

Comments: **STATIC AFTER FLOW TEST WAS PERFORMED 65.18 PSI**

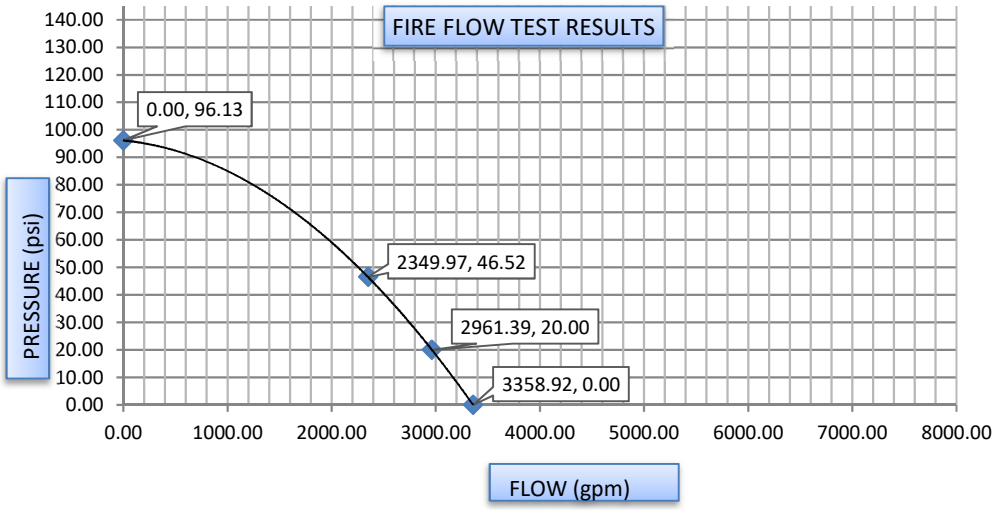
ALL HYDRANTS WERE DRAINED AFTER FIRE FLOW WAS COMPLETED

FLOW TESTING

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

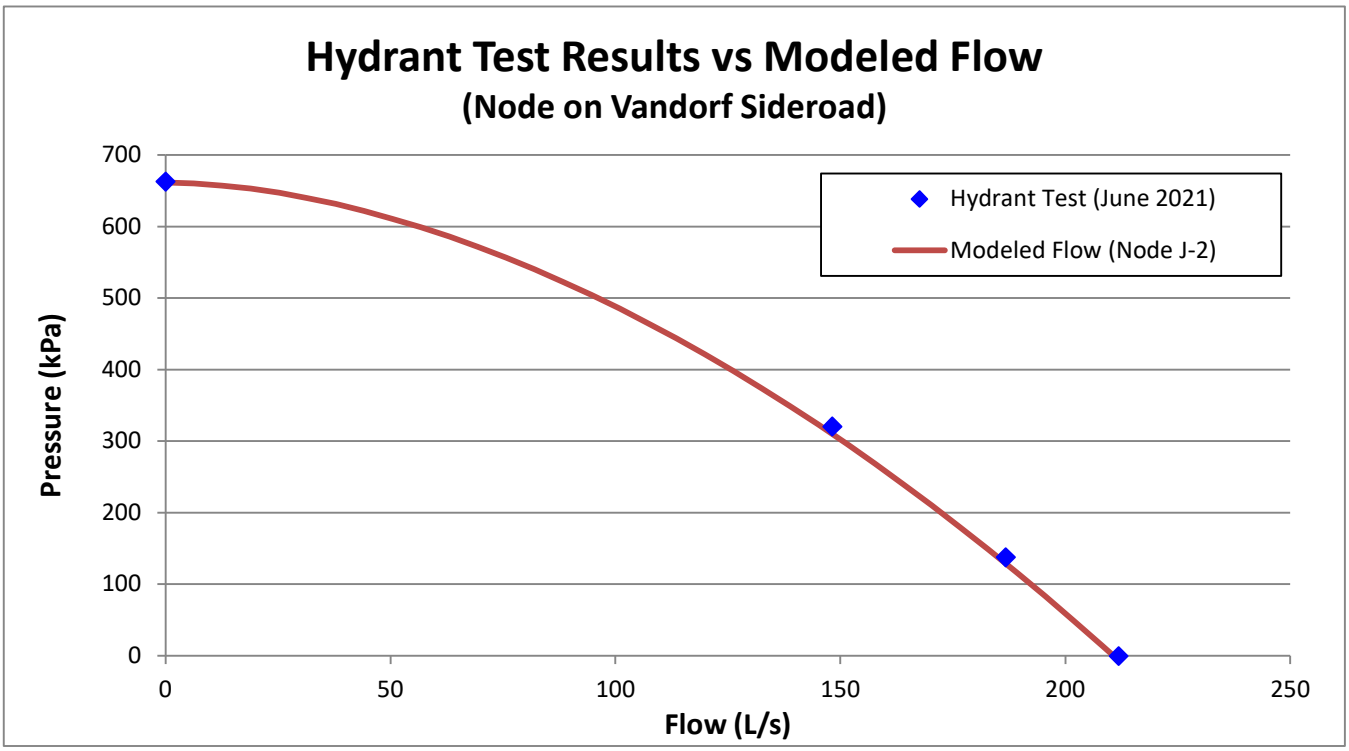
Date: 1-Jun-21 Time: 7:59 AM

Flow Hydrant								Test Hydrant		
ID	Flow Device Used	Size	Coefficient	Time Flushed	Flow	Total Flow	Pitot	ID	Static	Residual
2190-03	Pollard Diffuser	2.5"	0.832	5.0 minutes	711 gal	3554 gal	21 psi	2190-05	96.13	46.52
2190-03	Pollard Diffuser	2.5"	0.832	5.0 minutes	658 gal	3291 gal	18 psi			
2015-04	Pollard Diffuser	2.5"	0.832	3.0 minutes	491 gal	1472 gal	10 psi			
2015-04	Pollard Diffuser	2.5"	0.832	3.0 minutes	491 gal	1472 gal	10 psi			



Calculated Results	
Calculated Flow @ 20 psi	2961 gpm
Calculated Flow @ 0 psi	3359 gpm
Pressure Drop	51.61%

Comments:



	Static Pressure	Residual Pressure	Test Flow	Theoretical Flow at 140 kPa
	(kPa)	(kPa)	(L/s)	(L/s)
Hydrant Test	662.8	320.7	148.3	186.8
Model	661.6	323.2	145.1	183.0

Appendix C

Model Results

Results
Highfair Investments Inc. Development, Aurora
August 2021

Municipal Engineering Solutions

Average Day

Node Table

ID	Demand	Elevation	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(kPa)*
J-1	0.00	271.00	338.58	661.35
J-2	0.00	271.00	338.58	661.35
J-3	0.00	279.07	338.57	582.35
J-4	0.00	278.19	338.57	590.95
J-5	0.21	278.98	338.57	583.22
J-6	0.14	277.77	338.57	595.06
J-7	0.32	277.09	338.57	601.71
J-8	0.14	276.12	338.57	611.20
J-9	0.39	276.74	338.57	605.13
J-10	0.00	276.53	338.57	607.19
J-11	0.11	276.53	338.57	607.19
J-12	0.00	276.98	338.57	602.79
J-13	0.28	276.02	338.57	612.18
J-14	0.11	274.89	338.57	623.24
J-15	0.21	275.17	338.57	620.50
J-16	0.11	274.11	338.57	630.87
J-17	0.26	274.27	338.57	629.30
J-18	0.14	272.66	338.57	645.06
J-19	0.16	273.32	338.57	638.60
J-20	0.00	280.00	338.57	573.25
J-21	0.00	276.41	338.57	608.38

MIN		**271.00**		**573.25**
MAX		**280.00**		**661.35**

Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(L/s)*	*(m/s)*
P-1	R-1	PMP-1	34.57	300	120	2.58	0.04
P-2	PMP-1	J-1	31.02	300	120	2.58	0.04
P-3	J-1	J-2	79.09	300	120	2.58	0.04
P-4	J-2	J-3	185.48	300	120	2.58	0.04
P-5	J-3	J-4	71.03	200	110	1.33	0.04
P-6	J-4	J-5	54.85	200	110	0.57	0.02
P-7	J-5	J-6	84.27	200	110	0.36	0.01
P-8	J-4	J-7	86.97	200	110	0.76	0.02
P-9	J-7	J-8	84.37	200	110	0.44	0.01
P-10	J-8	J-9	84.89	200	110	-0.15	0.00
P-11	J-9	J-6	80.44	200	110	-0.65	0.02
P-12	J-9	J-10	28.06	200	110	0.11	0.00
P-13	J-10	J-11	17.63	200	110	0.11	0.00
P-14	J-11	J-10	85.48	50	100	0.00	0.00
P-15	J-6	J-12	33.81	200	110	-0.43	0.01
P-16	J-12	J-13	62.24	200	110	0.82	0.03
P-17	J-13	J-14	50.82	200	110	0.54	0.02
P-18	J-8	J-15	61.53	200	110	0.45	0.01
P-19	J-15	J-16	55.99	200	110	0.24	0.01
P-20	J-16	J-17	66.57	200	110	0.04	0.00
P-21	J-17	J-14	71.46	200	110	-0.22	0.01
P-22	J-16	J-18	88.93	200	110	0.09	0.00
P-23	J-18	J-19	96.71	200	110	-0.05	0.00
P-24	J-19	J-14	90.00	200	110	-0.21	0.01
P-25	J-3	J-20	158.07	300	120	1.25	0.02
P-26	J-20	J-21	170.81	400	130	1.25	0.01
P-27	J-12	J-21	72.47	200	110	-1.25	0.04

Maximum Day

Node Table

ID	Demand	Elevation	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(kPa)*
J-1	0.00	271.00	338.52	660.77
J-2	0.00	271.00	338.51	660.75
J-3	0.00	279.07	338.51	581.71
J-4	0.00	278.19	338.50	590.27
J-5	0.42	278.98	338.50	582.53
J-6	0.28	277.77	338.50	594.37
J-7	0.64	277.09	338.50	601.01
J-8	0.28	276.12	338.50	610.50
J-9	0.78	276.74	338.50	604.43
J-10	0.00	276.53	338.50	606.49
J-11	0.22	276.53	338.50	606.49
J-12	0.00	276.98	338.50	602.10
J-13	0.56	276.02	338.50	611.48
J-14	0.22	274.89	338.50	622.53
J-15	0.42	275.17	338.50	619.79
J-16	0.22	274.11	338.50	630.16
J-17	0.52	274.27	338.50	628.60
J-18	0.28	272.66	338.50	644.35
J-19	0.32	273.32	338.50	637.89
J-20	0.00	280.00	338.51	572.60
J-21	0.00	276.41	338.51	607.73
MIN		**271.00**		**572.60**
MAX		**280.00**		**660.77**

Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(L/s)*	*(m/s)*
P-1	R-1	PMP-1	34.57	300	120	5.16	0.07
P-2	PMP-1	J-1	31.02	300	120	5.16	0.07
P-3	J-1	J-2	79.09	300	120	5.16	0.07
P-4	J-2	J-3	185.48	300	120	5.16	0.07
P-5	J-3	J-4	71.03	200	110	2.66	0.08
P-6	J-4	J-5	54.85	200	110	1.14	0.04
P-7	J-5	J-6	84.27	200	110	0.72	0.02
P-8	J-4	J-7	86.97	200	110	1.52	0.05
P-9	J-7	J-8	84.37	200	110	0.88	0.03
P-10	J-8	J-9	84.89	200	110	-0.30	0.01
P-11	J-9	J-6	80.44	200	110	-1.30	0.04
P-12	J-9	J-10	28.06	200	110	0.22	0.01
P-13	J-10	J-11	17.63	200	110	0.23	0.01
P-14	J-11	J-10	85.48	50	100	0.01	0.00
P-15	J-6	J-12	33.81	200	110	-0.86	0.03
P-16	J-12	J-13	62.24	200	110	1.64	0.05
P-17	J-13	J-14	50.82	200	110	1.08	0.03
P-18	J-8	J-15	61.53	200	110	0.90	0.03
P-19	J-15	J-16	55.99	200	110	0.48	0.02
P-20	J-16	J-17	66.57	200	110	0.08	0.00
P-21	J-17	J-14	71.46	200	110	-0.44	0.01
P-22	J-16	J-18	88.93	200	110	0.18	0.01
P-23	J-18	J-19	96.71	200	110	-0.10	0.00
P-24	J-19	J-14	90.00	200	110	-0.42	0.01
P-25	J-3	J-20	158.07	300	120	2.50	0.04
P-26	J-20	J-21	170.81	400	130	2.50	0.02
P-27	J-12	J-21	72.47	200	110	-2.50	0.08

Peak Hour

Node Table

ID	Demand	Elevation	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(kPa)*
J-1	0.00	271.00	338.43	659.89
J-2	0.00	271.00	338.42	659.84
J-3	0.00	279.07	338.41	580.74
J-4	0.00	278.19	338.40	589.24
J-5	0.63	278.98	338.40	581.49
J-6	0.42	277.77	338.39	593.32
J-7	0.96	277.09	338.39	599.96
J-8	0.42	276.12	338.39	609.44
J-9	1.17	276.74	338.39	603.37
J-10	0.00	276.53	338.39	605.42
J-11	0.33	276.53	338.39	605.42
J-12	0.00	276.98	338.40	601.06
J-13	0.84	276.02	338.39	610.42
J-14	0.33	274.89	338.39	621.46
J-15	0.63	275.17	338.39	618.72
J-16	0.33	274.11	338.39	629.09
J-17	0.78	274.27	338.39	627.52
J-18	0.42	272.66	338.39	643.28
J-19	0.48	273.32	338.39	636.82
J-20	0.00	280.00	338.41	571.61
J-21	0.00	276.41	338.41	606.74

MIN		**271.00**		**571.61**
MAX		**280.00**		**659.89**

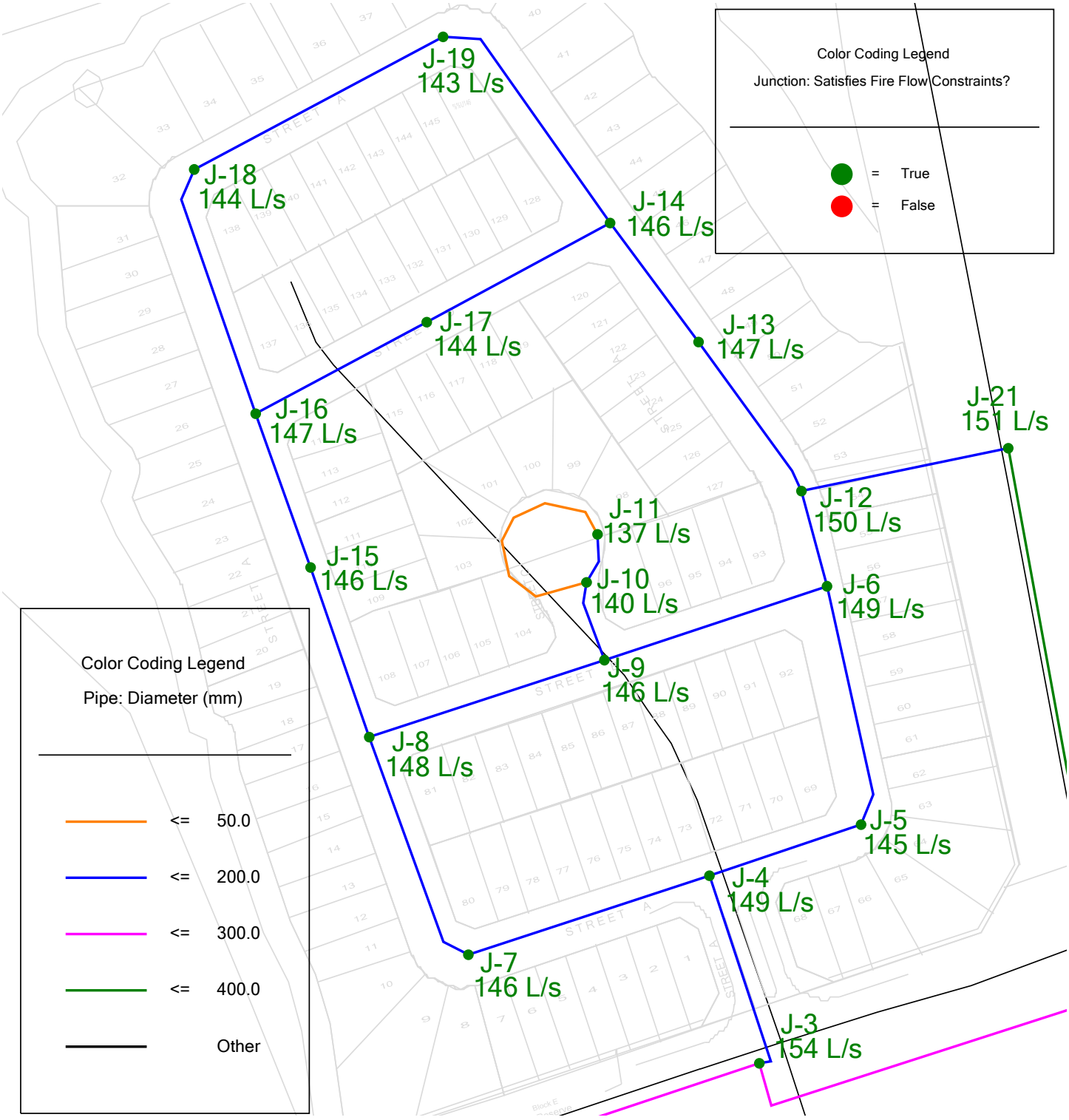
Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(L/s)*	*(m/s)*
P-1	R-1	PMP-1	34.57	300	120	7.74	0.11
P-2	PMP-1	J-1	31.02	300	120	7.74	0.11
P-3	J-1	J-2	79.09	300	120	7.74	0.11
P-4	J-2	J-3	185.48	300	120	7.74	0.11
P-5	J-3	J-4	71.03	200	110	3.98	0.13
P-6	J-4	J-5	54.85	200	110	1.71	0.05
P-7	J-5	J-6	84.27	200	110	1.08	0.03
P-8	J-4	J-7	86.97	200	110	2.28	0.07
P-9	J-7	J-8	84.37	200	110	1.32	0.04
P-10	J-8	J-9	84.89	200	110	-0.45	0.01
P-11	J-9	J-6	80.44	200	110	-1.95	0.06
P-12	J-9	J-10	28.06	200	110	0.33	0.01
P-13	J-10	J-11	17.63	200	110	0.34	0.01
P-14	J-11	J-10	85.48	50	100	0.01	0.00
P-15	J-6	J-12	33.81	200	110	-1.29	0.04
P-16	J-12	J-13	62.24	200	110	2.46	0.08
P-17	J-13	J-14	50.82	200	110	1.62	0.05
P-18	J-8	J-15	61.53	200	110	1.35	0.04
P-19	J-15	J-16	55.99	200	110	0.72	0.02
P-20	J-16	J-17	66.57	200	110	0.11	0.00
P-21	J-17	J-14	71.46	200	110	-0.67	0.02
P-22	J-16	J-18	88.93	200	110	0.27	0.01
P-23	J-18	J-19	96.71	200	110	-0.15	0.00
P-24	J-19	J-14	90.00	200	110	-0.63	0.02
P-25	J-3	J-20	158.07	300	120	3.76	0.05
P-26	J-20	J-21	170.81	400	130	3.76	0.03
P-27	J-12	J-21	72.47	200	110	-3.76	0.12

Fire Flow Table					
ID	Fire Flow Demand	Total Demand	Total Available Flow	Available Fire Flow	**Fire Flow Met?**
	(L/s)	*(L/s)*	*(L/s)*	*(L/s)*	
J-3	117.00	117.00	154.40	154.40	**TRUE**
J-4	117.00	117.00	149.32	149.32	**TRUE**
J-5	117.00	117.42	145.28	144.86	**TRUE**
J-6	117.00	117.28	149.18	148.90	**TRUE**
J-7	117.00	117.64	146.47	145.83	**TRUE**
J-8	117.00	117.28	148.73	148.45	**TRUE**
J-9	117.00	117.78	146.69	145.91	**TRUE**
J-10	117.00	117.00	140.36	140.36	**TRUE**
J-11	117.00	117.22	137.27	137.05	**TRUE**
J-12	117.00	117.00	150.47	150.47	**TRUE**
J-13	117.00	117.56	147.16	146.60	**TRUE**
J-14	117.00	117.22	146.54	146.32	**TRUE**
J-15	117.00	117.42	146.82	146.40	**TRUE**
J-16	117.00	117.22	147.28	147.06	**TRUE**
J-17	117.00	117.52	144.90	144.38	**TRUE**
J-18	117.00	117.28	144.11	143.83	**TRUE**
J-19	117.00	117.32	143.14	142.82	**TRUE**

MIN	**137.05**
MAX	**154.40**

Scenario: Maximum Day
Available Fire Flow



APPENDIX B-5

PRE-CONSULTATION MEETING COMMENTS BY LSRCA AND AURORA

TOWN OF AURORA
PRE-CONSULTATION PACKAGE & CHECKLIST

For Official Plan Amendments, **Zoning By-law Amendments, Plans of Subdivision** & Condominiums and Consent Applications.

Archerhill Court

PLANNING AND DEVELOPMENT SERVICES
Development Planning Division
Phone: 905-727-3123 ext. 4226
Fax: 905-726-4736
E-mail: planning@aurora.ca

Town of Aurora
100 John West Way,
Box 1000, Aurora, ON L4G 6J1
www.aurora.ca

January, 2019

TOWN OF AURORA
Planning and Development Services

PRE-CONSULTATION PACKAGE & CHECKLIST

For Official Plan Amendments, Zoning By-law Amendments, Plans of Subdivision & Condominiums and Consent Applications.

Pre-Consultation Meeting Date	**Monday December 14, 2020, 1pm**
Attendees	**Asif Abbas (York Region), Eric Sadler (Fire), Anna Henriques, Rosanna Punit, Bill Butler, Bill Jean, Edward Terry, Michael Logue, Nick Pileggi (MSH Planning), Matt Creador (Treasure Hill), Enrich Knechtel (SCS Consulting), Jason Bottoni (Treasure Hill), Steve Schaefer (SCS Consulting)**
Proposal	- **175 single detached units** - **SWM pond** - **New road network**
Legal Description	**Part Lot 76, Cons 1**
Property Address	**5,10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65 & 70 Archerhill Court**

REQUIRED MATERIALS

Subsections 22(5); 34(10.2); 51(18) and 53(3) of the *Planning Act*, 1990, permit a Council or approval authority to require that a person, public body or Applicant who apply, submit or make requests or Applications for Consents, Amendments to the Official Plan, Amendments to the Zoning By-law, and approval of Plans of Subdivision, provide any "other information or materials" that Council or the approval authority considers it may need, but only if the Official Plan contains provisions relating to such requirements.

This "other information or materials" together with the prescribed information listed in the Ontario Regulations of the *Planning Act* will comprise the notion of a Complete Application. The following outlines the provisions for the requirements of a Complete Application.

(as determined at Pre-Consultation Meeting)

Required Materials	No. of Copies	Official Plan Amendment	Zoning By-law Amendment	Plan of Subdivision, Condominium and Consents
Planning Matters				
Planning Justification Report	2		✓	✓
Draft Official Plan Amendment document				
Draft Zoning by-law Amendment document	2		✓	
Draft Plan of Subdivision/ Condominium	2			✓
Conceptual/Approved Site Plan*				
Schedule of Lots and Blocks Indicating Area and Frontage*	2		✓	✓
Block Plan				

Neighbourhood Plan				
Phasing Plan	2		✓	✓

Required Materials	No. of Copies	Official Plan Amendment	Zoning By-law Amendment	Plan of Subdivision, Condominium and Consents
Urban Design Matters				
Urban Design Reports, Plans and Guidelines	2		✓	✓
Conceptual Building Elevations				
Streetscape Plan	2		✓	✓
Lighting Study/Plan	2			✓
Priority Lot Plan				
Shadow and/or Massing Study				
Site assessment				
Snow Storage Study/Plan	2			✓
Accessibility Audit				

Required Materials	No. of Copies	Official Plan Amendment	Zoning By-law Amendment	Plan of Subdivision, Condominium and Consents
Environmental Matters				
Environmental Assessment Study			✓	✓
Environmental Impact Study	2		✓	✓
Flood Impact Study			✓	✓
Floodplain Mapping/Analysis			✓	✓
Geotechnical Study			✓	✓
Hydrogeological Study			✓	✓
Landform Conservation Study			✓	✓
Natural Heritage Evaluation			✓	✓

Phase 1 Environmental Site Assessment (ESA) And Phase 2 ESA (if required by Phase 1 ESA)				✓
Soils Report			✓	✓
Tree Preservation Protection and Replacement Plan, Landscape Analysis Plans, Tree Survey, Tree Inventory and Vegetation Preservation and Enhancement Strategy			✓	✓

Required Materials	No. of Copies	Official Plan Amendment	Zoning By-law Amendment	Plan of Subdivision, Condominium and Consents
Lake Simcoe Region Conservation Authority				
Lake Simcoe Protection Conformity Report	**See attached comments dated: December 18 , 2020**			
Pre-consultation letter from the relevant Conservation Authority within or adjacent to a regulated area				

Required Materials	No. of Copies	Official Plan Amendment	Zoning By-law Amendment	Plan of Subdivision, Condominium and Consents
Toronto and Region Conservation Authority				
Toronto and Region Protection Conformity Report				
Pre-consultation letter from the relevant Conservation Authority within or adjacent to a regulated area				

Required Materials	No. of Copies	Official Plan Amendment	Zoning By-law Amendment	Plan of Subdivision, Condominium and Consents
Site Servicing Matters				
Functional Servicing Report and/or Master Plan	2		✓	✓
Grading/Drainage Plan	2			✓
Service Infrastructure Master Plan	2		✓	✓
Stormwater Management Report and/or Master Plan	2		✓	✓
Slope Stability Study	2		✓	✓
Construction Impact Mitigation Study	2			✓
Power Generation Impact Study				
Transmission Line Impact Study				

Green Building Report (refer to s. 5.2 in OP)			✓	✓

Required Materials	No. of Copies	Official Plan Amendment	Zoning By-law Amendment	Plan of Subdivision, Condominium and Consents
Economic Analysis				
Market Analysis and Financial Impact Study				

Required Materials	No. of Copies	Official Plan Amendment	Zoning By-law Amendment	Plan of Subdivision, Condominium and Consents
Transportation				
Entrance Analysis	2		✓	✓
Parking Study/Analysis	2			✓
Transportation Study and/or Master Plan (including linkages to trails or park system)	2		✓	✓
Traffic Impact Study	2		✓	✓
Noise and Vibration Impact Assessment	2		✓	✓
Functional Internal Traffic Study	2		✓	✓

Required Materials	No. of Copies	Official Plan Amendment	Zoning By-law Amendment	Plan of Subdivision, Condominium and Consents
Cultural Matters				
Stage 1 Archaeological Assessment and Stage 2 Archaeological Assessment (if required by Stage 1 Archaeological Assessment)				
Archaeological Conservation Plan (if archaeological resources are identified)				
Heritage Evaluation/Heritage Impact Statement				

PRE-CONSULTATION PACKAGE & CHECKLIST

For Official Plan Amendments, Zoning By-law Amendments, Plans of Subdivision & Condominiums and Consent Applications.

Required Materials	No. of Copies	Official Plan Amendment	Zoning By-law Amendment	Plan of Subdivision, Condominium and Consents
York Region				
Aggregate Potential Assessment/Compatibility Study	**See York Region Comments below.**			
Community Health Promotion Audit				
Context Plan				
Regional Impact Analysis for retail greater than 30,000 square metres				
Section 59 Notice from York Region required if the subject lands are located within Wellhead Protection Area C and/or D (WHPA-C, WHPA-D, WHPA-Q) and an Industrial/ commercial/ Institutional Agriculture or Underground/ Basement Residential Fuel Oil.				

Required Materials	No. of Copies	Official Plan Amendment	Zoning By-law Amendment	Plan of Subdivision, Condominium and Consents
Administrative items				
8,5”x11” reductions of all plans*	2		✓	✓
Application Fees*	1		✓	
Application Form*	1		✓	✓
Survey*	2		✓	✓
CD/USB containing PDFs of all plans and required reports*	1		✓	✓

Required Materials	No. of Copies	Official Plan Amendment	Zoning By-law Amendment	Plan of Subdivision, Condominium and Consents
Others				
Other Required Information as Identified according to the Pre-Consultation Meetings.				

*Not required according to OP’s; however, required pursuant to the prescribed information in accordance with Town requirements, as described in the *Planning Act* and/or by Secondary Plan.

It is acknowledged that Applications received may have unique circumstances and not every Report would be required for all Applications. It is the intent of the Planning and Development Services Department that Applicants pre-consult with the Town prior to making a submission for an Official Plan Amendment, Zoning By-law Amendment, Plan of Subdivision/Condominium and Site Plan. This would allow for the determination of which reports are required and if any of the required reports could be scoped and/or submitted later in the planning approvals process. In addition, the above checklist is not intended to preclude Council and its delegated approval authorities from requiring additional reports and studies that may be identified during the planning process, if the circumstances necessitate the need for such information as part of the decision making process.

Planning Comments:

- Applications required: Zoning By-law Amendment (Major) and Plan of Subdivision.
- The subject lands are located within the Oak Ridges Moraine and subject to OPA 48 of the Town's Official Plan, as per Schedule B. Please note, due to the lands being located in the ORMCP, Council and/or staff may also require site plan approval.
- The Oak Ridges Moraine Conservation Plan (Provincial Policy) and Section 3.13.6 of OPA 48 identifies the subject lands as "Category 2 – Moderately Complex land form". This proposal must conform to the Landform Conservation Area policies, and keep disturbance to landform character to a minimum.

"Landform Conservation Area (Category 2)

An application for development or site alteration with respect to land in a Landform Conservation Area (Category 2) where permitted by this Plan shall identify planning, design and construction practices that will keep disturbance to landform character to a minimum, including,

a) maintaining significant landform features such as steep slopes, kames, kettles, ravines and ridges in their natural undisturbed form;

b) limiting the portion of the net developable area of the site that is disturbed to not more than 50 per cent of the total area of the site; and

c) limiting the portion of the net developable area of the site that has impervious surfaces to not more than 20 per cent of the total area of the site"

- It appears that the current proposal does not meet the Landform Conservation Area policies. Proposed development will be required to conform to the Provincial Policy and the Town's Official Plan (OPA 48). A supporting Planning Justification Report will be required to outline how all applicable ORMCP policies have been addressed.
- Schedule E1 – Environmental Designations on ORM - Official Plan (OPA 48):
    - watercourse runs through the lands (north east corner) a minimum protection Zone of 30m required. Lake Simcoe Regional Conservation Authority will further re-define the area required to be protected.
    - Woodlands area located on the north west portion of the lands. A minimum vegetation protection zone of 30m is required. Lake Simcoe Regional Conservation Authority will further re-define the area required to be protected.
    - As a result of the above protections, the net developable area may be reduced.
- Official Plan – Stable Neighborhoods designation applies to the lands:

  - All new development: Maximum height of 3 storeys or 9 metres, whichever is less (Section 8.1.3)
  - All new development shall respect and reinforce the existing physical and uses of the surrounding area (Section 8.1.4)
  - Planning Justification report to demonstrate conformity with all applicable policies
- Submission of Urban Design Guidelines is required (Official Plan Section 4.0)
- Proposal to have regard to the affordable housing policies outlined in Section 6.3 of the Official Plan. Staff encourage the applicant to review York Regions Affordable Housing Strategy program
- 'Archerhill Court' is a Town Right of Way. The road may be required to be purchased from the Town to facilitate the proposed development, in accordance with the Town By-law 4255-01.Aand administrative procedures. Planning staff encourage the applicant to enter into discussions with the appropriate Town staff in this regard prior to submitting applications.
- The Draft Plan of Subdivision application form will require an "Owners Authorization" from the Town to allow Treasure Hill to Act on behalf of the Town regarding the Archerhill Court Right of Way. Note that with the Town's authorization and signature does not constitute Council approval of the application.
- For the Draft Plan of Subdivision, the Town will be a signatory on the M-Plan
- Consider providing multiple access points from subject lands to existing trails located on the north and west of the subject lands (Subject to Parks and LSRCA review and sign off).
- Consider providing more than one access point into the proposed plan of subdivision
- Cash in Lieu of Parkland will be required

Zoning Comments:

- The properties are within the generic regulation limit of Lake Simcoe Region Conservation Authority and may require a permit prior to the issuance of any building permits. Please contact LSRCA at (905)895-1281 or info@lsrca.on.ca.
- Demolition permits are required for any buildings to be removed. Also, a building permit is required for decommissioning of the septic systems. (If any).
- Further comments will be provided once we received more comprehensive plans and draft zoning bylaw.

Parks Comments:

- Vegetative management initiative for what is proposed to be removed as per policy C of Town's preservation documents. A vegetation management agreement will most likely be required
- We would prefer compensation planting be on TOWN PROPERTY to the West (Sheppards Bush) and to the North (Vandorf Woodlot). The compensation planting would be in the Open spaces in the form of caliper trees and understorey planting.
- We are concerned with the proximity of the lots on Street A to the existing trail in Sheppards Bush and the Vandorf Woodlot. In some cases it is extremely close to the

rear of the lots (Sheppards Bush, south west area of the subdivision) We would like to see infill planting as mentioned above and in the rear of the lots on town property. We would also like to advise on this planting, specie type, etc. once a preliminary plan is prepared and in and around the first submission.

- Our regular landscape standards for subdivisions will also need to be applied to this site and incorporated into the drawings. The standards are available on the Town website.

Brian Jakovina, Operations Division – PARKS
Phone: 905 727-3903
bjakovina@aurora.ca

York Region Comments:

- The subject lands are located within "Urban Area", as shown on Map 1 of the York Region Official Plan 2010 (YROP). The site is within the Settlement Area of the Oak Ridges Moraine Conservation Plan (ORMCP). Based Map 2 (YROP-2010), Regional Greenlands System is located adjacent to the site on the west. A watercourse and woodlot are located within 120m of the site as per Map 4 & 5 (YROP). Any proposed development or site alteration should be located outside of the required setbacks/vpz associates with the natural features/hazards. We rely on the LSRCA to comment on any natural hazard & heritage matters, including scope of Environment Impact Study (EIS) and Natural Heritage Evaluation (NHE), on our behalf.

- Should and OPA be required, a Planning Justification Report need to be submitted to demonstrating how this proposal conforms with the applicable policies of the related Provincial, Region and local plans.

- Residential development requires servicing capacity allocation prior to final approval. If the Town does not grant this development allocation from the existing capacity assignments to date, the proposal may require additional Regional infrastructure based on conditions of future capacity assignments. For information purposes for the Applicant, an information sheet on York Region's Residential Servicing Incentive Programs is available at: http://www.york.ca/wps/wcm/connect/yorkpublic/876cece5-676a-4dfe-ba4d-a249b95b3998/SIPImplementationGuideNov2015Accessible.pdf?MOD=AJPERES

- The site is within the South Georgian Bay Lake Simcoe (SGBLS) Source Protection Region in correspondence with the Lower Simcoe Region Conservation Authority (LSRCA) boundary. The site is within a Wellhead Protection Area D (WHPA-D) on the ORM, as well as the Wellhead Protection Area Q (WHPA-Q). The site is also within a Highly Vulnerable Aquifer (HVA). The site is also within the Area of Concern for groundwater in Aurora. The applicant is advised to contact the Source Water Protection Admin at York Region at 1-877-464-9675 ext. 75139 or

SourceWaterProtection@york.ca to discuss the proposed works and associated requirements from Water Resources. A Section 59 Notice WILL NOT be required.

With respect to WHPA-Q, the applicant is advised to contact Shelly Cuddy at LSRCA s.cuddy@lsrca.on.ca to discuss the proposed works and associated requirements. The approving body for compliance with the policy will be the local municipality.

- Development Engineering has no comments on the OPA and ZBA. For the draft plan of subdivision typical conditions will be provided. An emergency access on to Bayview maybe permitted.

- Please refer to York Region's Development Application Fees on our webpage: York.ca/developmentservices for additional fees. All fees need to be made payable by cheque to "The Regional Municipality of York". York Region fees have increased as of January 1, 2020.

- A digital copy of all the information submitted to the Town should be provided as part of the circulation package. York Region submission checklist: https://www.york.ca/wps/wcm/connect/yorkpublic/70be4a47-bd66-47fc-834e-dd06c12a7d33/18082_devAppSubmissionChecklistOct2018.pdf?MOD=AJPERES

Please be advised that the comments above are based upon the information provided as part of this pre-consultation meeting request. Should the scope of the proposal change and/or should it be determined that additional approvals are required under the Planning Act, our comments and requirements may be subject to change.

Asif Abbas, B.U.R.PL. | Planner, Planning and Economic Development Branch, Corporate Services
---
The Regional Municipality of York | 17250 Yonge Street | Newmarket, ON L3Y 6Z1
1-877-464-9675 ext. 77271 | Asif.Abbas@york.ca | york.ca

Central York Fire Services Comments: See attached memo dated December 15, 2020

Prepared by Project Planner: Rosanna Punit

Date: January 15, 2021

Reviewed by Manager of Development Planning: Anna Henriques

Date: January 15, 2021

PLANNING ACT APPLICATION - PRE-CONSULTATION

Date: December 18, 2020
Planner: Laura Tafreshi
Contact #: 905.895.1281
Email: L.Tafreshi@lsrca.on.ca

Address: 5-70 Archerhill Court, Town of Aurora (14 properties) **APID:** 473756

Type of Proposal (Please Highlight):

Official Plan Amendment	Site Plan Approval	Consent
Zoning By-law Amendment	Plan of Subdivision or Condominium	Minor Variance

Description of Proposal:

- 175 Single Detached dwellings (range in frontages of 11m to 18m)
- SWM pond
- New road network

Is the site within an area governed by Ontario Regulation 179/06? (Please Highlight)
YES (Permit Required) NO

Regulated Components (Please list):
The properties are partially within an area that is regulated by the LSRCA under Ontario Regulation 179/06 of the *Conservation Authorities Act* for the following natural heritage features and/or natural hazards:
-Apparent valleylands, characterized by steep slopes, associated with two (2) tributaries of the East Holland River;
-Meander belt erosion hazards associated with two (2) tributaries of the East Holland River;
-Ministry of Natural Resources and Forestry (MNRF) Non-Provincially Significant Wetland and its associated adjacent lands.

Required Report / Study	Functional Submission	Detailed Design	Required Report / Study	Functional Submission	Detailed Design
Proposed Amendment Documents (OPA/ZBA)	X		Top of Bank Demarcation Mapping	X	X
Planning Justification Report prepared by a qualified professional (inclusive of Provincial Plan Conformity including LSPP)	X	X	Floodplain Analysis		
Environmental Impact Study / Natural Heritage Evaluation	X	X	Geotechnical / Soils Report	X	X
Ecological Offsetting Strategy			Master Drainage Plan		
Rare, Threatened and Endangered Species Analysis			Slope Stability / Erosion Assessment	X	X
Tree Inventory & Preservation Plan / Arborist Report			Topographic Survey prepared by an OLS	X	X
Watercourse / Shoreline Protection, Enhancement and Restoration Plans			Hydrogeological Analysis including a Water Balance	X	X
Coastal Engineering Study			Phosphorus Budget	X	X
Vegetation Protection, Enhancement and Restoration Plans	X	X	Functional Servicing Report	X	X
Edge Management Plan	X	X	Stormwater Management Report	X	X
Landscape Plan			Erosion and Sediment Control Plan	X	X
Site Plan / Draft Plan/R Plan	X	X	Grading and Drainage Plan	X	X
			LSRCA Review Fee	X	X

Comments:
Please contact LSRCA staff to delineate the boundary of the Natural Heritage features on the site through a feature staking. We note that current LSRCA environmental mapping identifies a significant woodland, significant valleyland and a wetland feature on the subject lands. Please note that development is to be located outside of key natural heritage/key hydrologic features and their associated Minimum Vegetation Protection Zones (MVPZ). Proposed development is required to meet the “no negative impact” test and demonstrate that there will be no negative impacts to the natural features and their ecological functions in accordance with Section 23 of the ORMCP per Section 2.1 of the Provincial Policy Statement (PPS) and Subsection 22(3) of the Oak Ridges Moraine Conservation Plan (ORMCP). A scoped Natural Heritage Evaluation (NHE) will be required to assess these features and determine an appropriate limit of disturbance/development footprint. For clarity regarding the determination/assessment of features, the Technical Definitions and criteria for Identifying Key Natural Heritage Features and Key Hydrologic Features for the Lake Simcoe Protection Plan (MNRF, 2015) document should be referenced. Please contact the LSRCA with a Terms of Reference.

Slope Stability: A geotechnical investigation indicating that the location of the proposed development and site alteration is located outside of the erosion hazard limit of the river/stream system and will not negatively impact the stability of the slope, including identification of any engineering recommendations during and after construction per that assessment.

The proposal includes the creation of four (4) or more lots. It is noted that this scale of development meets the definition of "Major Development" per the Lake Simcoe Protection Plan (LSPP), the Oak Ridges Moraine Conservation Plan (ORMCP), the Greenbelt Plan (GBP), York Region Official Plan, and the Lake Simcoe Phosphorus Offsetting Policy (LSPOP), as well as the South Georgian Bay Lake Simcoe Source Protection Plan:

- A Stormwater Management Report will be required to satisfy designated policy 4.8-DP of the LSPP and in accordance with the LSRCA Technical Guidelines for Stormwater Management (SWM) Submissions, inclusive of a phosphorus budget and a pre- and post-development water balance assessment. Please refer to the LSRCA Technical Guidelines for SWM Submissions: https://www.lsrca.on.ca/Shared%20Documents/permits/swm_guidelines.pdf.
- The subject lands are within an Ecologically Significant Groundwater Recharge Area (ESGRA) and a Significant Groundwater Recharge Area (SGRA), and therefore the application will be required to be in accordance with the applicable policies of the Oak Ridges Moraine Conservation Plan (ORMCP). This includes an accompanying study which demonstrates that the quality and quantity of groundwater and the function of the recharge area will be maintained. The lands are identified as being within the Recharge Management Area (WHPA Q2) per the South Georgian Bay Lake Simcoe Source Protection Plan. A Hydrogeological Analysis and pre- and post-development water balance assessment will be required in support of the application per LUP-12 / LUP-13 of the Source Protection Plan following the CA Hydrogeological guidelines for Land Development Applications: https://www.lsrca.on.ca/Shared%20Documents/permits/hydrogeological%20_guidelines.pdf?pdf=Hydrogeological-Guidelines.
- Infiltration mitigation plan (LIDs) to address the loss of infiltration identified within the water balance assessment – this is usually contained in the SWM report through the design of appropriate LID measures. Seasonally high groundwater levels (from monitoring data) and in-situ soil percolation testing are required to support the design of any underground infiltration facility.
- The application will also be subject to the Lake Simcoe Phosphorus Offsetting Policy (LSPOP): https://www.lsrca.on.ca/watershed-health/phosphorus.

The proponent will need to demonstrate that any proposal to develop these lands is consistent with the policies of the Provincial Policy Statement (PPS) and in conformity with the Lake Simcoe Protection Plan (LSPP), The Growth Plan for the Greater Golden Horseshoe, the Oak Ridges Moraine Conservation Plan (ORMCP), the Greenbelt Plan (GBP), the York Region Official Plan, and the Town of Aurora Official Plan.

The subject lands are currently within an area that is regulated by the LSRCA under Ontario Regulation 179/06 of the Conservation Authorities Act. Accordingly, a permit from the LSRCA under Ontario Regulation 179/06 will be required prior to development or site alteration occurring within the regulated portion of the properties.

The Applicant is required to provide completed and signed technical checklists (attached) as part of their submissions to the LSRCA.

PLEASE NOTE:
Properly developed technical studies, prepared in accordance with applicable technical guidelines, will support timely review by the LSRCA. It is expected that technical submissions by the Applicant will meet good practice and industry standards to minimize resubmissions and avoid unnecessary delay.

LSRCA Hydrogeological Submission Acknowledgement

I, Name:_____, Credentials:_____(i.e. P.Geo, or exempted P.Eng. as determined within the *Professional Geoscientists Act of Ontario*), confirm that I am a professional familiar with applicable documents, guidelines and criteria pertaining to groundwater management and that the submission entitled:

Report Name:_____, with associated Drawings: _____has been reviewed by me and addresses the key components in the check list included below.

I acknowledge that hydrogeological sign-off or sign-off from another discipline pertaining to this submission or a portion of this submission does not constitute a permit from LSRCA. A permit will be required for all works within an LSRCA Regulated Area in accordance with Ontario Regulation 179/06 and additional information may be required as part of the permit process.

I acknowledge that an incomplete submission will result in processing delays and may be returned and/or additional information may be requested.

Signature:_____Printed Name:_____

Name of Consulting Firm:_____

Date:_____(mm/dd/yy)

LSRCA Hydrogeological Submission Checklist

The following checklist refers to the requirements when submitting a detailed design submission. These same requirements apply to functional design submissions as well, with the exception of the detailed design drawings. The functional design needs to provide sufficient detail to demonstrate the proposed development concept will be capable of meeting the hydrogeological requirements at the detailed design stage.

For items that have been included, please fill in the report section and report page along with appendix location or drawings pertaining to each item. For items not included, check "No" or "N/A" (Not Applicable) for each item. If "No" or "N/A" are checked, please provide an explanation in the note section of why the criteria do not apply in a particular instance. Please note that the submission may be deemed incomplete and that additional consultation with LSRCA may be required prior to submission acceptance.

The checklist below refers to requirements for every development type, therefore the **LSRCA Hydrogeological Submission Guidelines (2013)** should be referred to for specific study requirements for your type of Planning Act application. For example, the study scope may be reduced for single lot residential applications. Please contact LSRCA to scope study requirements prior to undertaking work.

Yes			No	N/A	Item	Comment
Report Section	Report Page	Drawing/ Appendix				
					Pre-submission consultation with LSRCA has been completed as recommended in the Hydrogeological Assessment Submission Guidelines (2013).	
					The hydrogeological report has been prepared as a **standalone document**. (i.e., all references, calculations and drawings, Thornthwaite-Mather water balance assessment, are included within the document).	
					A **Hard Copy** of all reports and all drawings (folded individually to 8.5" x 11" size) has been submitted for LSRCA review.	
					Geological Characterization as per Section 3.1	
					Test pits/Boreholes as per Section 3.1.6 (Required for detailed design)	
					Monitoring Wells as per Section 3.1.7 (Preliminary data required for functional design)	
					Private Well Survey as per Section 3.1.8	
					Characterization of the local hydrostratigraphy/hydrogeology as per Section 3.1.9	
					Description of Surface Water Features and Functions as per Section 3.1.10	
					Water Quality as per Section 3.1.12	
					D-5-5 Water Supply (private servicing only) as per Section 3.1.13	
					Groundwater Levels as per Section 3.2.1 (Preliminary data required for functional design)	
					Pumping Tests as per Section 3.2.2	
					Groundwater Discharge (Baseflow) as per Section 3.2.3	
					Pre- and Post-Development Water Balance Assessment as per Section	

Yes			No	N/A	Item	Comment
Report Section	Report Page	Drawing/ Appendix				
					3.2.4	
					D-5-4 (Onsite Sewage Systems only) as per Section 3.2.6	
					Infiltration/recharge mitigation plan as per Section 3.3	
					In-situ infiltration testing as per Section 3.3	
					Low impact development design calculations	

Submission/Resubmission Requirements:

1. A completed response matrix which includes a detailed response outlining how each of the comments above have been addressed with reference to applicable reports/drawings (i.e. specific sections/pages/details or tab identifiers).
2. The response matrix is to also include a summary of any additional changes to the design (i.e. in addition to those not identified in the detailed response to comments, and includes changes to reports, drawings, details, facility design, etc.).
3. All drawings are to be folded (8.5 x 11).
4. Reports and engineering drawings/details are to be signed and sealed by a Professional Geoscientist of Professional Engineer as appropriate.
5. Reports are to include a digital copy of applicable models on a Data CD or USB Thumb Drive.
6. All submissions/reports are to include applicable technical components which achieve the minimum requirements outlined in the LSRCA Technical Guidelines for Stormwater Management Submissions, September 2016.

Important Notes and References:

1. Please contact the LSRCA to scope any required Environmental Impact Study or Natural Heritage Evaluation
2. The stormwater management submission is required to be prepared in accordance with "LSRCA Technical Guidelines for SWM Submissions" https://www.lsrca.on.ca/Shared%20Documents/permits/swm_guidelines.pdf
3. Submissions are to be in accordance with the LSRCA Watershed Development Guidelines https://www.lsrca.on.ca/Shared%20Documents/permits/watershed-development-guidelines.pdf?pdf=Watershed-Development-Guidelines
4. The hydrogeological analysis is required to be prepared in accordance with "Hydrogeological Assessment Submissions: Conservation Authority Guidelines for Development Applications" https://www.lsrca.on.ca/Shared%20Documents/permits/hydrogeological%20_guidelines.pdf?pdf=Hydrogeological-Guidelines
5. Where the LSPOP applies, submissions are to be in accordance with the LSPOP found here: https://www.lsrca.on.ca/watershed-health/phosphorus
6. Low Impact Development Treatment Train Tool can be found here: https://www.lsrca.on.ca/Pages/LIDTTTool.aspx

7. LSPP Water Balance Offsetting Policy: applies to all new applications under the planning act received after 1 January 2019, details can be found here: https://www.lsrca.on.ca/Shared%20Documents/lspp-water-budget-policy.pdf
8. LSRCA Review Fees can be found here: https://www.lsrca.on.ca/permits/permit-fees

LSRCA Engineering Submission Acknowledgement

I, Name:_____, Credentials:_____(i.e. P.Eng., C.E.T.), confirm that I am a professional familiar with applicable documents, guidelines and criteria pertaining to stormwater management, erosion / sediment controls and natural hazards in the province of Ontario and that the submission entitled Report Name:_____, with associated drawings Drawings: _____, has been reviewed by me and addresses the key components in the checklist included below.

I acknowledge that engineering sign-off or sign-off from another discipline pertaining to this submission or a portion of this submission does not constitute a permit from LSRCA. A permit will be required for all works within an LSRCA Regulated Area in accordance with Ontario Regulation 179/06 and additional information may be required as part of the permit process.

I acknowledge that an incomplete submission will result in processing delays and may be returned or rejected and/or additional information may be requested, during which time, the submission will be placed on hold.

Signature:_____Printed Name:_____

Name of Consulting Firm:_____

Date:_____(mm/dd/yy)

LSRCA Engineering Submission Checklist

For items that have been included, please fill in the report section and report page along with appendix location or drawings pertaining to each item. For items not included, check "No" or "N/A (Not Applicable)" for each item. If "No" or "N/A" are checked, please provide an explanation of why the criteria do not apply in a particular instance and note that the submission may be deemed incomplete and that additional consultation with LSRCA will likely be required prior to submission acceptance. The sections noted in this check list refer to those contained within the **LSRCA Technical Guidelines for Stormwater Management Submissions**:

Yes			No	N/A	Item	Comment
Report Section	Report Page	Drawing/ Appendix				
					Pre-submission consultation with LSRCA has been completed as per Section 2.0.	
					The SWM report has been prepared as per Section 3.4 as a **standalone document** (i.e. all references, calculations and modelling are included within the document or a referenced appendix).	
					A **Hard Copy** of all reports and all drawings (folded	

Yes			No	N/A	Item	Comment
Report Section	Report Page	Drawing/ Appendix				
					individually to 8.5" x 11" size) has been submitted for LSRCA review.	
					Stormwater Quantity **Peak Flow Control** as per Section 2.2.1.	
					Stormwater Quantity **Volume Control** as per Section 2.2.2.	
					Safe conveyance of stormwater to a **sufficient outlet** as per Sections 2.2.3 / 2.2.4.	
					Stormwater Quality Control **(80% TSS removal/Enhanced Level Treatment/Level 1 Treatment)** as per Section 2.3.	
					Stormwater Quality Control **(Phosphorus Removal)** as per Section 2.3.2 and as outlined in the Lake Simcoe Protection Plan.	
					Stormwater Quality Control **(Other Pollutants)** as per Sections 2.3.3 – 2.3.5	
					Stream **Erosion Control** as per Section 2.4.	
					A **Water Balance / Groundwater** analysis as per Section 2.5.	
					Erosion and Sediment Control drawings and details including an applicable section in the SWM report as per Section 2.6.	
					The Lake Simcoe Phosphorus Offsetting Policy (LSPOP) including a **Phosphorous Budget** completed for the site using the MOE PTool or STEP's LID TTT.	
					Natural Hazards including	

Yes			No	N/A	Item	Comment
Report Section	Report Page	Drawing/ Appendix				
					floodplain (hydraulics, hydrology, mapping and cut / fill balance if applicable.)	
					SWM Modelling (hydrology and hydraulics) including digital files and all supporting SWM **calculations**.	
					The general requirements, as per **Appendix A** of the LSRCA Technical Guidelines for SWM Submissions. Please note that this Appendix is not an exhaustive list and that additional site-specific requirements may apply.	

Submission/Resubmission Requirements:

7. A completed response matrix which includes a detailed response outlining how each of the comments above have been addressed with reference to applicable reports/drawings (i.e. specific sections/pages/details or tab identifiers).
8. The response matrix is to also include a summary of any additional changes to the design (i.e. in addition to those not identified in the detailed response to comments, and includes changes to reports, drawings, details, facility design, etc.).
9. All drawings are to be folded (8.5 x 11).
10. Reports and engineering drawings/details are to be signed and sealed by a Professional Engineer.
11. Reports are to include a digital copy of applicable models on a Data CD or USB Thumb Drive.
12. All submissions/reports are to include applicable technical components which achieve the minimum requirements outlined in the LSRCA Technical Guidelines for Stormwater Management Submissions, September 2016.

Important Notes and References:

9. Please contact the LSRCA to scope any required Environmental Impact Study or Natural Heritage Evaluation
10. The stormwater management submission is required to be prepared in accordance with "LSRCA Technical Guidelines for SWM Submissions" https://www.lsrca.on.ca/Shared%20Documents/permits/swm_guidelines.pdf
11. Submissions are to be in accordance with the LSRCA Watershed Development Guidelines https://www.lsrca.on.ca/Shared%20Documents/permits/watershed-development-guidelines.pdf?pdf=Watershed-Development-Guidelines
12. The hydrogeological analysis is required to be prepared in accordance with "Hydrogeological Assessment Submissions: Conservation Authority Guidelines for Development Applications" https://www.lsrca.on.ca/Shared%20Documents/permits/hydrogeological%20_guidelines.pdf?pdf=Hydrogeological-Guidelines
13. Where the LSPOP applies, submissions are to be in accordance with the LSPOP found here: https://www.lsrca.on.ca/watershed-health/phosphorus
14. Low Impact Development Treatment Train Tool can be found here: https://www.lsrca.on.ca/Pages/LIDTTTool.aspx
15. LSRCA Review Fees can be found here: https://www.lsrca.on.ca/permits/permit-fees

APPENDIX B-6

EXISTING STORM OUTLET PHOTOS

	
Photo No.1 Gabion Basket Drop Structure	**Photo No.2** Channel downstream of gabion basket drop structure

Photo No.3
Channel between gabion basket drop structure and wetland

Photo No.4
Channel outlet to wetland

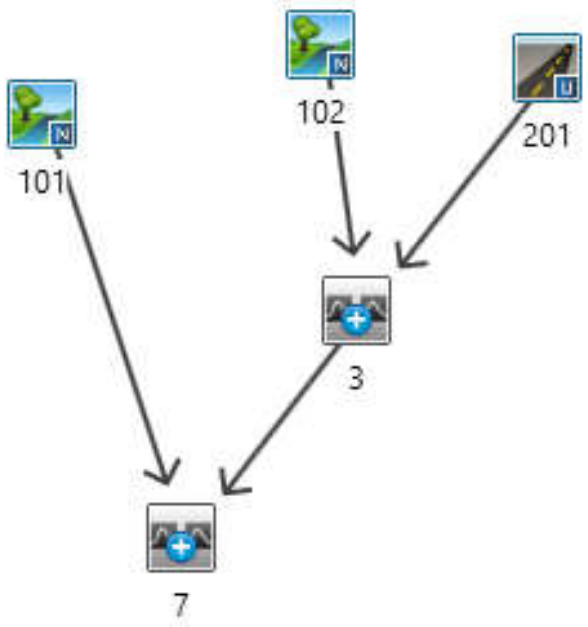
APPENDIX C

HYDROLOGY MODELLING

The following secure link is being provided by **SCS Consulting Group** to share Highfair Investments Inc. FSSR related digital data:
https://filesafecloud.scsconsultinggroup.com/url/bxp22fnitvke2nkg

Please click on the link and download all files from this location.

- Digital copy of the FSSR; and
- Visual Otthymo modelling files


101
102
201
3
7

Existing Conditions
VO2 Parameter Summary

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

NASHYD

Number	101	102
Description		
DT(min)	2	2
Area (ha)	2.38	9.96
CN*	77.0	80.0
IA(mm)	7.0	5.3
TP Method	Uplands	Uplands
TP (hr)	0.04	0.14

STANDHYD

Number	201
Description	External
DT(min)	2
Area (ha)	0.71
XIMP[1,2]	0.51
TIMP[2]	0.51
CN*	77.0
IA(mm)	5.5
SLPP(%)	2
LGP(m)	40
MNP	0.25
DPSI (mm)	2.0
SLPI(%)	1
LGI(m)	68.80
MNI	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 used

Total Area = 13.1 ha

Existing Conditions
CN Calculations

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

Site Soils: (per GEOTECHNICAL INVESTIGATION BY EXP)

Soil Type	Hydrologic Soil Group
Silty Clay	CD

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, 2 acre, 12% imp		46	55.5	65	71	77	79.5	82	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 (%) - Existing Conditions								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
101						100		100
102						100		100
201						100		100

LAND USE (%) - Existing Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
101		40.4		58.3					1.3	100.0
102	14.2	6.0		64.1					15.7	100.0
201	16.1			83.9						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) - Existing Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Weighted CN
101	0.0	30.7	0.0	44.9	0.0	0.0	0.0	0.0	1.3	77
102	10.6	4.6	0.0	49.4	0.0	0.0	0.0	0.0	15.4	80
201	12.0	0.0	0.0	64.6	0.0	0.0	0.0	0.0	0.0	77

** AMC II assumed

scs consulting group ltd

Existing Conditions
CN Calculations

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

Step	Input Values				
	Subcatchment:	101		102	201
1	**CN (AMC II):**	**77**		**80**	**77**
2	CN (AMC III) =	89		91	89
3	100 Year Precipitation, P =	108.98	mm	108.98	108.98

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

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				
	Subcatchment:	101		102	201
	S_{III} =	31.39	mm	25.12	31.39
	SCS Assumption of 0.2 S = Ia =	6.28	mm	5.02	6.28
4	Q_{III} =	78.66	mm	83.72	78.66
	Preferred Initial Abstraction, Ia =	7.0	mm	5.3	5.5
5	S^*_{III} =	30.27	mm	24.78	32.68
6	CN^*_{III} =	89.35	mm	91.11	88.60
	CN^*_{III}=	**89**	Rounded	**91**	**89**
7	**CN^*_{II}=**	**77**	convert	**80**	**77**

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

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

LAND USE (%) - Existing Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
101		40.4		58.3					1.3	100.0
102	14.2	6.0		64.1					15.7	100.0
201	16.1			83.9						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		4.0		2.9					0.0	7.0
102	1.1	0.6		3.2					0.3	5.3
201	1.3			4.2						5.5

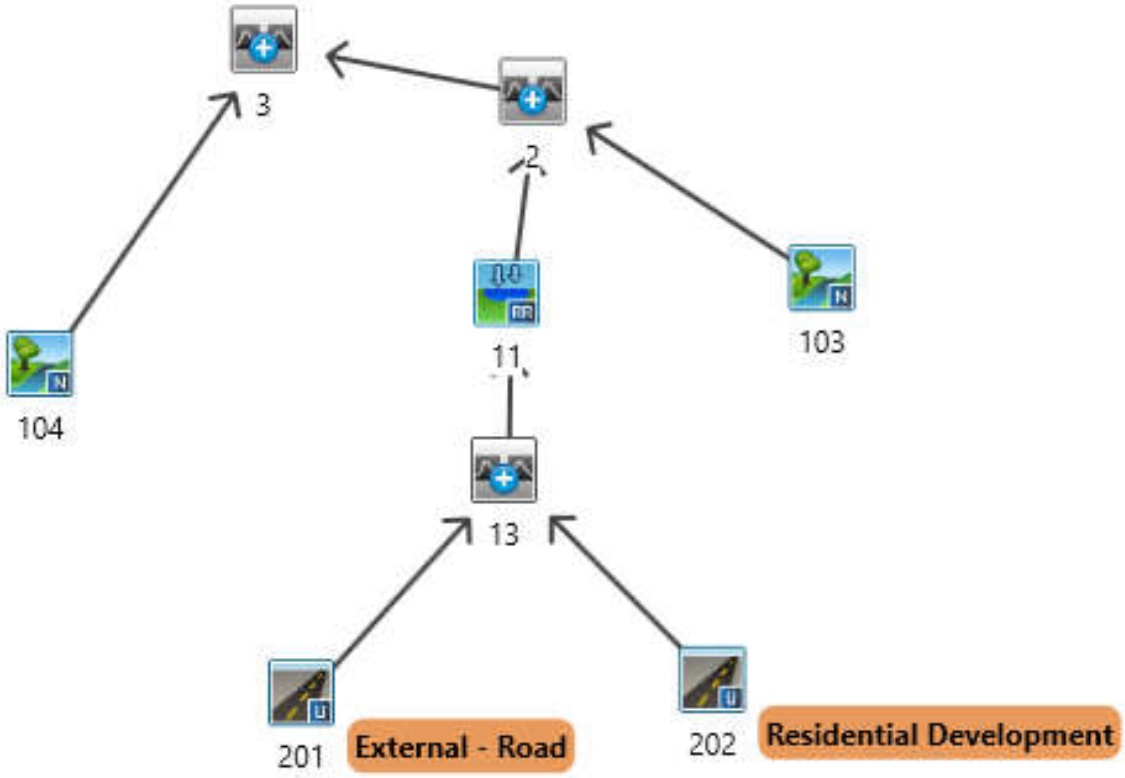
* IA values based on LRSCA guidelines

Existing Conditions
Time to Peak Calculations

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

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	277.69	270.39	100	7.31	Pasture	0.59	168.3	0.05	0.03
101b	270.39	269.04	15	8.84	Forest (Heavy Litter)	0.23	67.4	0.02	0.01
101									**0.04**
102a	278.00	274.90	70	4.41	Pasture	0.46	152.9	0.04	0.03
102b	274.90	267.60	382	1.91	Waterway	0.64	592.0	0.16	0.11
102									**0.14**


3
2
104
11
103
13
201
External - Road
202
Residential Development

Proposed Conditions
VO2 Parameter Summary

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

NASHYD

Number	103	104
Description		
DT(min)	2	2
Area (ha)	2.57	1.61
CN*	80.0	80.0
IA(mm)	7.4	8.1
TP Method	Uplands	Uplands
TP (hr)	0.06	0.06

STANDHYD

Number	201	202
Description		
DT(min)	2	2
Area (ha)	0.71	8.15
XIMP[1,2]	0.51	0.27
TIMP[2]	0.51	0.64
CN*	77.0	75.0
IA(mm)	5.5	5.0
SLPP(%)	2	2
LGP(m)	40	40
MNP	0.25	0.25
DPSI (mm)	2.0	2.0
SLPI(%)	1	1
LGI(m)	68.80	233.10
MNI	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 used

Total Area = 13.0 ha

Proposed Conditions
CN Calculations

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

Site Soils: (per GEOTECHNICAL INVESTIGATION BY EXP)

Soil Type: Silty Clay

Hydrologic Soil Group: CD

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 (%) - Proposed Conditions								
	Hydrologic Soil Type							
Catchment	A	AB	B	BC	C	CD	D	TOTAL
103						100		100
104						100		100
201						100		100
202						100		100

LAND USE (%) - Proposed Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
103	52.8	23.3		12.9					11.0	100.0
104	15.8	59.7		13.1					11.3	100.0
201	17.8			82.2						100.0
202				100.0						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) - Proposed Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Weighted CN
103	39.3	17.7	0.0	9.9	0.0	0.0	0.0	0.0	10.8	78
104	11.8	45.4	0.0	10.1	0.0	0.0	0.0	0.0	11.1	78
201	13.3	0.0	0.0	63.3	0.0	0.0	0.0	0.0	0.0	77
202	0.0	0.0	0.0	77.0	0.0	0.0	0.0	0.0	0.0	77

** AMC II assumed

scs consulting group ltd

Proposed Conditions
CN Calculations

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

Step	Input Values					
	Subcatchment:	103		104	201	202
1	**CN (AMC II):**	**78**		**78**	**77**	**77**
2	CN (AMC III) =	90		90	89	89
3	100 Year Precipitation, P =	108.98	mm	108.98	108.98	108.98

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

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					
	Subcatchment:	103		104	201	202
	S_{III} =	28.22	mm	28.22	31.39	31.39
	SCS Assumption of 0.2 S = Ia =	5.64	mm	5.64	6.28	6.28
4	Q_{III} =	81.17	mm	81.17	78.66	78.66
	Preferred Initial Abstraction, Ia =	7.4	mm	8.1	5.5	5.0
5	S^*_{III} =	25.52	mm	24.47	32.60	33.47
6	CN^*_{III} =	90.87	mm	91.21	88.63	88.36
	CN^*_{III}=	**91**	Rounded	**91**	**89**	**88**
7	**CN^*_{II}=**	**80**	convert	**80**	**77**	**75**

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

Proposed Conditions
IA Calculations

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

LAND USE (%) - Proposed Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
103	52.8	23.3		12.9					11.0	100.0
104	15.8	59.7		13.1					11.3	100.0
201	17.8			82.2						100.0
202				100.0						100.0

IA VALUES (mm) - Proposed 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	
103	4.2	2.3		0.6					0.2	7.4
104	1.3	6.0		0.7					0.2	8.1
201	1.4			4.1						5.5
202				5.0						5.0

* IA values based on LRSCA guidelines

scs consulting group ltd

Proposed Conditions
Time to Peak Calculations

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

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)
103a	276.15	270.80	27	19.79	Pasture	0.98	27.5	0.01	0.01
103b	270.80	268.50	74	3.11	Waterway	0.82	90.7	0.03	0.02
103c	268.50	267.50	103	0.97	Waterway	0.46	221.4	0.06	0.04
103									**0.06**
104a	275.94	274.40	37	4.12	Forest (Heavy Litter)	0.15	244.3	0.07	0.045
104b	274.40	269.72	26	17.73	Forest (Heavy Litter)	0.32	81.6	0.02	0.015
104									**0.06**

Hydrologic Soil Group Notes
August 2021
E.A.S.

Design Chart 1.08: Hydrologic Soil Groups (Continued)

- Based on Soil Texture

Sands, Sandy Loams and Gravels	
- overlying sand, gravel or limestone bedrock, very well drained	A
- ditto, imperfectly drained	AB
- shallow, overlying Precambrian bedrock or clay subsoil	B
Medium to Coarse Loams	
- overlying sand, gravel or limestone, well drained	AB
- shallow, overlying Precambrian bedrock or clay subsoil	B
Medium Textured Loams	
- shallow, overlying limestone bedrock	B
- overlying medium textured subsoil	BC
Silt Loams, Some Loams	
- with good internal drainage	BC
- with slow internal drainage and good external drainage	C
Clays, Clay Loams, Silty Clay Loams	
- with good internal drainage	C
- with imperfect or poor external drainage	C
- with slow internal drainage and good external drainage	D

Per EXP and RJ Burnside borehole logs, the site soils consist of silt and clayey silt.

A hydrologic soil group of CD was adopted for the hydrology calculations

Source: U.S. Department of Agriculture (1972)

APPENDIX D

PHOSPHOROUS BUDGET

SCS consulting group ltd

Existing Phosphorus Budget

Watershed East Holland River

Land Cover	TP Loading (kg/ha/yr)	Area (ha)	TP Loading (kg/yr)
Low Intensity Development	0.13	9.13	1.187
TOTAL		9.13	1.187

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

Proposed Conditions Phosphorus Budget

Watershed East Holland River

Description	Land Cover	TP Loading (kg/ha/yr)	Area (ha)	TP Loading (kg/yr)	BMP #1			BMP #2			Combined Removal Efficiency	Unmitigated P_{load} (kg/year)	Mitigated P_{load} (kg/year)
					BMP	TP Removal Rate (%)	TP Export (kg/yr)	BMP	TP Removal Rate (%)	TP Export (kg/yr)			
Rear Yard Infiltration and Stream Buffer	High Intensity Dev. - Residential	1.32	1.01	1.335	Infiltration Trenches	60%	0.534	Vegetated Filter Strips / Stream Buffers	65%	0.187	86%	1.335	0.187
Rear Yard Infiltration and Underground Storage	High Intensity Dev. - Residential	1.32	1.24	1.637	Infiltration Trenches	60%	0.655	Underground Storage	25%	0.491	70%	1.637	0.491
Catchbasin Filtration and Underground Storage	High Intensity Dev. - Residential	1.32	6.27	8.276	Sorbtive Media Interceptors	79%	1.738	Underground Storage	25%	1.304	84%	8.276	1.304
Bioswale Infiltration and Underground Storage	High Intensity Dev. - Residential	1.32	0.61	0.802	Infiltration Trenches	60%	0.321	Underground Storage	25%	0.241	70%	0.802	0.241
		Total	9.13								**Total**	12.050	2.222
												Removal Rate	**82%**

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

Lake Simcoe Phosphorous Offsetting Policy Calculation

Phosphorus Export =		2.22	kg/yr
Offset Ratio =		2.5	:1
Offsetting Value =	$	35,000.00	/kg/year
Offsetting Cost =	$	194,434.42	
Administration Fee =		15%	
	$	29,165.16	
TOTAL PHOSPHORUS OFFSETTING FEE =	**$**	**223,599.58**	

APPENDIX E

LID PRELIMINARY DESIGN

SCS consulting group ltd

18m ROW BOULEVARD FILTRATION
TRENCH SIZING

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer: E.A.S.

Estimate imperviousness of drainage area from roofs, driveway, and road areas draining to filtration trench. Assume a section of road with the full 18m ROW, a 13.7 m frontage lot with a split draining lot on one side, and a 13.7 frontage front draining lot on the other side, which also has the backyard of a split lot behind it contributing.

Total Area	13.7 x 82 =	1123.40 m^2
Imp Area (Roof)	(220.2 x 1/2) + (220.2 x 1/2) + (220.2) =	440.40 m^2
Imp Area (Driveway, including boulevard driveway)	(5.5 x 6 x 2) + (3.75 x 6 x 2) =	111 m^2
Imp Area (Sidewalk)	(1.5 x 13.7) =	20.55 m^2
Imp Area (Pavement+Curb)	(8 + 0.5 + 0.5) x 13.7=	123.3 m^2
Total Imp. Area		695.25 m^2
Imperviousness		**61.9%**
Sample Drainage Area	82 m2/m-road	0.0082 ha/m-road

Required Volume per Hectare (Water Quality Requirements)

(as per Table 3.2, MOE, 2003)	32.3 m^3/ha
Required Water Quality Infiltration Volume	**0.265** m^3/m-road

Required Volume per Hectare (25 mm Storm Requirements)

as per 25 mm Storm Event	154.7 m^3/ha
Required 25 mm Storm Event Volume	**1.269** m^3/m-road

Required Trench Volume	**1.269** m^3/m-road

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 (ContinuousFlow)	90	150	200	240

Filtration Trench Design - Provided

	Units	Total to Filtration Trench
D - Depth	m	0.80
W - Width	m	1.25
L - Length	m	1.00
A - Bottom Area	m^2	1.3
Total Volume of the Filtration Trench (i.e. stone volume)	m^3	1.0
n - Media Porosity		0.40
Total Runoff Storage Volume of the Filtration Trench	m^3	0.40
Total Runoff Storage Volume of the Filtration Trench	mm	7.9

Based on the maximum dimensions of the filtration trench to avoid conflicts with service laterals and utilities in the boulevard, the filtration trench provides 7.9 mm/impervious area of storage.

18m ROW BOULEVARD FILTRATION
TRENCH SIZING

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer: E.A.S.

Estimate imperviousness of drainage area from roofs, driveway, and road areas draining to filtration trench. Assume a section of road with a 13.7 m frontage lot with a split draining lot on one side and half of the 18m ROW.

Total Area	13.7 x 24 =	328.80 m^2
Imp Area (Roof)	(220.2 x 1/2) =	110.10 m^2
Imp Area (Driveway, including boulevard driveway)	(5.5 x 6) + (3.75 x 6) =	55.5 m^2
Imp Area (1/2 Sidewalk)	(0.75 x 13.7) =	10.275 m^2
Imp Area (Pavement+Curb)	(4 + 0.5) x 13.7=	61.65 m^2
Total Imp. Area		237.53 m^2
Imperviousness		**72.2%**
Sample Drainage Area	24 m2/m-road	0.0024 ha/m-road

Required Volume per Hectare (Water Quality Requirements)

(as per Table 3.2, MOE, 2003)	35.7	m^3/ha
Required Water Quality Infiltration Volume	**0.086**	m^3/m-road

Required Volume per Hectare (25 mm Storm Requirements)

as per 25 mm Storm Event	180.6	m^3/ha
Required 25 mm Storm Event Volume	**0.433**	m^3/m-road

Required Trench Volume	**0.433 m^3/m-road**

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 (ContinuousFlow)	90	150	200	240

Filtration Trench Design - Provided

	Units	Total to Filtration Trench
D - Depth	m	0.80
W - Width	m	1.25
L - Length	m	1.00
A - Bottom Area	m^2	1.3
Total Volume of the Filtration Trench (i.e. stone volume)	m^3	1.0
n - Media Porosity		0.40
Total Runoff Storage Volume of the Filtration Trench	m^3	0.40
Total Runoff Storage Volume of the Filtration Trench	mm	23.1

Based on the maximum dimensions of the filtration trench to avoid conflicts with service laterals and utilities in the boulevard, the filtration trench provides 23.1 mm/impervious area of storage.

Half of 18m ROW BIOSWALE SIZING

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer: E.A.S.

Estimate imperviousness of drainage area from road area of half of the 18m ROW and 13.7 split draining lot to bioswale.

Total Area	24 x 13.7 =	328.80 m^2
Imp Area (Half of Roof)	220.15 x 1/2 =	110.08 m^2
Imp Area (Driveway)	(5.5 x 6) + (3.75 x 6) =	55.5 m^2
Imp Area (Sidewalk/Trail/Multi-Use Pathway)	(1.5 x 13.7) =	20.55 m^2
Imp Area (Pavement+Curb)	(4 + 0.5) x 13.7 =	61.65 m^2
Total Imp. Area		247.78 m^2

Imperviousness **75.4%**

Sample Drainage Area 24 m2/m-road 0.0024 ha/m-road

Required Volume per Hectare (Water Quality Requirements)

(as per Table 3.2, MOE, 2003) 36.8 m^3/ha
Required Water Quality Infiltration Volume **0.088** m^3/m-road

Required Volume per Hectare (25 mm Storm Requirements)

as per 25 mm Storm Event 188.4 m^3/ha
Required 25 mm Storm Event Volume **0.452** m^3/m-road

Required Trench Volume	**0.452 m^3/m-road**

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 (ContinuousFlow)	90	150	200	240

Bioswale Design - Provided

	Units	Total to Bioswale
D - Depth	m	0.60
W - Width	m	1.0
L - Length	m	1.00
A - Bottom Area	m^2	1.0
Total Volume of the Bioswale (i.e. media volume)	m^3	0.6
n - Media Porosity		0.40
Total Runoff Storage Volume of the Bioswale	m^3	0.24
Total Runoff Storage Volume of the Bioswale	mm	13.3

Based on the maximum dimensions of the bioswale to avoid conflicts with service laterals and utilities in the boulevard, the filtration trench provides 13.3 mm/impervious area of storage.

Rear Yard Infiltration Trench Sizing

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

Individual Infiltration Trench Sizing - Maximum Trench Depth

		House Product Line				
	Units	11.0m	12.1m	13.7m	18.3m	Notes
Roof Area to Infiltration Trench	m^2	85.1	95.3	110.1	137.7	Estimated per zoning (50% coverage, 1/2 of roof)
Runoff Depth to Infiltration Trench	mm	25.0	25.0	25.0	25.0	Rainfall event to capture less evaporation (initial abstraction)
Runoff Volume to Infiltration Trench	m^3	2.13	2.38	2.75	3.44	
P - Percolation Rate	mm/h	12.0	12.0	12.0	12.0	per Hydrogeological Assessment
SF - Safety Factor		2.50	2.50	2.50	2.50	
n - Media Porosity		0.40	0.40	0.40	0.40	
t - Detention Time	h	48	48	48	48	
D - Maximum Infiltration Trench Depth	m	0.58	0.58	0.58	0.58	$D = \frac{P * t}{SF * n * 1000}$

Individual Infiltration Trench Design - Provided

		House Product Line				
	Units	11.0m	12.1m	13.7m	18.3m	Notes
D - Depth	m	0.58	0.58	0.58	0.58	
W - Width	m	1.1	1.1	1.1	1.1	
L - Length	m	9.00	10.10	11.70	13.50	
A - Bottom Area	m^2	9.9	11.1	12.9	14.9	
Total Volume of the Infiltration Trench	m^3	5.7	6.4	7.5	8.6	
n - Media Porosity		0.40	0.40	0.40	0.40	
Total Runoff Storage Volume of the Infiltration Trench	m^3	2.30	2.58	2.99	3.45	

Summary Table

		House Product Line				
	Units	11.0m	12.1m	13.7m	18.3m	Notes
Maximum Depth Required	m	0.58	0.58	0.58	0.58	
Depth Provided	m	0.58	0.58	0.58	0.58	
Volume Required	m^3	2.13	2.38	2.75	3.44	(per Runoff Volume to Infiltration Trench above)
Volume Provided	m^3	2.30	2.58	2.99	3.45	

APPENDIX F

SUPERPIPE SIZING CALCULATIONS

EXTENDED DETENTION

Using the 25mm - 4 hour Chicago Storm

Erosion Control Volume (V) = Runoff Depth (mm) x Drainage Area (ha) x 10 (m^3) / (mm)(ha)

Erosion Control Volume (V) = 12.11 mm x 8.86 ha x 10 m^3 / mm·ha

Erosion Control Volume (V) = 1073 m^3

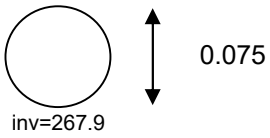
Governing Volume (V) = 1073 m^3

CONTROL STRUCTURE SUMMARY

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

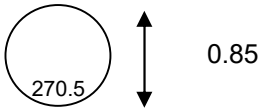
Orifice 1

Invert =	267.9	m
Size =	0.075	m
Orifice Coefficient, C =	0.62	
Obvert =	267.975	m



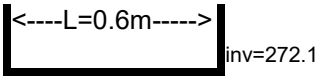
Orifice 2 (Round Only)

Invert =	270.5	m
Size =	0.85	m
C =	0.62	
Obvert =	271.35	m



Broad Crested Weir (Weir 2)

Length =	0.60	m
Elevation =	272.10	m
Crest Breadth =	0.254	m



OUTFLOW SUMMARY

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

Starting Water Level (m) = 267.9
Elevation Increment (m) = 0.05

Shading represents Storage-Discharge pairings used in VO6 modelling

Upstream Elevation (m)	Orifice 1 Outflow (cms)	Orifice 2 Outflow (cms)	Weir 2 Outflow (cms)	Stage (m)	Total Flow (cms)	Storage (m^3)	Detention Time (hrs)	4hr Chicago	12hr SCS	24hr SCS
267.90	0.000	0.000	0.000	267.90	0.000	0	0.0			
267.95	0.001	0.000	0.000	267.95	0.001	1	0.5			
268.00	0.003	0.000	0.000	268.00	0.003	5	1.0			
268.05	0.004	0.000	0.000	268.05	0.004	12	1.5			
268.10	0.005	0.000	0.000	268.10	0.005	21	2.1			
268.15	0.006	0.000	0.000	268.15	0.006	34	2.8			
268.20	0.006	0.000	0.000	268.20	0.006	48	3.5			
268.25	0.007	0.000	0.000	268.25	0.007	63	4.1			
268.30	0.007	0.000	0.000	268.30	0.007	78	4.7			
268.35	0.008	0.000	0.000	268.35	0.008	93	5.2			
268.40	0.008	0.000	0.000	268.40	0.008	108	5.8			
268.45	0.009	0.000	0.000	268.45	0.009	123	6.3			
268.50	0.009	0.000	0.000	268.50	0.009	139	6.8			
268.55	0.009	0.000	0.000	268.55	0.009	155	7.2			
268.60	0.010	0.000	0.000	268.60	0.010	172	7.7			
268.65	0.010	0.000	0.000	268.65	0.010	189	8.2			
268.70	0.011	0.000	0.000	268.70	0.011	206	8.7			
268.75	0.011	0.000	0.000	268.75	0.011	225	9.1			
268.80	0.011	0.000	0.000	268.80	0.011	243	9.6			
268.85	0.012	0.000	0.000	268.85	0.012	262	10.0			
268.90	0.012	0.000	0.000	268.90	0.012	281	10.5			
268.95	0.012	0.000	0.000	268.95	0.012	301	11.0			
269.00	0.013	0.000	0.000	269.00	0.013	322	11.4			
269.05	0.013	0.000	0.000	269.05	0.013	343	11.9			
269.10	0.013	0.000	0.000	269.10	0.013	366	12.4			
269.15	0.013	0.000	0.000	269.15	0.013	388	12.9			
269.20	0.014	0.000	0.000	269.20	0.014	412	13.3			
269.25	0.014	0.000	0.000	269.25	0.014	436	13.8			
269.30	0.014	0.000	0.000	269.30	0.014	461	14.3			
269.35	0.014	0.000	0.000	269.35	0.014	487	14.8			
269.40	0.015	0.000	0.000	269.40	0.015	512	15.3			
269.45	0.015	0.000	0.000	269.45	0.015	538	15.8			
269.50	0.015	0.000	0.000	269.50	0.015	562	16.2			
269.55	0.015	0.000	0.000	269.55	0.015	583	16.6			
269.60	0.016	0.000	0.000	269.60	0.016	603	17.0			
269.65	0.016	0.000	0.000	269.65	0.016	621	17.3			
269.70	0.016	0.000	0.000	269.70	0.016	638	17.6			
269.75	0.016	0.000	0.000	269.75	0.016	657	17.9			
269.80	0.017	0.000	0.000	269.80	0.017	677	18.2			
269.85	0.017	0.000	0.000	269.85	0.017	698	18.6			
269.90	0.017	0.000	0.000	269.90	0.017	721	19.0			
269.95	0.017	0.000	0.000	269.95	0.017	745	19.4			
270.00	0.017	0.000	0.000	270.00	0.017	771	19.8			
270.05	0.018	0.000	0.000	270.05	0.018	798	20.2			
270.10	0.018	0.000	0.000	270.10	0.018	826	20.6			
270.15	0.018	0.000	0.000	270.15	0.018	855	21.1			
270.20	0.018	0.000	0.000	270.20	0.018	885	21.6			
270.25	0.018	0.000	0.000	270.25	0.018	917	22.0			
270.30	0.019	0.000	0.000	270.30	0.019	949	22.5			
270.35	0.019	0.000	0.000	270.35	0.019	983	23.0			
270.40	0.019	0.000	0.000	270.40	0.019	1017	23.5			
270.45	0.019	0.000	0.000	270.45	0.019	1053	24.0			
270.50	0.019	0.000	0.000	270.50	0.019	1090	24.6			
270.55	0.020	0.005	0.000	270.55	0.025	1128	25.1			
270.60	0.020	0.020	0.000	270.60	0.039	1166	25.4			
270.65	0.020	0.043	0.000	270.65	0.063	1205	25.6	2 Year		
270.70	0.020	0.075	0.000	270.70	0.095	1244	25.7			
270.75	0.020	0.115	0.000	270.75	0.135	1284	25.8			
270.80	0.021	0.162	0.000	270.80	0.182	1323	25.9		2 Year	2 Year
270.85	0.021	0.215	0.000	270.85	0.236	1362	26.0			

OUTFLOW SUMMARY

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

Starting Water Level (m) = 267.9
Elevation Increment (m) = 0.05

Shading represents Storage-Discharge pairings used in VO6 modelling

Upstream Elevation (m)	Orifice 1 Outflow (cms)	Orifice 2 Outflow (cms)	Weir 2 Outflow (cms)	Stage (m)	Total Flow (cms)	Storage (m^3)	Detention Time (hrs)	4hr Chicago	12hr SCS	24hr SCS
270.90	0.021	0.274	0.000	270.90	0.295	1401	26.0	5 Year		
270.95	0.021	0.274	0.000	270.95	0.295	1439	26.0			
271.00	0.021	0.427	0.000	271.00	0.448	1476	26.1	10 Year		
271.05	0.021	0.551	0.000	271.05	0.572	1512	26.1		5 Year	
271.10	0.022	0.652	0.000	271.10	0.673	1548	26.1			5 Year
271.15	0.022	0.739	0.000	271.15	0.761	1582	26.1	25 Year		
271.20	0.022	0.817	0.000	271.20	0.839	1616	26.1			
271.25	0.022	0.888	0.000	271.25	0.910	1647	26.1		10 Year	
271.30	0.022	0.954	0.000	271.30	0.977	1677	26.1			10 Year
271.35	0.022	1.016	0.000	271.35	1.038	1705	26.1			
271.40	0.023	1.074	0.000	271.40	1.097	1732	26.1	50 Year		
271.45	0.023	1.129	0.000	271.45	1.152	1757	26.2		25 Year	
271.50	0.023	1.182	0.000	271.50	1.205	1781	26.2			25 Year
271.55	0.023	1.232	0.000	271.55	1.255	1803	26.2			
271.60	0.023	1.280	0.000	271.60	1.304	1823	26.2			
271.65	0.023	1.327	0.000	271.65	1.350	1842	26.2		50 Year	
271.70	0.024	1.372	0.000	271.70	1.395	1859	26.2	100 Year		
271.75	0.024	1.415	0.000	271.75	1.439	1875	26.2			50 Year
271.80	0.024	1.458	0.000	271.80	1.482	1888	26.2			
271.85	0.024	1.499	0.000	271.85	1.523	1901	26.2			
271.90	0.024	1.539	0.000	271.90	1.563	1912	26.2			
271.95	0.024	1.578	0.000	271.95	1.602	1921	26.2			
272.00	0.024	1.616	0.000	272.00	1.640	1928	26.2		100 Year	100 Year
272.05	0.025	1.653	0.000	272.05	1.677	1934	26.2			
272.10	0.025	1.689	0.000	272.10	1.714	1939	26.2			
272.15	0.025	1.725	0.010	272.15	1.760	1942	26.2			
272.20	0.025	1.760	0.029	272.20	1.814	1944	26.2			
272.25	0.025	1.794	0.054	272.25	1.873	1945	26.2			
272.30	0.025	1.827	0.083	272.30	1.936	1946	26.2			
272.35	0.025	1.860	0.120	272.35	2.006	1946	26.2			

Storage Summary

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

Control Structure Outlet Invert = 267.9 m

Superpipe 1 Parameters

Length =	50	m
Slope =	0.5	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	267.90	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.52	m^2
Total Storage Provided =	225.81	m^3
U/S Superpipe Invert =	268.15	m
U/S Superpipe Obvert =	269.67	m
U/S Haunch Invert =	268.40	m
U/S Haunch Obvert =	269.42	m
D/S Superpipe Obvert =	269.42	m
D/S Haunch Invert =	268.15	m
D/S Haunch Obvert =	269.17	m

Superpipe 2 Parameters

Length =	150	m
Slope =	1.6	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	268.41	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.51612	m^2
Total Storage Provided =	677.42	m^3
U/S Superpipe Invert =	270.81	m
U/S Superpipe Obvert =	272.33	m
U/S Haunch Invert =	271.06	m
U/S Haunch Obvert =	272.08	m
D/S Superpipe Obvert =	269.93	m
D/S Haunch Invert =	268.66	m
D/S Haunch Obvert =	269.68	m

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
267.90	0.00
267.95	0.64
268.00	2.61
268.05	5.94
268.10	10.69
268.15	16.92
268.20	24.01
268.25	31.31
268.30	38.76
268.35	46.31
268.40	53.92
268.45	61.54
268.50	69.16
268.55	76.78
268.60	84.40
268.65	92.02
268.70	99.64
268.75	107.26
268.80	114.88
268.85	122.50
268.90	130.12
268.95	137.74
269.00	145.36
269.05	152.98
269.10	160.60
269.15	168.22
269.20	175.84
269.25	183.43
269.30	190.94
269.35	198.32
269.40	205.51
269.45	212.31
269.50	217.76
269.55	221.77
269.60	224.39

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
267.90	0.00
267.95	0.00
268.00	0.00
268.05	0.00
268.10	0.00
268.15	0.00
268.20	0.00
268.25	0.00
268.30	0.00
268.35	0.00
268.40	0.00
268.45	0.13
268.50	0.66
268.55	1.61
268.60	3.01
268.65	4.86
268.70	7.18
268.75	9.98
268.80	13.26
268.85	17.01
268.90	21.24
268.95	25.94
269.00	31.12
269.05	36.78
269.10	42.91
269.15	49.52
269.20	56.60
269.25	64.16
269.30	72.20
269.35	80.71
269.40	89.70
269.45	99.17
269.50	109.11
269.55	119.53
269.60	130.43

Storage Summary

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

Superpipe 1 Parameters

Length =	50	m
Slope =	0.5	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	267.90	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.52	m^2
Total Storage Provided =	225.81	m^3
U/S Superpipe Invert =	268.15	m
U/S Superpipe Obvert =	269.67	m
U/S Haunch Invert =	268.40	m
U/S Haunch Obvert =	269.42	m
D/S Superpipe Obvert =	269.42	m
D/S Haunch Invert =	268.15	m
D/S Haunch Obvert =	269.17	m

Superpipe 2 Parameters

Length =	150	m
Slope =	1.6	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	268.41	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.51612	m^2
Total Storage Provided =	677.42	m^3
U/S Superpipe Invert =	270.81	m
U/S Superpipe Obvert =	272.33	m
U/S Haunch Invert =	271.06	m
U/S Haunch Obvert =	272.08	m
D/S Superpipe Obvert =	269.93	m
D/S Haunch Invert =	268.66	m
D/S Haunch Obvert =	269.68	m

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
269.65	225.66
269.70	225.81
269.75	225.81
269.80	225.81
269.85	225.81
269.90	225.81
269.95	225.81
270.00	225.81
270.05	225.81
270.10	225.81
270.15	225.81
270.20	225.81
270.25	225.81
270.30	225.81
270.35	225.81
270.40	225.81
270.45	225.81
270.50	225.81
270.55	225.81
270.60	225.81
270.65	225.81
270.70	225.81
270.75	225.81
270.80	225.81
270.85	225.81
270.90	225.81
270.95	225.81
271.00	225.81
271.05	225.81
271.10	225.81
271.15	225.81
271.20	225.81
271.25	225.81
271.30	225.81
271.35	225.81
271.40	225.81
271.45	225.81

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
269.65	141.80
269.70	153.65
269.75	165.96
269.80	178.73
269.85	191.94
269.90	205.58
269.95	219.60
270.00	233.71
270.05	247.82
270.10	261.93
270.15	276.05
270.20	290.16
270.25	304.27
270.30	318.39
270.35	332.50
270.40	346.61
270.45	360.73
270.50	374.84
270.55	388.95
270.60	403.06
270.65	417.18
270.70	431.29
270.75	445.40
270.80	459.52
270.85	473.50
270.90	487.08
270.95	500.24
271.00	512.96
271.05	525.22
271.10	537.01
271.15	548.32
271.20	559.16
271.25	569.52
271.30	579.41
271.35	588.82
271.40	597.75
271.45	606.21

Storage Summary

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

Superpipe 1 Parameters

Length =	50	m
Slope =	0.5	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	267.90	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.52	m^2
Total Storage Provided =	225.81	m^3
U/S Superpipe Invert =	268.15	m
U/S Superpipe Obvert =	269.67	m
U/S Haunch Invert =	268.40	m
U/S Haunch Obvert =	269.42	m
D/S Superpipe Obvert =	269.42	m
D/S Haunch Invert =	268.15	m
D/S Haunch Obvert =	269.17	m

Superpipe 2 Parameters

Length =	150	m
Slope =	1.6	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	268.41	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.51612	m^2
Total Storage Provided =	677.42	m^3
U/S Superpipe Invert =	270.81	m
U/S Superpipe Obvert =	272.33	m
U/S Haunch Invert =	271.06	m
U/S Haunch Obvert =	272.08	m
D/S Superpipe Obvert =	269.93	m
D/S Haunch Invert =	268.66	m
D/S Haunch Obvert =	269.68	m

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
271.50	225.81
271.55	225.81
271.60	225.81
271.65	225.81
271.70	225.81
271.75	225.81
271.80	225.81
271.85	225.81
271.90	225.81
271.95	225.81
272.00	225.81
272.05	225.81
272.10	225.81
272.15	225.81
272.20	225.81
272.25	225.81
272.30	225.81
272.35	225.81
272.40	225.81
272.45	225.81
272.50	225.81
272.55	225.81
272.60	225.81

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
271.50	614.19
271.55	621.69
271.60	628.72
271.65	635.27
271.70	641.35
271.75	646.95
271.80	652.07
271.85	656.72
271.90	660.89
271.95	664.58
272.00	667.80
272.05	670.54
272.10	672.80
272.15	674.60
272.20	675.94
272.25	676.85
272.30	677.33
272.35	677.42
272.40	677.42
272.45	677.42
272.50	677.42
272.55	677.42
272.60	677.42

Storage Summary

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

Superpipe 3 Parameters

Length =	50	m
Slope =	0.5	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	267.90	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.51612	m^2
Total Storage Provided =	225.81	m^3
U/S Superpipe Invert =	268.15	m
U/S Superpipe Obvert =	269.67	m
U/S Haunch Invert =	268.40	m
U/S Haunch Obvert =	269.42	m
D/S Superpipe Obvert =	269.42	m
D/S Haunch Invert =	268.15	m
D/S Haunch Obvert =	269.17	m

Superpipe 4 Parameters

Length =	70	m
Slope =	2.7	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	268.93	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.51612	m^2
Total Storage Provided =	316.13	m^3
U/S Superpipe Invert =	270.82	m
U/S Superpipe Obvert =	272.34	m
U/S Haunch Invert =	271.07	m
U/S Haunch Obvert =	272.09	m
D/S Superpipe Obvert =	270.45	m
D/S Haunch Invert =	269.18	m
D/S Haunch Obvert =	270.20	m

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
267.90	0.00
267.95	0.64
268.00	2.61
268.05	5.94
268.10	10.69
268.15	16.92
268.20	24.01
268.25	31.31
268.30	38.76
268.35	46.31
268.40	53.92
268.45	61.54
268.50	69.16
268.55	76.78
268.60	84.40
268.65	92.02
268.70	99.64
268.75	107.26
268.80	114.88
268.85	122.50
268.90	130.12
268.95	137.74
269.00	145.36
269.05	152.98
269.10	160.60
269.15	168.22
269.20	175.84
269.25	183.43
269.30	190.94
269.35	198.32
269.40	205.51
269.45	212.31
269.50	217.76
269.55	221.77
269.60	224.39

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
267.90	0.00
267.95	0.00
268.00	0.00
268.05	0.00
268.10	0.00
268.15	0.00
268.20	0.00
268.25	0.00
268.30	0.00
268.35	0.00
268.40	0.00
268.45	0.00
268.50	0.00
268.55	0.00
268.60	0.00
268.65	0.00
268.70	0.00
268.75	0.00
268.80	0.00
268.85	0.00
268.90	0.00
268.95	0.02
269.00	0.23
269.05	0.70
269.10	1.42
269.15	2.41
269.20	3.67
269.25	5.22
269.30	7.05
269.35	9.16
269.40	11.55
269.45	14.22
269.50	17.18
269.55	20.42
269.60	23.94

Storage Summary

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

Superpipe 3 Parameters

Length =	50	m
Slope =	0.5	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	267.90	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.51612	m^2
Total Storage Provided =	225.81	m^3
U/S Superpipe Invert =	268.15	m
U/S Superpipe Obvert =	269.67	m
U/S Haunch Invert =	268.40	m
U/S Haunch Obvert =	269.42	m
D/S Superpipe Obvert =	269.42	m
D/S Haunch Invert =	268.15	m
D/S Haunch Obvert =	269.17	m

Superpipe 4 Parameters

Length =	70	m
Slope =	2.7	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	268.93	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.51612	m^2
Total Storage Provided =	316.13	m^3
U/S Superpipe Invert =	270.82	m
U/S Superpipe Obvert =	272.34	m
U/S Haunch Invert =	271.07	m
U/S Haunch Obvert =	272.09	m
D/S Superpipe Obvert =	270.45	m
D/S Haunch Invert =	269.18	m
D/S Haunch Obvert =	270.20	m

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
269.65	225.66
269.70	225.81
269.75	225.81
269.80	225.81
269.85	225.81
269.90	225.81
269.95	225.81
270.00	225.81
270.05	225.81
270.10	225.81
270.15	225.81
270.20	225.81
270.25	225.81
270.30	225.81
270.35	225.81
270.40	225.81
270.45	225.81
270.50	225.81
270.55	225.81
270.60	225.81
270.65	225.81
270.70	225.81
270.75	225.81
270.80	225.81
270.85	225.81
270.90	225.81
270.95	225.81
271.00	225.81
271.05	225.81
271.10	225.81
271.15	225.81
271.20	225.81
271.25	225.81
271.30	225.81
271.35	225.81
271.40	225.81
271.45	225.81

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
269.65	27.74
269.70	31.83
269.75	36.20
269.80	40.85
269.85	45.78
269.90	50.99
269.95	56.49
270.00	62.27
270.05	68.33
270.10	74.67
270.15	81.30
270.20	88.21
270.25	95.40
270.30	102.86
270.35	110.58
270.40	118.56
270.45	126.79
270.50	135.15
270.55	143.51
270.60	151.88
270.65	160.24
270.70	168.60
270.75	176.96
270.80	185.33
270.85	193.65
270.90	201.75
270.95	209.60
271.00	217.18
271.05	224.51
271.10	231.55
271.15	238.31
271.20	244.79
271.25	250.99
271.30	256.90
271.35	262.53
271.40	267.88
271.45	272.95

Storage Summary

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

Superpipe 3 Parameters

Length =	50	m
Slope =	0.5	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	267.90	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.51612	m^2
Total Storage Provided =	225.81	m^3
U/S Superpipe Invert =	268.15	m
U/S Superpipe Obvert =	269.67	m
U/S Haunch Invert =	268.40	m
U/S Haunch Obvert =	269.42	m
D/S Superpipe Obvert =	269.42	m
D/S Haunch Invert =	268.15	m
D/S Haunch Obvert =	269.17	m

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
271.50	225.81
271.55	225.81
271.60	225.81
271.65	225.81
271.70	225.81
271.75	225.81
271.80	225.81
271.85	225.81
271.90	225.81
271.95	225.81
272.00	225.81
272.05	225.81
272.10	225.81
272.15	225.81
272.20	225.81
272.25	225.81
272.30	225.81
272.35	225.81
272.40	225.81
272.45	225.81
272.50	225.81
272.55	225.81
272.60	225.81

Superpipe 4 Parameters

Length =	70	m
Slope =	2.7	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	268.93	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.51612	m^2
Total Storage Provided =	316.13	m^3
U/S Superpipe Invert =	270.82	m
U/S Superpipe Obvert =	272.34	m
U/S Haunch Invert =	271.07	m
U/S Haunch Obvert =	272.09	m
D/S Superpipe Obvert =	270.45	m
D/S Haunch Invert =	269.18	m
D/S Haunch Obvert =	270.20	m

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
271.50	277.74
271.55	282.24
271.60	286.46
271.65	290.40
271.70	294.06
271.75	297.43
271.80	300.52
271.85	303.33
271.90	305.86
271.95	308.11
272.00	310.07
272.05	311.75
272.10	313.15
272.15	314.27
272.20	315.12
272.25	315.70
272.30	316.04
272.35	316.13
272.40	316.13
272.45	316.13
272.50	316.13
272.55	316.13
272.60	316.13

Storage Summary

Highfair Investments Inc.
Project Number: 2301
Date: August 2021
Designer Initials: E.A.S.

Superpipe 5 Parameters

Length =	111	m
Slope =	0.9	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	269.61	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.51612	m^2
Total Storage Provided =	501.29	m^3
U/S Superpipe Invert =	270.61	m
U/S Superpipe Obvert =	272.13	m
U/S Haunch Invert =	270.86	m
U/S Haunch Obvert =	271.88	m
D/S Superpipe Obvert =	271.13	m
D/S Haunch Invert =	269.86	m
D/S Haunch Obvert =	270.88	m

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
267.90	0.00
267.95	0.00
268.00	0.00
268.05	0.00
268.10	0.00
268.15	0.00
268.20	0.00
268.25	0.00
268.30	0.00
268.35	0.00
268.40	0.00
268.45	0.00
268.50	0.00
268.55	0.00
268.60	0.00
268.65	0.00
268.70	0.00
268.75	0.00
268.80	0.00
268.85	0.00
268.90	0.00
268.95	0.00
269.00	0.00
269.05	0.00
269.10	0.00
269.15	0.00
269.20	0.00
269.25	0.00
269.30	0.00
269.35	0.00
269.40	0.00
269.45	0.00
269.50	0.00
269.55	0.00
269.60	0.00

Superpipe 5 Parameters

Length =	111	m
Slope =	0.9	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	269.61	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.51612	m^2
Total Storage Provided =	501.29	m^3

U/S Superpipe Invert =	270.61	m
U/S Superpipe Obvert =	272.13	m
U/S Haunch Invert =	270.86	m
U/S Haunch Obvert =	271.88	m
D/S Superpipe Obvert =	271.13	m
D/S Haunch Invert =	269.86	m
D/S Haunch Obvert =	270.88	m

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
269.65	0.23
269.70	1.17
269.75	2.87
269.80	5.35
269.85	8.64
269.90	12.77
269.95	17.74
270.00	23.57
270.05	30.24
270.10	37.75
270.15	46.11
270.20	55.32
270.25	65.38
270.30	76.28
270.35	88.03
270.40	100.62
270.45	114.07
270.50	128.36
270.55	143.49
270.60	159.47
270.65	176.06
270.70	192.78
270.75	209.59
270.80	226.46
270.85	243.37
270.90	260.29
270.95	277.19
271.00	294.06
271.05	310.85
271.10	327.56
271.15	344.10
271.20	359.97
271.25	374.98
271.30	389.16
271.35	402.48
271.40	414.96
271.45	426.59

Superpipe 5 Parameters

Length =	111	m
Slope =	0.9	%
Span =	3048	mm
Rise =	1524	mm
Haunch height =	254	mm
D/S Superpipe Invert =	269.61	m
Elevation Increment =	0.05	m
Cross-Sectional Area =	4.51612	m^2
Total Storage Provided =	501.29	m^3

U/S Superpipe Invert =	270.61	m
U/S Superpipe Obvert =	272.13	m
U/S Haunch Invert =	270.86	m
U/S Haunch Obvert =	271.88	m
D/S Superpipe Obvert =	271.13	m
D/S Haunch Invert =	269.86	m
D/S Haunch Obvert =	270.88	m

Stage/Storage Table:

Stage (m)	Total Volume (m^3)
271.50	437.37
271.55	447.31
271.60	456.40
271.65	464.64
271.70	472.04
271.75	478.59
271.80	484.29
271.85	489.15
271.90	493.16
271.95	496.34
272.00	498.71
272.05	500.30
272.10	501.13
272.15	501.29
272.20	501.29
272.25	501.29
272.30	501.29
272.35	501.29
272.40	501.29
272.45	501.29
272.50	501.29
272.55	501.29
272.60	501.29

APPENDIX G

SANITARY FLOW CALCULATIONS

EXISTING SANITARY SEWER DESIGN SHEET
Town of Aurora
Regional Municipality of York

Minimum Dia. =	**200 mm**		
Mannings "n"=	**0.013**		
Minimum Velocity =	**0.6 m/s**		
Minimum Grade =	**0.5 %**		
Avg. Domestic Flow =	**400 l/c/d**	**(365 l/c/d used for 600mm Trunk Sewer)**	
Infiltration =	**0.26 l/s/ha**		
Max. Peaking Factor=	**4.0**		
Min. Peaking Factor=	**1.0**		
Maximum Velocity =	**3.65 m/s**		

Project:	**Highfair Investments Inc.**
Project No:	**2301**
Date:	**1-Aug-21**
Designed by:	**P.R.S./S.E.K.**
NOMINAL PIPE SIZE USED	

STREET	FROM MH	TO MH	RESIDENTIAL							FLOW CALCULATIONS						PIPE DATA				
			AREA (ha)	ACC. AREA (ha)	UNITS (#)	DENISTY (P/ha)	DENSITY (P/unit)	POP	ACC. RES. POP.	INFILTRATION (l/s)	TOTAL ACC. POP.	PEAKING FACTOR	RES. FLOW (l/s)	COMM. FLOW (l/s)	TOTAL FLOW (l/s)	DIA. (mm)	SLOPE (%)	Q FULL (l/s)	V FULL (m/s)	V ACT (m/s)
Stonebridge Estates S	CB1	SC1	7.82	7.82	35		3.8	133	133	2.0	133	4.00	2.5	0.0	4.5	200	0.50	23.2	0.74	0.56
Stonebridge Estates N	SC1	VSPS	7.85	15.67	64		3.8	243	376	4.1	376	4.00	7.0	0.0	11.0	200	0.50	23.2	0.74	0.72
Wycliffe Diamond South	SC1EX	VSPS	8.80	8.80	0	45	3.5	396	396	2.3	396	4.00	7.3	0.0	9.6	200	0.50	23.2	0.74	0.70
Benville Crescent	BC1	VSPS	3.78	3.78	41		3.8	156	156	1.0	156	4.00	2.9	0.0	3.9	200	0.50	23.2	0.74	0.54
Monkman Court	MC1	VSPS	3.23	3.23	32		3.8	122	122	0.8	122	4.00	2.3	0.0	3.1	200	0.50	23.2	0.74	0.51
Wycliffe Diamond North	DK1	VSPS	2.60	2.60	28		3.5	98	98	0.7	98	4.00	1.8	0.0	2.5	200	0.50	23.2	0.74	0.48
Ex.VANDORF SPS	VSPS	Ex1A	0.00	34.08	0		3.8	0	1,148	8.9	1148	3.76	20.0	0.0	28.8	200	0.50	23.2	0.74	0.84
Belfountain on Bayview	BB1	Ex1A	12.72	12.72	75		3.8	285	285	3.3	285	4.00	5.3	0.0	8.6	200	0.50	23.2	0.74	0.68
Belfountain on Bayview Park	BB2	Ext1A	0.83	0.83	0	45		37	37	0.2	37	4.00	0.7	0.0	0.9	200	0.50	23.2	0.74	0.35
Bayview Avenue	Ex1A	Ex4A	0.00	46.80	0		3.8	0	1,433	12.2	1433	3.69	24.5	0.0	36.7	300	1.50	118.4	1.67	1.47
Rickard St. (Genview)	RS1	Ex4A	8.59	8.59	0	45		387	387	2.2	387	4.00	7.2	0.0	9.4	200	0.97	32.3	1.03	0.88
Bayvew Avenue	Ex4A	Ex9A	0.00	55.39	0		3.8	0	1,819	14.4	1819	3.62	30.5	0.0	44.9	300	0.50	68.3	0.97	1.03
New Pipe	NewUp	NewDown	0.00	0.00	0		3.8	0	0	0.0	0	4.00	0.0	0.0	0.0	200	0.50	23.2	0.74	0.00
New Pipe	NewUp	NewDown	0.00	0.00	0		3.8	0	0	0.0	0	4.00	0.0	0.0	0.0	200	0.50	23.2	0.74	0.00
Colyton Court	MH1A	MH2A	0.55	0.55	6		3.8	23	23	0.1	23	4.00	0.4	0.0	0.6	200	0.97	32.3	1.03	0.39
Colyton Court	MH2A	MH3A	0.02	0.57	0		3.8	0	23	0.1	23	4.00	0.4	0.0	0.6	200	0.75	28.4	0.90	0.34
Colyton Court	MH3A	MH5A	0.13	0.70	1		3.8	4	27	0.2	27	4.00	0.5	0.0	0.7	200	0.50	23.2	0.74	0.31
Strawbridge Farm Drive	MH4A	MH5A	0.35	0.35	5		3.8	19	19	0.1	19	4.00	0.4	0.0	0.4	200	1.55	40.9	1.30	0.42
Strawbridge Farm Drive	MH5A	MH6A	0.43	1.48	6		3.8	23	68	0.4	68	4.00	1.3	0.0	1.7	200	0.43	21.5	0.68	0.39
Strawbridge Farm Drive	MH6A	MH7A	0.34	1.82	3		3.8	11	80	0.5	80	4.00	1.5	0.0	2.0	200	1.04	33.5	1.06	0.57
Strawbridge Farm Drive	MH7A	MH9A	0.40	2.22	6		3.8	23	103	0.6	103	4.00	1.9	0.0	2.5	200	0.53	23.8	0.76	0.48
Strawbridge Farm Drive	MH8A	MH9A	0.87	0.87	15		3.8	57	57	0.2	57	4.00	1.1	0.0	1.3	200	4.03	65.8	2.10	0.79
Hackwood Crescent	MH9A	MH10A	0.37	3.46	6		3.8	23	182	0.9	182	4.00	3.4	0.0	4.3	200	0.50	23.1	0.73	0.56
Hackwood Crescent	MH10A	MH11A	0.26	3.72	3		3.8	11	194	1.0	194	4.00	3.6	0.0	4.6	200	0.34	19.0	0.60	0.49
Hackwood Crescent	MH11A	MH12A	0.94	4.66	17		3.8	65	258	1.2	258	4.00	4.8	0.0	6.0	200	0.44	21.8	0.69	0.58
Hackwood Crescent	MH12A	MH13A	0.17	4.83	2		3.8	8	266	1.3	266	4.00	4.9	0.0	6.2	200	0.98	32.4	1.03	0.79
Hackwood Crescent	MH13A	MH14A	0.82	5.65	14		3.8	53	319	1.5	319	4.00	5.9	0.0	7.4	200	0.44	21.6	0.69	0.62
Strawbridge Farm Drive	MH14A	MH15A	0.20	5.85	2		3.8	8	327	1.5	327	4.00	6.1	0.0	7.6	200	0.49	23.0	0.73	0.65
Strawbridge Farm Drive	MH15A	Ex.MH7A	0.08	5.93	0		3.8	0	327	1.5	327	4.00	6.1	0.0	7.6	200	0.54	24.2	0.77	0.68
Stone Road	Ex.MH7A	Ex.MH9A	4.77	10.70	107		3.5	375	701	2.8	701	3.89	12.6	0.0	15.4	200	3.34	59.9	1.91	1.58
Bayview Ave	Ex9A	Ex.MH8A	0	55.39	0	45	3.5	0	1,819	14.4	1819	3.62	30.5	0.0	44.9	300	1.00	96.8	1.37	1.33
Stone Road	Ex.MH8A	Ex.MH9A	0.36	55.75	4		3.5	14	1,833	14.5	1833	3.61	30.7	0.0	45.2	300	0.50	68.3	0.97	1.03
October Lane	Ex.MH9A	Ex.MH10A	0.78	67.23	16		3.5	56	2,590	17.5	2590	3.50	41.9	0.0	59.4	300	0.69	80.4	1.14	1.24
October Lane	Ex.MH10A	Ex.MH11A	1.2	68.43	32		3.5	112	2,702	17.8	2702	3.48	43.5	0.0	61.3	300	0.49	67.4	0.95	1.08
October Lane	Ex.MH11A	Ex.MH12A	0.84	69.27	22		3.5	77	2,779	18.0	2779	3.47	44.7	0.0	62.7	300	1.31	110.5	1.56	1.60
October Lane	Ex.MH12A	Ex.MH16A	0.32	69.59	6		3.5	21	2,800	18.1	2800	3.47	45.0	0.0	63.1	300	2.50	152.9	2.16	2.04
Fife Road	Ex.MH15A	Ex.MH16A	1.11	1.11	25		3.5	88	88	0.3	88	4.00	1.6	0.0	1.9	200	3.71	63.1	2.01	0.86
October Lane	Ex.MH16A	Ex.MH17A	0.79	71.49	20		3.5	70	2,958	18.6	2958	3.45	47.2	0.0	65.8	300	1.70	126.1	1.78	1.80
October Lane	Ex.MH17A	Ex.MH18A	0.41	71.90	8		3.5	28	2,986	18.7	2986	3.44	47.6	0.0	66.3	300	1.65	124.3	1.76	1.77
October Lane	Ex.MH18A	Ex.MH19A	0.92	72.82	21		3.5	74	3,059	18.9	3059	3.44	48.7	0.0	67.6	300	1.46	116.8	1.65	1.71
October Lane	Ex.MH19A	Ex.MH25A	0.29	73.11	4		3.5	14	3,073	19.0	3073	3.43	48.9	0.0	67.9	300	1.10	101.4	1.43	1.53
Stone Road (from West)	StoneWest	Ex.MH25A	4.95	4.95	0		3.5	0	0	1.3	0	4.00	0.0	0.0	1.3	200	1.40	38.9	1.24	0.56
Stone Road	Ex.MH25A	Ex.MH12	0.38	78.44	6		3.5	21	3,094	20.4	3094	3.43	49.2	0.0	69.5	300	0.77	84.9	1.20	1.34
New Pipe	NewUp	NewDown	0.55	0.55	6		3.8	22.8	22.8	0.1	22.8	4.00	0.4	0.0	0.6	200	1.00	32.8	1.04	0.39
Victoria Street	Plug1	1	0.15	0.15	0	60		9	9	0.0	9	4.00	0.2	0.0	0.2	200	0.50	23.2	0.74	0.21
Victoria Street	1	2	0.86	1.01000001	0	60		51.6	60.6	0.3	60.6	4.00	1.1	0.0	1.4	200	1.40	38.7	1.23	0.55

PROPOSED SANITARY SEWER DESIGN SHEET
Town of Aurora
Regional Municipality of York

Minimum Dia. =	**200 mm**		
Mannings "n"=	**0.013**		
Minimum Velocity =	**0.6 m/s**		
Minimum Grade =	**0.5 %**		
Avg. Domestic Flow =	**400 l/c/d**	**(365 l/c/d used for 600mm Trunk Sewer)**	
Infiltration =	**0.26 l/s/ha**		
Max. Peaking Factor=	**4.0**		
Min. Peaking Factor=	**1.0**		
Maximum Velocity =	**3.65 m/s**		

Project:	**Highfair Investments Inc.**
Project No:	**2301**
Date:	**1-Aug-21**
Designed by:	**P.R.S./S.E.K.**
NOMINAL PIPE SIZE USED	

STREET	FROM MH	TO MH	RESIDENTIAL							FLOW CALCULATIONS						PIPE DATA				
			AREA (ha)	ACC. AREA (ha)	UNITS (#)	DENISTY (P/ha)	DENSITY (P/unit)	POP	ACC. RES. POP.	INFILTRATION (l/s)	TOTAL ACC. POP.	PEAKING FACTOR	RES. FLOW (l/s)	COMM. FLOW (l/s)	TOTAL FLOW (l/s)	DIA. (mm)	SLOPE (%)	Q FULL (l/s)	V FULL (m/s)	V ACT (m/s)
Stonebridge Estates S	CB1	SC1	7.82	7.82	35		3.8	133	133	2.0	133	4.00	2.5	0.0	4.5	200	0.50	23.2	0.74	0.56
Stonebridge Estates N	SC1	VSPS	7.85	15.67	64		3.8	243	376	4.1	376	4.00	7.0	0.0	11.0	200	0.50	23.2	0.74	0.72
Wycliffe Diamond South	SC1EX	VSPS	8.80	8.80	0	45	3.5	396	396	2.3	396	4.00	7.3	0.0	9.6	200	0.50	23.2	0.74	0.70
Benville Crescent	BC1	VSPS	3.78	3.78	41		3.8	156	156	1.0	156	4.00	2.9	0.0	3.9	200	0.50	23.2	0.74	0.54
Monkman Court	MC1	VSPS	3.23	3.23	32		3.8	122	122	0.8	122	4.00	2.3	0.0	3.1	200	0.50	23.2	0.74	0.51
Wycliffe Diamond North	DK1	VSPS	2.60	2.60	28		3.5	98	98	0.7	98	4.00	1.8	0.0	2.5	200	0.50	23.2	0.74	0.48
Ex.VANDORF SPS	VSPS	Ex1A	0.00	34.08	0		3.8	0	1,148	8.9	1148	3.76	20.0	0.0	28.8	200	0.50	23.2	0.74	0.84
Belfountain on Bayview	BB1	Ex1A	12.72	12.72	75		3.8	285	285	3.3	285	4.00	5.3	0.0	8.6	200	0.50	23.2	0.74	0.68
Belfountain on Bayview Park	BB2	Ext1A	0.83	0.83	0	45		37	37	0.2	37	4.00	0.7	0.0	0.9	200	0.50	23.2	0.74	0.35
Bayview Avenue	Ex1A	Ex4A	0.00	46.80	0		3.8	0	1,433	12.2	1433	3.69	24.5	0.0	36.7	300	1.50	118.4	1.67	1.47
Rickard St. (Genview)	RS1	Ex4A	8.59	8.59	0	45		387	387	2.2	387	4.00	7.2	0.0	9.4	200	0.97	32.3	1.03	0.88
Highfair Investments Inc.	AR1	Ex4A	9.18	9.18	149		3.8	566	566	2.4	566	3.95	10.3	0.0	12.7	200	0.50	23.2	0.74	0.75
Bayvew Avenue	Ex4A	Ex9A	0.00	64.57	0		3.8	0	2,385	16.8	2385	3.53	38.9	0.0	55.7	300	0.50	68.3	0.97	1.08
New Pipe	NewUp	NewDown	0.00	0.00	0		3.8	0	0	0.0	0	4.00	0.0	0.0	0.0	200	0.50	23.2	0.74	0.00
New Pipe	NewUp	NewDown	0.00	0.00	0		3.8	0	0	0.0	0	4.00	0.0	0.0	0.0	200	0.50	23.2	0.74	0.00
Colyton Court	MH1A	MH2A	0.55	0.55	6		3.8	23	23	0.1	23	4.00	0.4	0.0	0.6	200	0.97	32.3	1.03	0.39
Colyton Court	MH2A	MH3A	0.02	0.57	0		3.8	0	23	0.1	23	4.00	0.4	0.0	0.6	200	0.75	28.4	0.90	0.34
Colyton Court	MH3A	MH5A	0.13	0.70	1		3.8	4	27	0.2	27	4.00	0.5	0.0	0.7	200	0.50	23.2	0.74	0.31
Strawbridge Farm Drive	MH4A	MH5A	0.35	0.35	5		3.8	19	19	0.1	19	4.00	0.4	0.0	0.4	200	1.55	40.9	1.30	0.42
Strawbridge Farm Drive	MH5A	MH6A	0.43	1.48	6		3.8	23	68	0.4	68	4.00	1.3	0.0	1.7	200	0.43	21.5	0.68	0.39
Strawbridge Farm Drive	MH6A	MH7A	0.34	1.82	3		3.8	11	80	0.5	80	4.00	1.5	0.0	2.0	200	1.04	33.5	1.06	0.57
Strawbridge Farm Drive	MH7A	MH9A	0.40	2.22	6		3.8	23	103	0.6	103	4.00	1.9	0.0	2.5	200	0.53	23.8	0.76	0.48
Strawbridge Farm Drive	MH8A	MH9A	0.87	0.87	15		3.8	57	57	0.2	57	4.00	1.1	0.0	1.3	200	4.03	65.8	2.10	0.79
Hackwood Crescent	MH9A	MH10A	0.37	3.46	6		3.8	23	182	0.9	182	4.00	3.4	0.0	4.3	200	0.50	23.1	0.73	0.56
Hackwood Crescent	MH10A	MH11A	0.26	3.72	3		3.8	11	194	1.0	194	4.00	3.6	0.0	4.6	200	0.34	19.0	0.60	0.49
Hackwood Crescent	MH11A	MH12A	0.94	4.66	17		3.8	65	258	1.2	258	4.00	4.8	0.0	6.0	200	0.44	21.8	0.69	0.58
Hackwood Crescent	MH12A	MH13A	0.17	4.83	2		3.8	8	266	1.3	266	4.00	4.9	0.0	6.2	200	0.98	32.4	1.03	0.79
Hackwood Crescent	MH13A	MH14A	0.82	5.65	14		3.8	53	319	1.5	319	4.00	5.9	0.0	7.4	200	0.44	21.6	0.69	0.62
Strawbridge Farm Drive	MH14A	MH15A	0.20	5.85	2		3.8	8	327	1.5	327	4.00	6.1	0.0	7.6	200	0.49	23.0	0.73	0.65
Strawbridge Farm Drive	MH15A	Ex.MH7A	0.08	5.93	0		3.8	0	327	1.5	327	4.00	6.1	0.0	7.6	200	0.54	24.2	0.77	0.68
Stone Road	Ex.MH7A	Ex.MH9A	4.77	10.70	107		3.5	375	701	2.8	701	3.89	12.6	0.0	15.4	200	3.34	59.9	1.91	1.58
Bayview Ave	Ex9A	Ex.MH8A	0	64.57	0	45	3.5	0	2,385	16.8	2385	3.53	38.9	0.0	55.7	300	1.00	96.8	1.37	1.41
Stone Road	Ex.MH8A	Ex.MH9A	0.36	64.93	4		3.5	14	2,399	16.9	2399	3.52	39.1	0.0	56.0	300	0.50	68.3	0.97	1.08
October Lane	Ex.MH9A	Ex.MH10A	0.78	76.41	16		3.5	56	3,157	19.9	3157	3.42	50.0	0.0	69.9	300	0.69	80.4	1.14	1.28
October Lane	Ex.MH10A	Ex.MH11A	1.2	77.61	32		3.5	112	3,269	20.2	3269	3.41	51.6	0.0	71.8	300	0.49	67.4	0.95	1.09
October Lane	Ex.MH11A	Ex.MH12A	0.84	78.45	22		3.5	77	3,346	20.4	3346	3.40	52.7	0.0	73.1	300	1.31	110.5	1.56	1.67
October Lane	Ex.MH12A	Ex.MH16A	0.32	78.77	6		3.5	21	3,367	20.5	3367	3.40	53.0	0.0	73.5	300	2.50	152.9	2.16	2.13
Fife Road	Ex.MH15A	Ex.MH16A	1.11	1.11	25		3.5	88	88	0.3	88	4.00	1.6	0.0	1.9	200	3.71	63.1	2.01	0.86
October Lane	Ex.MH16A	Ex.MH17A	0.79	80.67	20		3.5	70	3,524	21.0	3524	3.38	55.2	0.0	76.2	300	1.70	126.1	1.78	1.87
October Lane	Ex.MH17A	Ex.MH18A	0.41	81.08	8		3.5	28	3,552	21.1	3552	3.38	55.6	0.0	76.7	300	1.65	124.3	1.76	1.84
October Lane	Ex.MH18A	Ex.MH19A	0.92	82.00	21		3.5	74	3,626	21.3	3626	3.37	56.6	0.0	77.9	300	1.46	116.8	1.65	1.76
October Lane	Ex.MH19A	Ex.MH25A	0.29	82.29	4		3.5	14	3,640	21.4	3640	3.37	56.8	0.0	78.2	300	1.10	101.4	1.43	1.58
Stone Road (from West)	StoneWest	Ex.MH25A	4.95	4.95	0		3.5	0	0	1.3	0	4.00	0.0	0.0	1.3	200	1.40	38.9	1.24	0.56
Stone Road	Ex.MH25A	Ex.MH12	0.38	87.62	6		3.5	21	3,661	22.8	3661	3.37	57.1	0.0	79.9	300	0.77	84.9	1.20	1.37
New Pipe	NewUp	NewDown	0.55	0.55	6		3.8	22.8	22.8	0.1	22.8	4.00	0.4	0.0	0.6	200	1.00	32.8	1.04	0.39
Victoria Street	Plug1	1	0.15	0.15	0	60		9	9	0.0	9	4.00	0.2	0.0	0.2	200	0.50	23.2	0.74	0.21
Victoria Street	1	2	0.86	1.01000001	0	60		51.6	60.6	0.3	60.6	4.00	1.1	0.0	1.4	200	1.40	38.7	1.23	0.55

Sanitary Sewer Hydraulic Grade Line Analysis
Highfair Investments Inc.
FSSR
Aurora, York Region

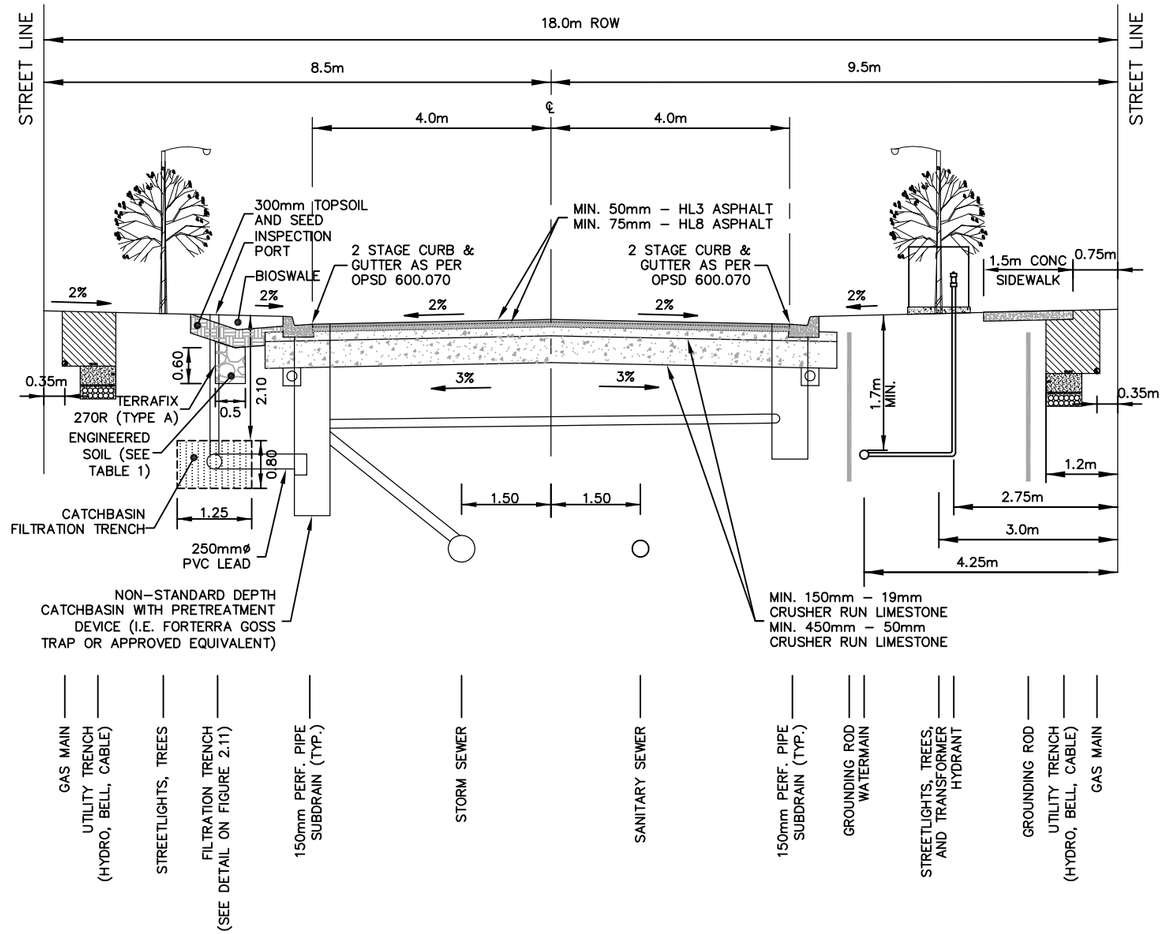
Project: Highfair Investments Inc.
Project No. 2301
Date: 01-Aug-21
Designed By: SEK
Reviewed By: SMS

P:\2301 Archer Hill, Aurora\Design\Pipe Design\Sanitary\2021 05(May) 02 - Sani Analysis - FSP\[2301- HGL-aurora.xlsm]Design

LOCATION			INVERTS		FLOW	PIPE DATA								PIPE LOSS CALCULATIONS					MH LOSS CALCULATIONS		TOTAL LOSS	HYDRAULIC GRADE LINE			
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$^{2/3}$	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)
Stone Road	Ex.MH8A	Ex.MH9A	261.083	260.750	56.0	300	66.5	0.013	0.071	0.178	0.50	68.3	0.82	221.667	0.031	0.792	0.032	0.223	0.02	0.00	0.25	261.383	0.000	261.050	265.42
October Lane	Ex.MH9A	Ex.MH10A	260.689	260.150	69.9	300	77.9	0.013	0.071	0.178	0.69	80.4	0.87	259.667	0.031	0.989	0.050	0.407	0.02	0.00	0.43	260.989	0.000	260.451	264.68
October Lane	Ex.MH10A	Ex.MH11A	260.075	259.530	71.8	300	112.2	0.013	0.071	0.178	0.49	67.4	1.07	374.000	0.031	1.016	0.053	0.618	0.00	0.00	0.62	260.451	0.076	259.830	264.12

APPENDIX H

RIGHT-OF-WAY CONCEPTS



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

Treasure Hill
1681 LANGSTAFF ROAD, UNIT 1
CONCORD, ONTARIO L4K 5T3
TEL: (416) 987-5500
FAX: (905) 326-3600

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

LEGEND:

HIGHFAIR INVESTMENTS INC.
FSSR

DESIGNED BY:	E.A.S.	CHECKED BY:	S.M.S.
SCALE:	1:100	DATE:	AUGUST 2021

PROPOSED 18.0m RESIDENTIAL LOCAL ROAD CROSS SECTION

PROJECT No: 2301

FIGURE No: H.1

File: P:\2301 Archer Hill, Aurora\Drawings\FSP\Fig\Report Figures\2301P–ROW–H.1.dwg – Revised by <ESIRRS> : Wed, Aug 04 2021 – 3:41pm

APPENDIX I

UTILITIES CORRESPONDENCE

SCS consulting group ltd

Sirrs, Emily

From: Harjit Allen <harjit.allen@rci.rogers.com>
Sent: Monday, July 12, 2021 2:58 PM
To: Knechtel, Erich
Cc: Sirrs, Emily
Subject: RE: Proposed Draft Plan of Subdivision - Aurora

Hi Erich

I can confirm that we have capacity in the area that will be able to service this development.

Please keep me posted on this progress of this development and send me Hydro & Civil drawings once they are available.

What is the name of this development?

From: Knechtel, Erich <eknechtel@scsconsultinggroup.com>
Sent: July 8, 2021 7:30 AM
To: Harjit Allen <harjit.allen@rci.rogers.com>
Cc: Sirrs, Emily <esirrs@scsconsultinggroup.com>
Subject: Proposed Draft Plan of Subdivision - Aurora

Hello,

We are currently preparing a Functional Servicing Report for the attached proposed Draft Plan of Subdivision in Aurora. The project is a land assembly that will include the demolition of the existing Archerhill Court and the subdivision of the lands as shown. Can you please confirm that there is capacity and whether there are any system upgrades required to service the proposed development?

The tentative schedule for the project is demolition and earthworks in the spring of 2023, with servicing construction likely beginning in the summer of 2023.

Erich Knechtel, P.Eng.

SCS Consulting Group Ltd.
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(F) 905.475.8335
(M) 647.389.7513
eknechtel@scsconsultinggroup.com
www.scsconsultinggroup.com

Sirrs, Emily

From: Phyllis Byer <Phyllis.Byer@enbridge.com>
Sent: Thursday, July 8, 2021 12:04 PM
To: Knechtel, Erich
Cc: Sirrs, Emily
Subject: FW: Proposed Draft Plan of Subdivision - Aurora
Attachments: 20049 THH Archerhill Aurora_DP-05_2021-04-16 DraftPlan Col.pdf

Good afternoon, gas availability would be too early depending on development in the next few years.

However we do have a 4"PE main on Vandorf Sideroad and a 6" PE main on Bayview Avenue that should suffice depending on your loads.

Hope this helps.

From: Knechtel, Erich <eknechtel@scsconsultinggroup.com>
Sent: Thursday, July 8, 2021 7:30 AM
To: Area Planning 30 <AreaPlanning30@enbridge.com>
Cc: Sirrs, Emily <esirrs@scsconsultinggroup.com>
Subject: [External] Proposed Draft Plan of Subdivision - Aurora

Hello,

We are currently preparing a Functional Servicing Report for the attached proposed Draft Plan of Subdivision in Aurora. The project is a land assembly that will include the demolition of the existing Archerhill Court and the subdivision of the lands as shown. Can you please confirm that there is capacity and whether there are any system upgrades required to service the proposed development?

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eknechtel@scsconsultinggroup.com
http://secure-web.cisco.com/1-AmutDMTx1bINYxcutojvMwG4e6nm5ylvmzk88ey330YM7XZ2DHW-8CfPM-aHjlXKNm--iSAQ-lht4hbszNB0MdwDwpZ7TH_vFGg
OpmaitxX/http%3A%2F%2Fwww.scsconsultinggroup.com

Sirrs, Emily

From: Ghobrial, Moudy <moudy.ghobrial1@bell.ca>
Sent: Monday, July 19, 2021 11:58 AM
To: Knechtel, Erich; Sirrs, Emily
Cc: Sirrs, Emily; Hoy, Cameron; Rodriguez, Ashley
Subject: RE: Proposed Draft Plan of Subdivision - Aurora
Attachments: Bell-RFI-FTTH.xls

Hi,

I don't see any problem in serving the sub division, I see fibre in the area.
But to be 100% sure please fill out the attached form so I can get approval for it.

Thank you

Moudy Ghobrial
Access Network Implementation Manager

444 Millard Ave , Floor 2,
Newmarket, ON L3Y 2A3
Moudy.ghobrial1@bell.ca
☎: **9056143633**
Cell : 289-383-5081

From: Rodriguez, Ashley <ashley.rodriguez@bell.ca>
Sent: July-08-21 8:52 PM
To: Ghobrial, Moudy <moudy.ghobrial1@bell.ca>
Cc: eknechtel@scsconsultinggroup.com; esirrs@scsconsultinggroup.com; Hoy, Cameron <cameron.hoy@bell.ca>
Subject: FW: Proposed Draft Plan of Subdivision - Aurora

HI Moudy

Would you be able to have a look at the below request from Erich?

Erich, thank you for your email, Moudy Ghobrial has taken over Aurora switch and he would be able to look into this for you.

Ashley Rodriguez
Access Network Implementation Manager
T: 905-264-5404 M: 416-420-0961

From: Knechtel, Erich <eknechtel@scsconsultinggroup.com>
Sent: July-08-21 8:56 AM
To: Rodriguez, Ashley <ashley.rodriguez@bell.ca>
Cc: Sirrs, Emily <esirrs@scsconsultinggroup.com>; Hoy, Cameron <cameron.hoy@bell.ca>
Subject: [EXT]FW: Proposed Draft Plan of Subdivision - Aurora

Hi Ashley,

We received an out of office notification from Cameron. Can you please help with the question below?

We are currently preparing a Functional Servicing Report for the attached proposed Draft Plan of Subdivision in Aurora. The project is a land assembly that will include the demolition of the existing Archerhill Court and the subdivision of the lands as shown. Can you please confirm that there is capacity and whether there are any system upgrades required to service the proposed development?

The tentative schedule for the project is demolition and earthworks in the spring of 2023, with servicing construction likely beginning in the summer of 2023.

Erich Knechtel, P.Eng.

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eknechtel@scsconsultinggroup.com
www.scsconsultinggroup.com

Sirrs, Emily

From: Tony D'Onofrio <tony.donofrio@alectrautilities.com>
Sent: Thursday, July 8, 2021 8:01 AM
To: Knechtel, Erich
Cc: Sirrs, Emily
Subject: RE: Proposed Draft Plan of Subdivision - Aurora
Attachments: AlectraSubdivisionApplicationForm-v4.pdf

Hello Erich

There is sufficient capacity for this proposed development. I have attached a Subdivision application form. This will get the project on our radar and I can assign a tech on it. We will issue 2 work orders. One for the demolition and one for the new subdivision.

Thanks

From: Knechtel, Erich <eknechtel@scsconsultinggroup.com>
Sent: Thursday, July 8, 2021 7:30 AM
To: Tony D'Onofrio <tony.donofrio@alectrautilities.com>
Cc: Sirrs, Emily <esirrs@scsconsultinggroup.com>
Subject: Proposed Draft Plan of Subdivision - Aurora

Hello,

We are currently preparing a Functional Servicing Report for the attached proposed Draft Plan of Subdivision in Aurora. The project is a land assembly that will include the demolition of the existing Archerhill Court and the subdivision of the lands as shown. Can you please confirm that there is capacity and whether there are any system upgrades required to service the proposed development?

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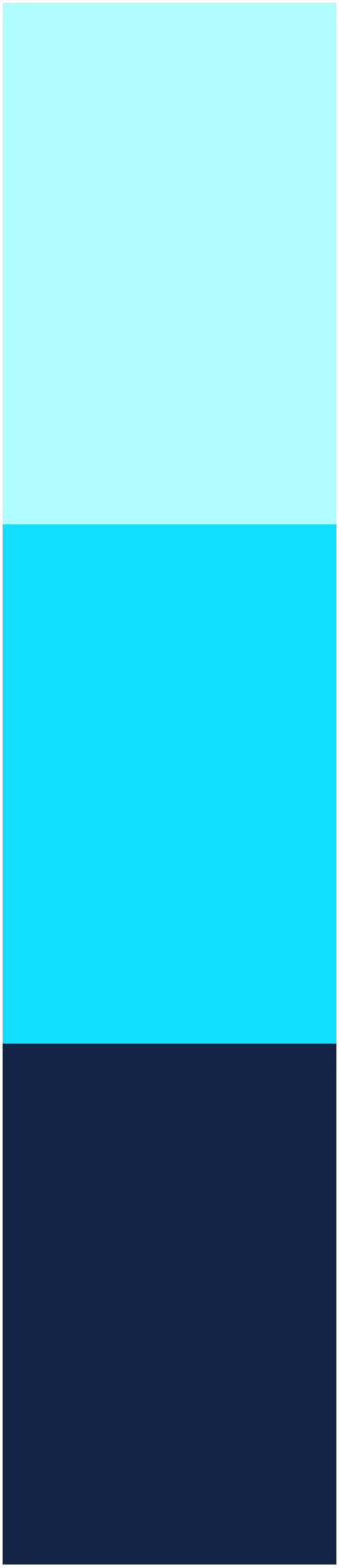

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