



**15450 Woodbine Avenue
Town of Whitchurch-Stouffville**

**Servicing & Stormwater Management
Report**

May 2023

Submitted by:

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

Project Number: 2400

TABLE OF CONTENTS

1.0 INTRODUCTION 1
 1.1 Purpose of the Report..... 1
 1.2 Study Area 1
 1.3 Background Servicing Information..... 2
2.0 STORM SERVICING 3
 2.1 Existing Storm Sewer System..... 3
 2.2 Proposed Storm Sewer System..... 3
 2.3 Overland Flow 4
3.0 STORMWATER MANAGEMENT..... 5
 3.1 Existing Drainage..... 5
 3.2 Existing Peak Flows 5
 3.3 Stormwater Runoff Control Criteria 6
 3.4 Stormwater Best Management Practices Selection 7
 3.4.1 At-Source Controls Evaluation 9
 3.4.2 Conveyance Controls Evaluation 10
 3.4.3 Proposed End-of-Pipe Controls..... 10
 3.5 Proposed Storm Drainage 12
 3.5.1 Quantity Control 12
 3.5.1.1 Peak Flow Control 12
 3.5.2 Volume Control 14
 3.5.3 Quality Control..... 15
 3.5.4 Erosion Control 15
 3.5.5 Water Balance..... 15
 3.5.6 Phosphorus Budget..... 16
4.0 SANITARY SERVICING 17
 4.1 Existing Sanitary Servicing..... 17
 4.2 Proposed Sanitary Servicing..... 17
5.0 WATER SERVICING 18
 5.1 Existing Water Servicing..... 18
 5.2 Proposed Water Servicing..... 18
6.0 GRADING 19
7.0 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION 20
8.0 SUMMARY..... 21

LIST OF TABLES

Table 3.1	Summary of Existing Peak Flows to Weslie Creek
Table 3.2	Summary of Existing Peak Flows to Highway 404
Table 3.3	Summary of Existing Peak Flows to Weslie Creek
Table 3.4	Stormwater Runoff Control Criteria
Table 3.5	Summary of Recommended Stormwater Best Management Practices
Table 3.6	Summary of Weslie Creek Release Rates
Table 3.7	Summary of Weslie Creek Storage Volumes
Table 3.8	Summary of Highway 404 Release Rates
Table 3.9	Summary of Highway 404 Storage Volumes
Table 5.1	Water Design Factors
Table 5.2	Water Demand for the Proposed Development
Table 5.3	Minimum Fire Flow Requirements

LIST OF FIGURES

Figure 1.1	Site Location Plan
Figure 3.1	Existing Storm Drainage Plan
Figure 3.2	Proposed Storm Drainage Plan

LIST OF APPENDICES

Appendix A	Site Plan
Appendix B	Excerpts from Background Reports
Appendix C	Stormwater Management Calculations
Appendix D	Filtration Unit Sizing Calculations
Appendix E	Phosphorus Budget Calculations
Appendix F	Water System Design
Appendix G	Drawings

LIST OF DRAWINGS (APPENDIX G)

- Drawing S-1 Servicing Plan 1
- Drawing GR-1 Grading Plan 1
- Drawing ESC-1 Erosion and Sediment Control Plan Stage 1
- Drawing ESC-2 Erosion and Sediment Control Plan Stage 2/3
- Drawing ESC-3 Erosion and Sediment Control Details

SUBMISSION HISTORY

Submission	Date	In Support Of	Distributed To
1 st	May 2023	Site Plan Approval	Town of Whitchurch-Stouffville, York Region, LSRCA

1.0 INTRODUCTION

SCS Consulting Group Ltd. has been retained by Galatia Lane Estates Inc. to prepare a Functional Servicing and Stormwater Management (SWM) Report for a proposed industrial development located at 15450 Woodbine Avenue in the community of Vandorf, within the Town of Whitchurch-Stouffville.

1.1 Purpose of the Report

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

The purpose of this report is to demonstrate that the proposed development can be graded and serviced in accordance with the Town of Whitchurch-Stouffville, Lake Simcoe Region Conservation Authority (LSRCA), York Region Road Design Guidelines, the Ministry of Transportation Ontario (MTO), the Ontario Building Code, and the Ministry of Environment, Conservation and Parks (MECP) design criteria.

1.2 Study Area

The existing site is comprised of agricultural land located within the East Holland watershed in the Town of Whitchurch-Stouffville. The proposed industrial development is at the west end of the site with a private access road proposed along the northern limit of the site to provide access to the western industrial property. As shown on **Figure 1.1**, the proposed development is bound by:

- Existing agricultural land to the north;
- Existing agricultural land to the south;
- Existing agricultural lands and Woodbine Avenue to the east; and
- Highway 404 to the west.

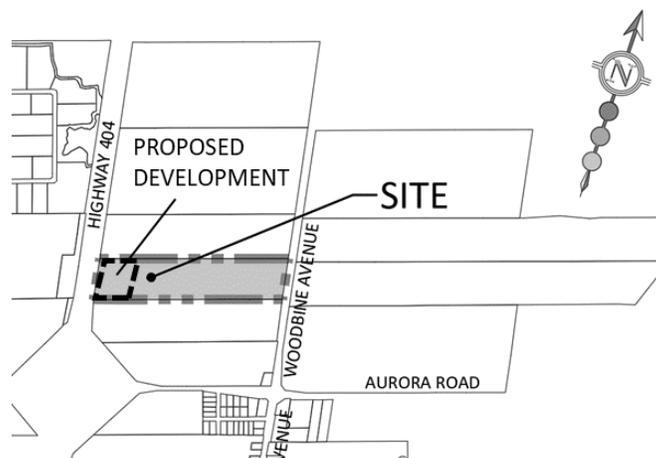


Figure 1.1: Site Location Plan

The proposed development consists of two parts, a panel plant manufacturing facility, approximately 4.86 ha in size with the parking lot, and open space areas, as well as a 1.48 ha access road along the north property line that connects the northeast corner of the industrial site to Woodbine Avenue on the east (refer to the Site Plan in **Appendix A** and detailed engineering drawings in **Appendix G**).

1.3 Background Servicing Information

The following reports have been referred to for the proposed development (relevant excerpts are included in **Appendix B**):

- York Region Road Design Guidelines (December 2020)
- Ministry of the Environment, Conservation and Parks (MECP) Stormwater Management Planning and Design Manual (March 2003);
- Town of Whitchurch-Stouffville Design guidelines and Standard Drawings (March 2021);
- Lake Simcoe Region Conservation Authority (LSRCA) Technical Guidelines for Stormwater Management Submissions (April 2022);
- Lake Simcoe Protection Plan (July 2009)
- Plan of Survey Showing Topography on Part of Lot 21 and 22, Concession 3 by Holding Jones Vanderveen Inc. (June 2021);
- Hydrogeological Investigation by EXP Services Inc. (March 2023);
- Geotechnical Investigation by Soil Engineers Ltd (March 2023); and
- Scoped Environmental Impact Study by Palmer Engineering (May 2023)

2.0 STORM SERVICING

2.1 Existing Storm Sewer System

There are no existing storm sewers in the vicinity of the site aside from an existing MTO owned box culvert conveying runoff westward under Highway 404. Existing drainage from the site and surrounding area is conveyed by overland flow partially east and partially west. There is a drainage divide near the eastern limit of the proposed industrial site, the western area conveys runoff to the existing MTO box culvert crossing Highway 404 while the eastern area conveys runoff to the roadside ditches in the Woodbine Avenue ROW. The existing drainage is further explained in *Section 3.1*.

2.2 Proposed Storm Sewer System

The storm sewer system has been designed with grades between 0.6% and 3.5%. Throughout the site, the storm sewer will be constructed at a minimum depth of 1.2 m where grading and servicing constraints exist to provide frost protection. As there are no proposed residential units or basements the only service connections to the storm sewer are provided for the industrial site roof. The layout for the proposed storm sewer within the development is provided on **Drawing S-1** in **Appendix G**.

The storm drainage system has been designed in accordance with the Town of Whitchurch-Stouffville 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: 5.0 m/s;
- ➔ Minimum Flow Velocity: 0.6 m/s; and
- ➔ Minimum Pipe Depth: 1.2m from the above surface grade to invert.

Rainfall intensity (mm/hr) was calculated using the Town of Whitchurch-Stouffville A, B, and C parameters listed in **Table 2.1** below:

Table 2-1: Town of Whitchurch-Stouffville Rainfall Intensity Parameters

Return Period Storm	A	B	C
2 Year	696.679	4.957	0.811
5 Year	1015.963	5.255	0.826
10 Year	1279.709	5.715	0.841
25 Year	1546.810	5.746	0.845
50 Year	1802.604	6.029	0.853
100 Year	2051.707	6.230	0.860

Storm sewers are proposed over the industrial site to convey overland flow captured via catch basins from parking lot, access road, storage yard, and roof leader from the manufacture building. Flows are then conveyed into an underground storage system. Refer to *Section 3.0* for a detailed description of the underground storage system. Refer to Drawing **S-1** in **Appendix G**.

2.3 Overland Flow

Major system (overland) flow will be directed to the southwest corner of the proposed development via the proposed parking area to catchbasins sized for 100 year capture.

3.0 STORMWATER MANAGEMENT

3.1 Existing Drainage

As illustrated on **Figure 3.1**, drainage from the existing land over the proposed industrial site is conveyed to three (3) outlets. Drainage from Catchment 101 (0.64 ha, **Figure 3.1**) is conveyed northeast to an existing ditch on the existing agricultural land north of the subject site, which continues northeast via overland flow to Weslie Creek, a tributary of the East Holland River conveyed through the western Woodbine ROW ditch along the site’s eastern limit. Drainage from Catchment 103 (0.44 ha, **Figure 3.1**) is conveyed southeast to the existing agricultural land south of the site, then eastward via overland flow to Weslie Creek. Drainage from Catchment 102 (3.78 ha, **Figure 3.1**) is conveyed southwest an existing ditch that conveys southwest to an existing culvert under Highway 404, which conveys runoff west under the 404 and ultimately outlets to a tributary of the East Holland River.

As illustrated on **Figure 3.1**, drainage from the existing land over the proposed access road, Catchment 104, is conveyed to northeast. Similarly to Catchment 101, an existing ditch conveys runoff northeast via overland flow to Weslie Creek.

3.2 Existing Peak Flows

The target release rates for the proposed development are the existing peak runoff rates for the subject lands for storms up to and including the 100 year storm event.

Visual Otthymo 6.2 (VO6) was used to model the 4-hour Chicago and 24-hour SCS storm distributions with time step of 10 minutes to determine the existing peak flows to the three (3) outlets as discussed above, per the Town of Whitchurch-Stouffville and LSRCA design criteria. An average of the Uplands Method and Airport Method was used to calculate the time of concentration for undeveloped areas of land. Curve Number (CN) values were determined based on the preliminary borehole logs by Soils Engineers Ltd. (**Appendix B**). The existing hydrologic model and modelling parameters are included in **Appendix C**.

Tables 3.1, 3.2 and 3.3 summarize the existing peak flows from the site to the three (3) outlets.

Table 3.1: Summary of Existing Peak Flows from Industrial Site to Weslie Creek

Return Period Storm	Catchment 101 (m ³ /s)		Catchment 103 (m ³ /s)	
	4 Hr Chicago	24 Hr SCS	4 Hr Chicago	24 Hr SCS
2 Year	0.008	0.013	0.006	0.010
5 Year	0.016	0.023	0.012	0.017

10 Year	0.022	0.029	0.016	0.021
25 Year	0.031	0.038	0.023	0.028
50 Year	0.039	0.044	0.028	0.033
100 Year	0.046	0.051	0.034	0.037

Table 3.2: Summary of Existing Peak Flows from Industrial Site to Highway 404 Culvert

Return Period Storm	Catchment 102 (Highway 404) (m ³ /s)	
	4 Hr Chicago	24 Hr SCS
2 Year	0.038	0.063
5 Year	0.076	0.108
10 Year	0.106	0.136
25 Year	0.149	0.180
50 Year	0.184	0.210
100 Year	0.218	0.239

Table 3.3: Summary of Existing Peak Flows from Access Road to Weslie Creek

Return Period Storm	Catchment 104A (m ³ /s)	
	4 Hr Chicago	24 Hr SCS
2 Year	0.032	0.051
5 Year	0.063	0.087
10 Year	0.086	0.108
25 Year	0.119	0.144
50 Year	0.146	0.168
100 Year	0.172	0.191

3.3 Stormwater Runoff Control Criteria

The following stormwater runoff control criteria have been established based on the Town of Whitchurch-Stouffville design criteria (March, 2021), LSRCA design criteria (April 2022), York Region Road Design Guidelines, and the MECP Stormwater Management Planning and Design Manual (2003). The stormwater runoff criteria are summarized below in **Table 3.4**.

Table 3.4: Stormwater Runoff Control Criteria

Criteria	Control Measure
Quantity Control	Control proposed peak flows to existing peak flows for the 2 through 100 year storm events. Proposed runoff volume from a 25 mm rainfall event over the total impervious area shall be captured and retained/treated on-site. If full compliance with the 25mm guidelines is not possible, retention/treatment is to be provided in accordance with LSRCA’s Flexible Treatment Guidelines (Section 3.2.6, LSRCA).
Quality Control	Provide MECP Enhanced (Level 1) Protection for 80% TSS Removal.
Water Budget	The site falls within Wellhead Protection Area (WHPA) Q1 & Q2 existing recharge is to be maintained. (CTC 2019) Where feasible, measures to minimize development impacts on the water balance to be incorporated into the development design (LSRCA).
Phosphorus Budget	Per Lake Simcoe Protection Plan, a Phosphorus Loading Study is to be done to evaluate the existing and proposed phosphorus loading rates and how changes will be minimized. We understand that in May 2023, it is anticipated that the criteria will be to control post-development phosphorus loading to pre-development levels and offsetting will be required for any exceedance of pre-development levels (LSRCA).

3.4 Stormwater Best Management Practices Selection

In accordance with the Ministry of Environment Stormwater Management Planning and Design Manual (2003), a review of stormwater management best practices was completed using a treatment train approach, which evaluated at-source, conveyance system and end-of-pipe alternatives. The potential best management practices were evaluated based on the stormwater management objectives listed in **Table 3.5**.

The following site characteristics were taken into consideration:

- Developable area of 4.86 ha consisting of industrial development and 1.48 ha of a private access road;
- Based on the geotechnical investigation, site soils generally comprised fill and/or topsoil overlying native deposits of silty sand, sandy silt, silt, clayey silt;

- Infiltration tests were completed and indicate that the native soils have percolation rates ranging from 70 - 75 mm/hr, and the estimated design infiltration rate is 21 mm/hr when adjusted for a safety factor of 3.5; and,
- Within the installed site wells, groundwater was observed with depths ranging between 1.37 m to 7.47 m below existing grade.

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

At-Source Controls

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

- Increased topsoil depth;
- Roof leaders to grassed areas;
- At-source storage (i.e. rooftop or parking lot storage);
- Pervious pavements;
- Infiltration trenches/soak-away pits.

Conveyance Controls

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

- Grassed Swales;
- Vegetated Filter Strips.

End-of-Pipe Controls

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

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

3.4.1 At-Source Controls Evaluation

It is noted these controls are proposed on private properties. Incorporating controls that require minimal routine maintenance can be an effective method in the treatment train approach to SWM. The following controls have been evaluated for use in the proposed development:

Increased Topsoil Depth

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

Roof Leaders to Grassed Area

Roof leaders are not proposed to be discharged to grassed area, but are proposed to discharge to storm sewers connecting to an underground storage facility with a controlled outlet structure and Jellyfish filter system to contribute to water quality and quantity control.

Passive Landscaping

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

Parking Lot Storage

Often employed with large parking lot footprints, flow attenuation for quantity or extended detention control can be provided via a flow restriction with stormwater storage provided via ponding on parking lots. Parking lot storage is proposed to accommodate attenuated flows in areas that do not drain directly to existing northeast and southeast agricultural lands or the culvert under Highway 404 to the west of the site.

Pervious Pavement

Pervious pavements are not proposed on site due to heavy loading vehicle traffic and challenges to maintain the permeability of the material in high traffic areas.

3.4.2 Conveyance Controls Evaluation

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

Vegetated Filter Strip

Filtration may be encouraged through the use of vegetated filter strips by directing sheet flow from impermeable areas to the strip prior to being collected via the storm system. Vegetated filter strips are best suited to parking lot areas with landscaped borders or islands. The proposed development contain parking lots boarded by vegetated landscape, however capture of the flows from the landscape areas is not feasible in this application therefore vegetated filter strips are not suitable.

Grassed Swales

Grassed swales conveying runoff promote infiltration, filtration, and evapotranspiration, contributing to water quality and quantity control, and contribute to groundwater recharge. Grassed swales are proposed along the north and south limits of the proposed access road, these swales act to promote filtration and infiltration from the overland flow generated from the access road.

3.4.3 Proposed End-of-Pipe Controls

While at-source and conveyance system controls are valuable components of the overall SWM plan, on their own they are not sufficient to meet the quantity and quality control objectives for the proposed development. End-of-pipe stormwater management facilities receive stormwater flows from a conveyance system (i.e., storm sewers or ditches) and provide treatment of stormwater prior to discharging flows to the receiving outlet. Accordingly, the following end-of-pipe controls have been evaluated for use in the proposed development:

Underground Storage

To meet quantity control targets, flow restrictors can be used to control stormwater release rates. To accommodate the reduced release rate, stormwater detention facilities are required to store stormwater runoff. Stormwater storage is proposed to be provided by on-site underground storage chambers (I-Storm or approved equivalent)

within the proposed industrial development under the parking lot outletting to the southwest corner, and a box culvert under the proposed access road for the eastern outlet as shown on **Figure 3.2**.

Open-Bottom Infiltration Chambers

To meet water quality, volume control and water balance requirements, infiltration is proposed in the underground storage facility. The underground storage facility is proposed to be a perforated bottom concrete facility (I-Storm or approved equivalent) with an outlet invert above the storage bottom to encourage infiltration.

Manufactured Treatment Device

A properly sized manufactured treatment device (MTD) can assist in providing MECP Enhanced (Level 1) treatment and can contribute to the treatment train approach for water quality control. The MTD units specified (Jellyfish JF12-20-5 and JF8-9-2 units) are Environmental Technology Verification (ETV) certified, to provide 80% TSS removal. Therefore, at source and conveyance controls will work in conjunction with the MTD units to provide overall enhanced quality control.

Table 3.5 below summarizes the recommended stormwater management Best Management Practices (BMPs) for the proposed development.

Table 3.5: Summary of Recommended Stormwater BMPs

Stormwater Management Control	Recommended BMP
At-Source Controls	Increased Topsoil Depth
	Passive Landscaping
	Parking Lot Storage
Conveyance System Controls	Grassed Swales
End-Of-Pipe Controls	Manufactured Treatment Device
	Open Bottom Infiltration
	Underground Storage

3.5 Proposed Storm Drainage

Proposed Industrial Site

The proposed major and minor system flow patterns and drainage areas are shown on **Figure 3.2**. As illustrated, the proposed development will convey runoff to one (1) outlet, the existing Highway 404 crossing box culvert, as described below. Flows will not be conveyed to the existing agricultural lands surrounding the proposed development, nor easterly to Weslie Creek.

Major system flows from Catchment 202 (0.86 ha, **Figure 3.2**) will be conveyed uncontrolled to the southwest corner of the development via overland flow. The flow then enters the existing ditch along the west side of the property limit that flows south, meeting the Highway 404 culvert near Aurora Road.

Major and minor system flows from Catchment 201 (4.00 ha, **Figure 3.2**) will be captured via a proposed internal storm sewer system and detailed on-site in the proposed underground storage systems, then outlet at a headwall on the southwest corner of the site.

Due to grading constraints, the drainage area conveyed to Highway 404 is slightly increased in the proposed condition. However, the proposed peak flows to Highway 404 from all storm events up to and including the 100 year storm will be controlled to below the existing peak flows from the 2 through 100 year storm events. Peak flow control is discussed further in **Section 3.5.1.1** and summarized in **Table 3.7**.

Proposed Access Road

The proposed major and minor system flow patterns and drainage areas are shown on **Figure 3.2**. Runoff will be captured via a ditch inlet catchbasin at the eastern end of the access road and attenuated on-site in the proposed underground box culvert storage system, then outlet at the northeast corner of the site to Weslie Creek.

3.5.1 Quantity Control

3.5.1.1 Peak Flow Control

The proposed 2 through 100 year storm flows for 4-hour Chicago and 24-hour SCS storm distributions have been designed to not exceed the allowable release rates for both the Highway 404 and Weslie Creek outlets. Proposed release rates and required storage volumes from the proposed development were calculated using VO 6.2 and the IDF rainfall curves from the Town of Whitchurch-Stouffville Design Standards. All hydrologic modelling and supplemental calculations are included in **Appendix C**.

Drainage to Weslie Creek

A summary of the allowable and proposed release rates to Weslie Creek via the existing northeast and southeast agricultural lands are listed in **Table 3.5**.

Table 3.6: Summary of Weslie Creek Proposed Release Rates

Storm Event	4-Hour Chicago		24-Hour SCS	
	Allowable Release Rate (m ³ /s)	Proposed Release Rate (m ³ /s)	Allowable Release Rate (m ³ /s)	Proposed Release Rate (m ³ /s)
2 Year	0.032	0.032	0.051	0.049
5 Year	0.063	0.063	0.087	0.081
10 Year	0.086	0.084	0.108	0.100
25 Year	0.119	0.112	0.144	0.132
50 Year	0.146	0.143	0.168	0.157
100 Year	0.172	0.169	0.191	0.185

Table 3.7: Summary of Weslie Creek Outlet Storage Volumes

Storm Event	4-Hour Chicago	24-Hour SCS
	Required Storage (m ³)	Required Storage (m ³)
2 Year	180	207
5 Year	230	261
10 Year	266	295
25 Year	318	342
50 Year	351	368
100 Year	382	397

Drainage to the Highway 404 Box Culvert

Drainages to Highway 404 culvert will be both controlled (Catchment 201) and uncontrolled (Catchment 202). Catchment 201 will be partially attenuated by the aboveground storage (i.e. parking lot), and further controlled and stored via the underground concrete storage system. The peak release rates from these two catchments are designed to maintain the allowable release rates for the 2 to 100 year storm events in the existing condition.

Within Catchment 201, overland flows will be controlled via flow restriction provided via ponding on the aboveground storage provided over the parking lot, while drainage from the entire site will be fully controlled by the underground storage system with three (3) orifice plates at the outlet. A summary of the allowable and proposed release rates to the Highway 404 culvert are listed in **Table 3.8**.

Table 3.8: Summary of Hwy 404 Culvert Proposed Release Rates

Storm Event	4-Hour Chicago		24-Hour SCS	
	Allowable Release Rate (m ³ /s)	Proposed Release Rate (m ³ /s)	Allowable Release Rate (m ³ /s)	Proposed Release Rate (m ³ /s)
2 Year	0.038	0.034	0.063	0.051
5 Year	0.076	0.069	0.108	0.101
10 Year	0.106	0.100	0.136	0.124
25 Year	0.149	0.135	0.180	0.168
50 Year	0.184	0.175	0.210	0.203
100 Year	0.218	0.212	0.239	0.228

As listed in **Table 3.8**, the 24-hour SCS Type II storm distribution produces the highest post-development storage requirements within the 2 through 100 year storm events. The proposed release rates in all storm events are less than the existing peak flow rates. Required storage volumes and resulting water levels for 24-hour SCS Type II storm distribution events are summarized in **Table 3.8**.

Table 3.9: Summary of Hwy 404 Culvert Outlet Storage Volumes

Storm Event	4-Hour Chicago	24-Hour SCS
	Required Storage (m ³)	Required Storage (m ³)
2 Year	538	605
5 Year	692	806
10 Year	848	950
25 Year	1,067	1,168
50 Year	1,222	1,292
100 Year	1,392	1,453

3.5.2 Volume Control

Per the LSRCA design standards, the equivalent of the 25 mm storm event over new impervious areas must be retained on-site. Retention of the required 25 mm storm event volume will be provided by an infiltration component in the proposed underground storage system.

Groundwater elevations and subsurface soil conditions were evaluated to determine the infiltration potential of the 25 mm storm event over the new imperious areas (Geotechnical Investigation Report by Soil Engineers Ltd (March 2023), and Hydrogeological Investigation by Exp (March 2023)).

Groundwater elevations monitored from February 1 to March 2, 2023 through monitoring wells (BH202, 203 and 208) installed around the proposed parking lot showed a maximum of 299.94 masl. The proposed bottom elevation of the underground storage system is 301.00 masl, which will provide a minimum of 1 m of separation from the groundwater for infiltration. The groundwater monitoring program will continue for a period of one year.

Infiltration of the required 25 mm retention volume of the impervious portion of the industrial site (Catchment 201) to Highway 404 will be provided by 0.46 m deep infiltration bed within the underground storage system. The required infiltration volume is 671.3 m³ and the provided infiltration volume is 698.2 m³. Calculations are provided in **Appendix C**.

Groundwater elevations recorded from monitoring well (BH209) showed a maximum of 297.12 masl. Due to constraints in grading of the access road to connect to Woodbine Avenue on the east, the grades are lowered as the road extends east, where infiltration of the 25 mm storm event is not feasible.

The runoff from the 25 mm storm event from the proposed access road will be treated on-site via a Jellyfish filtration unit to achieve the volume control criterion.

3.5.3 Quality Control

A treatment train approach is proposed in order to provide quality control. This treatment train approach consists of catchbasin shields, an infiltration component, provided within the proposed underground concrete storage tank, and manufactured treatment devices performing filtration. The infiltration beds and filtration units are sized to provide MECP Enhanced (Level 1) Protection (80% TSS removal). Sizing calculations are provided in **Appendix D**.

3.5.4 Erosion Control

Erosion control is provided by infiltrating the 25 mm storm event on-site as summarized in **Section 3.5.2**.

3.5.5 Water Balance

As 25mm infiltration is proposed on-site to satisfy the volume control requirements it is anticipated that the pre to post water balance is achieved, further investigation may be conducted in future submissions if required.

3.5.6 Phosphorus Budget

The existing phosphorus loadings to the Highway 404 culvert and Weslie Creek are based on the existing land use illustrated on Figure 3.1A, 3.1B and 3.1C. Based on the phosphorus loading calculations provided in **Appendix E**, the existing annual phosphorus loadings were calculated to be 1.75 kg/year to Highway 404 Culvert, and 1.82 kg/year to Weslie Creek.

The phosphorus removal criteria of controlling post-development to pre-development phosphorus loading levels are achieved through infiltration of 25mm of runoff over impervious surfaces via the proposed LID treatments. Any phosphorus loading generated in the post-development condition will be infiltrated on site with exception of the runoff from small uncontrolled landscaped areas. As it is expected that all phosphorus will be retained on-site, a proposed annual reduction in phosphorus loading, equivalent to the pre-development phosphorus loading rate, of 1.75 kg/year to Highway 404 and 1.82 kg/year to Weslie Creek or less are anticipated (**Appendix E**).

4.0 SANITARY SERVICING

4.1 Existing Sanitary Servicing

There are no existing sanitary sewers surrounding the subject development.

4.2 Proposed Sanitary Servicing

The sanitary servicing system was designed by Gunnell Engineering LTD in accordance with the Municipality, OBC and MECP criteria, and will be submitted under a separate cover.

Sanitary servicing for the proposed building will be provided by a sewage collection system, sewage treatment plant and large subsurface disposal system. The sewage will be conveyed to the sewage treatment plant by gravity through a 150 mm diameter sanitary sewer. From the treatment plant, the sewage will be pumped via forcemain to dispersal beds east of the proposed building.

The configuration of the sanitary servicing works is shown on **Drawings S-1**. The sanitary servicing system is to be designed in accordance with the Town of Whitchurch-Stouffville and MECP criteria, including but not limited to:

- Residential Sanitary Generation Rate: 350 l/c/d;
- Population Density: 2.6 people/unit (Townhouse);
- Peaking Factor: Harmon (Max. 4.0, Min. 1.5);
- Infiltration Rate: 0.23 L/s/ha;
- Minimum Pipe Size: 200 mm diameter;
- Minimum Actual Velocity: 0.60 m/s; and
- Maximum Velocity: 3.0 m/s.

5.0 WATER SERVICING

5.1 Existing Water Servicing

There are no existing watermain systems surrounding the subject development.

5.2 Proposed Water Servicing

Domestic water supply for the proposed building will be provided from a new well northwest of the proposed building. A treatment system will be required to deliver potable water to the new building. **Table 5.1** summarizes the average daily demand and peaking factors used for the calculations. **Table 5.2** summarizes the calculated demands for the development.

Table 5.1: Water Design Factors

Type of Development	Average Daily Demand	Maximum Daily Demand Peaking Factor	Peak Hourly Demand Peaking Factor
Industrial	28,000 L/day/ha (1)	2.0 (1)	3.0 (1)

(1) Town of Stouffville Design Guidelines, November 2018

Table 5.2: Water Demand for the Proposed Development

	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Water Demands	1.58 (1)	3.15	4.74

(1) Based on Building GFA of 48,600 sq.m.

The fire demand is calculated per of Water Supply For Public Fire Protection – Fire Underwriters Survey 2019. **Table 5.3** shows the fire demands of the proposed building. The fire demand will be confirmed by a sprinkler consultant for future submissions.

Table 5.3: Minimum Fire Flow Requirements

Minimum Town of Whitchurch-Stouffville Fire Flow (L/s)	Maximum Daily Demand (L/s)	FUS Fire Flow (L/s)	Required Fire Flow (L/s)
250	3	281.8	281.8

The water demand and FUS calculation can be found in **Appendix F**.

6.0 GRADING

6.1 Existing Grading Conditions

The existing topography shows the agricultural field with a higher point in the northern and middle areas of the site. The elevations are lower at the connections with Woodbine Avenue on the east and towards Highway 404 to the west. The ground surface elevations range from approximately 311.10 m to approximately 290.75 m.

6.2 Proposed Grading Concept

In general, the proposed development has been graded in a manner to maintain existing site grading as much as possible. This would include:

- Minimum Parking Grade: 1.5%;
- Maximum Parking Grade: 5%;
- Minimize the need for retaining walls;
- Minimize the volume of earth to be moved and minimize cut/fill differentials;
- Achieve the stormwater management objectives required for the proposed development.

Per MTO design standards, permanent infrastructure is not permitted within 14 m of an MTO ROW. As shown on **Drawing GR-1**, no proposed development is location within the 14 m setback from Highway 404.

A grading plan is provided on **Drawing GR-1** and **GR-2**, provided in **Appendix G**.

7.0 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

The detailed erosion and sediment control plan will be provided under separate cover. Erosion and sediment control measures will be designed and may include temporary sediment control fencing, a construction access driveway, check dams and temporary sediment control facilities where required. These measures will be designed and constructed as per the “Erosion and Sediment Control Guide for Urban Construction” document (TRCA, 2019). The detailed erosion and sediment control plan will be approved by the Town of Whitchurch-Stouffville and York Region prior to any site alteration being undertaken. The plan will address phasing, inspection and monitoring aspects of erosion and sediment control.

8.0 SUMMARY

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

- The site can be serviced by proposed septic system and well system;
- The Site Plan layout supports the stormwater management requirements.

Stormwater Management

Quantity Control:

- Runoff from the areas proposed to be modified will be limited to the existing release rates;
- Stormwater quantity control will be achieved through inlet-controlled devices, and weir wall controls with stormwater storage provided by parking lot storage, underground concrete tank storage and superpipe storage;
- Volume control will be achieved by infiltrating the runoff from a 25 mm rainfall event in the underground concrete storage facility and filtering the 25mm storm event runoff from each outlet.

Quality Control

- The water quality objective will be satisfied by catchbasin shields, infiltration, and filtration through manufactured treatment devices.

Water Balance

- On-site retention of runoff from the 25 mm rainfall event will be through the use of an infiltration component within the underground storage facility.

Erosion Control

- The erosion control criteria will be satisfied as the design meets the volume control criteria.

Phosphorus Budget

- A phosphorus budget analysis was completed which shows that the proposed phosphorus export will be reduced to the greatest extent feasible, far below the pre-development phosphorus levels.

Sanitary Servicing

The proposed development will be serviced by an onsite septic system.

Water Supply

The proposed development will be serviced by an onsite well system. Fire protection will be provided via underground fire protection storage tanks.

Grading

The site has been graded to mimic the existing drainage pattern while minimizing cut and fill differentials.

Respectfully Submitted:

SCS Consulting Group Ltd.

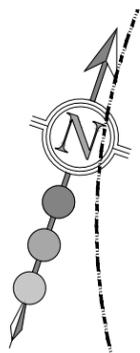
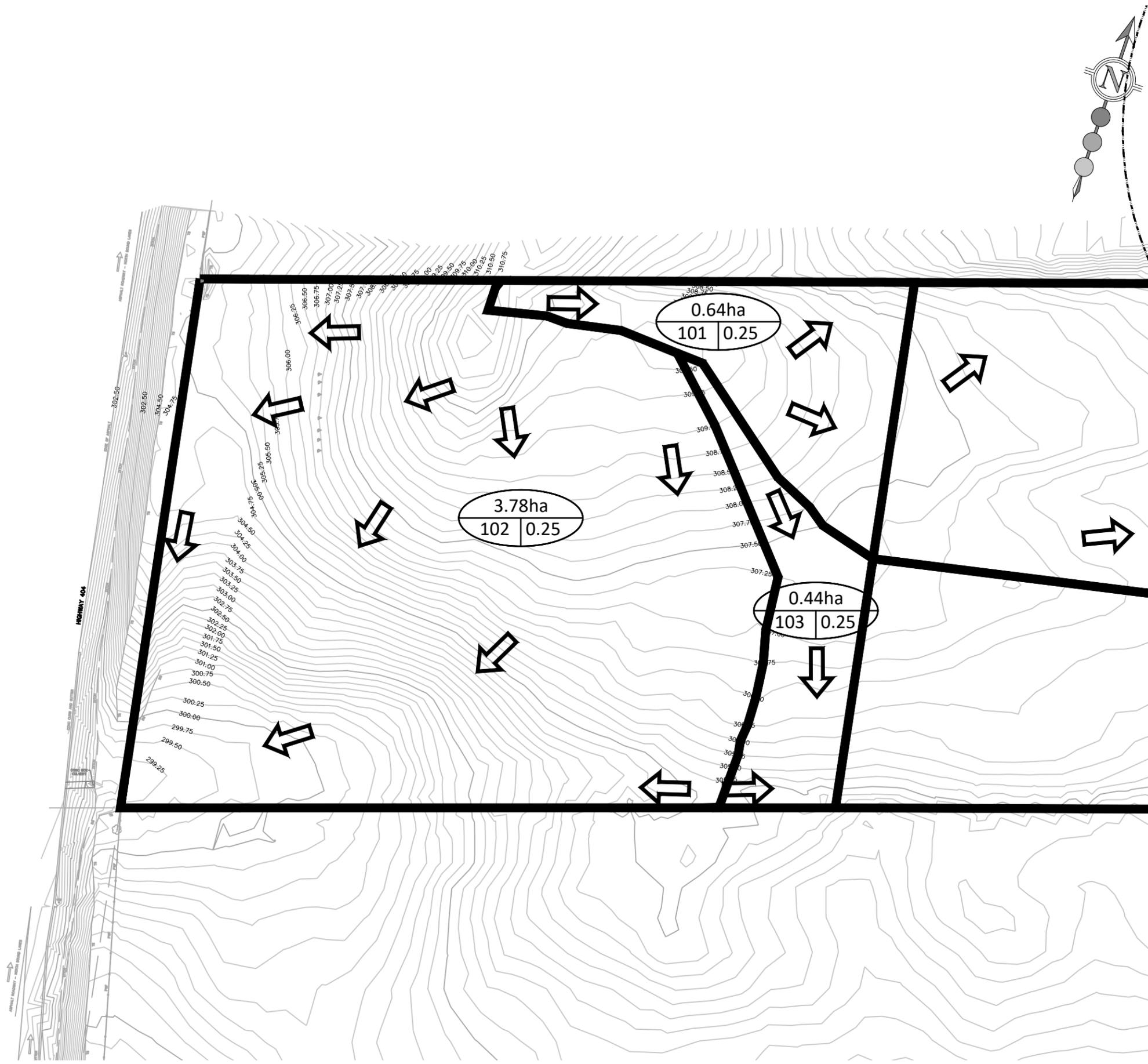


Yan (Annie) Wang, B.A.S.c
awang@scsconsultinggroup.com

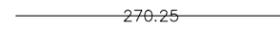
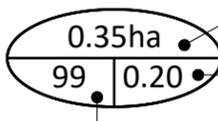
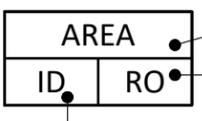


Michael Ventresca, P. Eng.
mventresca@scsconsultinggroup.com

P:\2400 Vandorf - Treasure Hill\Design\Reports\SWM\2023 05(May) 08 - 1st Submission\2400-SSR.docx



LEGEND:

-  LIMIT OF DEVELOPMENT
-  STORM DRAINAGE BOUNDARY
-  EXISTING CONTOUR AND ELEVATION
-  MAJOR SYSTEM - OVERLAND FLOW
-  DRAINAGE AREA (HECTARES)
RUNOFF COEFFICIENT
CATCHMENT ID
-  EXTERNAL STORM DRAINAGE AREA (HECTARES)
RUNOFF COEFFICIENT
CATCHMENT ID

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

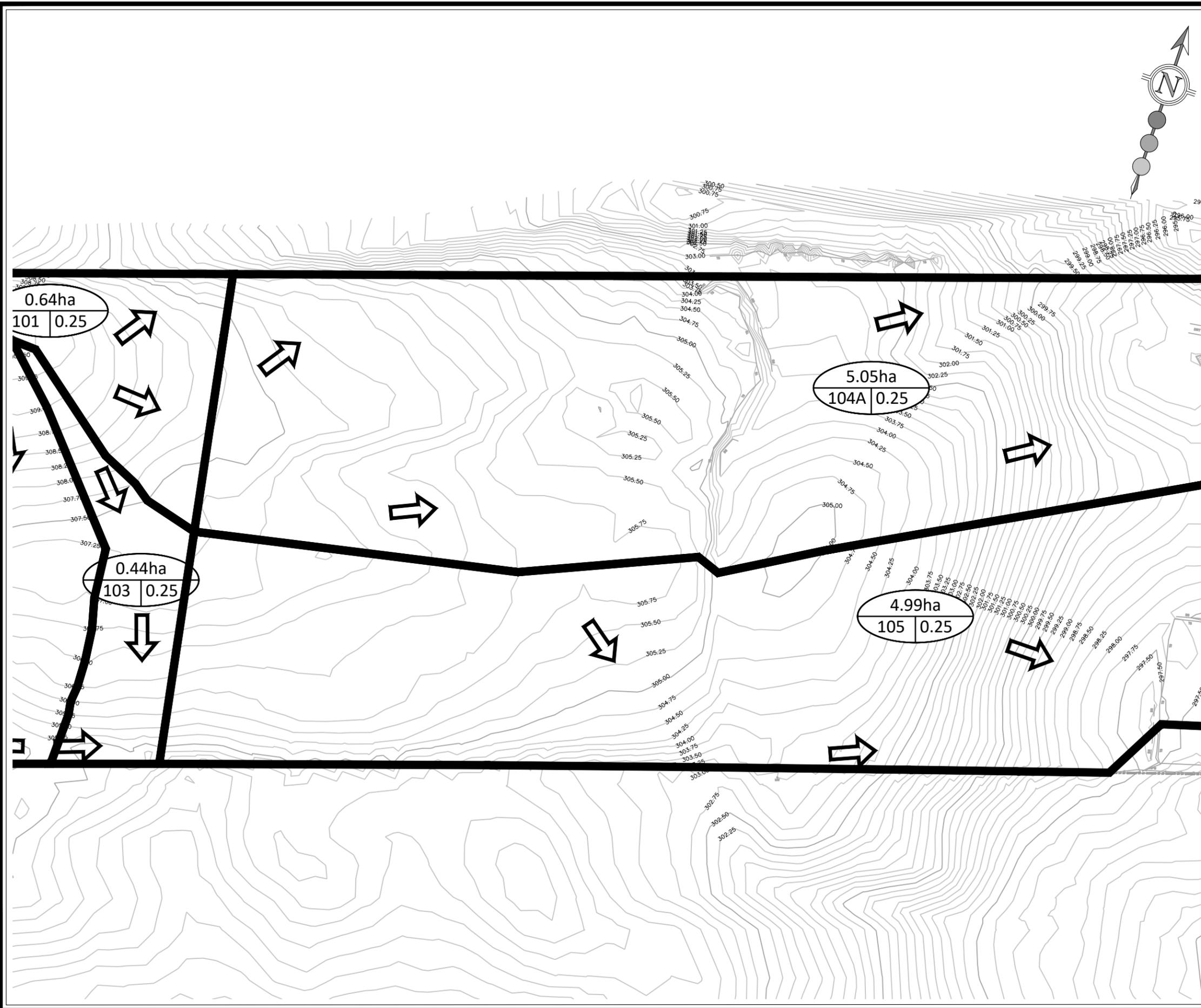
 30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

TREASURE HILL

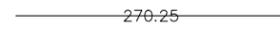
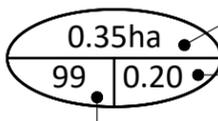
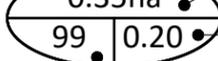
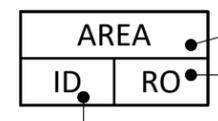
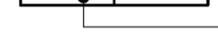
VANDORF - TREASURE HILL

EXISTING STORM DRAINAGE PLAN

DESIGNED BY:	Y.W.	CHECKED BY:	M.G.V.
SCALE:	1:1500	DATE:	MAY 2023
PROJECT No:	2400	FIGURE No:	3.1A



LEGEND:

-  LIMIT OF DEVELOPMENT
-  STORM DRAINAGE BOUNDARY
-  EXISTING CONTOUR AND ELEVATION
-  MAJOR SYSTEM - OVERLAND FLOW
-  DRAINAGE AREA (HECTARES)
 RUNOFF COEFFICIENT
 CATCHMENT ID
-  EXTERNAL STORM DRAINAGE AREA (HECTARES)
 RUNOFF COEFFICIENT
 CATCHMENT ID

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

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

TREASURE HILL

VANDORF - TREASURE HILL

EXISTING STORM DRAINAGE PLAN

DESIGNED BY:	Y.W.	CHECKED BY:	M.G.V.
SCALE:	1:1500	DATE:	MAY 2023
PROJECT No:	2400	FIGURE No:	3.1B



LEGEND:

- LIMIT OF DEVELOPMENT
- STORM DRAINAGE BOUNDARY
- EXISTING CONTOUR AND ELEVATION
- MAJOR SYSTEM - OVERLAND FLOW
- DRAINAGE AREA (HECTARES)
- RUNOFF COEFFICIENT
- CATCHMENT ID
- EXTERNAL STORM DRAINAGE AREA (HECTARES)
- RUNOFF COEFFICIENT
- CATCHMENT ID
- DEVELOPMENT LIMIT
- WETLAND LIMIT

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

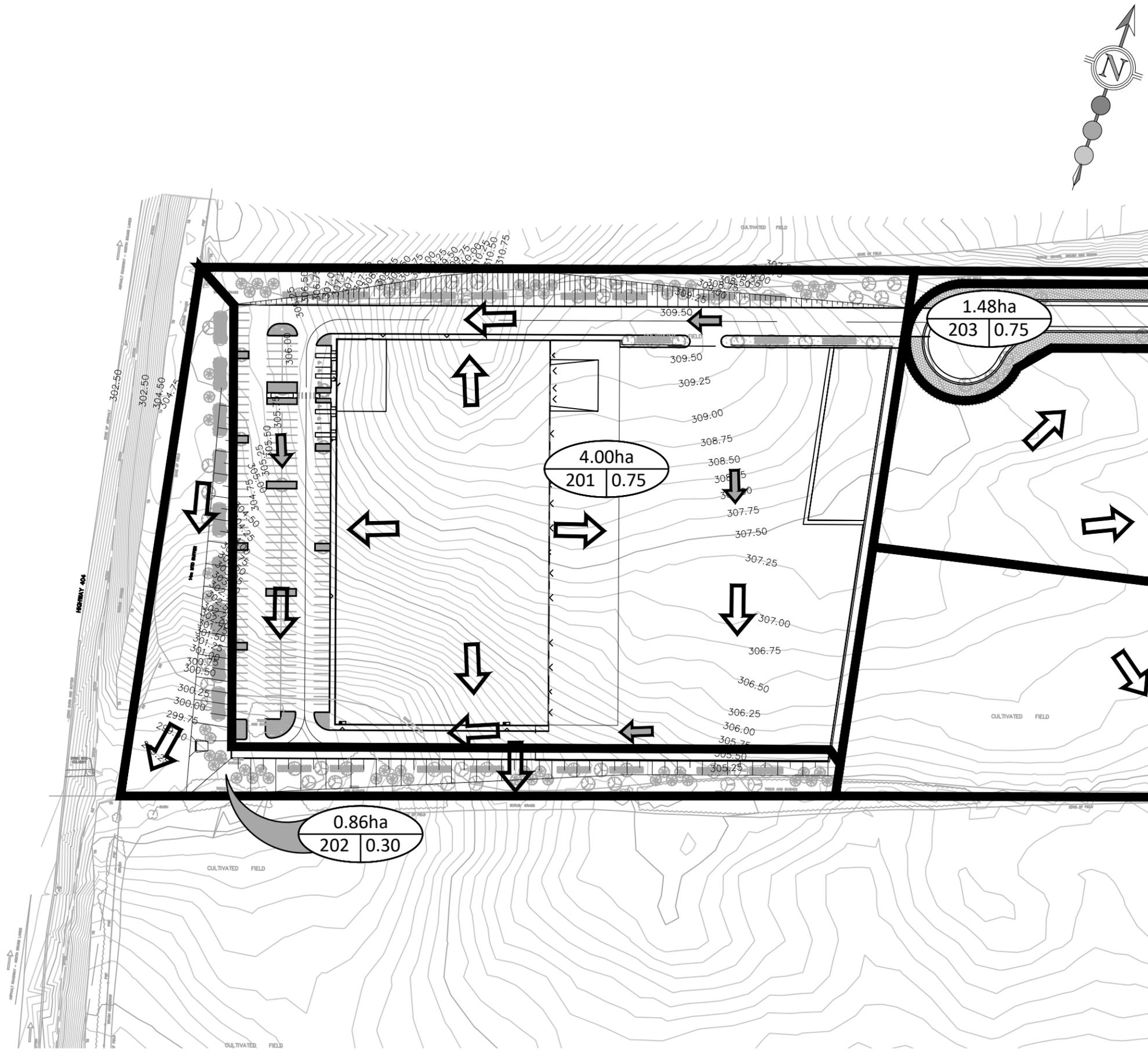
30 CENTURIAN DRIVE, SUITE 100
 MARKHAM, ONTARIO L3R 8B8
 TEL: (905) 475-1900
 FAX: (905) 475-8335

TREASURE HILL

VANDORF - TREASURE HILL

EXISTING STORM DRAINAGE PLAN

DESIGNED BY:	Y.W.	CHECKED BY:	M.G.V.
SCALE:	1:1500	DATE:	MAY 2023
PROJECT No:	2400	FIGURE No:	3.1C



LEGEND:

- LIMIT OF DEVELOPMENT
- STORM DRAINAGE BOUNDARY
- 270-25 EXISTING CONTOUR AND ELEVATION
- MAJOR SYSTEM - OVERLAND FLOW
- DRAINAGE AREA (HECTARES)
- RUNOFF COEFFICIENT
- CATCHMENT ID
- EXTERNAL STORM DRAINAGE AREA (HECTARES)
- RUNOFF COEFFICIENT
- CATCHMENT ID

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

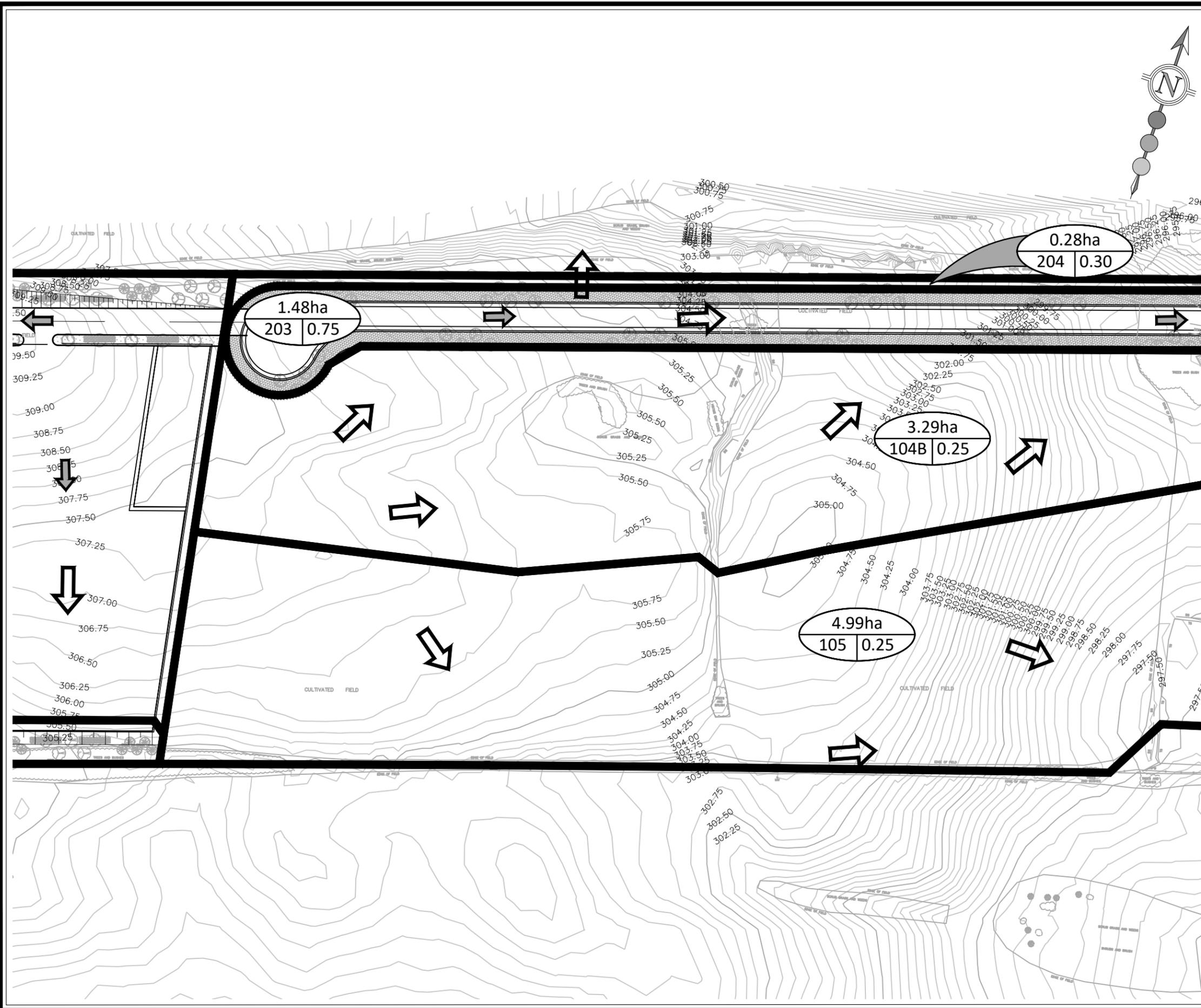
30 CENTURIAN DRIVE, SUITE 100
 MARKHAM, ONTARIO L3R 8B8
 TEL: (905) 475-1900
 FAX: (905) 475-8335

TREASURE HILL

VANDORF - TREASURE HILL

PROPOSED STORM DRAINAGE PLAN

DESIGNED BY: Y.W.	CHECKED BY: M.G.V.
SCALE: 1:1500	DATE: MAY 2023
PROJECT No: 2400	FIGURE No: 3.2A



LEGEND:

- LIMIT OF DEVELOPMENT
- STORM DRAINAGE BOUNDARY
- 270-25 EXISTING CONTOUR AND ELEVATION
- MAJOR SYSTEM - OVERLAND FLOW
- DRAINAGE AREA (HECTARES)
- RUNOFF COEFFICIENT
- CATCHMENT ID
- EXTERNAL STORM DRAINAGE AREA (HECTARES)
- RUNOFF COEFFICIENT
- CATCHMENT ID

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

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

TREASURE HILL

VANDORF - TREASURE HILL

PROPOSED STORM DRAINAGE PLAN

DESIGNED BY:	Y.W.	CHECKED BY:	M.G.V.
SCALE:	1:1500	DATE:	MAY 2023
PROJECT No:	2400	FIGURE No:	3.2B



LEGEND:

- LIMIT OF DEVELOPMENT
- STORM DRAINAGE BOUNDARY
- EXISTING CONTOUR AND ELEVATION
- MAJOR SYSTEM - OVERLAND FLOW
- DRAINAGE AREA (HECTARES)
- RUNOFF COEFFICIENT
- CATCHMENT ID
- EXTERNAL STORM DRAINAGE AREA (HECTARES)
- RUNOFF COEFFICIENT
- CATCHMENT ID
- DEVELOPMENT LIMIT
- WETLAND LIMIT

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

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

TREASURE HILL

VANDORF - TREASURE HILL

PROPOSED STORM DRAINAGE PLAN

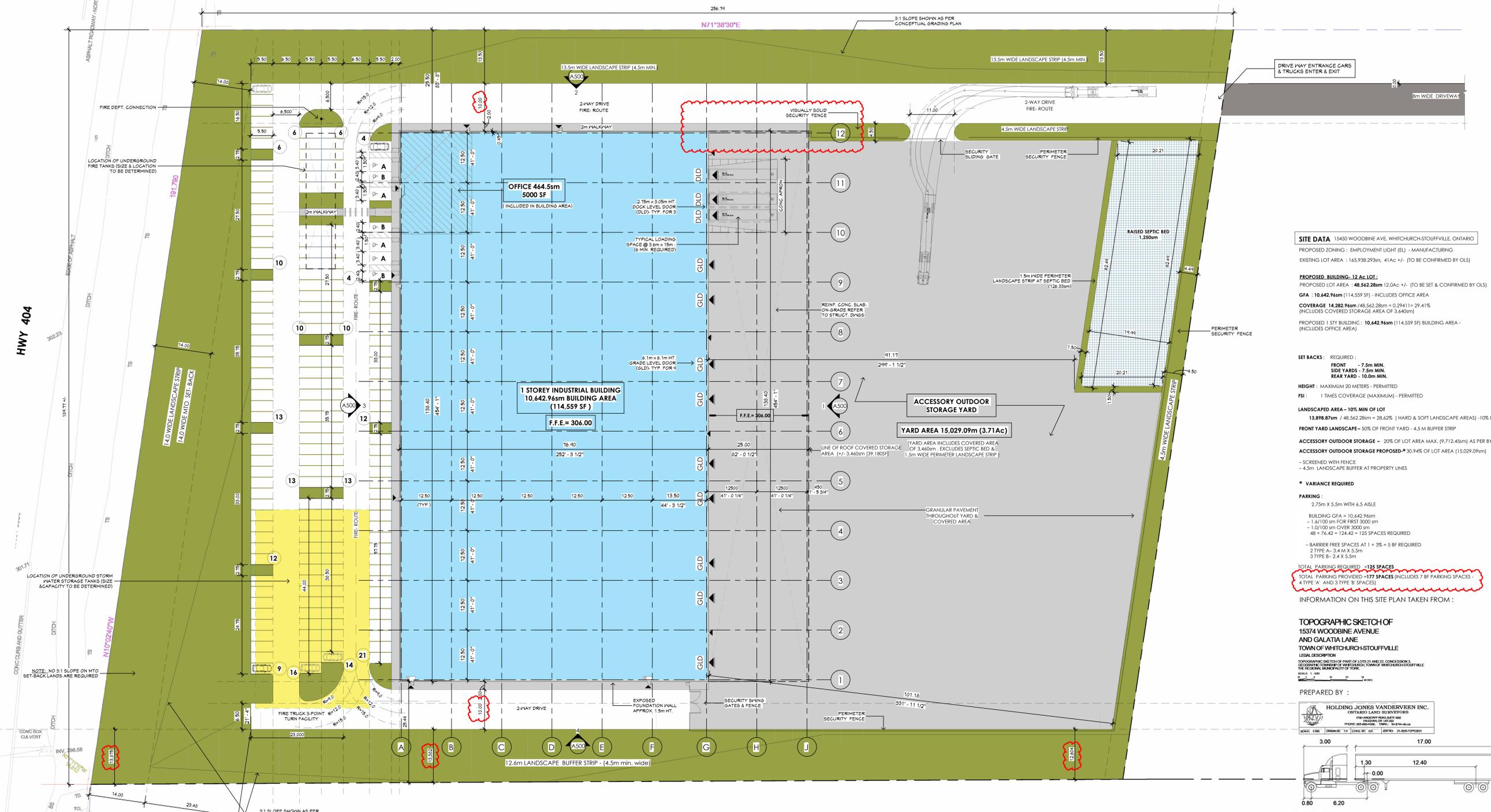
DESIGNED BY:	Y.W.	CHECKED BY:	M.G.V.
SCALE:	1:1500	DATE:	MAY 2023
PROJECT No:	2400	FIGURE No:	3.2C

APPENDIX A

SITE PLAN



KEY PLAN SITE: 15450 WOODBINE AVE



SITE DATA 15450 WOODBINE AVE, WHITCHURCH-STOUFFVILLE, ONTARIO
 PROPOSED ZONING: EMPLOYMENT LIGHT (EL) - MANUFACTURING
 EXISTING LOT AREA: 165,938.293sqm, 41Ac +/- (TO BE CONFIRMED BY OLS)

PROPOSED BUILDING - 12 AC LOT:
 PROPOSED LOT AREA: 48,562.28sqm 12.0Ac +/- (TO BE SET & CONFIRMED BY OLS)
GFA: 10,642.96sqm (114,559 SF) - INCLUDES OFFICE AREA
COVERAGE: 14,282.96sqm (48,562.28sqm = 0.2941) = 29.41%
 (INCLUDES COVERED STORAGE AREA OF 3,460sqm)
 PROPOSED 1STY BUILDING: 10,642.96sqm (114,559 SF) BUILDING AREA - (INCLUDES OFFICE AREA)

SET BACKS: REQUIRED:
 FRONT: 7.5m MIN.
 SIDE YARDS: 7.5m MIN.
 REAR YARD: 10.0m MIN.

HEIGHT: MAXIMUM 20 METERS - PERMITTED
FSI: 1 TIMES COVERAGE (MAXIMUM) - PERMITTED

LANDSCAPED AREA - 10% MIN OF LOT
 13,898.87sqm / 48,562.28sqm = 28.62% (HARD & SOFT LANDSCAPE AREAS) - 10% MIN.
FRONT YARD LANDSCAPE - 50% OF FRONT YARD - 4.5 M BUFFER STRIP
ACCESSORY OUTDOOR STORAGE - 20% OF LOT AREA MAX. (9,712.45sqm) AS PER BY-LAW
ACCESSORY OUTDOOR STORAGE PROPOSED - 30.94% OF LOT AREA (15,029.09sqm)

- SCREENED WITH FENCE
 - 4.5m LANDSCAPE BUFFER AT PROPERTY LINES

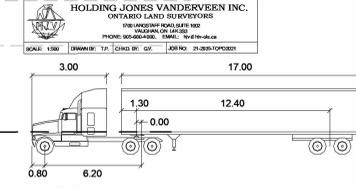
*** VARIANCE REQUIRED**

PARKING:
 2.75m X 5.5m WITH 4.5 ASLE
 BUILDING GFA = 10,642.96sqm
 - 1.6/100 sqm FOR FIRST 3000 sqm
 - 1.0/100 sqm COVER 3000 sqm
 48 + 76.42 = 124.42 = 125 SPACES REQUIRED
 - BARRIER FREE SPACES AT 1 + 3% = 5 BF REQUIRED
 2 TYPE A - 3.4 M X 5.5 M
 3 TYPE B - 2.4 X 5.5 M

TOTAL PARKING REQUIRED - 125 SPACES
TOTAL PARKING PROVIDED - 177 SPACES (INCLUDES 7 BF PARKING SPACES - 4 TYPE 'A' AND 3 TYPE 'B' SPACES)

INFORMATION ON THIS SITE PLAN TAKEN FROM:

TOPOGRAPHIC SKETCH OF 15374 WOODBINE AVENUE AND GALATIA LANE TOWN OF WHITCHURCH-STOUFFVILLE
 LEGAL DESCRIPTION
 TOPOGRAPHIC SKETCH OF PART OF LOTS 11 AND 22, CONCESSION 11, DISTRICT OF WHITCHURCH-STOUFFVILLE, TOWN OF WHITCHURCH-STOUFFVILLE, THE REGIONAL MUNICIPALITY OF YORK.
 SCALE: 1:500
 PREPARED BY:
 HOLDING JONES VANDERVEEN INC.
 ONTARIO LAND SURVEYORS
 1000 SHEPPARD AVENUE EAST
 UNIT 1000 SCARBOROUGH, ONTARIO M1S 1T5
 PHONE: (416) 291-1000
 FAX: (416) 291-1001
 SCALE: 1:500 DRAWN BY: T.J. CHECK BY: G.M. DATE: 21-08-10 (0000)



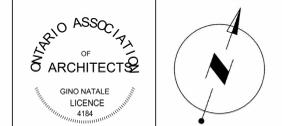
WB-20TAC meters
 Tractor Width: 2.60
 Trailer Width: 2.60
 Tractor Track: 2.60
 Trailer Track: 2.60
 Lock to Lock Time: 6.00
 Steering Angle: 28.30
 Articulating Angle: 70.00

13			
12			
11			
10			
9			
8	REVISION AS PER CLIENT COMMENTS. RE ISSUED FOR CLIENT REVIEW.	APR. 24/23	GN
7	CLIENT REVISION. RE ISSUED FOR CLIENT REVIEW & MEETING.	JAN. 26/23	GN
6	ISSUED FOR CLIENT REVIEW & MEETING.	JAN. 25/23	GN
5	ISSUED FOR CLIENT REVIEW.	OCT. 24/22	GN
4	ISSUED FOR CLIENT REVIEW.	OCT. 06/22	GN
3	ISSUED FOR CLIENT REVIEW.	OCT. 03/22	GN
2	ISSUED FOR CLIENT REVIEW.	SEP. 27/22	GN
1	ISSUED FOR CLIENT REVIEW.	SEP. 16/22	GN
NO.	REVISIONS	DATE	BY:

*ALL DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE COPYRIGHT PROPERTY OF THE ARCHITECT AND MUST BE RETURNED UPON REQUEST. REPRODUCTION OF DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS IN PART OR WHOLE IS FORBIDDEN WITHOUT THE ARCHITECT'S WRITTEN PERMISSION. DRAWINGS SHALL NOT BE SCALED.

CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS ON THE JOB.

NATALE ARCHITECT INC.
 Suite 218
 480 Dundas St. West
 Toronto, Ontario
 M5G 1R5
 Phone: (416) 593-3333



CLIENT: **Cerito Investment Corp.**

PROJECT: PROPOSED INDUSTRIAL BUILDING
 15450 WOODBINE AVE. S.
 WHITCHURCH-STOUFFVILLE, ONTARIO

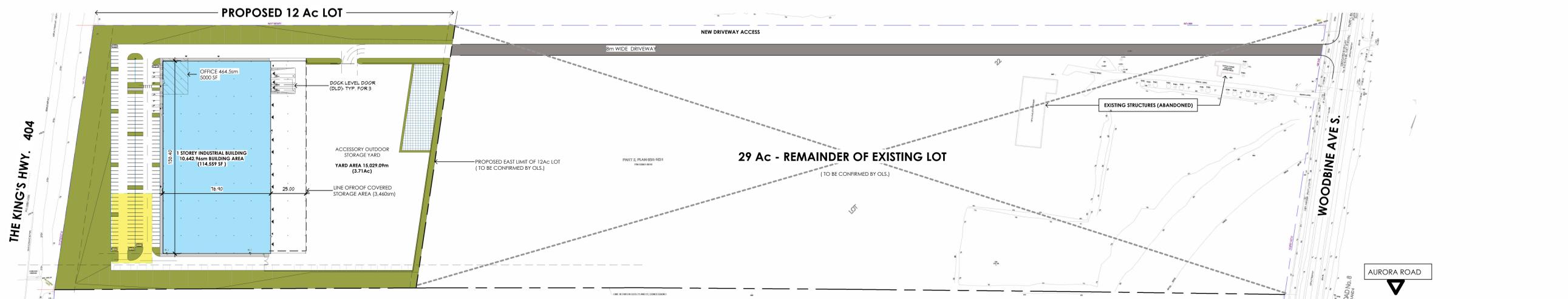
DRAWING: SITE PLAN, SITE DATA, & BUILDING DATA

THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES UNLESS CORRECTED BY:

DRAWN BY: nm CHECKED BY: GN
 DATE: SCALE: AS NOTED

PROJECT NO.: DRAWING NO.: 21-14 A100

2 SITE PLAN
 A100 1:400



1 OVERALL SITE PLAN
 A100 1:1200

APPENDIX B

EXCERPTS FROM BACKGROUND REPORTS



Soil Engineers Ltd.

CONSULTING ENGINEERS

GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE

90 WEST BEAVER CREEK ROAD, SUITE 100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

BARRIE
TEL: (705) 721-7863
FAX: (705) 721-7864

MISSISSAUGA
TEL: (905) 542-7605
FAX: (905) 542-2769

OSHAWA
TEL: (905) 440-2040
FAX: (905) 725-1315

NEWMARKET
TEL: (905) 853-0647
FAX: (905) 881-8335

GRAVENHURST
TEL: (705) 684-4242
FAX: (705) 684-8522

HAMILTON
TEL: (905) 777-7956
FAX: (905) 542-2769

**A REPORT TO
GALATIA LANE ESTATES INC.**

**A GEOTECHNICAL INVESTIGATION FOR
PROPOSED INDUSTRIAL DEVELOPMENT**

15450 WOODBINE AVENUE

**TOWN OF WHITCHURCH-STOUFFVILLE
(WESLEY CORNERS)**

REFERENCE NO. 2210-S077

MARCH 2023

DISTRIBUTION

- 1 Digital Copy - Galatia Lane Estates Inc.
- 1 Digital Copy - Soil Engineers Ltd. (Richmond Hill)



1.0 **INTRODUCTION**

In accordance with written authorization from Mr. Angelo Baldassarra of Galatia Lane Estates Inc., dated November 7, 2022, a geotechnical investigation was carried out at 15450 Woodbine Avenue in the Town of Whitchurch-Stouffville (Wesley Corners).

The purpose of the investigation was to reveal the subsurface conditions and determine the engineering properties of the disclosed soils for the design and construction of an industrial development. The geotechnical findings and resulting recommendations are presented in this Report.

2.0 **SITE AND PROJECT DESCRIPTION**

The Town of Whitchurch-Stouffville is situated on the Markham till plain where drift dominates the soil stratigraphy. In places, the drift has been eroded by Peel ponding (glacial lake) and filled with glacial flow sands and lacustrine sand, silt and clay.

The subject site, 48,562.28 m² in area, is located in the west side of Woodbine Avenue, approximately 600 m north of Aurora Road, in the Town of Whitchurch-Stouffville. At the time of investigation, the property was a farm field with abandoned structures fronting Woodbine Avenue. The topographic sketch prepared by Holding Jones Vanderbeen Inc., indicates that the grading of the site descends towards the south and east, having a grade difference of up to 17 m.

A review of the aerial photos of the site available from the Regional Municipality of York website indicates that the western portion of the property has been previously graded between 2002 and 2006.

Based on the architectural drawings prepared by Natale Architect Inc. dated January 26, 2023, the property will be developed with a slab-on-grade industrial building with covered loading docks. The building will be provided with a paved parking lot, an outdoor storage yard and an access roadway to Woodbine Avenue. The sewage effluent for the building will be managed by a private septic system at the northeast corner of the storage yard, designed by others.



3.0 **FIELD WORK**

The field work, consisting of eight (8) sampled boreholes extending to a depth of 3.5 m to 11.0 m, was performed between January 27 and 31, 2023, at the locations shown on the Borehole Location Plan, Drawing No. 1.

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

The field work was supervised and the findings were recorded by a Geotechnical Technician. The geodetic ground elevation at each borehole location was obtained using the Global Navigation Satellite System (GNSS).

4.0 **SUBSURFACE CONDITIONS**

The boreholes were carried out on a farm field, where beneath a layer of topsoil and earth fill, the site is underlain by strata of sand, silt, sandy silt till and silty clay.

Detailed descriptions of the subsurface conditions are presented on the Borehole Logs, comprising Figures 1 to 8, inclusive. The revealed stratigraphy is plotted on the Subsurface Profile, Drawing Nos. 2 and 3. The engineering properties of the disclosed soils are discussed herein.

4.1 **Topsoil** (Boreholes 4 to 8, inclusive)

A layer of topsoil, 13 to 38 cm in thickness, was encountered at the ground surface. The topsoil is void of engineering value and must be removed for the development. It can only be reused in landscaped areas of the development and must not be buried below any structures or deeper than 1.4 m below the finished grade.



4.2 **Earth Fill** (Boreholes 2 to 8, inclusive)

Beneath the topsoil, a layer of earth fill, consisting of sandy silt and silty clay mixed with topsoil and rootlets, was contacted in all the boreholes except Borehole 1. The earth fill extends to a depth of 0.7 to 4.0 m from the prevailing ground surface.

The obtained 'N' values range from 2 to 34, with a median of 9 blows per 30 cm of penetration, indicating that the fill is was likely placed without quality control. The natural water content values range from 12% to 39%, with a median of 20%. The high water content values indicate the presence of organic material in the fill. Accordingly, four (4) earth fill samples were retrieved to determine their organic content. The results are summarized in Table 1.

Table 1 - Organic Content of Topsoil

Borehole No./Sample No.	2/3	3/3	4/3	5/2
Organic Content (%)	5.7	3.7	5.4	3.7

The results indicate the samples contain 3.7% to 5.7% of organic content, indicating that the fill contains organic material and is generally unsuitable for reuse in its present state.

4.3 **Silt** (Boreholes 1, 2, 3, 4, 5 and 8)

The native silt was encountered in 6 of the 8 boreholes, beneath the earth fill, sand, silty clay, and/or sandy silt till and extended to the investigated depths of 3.5 to 9.5 m below grade. Grain size analyses were performed on four (4) samples of the silt; the results are plotted on Figure 9.

The silt samples are very moist to wet, as confirmed by the natural water content ranging from 14% to 26%, with a median of 20%. The silt is generally water bearing.

The obtained 'N' values ranges from 11 to 60, with a median of 24 blows per 30 cm of penetration, indicating the silt deposit is compact to very dense, being generally compact in relative density.

The engineering properties of the silt deposit are presented below:

- High frost susceptibility



- High water erodibility; it is susceptible to fine migration under seepage condition.
- It has a high water capillarity and water retention capacity.
- The wet silt is susceptible to impact disturbance, which will cause built up of pore water pressure, resulting in soil dilation and reduction in shear strength.
- In excavation, the wet silt will slough, run with water seepage and boil with a piezometric head of 0.4 m.

4.4 **Sandy Silt Till** (Boreholes 1, 2, 4 and 7)

The sandy silt till was encountered beneath the earth fill and/or silt and extended to the maximum investigated depth of Boreholes 1, 2 and 7, between 3.5 m and 9.5 m below grade. In Borehole 4, the till was found between 2 silt layers, between 2.9 m and 4.0 m below grade. It consists of a random mixture of particle sizes ranging from clay to gravel, with sand and silt predominates the soil stratigraphy.

The obtained 'N' values of the sandy silt till range from 29 to over 100, with a median of 83 blows per 30 cm of penetration, indicating that the till is compact to very dense, being generally very dense in relative density.

The natural water content values range from 7% to 15%, with a median of 9%, showing that the sandy silt till is generally in moist to very moist conditions.

The engineering properties of the sandy silt till are presented below:

- Highly frost susceptible and low water erodibility.
- In excavation, the till will be stable in steep cuts. However, local sloughing and sheet collapse may occur under prolonged exposure.

4.5 **Sand** (Boreholes 1 and 6)

The native sand stratum was encountered at the surface in Borehole 1 and below the earth fill in Borehole 6. It consists of fine-grained sand with some silt. Grain size analysis was performed on a representative sample of the sand; the result is plotted on Figure 10.

The natural water content values of the sand are 4% and 12%, showing that the sand is in a damp to wet conditions. The sand encountered in Borehole 4 is water bearing.



The obtained 'N' values of 8, 16 and 21 blows per 30 cm of penetration indicates that the sand is loose to compact, being generally compact in relative density.

The engineering properties of the sand are presented below:

- Low to high frost susceptibility, depending on its silt content.
- High water erodibility, it is susceptible to migration under seepage condition.
- In excavation, the sand will slough to its angle of repose, run with water seepage and will boil under a piezometric head of 0.3 m.

4.6 **Silty Clay** (Boreholes 2 and 3)

The silty clay was encountered beneath the earth fill and extended to a depth of 4.0 m below grade in Borehole 2. In Borehole 3, the silty clay was encountered beneath the silt layer and extended to the borehole depth of 10.9 m.

Grain size analysis was performed on a representative sample of the silty clay; the result is plotted on Figure 11.

The consistency of the clay is stiff to hard, generally hard, confirmed by the obtained 'N' values of 10 to over 100 blows, with a median of 41 blows per 30 cm of penetration.

The Atterberg Limits of the representative sample of the silty clay, and the natural water content of all the samples were determined. The results are plotted on the Borehole Logs and summarized below:

Liquid Limits	32%
Plastic Limits	18%
Natural Water Content	14% to 23% (median 20%)

The above results show that the clay is a cohesive material with medium plasticity. The natural water content generally lies below the plastic limit or between the plastic and liquid limits, confirming the consistency of the silty clay as determined by the 'N' values.

The engineering properties of the silty clay are presented below:

- High frost susceptibility and high soil-adsfreezing potential.
- Low water erodibility.



- In excavation, the clay will be stable in relatively steep slope, but will slough under prolonged exposure.

5.0 **GROUNDWATER CONDITION**

All boreholes remained dry upon completion of drilling; however, seepages were encountered in the sand and silt deposit below a depth of 3.0 to 4.0 m from the prevailing ground surface in most boreholes.

6.0 **DISCUSSION AND RECOMMENDATIONS**

The boreholes were carried out on a farm field, where beneath a layer of topsoil, and in places, a layer of earth fill, the site is underlain by strata of sand, silt, sandy silt till and silty clay.

The boreholes remained dry and open upon completion of the fieldwork; however, seepages were encountered in the sand and silt deposits.

The conceptual site plan indicates that the property will be developed with a slab-on-grade industrial building with a covered loading dock area. It will be provided with paved parking area, an outdoor storage yard and access driveway to Woodbine Avenue. The sewage from the development will be managed by a private septic system located at the northeast corner of the storage yard.

The geotechnical findings warranting special consideration for the project are presented below:

1. The topsoil is void of engineering value and should only be reused for landscape purpose. Any surplus should be removed off site.
2. Due to the lack of quality and compaction records, the existing earth fill cannot be used to support any structure sensitive to movement. Furthermore, the fill contains relatively high organic content; therefore, it must be subexcavated to native ground, sorted free of concentrated topsoil, organics and deleterious materials, prior to be reused for structural backfill.
3. Where site grading with additional fill is required, it is economical to place an engineered fill for foundation, slab-on-grade and pavement construction.



4. The proposed building can be constructed on conventional spread and strip footings founded on engineered fill or competent native soil. The foundation subgrade must be inspected by a geotechnical engineer.

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

6.1 **Site Preparation**

The topsoil must be removed. It can be stockpiled on-site for reuse in landscaped areas only. Any surplus should be removed off-site.

The existing earth fill cannot be used to support any structure sensitive to movement. It should be subexcavated, sorted free of concentrated topsoil, organic or deleterious material, and compacted to the engineered fill specifications for structural uses.

In areas where the site will be re-graded with additional earth fill, the earth fill can be compacted to engineered fill specifications for construction of building foundation, pavement, and underground services. The engineering requirements for a certifiable fill are presented below:

1. After the topsoil and earth fill are removed; the subgrade must be inspected and proof-rolled prior to any fill placement. Any soft/loose soils identified should also be subexcavated.
2. Inorganic soils must be used for the fill, and they must be uniformly compacted in lifts of 20 cm to at least 98% Standard Proctor dry density (SPDD), up to the proposed finished grade. The soil moisture must be properly controlled near the optimum. Where the foundation is to be constructed immediately after the engineered fill construction, the degree of compaction must be increased to 100% SPDD.
3. If imported fill is to be used, it should be inorganic soils, free of any deleterious material with environmental issue (contamination). Any potential imported earth fill from off-site must be reviewed for geotechnical and environmental quality by the appropriate personnel as authorized by the developer or agency, before it is hauled to the site.



4. The engineered fill must not be placed when freezing ambient temperatures occur either persistently or intermittently. This is to ensure that the fill is free of frozen soils, ice and snow.
5. If the engineered fill is to be left over the winter months, adequate earth cover or equivalent must be provided for protection against frost action.
6. The fill operation must be fully supervised and monitored by a technician under the direction of a geotechnical engineer.
7. The footing and underground services subgrade must be inspected by the geotechnical consulting firm that supervised the engineered fill placement. This is to ensure that the foundations and service pipes are placed within the engineered fill envelope, and the integrity of the fill has not been compromised by interim construction, environmental degradation and/or disturbance by the footing excavation.
8. Despite stringent control in the placement of the engineered fill, variations in soil type and density may occur in the engineered fill. Building foundations founded on engineered fill must be reinforced in the footings and upper section of the foundation walls, designed by a structural engineer to distribute the stress induced by the potential abrupt differential settlement.

6.2 **Foundation**

The proposed slab-on-grade building can be constructed on conventional footings founded in the undisturbed native soils or engineered fill. Based on the borehole findings, the recommended bearing pressures for the design of the conventional strip and spread footings are presented below:

- Maximum Soil Bearing Pressure at Serviceability Limit State (SLS) = 150 kPa
- Factored Ultimate Bearing Pressure at Ultimate Limit State (ULS) = 250 kPa

The total and differential settlements of footings, designed for the bearing pressure at SLS, are estimated within 25 mm and 20 mm, respectively.

Foundation subgrade should be inspected by a geotechnical engineer to ensure that the revealed conditions are compatible with the foundation design requirements.

Footings exposed to weathering or in unheated areas should have at least 1.2 m of earth cover for protection against frost action.



The building foundations must meet the requirements specified in the latest Ontario Building Code. As a guide, the new building designed should be designed to resist an earthquake force using Site Classification 'D' (stiff soil).

The in-situ soils are high in soil ad-freezing potential. The foundation should be constructed with concrete and the perimeter foundation walls must be shielded with a polyethylene slip membrane extending to the depth of the frost penetration depth. Alternatively, the foundation wall must be backfilled with free-draining granular material, compacted to at least 95% SPDD, in lifts no more than 200 mm in thickness.

6.3 **Slab-On-Grade Construction**

The building subgrade for slab-on-grade construction should consist of sound native soil or engineered fill. It should be inspected and assessed by proof-rolling using a heavy roller or loaded dump truck. Where soft subgrade is identified, it should be subexcavated and replaced with inorganic material, uniformly compacted to at least 98% SPDD.

The slab should be constructed on a granular bedding of 19-mm CRL, or equivalent, compacted to 100% SPDD.

For a minimum bedding thickness of 20 cm, a Modulus of Subgrade Reaction (k_s) of 25 MPa/m can be used for slab design. The k_s value can be increased slightly with the increase of thickness in the granular bedding.

The floor slab at the entrances into the building should be insulated with 50-mm Styrofoam, or equivalent, extending 1.2 m internally. This measure is to prevent cold drafts in the winter from inducing frost action in the subgrade and causing damage to the floor slab.

The external grading must be designed to drain surface runoff away from the structure to prevent ponding of water adjacent to the structure.

6.4 **Loading Docks and Concrete Aprons**

In the loading dock area, the subgrade soil will be subject to freezing temperature. It is recommended that the backfill behind the loading dock should consist of non-frost susceptible granular material. In addition, a 50-mm thick rigid foam insulation should be placed behind the concrete walls exposed to freezing. The foundation walls at the truck



loading docks should be designed as a retaining structure using the soil parameters presented in Section 6.9 of this report.

Concrete apron is recommended at the truck loading area and ramp. The apron should be constructed on compacted granular bedding, 300 mm in thickness, consisting of 19-mm CRL, or equivalent. Perforated subdrain, wrapped with geotextile filter fabric, should be used to drain the subsurface water around the concrete pad to prevent any excessive seasonal ground movement.

6.5 **Underground Services**

The subgrade for the underground services should consist of sound native soil or properly compacted, inorganic earth fill. A Class 'B' bedding, consisting of compacted 19-mm CRL, or equivalent, is recommended for the underground service construction.

Service pipes connecting into manholes and catch basins must be connected by leak-proof joints, or the joints should be wrapped with a water proof membrane, to prevent any soil penetration and upfiltration through the joints.

In order to prevent pipe floatation when the sewer trench is deluged with water derived from precipitation, a minimum soil cover of at least a diameter of the pipe should be in place at all times after completion of the pipe installation. Openings to subdrains and catch basins should be shielded with a fabric filter to prevent blockage by silting.

The on-site soils has moderate to moderately high corrosivity to ductile iron pipes and metal fittings; therefore, the underground services should be protected against soil corrosion. For estimation for the anode weight requirements, the electrical resistivities shown in Section 6.9 can be used. The proposed anode weight must meet the minimum requirements as specified by the Town of Whitchurch-Stouffville and York Region Standard.

6.6 **Backfilling in Trenches and Excavated Areas**

The obtainable degree of compaction is primarily dependent on the soil moisture and, to a lesser extent, on the type of compactor used and the effort applied. As a general guide, the typical water content values of the revealed soils for Standard Proctor compaction are presented in Table 1:

**Table 2 - Estimated Water Content for Compaction**

Soil Type	Determined Natural Water Content (%)	Water Content (%) for Standard Proctor Compaction	
		100% (optimum)	Range for 95% or +
Existing Earth Fill	12 to 39 (median 20)	12	8 to 15
Silt	14 to 26 (median 20)	13	9 to 17
Sandy Silt Till	7 to 15 (median 9)	12	8 to 15
Sand	4 and 12	8	5 to 10
Silty Clay	14 to 23 (median 20)	18	14 to 22

Based on the above findings, portions of the native soils and inorganic earth fill are suitable for structural backfill. The soils that are too wet will require aeration by spreading them thinly on the ground during warm and dry weather, prior to reuse for structural backfill. Oversized boulders, over 15 cm, must be removed or they must be broken into pieces before reusing.

The existing earth fill should be sorted free of concentrated topsoil, organics and other deleterious materials prior to its reuse as structural backfill and/or engineered fill.

The trench backfill should be compacted to 95% SPDD. Below the floor slab, or within 1.0 m below the pavement subgrade, the compaction of the backfill should be increased to 98% SPDD. The lift of each backfill layer should either be limited to a thickness of 20 cm, or the thickness should be determined by test strips. Narrow trenches for services crossing should be cut at 1 vertical: 2 horizontal or flatter so that the backfill can be effectively compacted.

In conventional construction practice, the problem areas of pavement settlement largely occur adjacent to foundation walls, columns, manholes, catch basins and services crossings. In areas which are inaccessible to a heavy compactor, a light duty compactor can be used on imported granular backfill.

One must be aware of possible consequences during trench backfilling and exercise caution as described below:

- When construction is carried out in freezing winter weather, allowance should be made for these following conditions. Despite stringent backfill monitoring, frozen soil layers may inadvertently be mixed with the structural trench backfill. Should the in-



- situ soils have a water content on the dry side of the optimum, it would be impossible to wet the soil due to the freezing condition, rendering difficulties in obtaining uniform and proper compaction. Furthermore, the freezing condition will prevent flooding of the backfill when it is required, such as when the trench box is removed. The above will invariably cause backfill settlement that may become evident within 1 to several years, depending on the depth of the trench which has been backfilled.
- In areas where the underground services construction is carried out during winter months, prolonged exposure of the trench walls will result in frost heave within the soil mantle of the walls. This may result in some settlement as the frost recedes.
 - To backfill a deep trench, one must be aware that future settlement is to be expected, unless the side of the cut is flattened to at least 1 vertical:1.5 + horizontal, and the lifts of the fill and its moisture content are stringently controlled; i.e., lifts should be no more than 20 cm (or less if the backfilling conditions dictate) and uniformly compacted to achieve at least 95% SPDD, with the moisture content on the wet side of the optimum.
 - It is often difficult to achieve uniform compaction of the backfill in the lower vertical section of a trench which is an open cut or is stabilized by a trench box, particularly in the sector close to the trench walls or the sides of the box. These sectors must be backfilled with sand. In a trench stabilized by a trench box, the void left after the removal of the box will be filled by the backfill. It is necessary to backfill this sector with sand, and the compacted backfill must be flooded for 1 day, prior to the placement of the backfill above this sector, i.e., in the upper sloped trench section. This measure is necessary in order to prevent consolidation of inadvertent voids and loose backfill which will compromise the compaction of the backfill in the upper section.

6.7 **Septic Bed**

A septic system is proposed at the northeast corner of the outdoor storage yard to the east of the proposed building envelope. It is understood that the design will be completed by others.

6.8 **Pavement Design**

The pavement design for light-duty parking lot, heavy duty access road and fire route is presented in Table 3.

**Table 3 - Pavement Design**

Course	Thickness (mm)	OPS Specifications
Asphalt Surface Course	40	HL3
Asphalt Base Course Light-Duty Parking Heavy-Duty/Fire Route	50 100	HL8
Granular Base	150	19-mm CRL or equivalent
Granular Sub-base Light-Duty Parking Heavy-Duty/Fire Route	300 450	50-mm CRL or equivalent

In preparation of the pavement subgrade after fine grading, the subgrade should be free of incompetent soil and it should be proof-rolled in the presence of a geotechnical technician. Any soft spot identified should be subexcavated and replaced by properly compacted inorganic earth fill. The subgrade within the 1.0 m zone below the underside of the granular base should be compacted to at least 98% SPDD with the moisture content 2% to 3% drier than the optimum.

The granular base and sub-base should be compacted to 100% of the maximum SPDD.

The pavement subgrade will suffer a strength regression if water is allowed to infiltrate prior to paving. The following measures should therefore be incorporated into the construction and pavement design:

- If the pavement is to be constructed during the wet seasons and extremely soft subgrade occurs, the granular sub-base may require thickening. This can be further assessed during construction.
- Along the perimeter where surface runoff may drain onto the pavement, or water may seep into the granular base, a swale or intercept subdrain system should be installed to prevent infiltrating precipitation from seeping into the granular bases (since this may inflict frost damage on the flexible pavement).
- Subdrains consisting of filter-wrapped weepers should be installed in the low spots and they should be connected to the catch basins or storm manholes in the paved areas. The subdrains should be backfilled with free-draining granular material.

6.9 **Soil Parameters**

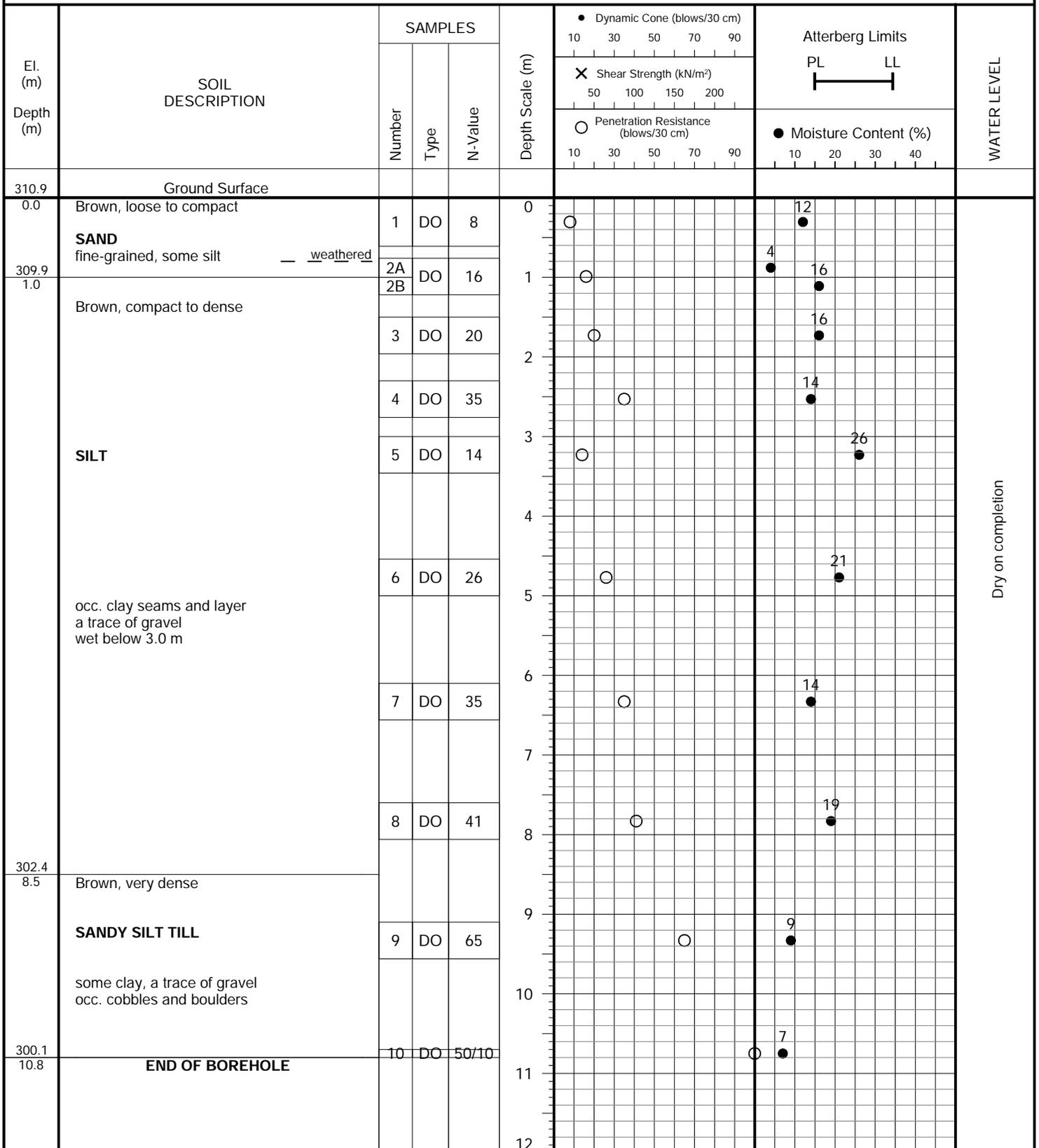
The recommended soil parameters for the project design are given in Table 4.

PROJECT DESCRIPTION: Proposed Industrial Development

METHOD OF BORING: Solid Stem

PROJECT LOCATION: 15450 Woodbine Avenue,
Town of Whitchurch-Stouffville (Wesley Corners)

DRILLING DATE: January 31, 2023

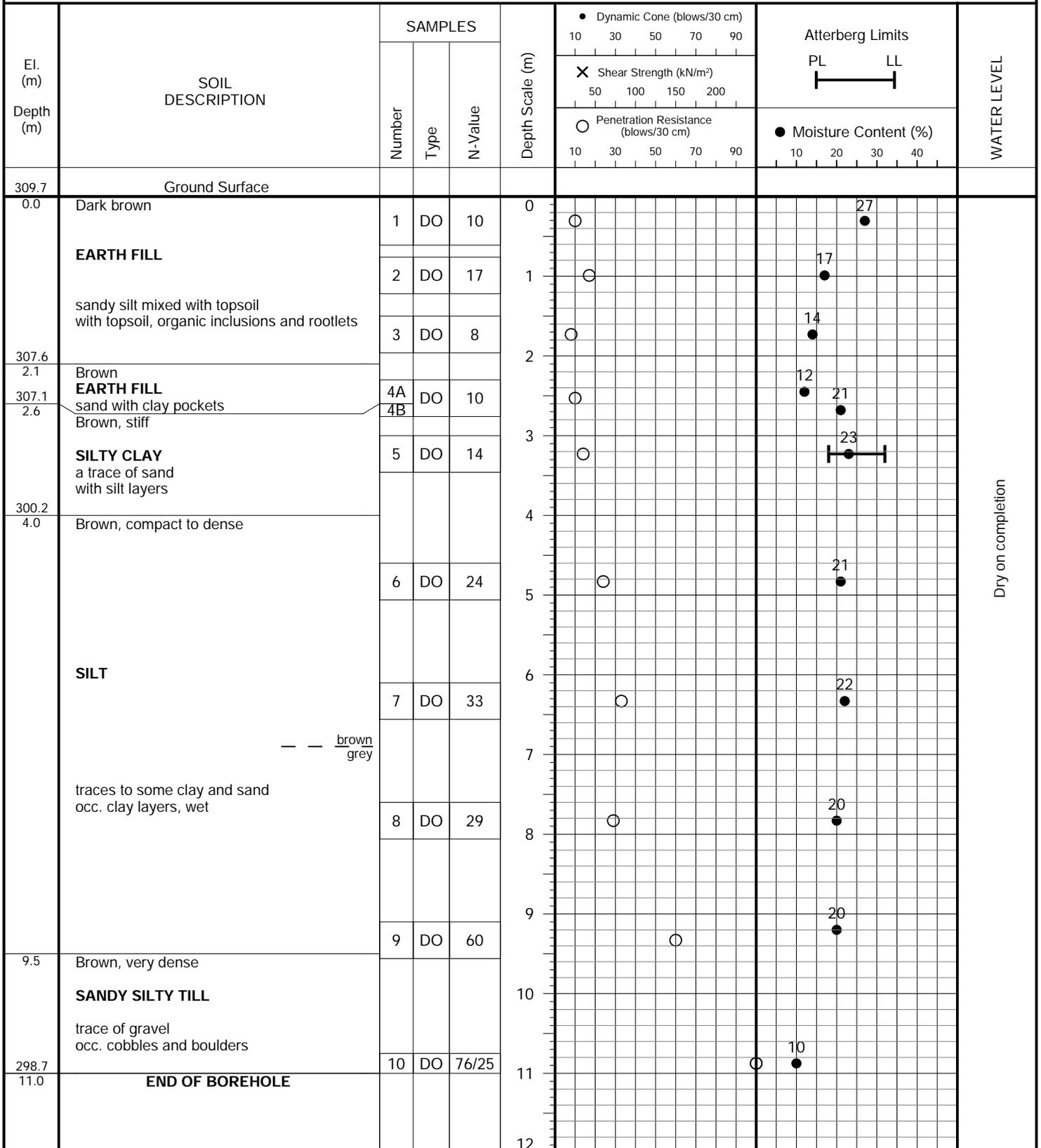


PROJECT DESCRIPTION: Proposed Industrial Development

METHOD OF BORING: Solid Stem

PROJECT LOCATION: 15450 Woodbine Avenue,
Town of Whitchurch-Stouffville (Wesley Corners)

DRILLING DATE: January 30, 2023

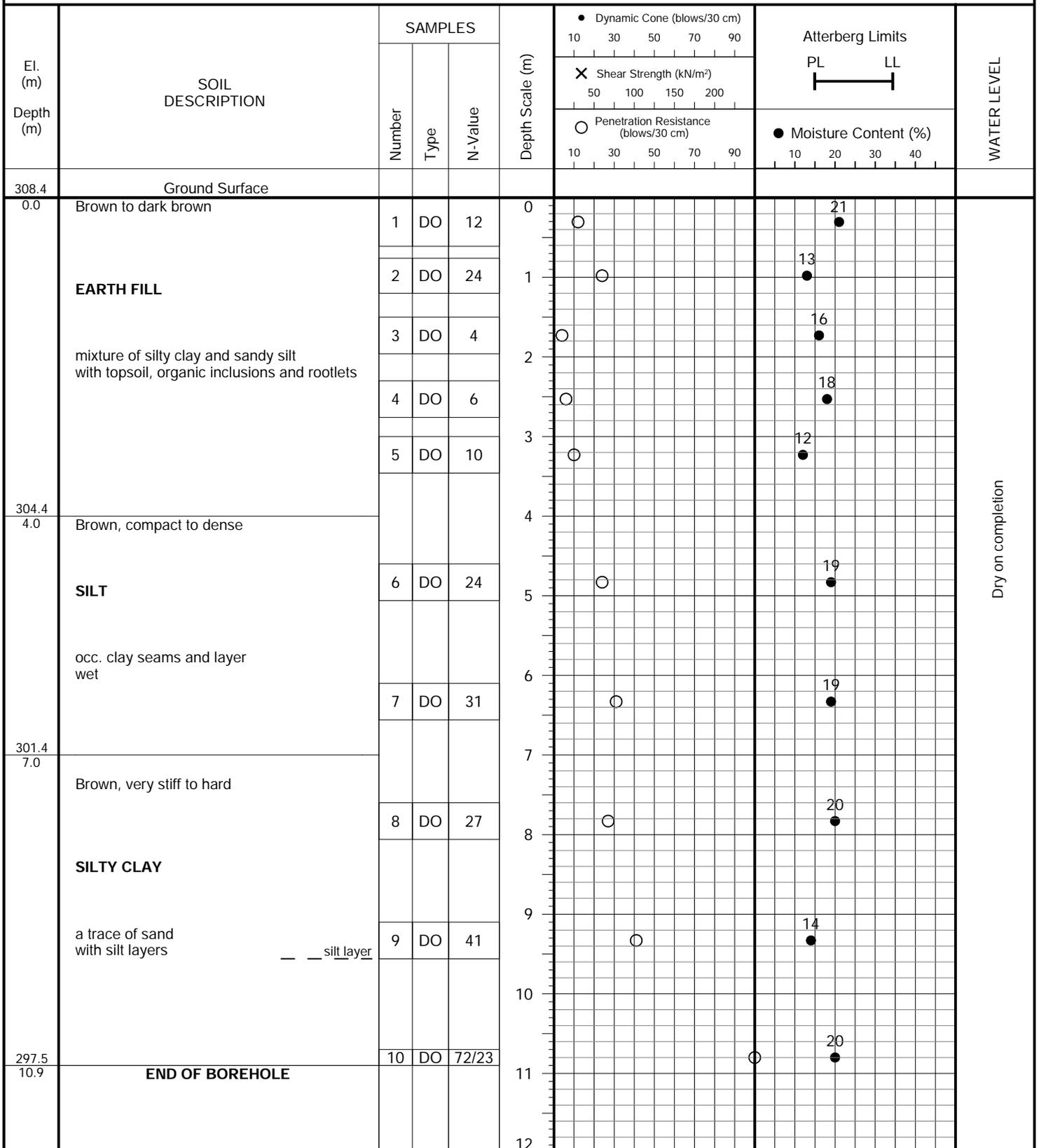


PROJECT DESCRIPTION: Proposed Industrial Development

METHOD OF BORING: Solid Stem

PROJECT LOCATION: 15450 Woodbine Avenue,
Town of Whitchurch-Stouffville (Wesley Corners)

DRILLING DATE: January 30, 2023

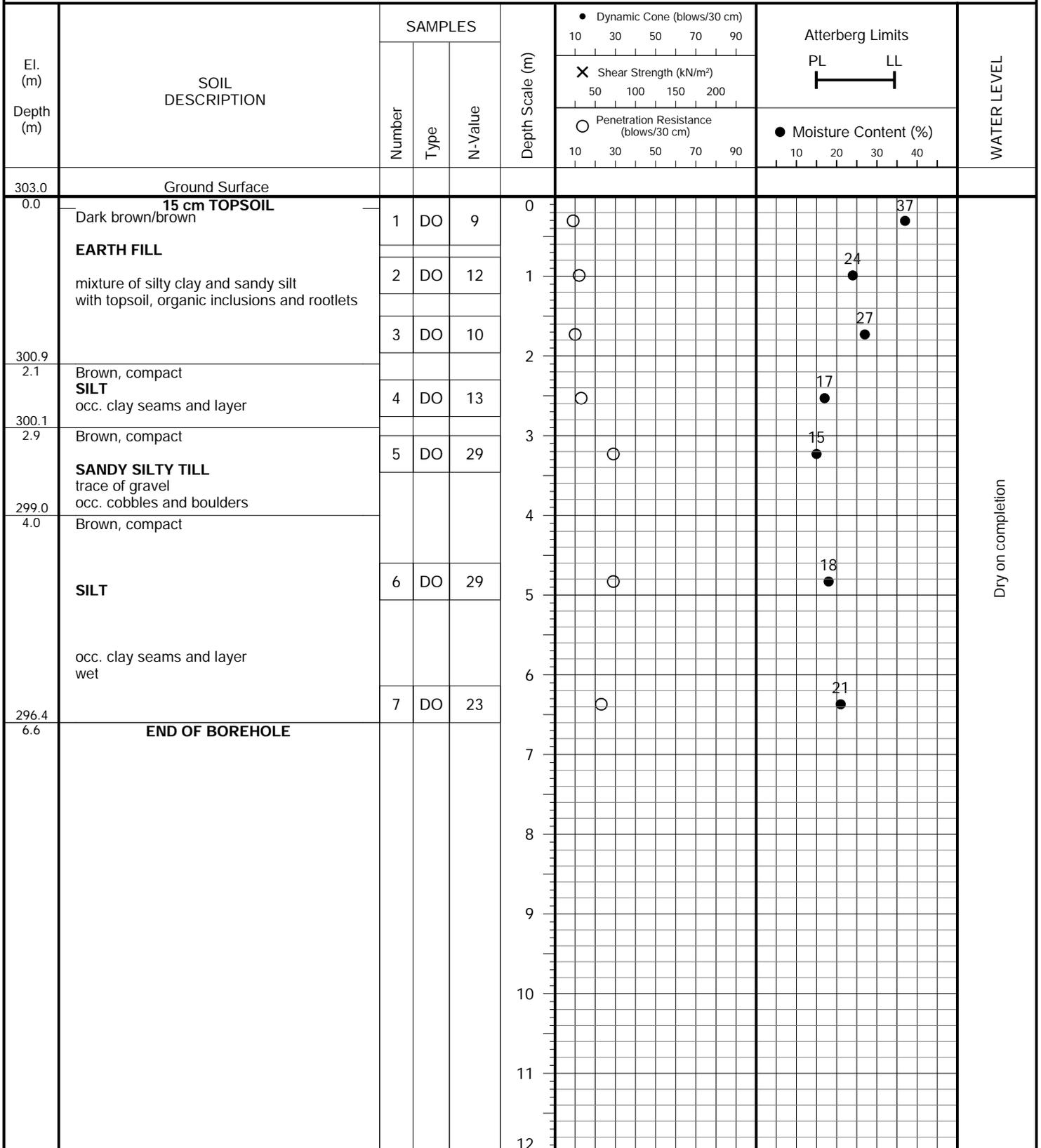


PROJECT DESCRIPTION: Proposed Industrial Development

METHOD OF BORING: Solid Stem

PROJECT LOCATION: 15450 Woodbine Avenue,
Town of Whitchurch-Stouffville (Wesley Corners)

DRILLING DATE: January 31, 2023



JOB NO.: 2210-S077

LOG OF BOREHOLE: 5

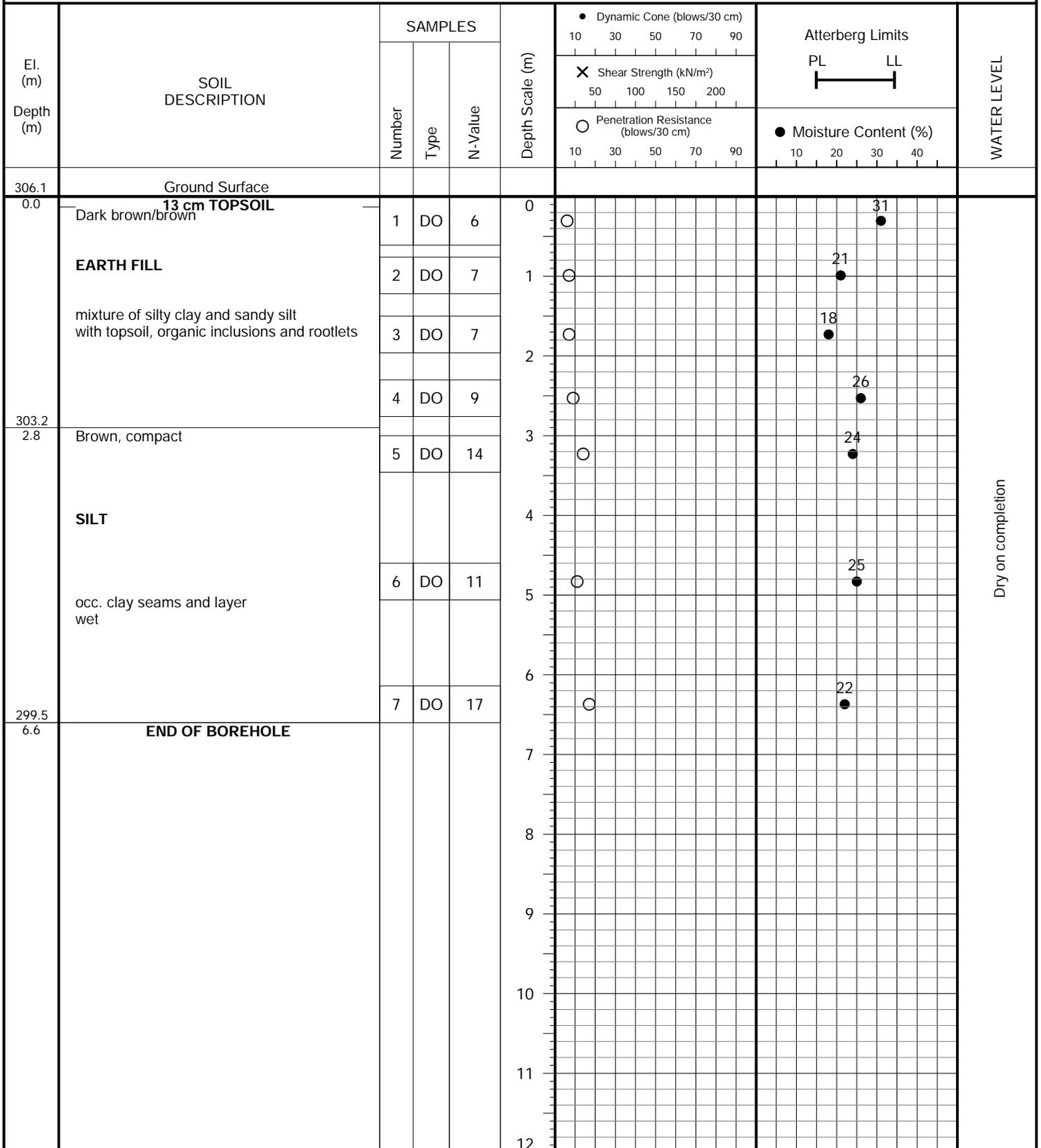
FIGURE NO.: 5

PROJECT DESCRIPTION: Proposed Industrial Development

METHOD OF BORING: Solid Stem

PROJECT LOCATION: 15450 Woodbine Avenue,
Town of Whitchurch-Stouffville (Wesley Corners)

DRILLING DATE: January 27, 2023



JOB NO.: 2210-S077

LOG OF BOREHOLE: 6

6

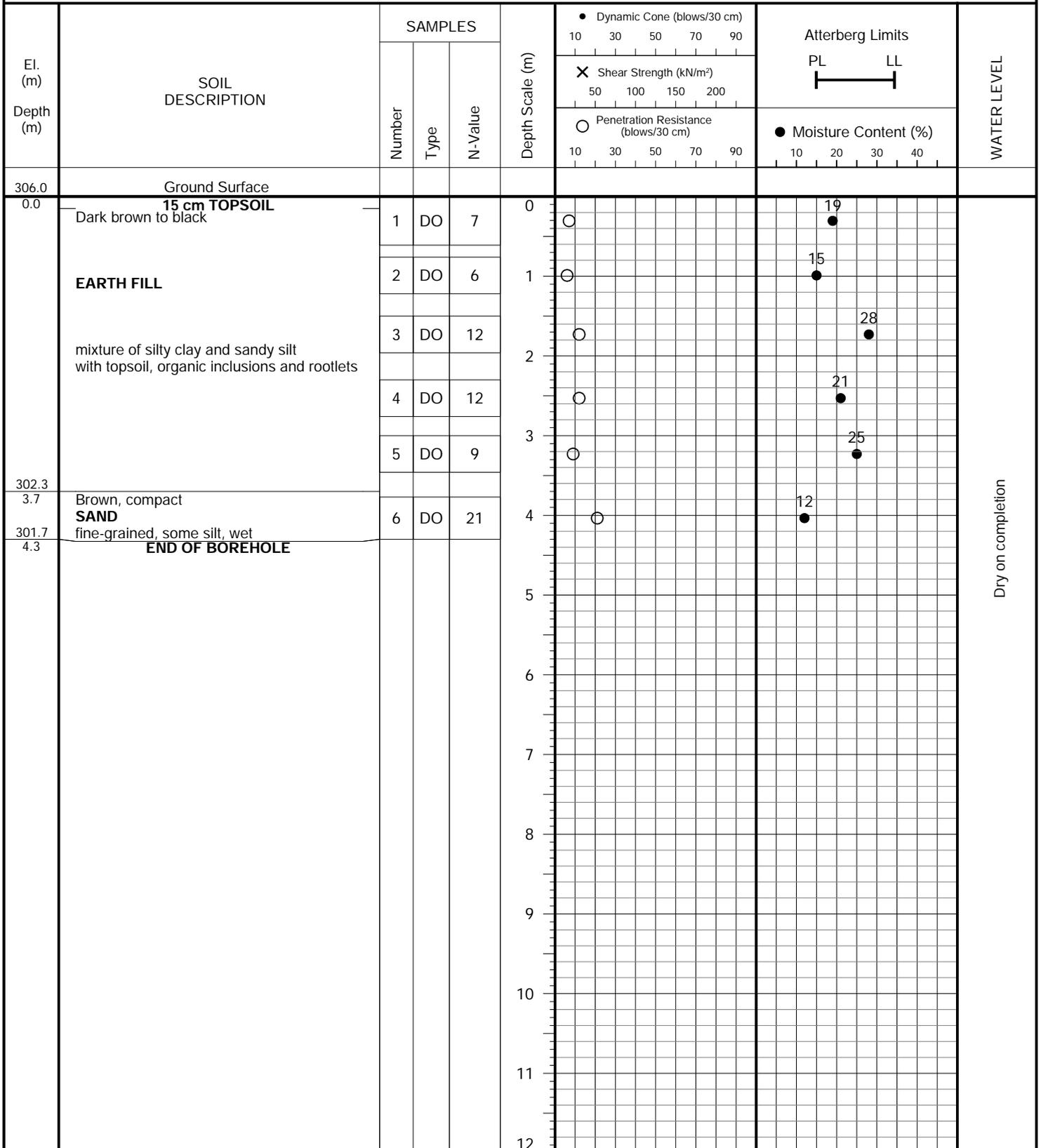
FIGURE NO.: 6

PROJECT DESCRIPTION: Proposed Industrial Development

METHOD OF BORING: Solid Stem

PROJECT LOCATION: 15450 Woodbine Avenue,
Town of Whitchurch-Stouffville (Wesley Corners)

DRILLING DATE: January 27, 2023



Dry on completion



Soil Engineers Ltd.

JOB NO.: 2210-S077

LOG OF BOREHOLE: 7

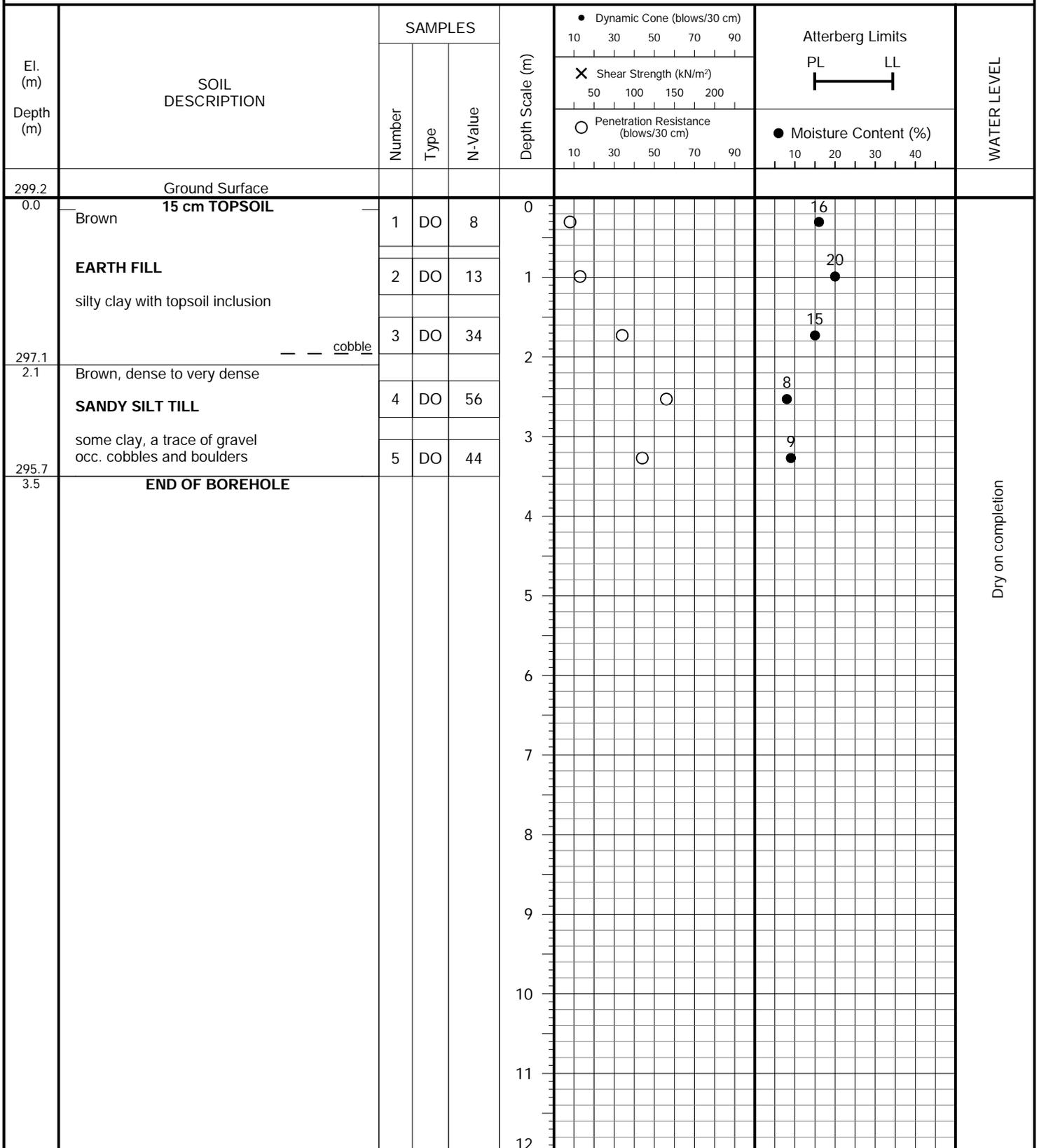
FIGURE NO.: 7

PROJECT DESCRIPTION: Proposed Industrial Development

METHOD OF BORING: Solid Stem

PROJECT LOCATION: 15450 Woodbine Avenue,
Town of Whitchurch-Stouffville (Wesley Corners)

DRILLING DATE: January 27, 2023



Dry on completion

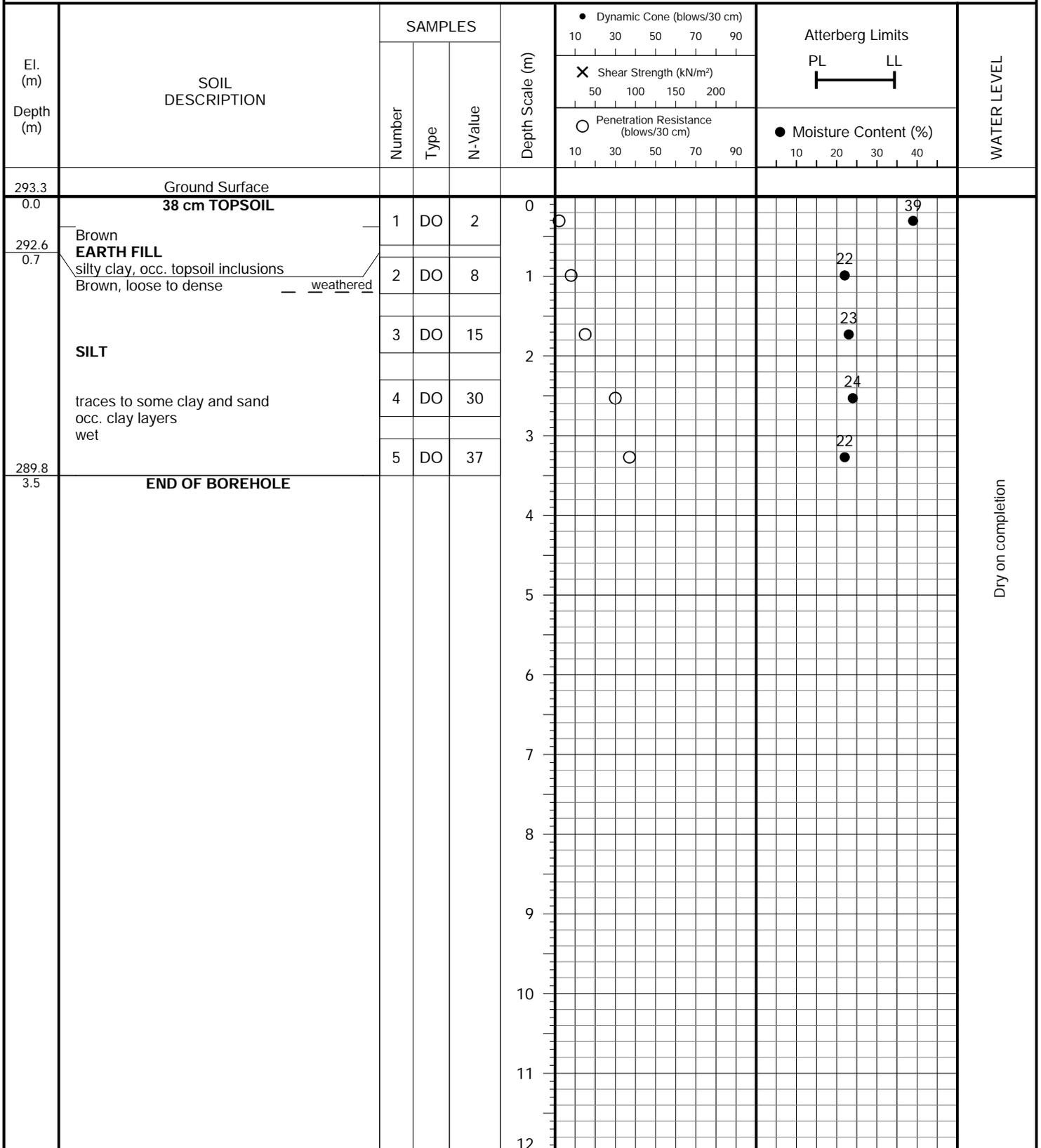


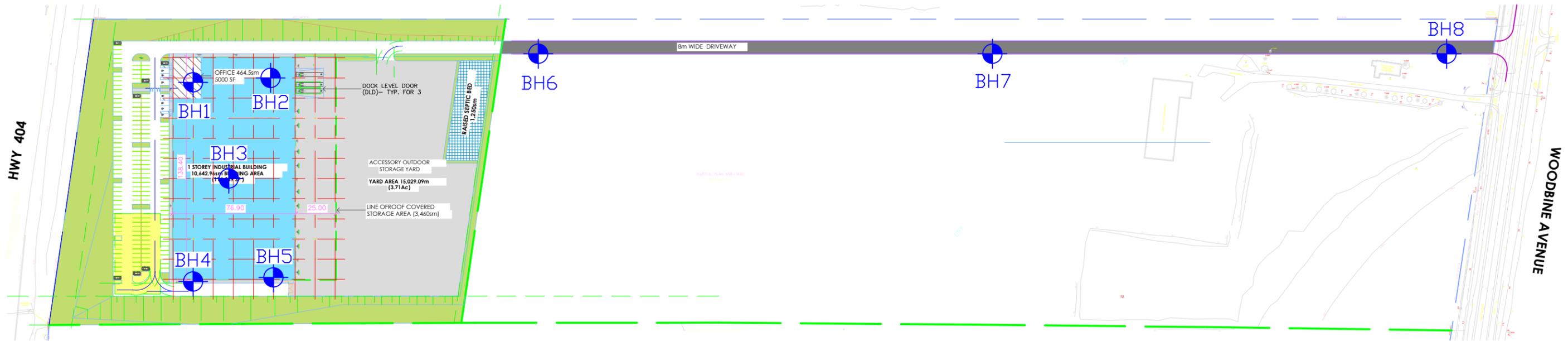
PROJECT DESCRIPTION: Proposed Industrial Development

METHOD OF BORING: Solid Stem

PROJECT LOCATION: 15450 Woodbine Avenue,
Town of Whitchurch-Stouffville (Wesley Corners)

DRILLING DATE: January 27, 2023






Soil Engineers Ltd.
 CONSULTING ENGINEERS
 GEOTECHNICAL | ENVIRONMENTAL | HYDROGEOLOGICAL | BUILDING SCIENCE
90 WEST BEAVER CREEK ROAD, SUITE #100, RICHMOND HILL, ONTARIO L4B 1E7 - TEL: (416) 754-8515 - FAX: (905) 881-8335

Borehole Location Plan

SITE: 15450 Woodbine Avenue,
Town of Whitchurch-Stouffville (Wesley Corners)

DESIGNED BY: C.L.	CHECKED BY: K.H.	DWG NO.: 1
SCALE: 1:2500	REF. NO.: 2210-S077	DATE: March 2023
		REV _



1-871 Equestrian Court, Oakville, ON L6L 6L7
Tel: 647-795-8153 / www.pecg.ca

15450 Woodbine Avenue

**Scoped Environmental
Impact Study**

Town of Whitchurch-Stouffville, ON

File #: PRE22.088

Palmer Project #

2108402

Prepared For

Galatia Lane Estates Inc.

May 3, 2023

1. Introduction

Palmer was retained by Galatia Lane Estates Inc. to complete this EIS for the proposed development of a single-storey industrial building, with an accessory outdoor storage yard and associated parking, at 15450 Woodbine Avenue in the Town of Whitchurch-Stouffville, Region of York (the Subject Property – **Figure 1**). The completion of this EIS has been prepared per the Zoning By-law Amendment application requirements of the Town of Whitchurch-Stouffville and Lake Simcoe Region Conservation Authority (LSRCA). The design of the proposed development must consider and limit potential effects on onsite natural features and on natural features on adjacent lands, providing the most feasible development envelope possible.

The Subject Property is approximately 16.6 hectares (ha) and is comprised primarily of agricultural lands, but also semi-natural communities and a wetland. The Subject Property is almost completely within the Greenbelt Land Use designation; however, a very small portion does fall within the Oak Ridges Moraine (ORM) Countryside Area Land Use designation (approximately 8 m² in the southwest corner).

The southeastern portion of the Subject Property is part of the Bogart Creek Wetland Complex, which is classified as a Provincially Significant Wetland (PSW). A tributary of Weslie Creek, a watercourse within this wetland complex, was also mapped as transecting the southeast corner of the Subject Property. The lands associated with the PSW and the mapped watercourse in this portion of the Subject Property (as well as a small section in the north) are regulated by the LSRCA.

The objective of this study is to complete a background review, field surveys, and desktop analysis to assess the Subject Property's natural heritage features and their functions, assess potential impacts from the proposed development, and provide mitigation measures where appropriate.



LEGEND

- Watercourse ¹
- Wetland ²**
 - Unevaluated
 - Evaluated-Provincial (Bogart Creek Wetland Complex)
- Subject Property (16.6 ha)

1 - Ontario Hydro Network (OHN)
2 - Land Information Ontario (LIO)

0 100 200 300 400 500
METRE SCALE

North American Datum 1983
Universal Transverse Mercator Projection Zone 17

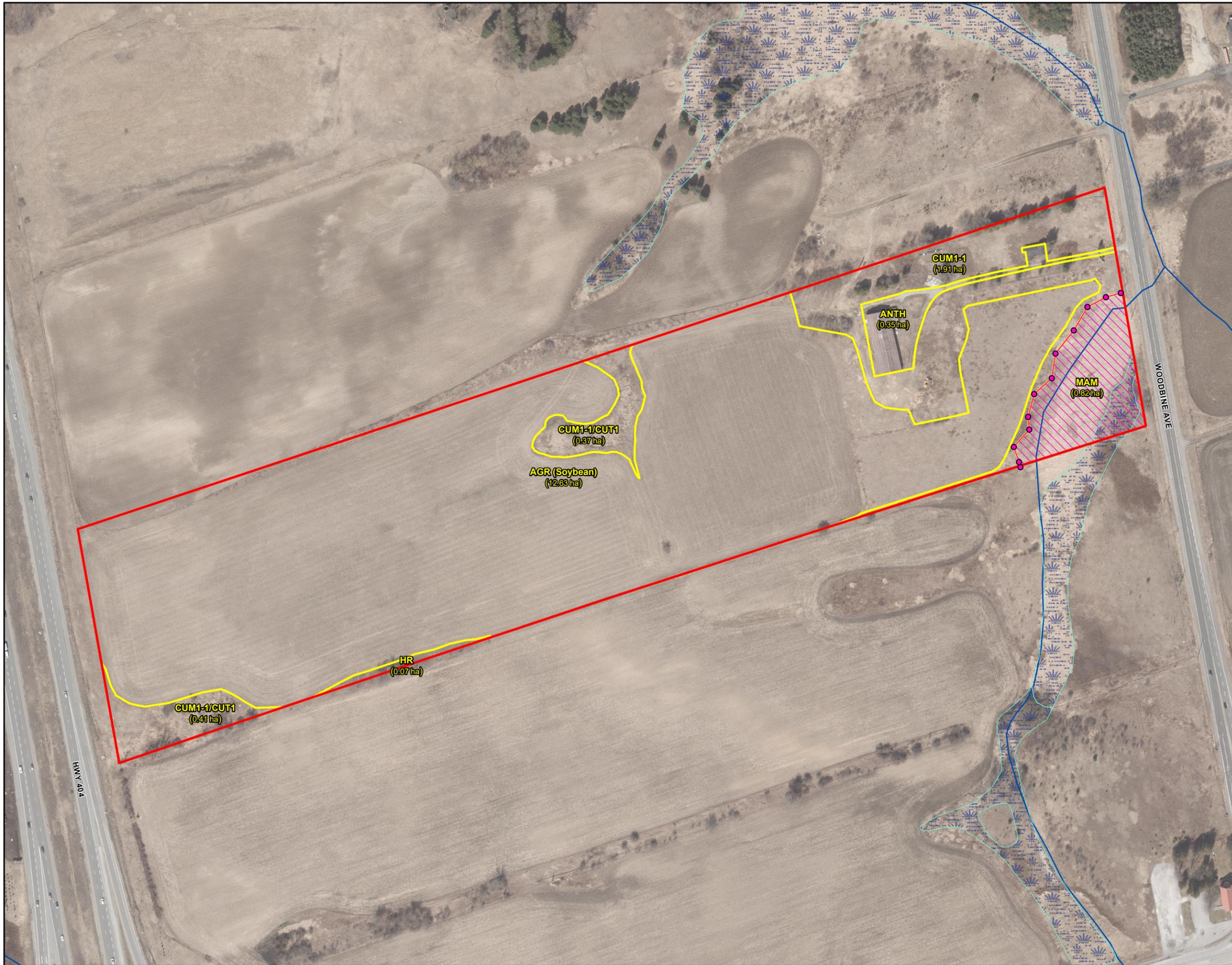
Scale: 1:8,000
Page Size: Tabloid (11 x 17 inches)

Drawn: SM
Checked: ED
Date: May 3, 2023

Source Notes:
Base imagery (2021) provided by York region open GIS services.

NORTH

CLIENT	Vistaview Mgmt (Treasure Hill)
PROJECT	15450 Woodbine Ave EIS
TITLE	Site Location
REF. NO.	2108402-1-1
Figure 1	



- LEGEND
- Watercourse ¹
 - Preliminary Staked Wetland (Nov 1 2022 LSRCA/Palmer)
 - Wetland Evaluated-Provincial (Bogart Creek Wetland Complex) ²
 - Ecological Land Classification (ELC)
 - Subject Property (16.6 ha)

- ELC LEGEND:
- ANTH: Anthropogenic
 - AGR: Agricultural
 - HR: Hedgerow
 - CUM1-1: Dry-Moist Old Field Meadow Type
 - CUM1-1/CUT1: Dry-Moist Old Field Meadow Type /Cultural Thicket
 - MAM: Mineral Meadow Marsh

1 - Ontario Hydro Network (OHN)
 2 - Land Information Ontario (LIO)

METRE SCALE

North American Datum 1983
 Universal Transverse Mercator Projection Zone 17
 Scale: 1:3,000
 Page Size: Tabloid (11 x 17 inches)

Drawn: SM
 Checked: ED
 Date: May 3, 2023

Source Notes:
 Base imagery (2021) provided by York region open GIS services.

NORTH

CLIENT	Vistaview Mgmt (Treasure Hill)
PROJECT	5450 Woodbine Ave EIS
TITLE	Existing Environmental Conditions
REF. NO.	2108402-2-1
Palmer™	
Figure 2	

4.2.2 Flora

A total of 26 species of vascular plants were recorded within the Subject Property during the 2022 field surveys, including 13 (50%) native species, nine (35%) species which are non-native to Ontario, and four species were identified to the genus only due to the limited representation of key characteristics (**Appendix C**). The high recorded presence of non-native species is indicative of past disturbance on the Subject Property, typical of developed areas (Morton & Venn, 1984). Oldham *et al.* (1995) indicate that in southern Ontario plant communities, non-native flora presence averages between 20 and 30%. No listed SAR or locally rare vegetation species were observed (Ministry of Natural Resources and Forestry, 2021; Oldham & Brinker, 2009; Varga, et al., 2000).

All native plants identified as S4 or S5 ranking, indicating that they are common within Ontario (Ministry of Natural Resources and Forestry, 2021). One species, White Spruce, was ranked as L3 by the TRCA. L3 ranked species indicate a plant “able to withstand minor disturbance; generally secure in natural matrix; considered to be of regional concern,” (Toronto and Region Conservation Authority, 2019). This ranking; however, refers to naturally occurring individuals and not planted individuals as present here. No species were noted as locally significant to York Region. Additionally, no Species at Risk plants were observed during the 2022 field investigations.

4.2.3 Wetland Delineation

Wetland delineation was conducted on November 1, 2022, with a Palmer ecologist and a representative of the LSRCA (Jessica Chan). Community boundaries were staked for identified wetlands on the Subject Property. These boundaries will require refinement during the spring growing season (2023), as the original staking exercise occurred outside the growing season.

4.3 Wildlife

4.3.1 Breeding Birds

Breeding bird surveys have yet to be conducted on the Subject Property and will be completed in the early summer of 2023, during the appropriate timing window. Results will be included as part of an Addendum.

4.3.2 Breeding Amphibians

The first round of breeding amphibian surveys were conducted on April 13, 2023. No calls were heard on the Subject Property; however, Spring Peepers (*Pseudacris crucifer*) were noted offsite, to the east (indicating that weather conditions were appropriate). The second and third round of amphibian breeding surveys will be completed throughout the spring of 2023, during the appropriate timing window. Results will be included as part of an Addendum.

4.3.3 Incidental Wildlife

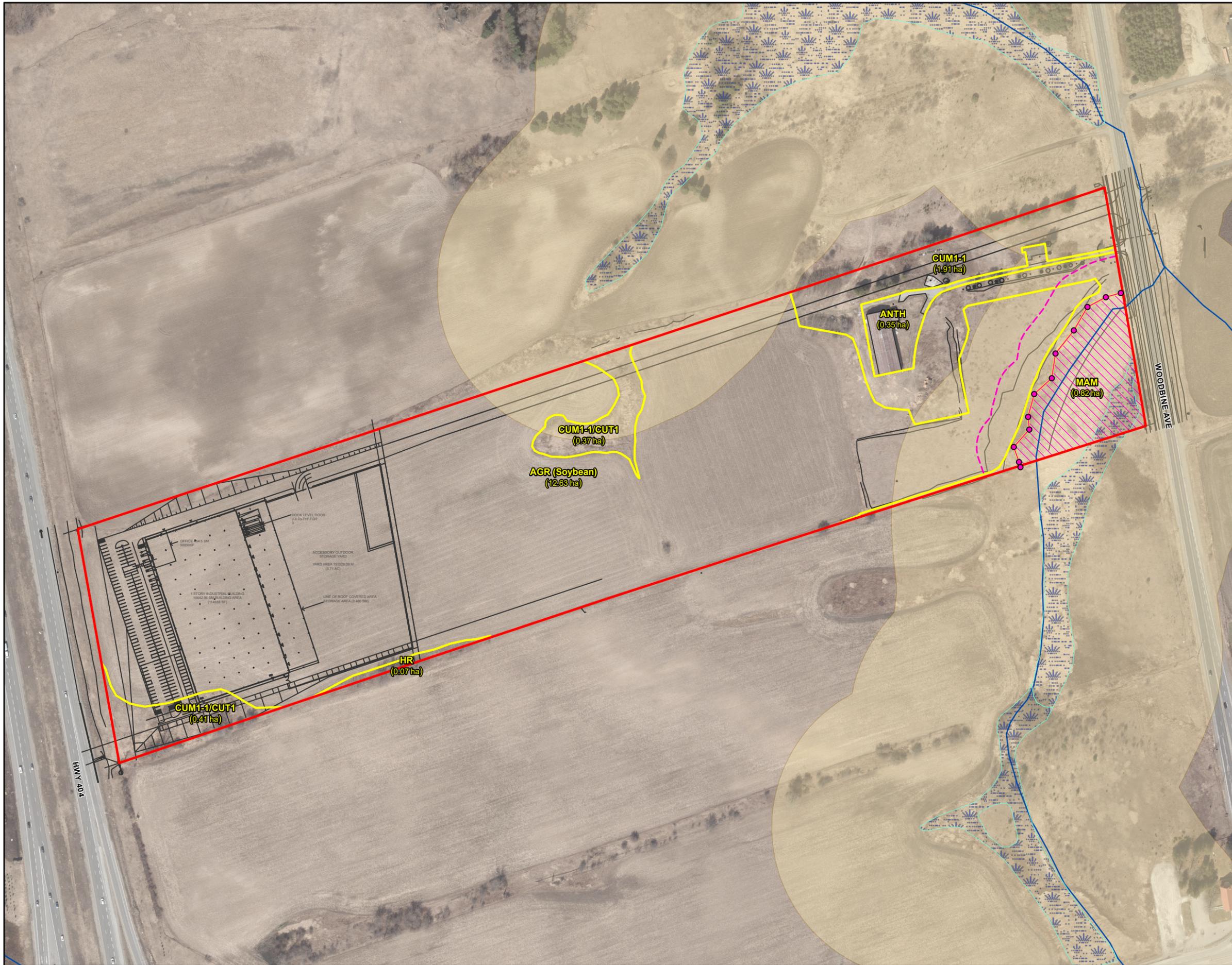
Wildlife expected to be present primarily consist of common, generalist and urban-adapted species such as Raccoon (*Procyon lotor*), Skunk (*Mephitis mephitis*), and Eastern Grey Squirrel (*Sciurus carolinensis*). 2022 and 2023 field investigations confirmed the following species:

6. Proposed Development

The proposed development is a 16,670 m² (180,403 sq. ft.) single-storey industrial building, with an accessory outdoor storage yard and associated parking. Generally, the industrial building is to be situated in the northwest quadrant of the Subject Property, adjacent to Highway 404 right-of-way. There is a proposed access road south of the north property boundary leading from Woodbine Avenue to the proposed development (**Figure 3**). The outdoor storage yard is located to the east of the industrial building and parking is located to the north and the west. The industrial building, the outdoor storage yard, and the associated parking occur within the existing agricultural (AGR) community. The existing old house and associated barn structure will be demolished as part of the development plan.

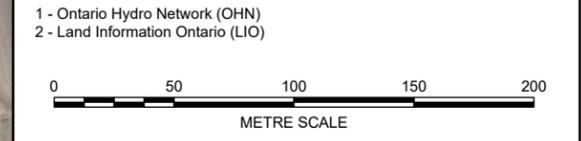
As shown on **Figure 3**, the proposed development envelope is to be setback from the Bogart Creek Wetland Complex PSW and its associated vegetation protection zone.

Grading and stormwater management have been determined by SCS Consulting Group Ltd., which has been outlined in the report entitled *Servicing and Stormwater Management Report, 15450 Woodbine Avenue, Town of Whitchurch-Stouffville*. Surface water inputs to the PSW will be similar to that which is occurring currently and therefore will not have an impact on the PSW and its ecological and hydrological functions. Proposed grading for the Subject Property also mimics the existing drainage patterns, while minimizing cut and fill differentials.



- LEGEND
- Watercourse ¹
 - Development Plan
 - Preliminary Staked Wetland (Nov 1 2022 LSRCA/Palmer)
 - Wetland Buffer/Development Limit (30m)
 - Wetland Evaluated-Provincial (Bogart Creek Wetland Complex) ²
 - Ecological Land Classification (ELC)
 - LSRCA Regulation Limit (4.12 ha)
 - Subject Property (16.6 ha)

- ELC LEGEND:
- ANTH: Anthropogenic
 - AGR: Agricultural
 - HR: Hedgerow
 - CUM1-1: Dry-Moist Old Field Meadow Type
 - CUM1-1/CUT1: Dry-Moist Old Field Meadow Type /Cultural Thicket
 - MAM: Mineral Meadow Marsh



North American Datum 1983
Universal Transverse Mercator Projection Zone 17
Scale: 1:3,000
Page Size: Tabloid (11 x 17 inches)
Drawn: SM
Checked: ED
Date: May 3, 2023
Source Notes:
Base imagery (2021) provided by York region open GIS services.

NORTH

CLIENT	Vistaview Mgmt (Treasure Hill)
PROJECT	5450 Woodbine Ave EIS
TITLE	Proposed Development
REF. NO.	2108402-3-2
Palmer™	
Figure 3	

7. Impact Assessment

Natural heritage features associated with the Subject Property are primarily linked to the Bogart Creek Wetland Complex PSW. This PSW provides significant ecological and hydrological functions. An assessment of the proposed development on the PSW is provided in Section 7.1 below, with mitigation measures outlined in Section 8.1.

Additionally, following an assessment of the vacant structures on the Subject Property, these buildings were determined to be potential habitat for avian and bat SAR. An assessment of the proposed development on these vacant structures is provided in Sections 7.2 and 7.3 below, with mitigation measures outlined in Sections 8.2 and 8.3. No other natural heritage/hydrological features (i.e., woodlands, lakes, etc.) were identified on or adjacent to the Subject Property.

During construction, there is the potential to affect natural features through the erosion of sediments or other materials into the wetland and/or the mapped watercourse or through disturbances to wildlife. Mitigation is discussed in Section 8.

7.1 Natural Heritage Features - Wetlands

The Bogart Creek Wetland Complex PSW is located in the southeast corner of the Subject Property and is associated with a mapped tributary of Weslie Creek. In determining the extent of the PSW, Palmer conducted a staking exercise with the LSRCA on November 1, 2022. Staked boundaries are documented within **Figure 2**, with the PSW being comprised of a Mineral Meadow Marsh (MAM) community. Confirmation of these boundaries will be required during the spring 2023 growing season.

Development of the proposed industrial building is not expected to impact the PSW on the Subject Property. The design avoids the PSW and its 30 m vegetation buffer. The proposed access road is approximately 30 m from the wetland buffer.

7.2 Species at Risk - Roosting Bats

Based on professional experience, Palmer biologists determined that the old house on the Subject Property could provide roosting habitat for SAR bats. Mitigation measures are discussed in Section 8.2.

7.3 Significant Wildlife Habitat - Barn Swallow

Approximately ten Barn Swallow nests were observed in the old barn, outside of the breeding bird season. Consequently, Palmer biologists were unable to conclude if Barn Swallow had recently bred on the Subject Property, and if so, how many nests were being used. This species is listed as Special Concern on a provincial level. The presence of several active nests could mean that the barn is considered Candidate SWH, rather than Confirmed SWH, due to two factors:

- a) a lack of understanding of how common the species is regionally and the number of active nests which at a given site which should be considered significant; and,
- b) whether artificial structures should be considered SWH in any circumstance.

8. Mitigation

Mitigation measures for the proposed development are outlined below.

8.1 Natural Heritage Features - Wetlands

Potential effects to the wetlands are largely avoided by the project design and overall placement of the proposed industrial building, storage area, and parking. It is recommended that an Erosion and Sediment Control (ESC) Plan be implemented throughout the phases of this project to avoid the addition of excess sediment into the PSW. The ESC Plan will be developed by SCS Consulting Group.

The 30 m vegetative buffer surrounding the PSW will also provide additional protection to this natural feature, ensuring that the ecological and hydrological functions are maintained.

As per Section 3.4.17 of the YROP and Section 6.33 of the LSPP, development proposals should include landscaping and habitat restoration that increase the ability of native plants and animals to use riparian areas. Thus, to be in accordance with the YROP and LSPP, native species planting within the wetland buffer is recommended, to enhance the riparian area. Restoration of buffers must use native species that achieve natural, self-sustaining vegetation covers. Woody species that might be suitable for the sloped buffer to the wetland include White Pine (*Pinus strobus*), Eastern White Cedar (*Thuja occidentalis*), Red or Silver Maple (*Acer rubrum* and *saccharinum*), Red Oak (*Quercus rubra*) Trembling Aspen (*Populus tremuloides*), Basswood (*Tilia americana*), Paper Birch (*Betula papyrifera*), regionally present Serviceberry (*Amelanchier spp.*), Red-osier or Gray Dogwood (*Cornus sericea* or *racemosa*), Canada Fly Honeysuckle (*Lonicera canadensis*), or Pin Cherry (*Prunus pensylvanica*), but numerous other species are possible.

8.2 Species at Risk - Roosting Bats

A demolition timing window between October 1st and March 30th is recommended. Should this building be used by the most likely species, Little Brown Myotis, (or Tri-coloured Bat and Northern Myotis) this should avoid the active-use time.

8.3 Significant Wildlife Habitat – Barn Swallow

Surveys in 2023 will determine the number of active Barn Swallow nests and therefore determine whether this habitat (i.e., the barn) is considered Candidate SWH. If the barn is deemed Candidate SWH, habitat compensation in the form of a new nesting structure may be recommended.

Regardless of SWH status, nests cannot be removed when active. Thus, to avoid interaction with potentially breeding Barn Swallow, an approximate species-specific demolition timing window between early August and mid April is recommended (based upon professional experience). Development timing; however, may require the demolition of the old house and the barn within the breeding bird window. Should demolition occur within this window, a qualified biologist should complete a nesting bird survey within the structures, to ensure that there are no conflicts with the *Migratory Birds Convention Act* (MBCA). These surveys should be completed no earlier than 48 hours prior to planned demolition activities. If activity is detected, demolition activities would be delayed until it can be established that the birds have fledged and left the nest.

APPENDIX C

STORMWATER MANAGEMENT CALCULATIONS

Existing and Proposed Conditions VO Parameters Summary

NASHYD

Number	101	102	103	104A	105	104B	202	204
Description								
DT(min)	2	2	2	2	2	2	2	2
Area (ha)	0.64	3.78	0.44	5.05	4.99	3.29	0.86	0.28
CN*	80.0	80.0	80.0	80.0	80.0	80.0	73.0	73.0
IA(mm)	8.0	8.0	8.0	8.0	8.0	8.0	5.0	5.0
TP Method	Uplands							
TP (hr)	0.09	0.14	0.08	0.37	0.26	0.37	0.10	0.01
TP Method	Airport							
TP (hr)	0.74	0.97	0.66	1.85	1.27	1.44	0.33	0.08
Average TP (hr)	0.41	0.56	0.37	1.11	0.76	0.91	0.21	0.04

STANDHYD

Number	201	203
Description		
DT(min)	2	2
Area (ha)	4.00	1.48
XIMP ^{1,2}	0.69	0.51
TIMP ²	0.73	0.51
CN*	80.0	75.0
IA(mm)	3.1	4.4
SLPP(%)	2	2
LGP(m)	40	40
MNP	0.25	0.25
DPSI (mm)	2.0	2.0
SLPI(%)	1	1
LGI(m)	163.27	99.23
MNI	0.013	0.013

¹Note that where there is NO directly connected area (ie: roof runoff to grassed areas), the hydrology program does not accept XIMP=0%, therefore, XIM

²Note that where there is NO pervious area, the hydrology program does not accept TIMP and XIMP=100%, therefore, TIMP and XIMP = 99% has been

Existing Condition:

Proposed Industrial Site Area (101, 102, 103) =	4.86	ha
Proposed Private Laneway & East Agricultural Area (104A, 105) =	10.04	ha
Total Area =	14.90	ha

Proposed Condition:

Industrial Site Area (201, 202) =	4.86	ha
Private Laneway Area (203) =	1.48	ha
Landscape Area (204) =	0.28	ha
Future Site Plan Block Area (104B, 105) =	8.28	ha
Total Area =	14.90	ha

Site Soils: (per Geotechnical Investigation - 15450 Woodbine)

Soil Type

*Silt

*from Geotechnical Investigation by Soil Engineers Ltd. dated April 2023

Hydrologic Soil Group

BC

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 "Fair"	49	59	69	74	79	81.5	84	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 (%) - Existing, Interim, or Proposed Conditions								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
101	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100
102	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100
103	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100
104A	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100
105	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100
104B	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100
202	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100
204	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100
201	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100
203	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100

HYDROLOGIC SOIL TYPE (%) - Existing, Interim, or Proposed Conditions								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
101				100				100
102				100				100
103				100				100
104A				100				100
105				100				100
104B				100				100
202				100				100
204				100				100
201				100				100
203				100				100

Existing and Proposed Conditions CN Calculations

LAND USE (%) - Existing, Interim, or Proposed Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
101	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
102	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
103	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
104A	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
105	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
104B	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
202	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
204	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
201	0.0	0.0	65.0	35.0	0.0	0.0	0.0	0.0	0.0	100.0
203	0.0	0.0	20.0	80.0	0.0	0.0	0.0	0.0	0.0	100.0

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

LAND USE (%) - Existing, Interim, or Proposed Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
101						100.0				100.0
102						100.0				100.0
103						100.0				100.0
104A						100.0				100.0
105						100.0				100.0
104B						100.0				100.0
202				100.0						100.0
204				100.0						100.0
201			65.0	35.0						100.0
203			20.0	80.0						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) - Existing, Interim, or Proposed Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Weighted CN
101	0.0	0.0	0.0	0.0	0.0	78.0	0.0	0.0	0.0	78
102	0.0	0.0	0.0	0.0	0.0	78.0	0.0	0.0	0.0	78
103	0.0	0.0	0.0	0.0	0.0	78.0	0.0	0.0	0.0	78
104A	0.0	0.0	0.0	0.0	0.0	78.0	0.0	0.0	0.0	78
105	0.0	0.0	0.0	0.0	0.0	78.0	0.0	0.0	0.0	78
104B	0.0	0.0	0.0	0.0	0.0	78.0	0.0	0.0	0.0	78
202	0.0	0.0	0.0	74.0	0.0	0.0	0.0	0.0	0.0	74
204	0.0	0.0	0.0	74.0	0.0	0.0	0.0	0.0	0.0	74
201	0.0	0.0	56.5	25.9	0.0	0.0	0.0	0.0	0.0	82
203	0.0	0.0	17.4	59.2	0.0	0.0	0.0	0.0	0.0	77

** AMC II assumed

Existing and Proposed Conditions CN Calculations

Input Values												
Step 1	Subcatchment:	101		102	103	104A	105	104B	202	204	201	203
	CN (AMC II):	78		78	78	78	78	78	74	74	82	77
2	CN (AMC III) =	90		90	90	90	90	90	88	88	92	89
3	100 Year Precipitation, P =	85.27	mm	85.27	85.27	85.27	85.27	85.27	85.27	85.27	85.27	85.27

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

$$S = \frac{(P - I_a)^2}{Q} - (P - I_a)$$

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

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

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

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

Output Values												
	Subcatchment:	101		102	103	104A	105	104B	202	204	201	203
	S _{III} =	28.22	mm	28.22	28.22	28.22	28.22	28.22	34.64	34.64	22.09	31.39
	SCS Assumption of 0.2 S = I _a =	5.64	mm	5.64	5.64	5.64	5.64	5.64	6.93	6.93	4.42	6.28
4	Q _{III} =	58.79	mm	58.79	58.79	58.79	58.79	58.79	54.32	54.32	63.50	56.53
	Preferred Initial Abstraction, I _a =	8.0	mm	8.0	8.0	8.0	8.0	8.0	5.0	5.0	3.1	4.4
5	S* _{III} =	24.29	mm	24.29	24.29	24.29	24.29	24.29	38.34	38.34	24.23	34.83
6	CN* _{III} =	91.27	mm	91.27	91.27	91.27	91.27	91.27	86.89	86.89	91.29	87.94
	CN*_{III} =	91	Rounded	91	91	91	91	91	87	87	91	88
7	CN*_{II} =	80	convert	80	80	80	80	80	73	73	80	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 I_a = 0.2S, compute Q_{III} for 100 year precipitation
- 5 For the same Q_{III}, compute S*_{III} using I_a=1.5mm (or otherwise determined)
- 6 Compute CN*_{III} using S*_{III}
- 7 Calculate CN*_{II} using SCS conversion table

Existing and Proposed Conditions IA Calculations

LAND USE (%) - Existing, Interim, or Proposed Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
101						100.0				100.0
102						100.0				100.0
103						100.0				100.0
104A						100.0				100.0
105						100.0				100.0
104B						100.0				100.0
202				100.0						100.0
204				100.0						100.0
201			65.0	35.0						100.0
203			20.0	80.0						100.0

IA VALUES (mm) - Existing, Interim, or 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	
101						8.0				8.0
102						8.0				8.0
103						8.0				8.0
104A						8.0				8.0
105						8.0				8.0
104B						8.0				8.0
202				5.0						5.0
204				5.0						5.0
201			1.3	1.8						3.1
203			0.4	4.0						4.4

* IA values based on LSRCA guidelines

Existing and Proposed Conditions Time To Peak Calculations

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	311.07	309.95	31	3.59	Cultivated Straight Row	0.53	58.9	0.02	0.01
101b	309.95	309.50	41	1.09	Cultivated Straight Row	0.29	141.6	0.04	0.03
101c	309.50	309.00	39	1.28	Cultivated Straight Row	0.32	123.2	0.03	0.02
101d	309.00	308.00	35	2.85	Cultivated Straight Row	0.47	74.6	0.02	0.01
101e	308.00	307.29	29	2.46	Cultivated Straight Row	0.44	66.2	0.02	0.01
101									0.09
102a	309.55	307.75	67	2.70	Cultivated Straight Row	0.46	145.6	0.04	0.03
102b	307.75	306.50	52	2.42	Cultivated Straight Row	0.43	119.3	0.03	0.02
102c	306.50	304.75	39	4.50	Cultivated Straight Row	0.59	65.7	0.02	0.01
102d	304.75	303.75	33	3.03	Cultivated Straight Row	0.48	68.1	0.02	0.01
102e	303.75	301.00	55	4.99	Cultivated Straight Row	0.62	88.7	0.02	0.02
102f	301.00	299.07	100	1.92	Cultivated Straight Row	0.39	259.5	0.07	0.05
102									0.14
103a	309.55	307.50	77	2.67	Cultivated Straight Row	0.46	168.0	0.05	0.03
103b	307.50	307.25	29	0.85	Cultivated Straight Row	0.26	114.0	0.03	0.02
103c	307.25	306.25	39	2.58	Cultivated Straight Row	0.45	86.5	0.02	0.02
103d	306.25	305.50	18	4.07	Cultivated Straight Row	0.56	32.8	0.01	0.01
103e	305.50	304.61	16	5.69	Cultivated Straight Row	0.66	23.6	0.01	0.00
103									0.08
104Aa	307.29	305.37	195	0.98	Cultivated Straight Row	0.28	706.5	0.20	0.13
104Ab	305.37	304.34	10	10.30	Cultivated Straight Row	0.89	11.2	0.00	0.00
104Ac	304.34	303.87	85	0.56	Cultivated Straight Row	0.21	407.4	0.11	0.08
104Ad	303.87	300.13	59	6.33	Cultivated Straight Row	0.70	84.3	0.02	0.02
104Ae	300.13	298.55	74	2.15	Cultivated Straight Row	0.41	180.0	0.05	0.03
104Af	298.55	297.57	95	1.03	Cultivated Straight Row	0.28	336.5	0.09	0.06
104Ag	297.57	295.64	32	6.04	Cultivated Straight Row	0.68	46.9	0.01	0.01
104Ah	295.64	294.90	48	1.55	Cultivated Straight Row	0.35	137.2	0.04	0.03
104Ai	294.90	290.75	65	6.36	Cultivated Straight Row	0.70	93.0	0.03	0.02
104A									0.37
105a	307.34	305.67	193	0.86	Cultivated Straight Row	0.26	743.6	0.21	0.14
105b	305.67	304.87	17	4.68	Cultivated Straight Row	0.60	28.4	0.01	0.01
105c	304.87	303.92	77	1.24	Cultivated Straight Row	0.31	247.2	0.07	0.05
105d	303.92	299.44	64	6.97	Cultivated Straight Row	0.73	87.5	0.02	0.02
105e	299.44	296.89	85	2.99	Cultivated Straight Row	0.48	177.0	0.05	0.03
105f	296.89	295.37	55	2.77	Cultivated Straight Row	0.46	118.5	0.03	0.02
105									0.26

Existing and Proposed Conditions Time To Peak Calculations

104Ba	307.29	305.37	195	0.98	Cultivated Straight Row	0.28	706.5	0.20	0.13
104Bb	305.37	304.34	10	10.30	Cultivated Straight Row	0.89	11.2	0.00	0.00
104Bc	304.34	303.87	85	0.56	Cultivated Straight Row	0.21	407.4	0.11	0.08
104Bd	303.87	300.13	59	6.33	Cultivated Straight Row	0.70	84.3	0.02	0.02
104Be	300.13	298.55	74	2.15	Cultivated Straight Row	0.41	180.0	0.05	0.03
104Bf	298.55	297.50	95	1.11	Cultivated Straight Row	0.29	322.7	0.09	0.06
104Bg	297.50	295.59	32	6.02	Cultivated Straight Row	0.68	46.6	0.01	0.01
104Bh	295.59	295.00	51	1.15	Cultivated Straight Row	0.30	171.0	0.05	0.03
104Bi	295.00	291.08	55	7.07	Cultivated Straight Row	0.74	75.0	0.02	0.01
104B									0.37
202a	305.75	304.44	14	9.34	Pasture	0.67	20.8	0.01	0.00
202b	304.44	299.52	180	2.73	Pasture	0.36	499.0	0.14	0.09
202									0.10
204a	305.85	305.83	5	0.44	Pasture	0.14	31.2	0.01	0.01
204									0.01

Existing and Proposed Conditions Time To Peak Calculations

Airport Method: (used for all catchments with a runoff coefficient of less than 0.4)

Catchment ID	High Elevation	Low Elevation	Length (m)	Slope (%)	Runoff Coefficient	Time of Concentration (minutes)	Time of Concentration (hr)	Time to Peak (hr)
101a	311.07	309.95	31	3.59	0.25	10.13	0.17	0.11
101b	309.95	309.50	41	1.09	0.25	17.31	0.29	0.19
101c	309.50	309.00	39	1.28	0.25	15.94	0.27	0.18
101d	309.00	308.00	35	2.85	0.25	11.62	0.19	0.13
101e	308.00	307.29	29	2.46	0.25	11.07	0.18	0.12
101								0.74
102a	309.55	307.75	67	2.70	0.25	16.31	0.27	0.18
102b	307.75	306.50	52	2.42	0.25	14.90	0.25	0.17
102c	306.50	304.75	39	4.50	0.25	10.51	0.18	0.12
102d	304.75	303.75	33	3.03	0.25	11.05	0.18	0.12
102e	303.75	301.00	55	4.99	0.25	12.11	0.20	0.14
102f	301.00	299.07	100	1.92	0.25	22.38	0.37	0.25
102								0.97
103a	309.55	307.50	77	2.67	0.25	17.53	0.29	0.20
103b	307.50	307.25	29	0.85	0.25	15.85	0.26	0.18
103c	307.25	306.25	39	2.58	0.25	12.62	0.21	0.14
103d	306.25	305.50	18	4.07	0.25	7.49	0.12	0.08
103e	305.50	304.61	16	5.69	0.30	5.81	0.10	0.06
103								0.66
104Aa	307.29	305.37	195	0.98	0.25	39.01	0.65	0.44
104Ab	305.37	304.34	10	10.30	0.40	3.34	0.06	0.04
104Ac	304.34	303.87	85	0.56	0.25	31.02	0.52	0.35
104Ad	303.87	300.13	59	6.33	0.30	10.90	0.18	0.12
104Ae	300.13	298.55	74	2.15	0.25	18.47	0.31	0.21
104Af	298.55	297.57	95	1.03	0.25	26.82	0.45	0.30
104Ag	297.57	295.64	32	6.04	0.30	8.16	0.14	0.09
104Ah	295.64	294.90	48	1.55	0.25	16.56	0.28	0.18
104Ai	294.90	290.75	65	6.36	0.30	11.44	0.19	0.13
104A								1.85
105a	307.34	305.67	193	0.86	0.25	40.44	0.67	0.45
105b	305.67	304.87	17	4.68	0.25	6.88	0.11	0.08
105c	304.87	303.92	77	1.24	0.25	22.64	0.38	0.25
105d	303.92	299.44	64	6.97	0.30	11.02	0.18	0.12
105e	299.44	296.89	85	2.99	0.25	17.83	0.30	0.20
105f	296.89	295.37	55	2.77	0.25	14.68	0.24	0.16
105								1.27

Existing and Proposed Conditions Time To Peak Calculations

104Ba	307.29	305.37	195	0.98	0.25	39.01	0.65	0.44
104Bb	305.37	304.34	10	10.30	0.40	3.34	0.06	0.04
104Bc	304.34	303.87	85	0.56	0.25	31.02	0.52	0.35
104Bd	303.87	300.13	59	6.33	0.30	10.90	0.18	0.12
104Be	300.13	298.55	74	2.15	0.25	18.47	0.31	0.21
104Bf	298.55	297.50	95	1.11	0.25	26.10	0.44	0.29
104Bg	297.50	295.59	32	6.02	0.30	8.13	0.14	0.09
104Bh	295.59	295.00	51	1.15	0.25	18.95	0.32	0.21
104Bi	295.00	291.08	55	7.07	0.30	10.19	0.17	0.11
104B								1.44
202a	305.75	304.44	14	9.34	0.30	4.67	0.08	0.05
202b	304.44	299.52	180	2.73	0.30	25.13	0.42	0.28
202								0.33
204a	305.85	305.83	5	0.44	0.30	7.23	0.12	0.08
204								0.08

Proposed Conditions Percent Impervious Calculations

Catchment Area (ha)			201	203
			4.00	1.48
Land Use Areas	Timp	Ximp	Land Use Areas	
Gravel	57%	43%	1.16	1.48
23m Laneway	51%	51%		
Impervious	100%	100%	2.22	
Open Space	7%	5%	0.62	
Total Land Use =			4.00	1.48
Timp =			73%	51%
Ximp =			69%	51%



I-STORM SWM SYSTEM

PART OF THE DE-STORM GROUP OF PRODUCTS



OPTIMIZE
LAND USE



LARGE STORAGE
CAPABILITIES



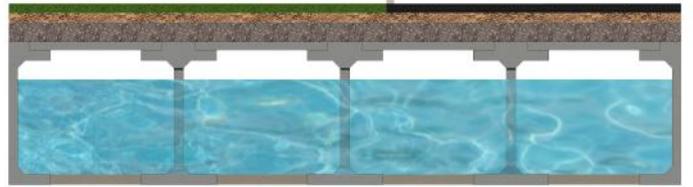
FAST AND EASY
INSTALLATION



ENGINEERED FOR
HEAVY LOADS

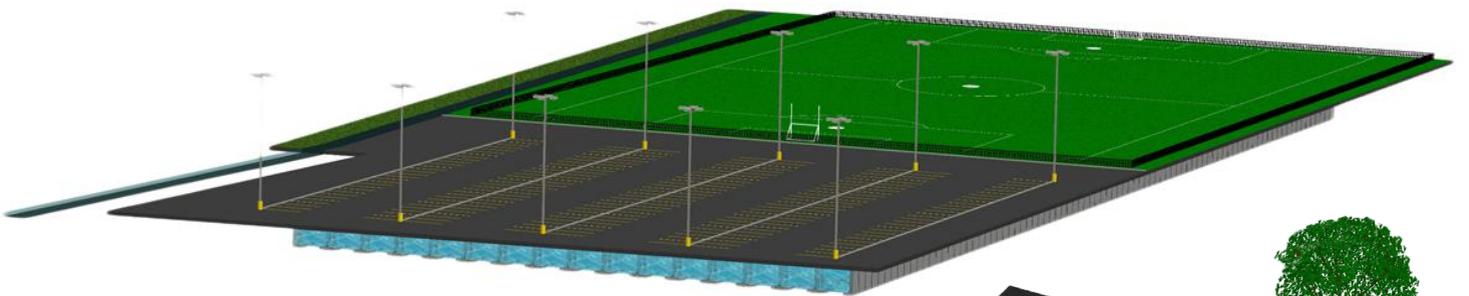
DECAST

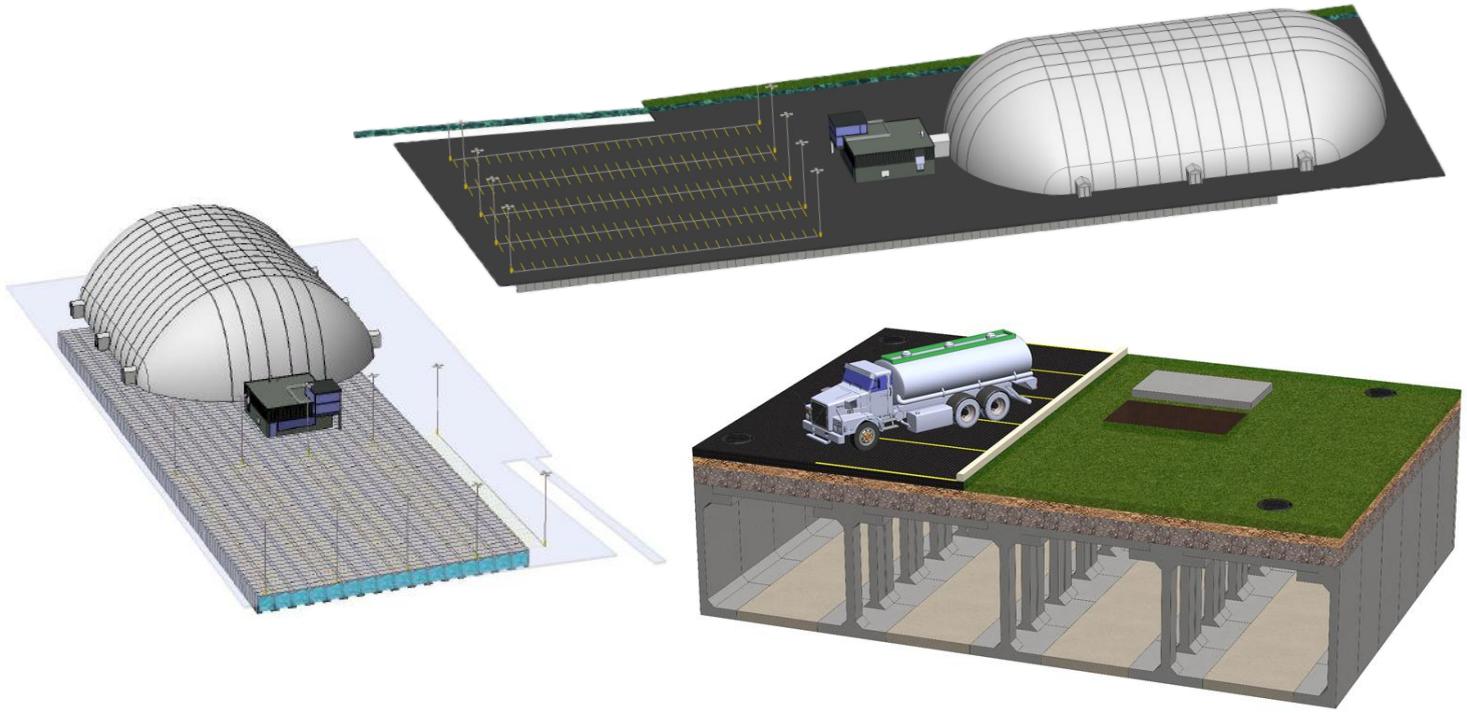
I-STORM STORMWATER MANAGEMENT SYSTEM



NEW SWM SOLUTION OFFERED BY DECAST

- Maximize land use with massive underground storage
- 100 to 150 year service life, only minor repairs required during this period
- Engineered to withstand extreme conditions, such as earthquakes (developed in Japan)
- Designed to support buildings, parks, football fields, soccer pitches and parking lots



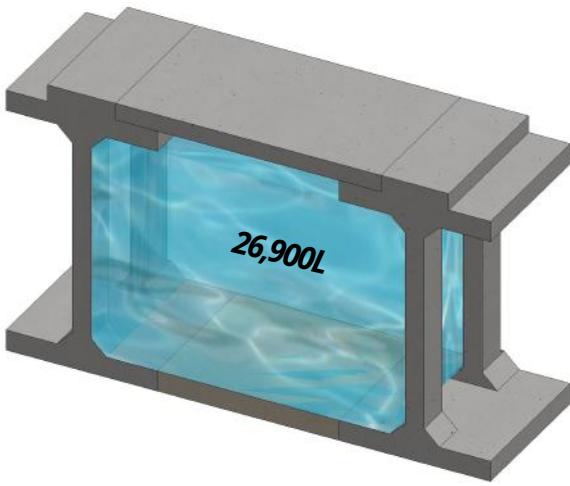


EASY, ACCESSIBLE, COST EFFECTIVE MAINTENANCE & INSPECTIONS

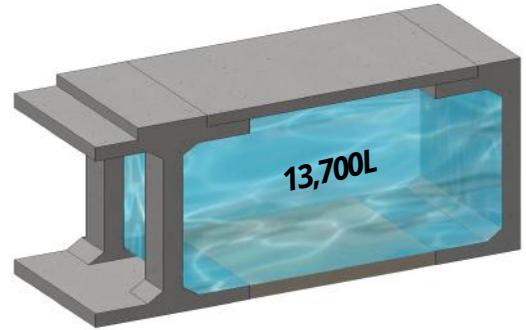
- Designed for maintenance, not replacement
- Accessible openings (grates, maintenance holes and removable slabs) to facilitate rapid inspection and cleaning processes



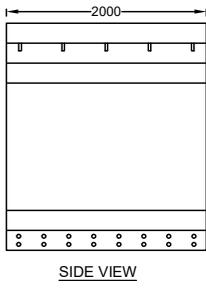
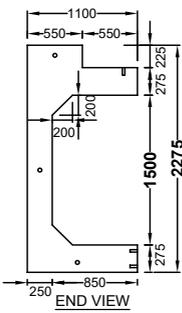
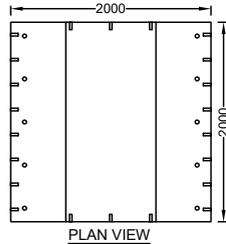
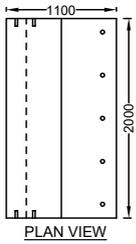
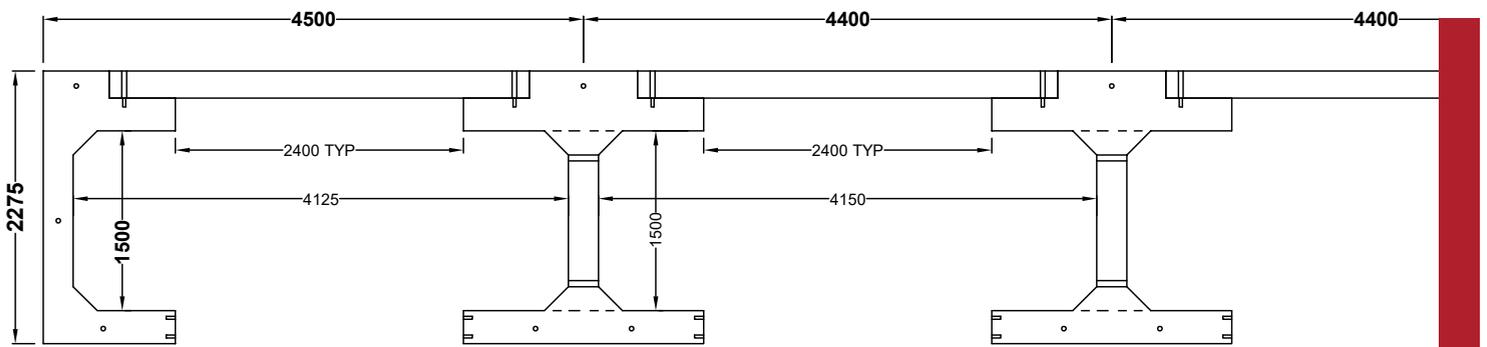
DECAST



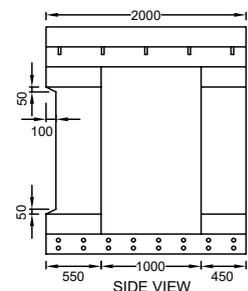
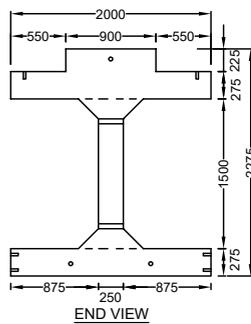
HEIGHT (m)	VOLUME		
	L/set	L/m	L/m ²
1.5	14,000	7,000	1,590
1.5 Wall	13,700	6,850	1,520
3.0	26,900	13,450	3,050
3.0 Wall	26,300	13,150	2,920



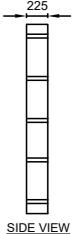
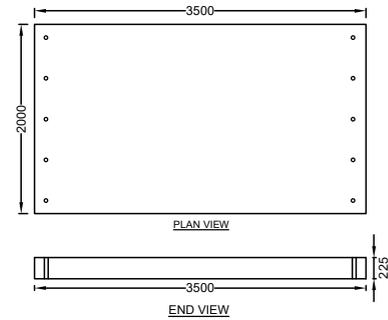
I-STORM - 1.5m High



PART 'A'
5,605 kg



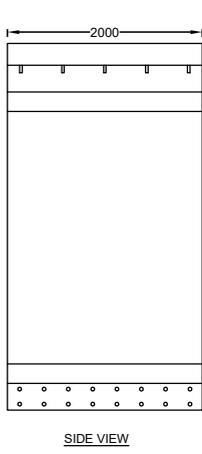
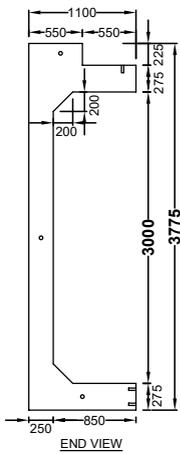
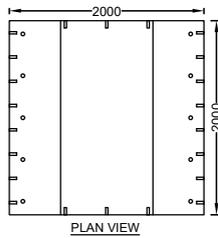
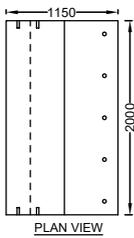
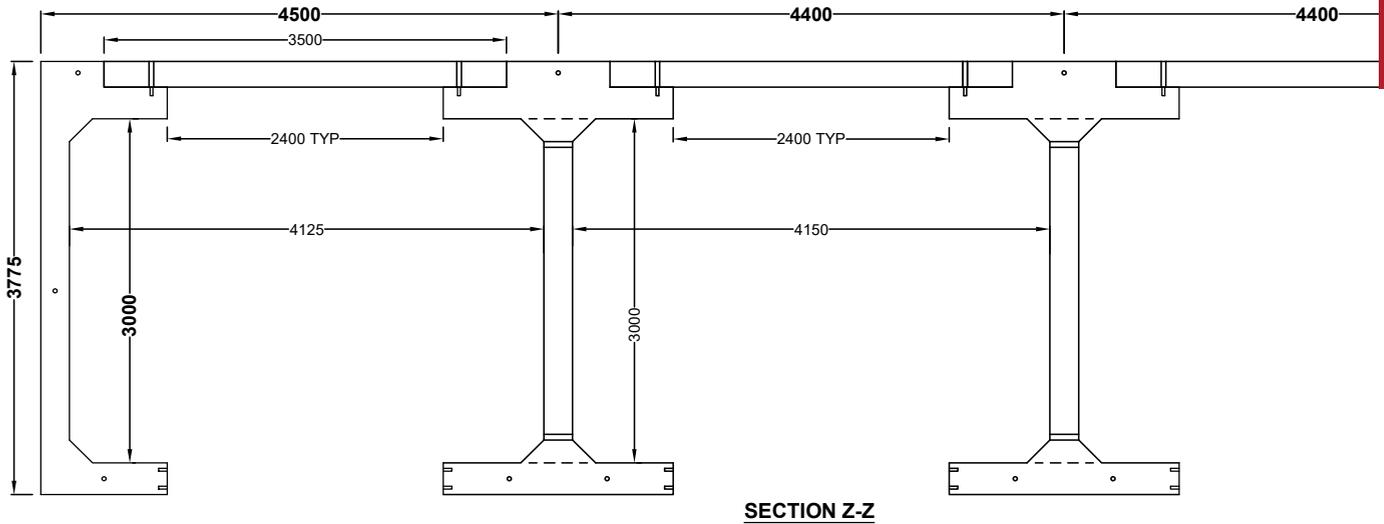
PART 'B'
7,430 kg



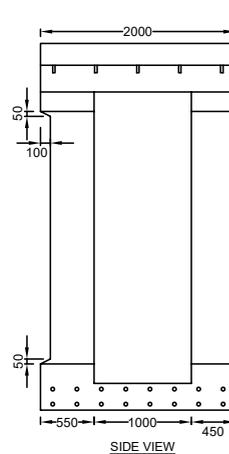
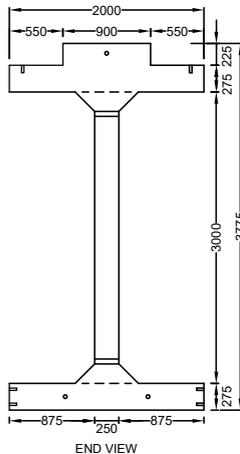
PART 'C'
3,860 kg

I-STORM - 3m High

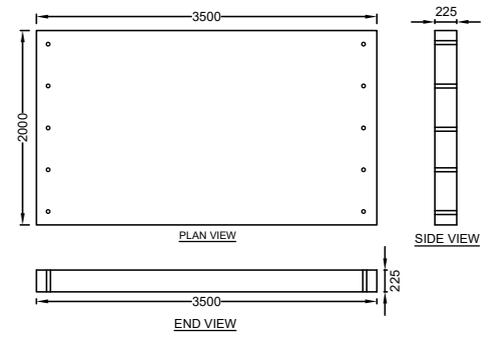
DIMENSIONS & VOLUMES



PART 'A'
7,440kg

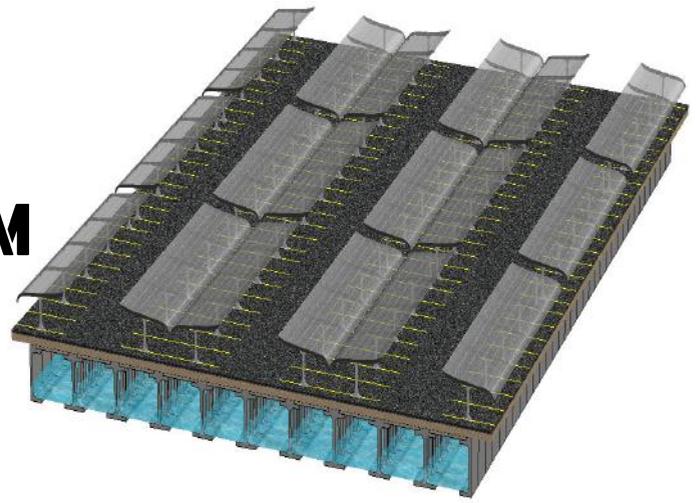


PART 'B'
8,260 kg



PART 'C'
3,860 kg

I-STORM STORMWATER MANAGEMENT SYSTEM



FEATURES

- Parks, sports fields, parking lots and buildings can be developed on top of the I-STORM SWM System
 - **Traditional SWM ponds waste valuable land**
- Use stored water for landscape irrigation, fire protection, dust suppression, ornamental pond & fountain filling and non-potable water applications
- **SAFETY** - To regard the duty to public welfare as paramount, prevent drowning deaths
- Efficient removal of TSS (Total Sustained Solids)
- Minimizes bird strike occurrences, reduces plane crash/incident risks
- Decreases the spread of mosquito-borne illnesses



WHAT WOULD YOU RATHER HAVE?

I-STORM SWM SYSTEM



TRADITIONAL SWM POND



VS



DANGER



DROWNING HAZARD



CONTACT

 Rob Micieli Vice President, Sales	416.605.7374
Frank Mazza, C.E.T. Sales	416.520.2779
John Pozzobon, C.E.T. Sales	905.302.1062
Martin Fischer Sales	705.796.8868
Jorge Silveira, A.Sc.T. Sales	416.453.6837
Mark Eaton Sales	519.717.1313
Nicholas Halcovitch Sales	437.328.2489
Mauro DeFranco, P.Eng. Technical Sales Engineer	647.500.3789
Anthony Abbruscato, P.Eng. Technical Sales Engineer	705.715.1269
Katya Seravalle, PMP Manager, New Products	705.229.7035
Jenny Ogden Manager, Shipping	705.734.2892 ext 2240

-  **SALES**
sales@decastltd.com
- ENGINEERING**
engineering@decastltd.com
- INFO & INQUIRIES**
info@decastltd.com
-  **DECAST Ltd.**
8807 County Road 56
Utopia, ON L0M 1T0
1.800.461.5632
705.734.2892
-  **WEB**
www.decastltd.com

DECAST

decastltd.com



2022.02.02

DIGITAL REPORT AND HYDROLOGIC MODELLING FILES

The following secure link is being provided by **SCS Consulting Group** to share the 15450 Woodbine Avenue site plan related digital data:

<https://filesafecloud.scsconsultinggroup.com/url/qc2kphsnj5axpppc>

Contents:

- Visual OTTHYMO Digital Modelling Files

Please click on the link and download all files from this location.

Expires: Does Not expire



APPENDIX D

FILTRATION UNIT SIZING CALCULATIONS



STANDARD OFFLINE Jellyfish Filter Sizing Report

Project Information

Date	Tuesday, March 28, 2023
Project Name	Vandorf – West Site and East Rd.
Project Number	Eastern Unit
Location	Stouffville

Jellyfish Filter Design Overview

This report provides information for the sizing and specification of the Jellyfish Filter. When designed properly in accordance to the guidelines detailed in the Jellyfish Filter Technical Manual, the Jellyfish Filter will exceed the performance and longevity of conventional horizontal bed and granular media filters.

Please see www.ImbriumSystems.com for more information.

Jellyfish Filter System Recommendation

The Jellyfish Filter model JF8-9-2 is recommended to meet the water quality objective by treating a flow of 50.5 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 569 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF8-9-2	9	2	2.4	50.5	569

The Jellyfish Filter System

The patented Jellyfish Filter is an engineered stormwater quality treatment technology featuring unique membrane filtration in a compact stand-alone treatment system that removes a high level and wide variety of stormwater pollutants. Exceptional pollutant removal is achieved at high treatment flow rates with minimal head loss and low maintenance costs. Each lightweight Jellyfish Filter cartridge contains an extraordinarily large amount of membrane surface area, resulting in superior flow capacity and pollutant removal capacity.

Maintenance

Regular scheduled inspections and maintenance is necessary to assure proper functioning of the Jellyfish Filter. The maintenance interval is designed to be a minimum of 12 months, but this will vary depending on site loading conditions and upstream pretreatment measures. Quarterly inspections and inspections after all storms beyond the 5-year event are recommended until enough historical performance data has been logged to comfortably initiate an alternative inspection interval.

Please see www.ImbriumSystems.com for more information.

Thank you for the opportunity to present this information to you and your client.

Performance

Jellyfish efficiently captures a high level of Stormwater pollutants, including:

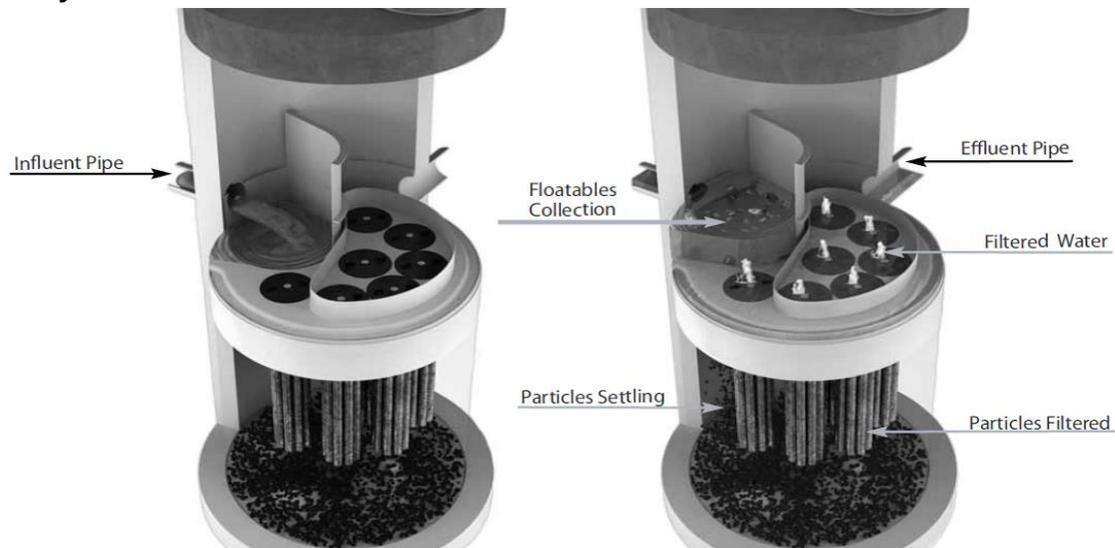
- ☑ 89% of the total suspended solids (TSS) load, including particles less than 5 microns
- ☑ 77% TP removal & 51% TN removal
- ☑ 90% Total Copper, 81% Total Lead, 70% Total Zinc
- ☑ Particulate-bound pollutants such as nutrients, toxic metals, hydrocarbons and bacteria
- ☑ Free oil, Floatable trash and debris

Field Proven Performance

The Jellyfish filter has been field-tested on an urban site with 25 TARP qualifying rain events and field monitored according to the TARP field test protocol, demonstrating:

- A median TSS removal efficiency of 89%, and a median SSC removal of 99%;
- The ability to capture fine particles as indicated by an effluent d50 median of 3 microns for all monitored storm events, and a median effluent turbidity of 5 NTUs;
- A median Total Phosphorus removal of 77%, and a median Total Nitrogen removal of 51%.

Jellyfish Filter Treatment Functions



Pre-treatment and Membrane Filtration

Project Information

Date:	Tuesday, March 28, 2023
Project Name:	Vandorf – West Site and East Rd.
Project Number:	Eastern Unit
Location:	Stouffville

Designer Information

Company:	SCS Consulting Group Ltd.
Contact:	Annie Wang
Phone #:	

Notes

--

Design System Requirements

Flow Loading	90% of the Average Annual Runoff based on 18 years of TORONTO CENTRAL rainfall data:	36.9 L/s
Sediment Loading	Treating 90% of the average annual runoff volume, 8776 m ³ , with a suspended sediment concentration of 60 mg/L.	527 kg*

* Indicates that sediment loading is the limiting parameter in the sizing of this Jellyfish system

Recommendation

The Jellyfish Filter model JF8-9-2 is recommended to meet the water quality objective by treating a flow of 50.5 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 569 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Wet Vol Below Deck (L)	Sump Storage (m ³)	Oil Capacity (L)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF4-1-1	1	1	1.2	2313	0.34	379	7.6	85
JF4-2-1	2	1	1.2	2313	0.34	379	12.6	142
JF6-3-1	3	1	1.8	5205	0.79	848	17.7	199
JF6-4-1	4	1	1.8	5205	0.79	848	22.7	256
JF6-5-1	5	1	1.8	5205	0.79	848	27.8	313
JF6-6-1	6	1	1.8	5205	0.79	848	28.6	370
JF8-6-2	6	2	2.4	9252	1.42	1469	35.3	398
JF8-7-2	7	2	2.4	9252	1.42	1469	40.4	455
JF8-8-2	8	2	2.4	9252	1.42	1469	45.4	512
JF8-9-2	9	2	2.4	9252	1.42	1469	50.5	569
JF8-10-2	10	2	2.4	9252	1.42	1469	50.5	626
JF10-11-3	11	3	3.0	14456	2.21	2302	63.1	711
JF10-12-3	12	3	3.0	14456	2.21	2302	68.2	768
JF10-12-4	12	4	3.0	14456	2.21	2302	70.7	796
JF10-13-4	13	4	3.0	14456	2.21	2302	75.7	853
JF10-14-4	14	4	3.0	14456	2.21	2302	78.9	910
JF10-15-4	15	4	3.0	14456	2.21	2302	78.9	967
JF10-16-4	16	4	3.0	14456	2.21	2302	78.9	1024
JF10-17-4	17	4	3.0	14456	2.21	2302	78.9	1081
JF10-18-4	18	4	3.0	14456	2.21	2302	78.9	1138
JF10-19-4	19	4	3.0	14456	2.21	2302	78.9	1195
JF12-20-5	20	5	3.6	20820	3.2	2771	113.6	1280
JF12-21-5	21	5	3.6	20820	3.2	2771	113.7	1337
JF12-22-5	22	5	3.6	20820	3.2	2771	113.7	1394
JF12-23-5	23	5	3.6	20820	3.2	2771	113.7	1451
JF12-24-5	24	5	3.6	20820	3.2	2771	113.7	1508
JF12-25-5	25	5	3.6	20820	3.2	2771	113.7	1565
JF12-26-5	26	5	3.6	20820	3.2	2771	113.7	1622
JF12-27-5	27	5	3.6	20820	3.2	2771	113.7	1679

Rainfall

Name:	TORONTO CENTRAL
State:	ON
ID:	100
Record:	1982 to 1999
Co-ords:	45°30'N, 90°30'W

Drainage Area

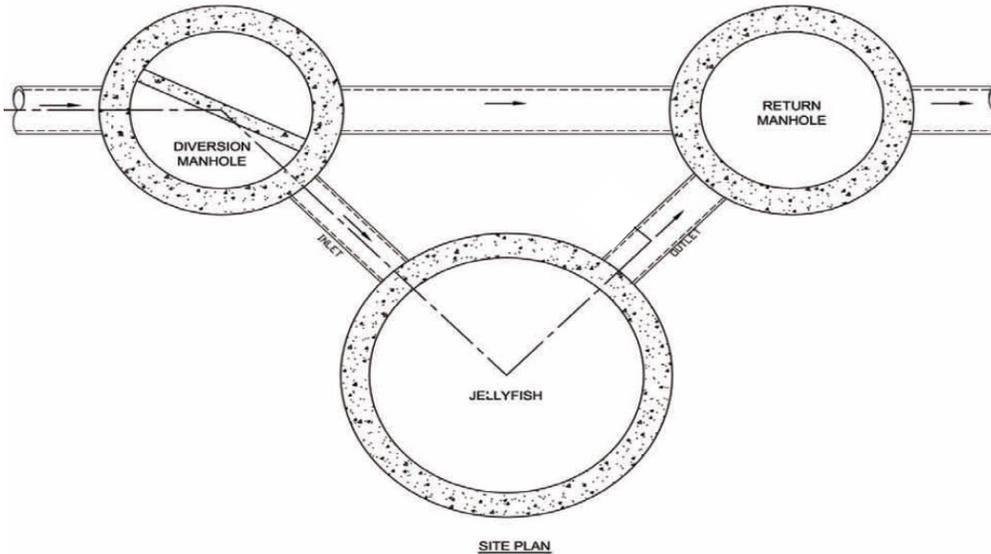
Total Area:	1.48 ha
Imperviousness:	100%

Upstream Detention

Peak Release Rate:	n/a
Pretreatment Credit:	n/a

Jellyfish Filter Design Notes

- Typically the Jellyfish Filter is designed in an offline configuration, as all stormwater filter systems will perform for a longer duration between required maintenance services when designed and applied in off-line configurations. Depending on the design parameters, an optional internal bypass may be incorporated into the Jellyfish Filter, however note the inspection and maintenance frequency should be expected to increase above that of an off-line system. Speak to your local representative for more information.



Jellyfish Filter Typical Layout

- Typically, 18 inches (457 mm) of driving head is designed into the system, calculated as the difference in elevation between the top of the diversion structure weir and the invert of the Jellyfish Filter outlet pipe. Alternative driving head values can be designed as 12 to 24 inches (305 to 610mm) depending on specific site requirements, requiring additional sizing and design assistance.
- Typically, the Jellyfish Filter is designed with the inlet pipe configured 6 inches (150 mm) above the outlet invert elevation. However, depending on site parameters this can vary to an optional configuration of the inlet pipe entering the unit below the outlet invert elevation.
- The Jellyfish Filter can accommodate multiple inlet pipes within certain restrictions.
- While the optional inlet below deck configuration offers 0 to 360 degree flexibility between the inlet and outlet pipe, typical systems conform to the following:

Model Diameter (m)	Minimum Angle Inlet / Outlet Pipes	Minimum Inlet Pipe Diameter (mm)	Minimum Outlet Pipe Diameter (mm)
1.2	62°	150	200
1.8	59°	200	250
2.4	52°	250	300
3.0	48°	300	450
3.6	40°	300	450

- The Jellyfish Filter can be built at all depths of cover generally associated with conventional stormwater conveyance systems. For sites that require minimal depth of cover for the stormwater infrastructure, the Jellyfish Filter can be applied in a shallow application using a hatch cover. The general minimum depth of cover is 36 inches (915 mm) from top of the underslab to outlet invert.
- If driving head calculations account for water elevation during submerged conditions the Jellyfish Filter will function effectively under submerged conditions.
- Jellyfish Filter systems may incorporate grated inlets depending on system configuration.
- For sites with water quality treatment flow rates or mass loadings that exceed the design flow rate of the largest standard Jellyfish Filter manhole models, systems can be designed that hydraulically connect multiple Jellyfish Filters in series or alternatively Jellyfish Vault units can be designed.

STANDARD SPECIFICATION STORMWATER QUALITY – MEMBRANE FILTRATION TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

Specifies requirements for construction and performance of an underground stormwater quality membrane filtration treatment device that removes pollutants from stormwater runoff through the unit operations of sedimentation, floatation, and membrane filtration.

1.2 REFERENCE STANDARDS

ASTM C 891: Specification for Installation of Underground Precast Concrete Utility Structures
ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM D 4101: Specification for Copolymer steps construction

CAN/CSA-A257.4-M92

Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections and Fittings Using Rubber Gaskets

CAN/CSA-A257.4-M92

Precast Reinforced Circular Concrete Manhole Sections, Catch Basins and Fittings

Canadian Highway Bridge Design Code

1.3 SHOP DRAWINGS

Shop drawings for the structure and performance are to be submitted with each order to the contractor. Contractor shall forward shop drawing submittal to the consulting engineer for approval. Shop drawings are to detail the structure's precast concrete and call out or note the fiberglass (FRP) internals/components.

1.4 PRODUCT SUBSTITUTIONS

No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the engineer of record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

1.5 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

PART 2 – PRODUCTS

2.1 GENERAL

- 2.1.1 The device shall be a cylindrical or rectangular, all concrete structure (including risers), constructed from precast concrete riser and slab components or monolithic precast structure(s), installed to conform to ASTM C 891 and to any required state highway, municipal or local specifications; whichever is more stringent. The device shall be watertight.
- 2.1.2 Cartridge Deck The cylindrical concrete device shall include a fiberglass deck. The rectangular concrete device shall include a coated aluminum deck. In either instance, the insert shall be bolted and sealed watertight inside the precast concrete chamber. The deck shall serve as: (a) a horizontal divider between the lower treatment zone and the upper treated effluent zone; (b) a deck for attachment of filter cartridges such that the membrane filter elements of each cartridge extend into the lower treatment zone; (c) a platform for maintenance workers to service the filter cartridges (maximum manned weight = 450 pounds (204 kg)); (d) a conduit for conveyance of treated water to the effluent pipe.
- 2.1.3 Membrane Filter Cartridges Filter cartridges shall be comprised of reusable cylindrical membrane filter elements connected to a perforated head plate. The number of membrane filter elements per cartridge shall be a minimum of eleven 2.75-inch (70-mm) diameter elements. The length of each filter element shall be a minimum 15 inches (381 mm). Each cartridge shall be fitted into the cartridge deck by insertion into a cartridge receptacle that is permanently mounted into the cartridge deck. Each cartridge shall be secured by a cartridge lid that is threaded onto the receptacle, or similar mechanism to secure the cartridge into the deck. The maximum treatment flow rate of a filter cartridge shall be controlled by an orifice in the cartridge lid, or on the individual cartridge itself, and based on a design flux rate (surface loading rate) determined by the maximum treatment flow rate per unit of filtration membrane surface area. The maximum design flux rate shall be 0.21 gpm/ft² (0.142 lps/m²).

Each membrane filter cartridge shall allow for manual installation and removal. Each filter cartridge shall have filtration membrane surface area and dry installation weight as follows (if length of filter cartridge is between those listed below, the surface area and weight shall be proportionate to the next length shorter and next length longer as shown below):

Filter Cartridge Length (in / mm)	Minimum Filtration Membrane Surface Area (ft ² / m ²)	Maximum Filter Cartridge Dry Weight (lbs / kg)
15	106 / 9.8	10.5 / 4.8
27	190 / 17.7	15.0 / 6.8
40	282 / 26.2	20.5 / 9.3
54	381 / 35.4	25.5 / 11.6

- 2.1.4 Backwashing Cartridges The filter device shall have a weir extending above the cartridge deck, or other mechanism, that encloses the high flow rate filter cartridges when placed in their respective cartridge receptacles within the cartridge deck. The weir, or other mechanism, shall collect a pool of filtered water during inflow events that backwashes the high flow rate cartridges when the inflow

event subsides. All filter cartridges and membranes shall be reusable and allow for the use of filtration membrane rinsing procedures to restore flow capacity and sediment capacity; extending cartridge service life.

- 2.1.5 Maintenance Access to Captured Pollutants The filter device shall contain an opening(s) that provides maintenance access for removal of accumulated floatable pollutants and sediment, removal of and replacement of filter cartridges, cleaning of the sump, and rinsing of the deck. Access shall have a minimum clear vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.
- 2.1.6 Bend Structure The device shall be able to be used as a bend structure with minimum angles between inlet and outlet pipes of 90-degrees or less in the stormwater conveyance system.
- 2.1.7 Double-Wall Containment of Hydrocarbons The cylindrical precast concrete device shall provide double-wall containment for hydrocarbon spill capture by a combined means of an inner wall of fiberglass, to a minimum depth of 12 inches (305 mm) below the cartridge deck, and the precast vessel wall.
- 2.1.8 Baffle The filter device shall provide a baffle that extends from the underside of the cartridge deck to a minimum length equal to the length of the membrane filter elements. The baffle shall serve to protect the membrane filter elements from contamination by floatables and coarse sediment. The baffle shall be flexible and continuous in cylindrical configurations, and shall be a straight concrete or aluminum wall in rectangular configurations.
- 2.1.9 Sump The device shall include a minimum 24 inches (610 mm) of sump below the bottom of the cartridges for sediment accumulation, unless otherwise specified by the design engineer. Depths less than 24 inches may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be manufactured to a minimum live load of HS-20 truck loading or greater based on local regulatory specifications, unless otherwise modified or specified by the design engineer, and shall be watertight.

2.3 JOINTS All precast concrete manhole configuration joints shall use nitrile rubber gaskets and shall meet the requirements of ASTM C443, Specification C1619, Class D or engineer approved equal to ensure oil resistance. Mastic sealants or butyl tape are not an acceptable alternative.

2.4 GASKETS Only profile neoprene or nitrile rubber gaskets in accordance to CSA A257.3-M92 will be accepted. Mastic sealants, butyl tape or Con Seal CS-101 are not acceptable gasket materials.

2.5 FRAME AND COVER Frame and covers must be manufactured from cast-iron or other composite material tested to withstand H-20 or greater design loads, and as approved by the

local regulatory body. Frames and covers must be embossed with the name of the device manufacturer or the device brand name.

- 2.6 DOORS AND HATCHES If provided shall meet designated loading requirements or at a minimum for incidental vehicular traffic.
- 2.7 CONCRETE All concrete components shall be manufactured according to local specifications and shall meet the requirements of ASTM C 478.
- 2.8 FIBERGLASS The fiberglass portion of the filter device shall be constructed in accordance with the following standard: ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks.
- 2.9 STEPS Steps shall be constructed according to ASTM D4101 of copolymer polypropylene, and be driven into preformed or pre-drilled holes after the concrete has cured, installed to conform to applicable sections of state, provincial and municipal building codes, highway, municipal or local specifications for the construction of such devices.
- 2.10 INSPECTION All precast concrete sections shall be inspected to ensure that dimensions, appearance and quality of the product meet local municipal specifications and ASTM C 478.

PART 3 – PERFORMANCE

3.1 GENERAL

- 3.1.1 Verification – The stormwater quality filter must be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV).
- 3.1.2 Function - The stormwater quality filter treatment device shall function to remove pollutants by the following unit treatment processes; sedimentation, floatation, and membrane filtration.
- 3.1.3 Pollutants - The stormwater quality filter treatment device shall remove oil, debris, trash, coarse and fine particulates, particulate-bound pollutants, metals and nutrients from stormwater during runoff events.
- 3.1.4 Bypass - The stormwater quality filter treatment device shall typically utilize an external bypass to divert excessive flows. Internal bypass systems shall be equipped with a floatables baffle, and must avoid passage through the sump and/or cartridge filtration zone.
- 3.1.5 Treatment Flux Rate (Surface Loading Rate) – The stormwater quality filter treatment device shall treat 100% of the required water quality treatment flow based on a maximum design treatment flux rate (surface loading rate) across the membrane filter cartridges of 0.21 gpm/ft² (0.142 lps/m²).

3.2 FIELD TEST PERFORMANCE

At a minimum, the stormwater quality filter device shall have been field tested and verified with a minimum 25 TARP qualifying storm events and field monitoring shall have been conducted according to the TARP 2009 NJDEP TARP field test protocol, and have received NJCAT verification.

- 3.2.1 Suspended Solids Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median TSS removal efficiency of 85% and a minimum median SSC removal efficiency of 95%.
- 3.2.2 Runoff Volume – The stormwater quality filter treatment device shall be engineered, designed, and sized to treat a minimum of 90 percent of the annual runoff volume determined from use of a minimum 15-year rainfall data set.
- 3.2.3 Fine Particle Removal - The stormwater quality filter treatment device shall have demonstrated the ability to capture fine particles as indicated by a minimum median removal efficiency of 75% for the particle fraction less than 25 microns, an effluent d_{50} of 15 microns or lower for all monitored storm events.
- 3.2.4 Turbidity Reduction - The stormwater quality filter treatment device shall have demonstrated the ability to reduce the turbidity from influent from a range of 5 to 171 NTU to an effluent turbidity of 15 NTU or lower.
- 3.2.5 Nutrient (Total Phosphorus & Total Nitrogen) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Phosphorus removal of 55%, and a minimum median Total Nitrogen removal of 50%.
- 3.2.6 Metals (Total Zinc & Total Copper) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Zinc removal of 55%, and a minimum median Total Copper removal of 85%.

3.3 INSPECTION and MAINTENANCE

The stormwater quality filter device shall have the following features:

- 3.3.1 Durability of membranes are subject to good handling practices during inspection and maintenance (removal, rinsing, and reinsertion) events, and site specific conditions that may have heavier or lighter loading onto the cartridges, and pollutant variability that may impact the membrane structural integrity. Membrane maintenance and replacement shall be in accordance with manufacturer's recommendations.
- 3.3.2 Inspection which includes trash and floatables collection, sediment depth determination, and visible determination of backwash pool depth shall be easily conducted from grade (outside the structure).
- 3.3.3 Manual rinsing of the reusable filter cartridges shall promote restoration of the flow capacity and sediment capacity of the filter cartridges, extending cartridge service life.

- 3.3.4 The filter device shall have a minimum 12 inches (305 mm) of sediment storage depth, and a minimum of 12 inches between the top of the sediment storage and bottom of the filter cartridge tentacles, unless otherwise specified by the design engineer. Variances may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.
- 3.3.5 Sediment removal from the filter treatment device shall be able to be conducted using a standard maintenance truck and vacuum apparatus, and a minimum one point of entry to the sump that is unobstructed by filter cartridges.
- 3.3.6 Maintenance access shall have a minimum clear height that provides suitable vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.
- 3.3.7 Filter cartridges shall be able to be maintained without the requirement of additional lifting equipment.

PART 4 – EXECUTION

4.1 INSTALLATION

4.1.1 PRECAST DEVICE CONSTRUCTION SEQUENCE

The installation of a watertight precast concrete device should conform to ASTM C 891 and to any state highway, municipal or local specifications for the construction of manholes, whichever is more stringent. Selected sections of a general specification that are applicable are summarized below.

4.1.1.1 The watertight precast concrete device is installed in sections in the following sequence:

- aggregate base
- base slab
- treatment chamber and cartridge deck riser section(s)
- bypass section
- connect inlet and outlet pipes
- concrete riser section(s) and/or transition slab (if required)
- maintenance riser section(s) (if required)
- frame and access cover

4.1.2 The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the precast concrete manufacturer's recommendations.

4.1.3 Adjustment of the stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary to restore original condition and watertight seals. Once the stormwater quality treatment device has been constructed, any/all lift holes must be plugged watertight with mortar or non-shrink grout.

- 4.1.4 Inlet and Outlet Pipes Inlet and outlet pipes should be securely set into the device using approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight, and such that any pipe intrusion into the device does not impact the device functionality.
- 4.1.5 Frame and Cover Installation Adjustment units (e.g. grade rings) should be installed to set the frame and cover at the required elevation. The adjustment units should be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover should be set in a full bed of mortar at the elevation specified.

4.2 MAINTENANCE ACCESS WALL

In some instances the Maintenance Access Wall, if provided, shall require an extension attachment and sealing to the precast wall and cartridge deck at the job site, rather than at the precast facility. In this instance, installation of these components shall be performed according to instructions provided by the manufacturer.

4.3 FILTER CARTRIDGE INSTALLATION Filter cartridges shall be installed in the cartridge deck only after the construction site is fully stabilized and in accordance with the manufacturer's guidelines and recommendations. Contractor to contact the manufacturer to schedule cartridge delivery and review procedures/requirements to be completed to the device prior to installation of the cartridges and activation of the system.

PART 5 – QUALITY ASSURANCE

5.1 FILTER CARTRIDGE INSTALLATION Manufacturer shall coordinate delivery of filter cartridges and other internal components with contractor. Filter cartridges shall be delivered and installed complete after site is stabilized and unit is ready to accept cartridges. Unit is ready to accept cartridges after it has been cleaned out and any standing water, debris, and other materials have been removed. Contractor shall take appropriate action to protect the filter cartridge receptacles and filter cartridges from damage during construction, and in accordance with the manufacturer's recommendations and guidance. For systems with cartridges installed prior to full site stabilization and prior to system activation, the contractor can plug inlet and outlet pipes to prevent stormwater and other influent from entering the device. Plugs must be removed during the activation process.

5.2 INSPECTION AND MAINTENANCE

5.2.1 The manufacturer shall provide an Owner's Manual upon request.

5.2.2 After construction and installation, and during operation, the device shall be inspected and cleaned as necessary based on the manufacturer's recommended inspection and maintenance guidelines and the local regulatory agency/body.

5.3 REPLACEMENT FILTER CARTRIDGES When replacement membrane filter elements and/or other parts are required, only membrane filter elements and parts approved by the manufacturer for use with the stormwater quality filter device shall be installed.

END OF SECTION



STANDARD OFFLINE Jellyfish Filter Sizing Report

Project Information

Date	Tuesday, March 28, 2023
Project Name	Vandorf – West Site and East Rd.
Project Number	Western Unit
Location	Stouffville

Jellyfish Filter Design Overview

This report provides information for the sizing and specification of the Jellyfish Filter. When designed properly in accordance to the guidelines detailed in the Jellyfish Filter Technical Manual, the Jellyfish Filter will exceed the performance and longevity of conventional horizontal bed and granular media filters.

Please see www.ImbriumSystems.com for more information.

Jellyfish Filter System Recommendation

The Jellyfish Filter model JF12-20-5 is recommended to meet the water quality objective by treating a flow of 113.6 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 1280 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF12-20-5	20	5	3.6	113.6	1280

The Jellyfish Filter System

The patented Jellyfish Filter is an engineered stormwater quality treatment technology featuring unique membrane filtration in a compact stand-alone treatment system that removes a high level and wide variety of stormwater pollutants. Exceptional pollutant removal is achieved at high treatment flow rates with minimal head loss and low maintenance costs. Each lightweight Jellyfish Filter cartridge contains an extraordinarily large amount of membrane surface area, resulting in superior flow capacity and pollutant removal capacity.

Maintenance

Regular scheduled inspections and maintenance is necessary to assure proper functioning of the Jellyfish Filter. The maintenance interval is designed to be a minimum of 12 months, but this will vary depending on site loading conditions and upstream pretreatment measures. Quarterly inspections and inspections after all storms beyond the 5-year event are recommended until enough historical performance data has been logged to comfortably initiate an alternative inspection interval.

Please see www.ImbriumSystems.com for more information.

Thank you for the opportunity to present this information to you and your client.

Performance

Jellyfish efficiently captures a high level of Stormwater pollutants, including:

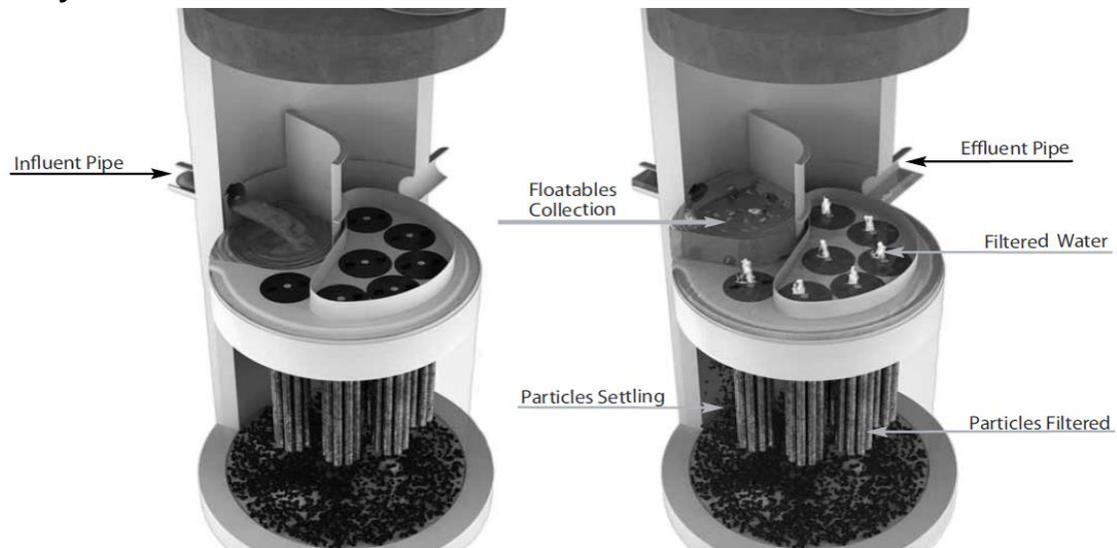
- ☑ 89% of the total suspended solids (TSS) load, including particles less than 5 microns
- ☑ 77% TP removal & 51% TN removal
- ☑ 90% Total Copper, 81% Total Lead, 70% Total Zinc
- ☑ Particulate-bound pollutants such as nutrients, toxic metals, hydrocarbons and bacteria
- ☑ Free oil, Floatable trash and debris

Field Proven Performance

The Jellyfish filter has been field-tested on an urban site with 25 TARP qualifying rain events and field monitored according to the TARP field test protocol, demonstrating:

- A median TSS removal efficiency of 89%, and a median SSC removal of 99%;
- The ability to capture fine particles as indicated by an effluent d50 median of 3 microns for all monitored storm events, and a median effluent turbidity of 5 NTUs;
- A median Total Phosphorus removal of 77%, and a median Total Nitrogen removal of 51%.

Jellyfish Filter Treatment Functions



Pre-treatment and Membrane Filtration

Project Information

Date:	Tuesday, March 28, 2023
Project Name:	Vandorf – West Site and East Rd.
Project Number:	Western Unit
Location:	Stouffville

Designer Information

Company:	SCS Consulting Group Ltd.
Contact:	Annie Wang
Phone #:	

Notes

--

Design System Requirements

Flow Loading	90% of the Average Annual Runoff based on 18 years of TORONTO CENTRAL rainfall data:	83.6 L/s
Sediment Loading	Treating 90% of the average annual runoff volume, 21001 m³, with a suspended sediment concentration of 60 mg/L.	1260 kg

Recommendation

The Jellyfish Filter model JF12-20-5 is recommended to meet the water quality objective by treating a flow of 113.6 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 1280 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Wet Vol Below Deck (L)	Sump Storage (m³)	Oil Capacity (L)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF4-1-1	1	1	1.2	2313	0.34	379	7.6	85
JF4-2-1	2	1	1.2	2313	0.34	379	12.6	142
JF6-3-1	3	1	1.8	5205	0.79	848	17.7	199
JF6-4-1	4	1	1.8	5205	0.79	848	22.7	256
JF6-5-1	5	1	1.8	5205	0.79	848	27.8	313
JF6-6-1	6	1	1.8	5205	0.79	848	28.6	370
JF8-6-2	6	2	2.4	9252	1.42	1469	35.3	398
JF8-7-2	7	2	2.4	9252	1.42	1469	40.4	455
JF8-8-2	8	2	2.4	9252	1.42	1469	45.4	512
JF8-9-2	9	2	2.4	9252	1.42	1469	50.5	569
JF8-10-2	10	2	2.4	9252	1.42	1469	50.5	626
JF10-11-3	11	3	3.0	14456	2.21	2302	63.1	711
JF10-12-3	12	3	3.0	14456	2.21	2302	68.2	768
JF10-12-4	12	4	3.0	14456	2.21	2302	70.7	796
JF10-13-4	13	4	3.0	14456	2.21	2302	75.7	853
JF10-14-4	14	4	3.0	14456	2.21	2302	78.9	910
JF10-15-4	15	4	3.0	14456	2.21	2302	78.9	967
JF10-16-4	16	4	3.0	14456	2.21	2302	78.9	1024
JF10-17-4	17	4	3.0	14456	2.21	2302	78.9	1081
JF10-18-4	18	4	3.0	14456	2.21	2302	78.9	1138
JF10-19-4	19	4	3.0	14456	2.21	2302	78.9	1195
JF12-20-5	20	5	3.6	20820	3.2	2771	113.6	1280
JF12-21-5	21	5	3.6	20820	3.2	2771	113.7	1337
JF12-22-5	22	5	3.6	20820	3.2	2771	113.7	1394
JF12-23-5	23	5	3.6	20820	3.2	2771	113.7	1451
JF12-24-5	24	5	3.6	20820	3.2	2771	113.7	1508
JF12-25-5	25	5	3.6	20820	3.2	2771	113.7	1565
JF12-26-5	26	5	3.6	20820	3.2	2771	113.7	1622
JF12-27-5	27	5	3.6	20820	3.2	2771	113.7	1679

Rainfall

Name:	TORONTO CENTRAL
State:	ON
ID:	100
Record:	1982 to 1999
Co-ords:	45°30'N, 90°30'W

Drainage Area

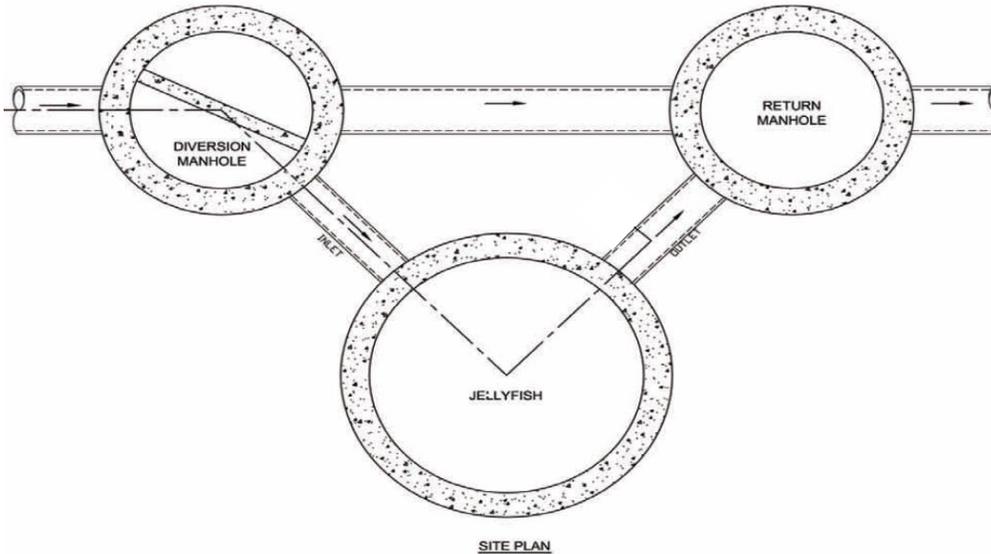
Total Area:	4 ha
Imperviousness:	89%

Upstream Detention

Peak Release Rate:	n/a
Pretreatment Credit:	n/a

Jellyfish Filter Design Notes

- Typically the Jellyfish Filter is designed in an offline configuration, as all stormwater filter systems will perform for a longer duration between required maintenance services when designed and applied in off-line configurations. Depending on the design parameters, an optional internal bypass may be incorporated into the Jellyfish Filter, however note the inspection and maintenance frequency should be expected to increase above that of an off-line system. Speak to your local representative for more information.



Jellyfish Filter Typical Layout

- Typically, 18 inches (457 mm) of driving head is designed into the system, calculated as the difference in elevation between the top of the diversion structure weir and the invert of the Jellyfish Filter outlet pipe. Alternative driving head values can be designed as 12 to 24 inches (305 to 610mm) depending on specific site requirements, requiring additional sizing and design assistance.
- Typically, the Jellyfish Filter is designed with the inlet pipe configured 6 inches (150 mm) above the outlet invert elevation. However, depending on site parameters this can vary to an optional configuration of the inlet pipe entering the unit below the outlet invert elevation.
- The Jellyfish Filter can accommodate multiple inlet pipes within certain restrictions.
- While the optional inlet below deck configuration offers 0 to 360 degree flexibility between the inlet and outlet pipe, typical systems conform to the following:

Model Diameter (m)	Minimum Angle Inlet / Outlet Pipes	Minimum Inlet Pipe Diameter (mm)	Minimum Outlet Pipe Diameter (mm)
1.2	62°	150	200
1.8	59°	200	250
2.4	52°	250	300
3.0	48°	300	450
3.6	40°	300	450

- The Jellyfish Filter can be built at all depths of cover generally associated with conventional stormwater conveyance systems. For sites that require minimal depth of cover for the stormwater infrastructure, the Jellyfish Filter can be applied in a shallow application using a hatch cover. The general minimum depth of cover is 36 inches (915 mm) from top of the underslab to outlet invert.
- If driving head calculations account for water elevation during submerged conditions the Jellyfish Filter will function effectively under submerged conditions.
- Jellyfish Filter systems may incorporate grated inlets depending on system configuration.
- For sites with water quality treatment flow rates or mass loadings that exceed the design flow rate of the largest standard Jellyfish Filter manhole models, systems can be designed that hydraulically connect multiple Jellyfish Filters in series or alternatively Jellyfish Vault units can be designed.

STANDARD SPECIFICATION STORMWATER QUALITY – MEMBRANE FILTRATION TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

Specifies requirements for construction and performance of an underground stormwater quality membrane filtration treatment device that removes pollutants from stormwater runoff through the unit operations of sedimentation, floatation, and membrane filtration.

1.2 REFERENCE STANDARDS

ASTM C 891: Specification for Installation of Underground Precast Concrete Utility Structures
ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM D 4101: Specification for Copolymer steps construction

CAN/CSA-A257.4-M92

Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections and Fittings Using Rubber Gaskets

CAN/CSA-A257.4-M92

Precast Reinforced Circular Concrete Manhole Sections, Catch Basins and Fittings

Canadian Highway Bridge Design Code

1.3 SHOP DRAWINGS

Shop drawings for the structure and performance are to be submitted with each order to the contractor. Contractor shall forward shop drawing submittal to the consulting engineer for approval. Shop drawings are to detail the structure's precast concrete and call out or note the fiberglass (FRP) internals/components.

1.4 PRODUCT SUBSTITUTIONS

No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the engineer of record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

1.5 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

PART 2 – PRODUCTS

2.1 GENERAL

- 2.1.1 The device shall be a cylindrical or rectangular, all concrete structure (including risers), constructed from precast concrete riser and slab components or monolithic precast structure(s), installed to conform to ASTM C 891 and to any required state highway, municipal or local specifications; whichever is more stringent. The device shall be watertight.
- 2.1.2 Cartridge Deck The cylindrical concrete device shall include a fiberglass deck. The rectangular concrete device shall include a coated aluminum deck. In either instance, the insert shall be bolted and sealed watertight inside the precast concrete chamber. The deck shall serve as: (a) a horizontal divider between the lower treatment zone and the upper treated effluent zone; (b) a deck for attachment of filter cartridges such that the membrane filter elements of each cartridge extend into the lower treatment zone; (c) a platform for maintenance workers to service the filter cartridges (maximum manned weight = 450 pounds (204 kg)); (d) a conduit for conveyance of treated water to the effluent pipe.
- 2.1.3 Membrane Filter Cartridges Filter cartridges shall be comprised of reusable cylindrical membrane filter elements connected to a perforated head plate. The number of membrane filter elements per cartridge shall be a minimum of eleven 2.75-inch (70-mm) diameter elements. The length of each filter element shall be a minimum 15 inches (381 mm). Each cartridge shall be fitted into the cartridge deck by insertion into a cartridge receptacle that is permanently mounted into the cartridge deck. Each cartridge shall be secured by a cartridge lid that is threaded onto the receptacle, or similar mechanism to secure the cartridge into the deck. The maximum treatment flow rate of a filter cartridge shall be controlled by an orifice in the cartridge lid, or on the individual cartridge itself, and based on a design flux rate (surface loading rate) determined by the maximum treatment flow rate per unit of filtration membrane surface area. The maximum design flux rate shall be 0.21 gpm/ft² (0.142 lps/m²).

Each membrane filter cartridge shall allow for manual installation and removal. Each filter cartridge shall have filtration membrane surface area and dry installation weight as follows (if length of filter cartridge is between those listed below, the surface area and weight shall be proportionate to the next length shorter and next length longer as shown below):

Filter Cartridge Length (in / mm)	Minimum Filtration Membrane Surface Area (ft ² / m ²)	Maximum Filter Cartridge Dry Weight (lbs / kg)
15	106 / 9.8	10.5 / 4.8
27	190 / 17.7	15.0 / 6.8
40	282 / 26.2	20.5 / 9.3
54	381 / 35.4	25.5 / 11.6

- 2.1.4 Backwashing Cartridges The filter device shall have a weir extending above the cartridge deck, or other mechanism, that encloses the high flow rate filter cartridges when placed in their respective cartridge receptacles within the cartridge deck. The weir, or other mechanism, shall collect a pool of filtered water during inflow events that backwashes the high flow rate cartridges when the inflow

event subsides. All filter cartridges and membranes shall be reusable and allow for the use of filtration membrane rinsing procedures to restore flow capacity and sediment capacity; extending cartridge service life.

- 2.1.5 Maintenance Access to Captured Pollutants The filter device shall contain an opening(s) that provides maintenance access for removal of accumulated floatable pollutants and sediment, removal of and replacement of filter cartridges, cleaning of the sump, and rinsing of the deck. Access shall have a minimum clear vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.
- 2.1.6 Bend Structure The device shall be able to be used as a bend structure with minimum angles between inlet and outlet pipes of 90-degrees or less in the stormwater conveyance system.
- 2.1.7 Double-Wall Containment of Hydrocarbons The cylindrical precast concrete device shall provide double-wall containment for hydrocarbon spill capture by a combined means of an inner wall of fiberglass, to a minimum depth of 12 inches (305 mm) below the cartridge deck, and the precast vessel wall.
- 2.1.8 Baffle The filter device shall provide a baffle that extends from the underside of the cartridge deck to a minimum length equal to the length of the membrane filter elements. The baffle shall serve to protect the membrane filter elements from contamination by floatables and coarse sediment. The baffle shall be flexible and continuous in cylindrical configurations, and shall be a straight concrete or aluminum wall in rectangular configurations.
- 2.1.9 Sump The device shall include a minimum 24 inches (610 mm) of sump below the bottom of the cartridges for sediment accumulation, unless otherwise specified by the design engineer. Depths less than 24 inches may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be manufactured to a minimum live load of HS-20 truck loading or greater based on local regulatory specifications, unless otherwise modified or specified by the design engineer, and shall be watertight.

2.3 JOINTS All precast concrete manhole configuration joints shall use nitrile rubber gaskets and shall meet the requirements of ASTM C443, Specification C1619, Class D or engineer approved equal to ensure oil resistance. Mastic sealants or butyl tape are not an acceptable alternative.

2.4 GASKETS Only profile neoprene or nitrile rubber gaskets in accordance to CSA A257.3-M92 will be accepted. Mastic sealants, butyl tape or Con Seal CS-101 are not acceptable gasket materials.

2.5 FRAME AND COVER Frame and covers must be manufactured from cast-iron or other composite material tested to withstand H-20 or greater design loads, and as approved by the

local regulatory body. Frames and covers must be embossed with the name of the device manufacturer or the device brand name.

- 2.6 DOORS AND HATCHES If provided shall meet designated loading requirements or at a minimum for incidental vehicular traffic.
- 2.7 CONCRETE All concrete components shall be manufactured according to local specifications and shall meet the requirements of ASTM C 478.
- 2.8 FIBERGLASS The fiberglass portion of the filter device shall be constructed in accordance with the following standard: ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks.
- 2.9 STEPS Steps shall be constructed according to ASTM D4101 of copolymer polypropylene, and be driven into preformed or pre-drilled holes after the concrete has cured, installed to conform to applicable sections of state, provincial and municipal building codes, highway, municipal or local specifications for the construction of such devices.
- 2.10 INSPECTION All precast concrete sections shall be inspected to ensure that dimensions, appearance and quality of the product meet local municipal specifications and ASTM C 478.

PART 3 – PERFORMANCE

3.1 GENERAL

- 3.1.1 Verification – The stormwater quality filter must be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV).
- 3.1.2 Function - The stormwater quality filter treatment device shall function to remove pollutants by the following unit treatment processes; sedimentation, floatation, and membrane filtration.
- 3.1.3 Pollutants - The stormwater quality filter treatment device shall remove oil, debris, trash, coarse and fine particulates, particulate-bound pollutants, metals and nutrients from stormwater during runoff events.
- 3.1.4 Bypass - The stormwater quality filter treatment device shall typically utilize an external bypass to divert excessive flows. Internal bypass systems shall be equipped with a floatables baffle, and must avoid passage through the sump and/or cartridge filtration zone.
- 3.1.5 Treatment Flux Rate (Surface Loading Rate) – The stormwater quality filter treatment device shall treat 100% of the required water quality treatment flow based on a maximum design treatment flux rate (surface loading rate) across the membrane filter cartridges of 0.21 gpm/ft² (0.142 lps/m²).

3.2 FIELD TEST PERFORMANCE

At a minimum, the stormwater quality filter device shall have been field tested and verified with a minimum 25 TARP qualifying storm events and field monitoring shall have been conducted according to the TARP 2009 NJDEP TARP field test protocol, and have received NJCAT verification.

- 3.2.1 Suspended Solids Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median TSS removal efficiency of 85% and a minimum median SSC removal efficiency of 95%.
- 3.2.2 Runoff Volume – The stormwater quality filter treatment device shall be engineered, designed, and sized to treat a minimum of 90 percent of the annual runoff volume determined from use of a minimum 15-year rainfall data set.
- 3.2.3 Fine Particle Removal - The stormwater quality filter treatment device shall have demonstrated the ability to capture fine particles as indicated by a minimum median removal efficiency of 75% for the particle fraction less than 25 microns, an effluent d_{50} of 15 microns or lower for all monitored storm events.
- 3.2.4 Turbidity Reduction - The stormwater quality filter treatment device shall have demonstrated the ability to reduce the turbidity from influent from a range of 5 to 171 NTU to an effluent turbidity of 15 NTU or lower.
- 3.2.5 Nutrient (Total Phosphorus & Total Nitrogen) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Phosphorus removal of 55%, and a minimum median Total Nitrogen removal of 50%.
- 3.2.6 Metals (Total Zinc & Total Copper) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Zinc removal of 55%, and a minimum median Total Copper removal of 85%.

3.3 INSPECTION and MAINTENANCE

The stormwater quality filter device shall have the following features:

- 3.3.1 Durability of membranes are subject to good handling practices during inspection and maintenance (removal, rinsing, and reinsertion) events, and site specific conditions that may have heavier or lighter loading onto the cartridges, and pollutant variability that may impact the membrane structural integrity. Membrane maintenance and replacement shall be in accordance with manufacturer's recommendations.
- 3.3.2 Inspection which includes trash and floatables collection, sediment depth determination, and visible determination of backwash pool depth shall be easily conducted from grade (outside the structure).
- 3.3.3 Manual rinsing of the reusable filter cartridges shall promote restoration of the flow capacity and sediment capacity of the filter cartridges, extending cartridge service life.

- 3.3.4 The filter device shall have a minimum 12 inches (305 mm) of sediment storage depth, and a minimum of 12 inches between the top of the sediment storage and bottom of the filter cartridge tentacles, unless otherwise specified by the design engineer. Variances may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.
- 3.3.5 Sediment removal from the filter treatment device shall be able to be conducted using a standard maintenance truck and vacuum apparatus, and a minimum one point of entry to the sump that is unobstructed by filter cartridges.
- 3.3.6 Maintenance access shall have a minimum clear height that provides suitable vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.
- 3.3.7 Filter cartridges shall be able to be maintained without the requirement of additional lifting equipment.

PART 4 – EXECUTION

4.1 INSTALLATION

4.1.1 PRECAST DEVICE CONSTRUCTION SEQUENCE

The installation of a watertight precast concrete device should conform to ASTM C 891 and to any state highway, municipal or local specifications for the construction of manholes, whichever is more stringent. Selected sections of a general specification that are applicable are summarized below.

4.1.1.1 The watertight precast concrete device is installed in sections in the following sequence:

- aggregate base
- base slab
- treatment chamber and cartridge deck riser section(s)
- bypass section
- connect inlet and outlet pipes
- concrete riser section(s) and/or transition slab (if required)
- maintenance riser section(s) (if required)
- frame and access cover

4.1.2 The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the precast concrete manufacturer's recommendations.

4.1.3 Adjustment of the stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary to restore original condition and watertight seals. Once the stormwater quality treatment device has been constructed, any/all lift holes must be plugged watertight with mortar or non-shrink grout.

- 4.1.4 Inlet and Outlet Pipes Inlet and outlet pipes should be securely set into the device using approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight, and such that any pipe intrusion into the device does not impact the device functionality.
- 4.1.5 Frame and Cover Installation Adjustment units (e.g. grade rings) should be installed to set the frame and cover at the required elevation. The adjustment units should be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover should be set in a full bed of mortar at the elevation specified.

4.2 MAINTENANCE ACCESS WALL

In some instances the Maintenance Access Wall, if provided, shall require an extension attachment and sealing to the precast wall and cartridge deck at the job site, rather than at the precast facility. In this instance, installation of these components shall be performed according to instructions provided by the manufacturer.

4.3 FILTER CARTRIDGE INSTALLATION Filter cartridges shall be installed in the cartridge deck only after the construction site is fully stabilized and in accordance with the manufacturer's guidelines and recommendations. Contractor to contact the manufacturer to schedule cartridge delivery and review procedures/requirements to be completed to the device prior to installation of the cartridges and activation of the system.

PART 5 – QUALITY ASSURANCE

5.1 FILTER CARTRIDGE INSTALLATION Manufacturer shall coordinate delivery of filter cartridges and other internal components with contractor. Filter cartridges shall be delivered and installed complete after site is stabilized and unit is ready to accept cartridges. Unit is ready to accept cartridges after it has been cleaned out and any standing water, debris, and other materials have been removed. Contractor shall take appropriate action to protect the filter cartridge receptacles and filter cartridges from damage during construction, and in accordance with the manufacturer's recommendations and guidance. For systems with cartridges installed prior to full site stabilization and prior to system activation, the contractor can plug inlet and outlet pipes to prevent stormwater and other influent from entering the device. Plugs must be removed during the activation process.

5.2 INSPECTION AND MAINTENANCE

5.2.1 The manufacturer shall provide an Owner's Manual upon request.

5.2.2 After construction and installation, and during operation, the device shall be inspected and cleaned as necessary based on the manufacturer's recommended inspection and maintenance guidelines and the local regulatory agency/body.

5.3 REPLACEMENT FILTER CARTRIDGES When replacement membrane filter elements and/or other parts are required, only membrane filter elements and parts approved by the manufacturer for use with the stormwater quality filter device shall be installed.

END OF SECTION

JELLYFISH® FILTER - SPECIFICATIONS

GENERAL

- A. **WORK INCLUDED:** SPECIFIES REQUIREMENTS FOR CONSTRUCTION AND PERFORMANCE OF AN UNDERGROUND STORMWATER QUALITY, MEMBRANE FILTRATION, AND TREATMENT DEVICE THAT REMOVES POLLUTANTS FROM STORMWATER RUNOFF THROUGH THE UNIT OPERATIONS OF SEDIMENTATION, FLOATATION, AND MEMBRANE FILTRATION.
- B. **REFERENCE STANDARDS:**
 - ASTM C 891: SPECIFICATION FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES
 - ASTM C 478: SPECIFICATION FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS
 - ASTM C 990: SPECIFICATION FOR JOINTS FOR CONCRETE MANHOLES USING PREFORMED FLEXIBLE JOINT SEALANTS
 - ASTM D 4101: SPECIFICATION FOR COPOLYMER STEPS CONSTRUCTION
- C. **SHOP DRAWINGS:** SHOP DRAWINGS FOR THE STRUCTURE AND PERFORMANCE ARE TO BE SUBMITTED WITH EACH ORDER TO THE CONTRACTOR. CONTRACTOR SHALL FORWARD SHOP DRAWING SUBMITTAL TO THE CONSULTING ENGINEER FOR APPROVAL. SHOP DRAWINGS ARE TO DETAIL THE STRUCTURE PRECAST CONCRETE AND CALL OUT OR NOTE THE FIBERGLASS (FRP) INTERNALS/COMPONENTS.
- D. **PRODUCT SUBSTITUTIONS:** NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD. SUBMISSIONS FOR SUBSTITUTIONS REQUIRE REVIEW AND APPROVAL BY THE ENGINEER OF RECORD, FOR HYDRAULIC PERFORMANCE, IMPACT TO PROJECT DESIGNS, EQUIVALENT TREATMENT PERFORMANCE, AND ANY REQUIRED PROJECT PLAN AND REPORT (HYDROLOGY/HYDRAULIC, WATER QUALITY, STORMWATER POLLUTION) MODIFICATIONS THAT WOULD BE REQUIRED BY THE APPROVING JURISDICTIONS/AGENCIES. CONTRACTOR TO COORDINATE WITH THE ENGINEER OF RECORD ANY APPLICABLE MODIFICATIONS TO THE PROJECT ESTIMATES OF COST, BONDING AMOUNT DETERMINATIONS, PLAN CHECK FEES FOR CHANGES TO APPROVED DOCUMENTS, AND/OR ANY OTHER REGULATORY REQUIREMENTS RESULTING FROM THE PRODUCT SUBSTITUTION.
- E. **HANDLING AND STORAGE:** PREVENT DAMAGE TO MATERIALS DURING STORAGE AND HANDLING.

PRODUCTS

- A. THE DEVICE SHALL BE A CYLINDRICAL OR RECTANGULAR, ALL CONCRETE STRUCTURE (INCLUDING RISERS), CONSTRUCTED FROM PRECAST CONCRETE RISER AND SLAB COMPONENTS OR MONOLITHIC PRECAST STRUCTURE(S), INSTALLED TO CONFORM TO ASTM C 891 AND TO ANY REQUIRED STATE HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS; WHICHEVER IS MORE STRINGENT. THE DEVICE SHALL BE WATERTIGHT.
- B. THE CYLINDRICAL CONCRETE DEVICE SHALL INCLUDE A FIBERGLASS CARTRIDGE DECK INSERT. THE RECTANGULAR CONCRETE DEVICE SHALL INCLUDE A COATED ALUMINUM INSERT. IN EITHER INSTANCE, THE INSERT SHALL BE BOLTED AND SEALED WATERTIGHT INSIDE THE PRECAST CONCRETE CHAMBER. THE INSERT SHALL SERVE AS: (A) A HORIZONTAL DIVIDER BETWEEN THE LOWER TREATMENT ZONE AND THE UPPER TREATED EFFLUENT ZONE; (B) A DECK FOR ATTACHMENT OF FILTER CARTRIDGES SUCH THAT THE MEMBRANE FILTER ELEMENTS OF EACH CARTRIDGE EXTEND INTO THE LOWER TREATMENT ZONE; (C) A PLATFORM FOR MAINTENANCE WORKERS TO SERVICE THE FILTER CARTRIDGES (MAXIMUM MANNED WEIGHT = 450 POUNDS); (D) A CONDUIT FOR CONVEYANCE OF TREATED WATER TO THE EFFLUENT PIPE.
- C. MEMBRANE FILTER CARTRIDGES SHALL BE COMPRISED OF REUSABLE CYLINDRICAL MEMBRANE FILTER ELEMENTS CONNECTED TO A PERFORATED HEAD PLATE. THE NUMBER OF MEMBRANE FILTER ELEMENTS PER CARTRIDGE SHALL BE A MINIMUM OF ELEVEN 2.75-INCH (70-MM) OR GREATER DIAMETER ELEMENTS. THE LENGTH OF EACH FILTER ELEMENT SHALL BE A MINIMUM 15 INCHES (381 MM). EACH CARTRIDGE SHALL BE FITTED INTO THE CARTRIDGE DECK BY INSERTION INTO A CARTRIDGE RECEPTACLE THAT IS PERMANENTLY MOUNTED INTO THE CARTRIDGE DECK. EACH CARTRIDGE SHALL BE SECURED BY A CARTRIDGE LID THAT IS THREADED ONTO THE RECEPTACLE, OR SIMILAR MECHANISM TO SECURE THE CARTRIDGE INTO THE DECK. THE MAXIMUM TREATMENT FLOW RATE OF A FILTER CARTRIDGE SHALL BE CONTROLLED BY AN ORIFICE IN THE CARTRIDGE LID, OR ON THE INDIVIDUAL CARTRIDGE ITSELF, AND BASED ON A DESIGN FLUX RATE (SURFACE LOADING RATE) DETERMINED BY THE MAXIMUM TREATMENT FLOW RATE PER UNIT OF FILTRATION MEMBRANE SURFACE AREA. THE MAXIMUM FLUX RATE SHALL BE 0.21 GPM/FT² (0.142 LPS/M²). EACH MEMBRANE FILTER CARTRIDGE SHALL ALLOW FOR MANUAL INSTALLATION AND REMOVAL.
- D. ALL FILTER CARTRIDGES AND MEMBRANES SHALL BE REUSABLE AND ALLOW FOR THE USE OF FILTRATION MEMBRANE RINSING PROCEDURES TO RESTORE FLOW CAPACITY AND SEDIMENT CAPACITY; EXTENDING CARTRIDGE SERVICE LIFE.
- E. ACCESS SHALL HAVE A MINIMUM CLEAR HEIGHT OF 60" OVER ALL OF THE FILTER CARTRIDGES, OR BE ACCESSIBLE BY A HATCH OR OTHER MECHANISM THAT PROVIDES MINIMUM 60" VERTICAL CLEAR SPACE OVER ALL OF THE FILTER CARTRIDGES. FILTER CARTRIDGES SHALL BE ABLE TO BE LIFTED STRAIGHT VERTICALLY OUT OF THE RECEPTACLES AND DECK FOR THE ENTIRE LENGTH OF THE CARTRIDGE.
- F. THE DEVICE SHALL INCLUDE A MINIMUM 24 INCHES (610 MM) OF SUMP BELOW THE BOTTOM OF THE CARTRIDGES FOR SEDIMENT ACCUMULATION, UNLESS OTHERWISE SPECIFIED BY THE DESIGN ENGINEER. DEPTHS LESS THAN 24" MAY HAVE AN IMPACT ON THE TOTAL PERFORMANCE AND/OR LONGEVITY BETWEEN CARTRIDGE MAINTENANCE/REPLACEMENT OF THE DEVICE.
- G. ALL PRECAST CONCRETE COMPONENTS SHALL BE MANUFACTURED TO A MINIMUM LIVE LOAD OF HS-20 TRUCK LOADING OR GREATER BASED ON LOCAL REGULATORY SPECIFICATIONS, UNLESS OTHERWISE MODIFIED OR SPECIFIED BY THE DESIGN ENGINEER, AND SHALL BE WATERTIGHT.
- H. GASKETS AND/OR SEALANTS TO PROVIDE WATER TIGHT SEAL BETWEEN CONCRETE JOINTS. JOINTS SHALL BE SEALED WITH PREFORMED JOINT SEALING COMPOUND CONFORMING TO ASTM C 990.
- I. FRAME AND COVERS MUST BE MANUFACTURED FROM CAST-IRON OR OTHER COMPOSITE MATERIAL TESTED TO WITHSTAND H-20 OR GREATER DESIGN LOADS, AND AS APPROVED BY THE LOCAL REGULATORY BODY. FRAMES AND COVERS MUST BE EMBOSSED WITH THE NAME OF THE DEVICE MANUFACTURER OR THE DEVICE BRAND NAME.
- J. DOOR AND HATCHES, IF PROVIDED SHALL MEET DESIGNATED LOADING REQUIREMENTS OR AT A MINIMUM FOR INCIDENTAL VEHICULAR TRAFFIC.
- K. ALL CONCRETE COMPONENTS SHALL BE MANUFACTURED ACCORDING TO LOCAL SPECIFICATIONS AND SHALL MEET THE REQUIREMENTS OF ASTM C 478.
- L. THE FIBERGLASS PORTION OF THE FILTER DEVICE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE FOLLOWING STANDARD: ASTM D-4097: CONTACT MOLDED GLASS FIBER REINFORCED CHEMICAL RESISTANT TANKS.
- M. STEPS SHALL BE CONSTRUCTED ACCORDING TO ASTM D4101 OF COPOLYMER POLYPROPYLENE, AND BE DRIVEN INTO PREFORMED OR PRE-DRILLED HOLES AFTER THE CONCRETE HAS CURED, INSTALLED TO CONFORM TO APPLICABLE SECTIONS OF STATE, PROVINCIAL AND MUNICIPAL BUILDING CODES, HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS FOR THE CONSTRUCTION OF SUCH DEVICES.
- N. ALL PRECAST CONCRETE SECTIONS SHALL BE INSPECTED TO ENSURE THAT DIMENSIONS, APPEARANCE AND QUALITY OF THE PRODUCT MEET LOCAL MUNICIPAL SPECIFICATIONS AND ASTM C 478.

PERFORMANCE

- A. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL FUNCTION TO REMOVE POLLUTANTS BY THE FOLLOWING UNIT TREATMENT PROCESSES; SEDIMENTATION, FLOATATION, AND MEMBRANE FILTRATION.
- B. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL REMOVE OIL, DEBRIS, TRASH, COARSE AND FINE PARTICULATES, PARTICULATE-BOUND POLLUTANTS, METALS AND NUTRIENTS FROM STORMWATER DURING RUNOFF EVENTS.
- C. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL TYPICALLY UTILIZE AN EXTERNAL BYPASS TO DIVERT EXCESSIVE FLOWS. INTERNAL BYPASS SYSTEMS SHALL BE EQUIPPED WITH A FLOATABLES BAFFLE, AND MUST PASS WATER OVER THE CARTRIDGE DECK, AND AVOID PASSAGE THROUGH THE SUMP AND/OR CARTRIDGE FILTRATION ZONE.
- D. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL TREAT 100% OF THE REQUIRED WATER QUALITY TREATMENT FLOW BASED ON A MAXIMUM TREATMENT FLUX RATE (SURFACE LOADING RATE) ACROSS THE MEMBRANE FILTER CARTRIDGES NOT TO EXCEED 0.21 GPM/FT² (0.142 LPS/M²).
- E. AT A MINIMUM, THE STORMWATER QUALITY FILTER DEVICE SHALL HAVE BEEN FIELD TESTED AND VERIFIED WITH A MINIMUM 25 QUALIFYING STORM EVENTS AND FIELD MONITORING CONDUCTED ACCORDING TO THE TARP TIER II OR TAPE FIELD TEST PROTOCOL, AND HAVE RECEIVED NJCAT VERIFICATION.
- F. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TSS REMOVAL EFFICIENCY OF 85% AND A MINIMUM MEDIAN SSC REMOVAL EFFICIENCY OF 95%.
- G. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED THE ABILITY TO CAPTURE FINE PARTICLES AS INDICATED BY A MINIMUM MEDIAN REMOVAL EFFICIENCY OF 75% FOR THE PARTICLE FRACTION LESS THAN 25 MICRONS, AN EFFLUENT D50 OF 15 MICRONS OR LOWER FOR ALL MONITORED STORM EVENTS, AND AN EFFLUENT TURBIDITY OF 15 NTUS OR LOWER.
- H. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TOTAL PHOSPHORUS REMOVAL OF 55%, AND A MINIMUM MEDIAN TOTAL NITROGEN REMOVAL OF 50%.
- I. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TOTAL ZINC REMOVAL OF 50%, AND A MINIMUM MEDIAN TOTAL COPPER REMOVAL OF 75%.

INSPECTION AND MAINTENANCE

- A. DURABILITY OF MEMBRANES ARE SUBJECT TO GOOD HANDLING PRACTICES DURING INSPECTION AND MAINTENANCE (REMOVAL, RINSING, AND REINSERTION) EVENTS, AND SITE SPECIFIC CONDITIONS THAT MAY HAVE HEAVIER OR LIGHTER LOADING ONTO THE CARTRIDGES, AND POLLUTANT VARIABILITY THAT MAY IMPACT THE MEMBRANE STRUCTURAL INTEGRITY. MEMBRANE MAINTENANCE AND REPLACEMENT SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- B. INSPECTION WHICH INCLUDES TRASH AND FLOATABLES COLLECTION, SEDIMENT DEPTH DETERMINATION, AND VISIBLE DETERMINATION OF BACKWASH POOL DEPTH SHALL BE EASILY CONDUCTED FROM GRADE (OUTSIDE THE STRUCTURE).
- C. MANUAL RINSING OF THE REUSABLE FILTER CARTRIDGES SHALL PROMOTE RESTORATION OF THE FLOW CAPACITY AND SEDIMENT CAPACITY OF THE FILTER CARTRIDGES, EXTENDING CARTRIDGE SERVICE LIFE.
- D. SEDIMENT REMOVAL FROM THE FILTER TREATMENT DEVICE SHALL BE ABLE TO BE CONDUCTED USING A STANDARD MAINTENANCE TRUCK AND VACUUM APPARATUS, AND A MINIMUM ONE POINT OF ENTRY TO THE SUMP THAT IS UNOBSTRUCTED BY FILTER CARTRIDGES.
- E. MAINTENANCE ACCESS SHALL HAVE A MINIMUM CLEAR HEIGHT OF 60" OVER ALL OF THE FILTER CARTRIDGES, OR BE ACCESSIBLE BY A HATCH OR OTHER MECHANISM THAT PROVIDES MINIMUM 60" VERTICAL CLEAR SPACE OVER ALL OF THE FILTER CARTRIDGES. FILTER CARTRIDGES SHALL BE ABLE TO BE LIFTED STRAIGHT VERTICALLY OUT OF THE RECEPTACLES AND DECK FOR THE ENTIRE LENGTH OF THE CARTRIDGE.
- F. FILTER CARTRIDGES SHALL BE ABLE TO BE MAINTAINED WITHOUT THE USE OF ADDITIONAL LIFTING EQUIPMENT.

EXECUTION

- A. THE INSTALLATION OF A WATERTIGHT PRECAST CONCRETE DEVICE SHOULD CONFORM TO ASTM C 891 AND TO ANY STATE HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS FOR THE CONSTRUCTION OF MANHOLES, WHICHEVER IS MORE STRINGENT. SELECTED SECTIONS OF A GENERAL SPECIFICATION THAT ARE APPLICABLE ARE SUMMARIZED BELOW.
- B. THE WATERTIGHT PRECAST CONCRETE DEVICE IS INSTALLED IN SECTIONS IN THE FOLLOWING SEQUENCE:
 - AGGREGATE BASE
 - BASE SLAB
 - TREATMENT CHAMBER AND CARTRIDGE DECK RISER SECTION(S)
 - BYPASS SECTION
 - CONNECT INLET AND OUTLET PIPES
 - CONCRETE RISER SECTION(S) AND/OR TRANSITION SLAB (IF REQUIRED)
 - MAINTENANCE RISER SECTION(S) (IF REQUIRED)
 - FRAME AND ACCESS COVER
- C. INLET AND OUTLET PIPES SHOULD BE SECURELY SET INTO THE DEVICE USING APPROVED PIPE SEALS (FLEXIBLE BOOT CONNECTIONS, WHERE APPLICABLE) SO THAT THE STRUCTURE IS WATERTIGHT, AND SUCH THAT ANY PIPE INTRUSION INTO THE DEVICE DOES NOT IMPACT THE DEVICE FUNCTIONALITY.
- D. ADJUSTMENT UNITS (E.G. GRADE RINGS) SHOULD BE INSTALLED TO SET THE FRAME AND COVER AT THE REQUIRED ELEVATION. THE ADJUSTMENT UNITS SHOULD BE LAID IN A FULL BED OF MORTAR WITH SUCCESSIVE UNITS BEING JOINED USING SEALANT RECOMMENDED BY THE MANUFACTURER. FRAMES FOR THE COVER SHOULD BE SET IN A FULL BED OF MORTAR AT THE ELEVATION SPECIFIED.
- E. IN SOME INSTANCES THE MAINTENANCE ACCESS WALL, IF PROVIDED, SHALL REQUIRE AN EXTENSION ATTACHMENT AND SEALING TO THE PRECAST WALL AND CARTRIDGE DECK AT THE JOB SITE, RATHER THAN AT THE PRECAST FACILITY. IN THIS INSTANCE, INSTALLATION OF THESE COMPONENTS SHALL BE PERFORMED ACCORDING TO INSTRUCTIONS PROVIDED BY THE MANUFACTURER.
- F. FILTER CARTRIDGES SHALL BE INSTALLED IN THE CARTRIDGE DECK AFTER THE CONSTRUCTION SITE IS FULLY STABILIZED AND IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES AND RECOMMENDATIONS. CONTRACTOR TO CONTACT THE MANUFACTURER TO SCHEDULE CARTRIDGE DELIVERY AND REVIEW PROCEDURES/REQUIREMENTS TO BE COMPLETED TO THE DEVICE PRIOR TO INSTALLATION OF THE CARTRIDGES AND ACTIVATION OF THE SYSTEM.
- G. MANUFACTURER SHALL COORDINATE DELIVERY OF FILTER CARTRIDGES AND OTHER INTERNAL COMPONENTS WITH CONTRACTOR. FILTER CARTRIDGES SHALL BE DELIVERED AND INSTALLED COMPLETE AFTER SITE IS STABILIZED AND UNIT IS READY TO ACCEPT CARTRIDGES. UNIT IS READY TO ACCEPT CARTRIDGES AFTER IS HAS BEEN CLEANED OUT AND ANY STANDING WATER, DEBRIS, AND OTHER MATERIALS HAVE BEEN REMOVED. CONTRACTOR SHALL TAKE APPROPRIATE ACTION TO PROTECT THE FILTER CARTRIDGE RECEPTACLES AND FILTER CARTRIDGES FROM DAMAGE DURING CONSTRUCTION, AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND GUIDANCE. FOR SYSTEMS WITH CARTRIDGES INSTALLED PRIOR TO FULL SITE STABILIZATION AND PRIOR TO SYSTEM ACTIVATION, THE CONTRACTOR CAN PLUG INLET AND OUTLET PIPES TO PREVENT STORMWATER AND OTHER INFLUENT FROM ENTERING THE DEVICE. PLUGS MUST BE REMOVED DURING THE ACTIVATION PROCESS.
- H. THE MANUFACTURER SHALL PROVIDE AN OWNER'S MANUAL UPON REQUEST.
- I. AFTER CONSTRUCTION AND INSTALLATION, AND DURING OPERATION, THE DEVICE SHALL BE INSPECTED AND CLEANED AS NECESSARY BASED ON THE MANUFACTURER'S RECOMMENDED INSPECTION AND MAINTENANCE GUIDELINES AND THE LOCAL REGULATORY AGENCY/BODY.
- J. WHEN REPLACEMENT MEMBRANE FILTER ELEMENTS AND/OR OTHER PARTS ARE REQUIRED, ONLY MEMBRANE FILTER ELEMENTS AND PARTS APPROVED BY THE MANUFACTURER FOR USE WITH THE STORMWATER QUALITY FILTER DEVICE SHALL BE INSTALLED.

END OF SECTION

The design and information shown on this drawing is provided as a service to the project owner, engineer, contractor, and others. It is not to be used, copied, reproduced, or modified in any manner without the prior written consent of Imbrium. Failure to comply with the terms of this agreement may result in Imbrium disclaiming any liability or responsibility for such use. If discrepancies between the supplied information upon which this drawing is based and the actual conditions are encountered as site work progresses, these discrepancies must be reported to Imbrium immediately for re-evaluation of the design. Imbrium accepts no responsibility for any errors, omissions, or inaccuracies in the information supplied by others.

#	#	#	#	BSF	BY
#	#	#	#	INITIAL RELEASE	REVISION DESCRIPTION
#	#	#	#	10/01/2014	DATE
#	#	#	#	0	MARK

JELLYFISH FILTER SPECIFICATIONS



JF8 STANDARD
Scale = 1:50

www.imbriumstructures.com
info@imbriumstructures.com



7037 Ridge Road, Suite 350, Hanover, MD 21076
USA 888-279-9826 CA 800-952-4801 INTL +1-410-960-9900

Jellyfish® Filter
A DIVISION OF IMBRIUM STRUCTURES, INC.
12345 MARKET STREET, SUITE 100, HANOVER, MD 21076
REGISTERED TRADEMARK © 2014 IMBRIUM STRUCTURES, INC.

DATE: #####	
DESIGNED: BSF	DRAWN: BSF
CHECKED: BSF	APPROVED: SP
PROJECT #: #####	PROJECT NAME: #####
SHEET: 2 OF 2	

JELLYFISH® FILTER - SPECIFICATIONS

GENERAL

- A. **WORK INCLUDED:** SPECIFIES REQUIREMENTS FOR CONSTRUCTION AND PERFORMANCE OF AN UNDERGROUND STORMWATER QUALITY, MEMBRANE FILTRATION, AND TREATMENT DEVICE THAT REMOVES POLLUTANTS FROM STORMWATER RUNOFF THROUGH THE UNIT OPERATIONS OF SEDIMENTATION, FLOATATION, AND MEMBRANE FILTRATION.
- B. **REFERENCE STANDARDS:**
 ASTM C 891: SPECIFICATION FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES
 ASTM C 478: SPECIFICATION FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS
 ASTM C 990: SPECIFICATION FOR JOINTS FOR CONCRETE MANHOLES USING PREFORMED FLEXIBLE JOINT SEALANTS
 ASTM D 4101: SPECIFICATION FOR COPOLYMER STEPS CONSTRUCTION
- C. **SHOP DRAWINGS:** SHOP DRAWINGS FOR THE STRUCTURE AND PERFORMANCE ARE TO BE SUBMITTED WITH EACH ORDER TO THE CONTRACTOR. CONTRACTOR SHALL FORWARD SHOP DRAWING SUBMITTAL TO THE CONSULTING ENGINEER FOR APPROVAL. SHOP DRAWINGS ARE TO DETAIL THE STRUCTURE PRECAST CONCRETE AND CALL OUT OR NOTE THE FIBERGLASS (FRP) INTERNALS/COMPONENTS.
- D. **PRODUCT SUBSTITUTIONS:** NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD. SUBMISSIONS FOR SUBSTITUTIONS REQUIRE REVIEW AND APPROVAL BY THE ENGINEER OF RECORD, FOR HYDRAULIC PERFORMANCE, IMPACT TO PROJECT DESIGNS, EQUIVALENT TREATMENT PERFORMANCE, AND ANY REQUIRED PROJECT PLAN AND REPORT (HYDROLOGY/HYDRAULIC, WATER QUALITY, STORMWATER POLLUTION) MODIFICATIONS THAT WOULD BE REQUIRED BY THE APPROVING JURISDICTIONS/AGENCIES. CONTRACTOR TO COORDINATE WITH THE ENGINEER OF RECORD ANY APPLICABLE MODIFICATIONS TO THE PROJECT ESTIMATES OF COST, BONDING AMOUNT DETERMINATIONS, PLAN CHECK FEES FOR CHANGES TO APPROVED DOCUMENTS, AND/OR ANY OTHER REGULATORY REQUIREMENTS RESULTING FROM THE PRODUCT SUBSTITUTION.
- E. **HANDLING AND STORAGE:** PREVENT DAMAGE TO MATERIALS DURING STORAGE AND HANDLING.

PRODUCTS

- A. THE DEVICE SHALL BE A CYLINDRICAL OR RECTANGULAR, ALL CONCRETE STRUCTURE (INCLUDING RISERS), CONSTRUCTED FROM PRECAST CONCRETE RISER AND SLAB COMPONENTS OR MONOLITHIC PRECAST STRUCTURE(S), INSTALLED TO CONFORM TO ASTM C 891 AND TO ANY REQUIRED STATE HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS, WHICHEVER IS MORE STRINGENT. THE DEVICE SHALL BE WATERTIGHT.
- B. THE CYLINDRICAL CONCRETE DEVICE SHALL INCLUDE A FIBERGLASS CARTRIDGE DECK INSERT. THE RECTANGULAR CONCRETE DEVICE SHALL INCLUDE A COATED ALUMINUM INSERT. IN EITHER INSTANCE, THE INSERT SHALL BE BOLTED AND SEALED WATERTIGHT INSIDE THE PRECAST CONCRETE CHAMBER. THE INSERT SHALL SERVE AS: (A) A HORIZONTAL DIVIDER BETWEEN THE LOWER TREATMENT ZONE AND THE UPPER TREATED EFFLUENT ZONE; (B) A DECK FOR ATTACHMENT OF FILTER CARTRIDGES SUCH THAT THE MEMBRANE FILTER ELEMENTS OF EACH CARTRIDGE EXTEND INTO THE LOWER TREATMENT ZONE; (C) A PLATFORM FOR MAINTENANCE WORKERS TO SERVICE THE FILTER CARTRIDGES (MAXIMUM MANNED WEIGHT = 450 POUNDS); (D) A CONDUIT FOR CONVEYANCE OF TREATED WATER TO THE EFFLUENT PIPE.
- C. MEMBRANE FILTER CARTRIDGES SHALL BE COMPRISED OF REUSABLE CYLINDRICAL MEMBRANE FILTER ELEMENTS CONNECTED TO A PERFORATED HEAD PLATE. THE NUMBER OF MEMBRANE FILTER ELEMENTS PER CARTRIDGE SHALL BE A MINIMUM OF ELEVEN 2.75-INCH (70-MM) OR GREATER DIAMETER ELEMENTS. THE LENGTH OF EACH FILTER ELEMENT SHALL BE A MINIMUM 15 INCHES (381 MM). EACH CARTRIDGE SHALL BE FITTED INTO THE CARTRIDGE DECK BY INSERTION INTO A CARTRIDGE RECEPTACLE THAT IS PERMANENTLY MOUNTED INTO THE CARTRIDGE DECK. EACH CARTRIDGE SHALL BE SECURED BY A CARTRIDGE LID THAT IS THREADED ONTO THE RECEPTACLE, OR SIMILAR MECHANISM TO SECURE THE CARTRIDGE INTO THE DECK. THE MAXIMUM TREATMENT FLOW RATE OF A FILTER CARTRIDGE SHALL BE CONTROLLED BY AN ORIFICE IN THE CARTRIDGE LID, OR ON THE INDIVIDUAL CARTRIDGE ITSELF, AND BASED ON A DESIGN FLUX RATE (SURFACE LOADING RATE) DETERMINED BY THE MAXIMUM TREATMENT FLOW RATE PER UNIT OF FILTRATION MEMBRANE SURFACE AREA. THE MAXIMUM FLUX RATE SHALL BE 0.21 GPM/FT2 (0.142 LPS/M2). EACH MEMBRANE FILTER CARTRIDGE SHALL ALLOW FOR MANUAL INSTALLATION AND REMOVAL.
- D. ALL FILTER CARTRIDGES AND MEMBRANES SHALL BE REUSABLE AND ALLOW FOR THE USE OF FILTRATION MEMBRANE RINSING PROCEDURES TO RESTORE FLOW CAPACITY AND SEDIMENT CAPACITY, EXTENDING CARTRIDGE SERVICE LIFE.
- E. ACCESS SHALL HAVE A MINIMUM CLEAR HEIGHT OF 60" OVER ALL OF THE FILTER CARTRIDGES, OR BE ACCESSIBLE BY A HATCH OR OTHER MECHANISM THAT PROVIDES MINIMUM 60" VERTICAL CLEAR SPACE OVER ALL OF THE FILTER CARTRIDGES. FILTER CARTRIDGES SHALL BE ABLE TO BE LIFTED STRAIGHT VERTICALLY OUT OF THE RECEPTACLES AND DECK FOR THE ENTIRE LENGTH OF THE CARTRIDGE.
- F. THE DEVICE SHALL INCLUDE A MINIMUM 24 INCHES (610 MM) OF SUMP BELOW THE BOTTOM OF THE CARTRIDGES FOR SEDIMENT ACCUMULATION, UNLESS OTHERWISE SPECIFIED BY THE DESIGN ENGINEER. DEPTHS LESS THAN 24" MAY HAVE AN IMPACT ON THE TOTAL PERFORMANCE AND/OR LONGEVITY BETWEEN CARTRIDGE MAINTENANCE/REPLACEMENT OF THE DEVICE.
- G. ALL PRECAST CONCRETE COMPONENTS SHALL BE MANUFACTURED TO A MINIMUM LIVE LOAD OF HS-20 TRUCK LOADING OR GREATER BASED ON LOCAL REGULATORY SPECIFICATIONS, UNLESS OTHERWISE MODIFIED OR SPECIFIED BY THE DESIGN ENGINEER, AND SHALL BE WATERTIGHT.
- H. GASKETS AND/OR SEALANTS TO PROVIDE WATER TIGHT SEAL BETWEEN CONCRETE JOINTS. JOINTS SHALL BE SEALED WITH PREFORMED JOINT SEALING COMPOUND CONFORMING TO ASTM C 990.
- I. FRAME AND COVERS MUST BE MANUFACTURED FROM CAST-IRON OR OTHER COMPOSITE MATERIAL TESTED TO WITHSTAND H-20 OR GREATER DESIGN LOADS, AND AS APPROVED BY THE LOCAL REGULATORY BODY. FRAMES AND COVERS MUST BE EMBOSSED WITH THE NAME OF THE DEVICE MANUFACTURER OR THE DEVICE BRAND NAME.
- J. DOOR AND HATCHES, IF PROVIDED SHALL MEET DESIGNATED LOADING REQUIREMENTS OR AT A MINIMUM FOR INCIDENTAL VEHICULAR TRAFFIC.
- K. ALL CONCRETE COMPONENTS SHALL BE MANUFACTURED ACCORDING TO LOCAL SPECIFICATIONS AND SHALL MEET THE REQUIREMENTS OF ASTM C 478.
- L. THE FIBERGLASS PORTION OF THE FILTER DEVICE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE FOLLOWING STANDARD: ASTM D-4097: CONTACT MOLDED GLASS FIBER REINFORCED CHEMICAL RESISTANT TANKS.
- M. STEPS SHALL BE CONSTRUCTED ACCORDING TO ASTM D4101 OF COPOLYMER POLYPROPYLENE, AND BE DRIVEN INTO PREFORMED OR PRE-DRILLED HOLES AFTER THE CONCRETE HAS CURED, INSTALLED TO CONFORM TO APPLICABLE SECTIONS OF STATE, PROVINCIAL AND MUNICIPAL BUILDING CODES, HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS FOR THE CONSTRUCTION OF SUCH DEVICES.
- N. ALL PRECAST CONCRETE SECTIONS SHALL BE INSPECTED TO ENSURE THAT DIMENSIONS, APPEARANCE AND QUALITY OF THE PRODUCT MEET LOCAL MUNICIPAL SPECIFICATIONS AND ASTM C 478.

PERFORMANCE

- A. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL FUNCTION TO REMOVE POLLUTANTS BY THE FOLLOWING UNIT TREATMENT PROCESSES: SEDIMENTATION, FLOATATION, AND MEMBRANE FILTRATION.
- B. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL REMOVE OIL, DEBRIS, TRASH, COARSE AND FINE PARTICULATES, PARTICULATE-BOUND POLLUTANTS, METALS AND NUTRIENTS FROM STORMWATER DURING RUNOFF EVENTS.
- C. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL TYPICALLY UTILIZE AN EXTERNAL BYPASS TO DIVERT EXCESSIVE FLOWS. INTERNAL BYPASS SYSTEMS SHALL BE EQUIPPED WITH A FLOATABLES BAFFLE, AND MUST PASS WATER OVER THE CARTRIDGE DECK, AND AVOID PASSAGE THROUGH THE SUMP AND/OR CARTRIDGE FILTRATION ZONE.
- D. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL TREAT 100% OF THE REQUIRED WATER QUALITY TREATMENT FLOW BASED ON A MAXIMUM TREATMENT FLUX RATE (SURFACE LOADING RATE) ACROSS THE MEMBRANE FILTER CARTRIDGES NOT TO EXCEED 0.21 GPM/FT2 (0.142 LPS/M2).
- E. AT A MINIMUM, THE STORMWATER QUALITY FILTER DEVICE SHALL HAVE BEEN FIELD TESTED AND VERIFIED WITH A MINIMUM 25 QUALIFYING STORM EVENTS AND FIELD MONITORING CONDUCTED ACCORDING TO THE TARP TIER II OR TAPE FIELD TEST PROTOCOL, AND HAVE RECEIVED NJCAT VERIFICATION.
- F. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TSS REMOVAL EFFICIENCY OF 85% AND A MINIMUM MEDIAN SSC REMOVAL EFFICIENCY OF 95%.
- G. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED THE ABILITY TO CAPTURE FINE PARTICLES AS INDICATED BY A MINIMUM MEDIAN REMOVAL EFFICIENCY OF 75% FOR THE PARTICLE FRACTION LESS THAN 25 MICRONS, AN EFFLUENT D50 OF 15 MICRONS OR LOWER FOR ALL MONITORED STORM EVENTS, AND AN EFFLUENT TURBIDITY OF 15 NTUS OR LOWER.
- H. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TOTAL PHOSPHORUS REMOVAL OF 55%, AND A MINIMUM MEDIAN TOTAL NITROGEN REMOVAL OF 50%.
- I. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TOTAL ZINC REMOVAL OF 50%, AND A MINIMUM MEDIAN TOTAL COPPER REMOVAL OF 75%.

INSPECTION AND MAINTENANCE

- A. DURABILITY OF MEMBRANES ARE SUBJECT TO GOOD HANDLING PRACTICES DURING INSPECTION AND MAINTENANCE (REMOVAL, RINSING, AND REINSERTION) EVENTS, AND SITE SPECIFIC CONDITIONS THAT MAY HAVE HEAVIER OR LIGHTER LOADING ONTO THE CARTRIDGES, AND POLLUTANT VARIABILITY THAT MAY IMPACT THE MEMBRANE STRUCTURAL INTEGRITY. MEMBRANE MAINTENANCE AND REPLACEMENT SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- B. INSPECTION WHICH INCLUDES TRASH AND FLOATABLES COLLECTION, SEDIMENT DEPTH DETERMINATION, AND VISIBLE DETERMINATION OF BACKWASH POOL DEPTH SHALL BE EASILY CONDUCTED FROM GRADE (OUTSIDE THE STRUCTURE).
- C. MANUAL RINSING OF THE REUSABLE FILTER CARTRIDGES SHALL PROMOTE RESTORATION OF THE FLOW CAPACITY AND SEDIMENT CAPACITY OF THE FILTER CARTRIDGES, EXTENDING CARTRIDGE SERVICE LIFE.
- D. SEDIMENT REMOVAL FROM THE FILTER TREATMENT DEVICE SHALL BE ABLE TO BE CONDUCTED USING A STANDARD MAINTENANCE TRUCK AND VACUUM APPARATUS, AND A MINIMUM ONE POINT OF ENTRY TO THE SUMP THAT IS UNOBSTRUCTED BY FILTER CARTRIDGES.
- E. MAINTENANCE ACCESS SHALL HAVE A MINIMUM CLEAR HEIGHT OF 60" OVER ALL OF THE FILTER CARTRIDGES, OR BE ACCESSIBLE BY A HATCH OR OTHER MECHANISM THAT PROVIDES MINIMUM 60" VERTICAL CLEAR SPACE OVER ALL OF THE FILTER CARTRIDGES. FILTER CARTRIDGES SHALL BE ABLE TO BE LIFTED STRAIGHT VERTICALLY OUT OF THE RECEPTACLES AND DECK FOR THE ENTIRE LENGTH OF THE CARTRIDGE.
- F. FILTER CARTRIDGES SHALL BE ABLE TO BE MAINTAINED WITHOUT THE USE OF ADDITIONAL LIFTING EQUIPMENT.

EXECUTION

- A. THE INSTALLATION OF A WATERTIGHT PRECAST CONCRETE DEVICE SHOULD CONFORM TO ASTM C 891 AND TO ANY STATE HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS FOR THE CONSTRUCTION OF MANHOLES, WHICHEVER IS MORE STRINGENT. SELECTED SECTIONS OF A GENERAL SPECIFICATION THAT ARE APPLICABLE ARE SUMMARIZED BELOW.
- B. THE WATERTIGHT PRECAST CONCRETE DEVICE IS INSTALLED IN SECTIONS IN THE FOLLOWING SEQUENCE:
 - AGGREGATE BASE
 - BASE SLAB
 - TREATMENT CHAMBER AND CARTRIDGE DECK RISER SECTION(S)
 - BYPASS SECTION
 - CONNECT INLET AND OUTLET PIPES
 - CONCRETE RISER SECTION(S) AND/OR TRANSITION SLAB (IF REQUIRED)
 - MAINTENANCE RISER SECTION(S) (IF REQUIRED)
 - FRAME AND ACCESS COVER
- C. INLET AND OUTLET PIPES SHOULD BE SECURELY SET INTO THE DEVICE USING APPROVED PIPE SEALS (FLEXIBLE BOOT CONNECTIONS, WHERE APPLICABLE) SO THAT THE STRUCTURE IS WATERTIGHT, AND SUCH THAT ANY PIPE INTRUSION INTO THE DEVICE DOES NOT IMPACT THE DEVICE FUNCTIONALITY.
- D. ADJUSTMENT UNITS (E.G. GRADE RINGS) SHOULD BE INSTALLED TO SET THE FRAME AND COVER AT THE REQUIRED ELEVATION. THE ADJUSTMENT UNITS SHOULD BE LAID IN A FULL BED OF MORTAR WITH SUCCESSIVE UNITS BEING JOINED USING SEALANT RECOMMENDED BY THE MANUFACTURER. FRAMES FOR THE COVER SHOULD BE SET IN A FULL BED OF MORTAR AT THE ELEVATION SPECIFIED.
- E. IN SOME INSTANCES THE MAINTENANCE ACCESS WALL, IF PROVIDED, SHALL REQUIRE AN EXTENSION ATTACHMENT AND SEALING TO THE PRECAST WALL AND CARTRIDGE DECK AT THE JOB SITE, RATHER THAN AT THE PRECAST FACILITY. IN THIS INSTANCE, INSTALLATION OF THESE COMPONENTS SHALL BE PERFORMED ACCORDING TO INSTRUCTIONS PROVIDED BY THE MANUFACTURER.
- F. FILTER CARTRIDGES SHALL BE INSTALLED IN THE CARTRIDGE DECK AFTER THE CONSTRUCTION SITE IS FULLY STABILIZED AND IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES AND RECOMMENDATIONS. CONTRACTOR TO CONTACT THE MANUFACTURER TO SCHEDULE CARTRIDGE DELIVERY AND REVIEW PROCEDURES/REQUIREMENTS TO BE COMPLETED TO THE DEVICE PRIOR TO INSTALLATION OF THE CARTRIDGES AND ACTIVATION OF THE SYSTEM.
- G. MANUFACTURER SHALL COORDINATE DELIVERY OF FILTER CARTRIDGES AND OTHER INTERNAL COMPONENTS WITH CONTRACTOR. FILTER CARTRIDGES SHALL BE DELIVERED AND INSTALLED COMPLETE AFTER SITE IS STABILIZED AND UNIT IS READY TO ACCEPT CARTRIDGES. UNIT IS READY TO ACCEPT CARTRIDGES AFTER IS HAS BEEN CLEANED OUT AND ANY STANDING WATER, DEBRIS, AND OTHER MATERIALS HAVE BEEN REMOVED. CONTRACTOR SHALL TAKE APPROPRIATE ACTION TO PROTECT THE FILTER CARTRIDGE RECEPTACLES AND FILTER CARTRIDGES FROM DAMAGE DURING CONSTRUCTION, AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND GUIDANCE. FOR SYSTEMS WITH CARTRIDGES INSTALLED PRIOR TO FULL SITE STABILIZATION AND PRIOR TO SYSTEM ACTIVATION, THE CONTRACTOR CAN PLUG INLET AND OUTLET PIPES TO PREVENT STORMWATER AND OTHER INFLUENT FROM ENTERING THE DEVICE. PLUGS MUST BE REMOVED DURING THE ACTIVATION PROCESS.
- H. THE MANUFACTURER SHALL PROVIDE AN OWNER'S MANUAL UPON REQUEST.
- I. AFTER CONSTRUCTION AND INSTALLATION, AND DURING OPERATION, THE DEVICE SHALL BE INSPECTED AND CLEANED AS NECESSARY BASED ON THE MANUFACTURER'S RECOMMENDED INSPECTION AND MAINTENANCE GUIDELINES AND THE LOCAL REGULATORY AGENCY/BODY.
- J. WHEN REPLACEMENT MEMBRANE FILTER ELEMENTS AND/OR OTHER PARTS ARE REQUIRED, ONLY MEMBRANE FILTER ELEMENTS AND PARTS APPROVED BY THE MANUFACTURER FOR USE WITH THE STORMWATER QUALITY FILTER DEVICE SHALL BE INSTALLED.

END OF SECTION

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Imbrium Systems ("Imbrium"). Imbrium does not warrant, represent, or guarantee the use, reproduction or modification in any manner without the prior written consent of Imbrium. Failure to comply with the terms and conditions of this agreement may result in any liability or responsibility for such use. If discrepancies between the supplied information upon which the design is based and the actual conditions are encountered as the work progresses, these discrepancies must be reported to Imbrium immediately for re-evaluation of the design. Imbrium accepts no responsibility for the accuracy, completeness or accuracy of information supplied by others.

#	#	#	#	#	BSF	BY
#	#	#	#	#	INITIAL RELEASE	REVISION DESCRIPTION
#	#	#	#	#	10/01/2014	DATE
#	#	#	#	#	0	MARK

JELLYFISH FILTER SPECIFICATIONS



JF10 STANDARD
Scale = 1:50

www.imbriumsystems.com
info@imbriumsystems.com



7037 Ridge Road, Suite 350, Hanover, MD 21076
USA 888-279-8826 CA 800-956-4801 INTL +1-415-960-9900

Jellyfish® Filter

FOLLOWING IS A SUMMARY OF THE INFORMATION CONTAINED ON THIS DRAWING. IT IS NOT INTENDED TO BE A COMPLETE AND EXHAUSTIVE LIST OF ALL INFORMATION CONTAINED ON THIS DRAWING. OTHER INFORMATION, MATERIALS, METHODS, AND PROCEDURES MAY BE REQUIRED FOR THE PROPER UNDERSTANDING AND USE OF THIS DRAWING.

DATE: #####	
DESIGNED: BSF	DRAWN: BSF
CHECKED: BSF	APPROVED: SP
PROJECT #: #####	PROJECT NAME: #####
SHEET: 2 OF 2	

STANDARD PERFORMANCE SPECIFICATION STORMWATER QUALITY – MEMBRANE FILTRATION TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground stormwater quality membrane filtration treatment device that removes pollutants from stormwater runoff through the unit operations of sedimentation, floatation, and membrane filtration.

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental Management – Environmental Technology Verification (ETV)

1.3 SUBMITTALS

- 1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.
- 1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: filtration surface area, treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.
- 1.3.3 Unless directed otherwise by the Engineer of Record, filtration treatment device product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 GENERAL

- 2.1.1 Maintenance Access to Captured Pollutants The filter device shall contain an opening(s) that provides maintenance access for removal of accumulated floatable pollutants and sediment, removal of and replacement of filter cartridges, cleaning of the sump, and rinsing of the internal components. Access shall have a minimum clear vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of their installed placement for the entire length of the cartridge.
- 2.1.2 Pollutant Storage: The Filter device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants.

PART 3 – PERFORMANCE

3.1 GENERAL

- 3.1.1 Verification – The stormwater quality filter treatment device shall have been field tested in accordance with either TARP Tier II Protocol (TARP, 2003) and New Jersey Tier II Stormwater Test Requirements – Amendments to TARP Tier II Protocol (NJDEP, 2009) or Washington State Technology Assessment Protocol – Ecology (TAPE), 2011 or later version. The field test shall have been verified in accordance with ISO 14034:2016 Environmental Management – Environmental Technology Verification (ETV). See Section 3.2 of this specification for field test performance requirements.

3.2 FIELD TEST PERFORMANCE

The field test (as specified in section 3.1.1) shall have monitored a minimum of twenty (20) TARP or TAPE qualifying storm events, and report at **minimum** the following results:

- 3.2.1 Suspended Solids Removal - The stormwater quality filter treatment device shall have ISO 14034 ETV verified load based median TSS removal efficiency of at least 85% and load based median SSC removal efficiency of at least 98%.
- 3.2.2 Runoff Volume – The stormwater quality filter treatment device shall be engineered, designed, and sized to treat a minimum of 90 percent of the annual runoff volume determined from use of a minimum 15-year rainfall data set.
- 3.2.3 Fine Particle Removal - The stormwater quality filter treatment device shall have demonstrated the ability to capture fine particles as indicated by a minimum median removal efficiency of 75% for the particle fraction less than 25 microns, and an effluent d_{50} of 15 microns or lower for all monitored storm events.
- 3.2.4 Turbidity Reduction - The stormwater quality filter treatment device shall have demonstrated the ability to reduce turbidity such that effluent turbidity is 15 NTU or lower.
- 3.2.5 Nutrients & Metals – The stormwater quality filter treatment device shall have ISO 14034 ETV Verified minimum load based removal efficiencies for the following:
- 3.2.5.1 Total Phosphorus (TP) Removal - Median TP removal efficiency of at least 49%.
- 3.2.5.2 Total Nitrogen (TN) Removal - Median TN removal efficiency of at least 39%.
- 3.2.5.3 Total Zinc (Zn) Removal - Median Zn removal efficiency of at least 69%.
- 3.2.5.4 Total Copper (Cu) Removal - Median Cu removal efficiency of at least 91%.

END OF SECTION

APPENDIX E

PHOSPHOROUS BUDGET CALCULATIONS

Existing Phosphorus Budget

Watershed **East Holland River**

Hwy 404 Culvert Outlet

Existing Site Conditions			
Land Cover	TP Loading (kg/ha/yr)	Area (ha)	TP Loading (kg/yr)
Cropland	0.36	4.86	1.75
Hay-Pasture	0.12		0.00
Sod Farm/Golf Course	0.24		0.00
High Intensity Dev. - Commercial/Industrial	1.82		0.00
High Intensity Dev. - Residential	1.32		0.00
Low Intensity Development	0.13		0.00
Quarry	0.08		0.00
Unpaved Road	0.83		0.00
Forest	0.10		0.00
Transitional	0.16		0.00
Wetland	0.10		0.00
Open Water	0.26		0.00
Total		4.86	1.75

Proposed Conditions Phosphorus Budget

Watershed **East Holland River** Hwy 404 Culvert Outlet

To: Hwy 404 Box Culvert				BMP #1			BMP #2			BMP #3		
Land Cover	TP Loading (kg/ha/yr)	Area (ha)	TP Loading (kg/yr)	BMP	TP Removal Rate (%)	TP Export (kg/yr)	BMP	TP Removal Rate (%)	TP Export (kg/yr)	BMP	TP Removal Rate (%)	TP Export (kg/yr)
Cropland	0.36		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Hay-Pasture	0.12		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Sod Farm/Golf Course	0.24		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
High Intensity Dev. - Commercial/Industrial	1.82	0.86	1.56	Vegetated Filter Strips / Stream Buffers	65%	0.55	None	0%	0.55	None	0%	0.55
High Intensity Dev. - Commercial/Industrial	1.82	3.61	6.57	Underground Storage	25%	4.93	Jellyfish Filter	77%	1.13	None	0%	1.13
High Intensity Dev. - Commercial/Industrial	1.82	0.39	0.70	Vegetated Filter Strips / Stream Buffers	65%	0.25	Underground Storage	25%	0.18	Jellyfish Filter	77%	0.04
Low Intensity Development	0.13		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Quarry	0.08		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Unpaved Road	0.83		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Forest	0.10		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Transitional	0.16		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Wetland	0.10		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Open Water	0.26		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Total		4.86	8.84							Total TP Export (kg/yr):		1.72

Existing Phosphorus Budget

Watershed **East Holland River**

Weslie Creek Outlet

Existing Site Conditions			
Land Cover	TP Loading (kg/ha/yr)	Area (ha)	TP Loading (kg/yr)
Cropland	0.36	5.05	1.82
Hay-Pasture	0.12		0.00
Sod Farm/Golf Course	0.24		0.00
High Intensity Dev. - Commercial/Industrial	1.82		0.00
High Intensity Dev. - Residential	1.32		0.00
Low Intensity Development	0.13		0.00
Quarry	0.08		0.00
Unpaved Road	0.83		0.00
Forest	0.10		0.00
Transitional	0.16		0.00
Wetland	0.10		0.00
Open Water	0.26		0.00
Total		5.05	1.82

Proposed Conditions Phosphorus Budget

Watershed **East Holland River** Weslie Creek Outlet

To: Hwy 404 Box Culvert				BMP #1			BMP #2			BMP #3		
Land Cover	TP Loading (kg/ha/yr)	Area (ha)	TP Loading (kg/yr)	BMP	TP Removal Rate (%)	TP Export (kg/yr)	BMP	TP Removal Rate (%)	TP Export (kg/yr)	BMP	TP Removal Rate (%)	TP Export (kg/yr)
Cropland	0.36	3.29	1.18	Underground Storage	25%	0.89	Jellyfish Filter	77%	0.20	None	0%	0.20
Hay-Pasture	0.12		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Sod Farm/Golf Course	0.24		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Paved Surface (Treated)	2.73	1.48	4.04	Underground Storage	25%	3.03	Jellyfish Filter	77%	0.70	None	0%	0.70
Landscape Area (Untreated)	2.73	0.28	0.76	None	0%	0.76	None	0%	0.76	None	0%	0.76
Low Intensity Development	0.13		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Quarry	0.08		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Unpaved Road	0.83		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Forest	0.10		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Transitional	0.16		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Wetland	0.10		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Open Water	0.26		0.00	None	0%	0.00	None	0%	0.00	None	0%	0.00
Total		5.05	5.98									Total TP Export (kg/yr): 1.66

APPENDIX F

WATER DISTRIBUTION ANALYSIS

**INDUSTRIAL WATER USAGE
 CALCULATION SHEET**

Other Uses

	Area (ha)	Avg Daily Demand (m ³ /ha/d)	Unit	Avg. Day (L/d)
Industrial	4.86	28	-	136,080
Other Use Avg. Day (L/d)				136,080
Avg. day (L/s)				2
<i>Peak flows</i>				
	<i>f</i>			
Min. hour (L/hr)	-			-
Peak hour (L/hr)	3			17,064
Max day (L/d)	2			272,160
Max day (L/s)				3

Fire Flow

Land Use	Min Town of Whitchurch-Stouffville Fire Flow (L/s)	Maximum Daily Demand (L/s)	FUS Fire Flow (L/s)	Required Fire Flow (L/s)
Industrial	250	3	281.8	281.8

SITE SUMMARY

Industrial Use Avg. Day (L/d)	136,080	Note: Demand calculated based on Town of Whitchurch-Stouffville ICI standards
Avg Day (L/s)	1.58	
Max Day (L/s)	3.15	
Min Hour (L/s)	-	
Peak Hour (L/s)	4.74	
Max day plus Fire Flow (L/s)	281.8	

INDUSTRIAL WATER USAGE CALCULATION SHEET

Industrial Site			
Base flow calculations			
A= Effective area		14,098	m ²
C= Non-combustible		0.8	
F= Required fire flow		20,897 L/min.	
"F" Rounded up to nearest 1,000		21,000 L/min.	
Occupancy Adjustments (f_1)			
	%		
Free burning	15%	3,150	
$F' = F + f_1$		24,150 L/min.	
Exposure / NFPA Adjustments			
Exp.	Sep. (m)	Charge	
N	999	0%	
E	999	0%	
S	999	0%	
W	70	0%	
E = Total Exposure Charge		0%	0
Sprinklered as per NFPA 13		Yes	-7,245
$F'' = F' + E + S$		16,905 L/min.	
		281.8 L/s	

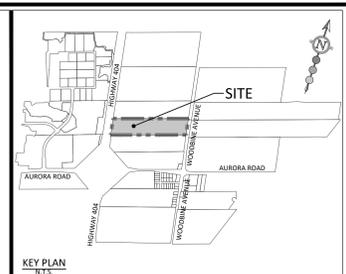
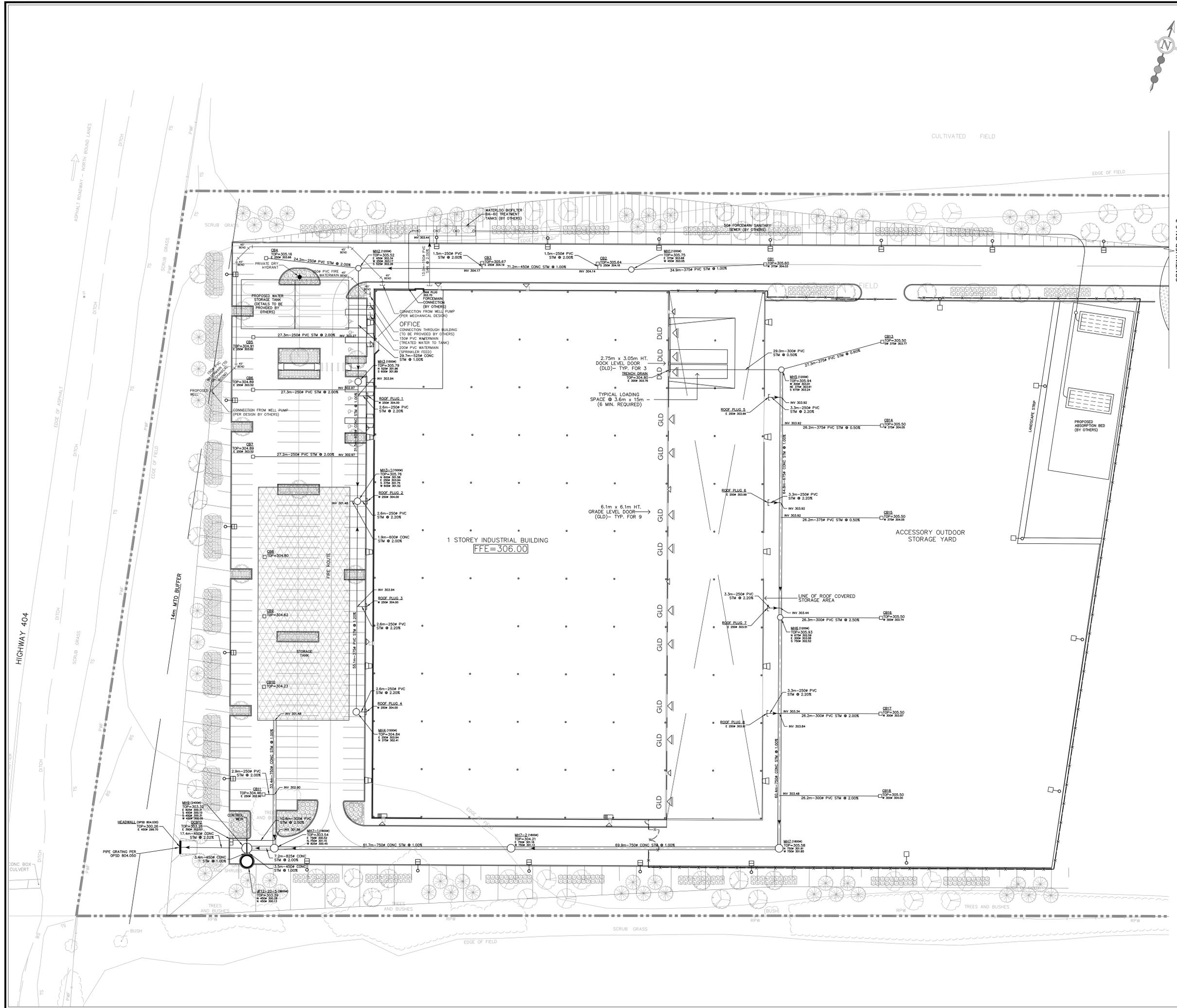
Based on Fire Underwriters Survey criteria for unprotected openings (2019)

Note

†As per Note J of the Water Supply for Public Fire Protection" by Fire Underwriters Survey (1999), single detached residential buildings with a separation of 3 to 10m have a suggested fire flow of **4000 L/min** (short method) rather than conducting the regular FUS Method, however as a measure of conservative design the regular method has been performed above.

APPENDIX G

ENGINEERING DRAWINGS



BENCHMARK: ELEV. 298.06
ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MTD BENCH MARK NO. 470-69 HAVING AN ELEVATION OF 298.06 METRES.

LEGEND:

- LIMIT OF PROPERTY
- EMBANKMENT (MAX 3:1 SLOPE UNLESS OTHERWISE NOTED)
- STORM MANHOLE AND SEWER
- PIPE INSULATION PER DETAIL ON DWG D-1
- SINGLE CATCHBASIN
- DOUBLE CATCHBASIN
- HYDRANT AND VALVE
- UNDERGROUND STORMWATER MANAGEMENT CHAMBER
- PROPOSED SWALE
- LSRC REGULATION BOUNDARY

CONTINUED ON S-2

TOPOGRAPHIC SURVEY PROVIDED BY HOLDING JONES VANDERVEEN INC. JUNE 2021

No.	DESCRIPTION	DATE	BY	APPROVED
1	ISSUED FOR SPA	MAY 08/23	P.C.	

SIS consulting group Ltd

30 CENTURIAN DRIVE, SUITE 500
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-3300
FAX: (905) 475-8335

TOWN OF WHITCHURCH-STOUFFVILLE

CERITO INVESTMENT CORP.

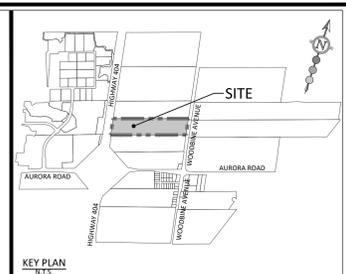
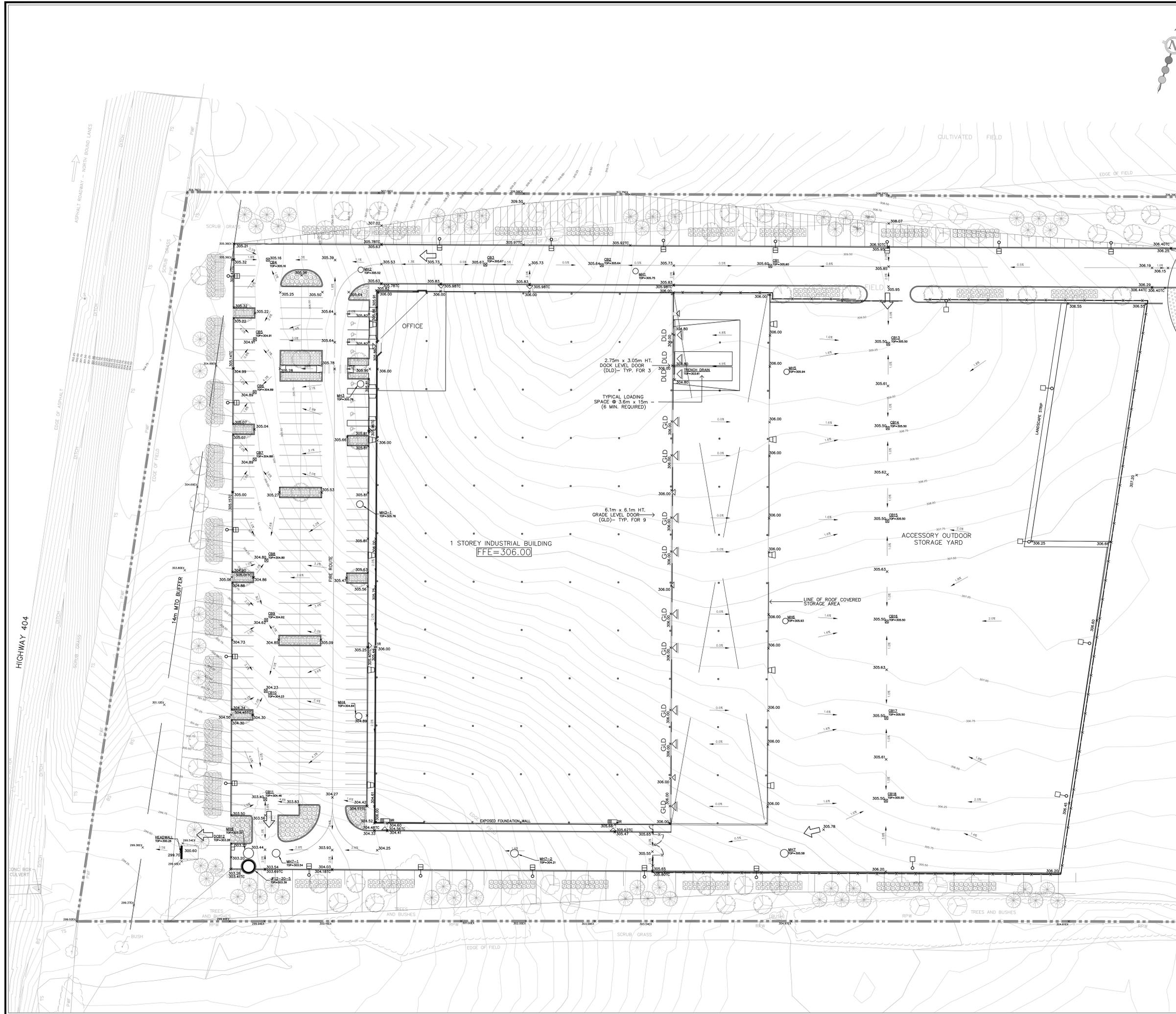
VANDORF - 15450 WOODBINE AVENUE

SERVICING PLAN

DATE: MAY 2023 DESIGNED BY: V.P. CHECKED BY: P.C.
SCALE: 1:300 DRAWN BY: V.P. CHECKED BY: P.C.

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

PROJECT NO: **2400**
DRAWING NO: **S-1**



BENCHMARK: ELEV. 298.806
 ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MTD BENCH MARK NO. 470-69 HAVING AN ELEVATION OF 298.806 METRES.

- LEGEND:**
- LIMIT OF PROPERTY
 - EMBANKMENT (MAX 3:1 SLOPE UNLESS OTHERWISE NOTED)
 - EXISTING CONTOUR AND ELEVATION
 - EXISTING ELEVATION
 - PROPOSED ELEVATION
 - PROPOSED TOP OF DEPRESSED CURB ELEVATION
 - PROPOSED SWALE ELEVATION
 - SWALE
 - STORM MANHOLE
 - SINGLE CATCHBASIN
 - DOUBLE CATCHBASIN
 - HYDRANT AND VALVE
 - PROPOSED SWALE
 - LSRCA REGULATION BOUNDARY

CONTINUED ON GR-2

TOPOGRAPHIC SURVEY PROVIDED BY HOLDING JONES VANDERVEEN INC. JUNE 2021

REVISIONS				
No.	DESCRIPTION	DATE	BY	APPROVED
1	ISSUED FOR SPA	MAY 08/23	P.C.	

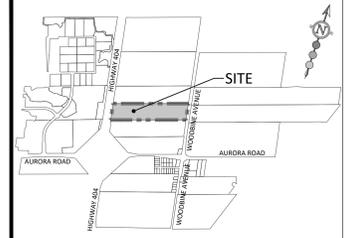
SGS consulting group ltd 30 CENTURIAN DRIVE, SUITE 500 MARKHAM, ONTARIO L3R 8B8 TEL: (905) 475-3300 FAX: (905) 475-8335

TOWN OF WHITCHURCH-STOUFFVILLE
CERITO INVESTMENT CORP.
VANDORF - 15450 WOODBINE AVENUE
GRADING PLAN



DATE: MAY 2023 DESIGNED BY: V.P. CHECKED BY: P.G.
 SCALE: 1:300 DRAWN BY: V.P. CHECKED BY: P.G.

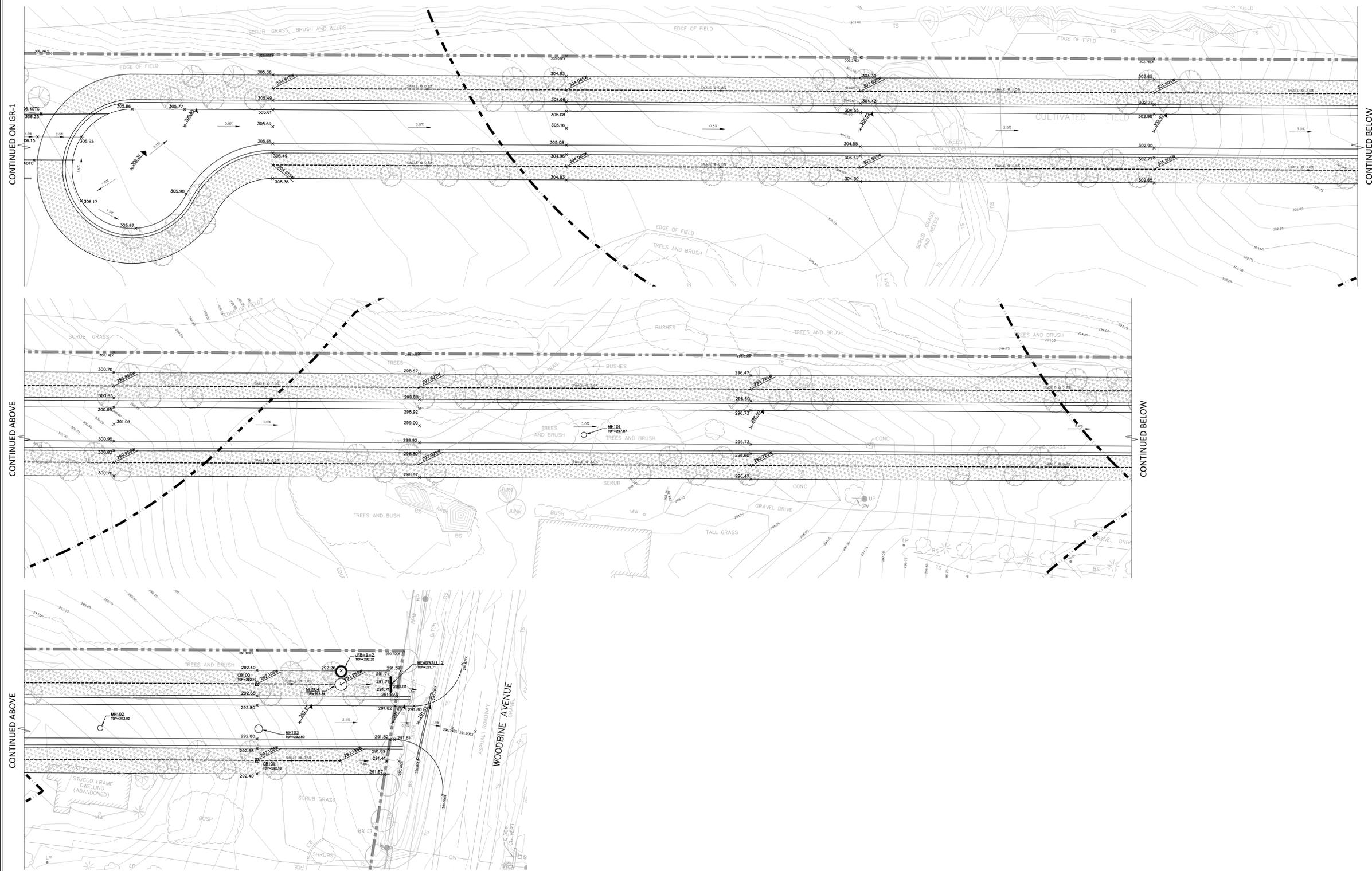
ACCEPTED AS TO FORM IN RELIANCE UPON THE PROFESSIONAL SKILL AND ABILITY OF SGS CONSULTING GROUP LTD. CONSULTING ENGINEERS AS TO DESIGN AND SPECIFICATIONS. PROJECT NO: 2400 DRAWING NO: GR-1



BENCHMARK: ELEV. 298.806
 ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MTD BENCHMARK NO. 470-69 HAVING AN ELEVATION OF 298.806 METRES.

LEGEND:

	LIMIT OF PROPERTY
	EMBANKMENT (MAX 3:1 SLOPE UNLESS OTHERWISE NOTED)
	EXISTING CONTOUR AND ELEVATION
	EXISTING ELEVATION
	PROPOSED ELEVATION
	PROPOSED TOP OF DEPRESSED CURB ELEVATION
	PROPOSED SWALE ELEVATION
	SWALE
	STORM MANHOLE
	SINGLE CATCHBASIN
	DOUBLE CATCHBASIN
	HYDRANT AND VALVE
	PROPOSED SWALE
	LSRA REGULATION BOUNDARY



CONTINUED ON GR-1

CONTINUED BELOW

CONTINUED ABOVE

CONTINUED BELOW

CONTINUED ABOVE

TOPOGRAPHIC SURVEY PROVIDED BY HOLDING JONES VANDERVEEN INC. JUNE 2021

REVISIONS				
No.	DESCRIPTION	DATE	BY	APPROVED
1	ISSUED FOR SPA	MAY 08/23	P.C.	

SIS consulting group Ltd
 30 CENTURIAN DRIVE, SUITE 500
 MARKHAM, ONTARIO L3R 8B8
 TEL: (905) 475-1900
 FAX: (905) 475-8335

TOWN OF WHITCHURCH-STOUFFVILLE
CERITO INVESTMENT CORP.
VANDORF - 15450 WOODBINE AVENUE
GRADING PLAN - ROAD

DATE: MAY 2023	DESIGNED BY: V.P.	CHECKED BY: P.C.
SCALE: 1:300	DRAWN BY: V.P.	CHECKED BY: P.C.

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

PROJECT No: **2400**
 DRAWING No: **GR-2**

GENERAL NOTES

1. THE OWNER IS RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS FROM THE TOWN OF WHITCHURCH-STOUFFVILLE, LSRCA, AND OTHER EXTERNAL AGENCIES PRIOR TO ANY SITE ALTERATION ACTIVITY.
2. PRIOR TO COMMENCEMENT OF ANY ON-SITE WORK/TOPOSOIL STRIPPING, EROSION & SEDIMENT CONTROL (ESC) MEASURES, AS PER APPROVED SITE ALTERATION PLAN, MUST BE INSTALLED AND APPROVED BY THE TOWN. ADDITIONAL ESC MEASURES, IF REQUIRED, SHALL BE INSTALLED AS DIRECTED BY THE TOWN. THE ESC MEASURES SHALL REMAIN IN PLACE UNTIL DIRECTED BY THE TOWN FOR THEIR REMOVAL.
3. NO CONSTRUCTION ACTIVITY OR MACHINERY SHALL BE ALLOWED BEYOND THE SEDIMENT CONTROL FENCE OR LIMITS OF THE SUBDIVISION, UNLESS WRITTEN PERMISSION HAS BEEN OBTAINED FROM LANDOWNERS.
4. THE CONTRACTOR IS RESPONSIBLE TO IMPLEMENT DUST CONTROL MEASURES AND CONSTRUCTION PRACTICE GUIDELINES AS APPROVED BY THE TOWN AND LSRCA.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL ESC MEASURES IN WORKING CONDITIONS AT ALL TIMES TO THE SATISFACTION OF THE TOWN. THE OWN CONSULTANT SHALL ROUTINELY INSPECT ALL ESC DEVICES AT A MINIMUM OF ONCE A WEEK AND AFTER EACH SIGNIFICANT SNOW MELT AND RAINFALL GREATER THAN 10MM TO ENSURE THAT ESC MEASURES ARE IN PROPER WORKING CONDITION. DURING INACTIVE PERIODS, WHEN THE SITE HAS LITTLE OR NO CONSTRUCTION ACTIVITY FOR 30 DAYS OR LONGER, A MONTHLY INSPECTION SHOULD BE CONDUCTED. ANY DAMAGES MUST BE REPAIRED WITHIN 48 HOURS BY THE CONTRACTOR.
6. EROSION AND SEDIMENT CONTROL INSPECTION REPORTS ARE TO BE SUBMITTED TO THE TOWN'S DEVELOPMENT INSPECTOR, THE LSRCA, AND ANY OTHER RELEVANT STAFF AS REQUIRED BY THE TOWN.
7. ALL CONSTRUCTION VEHICLES MUST ENTER AND EXIT THE SITE ONLY FROM THE APPROVED ACCESS ROUTES AS SHOWN ON THE PLAN. CONSTRUCTION ACCESS SHALL BE MAINTAINED TO THE SATISFACTION OF THE TOWN AND LSRCA. STREET SWEEPING MAY BE REQUIRED AS NEEDED.
8. THE CONTRACTOR SHALL ENDEAVOUR TO PREVENT MUD TRACKING ONTO EXISTING RIGHT-OF-WAYS AND SHALL PROVIDE FOR CLEAN UP AT OWNER'S EXPENSE AS DIRECTED BY THE CONSULTING ENGINEER/TOWN.
9. ALL TOPOSOIL STOCKPILES AND/OR DISTURBED GROUND LEFT INACTIVE, OR TO BE LEFT INACTIVE, FOR OVER 30 DAYS SHALL BE STABILIZED, SUBJECT TO WEATHER CONDITIONS, BY SEEDING OR APPROVED EQUIVALENT TO THE SATISFACTION OF THE TOWN.
10. ALL TOPOSOIL STOCKPILES SHALL BE SURROUNDED WITH SEDIMENT CONTROL FENCE. THE MAXIMUM SIDE SLOPES FOR STOCKPILES SHALL BE 2:1 (H) TO 1:0 (V). THE MAXIMUM HEIGHT OF STOCKPILE SHOULD GENERALLY NOT EXCEED 1.0 METRES.
11. THE ESC STRATEGIES OUTLINED ON THIS PLAN ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO PREVENT SEDIMENT RELEASE TO THE NATURAL ENVIRONMENT.
12. CONTRACTOR TO CONFIRM THE LOCATION OF THE EXISTING UTILITIES PRIOR TO INITIATING ANY ON-SITE WORKS.
13. TREE REMOVALS TO BE COMPLETED IN ACCORDANCE WITH THE APPROVED ARBORIST REPORT OR LATEST ARBORIST THEREOF. TREE REMOVALS WILL TAKE PLACE BEFORE TOPOSOIL STRIPPING COMMENCES.
14. THE CONTRACTOR SHALL CARE AND CONTROL SPILLS, FLUIDS, AND MATERIALS DURING CONSTRUCTION TO MINIMIZE RISK TO THE ENVIRONMENT.

ESC STAGE 1 - STRIPPING NOTES

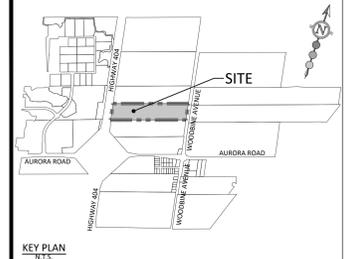
1. ALL TEMPORARY SEDIMENT CONTROL (I.E. SEDIMENT CONTROL FENCE, CHECK DAMS, SEDIMENT TRAP, AND CONSTRUCTION ACCESS) TO BE INSTALLED PRIOR TO ANY TOPOSOIL STRIPPING WORKS.
2. SEDIMENTS COLLECTED IN THE SEDIMENT TRAP SHALL BE REMOVED WHEN 50% OF THE STORAGE CAPACITY IS FILLED.
3. TEMPORARY INTERCEPTOR SWALES ALONG THE SITE PERIMETER TO BE SEEDED AND STABILIZED WITH EROSION CONTROL BLANKETS (LAFIELD LPS-1 OR APPROVED EQUIVALENT).
4. SURFACE ROUGHENING TO TAKE PLACE WHEREVER POSSIBLE AS A MEANS OF TEMPORARY EROSION AND SEDIMENT CONTROL. SURFACE ROUGHENING TO BE ACHIEVED BY TRACKWALKING PARALLEL TO THE DIRECTION OF FLOW OR WITH A SHEEP'S FOOT Packer.
5. CONTRACTOR TO ENSURE THAT SEDIMENT LOADS RUNOFF IS DIRECTED TO APPROPRIATE ESC CONTROL THROUGHOUT THE STAGED CONSTRUCTION PROCESS, INCLUDING TRANSITIONAL WORKS BETWEEN STAGES.

ESC STAGE 2 - EARTHWORKS NOTES

1. SEDIMENTS COLLECTED IN THE SEDIMENT CONTROL TRAP SHALL BE REMOVED WHEN 50% OF THE STORAGE CAPACITY IS FILLED.
2. TEMPORARY INTERCEPTOR SWALES ALONG THE SITE PERIMETER TO BE SEEDED AND STABILIZED WITH EROSION CONTROL BLANKETS (LAFIELD LPS-1, OR 1" FILLTEX GROWTH MEDIA OR APPROVED EQUIVALENT).
3. SURFACE ROUGHENING TO TAKE PLACE WHEREVER POSSIBLE AS A MEANS OF TEMPORARY EROSION AND SEDIMENT CONTROL. SURFACE ROUGHENING TO BE ACHIEVED BY TRACKWALKING PARALLEL TO THE DIRECTION OF FLOW OR WITH A SHEEP'S FOOT TRACKER.

LSRCA STANDARD NOTES

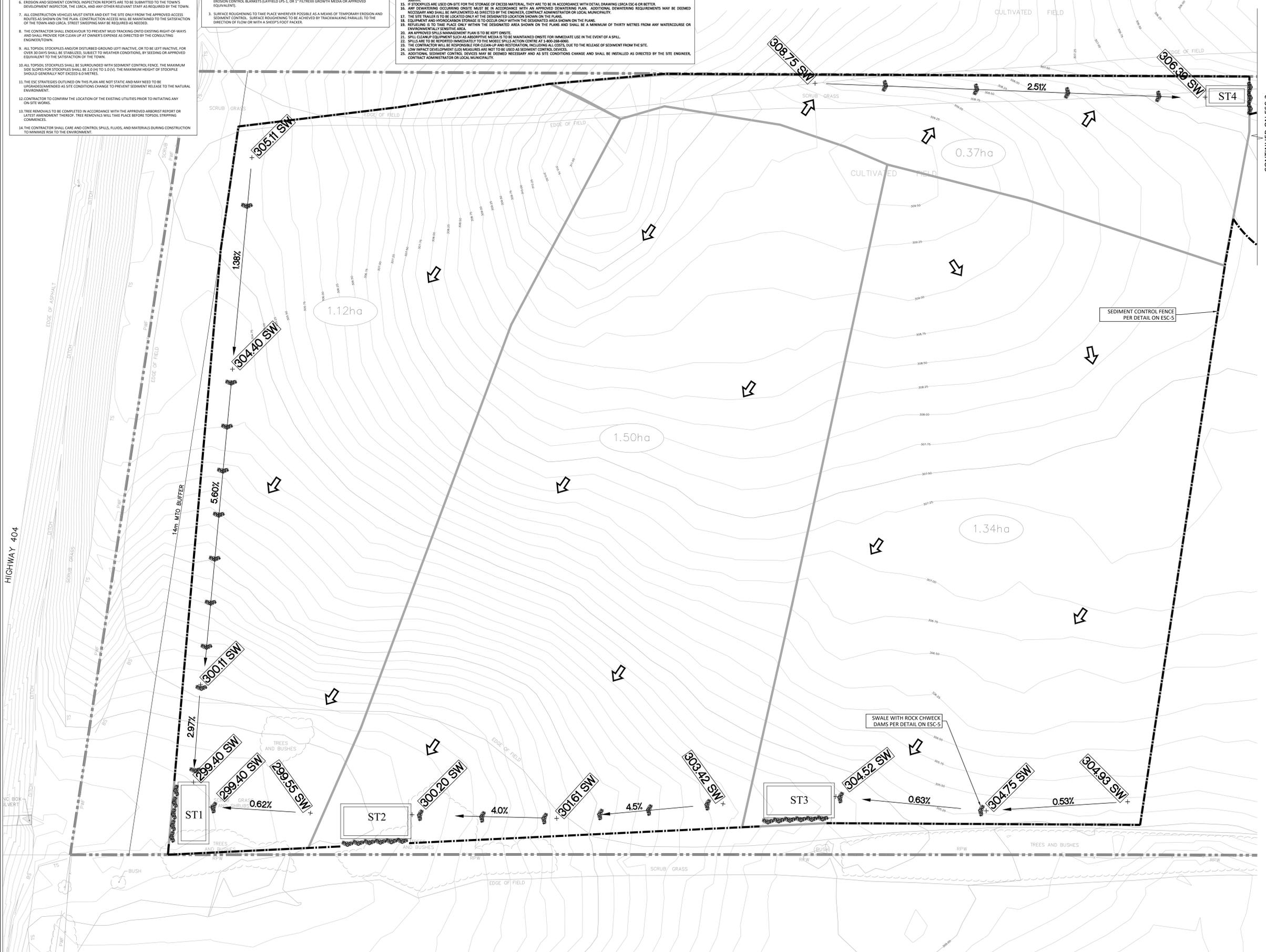
1. ALL SEDIMENT CONTROL MEASURES SUCH AS SEDIMENT CONTROL FENCE, TEMPORARY PONDS, CONSTRUCTION ACCESS MATS, SEDIMENT TRAPS, SWALES AND CHECK DAMS MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
2. SEDIMENT CONTROL DEVICES SHOULD BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT. REPAIRS TO ESC MEASURES MUST BE COMPLETED IN A TIMELY MANNER TO PREVENT SEDIMENT MIGRATION.
3. ADDITIONAL MATERIALS SUCH AS CLEAR STONE, FILTER FABRIC, PUMPS, HOSES AND SILTSOCKS TO BE KEPT ON-SITE AT ALL TIMES FOR CONDUCTING REPAIRS TO SEDIMENT CONTROL MEASURES.
4. ALL DISTURBED AREAS LEFT INACTIVE FOR MORE THAN THIRTY DAYS ARE TO BE STABILIZED.
5. THE STABILIZATION SEED MIXTURE IS TO BE AS SPECIFIED ON THE EROSION AND SEDIMENT CONTROL PLAN.
6. THE STABILIZATION SEED MIXTURE IS TO BE APPLIED AT A MINIMUM RATE OF 25 kg/m².
7. ENGINEER CHANGES TO THE ESC MEASURES MAY BE NEEDED AS SITE CONDITIONS CHANGE THROUGHOUT THE CONSTRUCTION PROCESS. THESE UPDATES MUST REFLECT BEST MANAGEMENT PRACTICES TO CONTROL SEDIMENT AND EROSION ON-SITE AND SHOULD BE COMPLETED BASED ON DIRECTION FROM THE SITE ENGINEER. ADDITIONAL MEASURES MAY BE REQUIRED AS DIRECTED BY AN ENGINEER THROUGHOUT THE CONSTRUCTION PROCESS.
8. THE CONSTRUCTION ENTRANCE MAT IS TO BE INSTALLED AS THE FIRST STEP IN THE SITE ALTERATION PROCESS.
9. SEDIMENT CONTROL FENCE IS TO BE INSTALLED DOWNSTREAM OF ALL DISTURBED AREAS. A DOUBLE ROW OF SEDIMENT CONTROL FENCE IS TO BE INSTALLED SURROUNDING ALL NATURAL HERITAGE FEATURES AND AS DIRECTED BY THE SITE ENGINEER. SEDIMENT CONTROL FENCE IS TO BE AS PER LSRCA STANDARD ESC-4 OR ESC-5 AS A MINIMUM. LIGHT DUTY SEDIMENT CONTROL FENCE IS NOT ACCEPTABLE.
10. CUT-OFF SWALES OR DITCHES ARE TO BE INSTALLED AS SHOWN ON THE ESC PLANS AND AS NECESSARY BASED ON CHANGING SITE CONDITIONS TO DIRECT OVERLAND FLOW TO THE APPROPRIATE SEDIMENT TRAP OR TEMPORARY SEDIMENT POND.
11. CHECK DAMS ARE TO BE INSTALLED AT ALL SWALES AND DITCHES IN ACCORDANCE WITH DRAWING (SRCA ESC-3) AS A MINIMUM.
12. TEMPORARY SEDIMENT TRAPS ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION, IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT TRAP(S) DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES.
13. NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION, IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT POND(S) DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES.
14. FILTERSOX SILTSOCKS OR APPROVED EQUIVALENT TO BE INSTALLED DOWNSTREAM FROM SEDIMENT TRAP AND TEMPORARY SEDIMENT POND OUTLETS TO A MINIMUM HEIGHT OF 100MM.
15. IF STOCKPILES ARE USED ON-SITE FOR THE STORAGE OF EXCESS MATERIAL, THEY ARE TO BE IN ACCORDANCE WITH DETAIL DRAWING LSRCA ESC-6 OR BETTER.
16. ANY DOWNSLOTTING OCCURRING ON-SITE MUST BE IN ACCORDANCE WITH AN APPROVED DOWNSLOTTING PLAN. ADDITIONAL DOWNSLOTTING REQUIREMENTS MAY BE DEEMED NECESSARY AND SHALL BE IMPLEMENTED AS DIRECTED BY THE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY.
17. THE SITE TRAILER IS TO BE LOCATED ONLY AT THE DESIGNATED LOCATION SHOWN ON THE PLAN.
18. EQUIPMENT AND HYDROCARBON STORAGE IS TO OCCUR ONLY WITHIN THE DESIGNATED AREA SHOWN ON THE PLAN.
19. REFUELING IS TO TAKE PLACE ONLY WITHIN THE DESIGNATED AREA SHOWN ON THE PLAN AND SHALL BE A MINIMUM OF THIRTY METRES FROM ANY WATERCOURSE OR ENVIRONMENTALLY SENSITIVE AREA.
20. AN APPROVED SPILLS MANAGEMENT PLAN IS TO BE KEPT ON-SITE.
21. SPILL CLEANUP EQUIPMENT SUCH AS ABSORBENT MEDIA IS TO BE MAINTAINED ON-SITE FOR IMMEDIATE USE IN THE EVENT OF A SPILL.
22. SPILLS ARE TO BE REPORTED IMMEDIATELY TO THE MHCESC SPILLS ACTION CENTRE AT 1-800-386-8800.
23. THE CONTRACTOR WILL BE RESPONSIBLE FOR CLEAN-UP AND RESTORATION, INCLUDING ALL COSTS, DUE TO THE RELEASE OF SEDIMENT FROM THE SITE.
24. LOW IMPACT DEVELOPMENT (LID) MEASURES ARE NOT TO BE USED AS SEDIMENT CONTROL DEVICES.
25. ADDITIONAL SEDIMENT CONTROL DEVICES MAY BE DEEMED NECESSARY AND AS SITE CONDITIONS CHANGE AND SHALL BE INSTALLED AS DIRECTED BY THE SITE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY.



BENCHMARK: ELEV. 298.806
ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MTD BENCHMARK NO. 470-69 HAVING AN ELEVATION OF 298.806 METRES.

- LEGEND:**
- LIMIT OF PROPERTY
 - EXISTING CONTOUR AND ELEVATION
 - EXISTING FLOW DIRECTION
 - - - ESC FENCE PER DETAIL ON ESC-5
 - X 175.00 SW SWALE ELEVATION
 - SWALE PER DETAIL ON ESC-5
 - 2.60ha DRAINAGE AREA (HA)
 - DRAINAGE BOUNDARY
 - ⊕ ROCK CHECK DAM
 - ▨ ACCESS MUDMAT PER DETAIL ON ESC-5
 - ⌋ LOCKABLE GATE PER DETAIL ON ESC-5
 - ST4 SEDIMENT TRAP PER DETAILS ON ESC-5

RESTORATION NOTE
ALL DISTURBED GROUND LEFT INACTIVE, OR TO BE LEFT INACTIVE, FOR OVER 30 DAYS SHALL BE STABILIZED AS SOON AS POSSIBLE, SUBJECT TO WEATHER CONDITIONS, BY SEEDING (LPS) AS ANNUAL EYE OR APPROVED EQUIVALENT TO THE SATISFACTION OF THE TOWN OF WHITCHURCH-STOUFFVILLE/LSRCA.



TOPOGRAPHIC SURVEY PROVIDED BY HOLDING JONES VANDERVEEN INC. JUNE 2021

No.	DESCRIPTION	DATE	BY	APPROVED
1	ISSUED FOR SPA	MAY 8/23	V.P.	

sgs consulting group inc.
30 CENTURIAN DRIVE, SUITE 500
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

TOWN OF WHITCHURCH-STOUFFVILLE

GALATIA LANE ESTATES INC.

VANDORF - 15450 WOODBINE AVENUE

STAGE 1 & 2 EROSION AND SEDIMENT CONTROL PLAN

DATE: MAY 2023 DESIGNED BY: V.P. CHECKED BY: P.C.
SCALE: 1:300 DRAWN BY: V.P. CHECKED BY: P.C.

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

PROJECT NO: 2400
DRAWING NO: ESC-1

HIGHWAY 404

CONTINUED ON ESC-2

GENERAL NOTES

1. THE OWNER IS RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS FROM THE TOWN OF WHITCHURCH-STOUFFVILLE, LSRCA, AND OTHER EXTERNAL AGENCIES PRIOR TO ANY SITE ALTERATION ACTIVITY.
2. PRIOR TO COMMENCEMENT OF ANY ON-SITE WORK/TOPSOIL STRIPPING, EROSION & SEDIMENT CONTROL (ESC) MEASURES, AS PER APPROVED SITE ALTERATION PLAN, MUST BE INSTALLED AND APPROVED BY THE TOWN. ADDITIONAL ESC MEASURES, IF REQUIRED, SHALL BE INSTALLED AS DIRECTED BY THE TOWN. THE ESC MEASURES SHALL REMAIN IN PLACE UNTIL DIRECTED BY THE TOWN FOR THEIR REMOVAL.
3. NO CONSTRUCTION ACTIVITY OR MACHINERY SHALL BE ALLOWED BEYOND THE SEDIMENT CONTROL/SNOW FENCE OR LIMITS OF THE SUBDIVISION, UNLESS WRITTEN PERMISSION HAS BEEN OBTAINED FROM LANDOWNERS.
4. THE CONTRACTOR IS RESPONSIBLE TO IMPLEMENT DUST CONTROL MEASURES AND CONSTRUCTION PRACTICE GUIDELINES AS APPROVED BY THE TOWN AND LSRCA.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL ESC MEASURES IN WORKING CONDITIONS AT ALL TIMES TO THE SATISFACTION OF THE TOWN. THE OWN CONSULTANTS SHALL ROUTINELY INSPECT ALL ESC DEVICES AT A MINIMUM OF ONCE A WEEK AND AFTER EACH SIGNIFICANT SNOW MELT AND RAINFALL GREATER THAN 25MM TO ENSURE THAT ESC MEASURES ARE IN PROPER WORKING CONDITION. DURING INACTIVE PERIODS, WHEN THE SITE HAS LITTLE OR NO CONSTRUCTION ACTIVITY FOR 30 DAYS OR LONGER, A MONTHLY INSPECTION SHOULD BE CONDUCTED. ANY DAMAGES MUST BE REPAIRED WITHIN 48 HOURS BY THE CONTRACTOR.
6. EROSION AND SEDIMENT CONTROL INSPECTION REPORTS ARE TO BE SUBMITTED TO THE TOWN'S DEVELOPMENT INSPECTOR, THE LSRCA, AND ANY OTHER RELEVANT STAFF AS REQUIRED BY THE TOWN.
7. ALL CONSTRUCTION VEHICLES MUST ENTER AND EXIT THE SITE ONLY FROM THE APPROVED ACCESS ROUTES AS SHOWN ON THE PLAN. CONSTRUCTION ACCESS WILL BE MAINTAINED TO THE SATISFACTION OF THE TOWN AND LSRCA. STREET SWEEPING MAY BE REQUIRED AS NEEDED.
8. THE CONTRACTOR SHALL ENDEAVOUR TO PREVENT MUD TRACKING ONTO EXISTING RIGHT-OF-WAYS AND SHALL PROVIDE FOR CLEAN UP AT OWNER'S EXPENSE AS DIRECTED BY THE CONSULTING ENGINEER/TOWN.
9. ALL TOPSOIL STOCKPILES AND/OR DISTURBED GROUND LEFT INACTIVE, OR TO BE LEFT INACTIVE, FOR OVER 30 DAYS SHALL BE STABILIZED, SUBJECT TO WEATHER CONDITIONS, BY SEEDING OR APPROVED EQUIVALENT TO THE SATISFACTION OF THE TOWN.
10. ALL TOPSOIL STOCKPILES SHALL BE SURROUNDED WITH SEDIMENT CONTROL FENCE. THE MAXIMUM SIDE SLOPES FOR STOCKPILES SHALL BE 2:0 (H) TO 1:0 (V). THE MAXIMUM HEIGHT OF STOCKPILE SHOULD GENERALLY NOT EXCEED 1.0 METRES.
11. THE ESC STRATEGIES OUTLINED ON THIS PLAN ARE NOT STATIC AND MAY NEED TO BE UPGRADDED/AMENDED AS SITE CONDITIONS CHANGE TO PREVENT SEDIMENT RELEASE TO THE NATURAL ENVIRONMENT.
12. CONTRACTOR TO CONFIRM THE LOCATION OF THE EXISTING UTILITIES PRIOR TO INITIATING ANY ON-SITE WORKS.
13. TREE REMOVALS TO BE COMPLETED IN ACCORDANCE WITH THE APPROVED ARBORIST REPORT OR LATEST AGREEMENT THEREOF. TREE REMOVALS WILL TAKE PLACE BEFORE TOPSOIL STRIPPING COMMENCES.
14. THE CONTRACTOR SHALL CARE AND CONTROL SPILLS, FLUIDS, AND MATERIALS DURING CONSTRUCTION TO MINIMIZE RISK TO THE ENVIRONMENT.

ESC STAGE 1 - STRIPPING NOTES

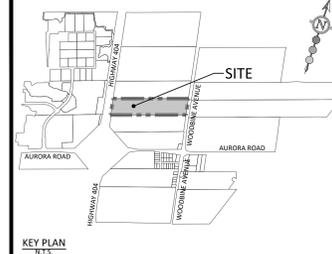
1. ALL TEMPORARY SEDIMENT CONTROL (I.E. SEDIMENT CONTROL FENCE, CHECK DAMS, SEDIMENT TRAP, AND CONSTRUCTION ACCESS) TO BE INSTALLED PRIOR TO ANY TOPSOIL STRIPPING WORKS.
2. SEDIMENTS COLLECTED IN THE SEDIMENT TRAP SHALL BE REMOVED WHEN 50% OF THE STORAGE CAPACITY IS FILLED.
3. TEMPORARY INTERCEPTOR SWALES ALONG THE SITE PERIMETER TO BE SEEDED AND STABILIZED WITH EROSION CONTROL BLANKETS (LAWFIELD LPS-1 OR APPROVED EQUIVALENT).
4. SURFACE ROUGHENING TO TAKE PLACE WHEREVER POSSIBLE AS A MEANS OF TEMPORARY EROSION AND SEDIMENT CONTROL. SURFACE ROUGHENING TO BE ACHIEVED BY TRACKWALKING PARALLEL TO THE DIRECTION OF FLOW OR WITH A SHEEP'S FOOT PCKER.
5. CONTRACTOR TO ENSURE THAT SEDIMENT LADEN RUNOFF IS DIRECTED TO APPROPRIATE ESC CONTROLS THROUGHOUT THE STAGED CONSTRUCTION PROCESS, INCLUDING TRANSITIONAL WORKS BETWEEN STAGES.

ESC STAGE 2 - EARTHWORKS NOTES

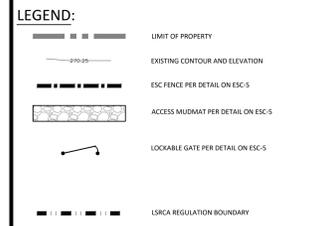
1. SEDIMENTS COLLECTED IN THE SEDIMENT CONTROL TRAP SHALL BE REMOVED WHEN 50% OF THE STORAGE CAPACITY IS FILLED.
2. TEMPORARY INTERCEPTOR SWALES ALONG THE SITE PERIMETER TO BE SEEDED AND STABILIZED WITH EROSION CONTROL BLANKETS (LAWFIELD LPS-1, OR 1" FILTRESX GROWTH MEDIA OR APPROVED EQUIVALENT).
3. SURFACE ROUGHENING TO TAKE PLACE WHEREVER POSSIBLE AS A MEANS OF TEMPORARY EROSION AND SEDIMENT CONTROL. SURFACE ROUGHENING TO BE ACHIEVED BY TRACKWALKING PARALLEL TO THE DIRECTION OF FLOW OR WITH A SHEEP'S FOOT TRACKER.

LSRCA STANDARD NOTES

1. ALL SEDIMENT CONTROL MEASURES SUCH AS SEDIMENT CONTROL FENCE, TEMPORARY PONDS, CONSTRUCTION ACCESS MATS, SEDIMENT TRAPS, SWALES AND CHECK DAMS MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
2. SEDIMENT CONTROL SHOULD BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT. REPAIRS TO ESC MEASURES MUST BE COMPLETED IN A TIMELY MANNER TO PREVENT SEDIMENT MIGRATION.
3. ADDITIONAL MATERIALS SUCH AS CLEAR STONE, FILTER FABRIC, PUMPS, HOSES AND SILTSOCKS TO BE KEPT ON-SITE AT ALL TIMES FOR CONDUCTING REPAIRS TO SEDIMENT CONTROL MEASURES.
4. ALL DISTURBED AREAS LEFT INACTIVE FOR MORE THAN THIRTY DAYS ARE TO BE STABILIZED.
5. THE STABILIZATION SEED MIXTURE IS TO BE AS SPECIFIED ON THE EROSION AND SEDIMENT CONTROL PLAN.
6. THE STABILIZATION SEED MIXTURE IS TO BE APPLIED AT A MINIMUM RATE OF 25 kg/m².
7. ENGINEER CHANGES TO THE ESC MEASURES MAY BE NEEDED AS THE CONDITIONS CHANGE THROUGHOUT THE CONSTRUCTION PROCESS. THESE UPDATES MUST REFLECT BEST MANAGEMENT PRACTICES TO CONTROL SEDIMENT AND EROSION ON-SITE AND SHOULD BE COMPLETED BASED ON DIRECTION FROM THE SITE ENGINEER. ADDITIONAL MEASURES MAY BE REQUIRED AS DIRECTED BY AN ENGINEER THROUGHOUT THE CONSTRUCTION PROCESS.
8. THE CONSTRUCTION ENTRANCE MAT IS TO BE INSTALLED AS THE FIRST STEP IN THE SITE ACTIVATION PROCESS.
9. SEDIMENT CONTROL FENCE IS TO BE INSTALLED DOWNSTREAM OF ALL DISTURBED AREAS. A DOUBLE ROW OF SEDIMENT CONTROL FENCE IS TO BE INSTALLED SURROUNDING ALL NATURAL HERITAGE FEATURES AND AS DIRECTED BY THE SITE ENGINEER. SEDIMENT CONTROL FENCE IS TO BE AS PER LSRCA STANDARD ESC-4 OR ESC-5 AS A MINIMUM. LIGHT DUTY SEDIMENT CONTROL FENCE IS NOT ACCEPTABLE.
10. CUT-OFF SWALES OR DITCHES ARE TO BE INSTALLED AS SHOWN ON THE ESC PLANS AND AS NECESSARY BASED ON CHANGING SITE CONDITIONS TO DIRECT OVERLAND FLOW TO THE APPROPRIATE SEDIMENT TRAP OR TEMPORARY SEDIMENT POND.
11. CHECK DAMS ARE TO BE INSTALLED IN ALL SWALES AND DITCHES IN ACCORDANCE WITH DRAWING LSRCA ESC-5, AS A MINIMUM.
12. TEMPORARY SEDIMENT TRAPS ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION, IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT TRAP(S) DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES.
13. TEMPORARY SEDIMENT PONDS ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION, IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT POND(S) DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES.
14. FILTRESX SOCKS OR APPROVED EQUIVALENT TO BE INSTALLED DOWNSTREAM FROM SEDIMENT TRAP AND TEMPORARY SEDIMENT POND OUTLETS TO A MINIMUM HEIGHT OF 100MM.
15. IF STOCKPILES ARE USED ON-SITE FOR THE STORAGE OF EXCESS MATERIAL, THEY ARE TO BE IN ACCORDANCE WITH DETAIL DRAWING LSRCA ESC-6 OR BETTER.
16. ANY DOWNSTREAM OCCURRENCE OF SITE MUST BE IN ACCORDANCE WITH AN APPROVED DOWNSWAMPING PLAN. ADDITIONAL DOWNSWAMPING REQUIREMENTS MAY BE DEMAND NECESSARY AND SHALL BE IMPLEMENTED AS DIRECTED BY THE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY.
17. THE SITE TRAILS TO BE LOCATED ONLY AT THE DESIGNATED LOCATION SHOWN ON THE PLAN.
18. EQUIPMENT AND HYDROCARBON STORAGE IS TO OCCUR ONLY WITHIN THE DESIGNATED AREA SHOWN ON THE PLAN.
19. REVERSING IS TO TAKE PLACE ONLY WITHIN THE DESIGNATED AREA SHOWN ON THE PLAN AND SHALL BE A MINIMUM OF THIRTY METRES FROM ANY WATERCOURSE OR ENVIRONMENTALLY SENSITIVE AREA.
20. AN APPROVED SPILL MANAGEMENT PLAN IS TO BE KEPT ON-SITE.
21. SPILL CLEANUP EQUIPMENT SUCH AS ABSORBENT MEDIA IS TO BE MAINTAINED ON-SITE FOR IMMEDIATE USE IN THE EVENT OF A SPILL.
22. SPILLS ARE TO BE REPORTED IMMEDIATELY TO THE LSRCA SPILL ACTION CENTRE AT 1-800-388-6900.
23. THE CONTRACTOR WILL BE RESPONSIBLE FOR CLEAN-UP AND RESTORATION, INCLUDING ALL COSTS, DUE TO THE RELEASE OF SEDIMENT FROM THE SITE.
24. LOW IMPACT DEVELOPMENT (LID) MEASURES ARE NOT TO BE USED AS SEDIMENT CONTROL DEVICES.
25. ADDITIONAL SEDIMENT CONTROL DEVICES MAY BE DEMAND NECESSARY AND AS SITE CONDITIONS CHANGE AND SHALL BE INSTALLED AS DIRECTED BY THE SITE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY.



BENCHMARK: ELEV. 298.806
ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MTD BENCH MARK NO. 470-69 HAVING AN ELEVATION OF 298.806 METRES.



RESTORATION NOTE
ALL DISTURBED GROUND LEFT INACTIVE, OR TO BE LEFT INACTIVE, FOR OVER 30 DAYS SHALL BE STABILIZED AS SOON AS POSSIBLE, SUBJECT TO WEATHER CONDITIONS, BY SEEDING OR AS AN ANNUAL CRYE OR APPROVED EQUIVALENT TO THE SATISFACTION OF THE TOWN OF WHITCHURCH-STOUFFVILLE/LSRCA.



TOPOGRAPHIC SURVEY PROVIDED BY HOLDING JONES VANDERBERG INC. JUNE 2021

REVISIONS				
No.	DESCRIPTION	DATE	BY	APPROVED
1	ISSUED FOR SPA	MAY 8/23	V.P.	

SGS consulting group Ltd
30 CENTURIAN DRIVE, SUITE 500
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

TOWN OF WHITCHURCH-STOUFFVILLE

GALATIA LANE ESTATES INC.

VANDORF - 15450 WOODBINE AVENUE

STAGE 1 & 2 EROSION AND SEDIMENT CONTROL PLAN - ROADS

DATE: MAY 2023 DESIGNED BY: V.P. CHECKED BY: P.C.
SCALE: 1:300 DRAWN BY: V.P. CHECKED BY: P.G.

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

PROJECT NO: **2400**
DRAWING NO: **ESC-2**

GENERAL NOTES

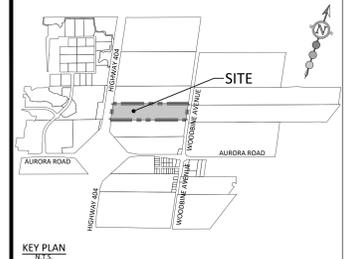
1. THE OWNER IS RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS FROM THE TOWN OF WHITCHURCH-STOUFFVILLE, LSJCA, AND OTHER EXTERNAL AGENCIES PRIOR TO ANY SITE ALTERATION ACTIVITY.
2. PRIOR TO COMMENCEMENT OF ANY ON-SITE WORK/TOPSOIL STRIPPING, EROSION & SEDIMENT CONTROL (ESC) MEASURES, AS PER APPROVED SITE ALTERATION PLAN, MUST BE INSTALLED AND APPROVED BY THE TOWN. ADDITIONAL ESC MEASURES, IF REQUIRED, SHALL BE INSTALLED AS DIRECTED BY THE TOWN. THE ESC MEASURES SHALL REMAIN IN PLACE UNTIL DIRECTED BY THE TOWN FOR THEIR REMOVAL.
3. NO CONSTRUCTION ACTIVITY OR MACHINERY SHALL BE ALLOWED BEYOND THE SEDIMENT CONTROL/SWAP FENCE OR LIMITS OF THE SUBDIVISION, UNLESS WRITTEN PERMISSION HAS BEEN OBTAINED FROM LANDOWNERS.
4. THE CONTRACTOR IS RESPONSIBLE TO IMPLEMENT DUST CONTROL MEASURES AND CONSTRUCTION PRACTICE GUIDELINES AS APPROVED BY THE TOWN AND LSJCA.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL ESC MEASURES IN WORKING CONDITIONS AT ALL TIMES TO THE SATISFACTION OF THE TOWN. THE OWN CONSULTANT SHALL REGULARLY INSPECT ALL ESC DEVICES AT A MINIMUM OF ONCE A WEEK AND AFTER EACH SIGNIFICANT SNOW MELT AND RAINFALL GREATER THAN 10MM TO ENSURE THAT ESC MEASURES ARE IN PROPER WORKING CONDITION. DURING INACTIVE PERIODS, WHEN THE SITE HAS LITTLE OR NO CONSTRUCTION ACTIVITY FOR 30 DAYS OR LONGER, A MONTHLY INSPECTION SHOULD BE CONDUCTED. ANY DAMAGES MUST BE REPAIRED WITHIN 48 HOURS BY THE CONTRACTOR.
6. EROSION AND SEDIMENT CONTROL INSPECTION REPORTS ARE TO BE SUBMITTED TO THE TOWN'S DEVELOPMENT INSPECTOR, THE LSJCA, AND ANY OTHER RELEVANT STAFF AS REQUIRED BY THE TOWN.
7. ALL CONSTRUCTION VEHICLES MUST ENTER AND EXIT THE SITE ONLY FROM THE APPROVED ACCESS ROUTES AS SHOWN ON THE PLAN. CONSTRUCTION ACCESS SHALL BE MAINTAINED TO THE SATISFACTION OF THE TOWN AND LSJCA. STREET SWEEPING MAY BE REQUIRED AS NEEDED.
8. THE CONTRACTOR SHALL ENDEAVOUR TO PREVENT MUD TRACKING ONTO EXISTING RIGHT-OF-WAYS AND SHALL PROVIDE FOR CLEAN UP AT OWNER'S EXPENSE AS DIRECTED BY THE CONSULTING ENGINEER/TOWN.
9. ALL TOPSOIL STOCKPILES AND/OR DISTURBED GROUND LEFT INACTIVE, OR TO BE LEFT INACTIVE, FOR OVER 30 DAYS SHALL BE STABILIZED, SUBJECT TO WEATHER CONDITIONS, BY SEEDING OR APPROVED EQUIVALENT TO THE SATISFACTION OF THE TOWN.
10. ALL TOPSOIL STOCKPILES SHALL BE SURROUNDED WITH SEDIMENT CONTROL FENCE. THE MAXIMUM SIDE SLOPES FOR STOCKPILES SHALL BE 3:1 (H) TO 1:1 (V). THE MAXIMUM HEIGHT OF STOCKPILE SHOULD GENERALLY NOT EXCEED 1.0 METRES.
11. THE ESC STRATEGIES OUTLINED ON THIS PLAN ARE NOT STATIC AND MAY NEED TO BE UPGRADED/DAMENDED AS SITE CONDITIONS CHANGE TO PREVENT SEDIMENT RELEASE TO THE NATURAL ENVIRONMENT.
12. CONTRACTOR TO CONFIRM THE LOCATION OF THE EXISTING UTILITIES PRIOR TO INITIATING ANY ON-SITE WORKS.
13. TREE REMOVALS TO BE COMPLETED IN ACCORDANCE WITH THE APPROVED ARBORIST REPORT ON LATEST ARRANGEMENT THEREOF. TREE REMOVALS WILL TAKE PLACE BEFORE TOPSOIL STRIPPING COMMENCES.
14. THE CONTRACTOR SHALL CARE AND CONTROL SPILLS, FLUIDS, AND MATERIALS DURING CONSTRUCTION TO MINIMIZE RISK TO THE ENVIRONMENT.

ESC STAGE 3 - SITE SERVICING AND ROADWORKS

1. CATCHBASIN SEDIMENT CONTROL DEVICES/SILT SACKS/ETC. FOR STREET CATCHBASINS AND DOUBLE CATCHBASINS TO BE INSTALLED IMMEDIATELY AFTER THE INSTALLATION OF THE CATCHBASINS.
2. STREET SWEEPING/CATCHBASIN CLEANING PROGRAM SHALL BE IMPLEMENTED TO THE SATISFACTION OF THE MUNICIPALITY. THIS SHALL BE THE RESPONSIBILITY OF THE DEVELOPER/UNIT ASSUMPTION.
3. TEMPORARY SEDIMENT TRAP TO REMAIN UNTIL SEWERS ARE INSTALLED AND/OR DRAINAGE AREA TO TEMPORARY SEDIMENT TRAP IS SIGNIFICANTLY REDUCED, AND/OR STABILIZED. TEMPORARY SEDIMENT CONTROL FENCE TO BE INSTALLED FOLLOWING REMOVAL OF SEDIMENT TRAP. TEMPORARY SEDIMENT TRAP TO BE DECOMMISSIONED IN THE FOLLOWING MANNER:
 - A. CONFIRM WEATHER FORECAST TO INSURE DRY CONDITIONS.
 - B. PUMP WATER FROM SEDIMENT TRAP TO SEDIMENT FILTER BAGS PLACED WITHIN VEGETATED AREA AS FAR FROM WATERCOURSE AS POSSIBLE, WHILE STILL ENSURING POSITIVE DRAINAGE AWAY FROM SITE.
 - C. CONTRACTOR TO MONITOR DRAINAGE.
 - D. CONTRACTOR TO ENSURE ADEQUATE AMOUNT OF SPARE FILTER BAGS ARE STORED ON SITE IN THE EVENT THAT BAGS ARE DAMAGED.
 - E. FILL TEMPORARY SEDIMENT TRAP WITH APPROVED MATERIAL FROM SITE.
 - F. AREA TO BE STABILIZED.

LSRCA STANDARD NOTES

1. ALL SEDIMENT CONTROL MEASURES SUCH AS SEDIMENT CONTROL FENCE, TEMPORARY PONDS, CONSTRUCTION ACCESS MATS, SEDIMENT TRAPS, SWALES AND CHECK DAMS MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
2. SEDIMENT CONTROL SHOULD BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT. REPAIRS TO ESC MEASURES MUST BE COMPLETED IN A TIMELY MANNER TO PREVENT SEDIMENT INFILTRATION.
3. ADDITIONAL MATERIALS SUCH AS CLEAR STONE, FILTER FABRIC, PUMPS, HOSES AND SILTSOCK TO BE KEPT ONSITE AT ALL TIMES FOR CONDUCTING REPAIRS TO SEDIMENT CONTROL MEASURES.
4. ALL DISTURBED AREAS LEFT INACTIVE FOR MORE THAN THIRTY DAYS ARE TO BE STABILIZED.
5. THE STABILIZATION SEED MIXTURE IS TO BE AS SPECIFIED ON THE EROSION AND SEDIMENT CONTROL PLAN.
6. THE STABILIZATION SEED MIXTURE IS TO BE APPLIED AT A MINIMUM RATE OF 25 kg/ha.
7. ENGINEER CHANGES TO THE ESC MEASURES MAY BE NEEDED AS SITE CONDITIONS CHANGE THROUGHOUT THE CONSTRUCTION PROCESS. THESE UPDATES MUST REFLECT BEST MANAGEMENT PRACTICES TO CONTROL SEDIMENT AND EROSION ONSITE AND SHOULD BE COMPLETED BASED ON DIRECTION FROM THE SITE ENGINEER. ADDITIONAL MEASURES MAY BE REQUIRED AS DIRECTED BY AN ENGINEER THROUGHOUT THE CONSTRUCTION PROCESS.
8. THE CONSTRUCTION ENTRANCE MAT IS TO BE INSTALLED AS THE FIRST STEP IN THE SITE ACTIVATION PROCESS.
9. SEDIMENT CONTROL FENCE IS TO BE INSTALLED DOWNSTREAM OF ALL DISTURBED AREAS. A DOUBLE ROW OF SEDIMENT CONTROL FENCE IS TO BE INSTALLED SURROUNDING ALL NATURAL HERITAGE FEATURES AND AS DIRECTED BY THE SITE ENGINEER. SEDIMENT CONTROL FENCE IS TO BE AS PER LSJCA STANDARD ESC-4 OR ESC-5 AS A MINIMUM. LIGHT DUTY SEDIMENT CONTROL FENCE IS NOT ACCEPTABLE.
10. CUT-OFF SWALES OR DITCHES TO BE INSTALLED AS SHOWN ON THE ESC PLANS AND AS NECESSARY BASED ON CHANGING SITE CONDITIONS TO DIRECT OVERLAND FLOW TO THE APPROPRIATE SEDIMENT TRAP OR TEMPORARY SEDIMENT POND.
11. CHECK DAMS ARE TO BE INSTALLED IN ALL SMALL AREAS ACCORDING WITH DRAWING (LSJCA ESC-4) AS A MINIMUM.
12. TEMPORARY SEDIMENT TRAPS ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION, IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT TRAP(S) DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES.
13. TEMPORARY SEDIMENT PONDS ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION, IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT POND(S) DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES.
14. FILTER SOCKS OR APPROVED EQUIVALENT TO BE INSTALLED DOWNSTREAM FROM SEDIMENT TRAP AND TEMPORARY SEDIMENT POND OUTLETS TO A MINIMUM HEIGHT OF 100MM.
15. IF STOPPIES ARE USED ON-SITE FOR THE STORAGE OF EXCESS MATERIAL, THEY ARE TO BE IN ACCORDANCE WITH DETAIL DRAWING LSJCA ESC-6 OR BETTER.
16. ANY DOWNSIDE OCCURRING ONSITE MUST BE IN ACCORDANCE WITH AN APPROVED DOWNSIDE PLAN. ADDITIONAL DOWNSIDE REQUIREMENTS MAY BE DEEMED NECESSARY AND SHALL BE IMPLEMENTED AS DIRECTED BY THE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY.
17. THE SITE SHALL BE LOCATED ONLY AT THE DESIGNATED LOCATION SHOWN ON THE PLAN.
18. EQUIPMENT AND HYDROCARBON STORAGE IS TO OCCUR ONLY WITHIN THE DESIGNATED AREA SHOWN ON THE PLAN.
19. REFUELING IS TO TAKE PLACE ONLY WITHIN THE DESIGNATED AREA SHOWN ON THE PLAN AND SHALL BE A MINIMUM OF THIRTY METRES FROM ANY WATERCOURSE OR ENVIRONMENTALLY SENSITIVE AREA.
20. AN APPROVED SPILL MANAGEMENT PLAN IS TO BE KEPT ONSITE.
21. SPILL CLEANUP EQUIPMENT SUCH AS ABSORBENT MEDIA IS TO BE MAINTAINED ONSITE FOR IMMEDIATE USE IN THE EVENT OF A SPILL.
22. SPILLS ARE TO BE REPORTED IMMEDIATELY TO THE MDEC SPILL ACTION CENTRE AT 1-800-388-6900.
23. THE CONTRACTOR WILL BE RESPONSIBLE FOR CLEAN-UP AND RESTORATION, INCLUDING ALL COSTS, DUE TO THE RELEASE OF SEDIMENT FROM THE SITE.
24. LOW IMPACT DEVELOPMENT (LID) MEASURES ARE NOT TO BE USED AS SEDIMENT CONTROL DEVICES.
25. ADDITIONAL SEDIMENT CONTROL DEVICES MAY BE DEEMED NECESSARY AND AS SITE CONDITIONS CHANGE AND SHALL BE INSTALLED AS DIRECTED BY THE SITE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY.

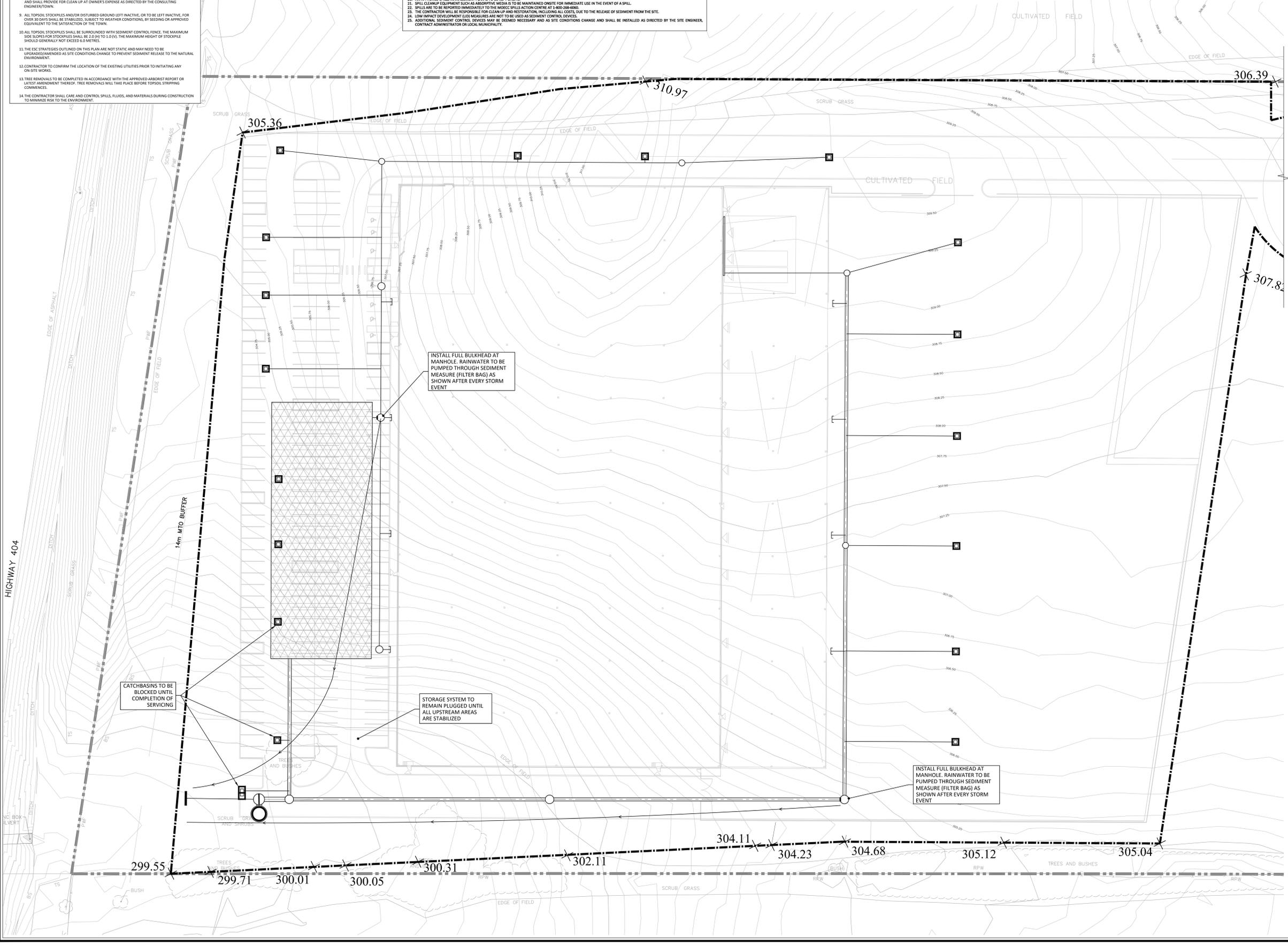


BENCHMARK: ELEV. 298.806
ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MTD BENCH MARK NO. 470-69 HAVING AN ELEVATION OF 298.806 METRES.

LEGEND:

- LIMIT OF PROPERTY
- EXISTING CONTOUR AND ELEVATION
- EXISTING FLOW DIRECTION
- - - ESC FENCE PER DETAIL ON ESC-5
- SWALE ELEVATION
- SWALE PER DETAIL ON ESC-5
- 2.60ha DRAINAGE AREA (HA)
- DRAINAGE BOUNDARY
- ROCK CHECK DAM
- ACCESS MUDMAT PER DETAIL ON ESC-5
- LOCKABLE GATE PER DETAIL ON ESC-5
- ST4 SEDIMENT TRAP PER DETAILS ON ESC-5
- CATCHBASIN SEDIMENT CONTROL DEVICE PER DETAILS ON ESC-5

RESTORATION NOTE
ALL DISTURBED GROUND LEFT INACTIVE, OR TO BE LEFT INACTIVE, FOR OVER 30 DAYS SHALL BE STABILIZED AS SOON AS POSSIBLE, SUBJECT TO WEATHER CONDITIONS, BY SEEDING OR AS ANNUAL RYE OR APPROVED EQUIVALENT TO THE SATISFACTION OF THE TOWN OF WHITCHURCH-STOUFFVILLE/LSJCA.



CATCHBASINS TO BE BLOCKED UNTIL COMPLETION OF SERVICING

INSTALL FULL BULKHEAD AT MANHOLE. RAINWATER TO BE PUMPED THROUGH SEDIMENT MEASURE (FILTER BAG) AS SHOWN AFTER EVERY STORM EVENT

STORAGE SYSTEM TO REMAIN PLUGGED UNTIL ALL UPSTREAM AREAS ARE STABILIZED

INSTALL FULL BULKHEAD AT MANHOLE. RAINWATER TO BE PUMPED THROUGH SEDIMENT MEASURE (FILTER BAG) AS SHOWN AFTER EVERY STORM EVENT

TOPOGRAPHIC SURVEY PROVIDED BY HOLDING JONES VANDERVEEN INC. JUNE 2021

No.	DESCRIPTION	DATE	BY	APPROVED
1	ISSUED FOR SPA	MAY 8/23	V.P.	

sgs consulting group inc.
30 CENTURIAN DRIVE, SUITE 500
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1000
FAX: (905) 475-8335

TOWN OF WHITCHURCH-STOUFFVILLE

GALATIA LANE ESTATES INC.
VANDORF - 15450 WOODBINE AVENUE
STAGE 3 EROSION AND SEDIMENT CONTROL PLAN

REGISTERED PROFESSIONAL ENGINEER
R. CHEW
100136982
MAY 8/23

DATE: MAY 2023	DESIGNED BY: V.P.	CHECKED BY: P.C.
SCALE: 1:300	DRAWN BY: V.P.	CHECKED BY: P.G.

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

Development Engineering Date

PROJECT NO: 2400
DRAWING NO: ESC-3

GENERAL NOTES

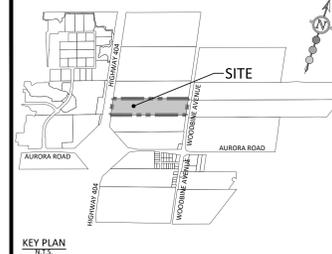
1. THE OWNER IS RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS FROM THE TOWN OF WHITCHURCH-STOUFFVILLE, LSRCA, AND OTHER EXTERNAL AGENCIES PRIOR TO ANY SITE ALTERATION ACTIVITY.
2. PRIOR TO COMMENCEMENT OF ANY ON-SITE WORK/TOPSOIL STRIPPING, EROSION & SEDIMENT CONTROL (ESC) MEASURES, AS PER APPROVED SITE ALTERATION PLAN, MUST BE INSTALLED AND APPROVED BY THE TOWN. ADDITIONAL ESC MEASURES, IF REQUIRED, SHALL BE INSTALLED AS DIRECTED BY THE TOWN. THE ESC MEASURES SHALL REMAIN IN PLACE UNTIL DIRECTED BY THE TOWN FOR THEIR REMOVAL.
3. NO CONSTRUCTION ACTIVITY OR MACHINERY SHALL BE ALLOWED BEYOND THE SEDIMENT CONTROL/SNOW FENCE OR LIMITS OF THE SUBDIVISION, UNLESS WRITTEN PERMISSION HAS BEEN OBTAINED FROM LANDOWNERS.
4. THE CONTRACTOR IS RESPONSIBLE TO IMPLEMENT DUST CONTROL MEASURES AND CONSTRUCTION PRACTICE GUIDELINES AS APPROVED BY THE TOWN AND LSRCA.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL ESC MEASURES IN WORKING CONDITIONS AT ALL TIMES TO THE SATISFACTION OF THE TOWN. THE OWN CONSULTANTS SHALL ROUTINELY INSPECT ALL ESC DEVICES AT A MINIMUM OF ONCE A WEEK AND AFTER EACH SIGNIFICANT SNOW MELT AND RAINFALL GREATER THAN 10MM TO ENSURE THAT ESC MEASURES ARE IN PROPER WORKING CONDITION. DURING INACTIVE PERIODS, WHEN THE SITE HAS LITTLE OR NO CONSTRUCTION ACTIVITY FOR 30 DAYS OR LONGER, A MONTHLY INSPECTION SHOULD BE CONDUCTED. ANY DAMAGES MUST BE REPAIRED WITHIN 48 HOURS BY THE CONTRACTOR.
6. EROSION AND SEDIMENT CONTROL INSPECTION REPORTS ARE TO BE SUBMITTED TO THE TOWN'S DEVELOPMENT INSPECTOR, THE LSRCA, AND ANY OTHER RELEVANT STAFF AS REQUIRED BY THE TOWN.
7. ALL CONSTRUCTION VEHICLES MUST ENTER AND EXIT THE SITE ONLY FROM THE APPROVED ACCESS ROUTES AS SHOWN ON THE PLAN. CONSTRUCTION ACCESS WILL BE MAINTAINED TO THE SATISFACTION OF THE TOWN AND LSRCA. STREET SWEEPING MAY BE REQUIRED AS NEEDED.
8. THE CONTRACTOR SHALL ENDEAVOUR TO PREVENT MUD TRACKING ONTO EXISTING RIGHT-OF-WAYS AND SHALL PROVIDE FOR CLEAN UP AT OWNER'S EXPENSE AS DIRECTED BY THE CONSULTING ENGINEER/TOWN.
9. ALL TOPSOIL STOCKPILES AND/OR DISTURBED GROUND LEFT INACTIVE, OR TO BE LEFT INACTIVE, FOR OVER 30 DAYS SHALL BE STABILIZED, SUBJECT TO WEATHER CONDITIONS, BY SEEDING OR APPROVED EQUIVALENT TO THE SATISFACTION OF THE TOWN.
10. ALL TOPSOIL STOCKPILES SHALL BE SURROUNDED WITH SEDIMENT CONTROL FENCE. THE MAXIMUM SIDE SLOPES FOR STOCKPILES SHALL BE 3:1 (H) TO 1:0 (V). THE MAXIMUM HEIGHT OF STOCKPILE SHOULD GENERALLY NOT EXCEED 1.0 METRES.
11. THE ESC STRATEGIES OUTLINED ON THIS PLAN ARE NOT STATIC AND MAY NEED TO BE UPGRADDED/AMENDED AS SITE CONDITIONS CHANGE TO PREVENT SEDIMENT RELEASE TO THE NATURAL ENVIRONMENT.
12. CONTRACTOR TO CONFIRM THE LOCATION OF THE EXISTING UTILITIES PRIOR TO INITIATING ANY ON-SITE WORKS.
13. TREE REMOVALS TO BE COMPLETED IN ACCORDANCE WITH THE APPROVED ARBORIST REPORT ON LATEST ARRANGEMENT THEREOF. TREE REMOVALS WILL TAKE PLACE BEFORE TOPSOIL STRIPPING COMMENCES.
14. THE CONTRACTOR SHALL CARE AND CONTROL SPILLS, FLUIDS, AND MATERIALS DURING CONSTRUCTION TO MINIMIZE RISK TO THE ENVIRONMENT.

ESC STAGE 3 - SITE SERVICING AND ROADWORKS

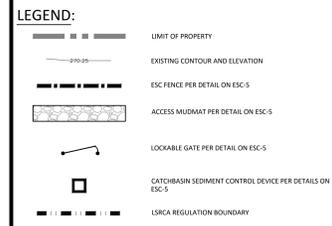
1. CATCHBASIN SEDIMENT CONTROL DEVICES/SILT SACKS/ETC. FOR STREET CATCHBASINS AND DOUBLE CATCHBASINS TO BE INSTALLED IMMEDIATELY AFTER THE INSTALLATION OF THE CATCHBASINS.
2. STREET SWEEPING/CATCHBASIN CLEANING PROGRAM SHALL BE IMPLEMENTED TO THE SATISFACTION OF THE MUNICIPALITY. THIS SHALL BE THE RESPONSIBILITY OF THE DEVELOPER/UTIL ASSOCIATION.
3. TEMPORARY SEDIMENT TRAP TO REMAIN UNTIL SEWERS ARE INSTALLED AND/OR DRAINAGE AREA TO TEMPORARY SEDIMENT TRAP IS SIGNIFICANTLY REDUCED, AND/OR STABILIZED. TEMPORARY SEDIMENT CONTROL FENCE TO BE INSTALLED FOLLOWING REMOVAL OF SEDIMENT TRAP. TEMPORARY SEDIMENT TRAP TO BE DECOMMISSIONED IN THE FOLLOWING MANNER:
 - A. CONFIRM WEATHER FORECAST TO INSURE DRY CONDITIONS.
 - B. PUMP WATER FROM SEDIMENT TRAP TO SEDIMENT FILTER BAGS PLACED WITHIN VEGETATED AREA AS FAR FROM WATERCOURSE AS POSSIBLE, WHILE STILL ENSURING POSITIVE DRAINAGE AWAY FROM SITE.
 - C. CONTRACTOR TO MONITOR DRAINAGE.
 - D. CONTRACTOR TO ENSURE ADEQUATE AMOUNT OF SPARE FILTER BAGS ARE STORED ON SITE IN THE EVENT OF UNEXPECTED DRAINAGE.
 - E. FILL TEMPORARY SEDIMENT TRAP WITH APPROVED MATERIAL FROM SITE.
 - F. AREA TO BE STABILIZED.

LSRCA STANDARD NOTES

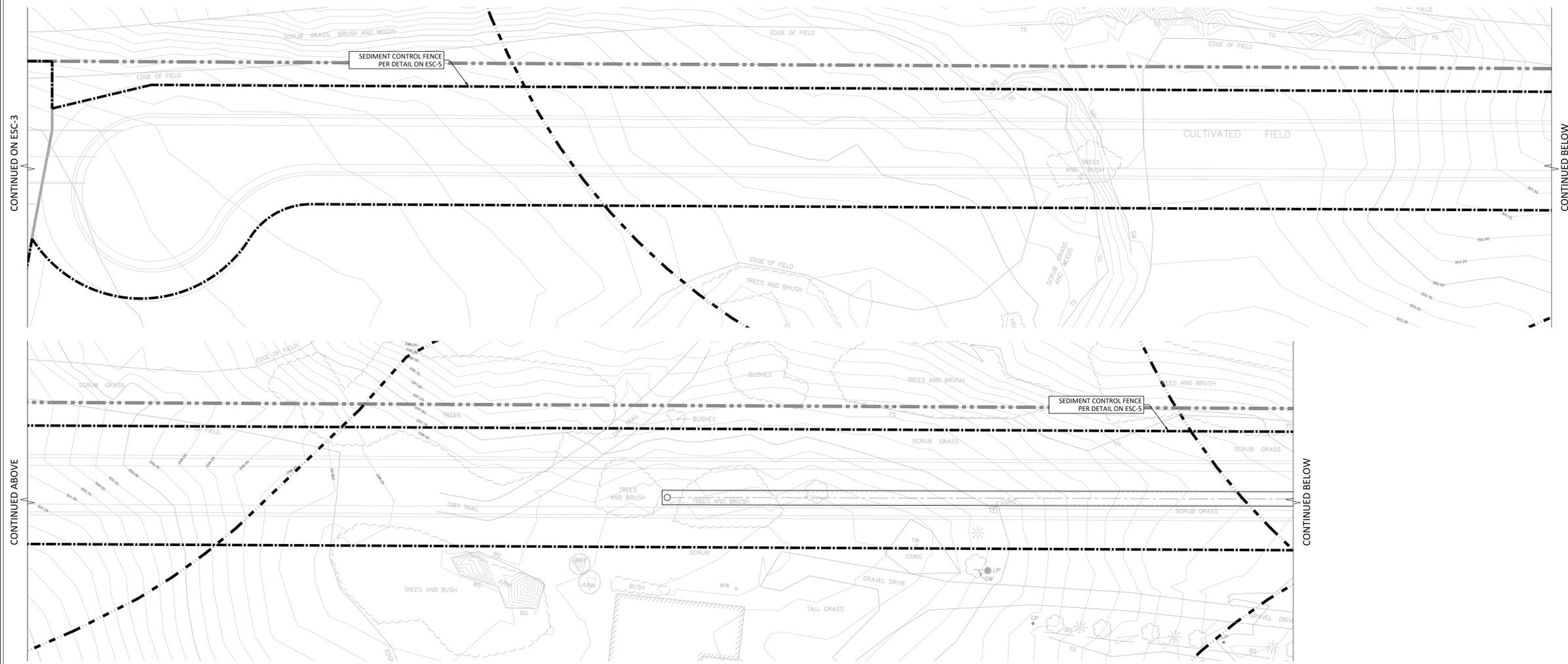
1. ALL SEDIMENT CONTROL MEASURES SUCH AS SEDIMENT CONTROL FENCE, TEMPORARY PONDS, CONSTRUCTION ACCESS MATS, SEDIMENT TRAPS, SWALES AND CHECK DAMS MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
2. SEDIMENT CONTROL DEVICES SHOULD BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT. REPAIRS TO ESC MEASURES MUST BE COMPLETED IN A TIMELY MANNER TO PREVENT SEDIMENT MIGRATION.
3. ADDITIONAL MATERIALS SUCH AS CLEAR STONE, FILTER FABRIC, PUMPS, HOSES AND SILTBOX TO BE KEPT ONSITE AT ALL TIMES FOR CONDUCTING REPAIRS TO SEDIMENT CONTROL MEASURES.
4. ALL DISTURBED AREAS LEFT INACTIVE FOR MORE THAN THIRTY DAYS ARE TO BE STABILIZED.
5. THE STABILIZATION SEED MIXTURE IS TO BE AS SPECIFIED ON THE EROSION AND SEDIMENT CONTROL PLAN.
6. THE STABILIZATION SEED MIXTURE IS TO BE APPLIED AT A MINIMUM RATE OF 25 kg/m².
7. ENGINEERED CHANGES TO THE ESC MEASURES MAY BE NEEDED AS THE CONDITIONS CHANGE THROUGHOUT THE CONSTRUCTION PROCESS. THESE UPDATES MUST REFLECT BEST MANAGEMENT PRACTICES TO CONTROL SEDIMENT AND EROSION ON SITE AND SHOULD BE COMPLETED BASED ON DIRECTION FROM THE SITE ENGINEER. ADDITIONAL MEASURES MAY BE REQUIRED AS DIRECTED BY AN ENGINEER THROUGHOUT THE CONSTRUCTION PROCESS.
8. THE CONSTRUCTION ENTRANCE MAT IS TO BE INSTALLED AS THE FIRST STEP IN THE SITE ALTERATION PROCESS.
9. SEDIMENT CONTROL FENCE IS TO BE INSTALLED DOWNSTREAM OF ALL DISTURBED AREAS. A DOUBLE ROW OF SEDIMENT CONTROL FENCE IS TO BE INSTALLED SURROUNDING ALL NATURAL HERITAGE FEATURES AND AS DIRECTED BY THE SITE ENGINEER. SEDIMENT CONTROL FENCE IS TO BE AS PER LSRCA STANDARD ESC-4 OR ESC-5 AS A MINIMUM. LIGHT DUTY SEDIMENT CONTROL FENCE IS NOT ACCEPTABLE.
10. CUT-OFF SWALES OR DITCHES ARE TO BE INSTALLED AS SHOWN ON THE ESC PLANS AND AS NECESSARY BASED ON CHANGING SITE CONDITIONS TO DIRECT OVERLAND FLOW TO THE APPROPRIATE SEDIMENT TRAP OR TEMPORARY SEDIMENT CONTROL FENCE.
11. CHECK DAMS ARE TO BE INSTALLED IN ALL SWALES AND DITCHES IN ACCORDANCE WITH DRAWING (LSRCA ESC-5) AS A MINIMUM.
12. TEMPORARY SEDIMENT TRAPS ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION, IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT TRAP(S) DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES.
13. TEMPORARY SEDIMENT PONDS ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION, IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT PONDS DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES.
14. FILTERBOX OR APPROVED EQUIVALENT TO BE INSTALLED DOWNSTREAM FROM SEDIMENT TRAP AND TEMPORARY SEDIMENT POND OUTLETS TO A MINIMUM HEIGHT OF 100MM.
15. IF STOPPILES ARE USED ON SITE FOR THE STORAGE OF EXCESS MATERIAL, THEY ARE TO BE IN ACCORDANCE WITH DETAIL DRAWING LSRCA ESC-6 OR BETTER.
16. ANY DOWNSTREAM OCCURRENCE OF SITE MUST BE IN ACCORDANCE WITH AN APPROVED DRAINAGE PLAN. ADDITIONAL DRAINAGE REQUIREMENTS MAY BE DEEMED NECESSARY AND SHALL BE IMPLEMENTED AS DIRECTED BY THE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY.
17. THE SITE TRAILER IS TO BE LOCATED ONLY AT THE DESIGNATED LOCATION SHOWN ON THE PLAN.
18. EQUIPMENT AND HYDROCARBON STORAGE IS TO OCCUR ONLY WITHIN THE DESIGNATED AREA SHOWN ON THE PLAN.
19. REVERSING IS TO TAKE PLACE ONLY WITHIN THE DESIGNATED AREA SHOWN ON THE PLAN AND SHALL BE A MINIMUM OF THIRTY METRES FROM ANY WATERCOURSE OR ENVIRONMENTALLY SENSITIVE AREA.
20. AN APPROVED SPILL MANAGEMENT PLAN IS TO BE KEPT ONSITE.
21. SPILL CLEANUP EQUIPMENT SUCH AS ABSORBENT MEDIA IS TO BE MAINTAINED ONSITE FOR IMMEDIATE USE IN THE EVENT OF A SPILL.
22. SPILLS ARE TO BE REPORTED IMMEDIATELY TO THE LSRCA SPILL ACTION CENTRE AT 1-800-386-6900.
23. THE CONTRACTOR WILL BE RESPONSIBLE FOR CLEAN-UP AND RESTORATION, INCLUDING ALL COSTS, DUE TO THE RELEASE OF SEDIMENT FROM THE SITE.
24. LOW IMPACT DEVELOPMENT (LID) MEASURES ARE NOT TO BE USED AS SEDIMENT CONTROL DEVICES.
25. ADDITIONAL SEDIMENT CONTROL DEVICES MAY BE DEEMED NECESSARY AND AS SITE CONDITIONS CHANGE AND SHALL BE INSTALLED AS DIRECTED BY THE SITE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY.



BENCHMARK: ELEV. 298.806
ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MTD BENCH MARK NO. 470-69 HAVING AN ELEVATION OF 298.806 METRES.



RESTORATION NOTE
ALL DISTURBED GROUND LEFT INACTIVE, OR TO BE LEFT INACTIVE, FOR OVER 30 DAYS SHALL BE STABILIZED AS SOON AS POSSIBLE, SUBJECT TO WEATHER CONDITIONS, BY SEEDING OR EQUIVALENT TO THE SATISFACTION OF THE TOWN OF WHITCHURCH-STOUFFVILLE/LSRCA.



TOPOGRAPHIC SURVEY PROVIDED BY HOLDING JONES VANDERVEEN INC. JUNE 2021

REVISIONS				
No.	DESCRIPTION	DATE	BY	APPROVED
1	ISSUED FOR SPA	MAY 8/23	V.P.	

SGS consulting group Ltd
30 CENTURIAN DRIVE, SUITE 500
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-3900
FAX: (905) 475-8335

TOWN OF WHITCHURCH-STOUFFVILLE

GALATIA LANE ESTATES INC.

VANDORF - 15450 WOODBINE AVENUE

STAGE 3 EROSION AND SEDIMENT CONTROL PLAN - ROADS

DATE: MAY 2023 DESIGNED BY: V.P. CHECKED BY: P.C.
SCALE: 1:300 DRAWN BY: V.P. CHECKED BY: P.G.

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

Development Engineering Date: PROJECT No: **2400**
DRAWING No: **ESC-4**

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

