



# 953 Maplevue Drive E – Block 193 Site Plan

Maplevue South (Innisfil) Ltd.

## Detailed Stormwater Management Report

June 2024

**The Jones Consulting Group Ltd.  
229 Maplevue Drive East, Barrie ON L4N 0W5**

**REI-17055 (70)**



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## Disclaimer

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# Detailed Stormwater Management Report

Mapleview South (Innisfil) Ltd. – Block 193 Site Plan

953 Mapleview Drive East, City of Barrie

## 1. Introduction

### 1.1. Appointment

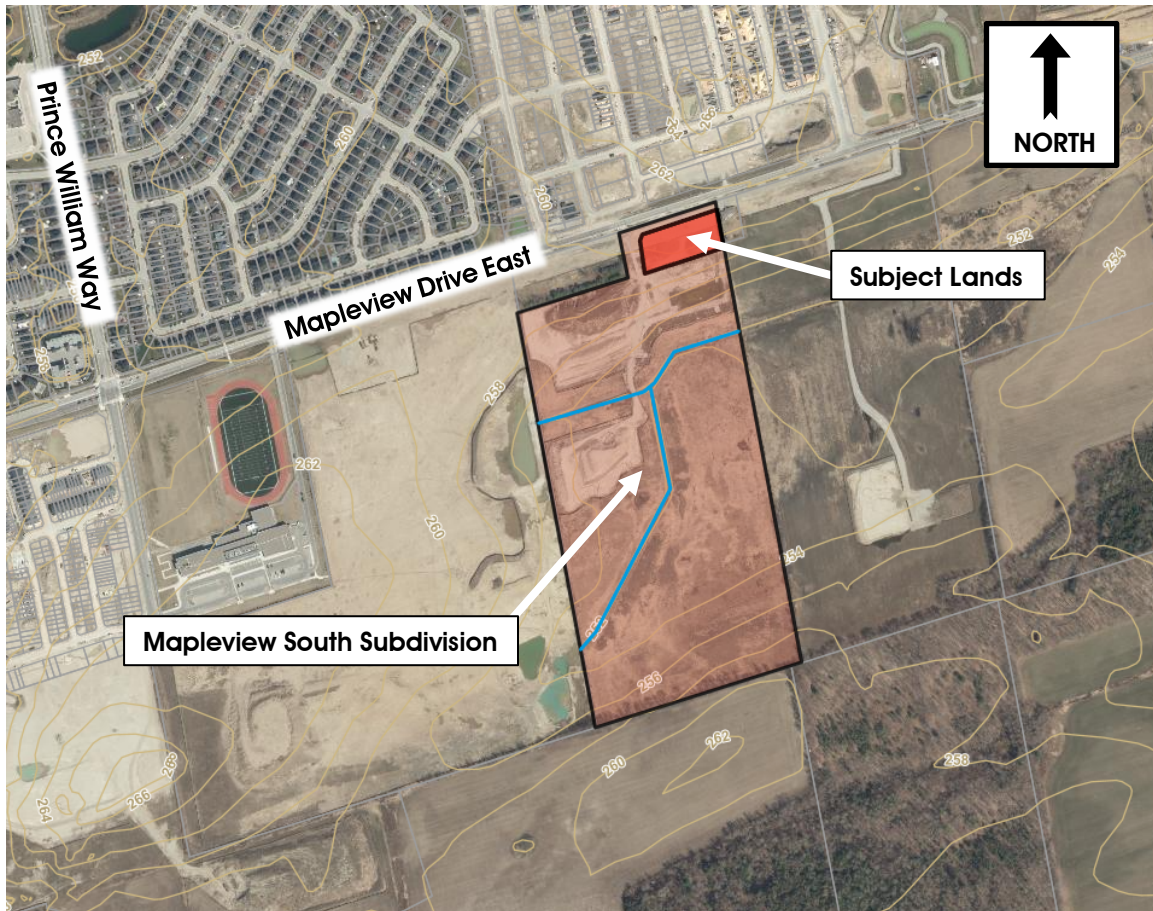
The Jones Consulting Group Ltd. (TJCG) was retained by Mapleview South (Innisfil) LTD. (Client) to provide engineering services for a proposed residential subdivision development located in the Hewitt's Secondary Plan Area (HSPA) southeast of Mapleview Drive and Prince William Way in the City of Barrie (City). The subdivision is to be known as the Mapleview South Subdivision. This Report pertains to the Block 193 Site Plan located in the northeast corner of the overall subdivision, east of Dallaire Street.

This *Detailed Stormwater Management Report* (DSWMR) has been prepared in support of the 953 *Mapleview Drive – Block-193 Site Plan* prepared by S&C Architects Inc., dated June 6<sup>th</sup>, 2024, and demonstrates how the lands will be serviced in regard to stormwater management. Block 193 is part of the overall *Mapleview South Draft Plan of Subdivision* prepared by TJCG, dated December 22, 2022.

### 1.2. Property Description

Block 193 is generally rectangular in shape and is comprised of approximately 0.63 hectares (ha) of land. The subject property is legally described as Part of Lot 19, Concession 11, Geographic Township of Innisfil, in the City of Barrie, County of Simcoe. A copy of the 953 *Mapleview Drive – Block-193 Site Plan* prepared by S&C Architects Inc. and the proposed *Draft Plan of Subdivision* prepared by The Jones Consulting Group for the overall subdivision lands have been attached in **Appendix D**.

The site is situated southeast of the intersection of Mapleview Drive East and Prince William Way. It is bound to the north by Mapleview Drive East, to the east by a Future Residential Subdivision (Sandy Creek Subdivision), and to the south and west by a Future Residential Subdivision (Mapleview South Subdivision). The location of the subject property is shown in **Figure 1**.



**Figure 1 - Site Location**

The existing site topography ranges in elevation from a maximum elevation of 261 meters at the northeast corner of the site adjacent to the Mapleview Drive East to a minimum elevation of 259 meters near the southern boundary of the block. Sandy Cove Creek generally drains from southwest to northeast, with the subject lands draining from the north and south towards the creek. Existing slopes range from 1% to 7%.

### **1.3. Existing and Proposed Land Use**

The lands were previously used for agricultural practices comprised of mainly pasture and seasonal crops. There was a single detached dwelling unit and agricultural storage structures fronting onto Mapleview Drive East which were demolished in 2019. The branch of Sandy Cove Creek/Redfern Channel traverses the Mapleview South Subdivision from southwest to northeast. Drainage of the subject lands in its previous condition was directed southerly to these watercourses.



The site is designated as residential per the City of Barrie Official Plan 2051, Council adopted Version February 15, 2022. A Zoning By-Law Amendment was executed under By-Law Number 2022-054 and the site is currently zoned as Neighbourhood Mixed Use (NMU). The Block 193 Site Plan proposes the development of a 100-unit, 5 storey apartment building with a commercial area dedication, above and below ground surface parking, an outdoor amenity area, and internal roadway/fire route.

#### **1.4. Supporting Documents**

The following documents have been referenced in the preparation of this report:

- Mapleview South (Innisfil) Ltd. Functional Servicing Report, The Jones Consulting Group, June 2023;
- Mapleview South (Innisfil) Ltd. Detailed Stormwater Management Report, The Jones Consulting Group, June 2023;
- 969,979 & 989 Mapleview Drive East Stormwater Management Report, Tatham Engineering, November 2023;
- Hewitt's Secondary Plan Area Subwatershed Impact Study, Lover's, Hewitt's and Sandy Cove Creeks, R.J. Burnside & Associates Ltd., September 2016;
- Mapleview South (Innisfil) Ltd. 953 Mapleview Drive, Barrie, Ontario, Proposed Draft Plan of Subdivision, The Jones Consulting Group, Dec. 22, 2022;
- 953 Mapleview Drive – Block-193 Site Plan, S&C Architects Inc., June 6, 2024;
- City of Barrie, Stormwater Infrastructure Design Standard, D700 June 2023;
- City of Barrie, Hewitt's Secondary Plan Transportation Improvements Municipal Class Environmental Assessment, Phases 3 & 4, adopted by council June 19, 2017;
- City of Barrie, Secondary Plan, Background Studies & Infrastructure Master Plan, Intensification and Annexed Lands, AMEC, October 2013;
- Lake Simcoe Region Conservation Authority, Watershed Development Guidelines, April 2015;
- Lake Simcoe Region Conservation Authority, Barrie Creeks, Lovers Creek and Hewitt's Creek Subwatershed Plan, 2012;
- Lake Simcoe Region Conservation Authority, Technical Guidelines for Stormwater Management Submissions, September 2016;



- Lake Simcoe Region Conservation Authority Phosphorus Offsetting Policy, July 2021;
- Credit Valley Conservation Authority & Toronto Region Conservation Authority, Low Impact Development Stormwater Management Planning and Design Guide, 2010;
- Sustainable Technologies Evaluation Program (Step), Evaluation of Residential Lot Level Stormwater Management Practices, 2013;
- Ministry of the Environment, Lake Simcoe Protection Plan, July 2009;
- Ministry of the Environment, Stormwater Management Planning and Design Manual, March 2003;
- Ministry of Transportation, Drainage Management Manual, February 2008;
- Geotechnical Investigation Report, Maplevue South Development, Cambium Inc., December 2018;
- Hydrogeological Assessment, Maplevue South (Innisfil) Ltd., R.J. Burnside & Associates Limited, May 2023;
- Geotechnical Investigation Report – Maplevue South Development Block A (193), Barrie, Ontario, Cambium Inc., June 2024;
- Hydrogeological Brief – Block 193 953 Maplevue Drive, R.J. Burnside & Associates Limited, June 2024;
- Functional Servicing & Stormwater Management Report, 969, 979 & 989 Maplevue Drive East Phase 1, Tatham Engineering Ltd, February 2022;
- Stormwater Management Report, 883 Maplevue Drive East Proposed Residential Subdivision, Schaeffers Consulting Engineers, April 2022.



## 2. Approval Agencies & Design Criteria

The proposed development is subject to the policies and requirements of the City of Barrie (City), the Lake Simcoe Region Conservation Authority (LSRCA), and the Ministry of the Environment Conservation and Parks (MOE) with respect to drainage and stormwater management.

### 2.1. City of Barrie

The stormwater drainage recommendations for the proposed development have been designed to adhere to the City of Barrie's *Storm Drainage and Stormwater Management Policies and Design Guidelines* (March 2023).



The City's document was prepared to reflect current accepted design practices and is intended as a guide to provide a solid engineering basis for storm drainage and stormwater management design, to establish uniform guidelines of minimum standards, and to improve the processing of site plan and plan of subdivision applications for approval in the City. The document provides legal and technical requirements specific to stormwater drainage systems, stormwater management systems, site grading, minimum requirements for erosion & sediment control, guidelines for hydrologic and hydraulic analysis, and stormwater quantity & quality control techniques, among other topics.

### 2.2. Lake Simcoe Region Conservation Authority (LSRCA)

The subject site is located within the Hewitt's Creek Subwatershed, which is part of the larger Lake Simcoe Watershed, located within the Lake Simcoe Region



**Lake Simcoe Region**  
conservation authority

Conservation Authority's (LSRCA) jurisdiction. Parts of the site are located within Regulated Areas Pursuant to *Ontario Regulations 179/06*. As such, it is expected that the LSRCA will require the stormwater management plan to adhere to the LSRCA *Technical Guidelines for Stormwater Management Submissions* (September 2016) as well as conform to the recommendations of the MOE *Stormwater Management Planning and Design Manual* (March 2003).

The goal of Stormwater Management is to mitigate the effects of urbanization on the hydrologic cycle including increased runoff and decreased infiltration, of rain and snowmelt. The LSRCA *Watershed Development Policies* and *Stormwater Management Technical Guidelines* provide a framework for the planning and design of major development projects adjacent to naturalized





areas as well as the design of stormwater management infrastructure to address flooding, water quality, erosion, water balance, and natural heritage.

The LSRCA Technical Guidelines no longer follow a traditional approach to the development of stormwater management infrastructure. The Technical Guidelines provide guidance in developing an effective approach to stormwater management which follows Better Site Design Techniques developed by the Minnesota Pollution Control Agency's *Minnesota Stormwater Manual* (2016). Better Site Design involves techniques applied early in the planning and design process to preserve natural areas, reduce impervious cover, redistribute runoff and use pervious areas to more effectively treat stormwater runoff. A major difference between the traditional development process and Better Site Design process is the implementation of Low Impact Development (LID) measures. The focus of design has shifted to treating and utilizing rainfall as soon as it hits the ground, reducing and controlling runoff volume and mimicking natural hydrology rather than simply conveying runoff.

### **2.3. Ministry of the Environment, Conservation and Parks (MECP)**

Stormwater management proposals for developments are to be consistent with the guidelines of the MECP's *Stormwater Management Planning and Design Manual* (March 2003), in an effort to mitigate against any negative effects on the receiving waters of Sandy Cove Creek resulting from increased urbanization.



### **2.4. Ministry of Natural Resources & Forestry (MNRF)**

The Ministry of Natural Resources and Forestry (MNRF) is the authority having jurisdiction on a provincial level with regards to development adjacent to and within floodplains. Through a series of provincial policy statements and Technical Guideline publications on Natural Hazards, Flooding, and Official Plan Flood



Limit Policies, the MNRF through its water management program aims to support development applications which are sustainable and do not create an additional public threat.

According to the provincial policy statement on public health and safety issued under the *Planning Act*, the "province's long-term economic prosperity, environmental health, and social well-being depend on reducing the potential for public costs and risk to Ontario's residents by directing development away from areas where there is a risk to public health and safety or a risk



of property damage”. The policy generally states that development will be diverted to areas outside of hazardous lands adjacent to river and stream systems which are impacted by flooding and/or erosion hazards.

## 2.5. Ministry of Transportation (MTO)

The Ministry of Transportation (MTO) provides design guidance through a series of publications including the *Drainage Management Manual* and the Ministry's *Drainage Directives*.



These documents provide users with tools and guidance for the hydrologic and hydraulic analysis of systems to analyze the potential hazards to the travelling public and ensure the longevity of critical infrastructure such as bridges and culverts.

## 2.6. Stormwater Management, Flood & Erosion Protection Design Criteria

The Flood & Erosion Protection and the Drainage & Conveyance design criteria within the City of Barrie are established by the Lake Simcoe Region Conservation Authority (LSRCA), Ministry of Transportation (MTO), Ministry of Environment Conservation and Parks (MECP), Ministry of Natural Resources & Forestry (MNRF) and the City of Barrie (City) engineering design standards. This section outlines the key design criteria as follows:

- City of Barrie *Storm Drainage & Stormwater Management Policies & Design Guidelines* (March 2023) as follows:
  - *Water Quality & Erosion Control* including;
    - Developments  $\geq 5$  Ha shall implement measures to detain and store the runoff from the 25mm event and release it over a minimum of 24 hours, and;
    - Phosphorus loadings projected under post-development conditions shall be minimized to limit the impacts on receiving watercourses and Lake Simcoe;
  - *Quantity Control (Flood Protection)* requires the control of post-development peak flow rates to pre-development levels;
  - *Water Balance* is required for all new developments  $\geq 5$  Ha where infiltration and recharge is promoted on-site to match pre-development annual infiltration volumes in the post-development condition;





- *Receiving Watercourses* are required in general to be maintained in their natural state, keeping with pre-development base flows and velocities;
- *Stormwater Management Facilities* cannot be constructed within the 100 year floodplain, and may only be constructed within the Regional floodplain if permitted by the City and Conservation Authority;
- *Erosion & Sediment Control* measures shall be implemented to minimize the impact of erosion and sediments leaving disturbed sites to receiving systems.
- *LSRCA Technical Guidelines for Stormwater Management Submissions (April 2022) – Sections 3, 4 & 5* as follows:
  - *Stormwater Quantity Control* including;
    - Peak Flow Control – post-development peak flow rates are not to exceed the corresponding pre-development peak flow rate for the 2, 5, 10, 25, 50 and 100 year storm events;
    - Runoff Volume Control – New developments that create more than 0.5 Ha of new impervious surface shall capture, treat and retain the runoff volume generated from the 25mm storm event from the total impervious area to be developed. Note '*Sites with Restrictions*' – Section 3.2.6.;
    - Major-Minor System Conveyance – The minor system is designed to convey more frequent events (1:5 Year Storm) while the major system conveys runoff from infrequent events (1:100 Year Storm) when the minor system's capacity is exceeded, and;
    - Regulatory Storm Conveyance – Where there is an external drainage area flowing through a site, the developer must demonstrate safe conveyance of the Regulatory Storm (Hurricane Hazel or 100-year storm, which ever produces a greater peak flow) to a sufficient outlet.
  - *Stormwater Quality Control* including;
    - MOE Enhanced Level of Protection corresponding to an 80% long term average removal of Total Suspended Solids (TSS);
    - An 80% reduction of Total Phosphorus load anticipated on an annual basis under Post-Development conditions;
    - Protection of fresh water sources (surface and ground-based) from Winter Salts;
    - Thermal mitigation where required to provide cooling of SWM Facility discharge to limit the impacts to receiving streams, and;



- A screening against any additional contaminants which may be generated from proposed land uses beyond what has been described earlier.
- *Stream Erosion Control* typically requires the detention of the runoff produced from the 25mm storm event and release over a period of at least 24 hours. In general, *Stream Erosion Control* is achieved by meeting the SWM Quality Control design criteria for the drawdown time from the end-of-pipe SWMF.
- *Water Balance / Groundwater Recharge* is to be maintained to the maximum extent possible where post-development annual infiltration volumes should meet pre-development levels.
- *Erosion & Sediment Control* measures should be instituted prior to site disturbance and should remain in place and in good working order until the subject lands have been re-stabilized.
- MTO Drainage Management Manual (1997)
- MTO Drainage Design Standards (2008)
- MOE Stormwater Management Planning and Design Manual (2003)



### 3. Site Physiography & Background Studies

#### 3.1. Subwatershed Impact Study

The *Hewitt's Secondary Plan Area Subwatershed Impact Study* (September 2016, Rev. 2017) prepared by RJ Burnside & Associates Ltd. detailed the preliminary approach to stormwater management for each of the subwatersheds and subcatchments within the *Hewitt's Secondary Plan*. The subject lands are identified under the SIS as part of *Post Development Catchment 12*. The following is a summary of the recommended approach established in the SIS for Catchment 12:

*SWMF#12 is proposed to be located in the Phase 3 lands of the Finger Lake Development between the south side of Mapleview Drive and Sandy Cove Creek in an area of relatively steep grades sloping away from Mapleview Drive. The intent of the facility is to provide treatment for Phase 1 portions of the non-participating landowner to the west of Finger Lakes property and for the Phase 1 and Phase 3 lands (north of Sandy Cove Creek) Finger Lakes property.*

*The entirety of the catchment area consists of residential development and there may be an opportunity to collect drainage from Mapleview Drive ROW and direct the flow into the SWMF, however additional P removal and infiltration to meet LSRCA guideline should be provided within the ROW. We have not included any part of the external ROW runoff in the digital model to SWMF#12 at this time as the majority of this area receives quality control treatment from the existing OGS at Hewitt's Creek.*

*The preliminary design for this facility is provided by the Finger Lakes consultant and is currently proposed to be oriented in a east-west direction, and meets all the requirements for the length to width ratio's recommended by the MOECC. The SWMF is proposed to have a wet forebay at the west end, with a main cell extending to either side of the north south collector road proposed. The two portions of the main cell are to be connected with an equalization pipe.*

*The SWMF and block are adequately sized for the drainage area but there is currently not a significant opportunity to reduce the facility size within the block or to reconfigure the shape to allow for more development lots due to the selected location and grading.*

*As the portion of Sandy Cove Creek which sits immediately south of the proposed SWMF location is currently part of the Redfern Municipal Drain, there is an opportunity to*



*relocate the watercourse channel to a location which may provide a more advantageous development configuration. The current SWMF location results in some grading and servicing challenges which could be avoided by relocating the Creek. A portion of the Creek on the adjacent Dorsay Lands is to be relocated south, and coordination will be required to ensure a proper transition is provided.*

Furthermore, based on preliminary investigations and background data, the SIS identifies the following opportunities and constraints for implementing LID's within Catchment 12:

*Although the catchment is dominated by sandy loam soils, the area also contains high groundwater levels on the southern, lower half of the site. The entire catchment is within the SGRA and there are no park or school blocks to utilize for LID. As such, the following are the LID recommendations for the catchment:*

- 5 mm target should be pursued at detailed design for the implementation of infiltration LID measures.*
- The remainder of the target is to be achieved through filtration and attenuation measures.*
- Due to the presence of the SGRA, infiltration LIDs within ROW must consider water quality issues including the potential for pre-treatment. Use of CB inserts and deepened sumps where ROW infiltration measures are to be implemented.*
- Use of shallow LID options (located all or partially above the frost line) to increase opportunities.*
- Placement of LID measures where feasible within Sandy Cove Creek stream corridor.*
- Consider the use of a 3<sup>rd</sup> pipe roof drainage clean water exfiltration in SGRA areas where pre-treatment is not feasible or cost prohibitive.*
- LIDs are to be provided to achieve groundwater balance volumes as outlined in Section 4.6.3. to the extent possible.*
- Additional topsoil depths of 300mm, as outlined in Section 5.5.2.1., on all of the proposed lots within this area could provide some level of infiltration and peak flow reduction, however there is currently no credit for this method.*



### **The SIS final recommendations for Catchment 12:**

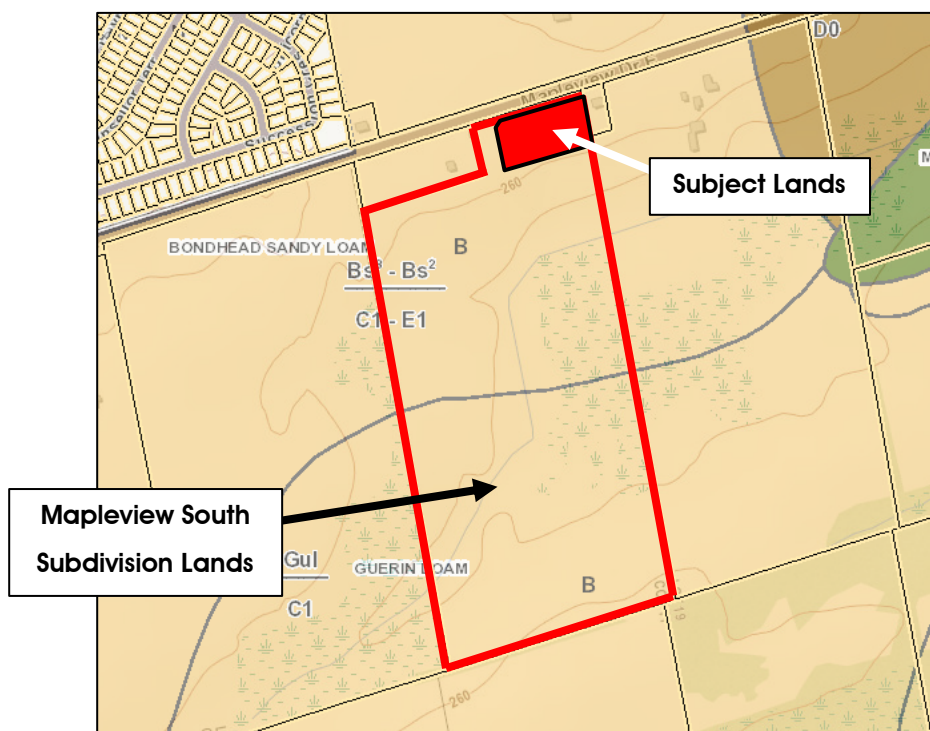
- a) *Provide an end-of-pipe SWMF within Catchment 12 to provide quality and quantity controls as per the LSRCAs and City Standards. Specific SWMF characteristics and precise location to be determined at Draft Plan and detailed design stage.*
- b) *A 5 mm infiltration target should be pursued at detailed design with an additional 20 mm filtration target.*
- c) *Infiltration/Filtration LID to be provided within the ROW, NHS buffer and on pervious areas of private lots where possible.*
- d) *The assumed Sandy Cove Creek road crossing location to be confirmed by the non-group participating landowner and detailed design of the crossing including confirmation of the potential impact on the floodplain to be completed.*

The SIS recommendations have been confirmed through the completion of further geotechnical & hydrogeological investigations, as well as a groundwater monitoring program and a detailed review of available background studies.

## **3.2. Site Soils and Geotechnical Considerations**

### **3.2.1. Soil Survey of Simcoe County**

The Soil Map of Simcoe County, South Sheet, Report No. 29 prepared by the Canada Department of Agriculture shows the site being comprised of Bondhead Sandy Loam (Bs) Soil. This soil type is noted to have good to imperfect drainage characteristics and belongs to Group B of the SCS Hydrological Soils Group Classification System. A copy of the Soil Map of Simcoe County, South Sheet, Report No. 29 has been attached in **Appendix D**.



**Figure 2 - Site Soils Identification**

**Table 1 - Soil Type Distribution**

Soil Type	Soil Name	HSG Group	Total Area (ha)	Percentage Area (%)
Bs	Bondhead Sandy Loam	Group B	0.63	100.00

### 3.2.2. Geotechnical Investigation

An initial analysis of the site's subsurface soils and groundwater conditions for the overall Maplevue South Subdivision Lands was completed by Cambium Inc. (Cambium) in May 2018 to provide geotechnical recommendations for the site's construction requirements based on observed borehole (BH) and groundwater monitoring data. The investigation included the advancement of sixteen (16) boreholes (BH No. 101 to 115) to a depth ranging from approx. 5 to 8 meters below the existing ground surface and each outfitted with a monitoring well.

The borehole logs show that the site is covered in a layer of topsoil (300-900 mm thick, average depth of 600 mm) over layers of clay, till, sand and silty sand. Over the course of the investigation



and monitoring, evidence of groundwater in all of the sixteen (16) boreholes was observed. Based on water level recordings, the stabilized ground water table appears to reflect a subdued expression of the ground profile, with downward gradient from west to east in the general direction of Sandy Cove Creek. The presence of a confined aquifer has also been identified in locations where groundwater level readings were recorded at or above the existing surface. The site's observed and predicted groundwater elevations have been utilized to establish the proposed grading design, for the Maplevue South Subdivision's future buried infrastructure, road bedding and dwellings. Refer to the *Geotechnical Investigation Report - Maplevue South Development, Maplevue Drive East*, prepared by Cambium Inc., dated December 2018, under separate cover.

A block specific geotechnical investigation was conducted by Cambium in May of 2024 for Block 193 which advanced four (4) boreholes to depths ranging from 5.1m to 8.2m below the existing ground surface. Groundwater and caving conditions were noted in the open boreholes during and upon completion of drilling. The subsurface investigation generally produced findings of a surficial layer of engineered fill followed by non-cohesive silty sand to sand soils. Bedrock was not encountered. Groundwater was observed in all boreholes at depths ranging from 5.8m to 7.6m below ground surface. For further information regarding subsurface soil characteristics and groundwater levels, refer to the *Geotechnical Investigation Report – Maplevue South Development Block A (193), Barrie, Ontario*, prepared by Cambium Inc. dated June 2024 under separate cover.

### **3.3. Existing Drainage Conditions**

The subject lands consist of approximately 0.63 hectares of land which has historically been used for agricultural purposes. The land's topography contains slopes ranging from 1 – 7%, generally draining from north to south toward the Sandy Cove Creek/Redfern Municipal Drain. The property is part of pre-development drainage area 128, as described in the SIS.

There are no existing stormwater management facilities on the subject lands and all flows are released uncontrolled to the Sandy Cove Creek/Redfern Municipal Drain.



### 3.4. Proposed Drainage Conditions

Development of the subject lands will consist of a 100-unit, 5 storey apartment building with a portion of commercial dedication, complete with above and below ground surface parking, an outdoor amenity area, landscaped areas, and internal roadway/fire route. The site is part of post-development drainage area 12, as described in the SIS, and is designated as catchment 110 on **Drawing STM-1** of the *Mapleview South Subdivision – Phase 1 Registration Drawings* dated June 2023.

The grading of the subject lands will direct stormwater runoff to the internal road network, which will contain a proposed storm sewer system to convey minor flow (up to the 5 Year event) to an underground infiltration gallery. Major event flow (> 5 year event) and minor flows that are not infiltrated within the underground facility will be conveyed to the downstream Stormwater Management Facility #12 (SWMF12) located within the adjacent Sandy Creek Estates lands (previously Finger Lakes), southeast of the Block 193 Site Plan. The internal roads of Block 193 and the overall Mapleview South Subdivision have been designed to convey the major overland flow within the right-of-way and prevent flooding of adjacent properties.

The end-of-pipe SWMF12 located on the Sandy Creek Estates lands is understood to be proposed as a wet pond complete with a forebay and filtration cell, aiming to provide extended detention and flood control, along with quantity and quality control functions. Details on that facility would be submitted by others (Tatham Engineering) in support of the Sandy Creek Estates development design approvals. Design coordination has been undertaken in accordance with the *Mapleview South Subdivision – Phase 1 Registration Drawings* to ensure adequate sizing of the downstream SWMF12 to provide the required quantity and quality control. At the time of this writing, SWMF12 and the Sandy Creek Estates development are in the Detailed Design phase.

The storm sewer subcatchment plans **Drawings STM-1** for Block 193 and the overall Mapleview South Subdivision have been included in **Appendix A** and **Appendix D** respectively. Furthermore, the Post-Development Stormwater Management Plan, **Drawing SWM-1** for Block 193 has been included in **Appendix A**.

The proposed drainage system will also include a Low Impact Development (LID) source and a conveyance control measure with the aim to deliver upstream treatment for contaminants, promote groundwater recharge and assist in maintaining water balance to pre-development levels as per regulatory stormwater management design criteria. The SIS had identified a preliminary list of LID measures deemed suitable for implementation within the subject lands,





which has been further refined through consultations with the City of Barrie and LSRCA during the *Design Charrette* process for the Mapleview South Subdivision. The LID measures proposed within Block 193 include an underground infiltration gallery complete with an upstream Oil Grit Separator (OGS) unit to achieve the LSRCA and City of Barrie targets for infiltration, filtration, water balance and total phosphorus removal. The proposed LID location and footprint is shown on **Drawing SWM-1** in **Appendix A**. Further design details regarding LID measures are provided in **Section 5.2.2**.

The proposed works require an Erosion and Sediment Control Plan in order to provide the appropriate protection of downstream receiving systems during construction. The proposed ESC works are outlined within **Section 5.7** of this Report and outline the construction and staging requirements at various phases of the development. The proposed erosion and sediment control techniques are illustrated on **Drawings ESC-1** and **ESC-2**.



## 4. Hydrology

### 4.1. OTTHYMO Modeling Overview

#### 4.1.1. Discrete Event Modeling – LID Model

The development was hydrologically modeled using the latest version of Visual OTTHYMO modeling software (version 6.2). Discrete event modeling was completed for the 25mm 4-hour Chicago (Water Quality) rainfall event, in accordance with the City of Barrie's *Storm Drainage and Stormwater Management Policies and Design Guidelines* (March 2023). LID sizing was determined based on the results of the 25mm Event modeling to ensure total volumetric capture on a discrete event basis and confirm adequate drawdown time (minimum 24hr period) of the facility.

#### 4.1.2. Continuous Simulation Modeling – LID Model

In addition to discrete event modeling, a continuous modeling simulation was developed to assess the drawdown characteristics of the LID, as well as assess Runoff Volume Capture, SWM Quality Control, and Post-Development Water Balance for the proposed site on an annual basis. The continuous modeling simulation uses a data set of hourly precipitation obtained in the City of Barrie for a 12-month period from June 1<sup>st</sup>, 2005 to May 31<sup>st</sup>, 2006, representing a typical year. To support the continuous model simulation, the corresponding set of climatic data consisting of maximum and minimum daily temperatures for the annual period was coded into the OTTHYMO model to simulate evapotranspiration processes. Inputs to the continuous modeling simulation mimic the model setup for the proposed condition continuous modeling completed as part of the SIS.

#### 4.1.3. Modeling Approach & Rationale

As described above, the hydrologic modeling pertaining to this Report includes two scenarios under post-development conditions. Pre-to-post development peak flow event modeling for the 2 to 100-year, 25mm Event, and Regional Event storms were completed as part of the detailed design of the Sandy Creek Estates lands and includes the proposed condition of the Maplevue South Subdivision Lands. Refer to the 969, 979 & 989 Maplevue Drive East Stormwater Management Report prepared by Tatham Engineering, dated November 3<sup>rd</sup> 2023. To ensure proper functionality of the receiving SWMF12 in relation to quantity and quality control, an



allowable runoff coefficient for Block 193 has been imposed as part of design coordination. Quantity and quality control target achievements for Block 193 are further described in **Section 5.3** and **Section 5.4** of this Report, respectively.

The post-development models evaluated are listed below:

- *Post-Dev-LID: Post Development LID Model 25mm 4hr Chicago Event*
- *Post-Dev-LID: Post Development LID Model Continuous Event*

The 25mm water quality event and continuous event simulations were completed to assess a number of LID facility characteristics, including:

- *the drawdown time during a typical 25mm event;*
- *the drawdown time between storm events producing runoff;*
- *sufficient redundant volume available if inter-event window is short (<48 hours);*
- *overflow of the LID;*
- *total infiltration volume on a single event and annual basis; and*
- *total capture volume on a single event and annual basis.*

After running the models, with respect to the area draining to the LID (catchment 301), the proposed infiltration gallery captured and infiltrated 100% of the total runoff water volume during the 25mm Event and **91.6%** of the annual runoff water on the continuous event. For more details and reference, the *detailed OTTHYMO outputs* can be found in **Appendix C**.

## **4.2. Post-Development Modeling**

The post-development condition of the development lands has been broken down into three (3) catchments. The post-development catchments are outlined on **Drawing SWM-1** provided in **Appendix A**.

Catchment 301 encompasses the majority of Block 193 and includes the proposed building, a portion of landscaped area, parking space, part of the internal roadway, and the LID feature. Runoff generated by this catchment during minor events (< 5-year storm) will be conveyed via the proposed subsurface storm sewer network to the LID feature before discharging off site to the downstream SWMF12. Site grading has been designed to direct runoff generated by this catchment during major events (> 5-year storm) to the proposed internal roadway network within the Maplevue South Subdivision lands, which drain overland through Block 199 to SWMF12.



Catchment 302 represents a large portion of lawn covered sloping around the perimeter of the block, landscaped areas, and a portion of the internal roadway. Due to grading constraints, drainage generated by this catchment is not able to be directed to the proposed LID. Minor event runoff (< 5-year storm) is captured by the subsurface storm sewer system at Dallaire Street and directed to SWMF12, while major event runoff (> 5-year storm) is conveyed overland to SWMF12.

Catchment 303 represents a small portion of landscaped area along the northern boundary of the site. Due to grading constraints, drainage generated by this catchment is not able to be directed to the proposed LID. Minor event runoff (< 5-year storm) from this catchment is conveyed through the subsurface storm sewer system at Mapleview Drive East and directed to the proposed SWMF11 (by Schaffers Consulting Engineers) located southwest of the development. Major event runoff (> 5-year storm) from this catchment is conveyed to Dallaire Street and directed overland to SWMF12.

The following **Table 2** illustrates the parameters coded into the post-development OTTHYMO models for Block 193. The post-development catchment properties are illustrated on **Drawing SWM-1** in **Appendix A** of this Report.

**Table 2: Post-Development OTTHYMO Model Parameters**

NASHYD Catchments	Area (ha)	L (m)	S (%)	RC	CN*	Ia (mm)	Tp (hr)	DT (min)
303	0.02	3	12	0.20	55	4.64	0.02	1
STANDHYD Catchments	Area (ha)	XIMP (%)	TIMP (%)	SLPP (%)	LGP (m)	SLPI (%)	LGI (m)	DT (min)
*301	0.42	94	94	2.00	25	2.00	52.92	1
302	0.17	40	24	25.00	10	2.00	34.06	1
Storage Chamber	Manufacturer	Model	Number of Chambers	Depth of Stone Above Chamber (mm)	Depth of Stone Below Chamber (mm)	System Footprint (m <sup>2</sup> )	Voids in Stone (Porosity)	Max Storage Volume (m <sup>3</sup> )
1	StormTech	SC-740	42	305	305	165.2	0.4	123.41

*\*Runoff from this catchment is conveyed to the Site's proposed LID*



## 5. Stormwater Management Plan

### 5.1. Introduction

The stormwater management plan is intended to provide an environmentally sound approach to stormwater issues. The issues can be divided into four main categories: stormwater quality control, stormwater quantity control, water balance, and erosion and sediment control.

In accordance with the *SIS*, the subject lands do not include any end-of-pipe stormwater management facilities. Primarily all quality and quantity control is provided off-site. All flows are directed to SWMF12 located on the Sandy Creek Estates Lands to the southeast of the subject lands. Any development adjacent to the re-aligned Sandy Cove Creek/Redfern Municipal Drain will drain uncontrolled to the 60m wide Natural Heritage System corridor which crosses the Maplevue South subdivision from southwest to northeast.

A Low Impact Development (LID) infiltration gallery has been proposed to provide additional stormwater quality control and water balance mitigation on site. In addition, the proposed infiltration gallery has been sized to accommodate the required erosion control volume for the development.

### 5.2. Low Impact Development & Pre-Treatment Devices

As per the recommendations of the *SIS*, the City of Barrie, LSRCA and MOE, a suite of Low Impact Development measures is being proposed throughout the subject lands in an effort to reduce the reliance on end-of-pipe facilities and better mimic the natural hydrologic cycle. The Maplevue South Subdivision will include both inline and offline practices associated with the stormwater management plan, all designed in accordance with the *Credit Valley Conservation Authority & Toronto and Region Conservation Authority – Low Impact Development Stormwater Management Planning and Design Guide (2010)*.

Infiltration rates used throughout the design and modeling utilize a factor of safety of 2.5 as per recommendations of the Geotechnical Consultant and Hydrogeologist.

Further description of the LID proposed for the site is provided in the subsections below. Plan, sections and detail drawings have been provided for the infiltration gallery. Refer to **Drawings LID-1** and **LID-2** in **Appendix A**.



### 5.2.1. Lot Level Controls

In accordance with the *S/S*, it is recommended that all catchments should incorporate an increased depth of absorbent topsoil of at least 300mm thick to promote at-source infiltration of pervious surfaces on lots. It is further recommended that any absorbent topsoil be amended with organic content (compost) as recommended in the *CVC Design Guidelines* while scarifying subsoils and remaining as unconsolidated as reasonably possible to maintain void spaces. A study conducted in BC has asserted reductions in runoff volume and peak flows up to 50% from the placement of 300mm of absorbent landscaping (British Columbia Ministry of Land, Water and Air Protection, May 2002). Another study conducted in Ontario through the *Sustainable Technologies Evaluation Program (STEP)* has confirmed similar findings with a reduction in runoff of up to 27% (STEP, Residential Lot Level SWM Practices, 2013).

Other recommendations include downspout disconnection, where roof leaders are directed away from impervious surfaces. Though not explicitly quantified, sub-area routing can be applied throughout all hydrologic modelling to capture the benefit of re-routing runoff produced from rooftops to pervious surfaces. Additionally, it is recommended to incorporate rain barrels at the lot level where possible, to further reduce runoff volumes to downstream systems.

Although the above lot level controls are recommended, they are not specifically quantified in the detailed design calculations as the provision of these controls cannot be enforced at the lot level.

### 5.2.2. Infiltration Gallery

An infiltration gallery is proposed in series with the storm sewer network where stormwater runoff is collected from the site's internal roadway, parking and landscaped areas, and building rooftop. The facility has been designed to have a maximized footprint to capture and infiltrate as much stormwater runoff as possible before overflowing into the next downstream segment of storm pipe. Runoff generated from the upstream catchment area will be collected by a conventional storm sewer network and directed to a proposed oil grit separator (OGS) unit for pre-treatment before entering the infiltration gallery.

The infiltration gallery is located within the parking lot of Block 193 and will be comprised of Stormtech SC-740 chambers surrounded by a clear stone media (void ratio of 0.4) and wrapped in a non-woven filter fabric. This LID will feature an ETV verified isolator row at the first run of chambers to provide additional removal of pollutants upon entry to the facility. The infiltration



gallery will have an open bottom to allow the entire footprint area to be utilized for infiltration and has been designed to provide greater than 1m of separation to the recorded high-groundwater level. Inlet and outlet pipes to the system have been configured to allow for the maximum amount of storage to be achieved in the facility, which was determined to be 123.4m<sup>3</sup>. This exceeds the volume of rainfall produced by the 25mm Water Quality Event within the LID's upstream drainage area; 105m<sup>3</sup> (0.42ha x 25mm x 10). In addition, discrete event modelling of the LID determined a 45.3hr drawdown period over the course of this simulation, falling within the desired 24-48hr period. For further details, a detailed cross section of the LID is displayed on **Drawings LID-1** and **LID-2** in **Appendix A**, and ADS design drawings have been included in **Appendix B**.

#### 5.2.3. Oil Grit Separator Unit

An oil grit separator (OGS) unit has been proposed immediately upstream of the LID to act as a pre-treatment device for flows entering the facility. An ADS FD-4HC unit has been sized to accept minor event runoff generated by 0.24ha of the development block. ADS detailed sizing reports have been provided in **Appendix B** of this Report. Equivalent OGS units may also be explored.

### 5.3. Stormwater Quantity Control

#### 5.3.1. Peak Flow Control

The SWMF12 designed by others will provide necessary stormwater quantity control for the development. This facility will be designed to attenuate post development peak runoff generated by the north portion of the Maplevue South Subdivision lands for storm events up to and including the 100-year event.

The design of the Maplevue South Subdivision (and corresponding downstream SWMF12 by Tatham) developed allowable runoff coefficients and imperviousness values for medium density blocks within the Maplevue South Lands. Block 193 is located within catchment area 12-A of the overall Maplevue South subdivision lands. It is further defined as part of Catchment 1202 on Drawing SWM-3 of the *Maplevue South Subdivision, Phase 1 Registration Drawings*, which has been included in **Appendix D** of this Report. Area 1202 of this drawing generates drainage from both Block 193 and an additional medium density Site Plan Block known as Block 192 to the south of the proposed lands. In the proposed grading condition, 1.23ha of drainage area is directed to



SWMF12 from these Blocks combined. Refer to the *953 Maplevue Dr E – Block 192 Site Plan, Detailed Stormwater Management Report*, prepared by TJCG under separate cover.

The allowable and proposed runoff coefficients for Catchment 1202 have been illustrated in **Table 3** below.

**Table 3 – Allowable vs Proposed Hydrologic Characteristics**

Catchment 1202 Hydrologic Properties		
	Allowable	Proposed
Drainage Area to SWMF12 (ha)	1.30 ha	1.23 ha
Runoff Coefficient	0.75	0.73
Total Imperviousness (TIMP %)	75%	74%

Given the proposed condition of the combined site plan blocks are within the allowable limits for the hydrologic properties outlined in **Table 3** (above), it is not anticipated that the development of the Block 193 Site Plan per the *953 Maplevue Drive – Block 193 Site Plan* prepared by S&C Architects Inc. dated June 6<sup>th</sup>, 2024, will have negative hydraulic impacts on the quantity control function of the downstream SWMF12. Refer to the *969, 979, & 989 Maplevue Drive East Stormwater Management Report* prepared by Tatham Engineering, dated November 3<sup>rd</sup> 2023, and the *Maplevue South Subdivision (953 Maplevue Dr. E) Detailed Stormwater Management Report* prepared by TJCG, dated June 2023 under separate cover for further information regarding how the overall development plan achieves the required quantity control targets.

### 5.3.2. Runoff Volume Control

The LSRCA's *Technical Guidelines for Stormwater Management* offers guidance in determining the appropriate volumetric control targets for subject sites as a function of the site characteristics. The overall Maplevue South Subdivision lands are deemed to be a *Major Development* under the *Lake Simcoe Protection Plan* and are required to provide runoff volume control. Several constraints have been identified within the Maplevue South Subdivision lands which limit the implementation of LID measures, therefore the targets for the development were established under *Section 3.2.6. Flexible Treatment Alternative for Sites with Restrictions*. The SIS as well as various background investigations and studies, identified the following constraints:





**Table 4 – Runoff Volume Control Target Factors & Constraints**

Factor	Site Specific Constraint
v. Areas with high chloride concentrations	<ul style="list-style-type: none"><li>• Infiltration of surface water from Mixed Use &amp; High Density Residential, Collector and Arterial roadways discouraged (permitted with conditions) per City of Barrie <i>Infiltration Low Impact Development Screening Process</i>.</li></ul>
vi. Zoning, Setbacks, Land Use Requirements	<ul style="list-style-type: none"><li>• Limited land use (Parks, Open Space, Institutional Blocks) given drainage area size available for centralized infiltration-based LID practices.</li><li>• No dedicated SWMF facilities on the subject lands</li></ul>
vii. Property/Infrastructure Restrictions	<ul style="list-style-type: none"><li>• Blocks available for centralized facility are located at upstream portions of catchment or in locations where limited flow can be routed to.</li><li>• Limited opportunities within ROW due to servicing constraints (depth vs. groundwater)</li></ul>

The factors identified above limit the location and effectiveness of infiltration-based LID practices throughout the subject lands applicable to this report. Therefore, Alternative #2 was selected as the target for the overall subdivision as this is the maximum practical amount achievable (best efforts for 5mm infiltration) given the constraints.

Although Alternative #2 was established for the overall subdivision lands due to the above noted constraints, the proposed LID for Block 193 is able to exceed this target by providing a means of capturing and retaining / treating direct runoff volume from 25mm of rainfall from all impervious surfaces on site. **Therefore, meeting initial runoff volume control requirements per the LSRCA without the need for a flexible treatment alternative.** The following is a summary of calculations used to determine the LID performance outlined herein.

LID Storage Capacity: **123.41m<sup>3</sup>**

Total Block Impervious Area: 0.47m<sup>2</sup>

25mm of Rainfall Across Impervious Surfaces: 0.47m<sup>2</sup> x 25mm x 10 = **117.5m<sup>3</sup>**



It should be noted that there is additional provided volume within the downstream SWMF12 that is not accounted for in this design.

### 5.3.3. Minor-Major System Conveyance

The Storm Sewer system (minor system) is designed for the 5-year event, with rainfall intensities calculated using the A, B, C parameters listed in Table 3.1 of the *City of Barrie Storm Drainage and Stormwater Management Policies and Design Guidelines*.

All storm sewers throughout the subject lands have been designed to maintain a minimum depth of cover of 1.5m.

There are no crossing conflicts anticipated with the Sanitary Sewers, Watermain, or Utility Ducts. The *Storm Drainage Area Plan*, referenced as **Drawing STM-1** in **Appendix A**, is to be reviewed in conjunction with the *Storm Sewer Design Sheet* in **Appendix B**.

Major System flows (flow > 5-year event) will be conveyed through Dallaire Street, which directs runoff to SWMF12 through a proposed overland spillway in accordance with City of Barrie Standards. For right-of-way conveyance calculations, refer to Section 5.3.3. of the *Mapleview South (Innisfil) Ltd. Detailed Stormwater Management Report*, prepared by The Jones Consulting Group, dated June 2023.

## 5.4. Stormwater Quality Control

As per the City, LSRCA and MOE requirements, Enhanced (Level 1) stormwater quality control for Total Suspended Solids (TSS) is required for the subject lands. Thus, an integrated treatment train approach is proposed, comprised of an oil grit separator, LID infiltration gallery and external SWM wet pond facility.

The incorporation of LID measures will also provide phosphorus removal benefits to ensure that best efforts are taken to reduce post-development phosphorus loadings to pre-development levels (or a minimum 80% removal of TP from post-development). Phosphorus Loading calculations are detailed within **Section 5.4.2**.

A summary of the proposed LID practices and their corresponding removal efficiencies is provided below in **Table 5**. Concentration-based removal efficiency values are taken from the Low Impact Development Treatment Train Tool (LIDTTT), Version 1.2.1., April 2018.



**Table 5 – LID Practice for TSS and TP removal efficiency**

LID BMP Concentration Based Removal Efficiencies		
LID Practice	TSS Removal Efficiency (%)	TP Removal Efficiency (%)
Oil Grit Separator	60%	20%
Infiltration Gallery	75%	60%
Wet Retention Pond	80%	63%

The total removal efficiency of a series of BMP devices in a treatment train can be expressed as follows:

$$R = 1 - (1 - A_1) * (1 - A_2) * \dots * (1 - A_n)$$

Where: R = Total Treatment Train Removal Efficiency

$A_1$  = Removal Efficiency of 1<sup>st</sup> (Upstream) BMP

$A_2$  = Removal Efficiency of 2<sup>nd</sup> (Upstream) BMP

$A_n$  = Removal Efficiency of n<sup>th</sup> (Last downstream) BMP

An overview of the treatment trains and catchment-based performance on TSS and TP removal efficiency are provided in **Sections 5.4.1. and 5.4.2.** below.

#### **5.4.1. TSS Removal**

In terms of the quality control requirements for stormwater runoff, the “Enhanced” level of protection as stipulated by the Ministry of Environment is to be provided. i.e. 80% removal of Total Suspended Solids (TSS) on an annual basis. These requirements are to be achieved through a combination of LID practices on site and the proposed off-site stormwater management facilities on the Bulut and Sandy Creek Estates lands (SWMF11 and SWMF 12, respectively).

As demonstrated in **Section 5.3.1.**, there is no anticipated increase in peak flow or runoff volume to the respective SWMF’s beyond their intended design and as such, no impact is expected to the facilities’ ability to achieve the water quality criteria they are designed for.

There are four (4) distinct treatment trains established within the site in relation to TSS removal, as described below:



**Table 6 - TSS Concentration Removal Efficiency**

<b>Treatment Train</b>	<b>Catchment Areas</b>	<b>Area (ha)</b>	<b>TSS Removal</b>
OGS > Infiltration Gallery > Wet Pond (SWMF12)	202, 203, 204	0.24	98.0 %
Infiltration Gallery > Wet Pond (SWMF12)	**201	0.18	95.0 %
Wet Pond (SWMF12)	205	0.17	80.0 %
Wet Pond (SWMF11)	206	0.02	80.0 %
Sanitary Collection System	N/A	0.02	100 %
<b>Total</b>		<b>0.63</b>	<b>91.8 %</b>

Note: \*Runoff from this catchment consists of rooftop drainage and does not produce pollutants.  
Catchment Areas 201-206 are illustrated on **Drawing STM-1**.

As the results show, a **net reduction in total suspended solids of 91.8%** is achieved when implementing BMPs in the post-development condition for the Mapleview South Block 193 lands.

#### **5.4.2. Phosphorus Budget**

Similar to the Total Suspended Solids calculation, LID BMP on site and SWM facilities off-site are utilized to reduce the total phosphorus amount leaving the property. A series of treatment train approaches, their removal efficiency rate, respective subcatchment description and area are summarized below.

There are four (4) distinct treatment trains established within the site in relation to TP removal, as described below:

**Table 7 - TP Concentration Removal Efficiency**

<b>Treatment Train</b>	<b>Catchment Areas</b>	<b>Area (ha)</b>	<b>TP Removal</b>
Infiltration Gallery > Wet Pond (SWMF12)	*201, 202, 203, 204	0.42	85.0 %
Wet Pond (SWMF12)	205	0.17	63.0 %
Wet Pond (SWMF11)	206	0.02	63.0 %
Sanitary Collection System	N/A	0.02	100 %
<b>Total</b>		<b>0.63</b>	<b>78.8 %</b>

Note: \*Runoff from this catchment consists of rooftop drainage and does not produce pollutants.  
Catchment Areas 201-206 are illustrated on **Drawing STM-1**.



As the results show, the overall TP removal rate achieved in the post-development condition when implementing BMPs is **78.8%**. The remaining phosphorus amount not managed within the property will be addressed by the Phosphorus Offsetting Policy as described below.

Under the Lake Simcoe Protection Plan (LSPP), a stormwater management plan must demonstrate how phosphorus loadings are minimized between the existing and proposed development scenarios. Thus, a Phosphorus Budget Tool spreadsheet was prepared to reflect all parameters and calculations presented in the MECP P-Budget tool, and to determine the increase and mitigation of phosphorus load after the development and BMP adoption.

Further, the pre-development and post-development total phosphorous loading was estimated using a mass balance approach, utilizing land use breakdown statistics provided in **Appendix C**. The *MECP Pre- and Post-Development Phosphorous Loading* calculations have been provided in **Appendix B**.

Supporting calculations are provided below:

#### **Pre-Development Annual TP Estimate**

Drainage Area:	0.63ha
Annual Load:	0.12 kg/yr – from MECP Pre-Development Phosphorous Load

#### **Post-Development Annual TP Estimate (without mitigation)**

Drainage Area:	0.63 ha
Annual Load:	0.83 kg/yr – from MECP Post-Development Phosphorous Load

#### **Post-Development Annual TP Estimate (with mitigation)**

Drainage Area:	0.63 ha
Annual Load:	0.18 kg/yr – from MECP Post-Development Phosphorous Load

Pre- and post-development annual loading of **0.12 kg/yr** and **0.18 kg/yr** were respectively estimated, indicating the site has **increased** the annual total phosphorous load in the post-development condition by **0.71 kg/yr** without the implementation of BMPs. The addition of BMPs will reduce the post-development annual total phosphorous load to **0.18 kg/yr**. A net **increase** of **0.06 kg/yr** has been estimated between pre- and post-development conditions.

This development will be subject to the *Lake Simcoe Phosphorous Offsetting Policy* and as such, will pay a phosphorous offsetting fee to the LSRCa. The Phosphorous offsetting Fee, including a 15% administration fee, is calculated as follows:



$$\text{Offsetting Calculation} = 1.15 \times (2.5 \times \text{TP deficit in kg/yr} \times \$35,770)$$

The developer is required to pay an estimated **\$6,170.33** in offsetting costs.

### 5.5. Stream Erosion Control

In terms of the erosion control requirements for stormwater runoff, the Ministry of Environment has stipulated that in the absence of an erosion assessment of the receiver, the 25mm post-development peak flow is to be released over a 24-hour period. These requirements are intended to be achieved through the proposed off-site stormwater management facilities on the Bulut and Sandy Creek Estates lands.

As demonstrated in **Section 5.3.1.**, there is no anticipated increase in peak flow or runoff volume to the respective SWMF's beyond their intended design and as such, no impact is expected to the facilities ability to achieve the erosion control criteria they are required to be designed for.

### 5.6. Water Balance

The primary objective of the LSRCA's water balance target is to capture and manage annual rainfall on the development site to preserve the pre-development hydrology (water balance) through a combination of infiltration, evapotranspiration, absorbent landscaping, rainwater reuse and/or other LID practices. Various site-specific characteristics contribute to the ability to achieve water balance. They include, but are not limited to: soil permeability, the ability to collect and direct drainage into the ground, groundwater table elevations and seasonal fluctuations. Best efforts will be made via the SWM Plan to maintain groundwater recharge while considering site specific characteristics.

A site-specific water balance in accordance with the SIS recommendations has been completed for Site Plan Block 193 by R.J. Burnside & Associates Ltd. and is included in **Appendix D** of this Report. RJB completed a pre- to post-development water balance to estimate the infiltration volume deficit that would need to be mitigated via the proposed SWM Plan. The infiltration and runoff volume as calculated in the RJB Water Balance Assessment are presented in **Table 8** below.



**Table 8 - Summary of Water Balance Calculations by RJB**

<b>Water Balance Runoff &amp; Infiltration Volumes – RJB Table G-3</b>			
	<b>Pre-Development</b>	<b>Post-Development</b>	<b>Difference</b>
Impervious Area Runoff Volume (m <sup>3</sup> /a)	333	3,886	3,553
Pervious Area Runoff Volume (m <sup>3</sup> /a)	795	185	-610
Total Runoff Volume (m <sup>3</sup> /a)	1,127	4,071	2,944
Total Infiltration Volume from Pervious Surfaces (m <sup>3</sup> /a)	1,251	344	<b>-907</b>

The results summarized in the table above indicate that there is an increase in total runoff volume and a deficit in infiltration volume from pre- to post-development without accounting for LID's. The SWM Plan herein is intended to mitigate or reduce the water balance deficit as outlined above. Runoff generated from this development is directed to the proposed Low Impact Development (LID) infiltration gallery. The infiltration gallery and its contributing drainage area is shown on **Drawing LID-1 in Appendix A.**

Upon review of the *Environment Canada Daily Climate Normals* for the *Barrie WPCC* from the years 1979 to 2008, a statistical analysis of rainfall data was completed and it is noted that on an annual average over that time period, this gauge has received **928.1mm** of total precipitation, comparable to the mean average annual precipitation of 939 mm for Hewitts Creek, published in the *LSRCA Climate Data Set, April 2017* and comparable to average annual precipitation of 933 mm used by RJB in their water balance calculations.

A continuous data set of precipitation and temperature for a one-year period (June 2005-May 2006) was used for the continuous model simulation in the PCSWMM hydrologic model to estimate the annual infiltration capability of the proposed LID's. The continuous data set has a total annual precipitation of **984.3mm**, comparable to the average annual precipitations noted above.

Reviewing the results of the Post-Dev-LID (Continuous) model simulation, it is estimated that approximately **72.3%** of the annual runoff generated from the site is captured and retained by the proposed infiltration gallery. This annual capture efficiency is applied to the post-development annual runoff volume calculated by RJB (4,071 m<sup>3</sup>), in addition to the post-development infiltration volume occurring naturally (344 m<sup>3</sup>), increasing the site's post-development infiltration from 344 m<sup>3</sup>/a to 3,275 m<sup>3</sup>/a ((4,071 m<sup>3</sup> x 72.3%) + 344 m<sup>3</sup>). The revised annual infiltration volume results in eliminating the infiltration deficit of 907 m<sup>3</sup>/a to a surplus of **2,024m<sup>3</sup>/a.**



In summary, the proposed stormwater management plan achieves the water balance criteria for the subject lands by fully mitigating the infiltration deficit established in RJB's pre-to-post-development water balance calculations.

### **5.7. Erosion & Sediment Control**

The proposed works will require an *Erosion and Sediment Control (ESC) Plan* in order to provide adequate protection of downstream receiver systems throughout construction. During construction, the majority of the development's natural features will be removed, and the topsoil stripped within the development area. The exposed surface will be susceptible to erosion, increasing the potential for sediment runoff. To minimize local and downstream impacts from erosion and sedimentation during construction, the following measures have been recommended:

- Excess earth and topsoil is to be stockpiled away from the creek limits and/or removed from site. Stockpiles shall be seeded or covered with erosion control if left for periods of greater than 30 days.
- Temporary sediment control fencing should be erected around the perimeter of all grading activities, including double silt fence along the south and east boundaries.
- Temporary sediment fabric and stone filters should be installed on catch basins until surface cover has been stabilized.
- Temporary rock flow check dams should be installed within drainage cut-off swales.
- A temporary construction access mud mat should be installed at the construction accesses to reduce the amount of material that may be transported off site.
- A Temporary erosion and sediment control trap is to be constructed, complete with a rip-rap lined overflow weir functioning as the trap outlet. The sediment trap's purpose is to detain runoff long enough to allow most soil particles to settle out of suspension.
- Construction during dryer months should be monitored for wind-borne transport of sediments. At the direction of the engineer, the contractor may be directed to water down exposed earth areas with an aqueous solution of calcium chloride.
- All disturbed areas not under immediate construction for 30 days, or not intended for building activities within a 3-month time period, should be stabilized with seeding.





- Phased removal of temporary sediment trap, drainage swales, rock check dams, etc. during building phase of the development to coincide with upstream stabilization (established vegetation) of catchment areas.
- A weekly monitoring program to ensure all ESC measures are in place and not damaged by vandalism or a significant weather event.

The measures described above are shown on the Erosion and Sediment Control Plan and Notes & Details, **Drawings ESC-1** and **ESC-2**, respectively, included in **Appendix A**. Through proper implementation of the detailed erosion and sediment control measures, off-site impacts are expected to be minimized during the construction phase of the project.



## 6. Conclusions

This Detailed Stormwater Management Report identifies the recommended servicing design for the proposed Maplevue South Subdivision. This Report outlines the proposed infrastructure required to service the site with regards to stormwater management quality control, quantity control, water balance and erosion and sediment control.

In particular, this report has recommended the following:

- Low Impact Development measures are recommended to be implemented throughout the subject lands in a variety of forms to meet additional quantity control and annual water balance targets, promote groundwater recharge and mitigate the impacts of increased runoff and stormwater pollution (including Phosphorus loadings) on end-of-pipe SWM facilities by managing runoff as close to its source as possible, as described in **Section 3.4.**
- Construct a Minor and Major Drainage system comprised of pipes and roadways to safely convey minor and major (Regional) storm events to a suitable outlet, as detailed in **Section 5.3.3.**
- Prior to construction, the erosion and sediment control measures outlined in **Section 5.7.** and detailed on the engineering plans should be implemented. These controls are to be maintained throughout the construction period and only removed once exposed areas have been stabilized with vegetative cover.
- The Designs in this report are consistent with the *Hewitt's Secondary Plan Area Subwatershed Impact Study* prepared by R.J. Burnside & Associates Ltd., *City of Barrie Storm Drainage and Stormwater Management Policies & Guidelines*, *LSRCA Technical Guidelines for Stormwater Management Submissions*, the *CVC/TRCA Low Impact Development Stormwater Management Planning and Design Guidelines*, the *MOE Stormwater Management Planning and Design Manual* and industry best-practices at the time of report preparation.

It is recommended that this report be accepted as fulfilling the civil engineering and stormwater management requirements in support of the Site Plan Application.

All of which is respectfully submitted,  
**THE JONES CONSULTING GROUP LTD.**



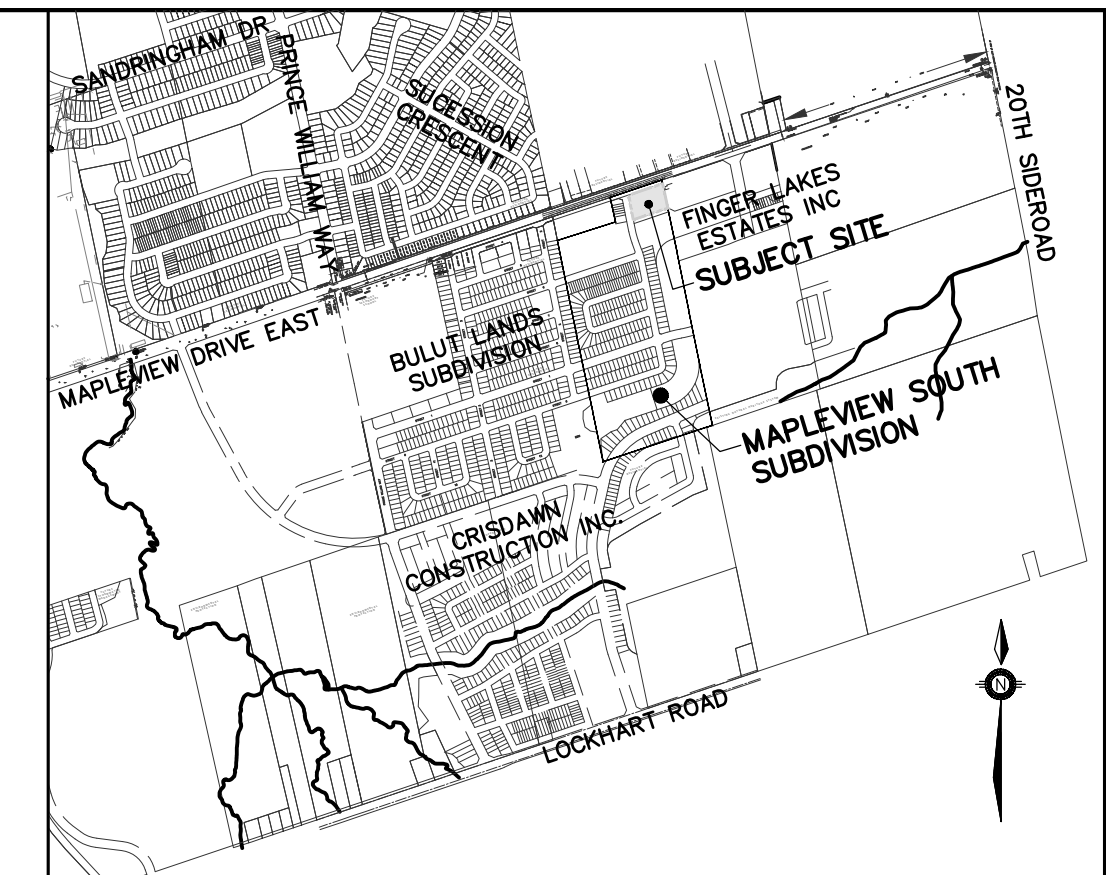
## Appendix A

### Engineering Drawings

The Jones Consulting Group Ltd. – *Mapleview South (Innisfil) Ltd. 953 Mapleview Drive East, Block 193 Drawings*, Stamped June 21, 2024:

ESC-1	Erosion and Sediment Control Plan
ESC-2	Erosion and Sediment Control Plan – Notes and Details
STM-1	Storm Sewer Subcatchment Plan
DS-1	Design Sheets
SWM-1	Post-Development Stormwater Drainage Area Plan
LID-1	LID Plan View, Infiltration Gallery
LID-2	LID Sections & Details, Infiltration Gallery





## NTS

251.00

PROPOSED CUT-OFF SWALE

PROPOSED SEDIMENT CONTROL FENCE  
PER P1233

PROPOSED CONSTRUCTION ENTRANCE  
PER D710

PROPOSED ROCK CHECK DAM  
PER D786

PROPOSED CEDAR POST

STORM CATCHMENT AREA BOUNDARY

DIRECTION OF EXTERNAL  
STORM DRAINAGE

DIRECTION OF STORM DRAINAGE

EROSION CATCHMENT  
AREA No.

0.10

4.46

COEFFICIENT

AREA IN HECTARE

$\times 256.30$

PROPOSED GROUND ELEVATION

2.5%

PROPOSED DRAINAGE FLOW DIRECTION  
AND GRADIENT

REFER TO DWG. No. ESC-2 FOR EROSION AND SEDIMENT  
CONTROL NOTES AND DETAILS

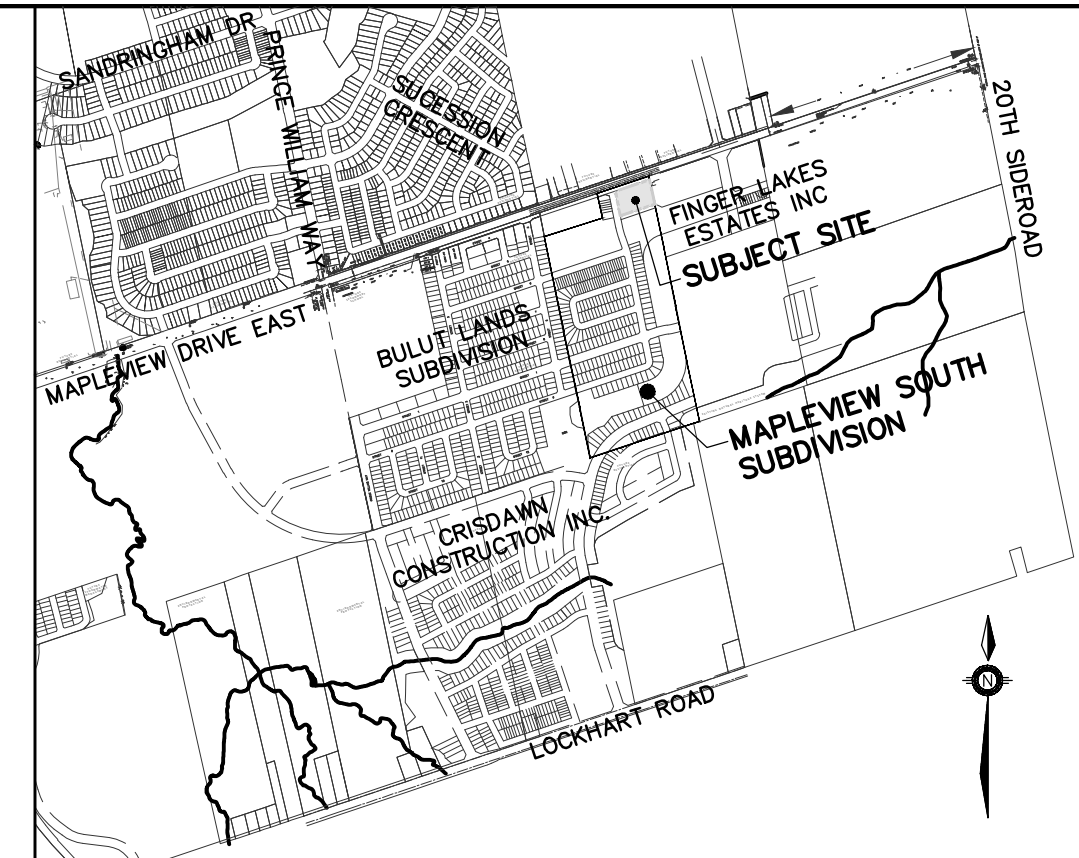
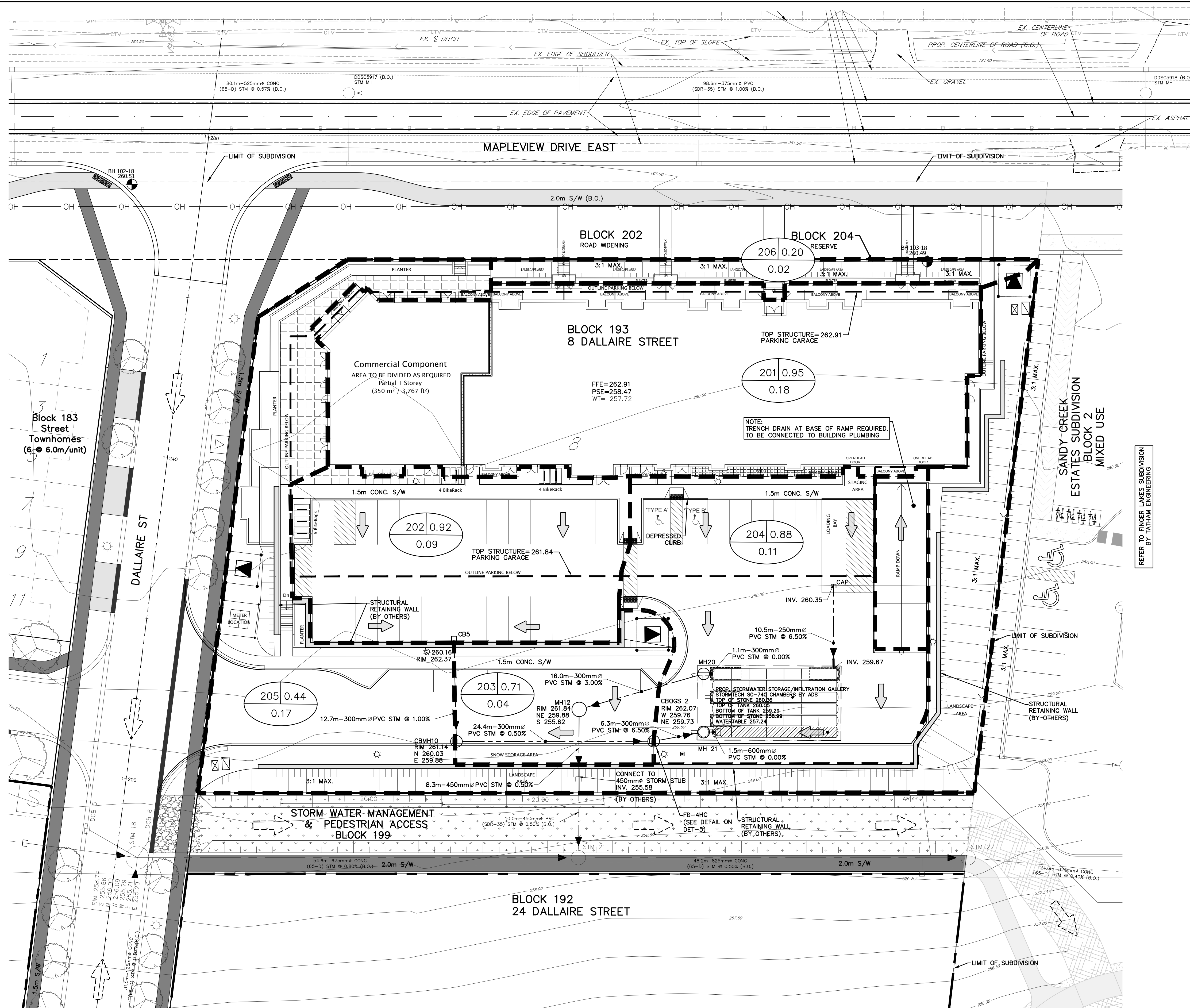
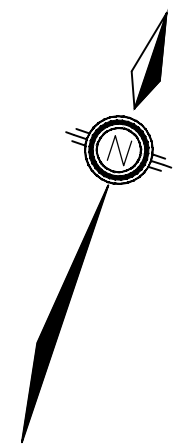
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DRAWN	KS	PROJECT REI-17055	DWG. NO	ESC-1
CHECKED	DR			

C:\Eng\_3D\REI-17055\Production DWGS\REI-17055-Block 193 ESC-1 Plotted Jun 19, 2024 @ 1:20pm by kschulz The Jones Consulting Group Ltd.










KEY PLAN  
NTS

- LEGEND**
- LIMIT OF SUBDIVISION
  - PHASE LIMIT
  - STM 01 (B.O.) STORM MAINTENANCE HOLE (B.O.)
  - CB (B.O.) SINGLE CATCHBASIN (B.O.)
  - DCB (B.O.) DOUBLE CATCHBASIN (B.O.)
  - STORM SEWER & DIRECTION OF FLOW (B.O.)
  - STM 25 PROP. STORM MAINTENANCE HOLE
  - CB PROP. CATCH BASIN
  - DCB PROP. DOUBLE CATCH BASIN
  - PROP. STORM SEWER & DIRECTION OF FLOW
  - STORM SEWER, EXFILTRATION TRENCH & DIRECTION OF FLOW
  - STORM SUB-CATCHMENT AREA
  - CATCHMENT AREA ID NUMBER
  - RUN-OFF COEFFICIENT
  - AREA (ha.)
  - DIRECTION OF POST DEVELOPMENT 100 YEAR STORM EVENT OVERLAND FLOW
  - EX. CONTOUR AND ELEVATION
  - DIRECTION OF EXISTING EXTERNAL OVERLAND FLOW
  - 50 MUNICIPAL ADDRESS
  - 173 LOT NUMBER

REFER TO DESIGN SHEET ON DRAWING DS-1



**JONES**  
CONSULTING GROUP LTD.  
PLANNERS & ENGINEERS

229 Mapview Dr. E. Unit 1  
Barrie, ON L4N 0W5  
P. 705.734.2538  
F. 705.734.1056

DESIGN	VBS	SCALE: 1:1000	DATE	APRIL 2024
DRAWN	VBS	PROJECT	DWG. NO	
CHECKED	RC/DR	REI-17055	STM-1	

G:\Eng-3D\VEI-17055\Production\DWG\REI-17055-Block 193 STM-1.dwg Layout: STM-1 Plotted Jun 20, 2024 @ 2:23pm by kechulz The Jones Consulting Group Ltd.

- REFERENCES:**
- CITY OF BARRIE LATEST MANUALS AND GUIDELINES
  - CRISP AND CRISP
  - CRYSTAL HOMES SUBDIVISION DEVELOPMENT BY TATHAM ENGINEERING LIMITED
  - SANDY COVE CREEK REALIGNMENT BY TATHAM ENGINEERING LIMITED
  - BULLY LANDS SUBDIVISION DEVELOPMENT BY SCHAEFFERS CONSULTING ENGINEERING
  - DRAFT PLAN OF MAPVIEW SOUTH SUBDIVISION BY JONES CONSULTING GROUP LTD.
  - MAPVIEW DRIVE EAST WIDENING BY R.J. BURNSIDE & ASSOCIATES LIMITED
  - OLS PLAN BY RUDY MAX SURVEYING LTD.
  - AWAN GROUP RESIDENTIAL DEVELOPMENT BY PEARSON ENGINEERING LTD.
  - HEWITTS CENTRAL SUBDIVISION (BRADLEY HOMES) BY JONES CONSULTING GROUP LTD.
  - GEOTECHNICAL INVESTIGATION REPORT BY CAMBLUM INC.
  - HYDROLOGICAL ASSESSMENT BY R.J. BURNSIDE & ASSOCIATES LIMITED
  - HEWITTS SECONDARY PLAN AREA SS BY R.J. BURNSIDE & ASSOCIATES LIMITED
  - LSRCA LATEST MANUALS AND GUIDELINES

<b>BENCHMARK:</b>			
BENCHMARK NO. 03120080055 LOCATED APPROXIMATELY 1.9km EAST OF YONGE STREET, APPROXIMATELY 6m NORTH OF CENTERLINE OF MAPVIEW DRIVE EAST AND 35m WEST OF CITY BOUNDARY LINE. N4912122.851 E611241.154 ELEV 225.030			
BENCHMARK NO. 03120110020 LOCATED ON MAPVIEW DRIVE EAST ON THE SOUTH SIDE OF THE BOULEVARD, APPROXIMATELY 700m WEST OF THE MAPVIEW DRIVE EAST AND 20TH SIDE ROAD INTERSECTION. N4812284.547 E611717.298 ELEV 225.549			
BENCHMARK NO. 03120080008 LOCATED ON THE NORTH SIDE OF MAPVIEW DRIVE EAST (12TH CONCESSION ROAD), APPROXIMATELY 0.8km EAST OF YONGE STREET (HWY #1) AND APPROXIMATELY 10.0m NORTH OF MAPVIEW DRIVE EAST CENTERLINE. N4911763.816 E610187.698 ELEV 211.834			
BENCHMARK NO. 03120080054 LOCATED ON THE SOUTH LIMIT OF MAPVIEW DRIVE WEST APPROXIMATELY 10m EAST OF HURONTARIO ROAD. N4910578.122 E607601.092 ELEV 248.998			
2.	FIRST SUBMISSION	JUNE 2024	MF
1.	ISSUED FOR PRE-CONSULTATION	JULY 2023	DR
NO.	REVISIONS	DATE	INITIAL



MAPVIEW SOUTH (INNISFIL) LTD  
953 MAPVIEW DRIVE EAST  
CITY OF BARRIE

**BLOCK 193  
STORM SEWER  
SUBCATCHMENT PLAN**



A detailed plat map of the Finger Lakes Estates, Inc. Succession and Bulut Lands Subdivisions. The map shows the 'SUBJECT SITE' (a 1.0-acre parcel) located between the Succession and Bulut Lands Subdivisions. It is bounded by 20th Street Road to the east and Lookhart Road to the south. Other features include Sandringham Dr, Mapleview Drive East, and Crisdamy Construction Inc. A north arrow is located in the bottom right corner.

# KEY PLAN

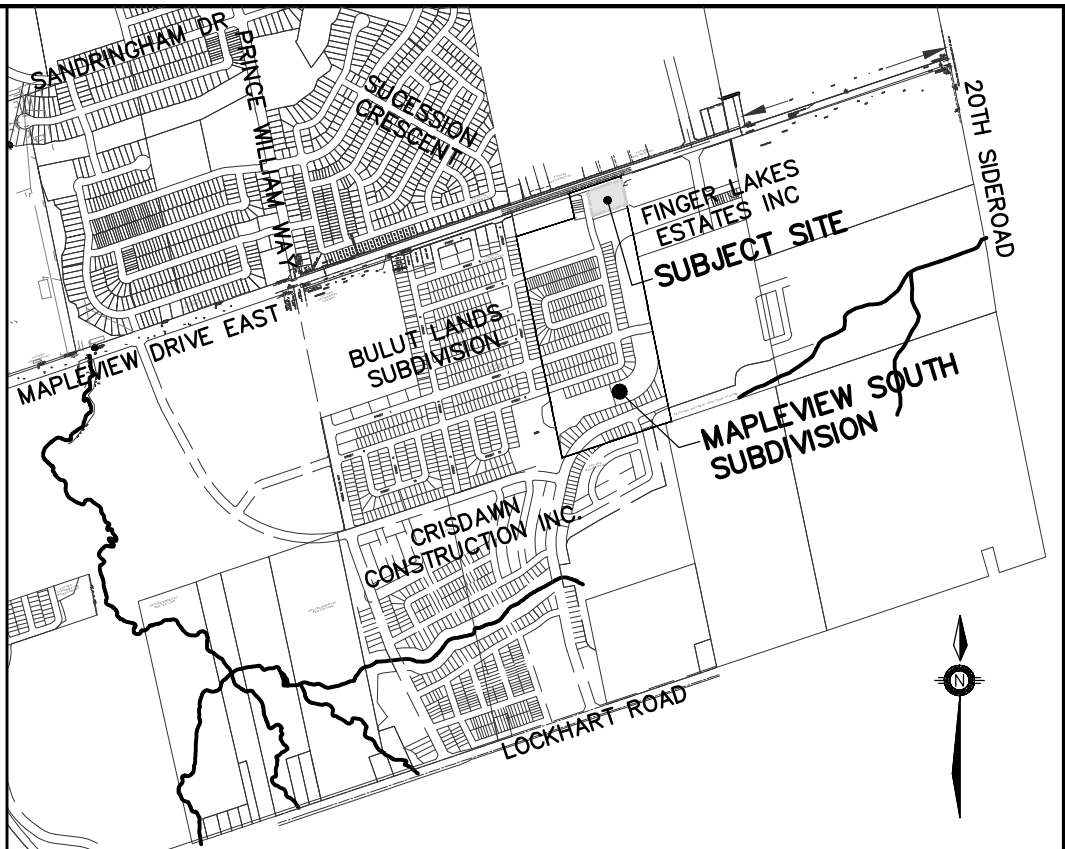
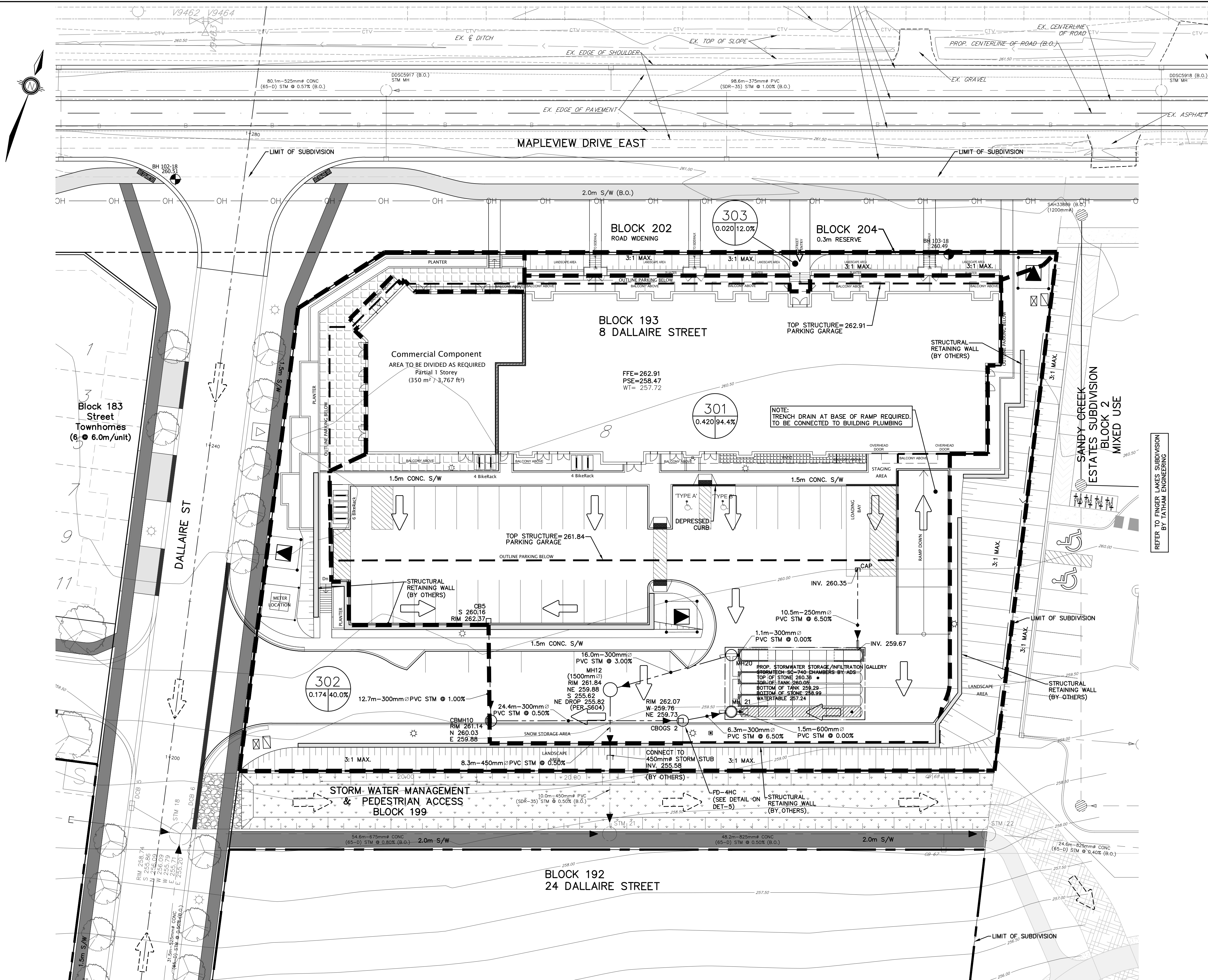
 **JONES**  
**CONSULTING GROUP LTD.**  
PLANNERS & ENGINEERS

229 Mapleview Dr. E, Unit 1  
Barrie, ON L4N 0W5  
P. 705.734.2538  
F. 705.734.1056

BLOCK 193  
STORM AND SANITARY  
DESIGN SHEETS

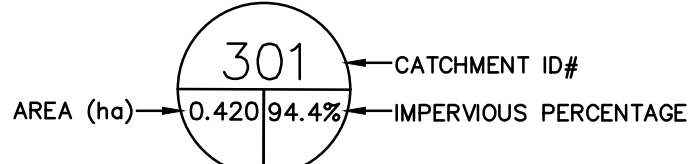
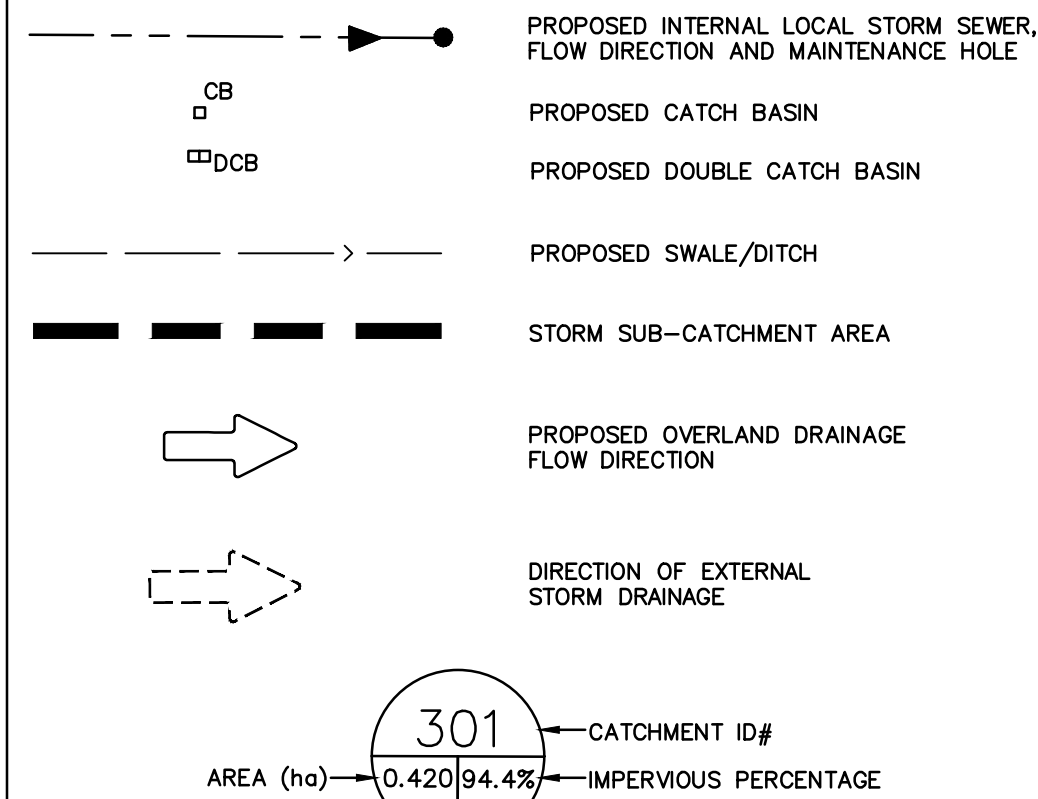
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DRAWN	KS	PROJECT REI-17055	DWG. №	
CHECKED	DR		DS-1	





KEY PLAN  
NTS

LEGEND



REFER TO FINGER LAKES SUBDIVISION  
BY TATHAM ENGINEERING

- REFERENCES:
1. CITY OF BARRIE LATEST MANUALS AND GUIDELINES
  2. CRISP AND CRISP
  3. CRYSTAL HOMES SUBDIVISION DEVELOPMENT BY TATHAM ENGINEERING LIMITED
  4. SANDY COVE CREEK REALIGNMENT BY TATHAM ENGINEERING LIMITED
  5. BULLY LANDS SUBDIVISION DEVELOPMENT BY SCHAEFFERS CONSULTING ENGINEERING
  6. DRAFT PLAN OF MAPLEVIEW SOUTH SUBDIVISION BY JONES CONSULTING GROUP LTD.
  7. MAPLEVIEW DRIVE EAST WIDENING BY R.J. BURNSIDE & ASSOCIATES LIMITED
  8. OLS PLAN BY RUDY MAX SURVEYING LTD.
  9. ARAW GROUP RESIDENTIAL DEVELOPMENT BY PEARSON ENGINEERING LTD.
  10. HEWITTS CENTRAL SUBDIVISION (BRADLEY HOMES) BY JONES CONSULTING GROUP LTD.
  11. GEOTECHNICAL INVESTIGATION REPORT BY CAMBLUM INC.
  12. HYDROLOGICAL ASSESSMENT BY R.J. BURNSIDE & ASSOCIATES LIMITED
  13. HEWITTS SECONDARY PLAN AREA SS BY R.J. BURNSIDE & ASSOCIATES LIMITED
  14. LSRCIA LATEST MANUALS AND GUIDELINES

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BENCHMARK NO. 03120110020 LOCATED ON MAPLEVIEW DRIVE EAST ON THE SOUTH SIDE OF THE BOULEVARD, APPROXIMATELY 700m WEST OF THE MAPLEVIEW DRIVE EAST AND 20TH SIDE ROAD INTERSECTION. N4812284.547 E611717.298 ELEV 225.549			
BENCHMARK NO. 03120080008 LOCATED ON THE NORTH SIDE OF MAPLEVIEW DRIVE EAST (12TH CONCESSION ROAD), APPROXIMATELY 0.8km EAST OF YONGE STREET (HWY #1) AND APPROXIMATELY 10.0m NORTH OF MAPLEVIEW DRIVE EAST CENTERLINE. N4911763.816 E610187.698 ELEV 221.834			
BENCHMARK NO. 03120080054 LOCATED ON THE SOUTH LIMIT OF MAPLEVIEW DRIVE WEST, APPROXIMATELY 1km EAST OF HURONTARIO ROAD. N4910578.122 E607601.092 ELEV 248.996			
1.	FIRST SUBMISSION	JUNE 2024	MF
NO.	REVISIONS	DATE	INITIAL



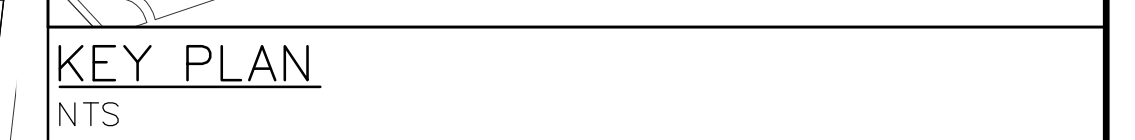
MAPLEVIEW SOUTH (INNISFIL) LTD  
953 MAPLEVIEW DRIVE EAST  
CITY OF BARRIE



BLOCK 193  
POST-DEVELOPMENT STORMWATER  
DRAINAGE AREA PLAN



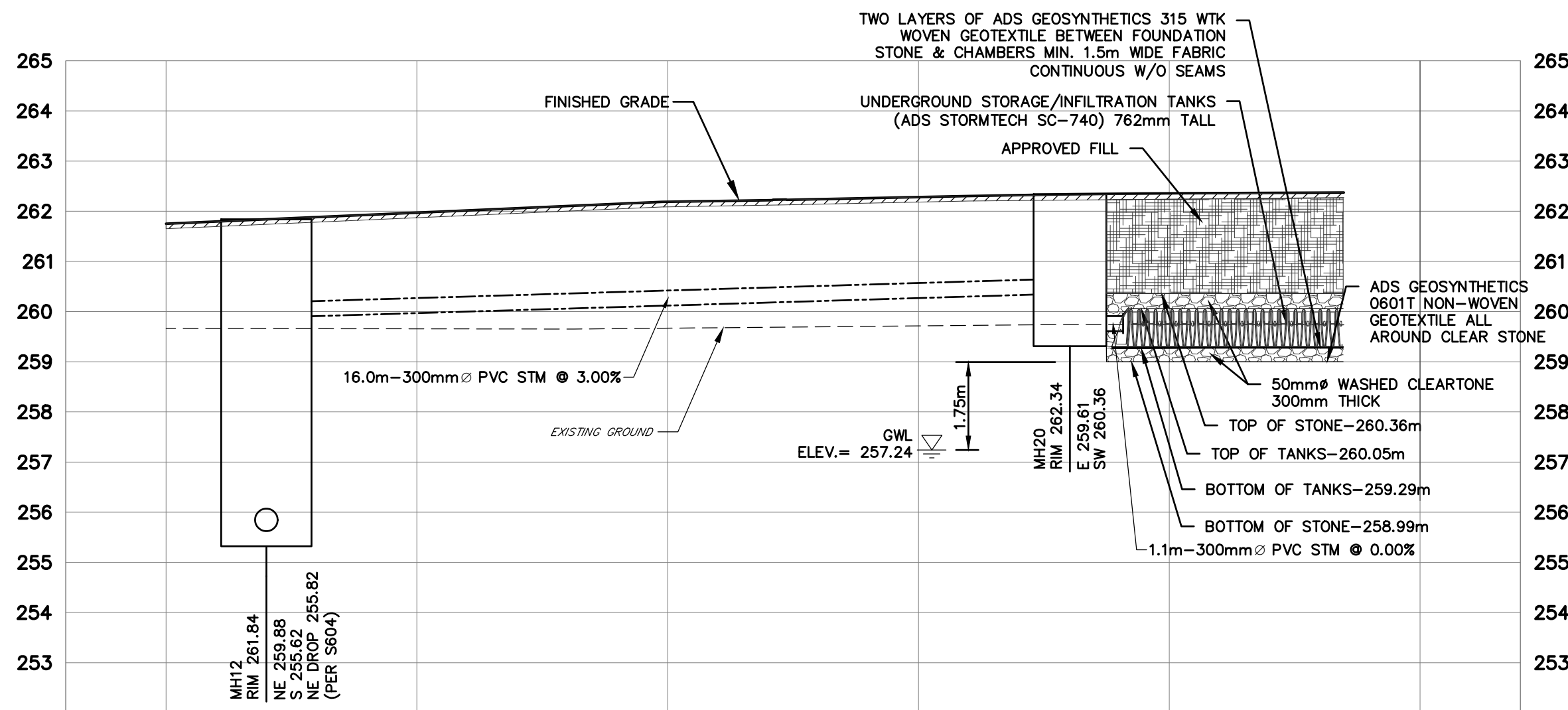
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CHECKED	RC/DR	REI-17055	SWM-1	



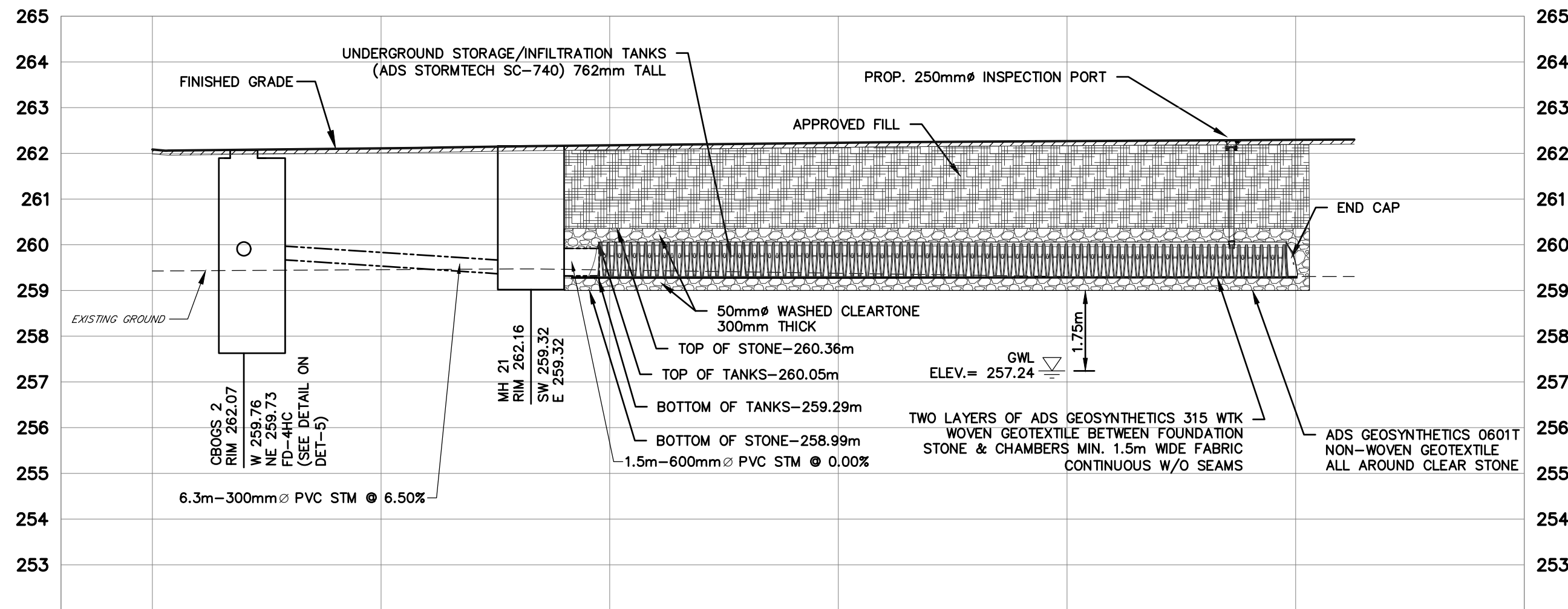


REFERENCES:		BENCHMARK:				MAPLEVIEW SOUTH (INNISFIL) LTD 953 MAPLEVIEW DRIVE EAST CITY OF BARRIE		 229 Mapleview Dr. E, Unit 1 Barrie, ON L4N 0W5 P. 705.734.2538 F. 705.734.1058					
1. CITY OF BARRIE LATEST MANUALS AND GUIDELINES 2. DRED AND OPEN CONSTRUCTION OF MAPLEVIEW DRIVE EAST AND 30m WEST OF CITY BOUNDARY LINE, N4912122.851 E611241.154 ELEV 225.039 3. CRYSTAL HOME SUBDIVISION DEVELOPMENT BY TATHAM ENGINEERING LIMITED 4. SANDY CREEK CREEK REALIGNMENT BY TATHAM ENGINEERING LIMITED 5. BRANT LANE SUBDIVISION DEVELOPMENT BY SCHAEFFERS CONSULTING ENGINEERING 6. BRANT LANE OF MAPLEVIEW SOUTH SUBDIVISION BY JONES CONSULTING GROUP LTD. 7. MAPLEVIEW SOUTH SUBDIVISION BY R.J. BURNSIDE & ASSOCIATES LIMITED 8. OLS PLAN BY RUDY MAK SURVEYING LTD. 9. AWWA OPEN RESOLUTION BY PEARSON ENGINEERING LTD. 10. HEWITT'S CENTRAL SUBDIVISION (BRADLEY HOMES) BY JONES CONSULTING GROUP LTD. 11. GEOTECHNICAL INVESTIGATION REPORT BY CAMBERLIN 12. HYDROLOGICAL ASSESSMENT BY R.J. BURNSIDE & ASSOCIATES LIMITED 13. HEWITT'S SECONDARY PLAN AREA S03 BY R.J. BURNSIDE & ASSOCIATES LIMITED 14. LSRA LATEST MANUALS AND GUIDELINES		BENCHMARK NO. 03120808005 LOCATED APPROXIMATELY 1.2km EAST OF YONGE STREET, APPROXIMATELY 6m NORTH OF CENTERLINE OF MAPLEVIEW DRIVE EAST AND 30m WEST OF CITY BOUNDARY LINE, N4912122.851 E611241.154 ELEV 225.039 BENCHMARK NO. 03120110020 LOCATED ON MAPLEVIEW DRIVE EAST ON THE SOUTH SIDE OF THE SCHAEFFERS DEVELOPMENT, APPROXIMATELY 75m WEST OF THE MAPLEVIEW DRIVE EAST AND 12m NORTH OF CENTERLINE, N491226.547 E611717.228 ELEV 222.549 BENCHMARK NO. 03120808005 LOCATED ON THE NORTH SIDE OF MAPLEVIEW DRIVE EAST (12TH CONCESSION ROAD), APPROXIMATELY 0.8km EAST OF YONGE STREET (HWY #12), APPROXIMATELY 10.0m NORTH OF MAPLEVIEW DRIVE EAST CENTERLINE, N4911762.816 E610197.608 ELEV 221.831 BENCHMARK NO. 03120808004 LOCATED ON THE SOUTH LIMIT OF MAPLEVIEW DRIVE WEST APPROXIMATELY 15m EAST OF HURONTARIO ROAD, N4910878.122 E607601.062 ELEV 248.996											
1.		FIRST SUBMISSION		JUNE 2024		MF		DESIGN MF/KS		SCALE: 1:100		DATE MAY 2024	
NO.		REVISIONS		DATE		INITIALS		DRAWN KS		PROJECT		DWG. N°	
								CHECKED DR		REI-17055		LID-1	

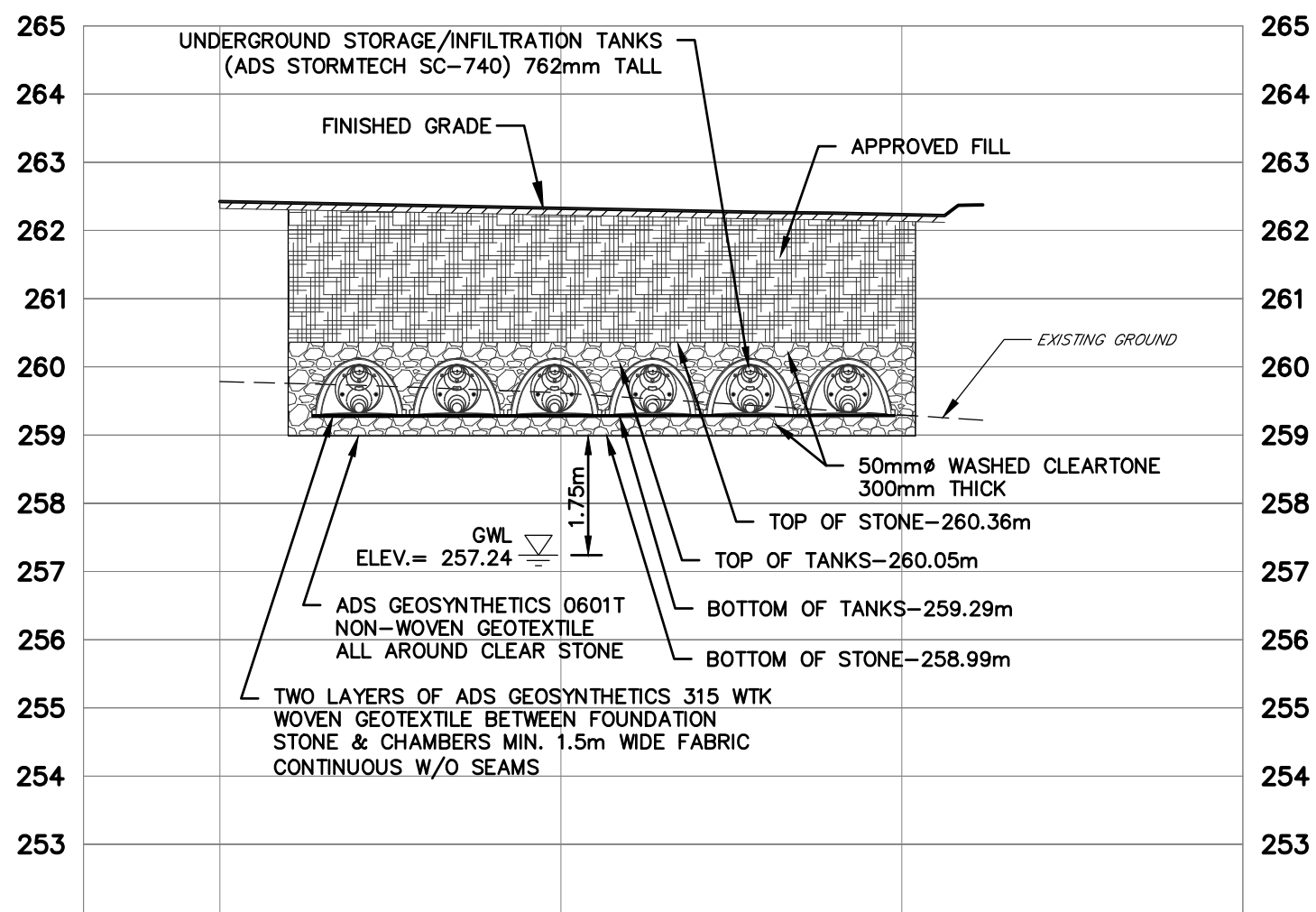




SECTION A-A  
1:100



SECTION B-B  
1:100



SECTION C-C  
1:100



KEY PLAN  
NTS

G:\Eng\_3D\VEI-17055\Production DWS\VEI-17055-Block 193 LID.dwg Layout: LID-2 Plotted Jun 19, 2024 @ 1:36pm by keshuz The Jones Consulting Group Ltd.

REFERENCES:	
1.	CITY OF BARRIE LATEST MANUALS AND GUIDELINES
2.	OPIS AND OPIS
3.	CRYSTAL HOMES SUBDIVISION DEVELOPMENT BY TATHAM ENGINEERING LIMITED
4.	SANDY COVE CREEK REALIGNMENT BY TATHAM ENGINEERING LIMITED
5.	BULLY LANDS SUBDIVISION DEVELOPMENT BY SCHAEFFERS CONSULTING ENGINEERING
6.	DRAFT PLAN OF MAPVIEW SOUTH SUBDIVISION BY JONES CONSULTING GROUP LTD.
7.	MAPVIEW DRIVE EAST WIDENING BY R.J. BURNSIDE & ASSOCIATES LIMITED
8.	OLS PLAN BY RUDY MAX SURVEYING LTD.
9.	AWAN GROUP RESIDENTIAL DEVELOPMENT BY PEARSON ENGINEERING LTD.
10.	HEWITTS CENTRAL SUBDIVISION (BRADLEY HOMES) BY JONES CONSULTING GROUP LTD.
11.	GEOTECHNICAL INVESTIGATION REPORT BY CAMBLUM INC.
12.	HYDROGEOLOGICAL ASSESSMENT BY R.J. BURNSIDE & ASSOCIATES LIMITED
13.	HEWITTS SECONDARY PLAN AREA SS BY R.J. BURNSIDE & ASSOCIATES LIMITED
14.	LSRCA LATEST MANUALS AND GUIDELINES

BENCHMARK:	
BENCHMARK NO. 03120080055, LOCATED APPROXIMATELY 1.9km EAST OF YONGE STREET, APPROXIMATELY 6m NORTH OF CENTERLINE OF MAPVIEW DRIVE EAST AND 35m WEST OF CITY BOUNDARY LINE. N4912122.851 E611241.154	
BENCHMARK NO. 03120110020 LOCATED ON MAPVIEW DRIVE EAST ON THE SOUTH SIDE OF THE BOULEVARD, APPROXIMATELY 780m WEST OF THE MAPVIEW DRIVE EAST AND 20TH SIDE ROAD INTERSECTION. N4812284.547 E611717.298 ELEV 225.549	
BENCHMARK NO. 03120080008, LOCATED ON THE NORTH SIDE OF MAPVIEW DRIVE EAST (12TH CONCESSION ROAD), APPROXIMATELY 0.8km EAST OF YONGE STREET (WY #11) AND APPROXIMATELY 10.0m NORTH OF MAPVIEW DRIVE EAST CENTERLINE. N4911763.816 E610187.698	
BENCHMARK NO. 03120080054, LOCATED ON THE SOUTH LIMIT OF MAPVIEW DRIVE WEST APPROXIMATELY 10m EAST OF HURONIA ROAD. N4910578.122 E607601.092 ELEV 248.998	
1.	FIRST SUBMISSION
NO.	REVISIONS
	DATE
	INITIAL



MAPVIEW SOUTH (INNISFIL) LTD 953 MAPVIEW DRIVE EAST CITY OF BARRIE	
BLOCK 193 LID SECTIONS & DETAILS INFILTRATION GALLERY	



		229 Mapview Dr. E. Unit 1 Barrie, ON L4N 0W6 P. 705.734.2538 F. 705.734.1050	
DESIGN	MF/KS	SCALE: AS NOTED	DATE MAY 2024
DRAWN	KS	PROJECT	DWG. NO
CHECKED	DR	REI-17055	LID-2



## Appendix B

### Supporting Calculations

- Storm Sewer Design Sheet
- ADS SC-740 Stormtech Chambers Design Drawings
- ADS FD-4HC OGS Sizing Summary
- ADS FD-4HC OGS Detail Drawing
- Pre- to Post-Development Phosphorous Loading Project Development Summary

BLK 193 STORM SEWER DESIGN - MINOR SYSTEM																					
		Design flow in (m³/s)		Q= C·I·A / 360		Pipe capacity (m³/s)		Q		Client: Anthony Reino											
		Site specific runoff coefficient		C		Manning roughness value		n=0.013		Project: Mapleview South (Innisfil) LTD - BLK 193											
		Rainfall intensity (mm/hr)		I = A/(T.C. + B) ^ C		Cross sectional area of pipe (m²)		A		Address: 953 Mapleview Drive East											
		function of the local intensity-duration data		A= 843.019		Hydraulic Radius (m)		R <sub>h</sub>		File: REI-17055											
		function of the local intensity-duration data		B= 4.582		Sewer pipe slope (m/m)		S		Design: KR											
		function of the local intensity-duration data		C= 0.763		Velocity of flow (m/s)		V		Check: MF											
		Max. time of concentration (min)		T.C.= 10						Date: June 19 2024											
		Drainage area (ha)		A						Design sheet: DS-1											
AREAS	Street	MANHOLE		LENGTH (m)	INCREMENT			TOTAL CA	FLOW TIME (min)		I (mm/h)	TOTAL Q (cms)	S (%)	D (mm)	Q FULL (cms)	V FULL (m/s)	% FULL				
		FROM	TO		C	A	CA		TO	IN											
201	BLK 193	BLDG	LID	10.5	0.95	0.18	0.17	0.17	10.00	0.06	109	0.052	6.50	250	0.152	3.1	34.6				
202	BLK 193	CB5	CBMH10	12.7	0.92	0.09	0.08	0.08	10.00	0.15	109	0.024	1.00	300	0.097	1.4	24.7				
203	BLK 193	CBMH10	CBOGS2	24.4	0.71	0.04	0.03	0.11	10.15	0.42	108	0.032	0.50	300	0.068	1.0	47.3				
204	BLK 193	CBOGS2	LID	6.3	0.88	0.11	0.10	0.21	10.58	0.03	106	0.061	6.50	300	0.247	3.5	24.6				
	BLK 193	LID	MH12	16.0				0.21	10.61	0.11	106	0.061	3.00	300	0.167	2.4	36.2				
	BLK 193	MH12	STUB	8.3				0.21	10.72	0.11	105	0.060	0.50	450	0.202	1.3	29.9				



PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	CODY NEATH 519-465-9958 CODY.NEATH@ADSPIPE.COM
ADS SALES REP:	RYAN MARTIN 705-207-3059 RYAN.MARTIN@ADSPIPE.COM
PROJECT NO:	S407367
ONTARIO SITE COORDINATOR:	RYAN RUBENSTEIN 519-710-3687 RYAN.RUBENSTEIN@ADSPIPE.COM



# 953 MAPLEVIEW DRIVE BLOCK 193

## BARRIE, ON.

### SC-740 STORMTECH CHAMBER SPECIFICATIONS

- CHAMBERS SHALL BE STORMTECH SC-740.
- CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
- CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
- THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
- CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 50 mm (2").
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
- ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
  - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
  - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
  - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
- CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

### IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

- STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
- STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/SC-800/DC-780 CONSTRUCTION GUIDE".
- CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
  - STONESHOOTER LOCATED OFF THE CHAMBER BED.
  - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
  - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
- THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
- JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
- MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
- EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 20-50 mm (3/4-2").
- THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
- ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

### NOTES FOR CONSTRUCTION EQUIPMENT

- STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/SC-800/DC-780 CONSTRUCTION GUIDE".
- THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
  - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
  - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/SC-800/DC-780 CONSTRUCTION GUIDE".
  - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/SC-800/DC-780 CONSTRUCTION GUIDE".
- FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

**USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.**

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

42	STORMTECH SC-740 CHAMBERS
12	STORMTECH SC-740 END CAPS
305	STONE ABOVE (mm)
305	STONE BELOW (mm)
40	% STONE VOID
<b>123.5</b>	<b>INSTALLED SYSTEM VOLUME (m³) (PERIMETER STONE INCLUDED)</b>
165.3	SYSTEM AREA (m²)
54.2	SYSTEM PERIMETER (m)

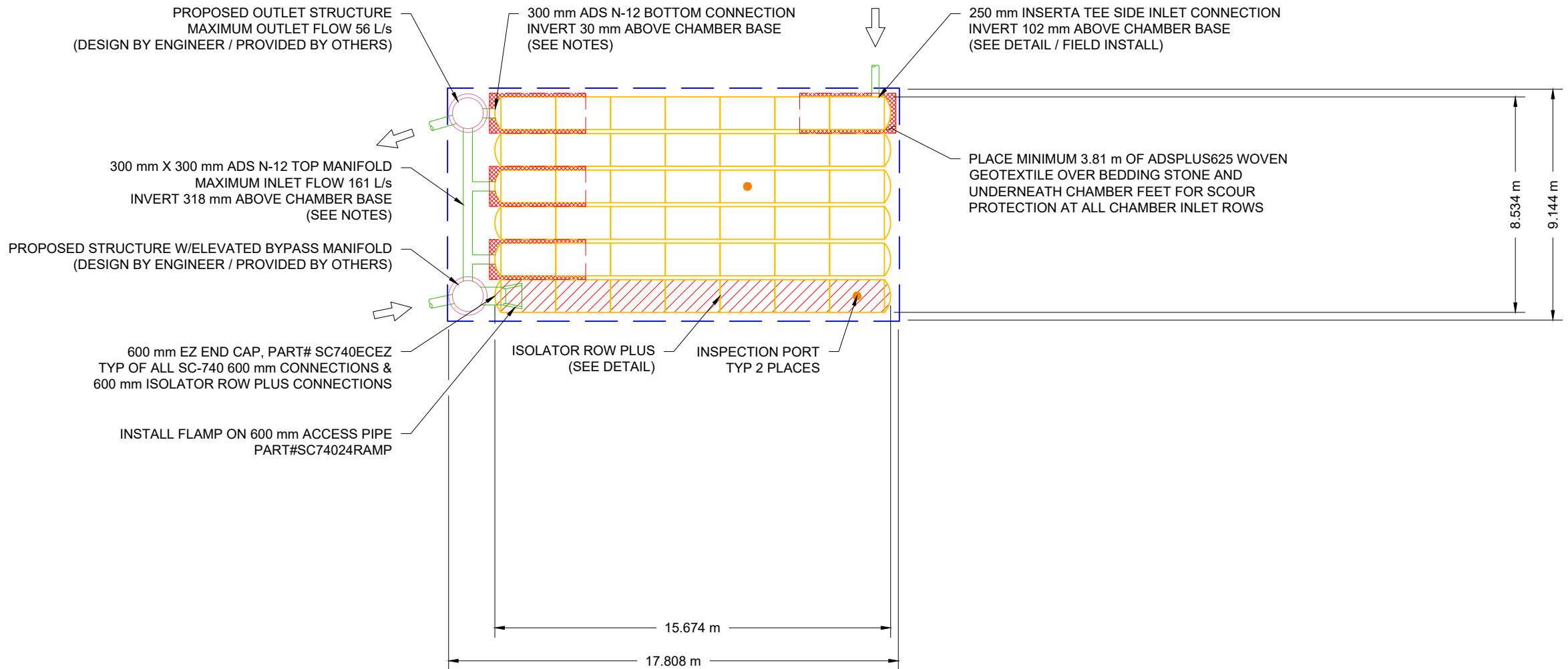
### PROPOSED ELEVATIONS

262.495	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):
260.667	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):
260.514	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):
260.514	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):
260.514	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT):
260.362	TOP OF STONE:
260.057	TOP OF SC-740 CHAMBER:
259.613	300 mm TOP MANIFOLD INVERT:
259.395	INSERTA TEE SIDE INLET CONNECTION INVERT:
259.325	300 mm BOTTOM CONNECTION INVERT:
259.298	600 mm ISOLATOR ROW PLUS INVERT:
259.295	BOTTOM OF SC-740 CHAMBER:
258.990	BOTTOM OF STONE:

262.495	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):
260.667	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):
260.514	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):
260.514	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):
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260.057	TOP OF SC-740 CHAMBER:
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259.325	300 mm BOTTOM CONNECTION INVERT:
259.298	600 mm ISOLATOR ROW PLUS INVERT:
259.295	BOTTOM OF SC-740 CHAMBER:
258.990	BOTTOM OF STONE:

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **ATTENTION:** THIS DRAWING IS NOT INTENDED FOR USE IN BIDDING OR CONSTRUCTION WITHOUT THE PRIOR APPROVAL OF THE PROJECT'S ENGINEER OF RECORD (EOR). AS WITH ALL PROPOSED ADS LAYOUTS, THE EOR SHOULD REVIEW AND APPROVE THIS DRAWING PRIOR TO USE IN BIDDING AND/OR CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE EOR TO ENSURE THAT THE PRODUCT(S) DEPICTED AND THE ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.



953 MAPLEVIEW DRIVE  
BLOCK 193  
BARRIE, ON.

JKZ

DRAW

ED: JR

CHEC

REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE

**StormTech®**

# Chamber System

888-892-2694 | WWW.STORMTECH.COM

**ADS**<sup>®</sup>  
4640 TRUEMAN BLVD  
HILLIARD, OH 43026

HILLIARD, OH 43026

SCALE = 1 : 200

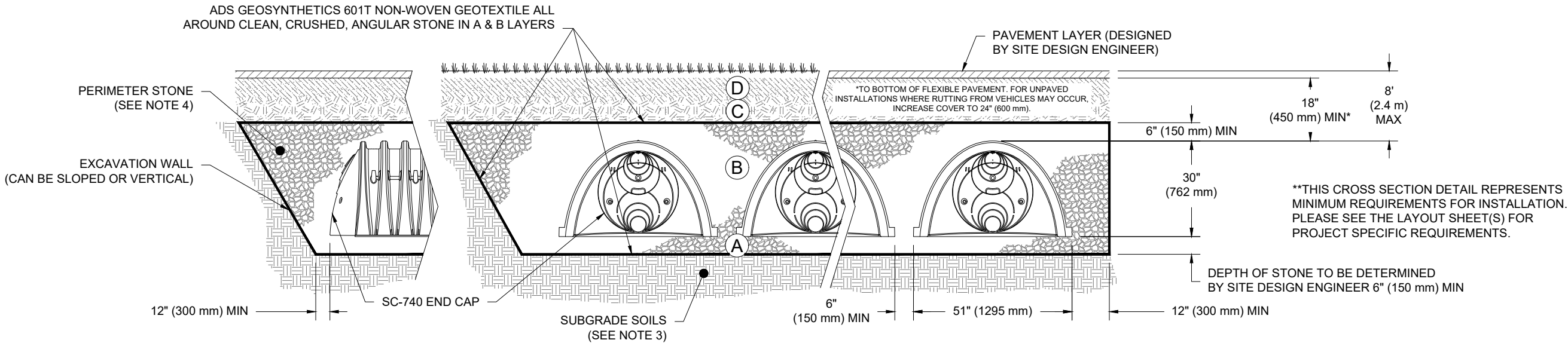
THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO VERIFY THE ACCURACY OF THE INFORMATION PROVIDED TO ADS. ADS SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS IN THIS DRAWING. THE SITE DESIGN ENGINEER SHALL BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS IN THIS DRAWING. THE SITE DESIGN ENGINEER SHALL BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS IN THIS DRAWING.

## ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	<b>FINAL FILL:</b> FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	<b>INITIAL FILL:</b> FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE.  MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145 <sup>1</sup> A-1, A-2-4, A-3  OR  AASHTO M43 <sup>1</sup> 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	<b>EMBEDMENT STONE:</b> FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE <sup>5</sup>	AASHTO M43 <sup>1</sup> 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	<b>FOUNDATION STONE:</b> FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE <sup>5</sup>	AASHTO M43 <sup>1</sup> 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. <sup>2,3</sup>

PLEASE NOTE:

1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



## NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

953 MAPLEVIEW DRIVE  
BLOCK 193  
BARRIE, ON.

DATE: 04-11-24 DRAWN: JR

PROJECT #: S407367 CHECKED: JR

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**StormTech®**  
Chamber System

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**ADS**<sup>™</sup>  
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HILLIARD, OH 43026

3 SHEET OF 5

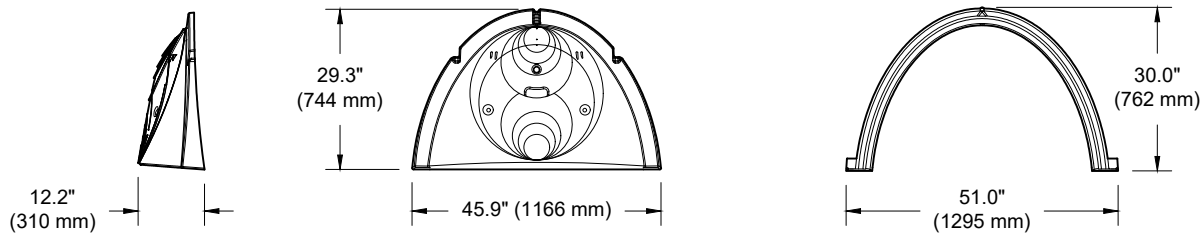
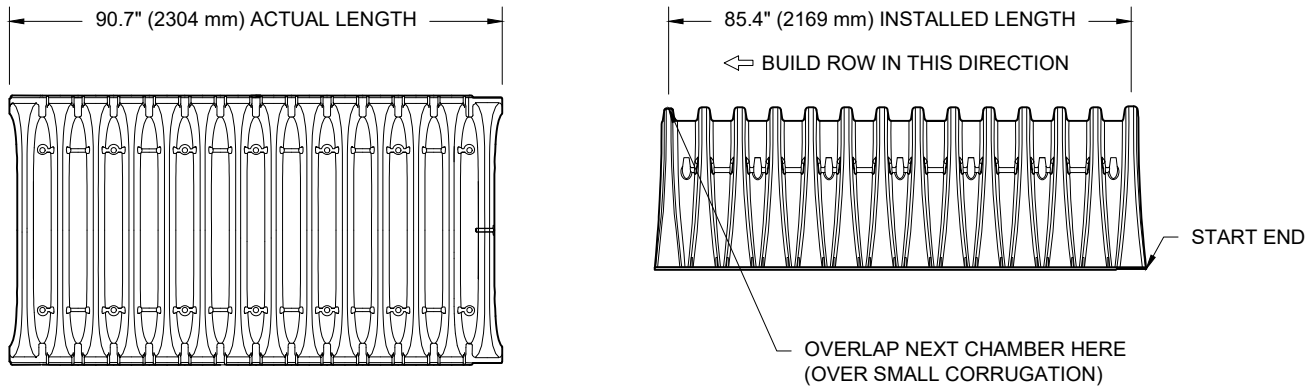






SC-740 TECHNICAL SPECIFICATION

NTS

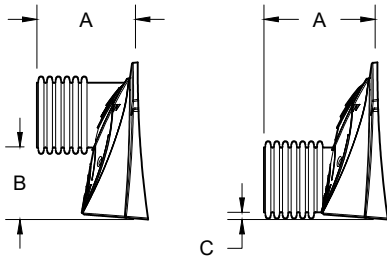


NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

\*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS

PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"  
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"  
PRE-CORED END CAPS END WITH "PC"



PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T / SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

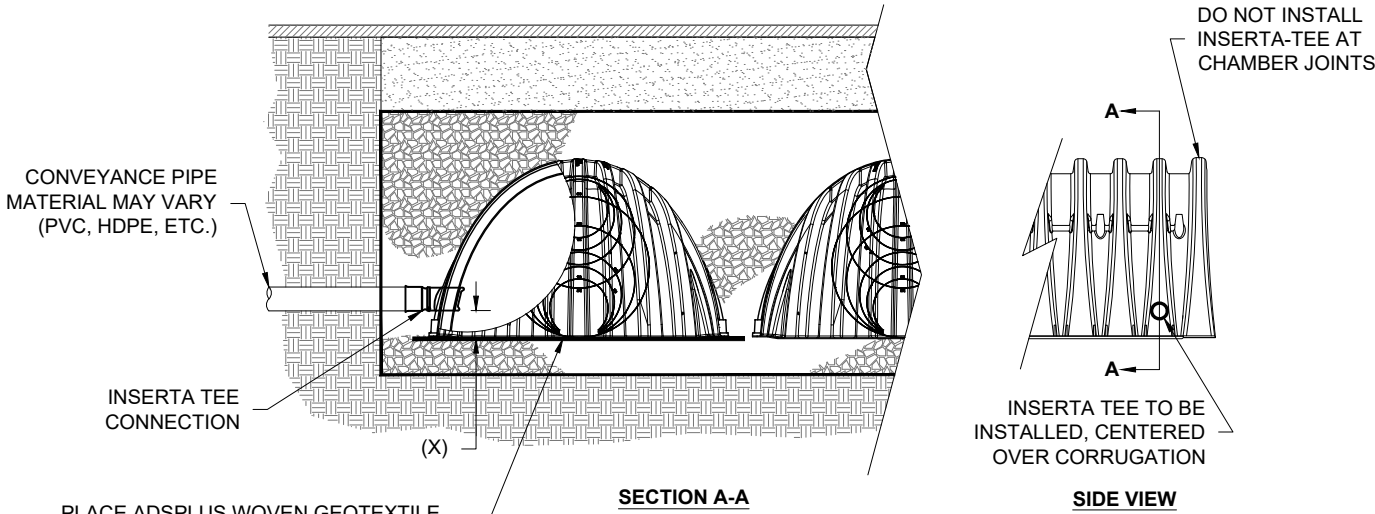
ALL STUBS, EXCEPT FOR THE SC740ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

\* FOR THE SC740ECEZ THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

INSERTA TEE DETAIL

NTS



PLACE ADSPLUS WOVEN GEOTEXTILE (CENTERED ON INSERTA-TEE INLET) OVER BEDDING STONE FOR SCOUR PROTECTION AT SIDE INLET CONNECTIONS. GEOTEXTILE MUST EXTEND 6" (150 mm) PAST CHAMBER FOOT

NOTES:

- PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.
- CONTACT ADS ENGINEERING SERVICES IF INSERTA TEE INLET MUST BE RAISED AS NOT ALL INVERTS ARE POSSIBLE.

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
SC-800	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
MC-7200	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

953 MAPLEVIEW DRIVE  
BLOCK 193  
BARRIE, ON.

DATE: 04-11-24 DRAWN: JR

PROJECT #: S407367 CHECKED: JR

Inserta Tee®  
Lateral Connection

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HILLIARD, OH 43026

ADS

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<b>Project Name:</b>	953 Mapleview - Block 193	
<b>Consulting Engineer:</b>	Jones Consulting Group	
<b>Location:</b>	Barrie, ON	
<b>Sizing Completed By:</b>	C. Neath	<b>Email:</b> <a href="mailto:cody.neath@ads-pipe.com">cody.neath@ads-pipe.com</a>

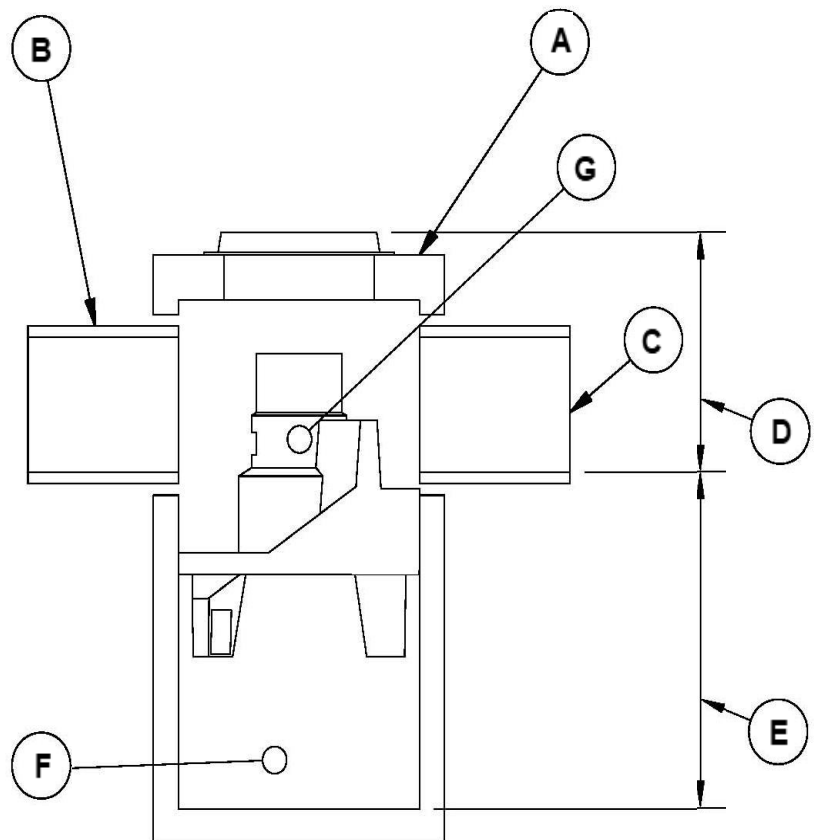
Treatment Requirements		
Treatment Goal:	Enhanced (MOE)	
Selected Parameters:	80% TSS	90% Volume
Selected Unit:	FD-4HC	

Summary of Results		
Model	TSS Removal	Volume Treated
FD-4HC	95.0%	>90%
FD-5HC	97.0%	>90%
FD-6HC	98.0%	>90%
FD-8HC	99.0%	>90%
FD-10HC	99.0%	>90%

FD-4HC Specification	
Unit Diameter (A):	1,200 mm
Inlet Pipe Diameter (B):	300 mm
Outlet Pipe Diameter (C):	300 mm
Height, T/G to Outlet Invert (D):	2340 mm
Height, Outlet Invert to Sump (E):	1515 mm
Sediment Storage Capacity (F):	0.78 m <sup>3</sup>
Oil Storage Capacity (G):	723 L
Recommended Sediment Depth for Maintenance:	440 mm
Max. Pipe Diameter:	600 mm
Peak Flow Capacity:	510 L/s

Site Elevations:	
Rim Elevation:	262.07
Inlet Pipe Elevation:	259.76
Outlet Pipe Elevation:	259.73

Site Details	
Site Area:	0.24 ha
% Impervious:	90%
Rational C:	0.84
Rainfall Station:	Barrie, ONT
Particle Size Distribution:	Fine
Peak Flowrate:	61 L/s



## Notes:

Removal efficiencies are based on NJDEP Test Protocols and independently verified.

All units supplied by ADS have numerous local, provincial, and international certifications (copies of which can be provided upon request). The design engineer is responsible for ensuring compliance with applicable regulations.



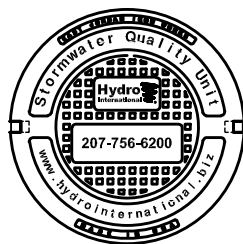
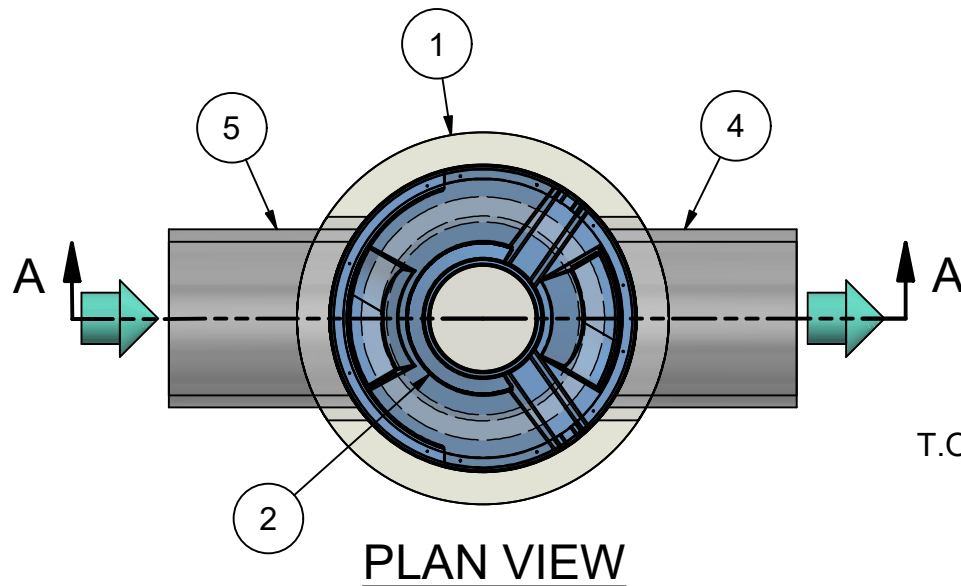
Project Name: 953 Mapleview - Block 193  
 Consulting Engineer: Jones Consulting Group  
 Location: Barrie, ON

### **Net Annual Removal Efficiency Summary: FD-4HC**

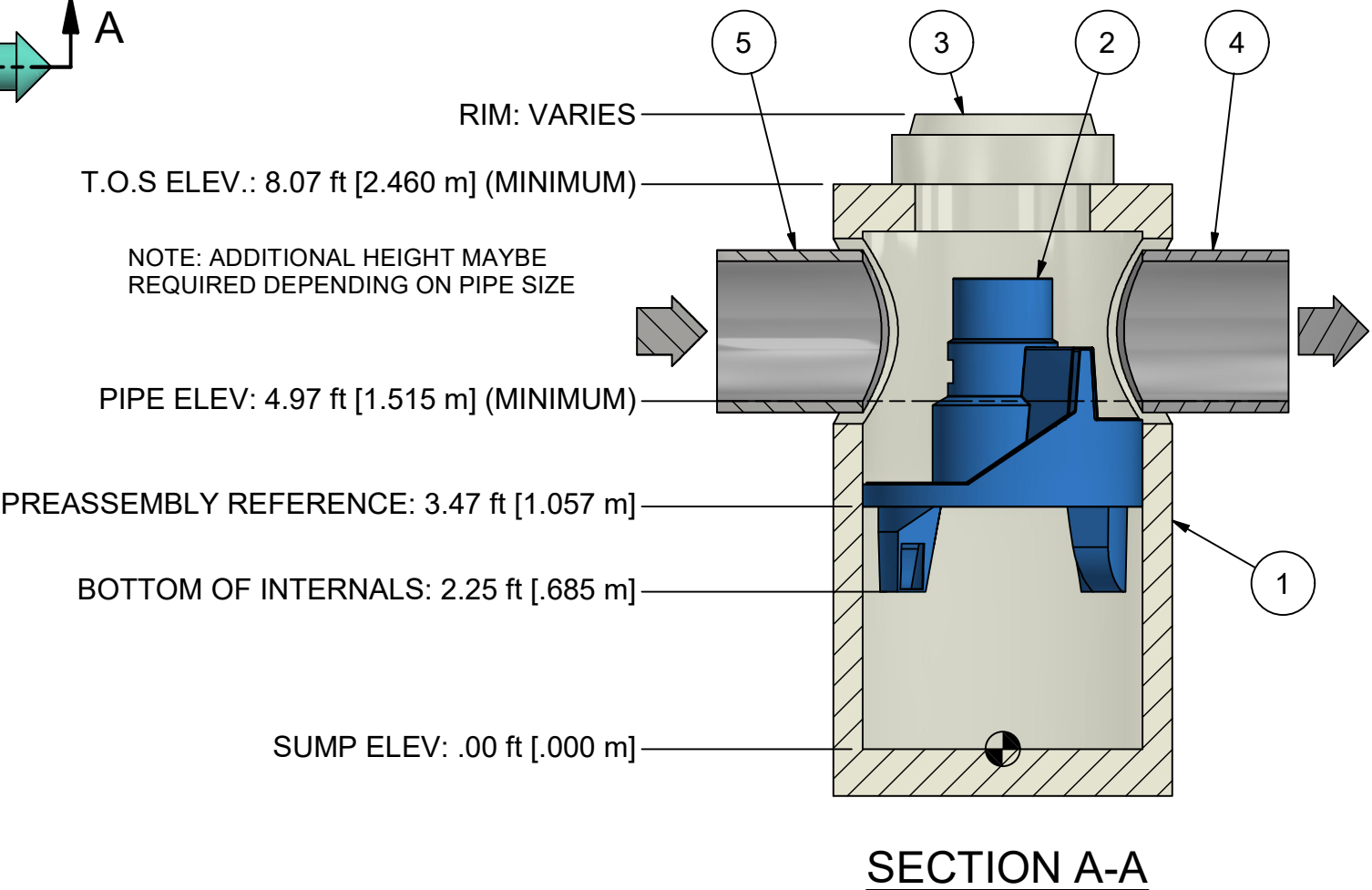
Rainfall Intensity <sup>(1)</sup>	Fraction of Rainfall <sup>(1)</sup>	FD-4HC Removal Efficiency <sup>(2)</sup>	Weighted Net-Annual Removal Efficiency
mm/hr	%	%	%
0.50	0.3%	100.0%	0.3%
1.00	25.7%	100.0%	25.7%
1.50	5.3%	100.0%	5.3%
2.00	13.4%	100.0%	13.4%
2.50	5.5%	100.0%	5.5%
3.00	3.7%	99.1%	3.7%
3.50	7.2%	97.7%	7.0%
4.00	3.4%	96.5%	3.2%
4.50	2.4%	95.4%	2.3%
5.00	4.3%	94.5%	4.1%
6.00	3.6%	92.9%	3.4%
7.00	4.3%	91.6%	4.0%
8.00	3.4%	90.5%	3.1%
9.00	1.6%	89.5%	1.5%
10.00	2.1%	88.6%	1.9%
20.00	8.9%	83.1%	7.4%
30.00	2.3%	80.0%	1.8%
40.00	1.0%	77.9%	0.8%
50.00	0.5%	76.3%	0.4%
100.00	0.7%	71.5%	0.5%
150.00	0.1%	68.9%	0.0%
200.00	0.0%	0.0%	0.0%
<b>Total Net Annual Removal Efficiency:</b>			95.4%
<b>Total Runoff Volume Treated:</b>			>90%

#### **Notes:**

- (1) Rainfall Data: 1978:2007, HLY03, Barrie, ONT, 6110557.
- (2) Based on third party verified data and approximating the removal of a PSD similar to the STC Fine distribution
- (3) Rainfall adjusted to 5 min peak intensity based on hourly average.



**HYDRO FRAME AND COVER (INCLUDED)**  
GRADE RINGS BY OTHERS  
AS REQUIRED



1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.
2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING FIRST DEFENSE MANHOLE.
3. CONTRACTOR TO CONFIRM RIM, PIPE INVERTS, PIPE DIA. AND PIPE ORIENTATION PRIOR TO RELEASE OF UNIT TO FABRICATION.



**IF IN DOUBT ASK**

DATE: 10/7/2019	SCALE: 1:30	
DRAWN BY: ER	CHECKED BY: MRJ	APPROVED BY:

Title  
4-ft DIAMETER  
FIRST DEFENSE

**GENERAL ARRANGEMENT**

**Hydro International**  
hydro-int.com  
HYDRO INTERNATIONAL

WEIGHT: 19448 lbmass	MATERIAL:
STOCK NUMBER:	
DRAWING NO.: FD GA-4	
SHEET SIZE: B	SHEET: 1 OF 1
Rev: -	

**PRODUCT SPECIFICATION:**

1. Peak Hydraulic Flow: 18.0 cfs (510 l/s)
2. Min Sediment Storage Capacity: 0.7 cu. yd. (0.5 cu. m.)
3. Maximum Inlet/Outlet Pipe Diameters: 24 in. (600 mm)
4. The Treatment System Shall Use An Induced Vortex To Separate Pollutants From Stormwater Runoff.
5. For More Product Information Including Regulatory Acceptances, Please Visit <https://hydro-int.com/en/products/first-defense>

**GENERAL NOTES:**

1. General Arrangement drawings only. Contact Hydro International for site specific drawings.
2. The diameter of the inlet and outlet pipes may be no more than 24".
3. Multiple inlet pipes possible (refer to project plan).
4. Inlet/outlet pipe angle can vary to align with drainage network (refer to project plan.s)
5. Peak flow rate and minimum height limited by available cover and pipe diameter.
6. Larger sediment storage capacity may be provided with a deeper sump depth.

PARTS LIST				
ITEM	QTY	SIZE (in)	SIZE (mm)	DESCRIPTION
1	1	48	1200	I.D. PRECAST MANHOLE
2	1			INTERNAL COMPONENTS (PRE-INSTALLED)
3	1	30	750	FRAME AND COVER (ROUND)
4	1	24 (MAX)	600 (MAX)	OUTLET PIPE (BY OTHERS)
5	1	24 (MAX)	600 (MAX)	INLET PIPE (BY OTHERS)



## Project DEVELOPMENT Summary

**DEVELOPMENT:** Block 193 Site Plan - Mapleview South Subdivision

**Subwatershed:** Hewitts Creek

Total Pre-Development Area (ha):	<b>0.63</b>	Total Pre-Development Phosphorus Load (kg/yr):	<b>0.12</b>
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Pre-Development Land Use	Area (ha)	P coeff. (kg/ha)	P Load (kg/yr)
Cropland	0.63	0.19	0.12

### POST-DEVELOPMENT LOAD

Post-Development Land Use	Area (ha)	P coeff. (kg/ha)	Best Management Practice applied with P Removal Efficiency	P Load (kg/yr)
High Intensity - Residential	0.63	1.32	Treatment Train Approach 79%	0.18

*Refer to Table 8 of the 953 Mapleview Drive E - Block 193 Site Plan, Detailed SWMR, prepared by The Jones Consulting Group, dated May 2024.*

Post-Development Area Altered:	<b>0.63</b>	P Load (kg/yr)
Total Pre-Development Area:	<b>0.63</b>	
Unaffected Area:	<b>0</b>	
		Pre-Development: <b>0.12</b>
		Post-Development: <b>0.83</b>
		Change (Pre - Post): <b>-0.71</b>
		<b>595% Net Increase in Load</b>
		Post-Development (with BMPs): <b>0.18</b>
		Change (Pre - Post): <b>-0.06</b>
		<b>47.28% Net Increase in Load</b>

**DEVELOPMENT: Block 193 Site Plan - Mapleview South Subdivision**  
**Subwatershed: Hewitts Creek**

**CONSTRUCTION PHASE LOAD**

<b>SUMMARY WITH IMPLEMENTATION OF BMPs</b>		<b>P Load (kg/yr)</b>
Pre-Development:		<b>0.12</b>
Construction Phase Amortized Over 8 Years :		to be determined
Post-Development:		<b>0.18</b>
Post-Development + Amortized Construction:		<b>to be determined</b>
<b>Pre-Development Load - Post-Development Load:</b>		<b>-0.06</b>
<b>Conclusion:</b>		<b>47% Increase in Load</b>
<b>Pre-Development Load - (Post-Development + Amortized Construction Load):</b>		<b>to be determined</b>
<b>Conclusion:</b>		<b>to be determined</b>
<b>Based on a comparison of Pre-Development and Post-Development loads, and in consideration of Construction Phase loads, the Ministry would encourage the Municipality to:</b>		
<b>Not approve development as site specific appropriate</b>		





Project:	Block 193 Site Plan - Mapleview South Subdivision	Date:	Jun-24
File No.:	REI-17055	Designed:	KR
Subject:	BLK 193 Infiltration Gallery per TRCA/CVC LID Manual	Checked:	MF
Revisions:			

#### BMP Type LOT LEVEL / CONVEYANCE CONTROL

Infiltration Galleries, designed per CVC Section 4.4 - Soakaways, Infiltration Trenches & Chambers, generally involve the collection of runoff to a stone filled reservoir providing storage for a particular return period event. Water then infiltrates into the ground over a period of 24 - 48 hours typically, recharging the groundwater sources. Infiltration Galleries are of three general types of facilities: Soakaway Pits (Typical to a Single Lot), Infiltration Trenches (Typical to Multiple Lots, located in an easement), or Infiltration Chambers (Typically centralized modular storage units below ground). These facilities promote groundwater recharge through infiltration which aids in meeting Water Balance, provide Water Quality benefits through a treatment train approach and can assist in Stream Erosion Control

#### Common Concerns

- 1 Risk of Groundwater Contamination
- 2 Risk of Soil Contamination
- 3 Location on Private Property / Enforcement
- 4 Standing Water and Mosquitoes
- 5 Proximity to Foundations & Seepage
- 6 Winter Operation

#### Physical Suitability and Constraints

- 1 Proximity to Drinking Water Sources i.e. WHPA's, not within 2yr Travel Time
- 2 Site Topography, locate on slopes <15%
- 3 Water Table, minimum 1.0m separation from Bottom of Facility to SHGWT
- 4 Site Soils & Infiltration Capacity, min 15 mm/hr
- 5 Drainage Area, 5:1 to 20:1 Impervious Drainage Area to BMP Area (10:1 Max for Roads)
- 6 Pollution Hot Spot Runoff
- 7 Setback from Buildings, minimum of 5m from foundations
- 8 Proximity to Underground Utilities

**Table 4.4.1 Ability of soakaways, infiltration trenches and chambers to meet SWM objectives**

BMP	Water Balance Benefit	Water Quality Improvement	Stream Channel Erosion Control Benefit
Soakaways, Infiltration Trenches and Chambers	Yes	Yes	Partial - depends on soil infiltration rate

**Table 4.4.2 Volumetric runoff reduction<sup>1</sup> achieved by infiltration trenches and perforated pipe systems**


LID Practice	Location	Runoff Reduction <sup>1</sup>	Reference
Infiltration trench with underdrain	Virginia	60%	Schueler (1983)
Grass swale/ Perforated pipe system	Ontario	73%	J.F. Sabourin and Associates (2008a)
Grass swale/ Perforated pipe system	Ontario	86%	J.F. Sabourin and Associates (2008a)
Perforated pipe system	Ontario	95%	SWAMP (2005)
Perforated pipe system	Ontario	89%	SWAMP (2005)
<b>Runoff Reduction Estimate<sup>2</sup></b>		<b>85%</b>	

#### Notes:

1. Runoff reduction estimates are based on differences in runoff volume between the practice and a conventional impervious surface over the period of monitoring.
2. This estimate is provided only for the purpose of initial screening of LID practices suitable for achieving stormwater management objectives and targets. Performance of individual facilities will vary depending on site specific contexts and facility design parameters and should be estimated as part of the design process and submitted with other documentation for review by the approval authority.

#### BMP Sizing Guidelines

- 1 Geometry & Layout, typically linear or rectangular, modular units afford flexibility to suit nearly any system orientation
- 2 Pretreatment should be provided to ensure system longevity, by way of leaf screens, vegetated filter strips/grass swales or filter devices (OGS Units)
- 3 Conveyance by Direct Inlet, 3rd Pipe System, or Storm Sewer, an Overflow should be provided outletting to grade or a nearby Storm Sewer
- 4 The infiltration rate of the soil in the pervious area should be at least 15 mm/hr
- 5 Filter Media will vary depending on type of system to be constructed. Typically includes a layer of clear stone (50mm dia.), which fills the reservoir. Systems can also be complimented with an underlying sand filter layer for improved Water Quality benefits. A geotextile is commonly used as a separator between adjacent native soils and stone reservoir, as well as between filter mediums. Check AOS (non-woven) or POA (woven) for piping, clogging, etc.

	Project:	Block 193 Site Plan - Mapleview South Subdivision	Date:	13-Jun-24
	File No.:	REI-17055	Designed:	KR
	Subject:	BLK 193 Infiltration Gallery per TRCA/CVC LID Manual	Checked:	MF
	Revisions:	<div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">0</div> <div style="border: 1px solid black; padding: 2px;">0</div>		

**BMP Sizing Calculations (Infiltration Galleries)** *Note: If sizing a chamber system, use the manufacturers design spreadsheet / sizing tools*

1) Depth of a facility is a function of native soil infiltration rate, porosity of storage media, and targeted drawdown time:

**Eq. 1.2**  $d_{R\ MAX} = i * t_s / V_R$       Where:  $d_{R\ MAX}$  = Maximum Depth of Stone Reservoir (mm), Limit to 2000mm MAX.  
 $i$  = Infiltration Rate for Native Soils (mm/hr) - Use FS Rate, not actual  
 $t_s$  = Drawdown Time (Design for 24 - 48 Hours)  
 $V_R$  = Void Ratio of Stone Reservoir (Typically 0.4 for 50mm Clear Stone)

2) Facility footprint is then determined based on the Water Quality Volume (WQV) to be captured, as well as the available storage volume in the reservoir:

**Eq. 2**  $A_F = WQV / (d_R * V_R)$       Where:  $A_F$  = Footprint Area of Facility (m<sup>2</sup>)  
 $WQV$  = Water Quality Volume (m<sup>3</sup>), Depth of Runoff (mm) \* Catchment (m<sup>2</sup>) OR Runoff Vol. (m<sup>3</sup>)  
 $d_{R\ MAX}$  = Design Stone Reservoir Depth (m)  
 $V_R$  = Void Ratio of Stone Reservoir (Typically 0.4 for 50mm Clear Stone)

**Infiltration Gallery Sizer:**

= user input
 = calculated / constant
 = design parameter

1)  $d_{R\ MAX} = i * t_s / V_R$

$d_{R\ MAX} = 1292\ mm$

Where:  $i = 11.4\ mm/hr$   
 $t_s = 45.32\ hrs$   
 $V_R = 0.4$

**Note: CHECK DEPTH TO SHGWT FOR MINIMUM 1.0m SEPARATION**

2)  $A_F = WQV / (d_R * V_R)$

$A_F = 177.1\ m^2$

$A_F = 165.2\ m^2$

Where:  $WQV = 91.476\ m^3$   
 $d_{R\ MAX} = 1.292\ m$   
 $V_R = 0.4$

Depth of Runoff:	21.78 mm
Catchment Area:	4200 m <sup>2</sup>
XIMP:	94%
Imp. Area	3964 m <sup>2</sup>

**Recommended Area Check (5:1 - 20:1 Ratio):** CAUTION! Consider additional protection against sedimentation      301 OTHYMO Catchment ID

**A<sub>p</sub> based on I/P Ratio:**

$A_{F\ MIN} = 264.264\ m^2$

$A_{F\ MAX} = 792.792\ m^2$

**I/P<sub>PROV</sub> : 24 :1**

**ADDITIONAL NOTES:**      Contributing Area Land Use is comprised of Medium Density Residential and Rooftop Drainage. Upstream pre-treatment is provide by an OGS unit prior to flows entering the facility

**References:**      **STEP Low Impact Development Stormwater Management Planning & Design Guide:**      [https://wiki.sustainabletechnologies.ca/wiki/Main\\_Page](https://wiki.sustainabletechnologies.ca/wiki/Main_Page)

Item	Page	Link
Eq.'s 1.1, 1.2, 2, 3	Bioretention: Sizing	<a href="https://wiki.sustainabletechnologies.ca/wiki/Bioretention:_Sizing">https://wiki.sustainabletechnologies.ca/wiki/Bioretention:_Sizing</a>
Eq. 4	Curb Cuts	<a href="https://wiki.sustainabletechnologies.ca/wiki/Curb_cuts">https://wiki.sustainabletechnologies.ca/wiki/Curb_cuts</a>
Eq. 5	Flow Through Media	<a href="https://wiki.sustainabletechnologies.ca/wiki/Flow_through_media">https://wiki.sustainabletechnologies.ca/wiki/Flow_through_media</a>
Eq. 6	Flow Through Perforated Pipe	<a href="https://wiki.sustainabletechnologies.ca/wiki/Flow_through_perforated_pipe">https://wiki.sustainabletechnologies.ca/wiki/Flow_through_perforated_pipe</a>





## Appendix C

### OTTHYMO Modeling

- Post-Development OTTHYMO Inputs
- Discrete Event Modelling: 25mm Storm, Detailed Output
- Continuous Event Modelling: Water Balance Summary
- OTTHYMO Digital Modeling Files

**Weighted Curve Number Calculator**

Input:

Catchment ID	301		
Hydrologic Soil Group	AB		
Soil Texture	Bondhead Sandy Loam	Weighted Curve Number	Weighted Runoff 'C'
Wetland(ha)/CN	0.000	N/A	N/A
Woods(ha)/CN	0.000	N/A	N/A
Pasture/Lawn Area(ha)/CN	0.024	49.0	0.10
Cultivated(ha)/CN	0.000	N/A	N/A
Impervious Area(ha)/CN	0.397	98.0	0.95

Calculated:

Area	0.420	ha
Average CN	95	
Average Pervious CN	49	
Average Runoff 'C'	0.90	

**Initial Abstraction Calculator**

Input:

Wetland	16	mm
Woods	10	mm
Pasture/Lawns	5	mm
Cultivated	7	mm
Impervious Areas	2	mm

Calculated:

Total Average IA	2.17	mm
Average Pervious IA	5.00	mm

\*Weighted Curve Numbers and Weighted Rational Coefficients are determined from the weighted average of the area and Curve Number or Rational Coefficient in a given soil type, i.e. Type A, B, C or D.

**Time of Concentration Calculator**

Input:

Flow Length Max El.		m
Flow Length Min. El.		m
Catchment Flow Length	25	m

Calculated:

Catchment Ave. Slope	2.00	%
Imperviousness	94.38%	
Directly Connected Imperviousness	94.38%	

Calculated:

RATIONAL COEFFICIENT

5YR Rational 'C'	0.90
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Calculated:

MTO DRAINAGE MANUAL

25YR Rational 'C'	0.99
50YR Rational 'C'	1.00
100YR Rational 'C'	1.00

Calculated:

AIRPORT METHOD (Runoff Coef &lt;0.4)

Time of Concentration	2.56	min
Time of Concentration	0.04	hr
Time to Peak	0.03	hr

$$T_c = 3.26 * (1.1 - C) * L^{0.5} * S^{-0.33}$$

Calculated:

BRANSBY-WILLIAMS METHOD (Runoff Coef &gt;=0.4)

Time of Concentration	1.35	min
Time of Concentration	0.02	hr
Time to Peak	0.02	hr

$$T_c = 0.057 * L * S^{-0.2} * A^{-0.1}$$

Use:

Time of Concentration	0.02	hr
Time to Peak	0.02	hr

Post-Development OTTHYMO Modeling

<b>Catchment Area Summary (301)</b>					
	Area (ha)	CN	CN*A	Rational "C"	C*A
Wetlands "A"	0.0000	50	0.00	0.05	0.0000
Woods "A"	0.0000	36	0.00	0.08	0.0000
Pasture/Lawn "A"	0.0000	49	0.00	0.10	0.0000
Cultivated "A"	0.0000	66	0.00	0.22	0.0000
Impervious "A" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "A" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "A"	0.0000				
Weighted CN "A"			0.00		0.0000
Wetlands "AB"	0.0000	50	0.00	0.05	0.0000
Woods "AB"	0.0000	36	0.00	0.08	0.0000
Pasture/Lawn "AB"	0.0236	49	1.16	0.10	0.0024
Cultivated "AB"	0.0000	66	0.00	0.22	0.0000
Impervious "AB" (Connected)	0.3968	98	38.88	0.95	0.3769
Impervious "AB" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "AB"	0.4204				
Weighted CN "AB"			95.25		0.9022
Wetlands "B"	0.0000	50	0.00	0.05	0.0000
Woods "B"	0.0000	60	0.00	0.25	0.0000
Pasture/Lawn "B"	0.0000	69	0.00	0.28	0.0000
Cultivated "B"	0.0000	74	0.00	0.35	0.0000
Impervious "B" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "B" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "B"	0.0000				
Weighted CN "B"			0.00		0.0000
Wetlands "BC"	0.0000	50	0.00	0.05	0.0000
Woods "BC"	0.0000	60	0.00	0.25	0.0000
Pasture/Lawn "BC"	0.0000	69	0.00	0.28	0.0000
Cultivated "BC"	0.0000	74	0.00	0.35	0.0000
Impervious "BC" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "BC" (Dis-Connectec	0.0000	98	0.00	0.95	0.0000
Total Area "BC"	0.0000				
Weighted CN "BC"			0.00		0.0000
Totals:	0.4204	Weighted CN	95.25	Weighted "C"	0.90

Weighted Curve Number Calculator			
Input:			
Catchment ID	302		
Hydrologic Soil Group	AB		
Soil Texture	Bondhead Sandy Loam	Weighted Curve Number	Weighted Runoff 'C'
Wetland(ha)/CN	0.000	N/A	N/A
Woods(ha)/CN	0.000	N/A	N/A
Pasture/Lawn Area(ha)/CN	0.104	49.0	0.10
Cultivated(ha)/CN	0.000	N/A	N/A
Impervious Area(ha)/CN	0.069	98.0	0.95
Calculated:			
Area	0.174	ha	
Average CN	69		
Average Pervious CN	49		
Average Runoff 'C'	0.44		

Initial Abstraction Calculator		
Input:		
Wetland	16	mm
Woods	10	mm
Pasture/Lawns	5	mm
Cultivated	7	mm
Impervious Areas	2	mm
Calculated:		
Total Average IA	3.80	mm
Average Pervious IA	5.00	mm

\*Weighted Curve Numbers and Weighted Rational Coefficients are determined from the weighted average of the area and Curve Number or Rational Coefficient in a given soil type, i.e. Type A, B, C or D.

Time of Concentration Calculator		
Input:		
Flow Length Max El.		m
Flow Length Min. El.		m
Catchment Flow Length	10	m
Calculated:		
Catchment Ave. Slope	12.00	%
Imperviousness	40.00%	
Directly Connected Imperviousness	24.00%	
Calculated: RATIONAL COEFFICIENT		
5YR Rational 'C'	0.44	
Calculated: MTO DRAINAGE MANUAL		
25YR Rational 'C'	0.48	
50YR Rational 'C'	0.53	
100YR Rational 'C'	0.55	
Calculated: AIRPORT METHOD (Runoff Coef <0.4)		
Time of Concentration	3.00	min
Time of Concentration	0.05	hr
Time to Peak	0.03	hr
$T_c = 3.26 * (1.1 - C) * L^{0.5} * S^{-0.33}$		
Calculated: BRANSBY-WILLIAMS METHOD (Runoff Coef >=0.4)		
Time of Concentration	0.41	min
Time of Concentration	0.01	hr
Time to Peak	0.00	hr
$T_c = 0.057 * L * S^{-0.2} * A^{-0.1}$		
Use:		
Time of Concentration	0.01	hr
Time to Peak	0.00	hr

Post-Development OTTHYMO Modeling

<b>Catchment Area Summary (302)</b>					
	Area (ha)	CN	CN*A	Rational "C"	C*A
Wetlands "A"	0.0000	50	0.00	0.05	0.0000
Woods "A"	0.0000	36	0.00	0.08	0.0000
Pasture/Lawn "A"	0.0000	49	0.00	0.10	0.0000
Cultivated "A"	0.0000	66	0.00	0.22	0.0000
Impervious "A" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "A" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "A"	0.0000				
Weighted CN "A"			0.00		0.0000
Wetlands "AB"	0.0000	50	0.00	0.05	0.0000
Woods "AB"	0.0000	36	0.00	0.08	0.0000
Pasture/Lawn "AB"	0.1041	49	5.10	0.10	0.0104
Cultivated "AB"	0.0000	66	0.00	0.22	0.0000
Impervious "AB" (Connected)	0.0417	98	4.08	0.95	0.0396
Impervious "AB" (Dis-Connected)	0.0278	98	2.72	0.95	0.0264
Total Area "AB"	0.1736				
Weighted CN "AB"			68.60		0.4400
Wetlands "B"	0.0000	50	0.00	0.05	0.0000
Woods "B"	0.0000	60	0.00	0.25	0.0000
Pasture/Lawn "B"	0.0000	69	0.00	0.28	0.0000
Cultivated "B"	0.0000	74	0.00	0.35	0.0000
Impervious "B" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "B" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "B"	0.0000				
Weighted CN "B"			0.00		0.0000
Wetlands "BC"	0.0000	50	0.00	0.05	0.0000
Woods "BC"	0.0000	60	0.00	0.25	0.0000
Pasture/Lawn "BC"	0.0000	69	0.00	0.28	0.0000
Cultivated "BC"	0.0000	74	0.00	0.35	0.0000
Impervious "BC" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "BC" (Dis-Connectec	0.0000	98	0.00	0.95	0.0000
Total Area "BC"	0.0000				
Weighted CN "BC"			0.00		0.0000
Totals:	0.1736	Weighted CN	68.60	Weighted "C"	0.44

Weighted Curve Number Calculator			
Input:			
Catchment ID	303		
Hydrologic Soil Group	AB		
Soil Texture	Bondhead Sandy Loam	Weighted Curve Number	Weighted Runoff 'C'
Wetland(ha)/CN	0.000	N/A	N/A
Woods(ha)/CN	0.000	N/A	N/A
Pasture/Lawn Area(ha)/CN	0.018	49.0	0.10
Cultivated(ha)/CN	0.000	N/A	N/A
Impervious Area(ha)/CN	0.002	98.0	0.95
Calculated:			
Area	0.020	ha	
Average CN	55		
Average Pervious CN	49		
Average Runoff 'C'	0.20		

Initial Abstraction Calculator		
Input:		
Wetland	16	mm
Woods	10	mm
Pasture/Lawns	5	mm
Cultivated	7	mm
Impervious Areas	2	mm
Calculated:		
Total Average IA	4.64	mm
Average Pervious IA	5.00	mm

\*Weighted Curve Numbers and Weighted Rational Coefficients are determined from the weighted average of the area and Curve Number or Rational Coefficient in a given soil type, i.e. Type A, B, C or D.

Time of Concentration Calculator		
Input:		
Flow Length Max El.		m
Flow Length Min. El.		m
Catchment Flow Length	3	m
Calculated:		
Catchment Ave. Slope	25.00	%
Imperviousness	12.00%	
Directly Connected Imperviousness	1.20%	
Calculated: RATIONAL COEFFICIENT		
5YR Rational 'C'	0.20	
Calculated: MTO DRAINAGE MANUAL		
25YR Rational 'C'	0.22	
50YR Rational 'C'	0.24	
100YR Rational 'C'	0.25	
Calculated: AIRPORT METHOD (Runoff Coef <0.4)		
Time of Concentration	1.75	min
Time of Concentration	0.03	hr
Time to Peak	0.02	hr
$T_c = 3.26 * (1.1 - C) * L^{0.5} * S^{-0.33}$		
Calculated: BRANSBY-WILLIAMS METHOD (Runoff Coef >=0.4)		
Time of Concentration	0.13	min
Time of Concentration	0.00	hr
Time to Peak	0.00	hr
$T_c = 0.057 * L * S^{-0.2} * A^{-0.1}$		
Use:		
Time of Concentration	0.03	hr
Time to Peak	0.02	hr

Post-Development OTTHYMO Modeling

<b>Catchment Area Summary (303)</b>					
	Area (ha)	CN	CN*A	Rational "C"	C*A
Wetlands "A"	0.0000	50	0.00	0.05	0.0000
Woods "A"	0.0000	36	0.00	0.08	0.0000
Pasture/Lawn "A"	0.0000	49	0.00	0.10	0.0000
Cultivated "A"	0.0000	66	0.00	0.22	0.0000
Impervious "A" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "A" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "A"	0.0000				
Weighted CN "A"			0.00		0.0000
Wetlands "AB"	0.0000	50	0.00	0.05	0.0000
Woods "AB"	0.0000	36	0.00	0.08	0.0000
Pasture/Lawn "AB"	0.0177	49	0.87	0.10	0.0018
Cultivated "AB"	0.0000	66	0.00	0.22	0.0000
Impervious "AB" (Connected)	0.0002	98	0.02	0.95	0.0002
Impervious "AB" (Dis-Connected)	0.0022	98	0.21	0.95	0.0021
Total Area "AB"	0.0201				
Weighted CN "AB"			54.88		0.2020
Wetlands "B"	0.0000	50	0.00	0.05	0.0000
Woods "B"	0.0000	60	0.00	0.25	0.0000
Pasture/Lawn "B"	0.0000	69	0.00	0.28	0.0000
Cultivated "B"	0.0000	74	0.00	0.35	0.0000
Impervious "B" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "B" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "B"	0.0000				
Weighted CN "B"			0.00		0.0000
Wetlands "BC"	0.0000	50	0.00	0.05	0.0000
Woods "BC"	0.0000	60	0.00	0.25	0.0000
Pasture/Lawn "BC"	0.0000	69	0.00	0.28	0.0000
Cultivated "BC"	0.0000	74	0.00	0.35	0.0000
Impervious "BC" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "BC" (Dis-Connectec	0.0000	98	0.00	0.95	0.0000
Total Area "BC"	0.0000				
Weighted CN "BC"			0.00		0.0000
Totals:	0.0201	Weighted CN	54.88	Weighted "C"	0.20

V V I SSSSS U U A L (v 6.2.2015)  
V V I SS U U A A L  
V V I SS U U AAAAA L  
V V I SS U U A A L  
VV I SSSSS UUUUU A A LLLLL

000 TTTT TTTT H H Y Y M M 000 TM  
O O T T H H Y Y MM MM O O  
O O T T H H Y M M O O  
000 T T H H Y M M 000

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\*\*\*\*\* D E T A I L E D O U T P U T \*\*\*\*\*

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat  
Output filename: C:\Users\kransom.JONES\AppData\Local\Civica\XH5\0e32c285-5856-4fe8-af0e-3a4eb0307df2\52  
Summary filename: C:\Users\kransom.JONES\AppData\Local\Civica\XH5\0e32c285-5856-4fe8-af0e-3a4eb0307df2\52

DATE: 05-31-2024 TIME: 11:43:04

USER:

COMMENTS: \_\_\_\_\_

\*\*\*\*\*  
\*\* SIMULATION : WQE 25mm 4hr CHI \*\*  
\*\*\*\*\*

CHICAGO STORM  
Ptotal= 25.00 mm

IDF curve parameters: A= 458.560  
B= 4.699  
C= 0.781  
used in: INTENSITY =  $A / (t + B)^C$   
Duration of storm = 4.00 hrs  
Storm time step = 5.00 min  
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.56	1.00	6.77	2.00	4.31	3.00	2.07
0.08	1.65	1.08	10.39	2.08	3.92	3.08	1.99
0.17	1.76	1.17	24.03	2.17	3.61	3.17	1.92
0.25	1.88	1.25	77.76	2.25	3.34	3.25	1.85
0.33	2.03	1.33	31.02	2.33	3.12	3.33	1.79
0.42	2.20	1.42	17.08	2.42	2.92	3.42	1.73
0.50	2.41	1.50	11.77	2.50	2.76	3.50	1.68
0.58	2.68	1.58	9.02	2.58	2.61	3.58	1.63
0.67	3.02	1.67	7.34	2.67	2.48	3.67	1.58
0.75	3.47	1.75	6.21	2.75	2.36	3.75	1.54
0.83	4.11	1.83	5.40	2.83	2.25	3.83	1.50
0.92	5.09	1.92	4.79	2.92	2.16	3.92	1.46

CALIB  
NASHYD ( 0303)  
ID= 1 DT= 1.0 min

Area (ha)= 0.02 Curve Number (CN)= 55.0  
Ia (mm)= 4.64 # of Linear Res.(N)= 3.00  
U.H. Tp(hrs)= 0.02

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.56	1.017	6.77	2.017	4.31	3.02	2.07
0.033	1.56	1.033	6.77	2.033	4.31	3.03	2.07
0.050	1.56	1.050	6.77	2.050	4.31	3.05	2.07
0.067	1.56	1.067	6.77	2.067	4.31	3.07	2.07
0.083	1.56	1.083	6.77	2.083	4.31	3.08	2.07
0.100	1.65	1.100	10.39	2.100	3.92	3.10	1.99



0.117	1.65	1.117	10.39	2.117	3.92	3.12	1.99
0.133	1.65	1.133	10.39	2.133	3.92	3.13	1.99
0.150	1.65	1.150	10.39	2.150	3.92	3.15	1.99
0.167	1.65	1.167	10.39	2.167	3.92	3.17	1.99
0.183	1.76	1.183	24.03	2.183	3.61	3.18	1.92
0.200	1.76	1.200	24.03	2.200	3.61	3.20	1.92
0.217	1.76	1.217	24.03	2.217	3.61	3.22	1.92
0.233	1.76	1.233	24.03	2.233	3.61	3.23	1.92
0.250	1.76	1.250	24.03	2.250	3.61	3.25	1.92
0.267	1.88	1.267	77.76	2.267	3.34	3.27	1.85
0.283	1.88	1.283	77.76	2.283	3.34	3.28	1.85
0.300	1.88	1.300	77.76	2.300	3.34	3.30	1.85
0.317	1.88	1.317	77.76	2.317	3.34	3.32	1.85
0.333	1.88	1.333	77.76	2.333	3.34	3.33	1.85
0.350	2.03	1.350	31.02	2.350	3.12	3.35	1.79
0.367	2.03	1.367	31.02	2.367	3.12	3.37	1.79
0.383	2.03	1.383	31.02	2.383	3.12	3.38	1.79
0.400	2.03	1.400	31.02	2.400	3.12	3.40	1.79
0.417	2.03	1.417	31.02	2.417	3.12	3.42	1.79
0.433	2.20	1.433	17.08	2.433	2.92	3.43	1.73
0.450	2.20	1.450	17.08	2.450	2.92	3.45	1.73
0.467	2.20	1.467	17.08	2.467	2.92	3.47	1.73
0.483	2.20	1.483	17.08	2.483	2.92	3.48	1.73
0.500	2.20	1.500	17.08	2.500	2.92	3.50	1.73
0.517	2.41	1.517	11.78	2.517	2.76	3.52	1.68
0.533	2.41	1.533	11.77	2.533	2.76	3.53	1.68
0.550	2.41	1.550	11.77	2.550	2.76	3.55	1.68
0.567	2.41	1.567	11.77	2.567	2.76	3.57	1.68
0.583	2.41	1.583	11.77	2.583	2.76	3.58	1.68
0.600	2.68	1.600	9.02	2.600	2.61	3.60	1.63
0.617	2.68	1.617	9.02	2.617	2.61	3.62	1.63
0.633	2.68	1.633	9.02	2.633	2.61	3.63	1.63
0.650	2.68	1.650	9.02	2.650	2.61	3.65	1.63
0.667	2.68	1.667	9.02	2.667	2.61	3.67	1.63
0.683	3.02	1.683	7.34	2.683	2.48	3.68	1.58
0.700	3.02	1.700	7.34	2.700	2.48	3.70	1.58
0.717	3.02	1.717	7.34	2.717	2.48	3.72	1.58
0.733	3.02	1.733	7.34	2.733	2.48	3.73	1.58
0.750	3.02	1.750	7.34	2.750	2.48	3.75	1.58
0.767	3.47	1.767	6.21	2.767	2.36	3.77	1.54
0.783	3.47	1.783	6.21	2.783	2.36	3.78	1.54
0.800	3.47	1.800	6.21	2.800	2.36	3.80	1.54
0.817	3.47	1.817	6.21	2.817	2.36	3.82	1.54
0.833	3.47	1.833	6.21	2.833	2.36	3.83	1.54
0.850	4.11	1.850	5.40	2.850	2.25	3.85	1.50
0.867	4.11	1.867	5.40	2.867	2.25	3.87	1.50
0.883	4.11	1.883	5.40	2.883	2.25	3.88	1.50
0.900	4.11	1.900	5.40	2.900	2.25	3.90	1.50
0.917	4.11	1.917	5.40	2.917	2.25	3.92	1.50
0.933	5.09	1.933	4.79	2.933	2.16	3.93	1.46
0.950	5.09	1.950	4.79	2.950	2.16	3.95	1.46
0.967	5.09	1.967	4.79	2.967	2.16	3.97	1.46
0.983	5.09	1.983	4.79	2.983	2.16	3.98	1.46
1.000	5.09	2.000	4.79	3.000	2.16	4.00	1.46

Unit Hyd Qpeak (cms)= 0.038

PEAK FLOW (cms)= 0.000 (i)  
TIME TO PEAK (hrs)= 1.333  
RUNOFF VOLUME (mm)= 1.765  
TOTAL RAINFALL (mm)= 24.998  
RUNOFF COEFFICIENT = 0.071

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

-----			
CALIB			
STANDHYD ( 0302)	Area (ha)= 0.17		
ID= 1 DT= 1.0 min	Total Imp(%)= 40.00	Dir. Conn.(%)= 24.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.07	0.10	
Dep. Storage (mm)=	2.00	5.00	
Average slope (%)=	2.00	2.00	
Length (m)=	34.06	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr

0.017	1.56	1.017	6.77	2.017	4.31	3.02	2.07
0.033	1.56	1.033	6.77	2.033	4.31	3.03	2.07
0.050	1.56	1.050	6.77	2.050	4.31	3.05	2.07
0.067	1.56	1.067	6.77	2.067	4.31	3.07	2.07
0.083	1.56	1.083	6.77	2.083	4.31	3.08	2.07
0.100	1.65	1.100	10.39	2.100	3.92	3.10	1.99
0.117	1.65	1.117	10.39	2.117	3.92	3.12	1.99
0.133	1.65	1.133	10.39	2.133	3.92	3.13	1.99
0.150	1.65	1.150	10.39	2.150	3.92	3.15	1.99
0.167	1.65	1.167	10.39	2.167	3.92	3.17	1.99
0.183	1.76	1.183	24.03	2.183	3.61	3.18	1.92
0.200	1.76	1.200	24.03	2.200	3.61	3.20	1.92
0.217	1.76	1.217	24.03	2.217	3.61	3.22	1.92
0.233	1.76	1.233	24.03	2.233	3.61	3.23	1.92
0.250	1.76	1.250	24.03	2.250	3.61	3.25	1.92
0.267	1.88	1.267	77.76	2.267	3.34	3.27	1.85
0.283	1.88	1.283	77.76	2.283	3.34	3.28	1.85
0.300	1.88	1.300	77.76	2.300	3.34	3.30	1.85
0.317	1.88	1.317	77.76	2.317	3.34	3.32	1.85
0.333	1.88	1.333	77.76	2.333	3.34	3.33	1.85
0.350	2.03	1.350	31.02	2.350	3.12	3.35	1.79
0.367	2.03	1.367	31.02	2.367	3.12	3.37	1.79
0.383	2.03	1.383	31.02	2.383	3.12	3.38	1.79
0.400	2.03	1.400	31.02	2.400	3.12	3.40	1.79
0.417	2.03	1.417	31.02	2.417	3.12	3.42	1.79
0.433	2.20	1.433	17.08	2.433	2.92	3.43	1.73
0.450	2.20	1.450	17.08	2.450	2.92	3.45	1.73
0.467	2.20	1.467	17.08	2.467	2.92	3.47	1.73
0.483	2.20	1.483	17.08	2.483	2.92	3.48	1.73
0.500	2.20	1.500	17.08	2.500	2.92	3.50	1.73
0.517	2.41	1.517	11.77	2.517	2.76	3.52	1.68
0.533	2.41	1.533	11.77	2.533	2.76	3.53	1.68
0.550	2.41	1.550	11.77	2.550	2.76	3.55	1.68
0.567	2.41	1.567	11.77	2.567	2.76	3.57	1.68
0.583	2.41	1.583	11.77	2.583	2.76	3.58	1.68
0.600	2.68	1.600	9.02	2.600	2.61	3.60	1.63
0.617	2.68	1.617	9.02	2.617	2.61	3.62	1.63
0.633	2.68	1.633	9.02	2.633	2.61	3.63	1.63
0.650	2.68	1.650	9.02	2.650	2.61	3.65	1.63
0.667	2.68	1.667	9.02	2.667	2.61	3.67	1.63
0.683	3.02	1.683	7.34	2.683	2.48	3.68	1.58
0.700	3.02	1.700	7.34	2.700	2.48	3.70	1.58
0.717	3.02	1.717	7.34	2.717	2.48	3.72	1.58
0.733	3.02	1.733	7.34	2.733	2.48	3.73	1.58
0.750	3.02	1.750	7.34	2.750	2.48	3.75	1.58
0.767	3.47	1.767	6.21	2.767	2.36	3.77	1.54
0.783	3.47	1.783	6.21	2.783	2.36	3.78	1.54
0.800	3.47	1.800	6.21	2.800	2.36	3.80	1.54
0.817	3.47	1.817	6.21	2.817	2.36	3.82	1.54
0.833	3.47	1.833	6.21	2.833	2.36	3.83	1.54
0.850	4.11	1.850	5.40	2.850	2.25	3.85	1.50
0.867	4.11	1.867	5.40	2.867	2.25	3.87	1.50
0.883	4.11	1.883	5.40	2.883	2.25	3.88	1.50
0.900	4.11	1.900	5.40	2.900	2.25	3.90	1.50
0.917	4.11	1.917	5.40	2.917	2.25	3.92	1.50
0.933	5.09	1.933	4.79	2.933	2.16	3.93	1.46
0.950	5.09	1.950	4.79	2.950	2.16	3.95	1.46
0.967	5.09	1.967	4.79	2.967	2.16	3.97	1.46
0.983	5.09	1.983	4.79	2.983	2.16	3.98	1.46
1.000	5.09	2.000	4.79	3.000	2.16	4.00	1.46

Max.Eff.Inten.(mm/hr)= 77.76 2.39  
over (min) 5.00 33.00  
Storage Coeff. (min)= 1.20 (ii) 32.62 (ii)  
Unit Hyd. Tpeak (min)= 5.00 33.00  
Unit Hyd. peak (cms)= 0.45 0.03

\*TOTALS\*

PEAK FLOW (cms)= 0.01 0.00 0.008 (iii)  
TIME TO PEAK (hrs)= 1.35 2.02 1.35  
RUNOFF VOLUME (mm)= 23.00 1.93 6.87  
TOTAL RAINFALL (mm)= 25.00 25.00 25.00  
RUNOFF COEFFICIENT = 0.92 0.08 0.27

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 49.0 Ia = Dep. Storage (Above)  
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
THAN THE STORAGE COEFFICIENT.  
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 ( 0302):	0.17	0.008	1.35	6.87
+ ID2= 2 ( 0303):	0.02	0.000	1.33	1.77
=====				
ID = 3 ( 0006):	0.19	0.008	1.35	6.34

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB				
STANDHYD ( 0301)	Area (ha)=	0.42		
ID= 1 DT= 1.0 min	Total Imp(%)=	94.38	Dir. Conn.(%)=	94.38

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.40	0.02
Dep. Storage	(mm)=	2.00	5.00
Average slope	(%)=	2.00	2.00
Length	(m)=	52.92	25.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.56	1.017	6.77	2.017	4.31	3.02	2.07
0.033	1.56	1.033	6.77	2.033	4.31	3.03	2.07
0.050	1.56	1.050	6.77	2.050	4.31	3.05	2.07
0.067	1.56	1.067	6.77	2.067	4.31	3.07	2.07
0.083	1.56	1.083	6.77	2.083	4.31	3.08	2.07
0.100	1.65	1.100	10.39	2.100	3.92	3.10	1.99
0.117	1.65	1.117	10.39	2.117	3.92	3.12	1.99
0.133	1.65	1.133	10.39	2.133	3.92	3.13	1.99
0.150	1.65	1.150	10.39	2.150	3.92	3.15	1.99
0.167	1.65	1.167	10.39	2.167	3.92	3.17	1.99
0.183	1.76	1.183	24.03	2.183	3.61	3.18	1.92
0.200	1.76	1.200	24.03	2.200	3.61	3.20	1.92
0.217	1.76	1.217	24.03	2.217	3.61	3.22	1.92
0.233	1.76	1.233	24.03	2.233	3.61	3.23	1.92
0.250	1.76	1.250	24.03	2.250	3.61	3.25	1.92
0.267	1.88	1.267	77.76	2.267	3.34	3.27	1.85
0.283	1.88	1.283	77.76	2.283	3.34	3.28	1.85
0.300	1.88	1.300	77.76	2.300	3.34	3.30	1.85
0.317	1.88	1.317	77.76	2.317	3.34	3.32	1.85
0.333	1.88	1.333	77.76	2.333	3.34	3.33	1.85
0.350	2.03	1.350	31.02	2.350	3.12	3.35	1.79
0.367	2.03	1.367	31.02	2.367	3.12	3.37	1.79
0.383	2.03	1.383	31.02	2.383	3.12	3.38	1.79
0.400	2.03	1.400	31.02	2.400	3.12	3.40	1.79
0.417	2.03	1.417	31.02	2.417	3.12	3.42	1.79
0.433	2.20	1.433	17.08	2.433	2.92	3.43	1.73
0.450	2.20	1.450	17.08	2.450	2.92	3.45	1.73
0.467	2.20	1.467	17.08	2.467	2.92	3.47	1.73
0.483	2.20	1.483	17.08	2.483	2.92	3.48	1.73
0.500	2.20	1.500	17.08	2.500	2.92	3.50	1.73
0.517	2.41	1.517	11.78	2.517	2.76	3.52	1.68
0.533	2.41	1.533	11.77	2.533	2.76	3.53	1.68
0.550	2.41	1.550	11.77	2.550	2.76	3.55	1.68
0.567	2.41	1.567	11.77	2.567	2.76	3.57	1.68
0.583	2.41	1.583	11.77	2.583	2.76	3.58	1.68
0.600	2.68	1.600	9.02	2.600	2.61	3.60	1.63
0.617	2.68	1.617	9.02	2.617	2.61	3.62	1.63
0.633	2.68	1.633	9.02	2.633	2.61	3.63	1.63
0.650	2.68	1.650	9.02	2.650	2.61	3.65	1.63
0.667	2.68	1.667	9.02	2.667	2.61	3.67	1.63
0.683	3.02	1.683	7.34	2.683	2.48	3.68	1.58
0.700	3.02	1.700	7.34	2.700	2.48	3.70	1.58
0.717	3.02	1.717	7.34	2.717	2.48	3.72	1.58
0.733	3.02	1.733	7.34	2.733	2.48	3.73	1.58
0.750	3.02	1.750	7.34	2.750	2.48	3.75	1.58
0.767	3.47	1.767	6.21	2.767	2.36	3.77	1.54
0.783	3.47	1.783	6.21	2.783	2.36	3.78	1.54
0.800	3.47	1.800	6.21	2.800	2.36	3.80	1.54
0.817	3.47	1.817	6.21	2.817	2.36	3.82	1.54
0.833	3.47	1.833	6.21	2.833	2.36	3.83	1.54
0.850	4.11	1.850	5.40	2.850	2.25	3.85	1.50
0.867	4.11	1.867	5.40	2.867	2.25	3.87	1.50
0.883	4.11	1.883	5.40	2.883	2.25	3.88	1.50
0.900	4.11	1.900	5.40	2.900	2.25	3.90	1.50
0.917	4.11	1.917	5.40	2.917	2.25	3.92	1.50
0.933	5.09	1.933	4.79	2.933	2.16	3.93	1.46
0.950	5.09	1.950	4.79	2.950	2.16	3.95	1.46

0.967	5.09	1.967	4.79	2.967	2.16	3.97	1.46
0.983	5.09	1.983	4.79	2.983	2.16	3.98	1.46
1.000	5.09	2.000	4.79	3.000	2.16	4.00	1.46

Max.Eff.Inten.(mm/hr)=	77.76	2.25	
over (min)	5.00	4.00	
Storage Coeff. (min)=	1.57 (ii)	3.47 (ii)	
Unit Hyd. Tpeak (min)=	5.00	4.00	
Unit Hyd. peak (cms)=	0.41	0.31	
			*TOTALS*
PEAK FLOW (cms)=	0.07	0.00	0.075 (iii)
TIME TO PEAK (hrs)=	1.35	1.38	1.35
RUNOFF VOLUME (mm)=	23.00	1.41	21.78
TOTAL RAINFALL (mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT =	0.92	0.06	0.87

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 49.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CHAMBER( 0002)	OUTFLOW: OFF, UNDERDRAIN: OFF, INFIL: ON
IN= 2--> OUT= 3	CHAMBER:
DT= 1.0 min	MAX STO VOL (cu.m.)= 123.41 Bottom Area(m2) = 165.20

DEPTH (mm)	STORAGE (cu.m.)	DEPTH (mm)	STORAGE (cu.m.)
0.00	0.00	711.00	69.83
25.00	1.68	737.00	72.68
51.00	3.36	762.00	75.49
76.00	5.03	787.00	78.26
102.00	6.71	813.00	80.97
127.00	8.39	838.00	83.62
152.00	10.07	864.00	86.20
178.00	11.75	889.00	88.72
203.00	13.42	914.00	91.17
229.00	15.10	940.00	93.52
254.00	16.78	965.00	95.77
279.00	18.46	991.00	97.88
305.00	20.14	1016.00	99.76
330.00	23.39	1041.00	101.55
356.00	26.64	1067.00	103.27
381.00	29.87	1092.00	104.95
406.00	33.08	1118.00	106.63
432.00	36.28	1143.00	108.31
457.00	39.46	1168.00	109.98
483.00	42.62	1194.00	111.66
508.00	45.76	1219.00	113.34
533.00	48.87	1245.00	115.02
559.00	51.96	1270.00	116.70
584.00	55.02	1295.00	118.37
610.00	58.05	1321.00	120.05
635.00	61.05	1346.00	121.73
660.00	64.01	1372.00	123.41
686.00	66.94	0.00	0.00

NATIVE SOIL LAYER:  
Infiltration (m/hr) = 0.0114

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.42	0.075	1.35	21.78
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%)=	100.00
Time to reach Max storage (Hr)=	4.07
Volume of water for drawdown in LID (cu.m.)=	85.34
Volume of maximum water storage (cu.m.)=	85.42
Calculated Drawdown Time (Hr)=	45.32

| Junction Command(0003) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3( 0002)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2( 0003)	0.00	0.00	0.00	0.00

-----

|

ADD HYD ( 0007)

|

|

1 + 2 = 3

|

-----

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
***	W A R N I N G :	HYDROGRAPH	0003	<ID= 1>	IS DRY.
***	W A R N I N G :	HYDROGRAPH	0007	= HYDROGRAPH	0006
	ID1= 1 ( 0003):	0.00	0.000	0.00	0.00
	+ ID2= 2 ( 0006):	0.19	0.008	1.35	6.34
		=====	=====	=====	=====
	ID = 3 ( 0007):	0.19	0.008	1.35	6.34

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

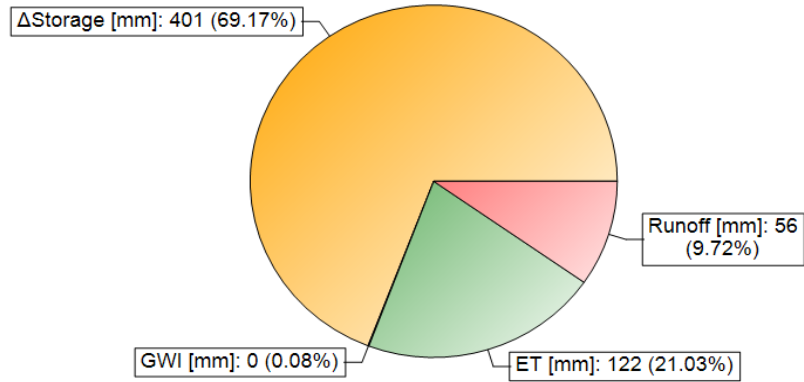
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### OTTHYMO Continuous Simulation Modelling - Block 193

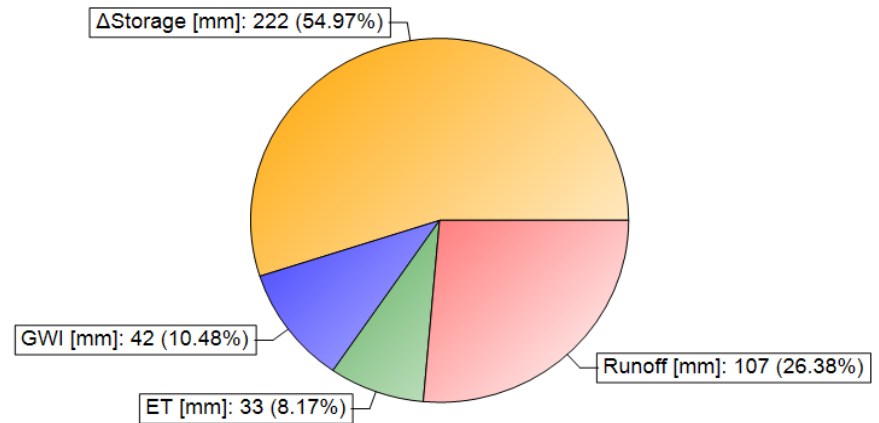
Addhyd 7 - Water Balance Output

Period	Precipitation (mm)	Rain (mm)	Snow (mm)	Snowmelt (mm)	ET (mm)	INFIL (mm)	GWI (mm)	Runoff (mm)	$\Delta$ Storage	Runoff Coef
2005	580.2	489.5	90.7	51.3	122.0	394.7	0.5	56.4	401.3	0.1
2006	404.1	242.4	161.7	366.8	33.0	317.8	42.3	106.6	222.1	0.3
Avg	492.2	365.9	126.2	209.0	77.5	356.3	21.4	81.5	311.7	0.2
Total	984.3	731.9	252.4	418.1	155.0	712.5	42.8	163.0	623.5	-

**Water Balance  
2005**



**Water Balance  
2006**

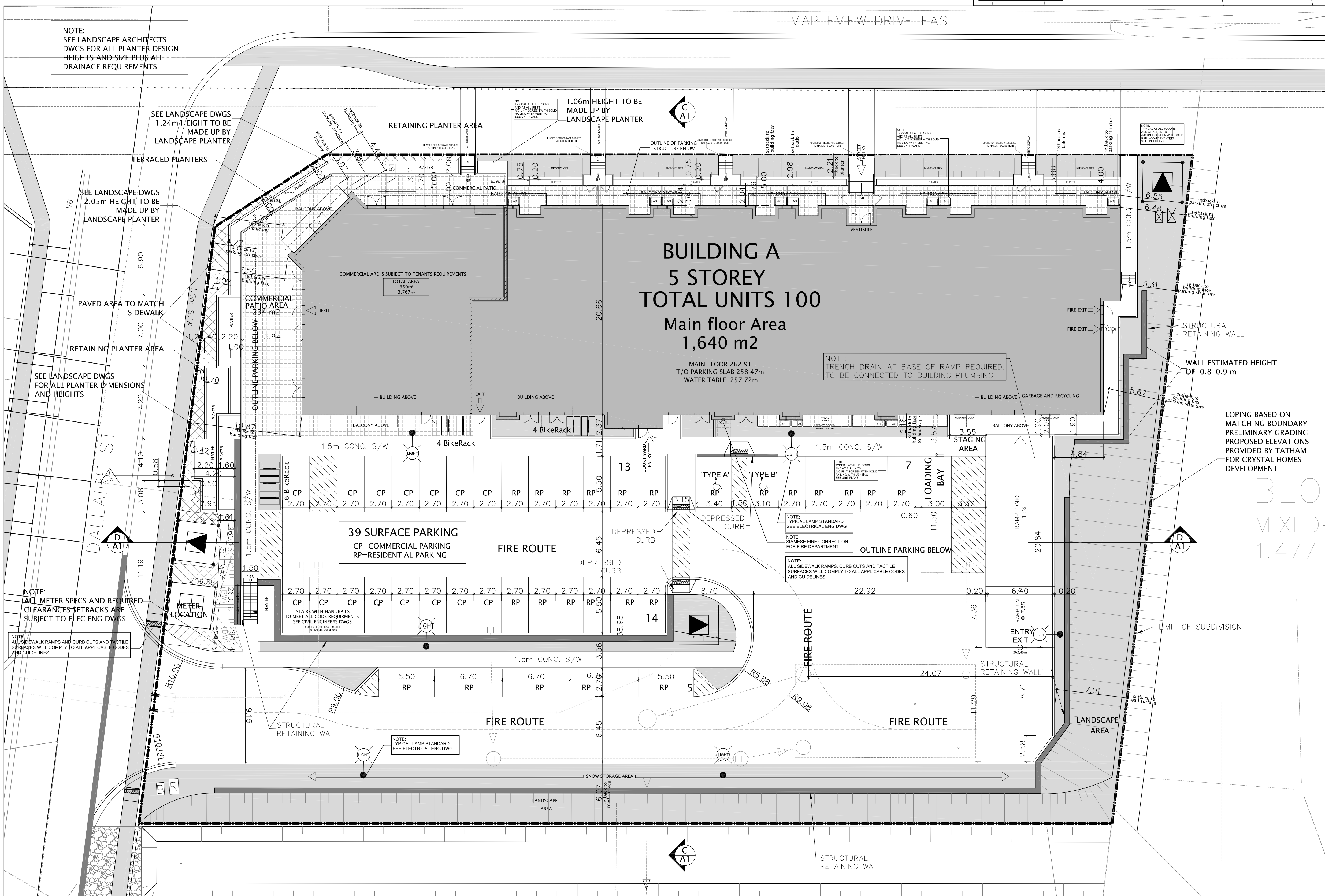
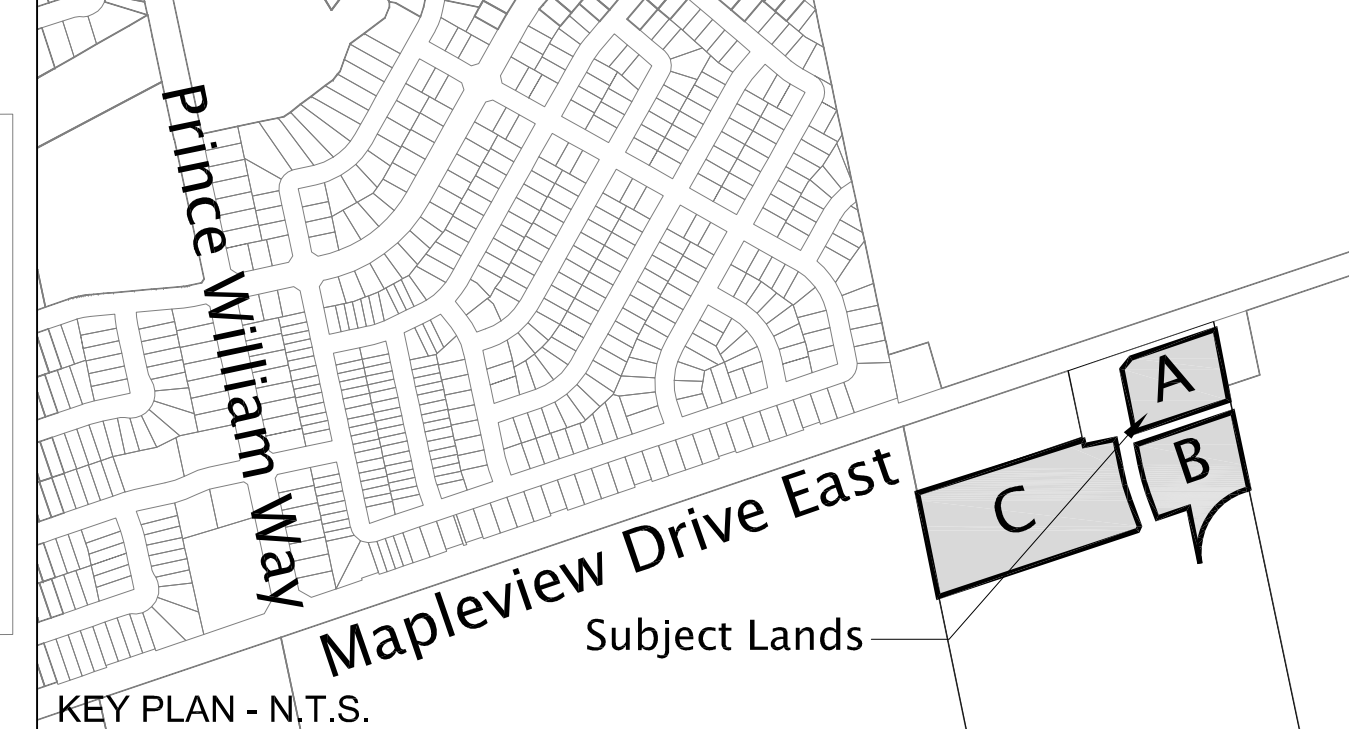
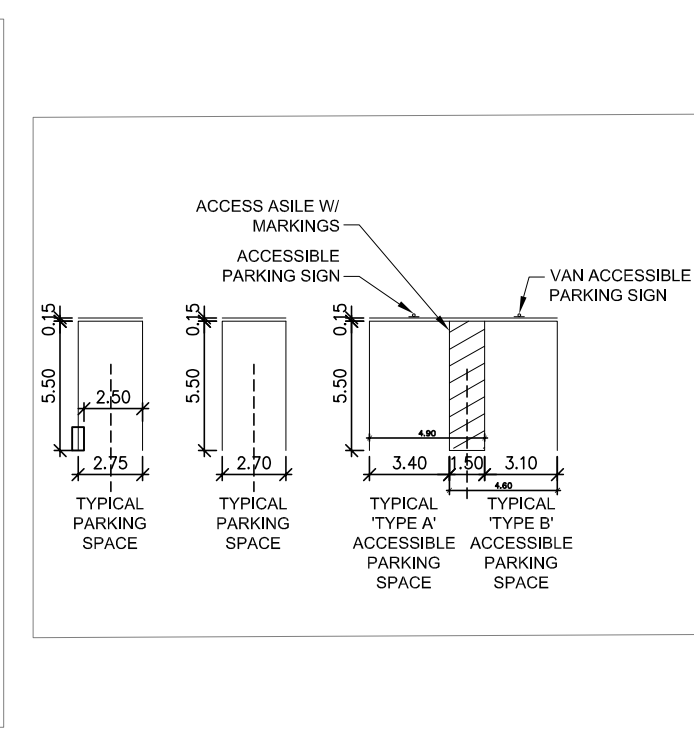
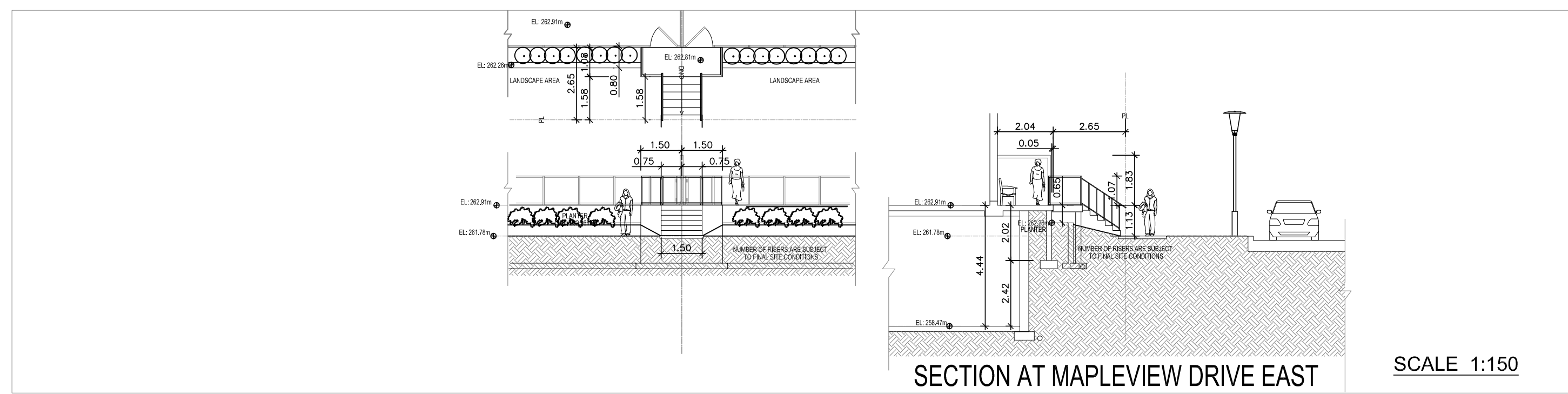




## Appendix D

### Supporting Documents

- 953 Maplevue Drive – Block-193 Site Plan, S&C Architects Inc., June 6, 2024
- 953 Maplevue Drive – Proposed Draft Plan of Subdivision, TJCG, Dec 2019
- Simcoe County Soils Map Excerpt, Report No. 29
- Drawing No. SWM-3, Maplevue South Subdivision Phase 1 Registration Drawings, TJCG, May 2021
- Drawing No. STM-1, Maplevue South Subdivision Phase 1 Registration Drawings, TJCG, May 2021
- Water Balance for Pre- and Post-Development Land Use Conditions – Site Plan Block 193, prepared by RJB



### Block 'A' Details

Unit Count:  
BLOCK 'A' Apartment Building (5 Storey) 100 units

A BUILDING FOOT  
(3.2.2.43A GROUP C)  
ALLOWABLE 1,800 m2  
PROPOSED 1,649 m2

Total	REQUIRED	PROPOSED
Site Plan Area	-	0.63 ha.(6,267.66m2)
Lot Frontage	24.0 m	85.4 m
Front Yard	3.0 m	5.33 m
Interior Side Yard	5.0 m	5.31m
Exterior Side Yard	2.0 m	7.50m
Rear Yard	5.0 m	38.98 m
Lot Coverage	max 50 % (0.931 ha.)	26 % (0.18 ha.)
Accessory Structures	max 10 % (0.06 ha.)	0 % (0.00 ha.)
Landscape Open Space	min. 25 % (0.16 ha.)	39 % (0.25 ha.)
Paved Area	max 35 %	35 % (0.22 ha.)
Density Index	min 120 max 300	158.73
Floor Space Index	min 0.5 max 2.5	1.31
Commercial Area	50% of the ground floor	21.45%
	816 m2	350 m2

Commercial Floor to Floor Height Required 4.5m Provided 4.5m

5m setback at street frontage

Percentage of building at the 5m setback to all street frontage

Percentage of building with in the 5m setback to all street frontage

Building

GFA 8184 m2  
Height in Stories 5  
Units 100

Parking Calculations

Required Parking (100(units) x 1.0) 100 spaces  
Required Parking Commercial (1 per 24m2)(350/24=15) 15 spaces  
Total Required 115 spaces

\*Parking Breakdown  
Typical Surface Spaces 22 spaces  
Typical Surface Spaces Commercial 15 spaces  
Surface Barrier Free Spaces 2 spaces  
Underground Barrier Free Spaces 2 spaces  
Typical Underground Spaces 81 spaces  
Total Provided 122 spaces

Barrie Zoning Bylaw 4.6.4 Barrier Free Parking  
Barrier Free spaces calculated using Accessibility Parking for Barrie Ont.  
Required over 100 spaces 1 space plus 3% of the required parking spaces  
3% of 122 =3.66 (4) plus 1 = 5 (5 required, provided 5)

(Type A - 3.4 x 1.5 - 2 spaces)  
(Type B - 3.1 x 1.5 - 3 spaces)

Bicycle Rack Storage (0.2 x 100) 20 Required 16 Secure Storage Provided  
14 Surface Bike Racks Provided

Total 30 Bikes

Required Outdoor Amenity Area (12m2/unit-12x100) 1200 m2

Proposed Outdoor Amenity  
Patio area at ground floor Apartments, Plus Patio area over parking structure  
Balkony area at typical floors  
Roof Deck  
Total Outdoor Amenity 1257.04 m2

Proposed Indoor Amenity  
loung/meeting rooms and 1st and 5th Floor washroom 197.50 m2

Total Indoor Amenity 197.50 m2

Fire Route

Unit type and area per floor AFFORDABLE UNIT \*

Unit	Area	Unit Type	Main floor	2nd floor	3rd floor	4th floor	5th floor
A	55m	1 bed 1 bath	2	2	2	2	10
B*	34m	Studio	2	4	4	4	4
C	55m	1 bed/1 bath/den	2	4	4	4	4
D	49m	1 bed/1 bath	1	1	1	1	4
E	57m	1 bed/1 bath/den	3	2	2	2	11
F	81m	2 bed/2 bath	2	4	4	4	18
F+	83m	2 bed/2 bath	1	1	1	1	5
G	109m	3 bed/2.5 bath	1	1	1	1	3
G+	111m	3 bed 2.5 bath					1
H	70m	2 bed 2 bath	1	1	1	1	3
H+	72m	2 bed/2 bath					1
I	103m	2 bed/2 bath/den	1	1	1	1	4
J	57m	1 bed/1 bath	1	1	1	1	3
K	52m	1 bed/1 bath					1
			12	22	22	22	100

Total Units 100  
Affordable Units \* 18



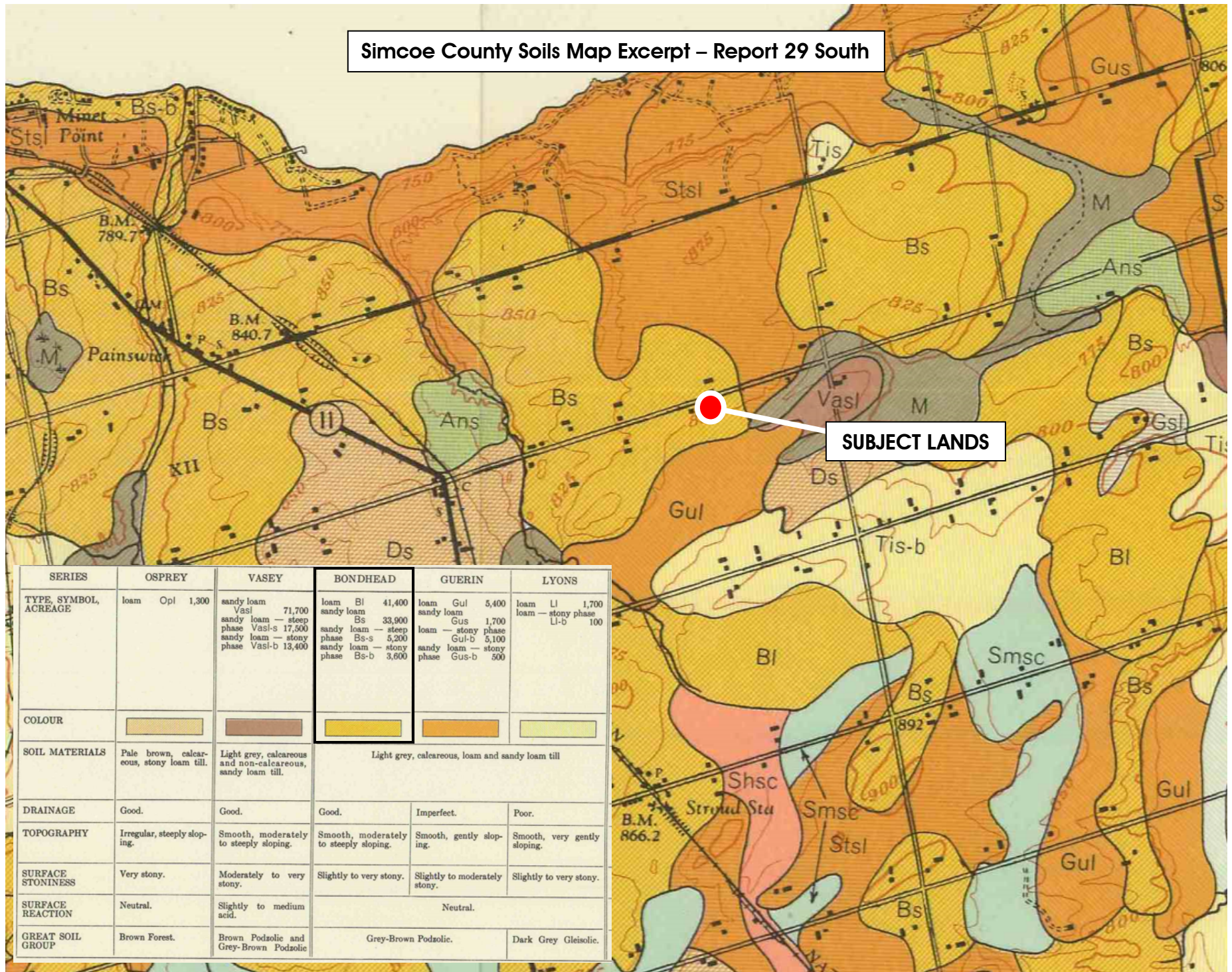
PROJECT MAPLEVIEW SOUTH (INNISFIL) LTD.		DRAWING NO. A-101	
953 MAPLEVIEW DRIVE-BLOCK-193		DATE: March 30, 2023	
SITE PLAN		REVISIONS	
TOTAL AREA:		DATE: March 30, 2023	
PROJECT #:		DRAWING NO.:	
2023-05		A-101	
SCALE:		DATE: March 30, 2023	
1:200		DATE: March 30, 2023	
CITY OF BARRIE		DATE: March 30, 2023	
S&C ARCHITECTS INC.		DATE: March 30, 2023	
7 (416) 848-1091 F: (416) 848-6101		DATE: March 30, 2023	
INFO@SCARCHITECTS.CA		DATE: March 30, 2023	
60 RANDALL DRIVE, SUITE 10		DATE: March 30, 2023	
AUX, ONTARIO L1S 6L5		DATE: March 30, 2023	







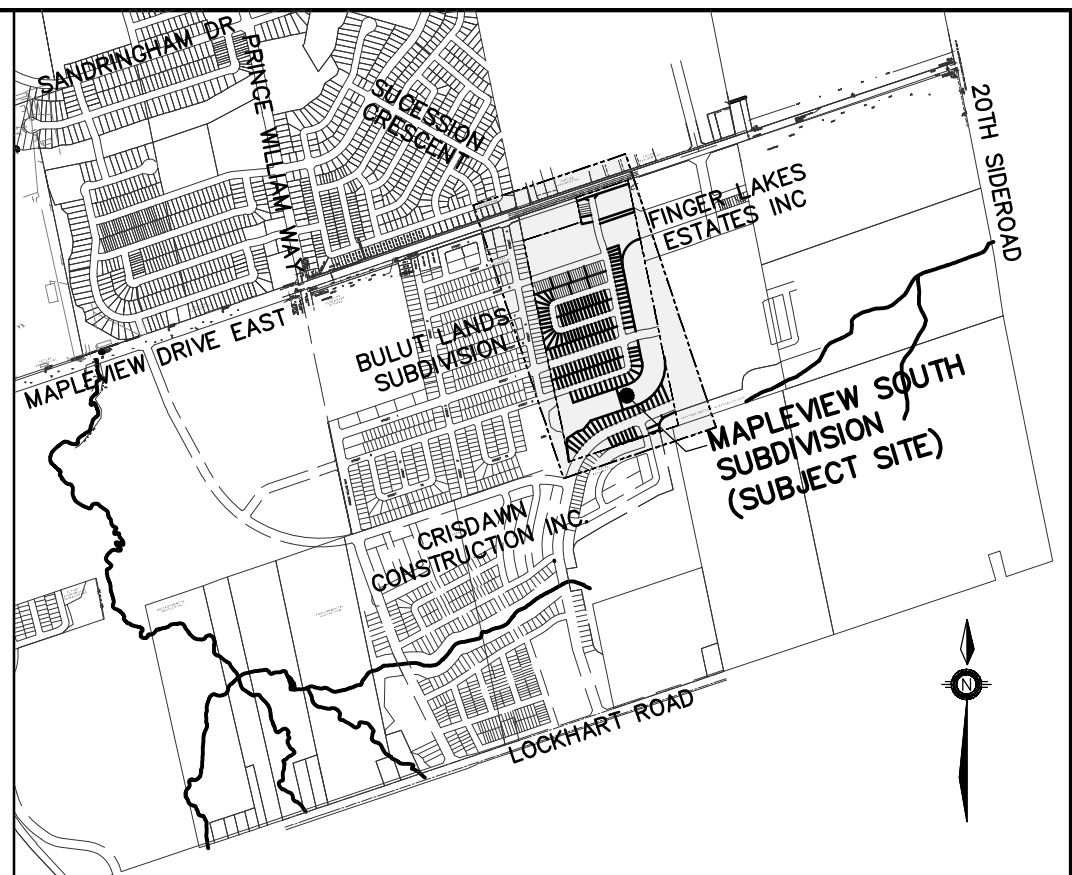
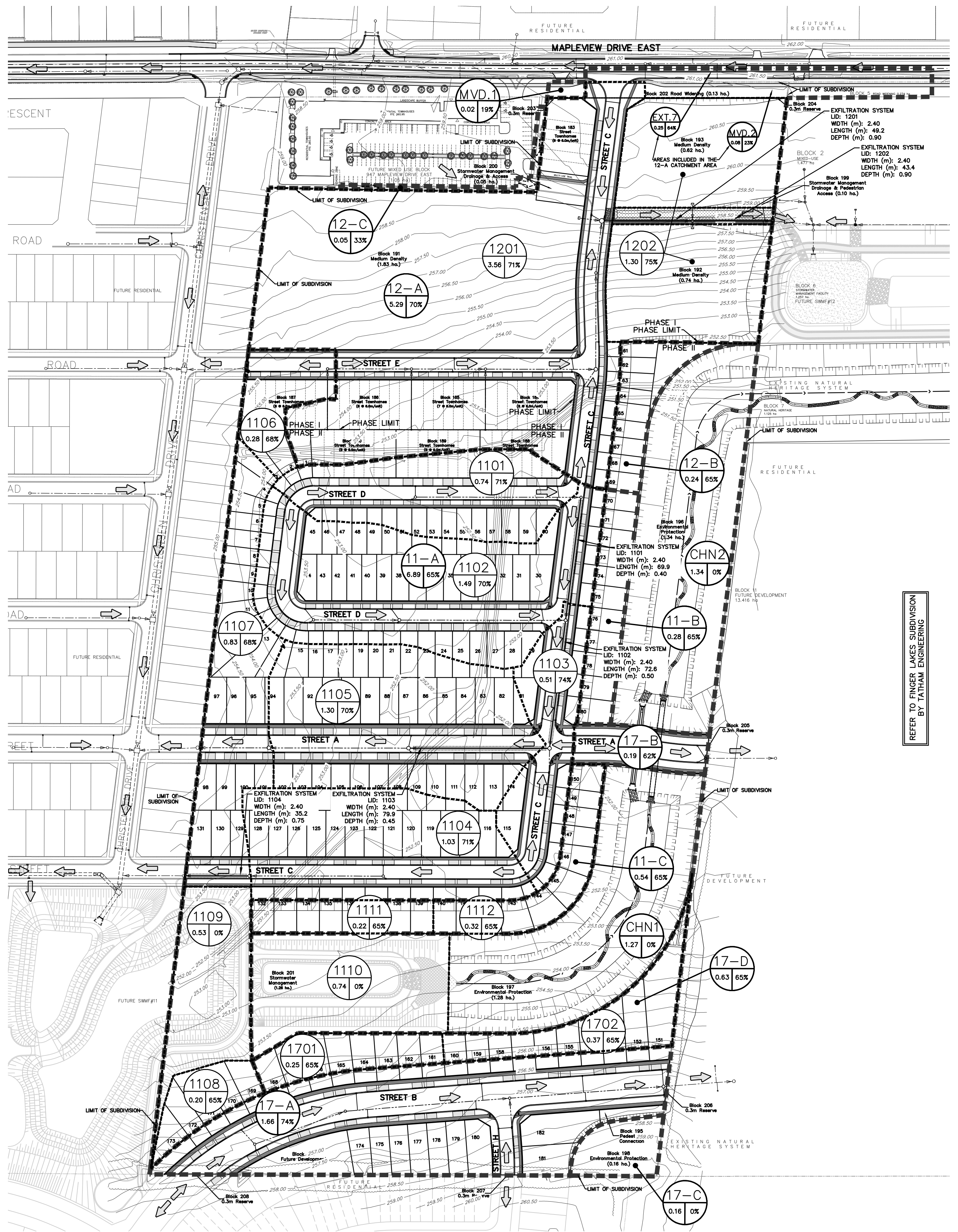
# Simcoe County Soils Map Excerpt – Report 29 South



SUBJECT LANDS

SERIES	OSPREY	VASEY	BONDHEAD	GUERIN	LYONS
TYPE SYMBOL, ACREAGE	loam Opl 1,300	sandy loam Vasi 71,700 sandy loam — steep phase Vasi-s 17,500 sandy loam — stony phase Vasi-b 13,400	loam Bl 41,400 sandy loam Bs 33,900 sandy loam — steep phase Bs-s 5,200 sandy loam — stony phase Bs-b 3,600	loam Gul 5,400 sandy loam Gus 1,700 loam — stony phase Gul-b 5,100 sandy loam — stony phase Gus-b 500	loam Li 1,700 loam — stony phase Li-b 100
COLOUR					
SOIL MATERIALS	Pale brown, calcareous, stony loam till.	Light grey, calcareous and non-calcareous, sandy loam till.	Light grey, calcareous, loam and sandy loam till		
DRAINAGE	Good.	Good.	Good.	Imperfect.	Poor.
TOPOGRAPHY	Irregular, steeply sloping.	Smooth, moderately to steeply sloping.	Smooth, moderately to steeply sloping.	Smooth, gently sloping.	Smooth, very gently sloping.
SURFACE STONINESS	Very stony.	Moderately to very stony.	Slightly to very stony.	Slightly to moderately stony.	Slightly to very stony.
SURFACE REACTION	Neutral.	Slightly to medium acid.	Neutral.		
GREAT SOIL GROUP	Brown Forest.	Brown Podzolic and Grey-Brown Podzolic	Grey-Brown Podzolic.		Dark Grey Gleisolic.





**KEY PLAN**  
NTS

**LEGEND** \*B.O. - BY OTHERS

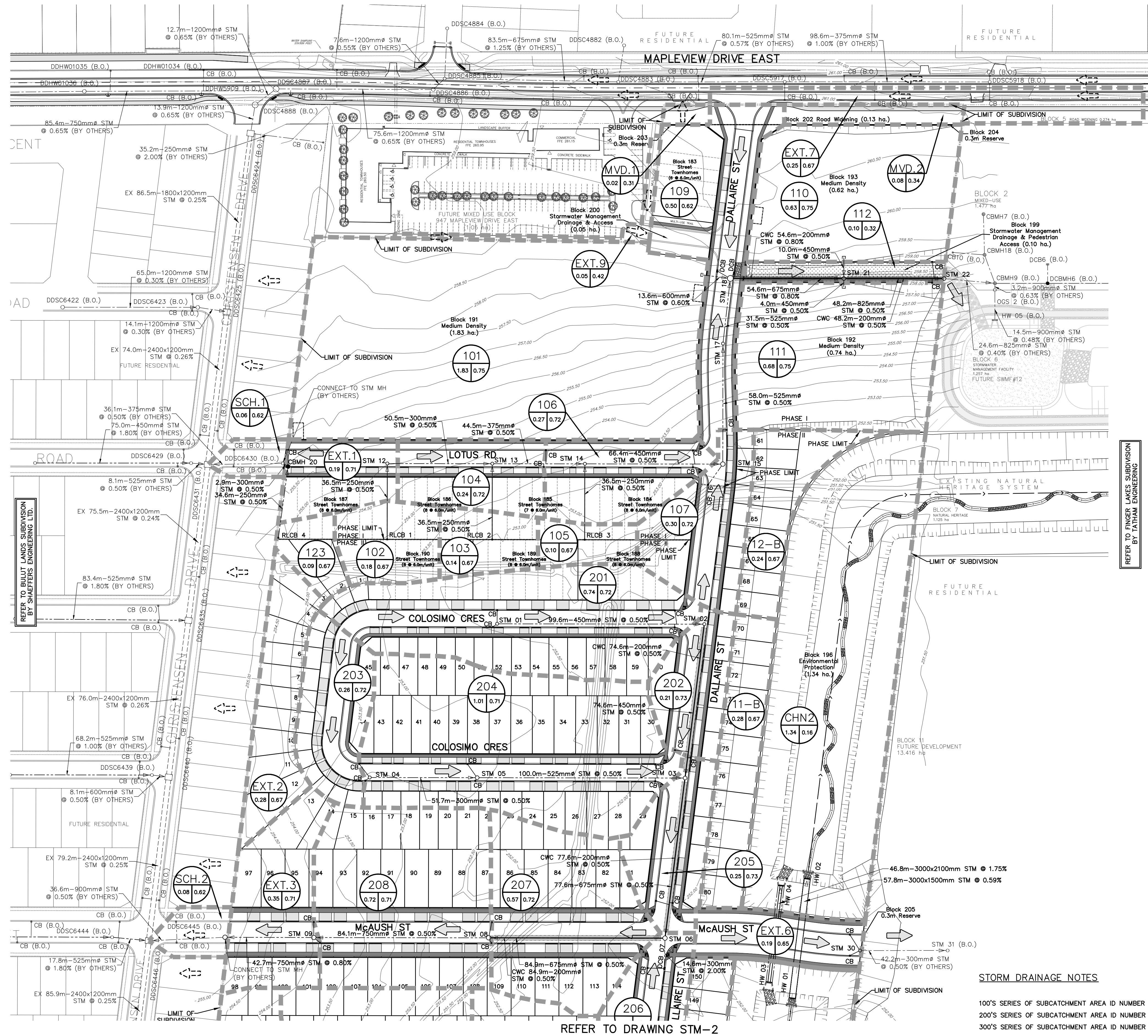
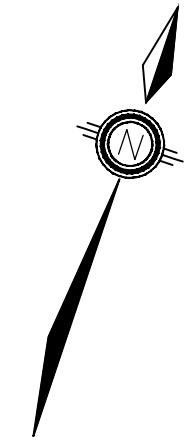
- LIMIT OF SUBDIVISION
- PHASE LIMIT
- STORM MAINTENANCE HOLE (B.O.)
- SINGLE CATCHBASIN (B.O.)
- DOUBLE CATCHBASIN (B.O.)
- STORM SEWER & DIRECTION OF FLOW (B.O.)
- PROP. STORM MAINTENANCE HOLE
- CB (B.O.)
- DCB (B.O.)
- PROP. CATCH BASIN
- PROP. DOUBLE CATCH BASIN
- PROP. STORM SEWER & DIRECTION OF FLOW
- 173 LOT NUMBER
- POOLS AND RIFFLES (BY TATHAM)
- PROP. CREEK CENTERLINE (BY TATHAM)
- STORM SEWER, EXFILTRATION TRENCH & DIRECTION OF FLOW
- LID SUBCATCHMENT BOUNDARY
- CATCHMENT BOUNDARY
- OVERALL / LID CATCHMENT AREA
- 12-A IMPERVIOUSNESS
- 1.03 AREA (ha.)
- DIRECTION OF POST DEVELOPMENT 100 YEAR STORM EVENT OVERLAND FLOW
- 251.00 EX. CONTOUR AND ELEVATION

ALL CB'S AND DCB'S TO BE EQUIPPED WITH CB SHIELDS. REFER TO DETAIL ON DRAWING DET-2  
REFER TO DRAWING DET-1 FOR EXFILTRATION TRENCH DETAIL

3. VEG-3D VEG-17055-POST-DEVELOPMENT DRAINAGE AREA PLAN.dwg Layout:SWM-3 Plotted Jun 14, 2023 @ 4:33pm by cagnion The Jones Consulting Group Ltd.

<b>REFERENCES:</b> 1. CITY OF BARRIE LATEST MANUALS AND GUIDELINES 2. OPIED AND OPIED 3. CRYSTAL HOMES SUBDIVISION DEVELOPMENT BY TATHAM ENGINEERING LIMITED 4. SANDY GLOVE CREEK REALIGNMENT BY TATHAM ENGINEERING LIMITED 5. BULLY LANDS SUBDIVISION DEVELOPMENT BY SCHAEFFERS CONSULTING ENGINEERING 6. DRAFT PLAN OF MAPLEVIEW SOUTH SUBDIVISION BY JONES CONSULTING GROUP LTD. 7. MAPLEVIEW DRIVE EAST WIDENING BY R.J. BURNSIDE & ASSOCIATES LIMITED 8. OLS PLAN BY RUDY MAN SURVEYING LTD. 9. ARAW GROUP RESIDENTIAL DEVELOPMENT BY PEARSON ENGINEERING LTD. 10. HEWITTS GATE EAST PHASE 3 BRADLEY HOMES BY JONES CONSULTING GROUP LTD. 11. GEOTECHNICAL INVESTIGATION REPORT BY CAMBLUM INCORPORATION 12. HYDROLOGICAL ASSESSMENT BY R.J. BURNSIDE & ASSOCIATES LIMITED 13. HEWITTS SECONDARY PLAN AREA SS BY R.J. BURNSIDE & ASSOCIATES LIMITED 14. LSRC LATEST MANUALS AND GUIDELINES				<b>BENCHMARK:</b> BENCHMARK NO. 03120080055 LOCATED APPROXIMATELY 1.9km EAST OF YONGE STREET, APPROXIMATELY 6m NORTH OF CENTERLINE OF MAPLEVIEW DRIVE EAST AND 35m WEST OF CITY BOUNDARY LINE. N4912122.851 E611241.154 ELEV 223.039 BENCHMARK NO. 03120110020 LOCATED ON MAPLEVIEW DRIVE EAST ON THE SOUTH SIDE OF THE BOULEVARD, APPROXIMATELY 700m WEST OF THE MAPLEVIEW DRIVE EAST AND 20TH SIDE ROAD INTERSECTION. N4812284.547 E611717.298 ELEV 225.549 BENCHMARK NO. 03120080008 LOCATED ON THE NORTH SIDE OF MAPLEVIEW DRIVE EAST (12TH CONCESSION ROAD), APPROXIMATELY 0.8km EAST OF YONGE STREET (HWY #17) AND APPROXIMATELY 10.0m NORTH OF MAPLEVIEW DRIVE EAST CENTERLINE. N4911763.816 E610187.698 ELEV 221.834 BENCHMARK NO. 03120080054 LOCATED ON THE SOUTH LIMIT OF MAPLEVIEW DRIVE WEST APPROXIMATELY 1km EAST OF HURONTARIO ROAD. N4910078.122 E607601.062 ELEV 248.996				<table><tr><td>3.</td><td>DETAILED DESIGN SUBMISSION</td><td>JUN 2023</td><td>RC</td></tr><tr><td>2.</td><td>FSR SUBMISSION - UPDATED</td><td>JUN 2022</td><td>MF</td></tr><tr><td>1.</td><td>FSR SUBMISSION FOR DRAFT PLAN</td><td>JUN 2021</td><td>DR</td></tr><tr><td>NO.</td><td>REVISIONS</td><td>DATE</td><td>INITIAL</td></tr></table>				3.	DETAILED DESIGN SUBMISSION	JUN 2023	RC	2.	FSR SUBMISSION - UPDATED	JUN 2022	MF	1.	FSR SUBMISSION FOR DRAFT PLAN	JUN 2021	DR	NO.	REVISIONS	DATE	INITIAL	<p>70 COLLIER STREET BARRIE, ONTARIO, L4M 4T5 TEL: (705) 726-4242 EMAIL: SERVICE.BARRIE@BARRIE.CA</p> <p>120 BAYVIEW PARKWAY NEWMARKET, ONTARIO, L3Y 3W3 TEL: (905) 895-1281 TOLL FREE: 1-800-465-0437</p>				<p>MAPLEVIEW SOUTH (INNISFIL) LTD 953 MAPLEVIEW DRIVE EAST CITY OF BARRIE</p> <p>LID - EXFILTRATION SYSTEM DRAINAGE AREA PLAN</p>				<p>229 Mapleview Dr. E. Unit 1 Barrie, ON L4N 0W6 P. 705.734.2538 F. 705.734.1056</p> <table><tr><td>DESIGN</td><td>VBS</td><td>SCALE: 1:1500</td><td>DATE</td><td>MAR 2023</td></tr><tr><td>DRAWN</td><td>VBS</td><td>PROJECT</td><td>DWG. NO</td><td></td></tr><tr><td>CHECKED</td><td>RC/DR</td><td>REI-17055</td><td>SWM-3</td><td></td></tr></table>				DESIGN	VBS	SCALE: 1:1500	DATE	MAR 2023	DRAWN	VBS	PROJECT	DWG. NO		CHECKED	RC/DR	REI-17055	SWM-3	
3.	DETAILED DESIGN SUBMISSION	JUN 2023	RC																																																			
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CHECKED	RC/DR	REI-17055	SWM-3																																																			





# KEY PLAN

## LEGEND

- PROF. SANITARY SERVICE
- PHASE LIMIT
- STORM MAINTENANCE HOLE (B.O.)
- SINGLE CATCHBASIN (B.O.)
- DOUBLE CATCHBASIN (B.O.)
- STORM SEWER & DIRECTION OF FLOW (B.O.)
- PROP. STORM MAINTENANCE HOLE
- PROP. CATCH BASIN
- PROP. DOUBLE CATCH BASIN
- PROP. STORM SEWER & DIRECTION OF FLOW
- STORM SEWER, INFILTRATION TRENCH & DIRECTION OF FLOW
- CATCHMENT AREA ID NUMBER
- RUN-OFF COEFFICIENT
- AREA (ha.)
- DIRECTION OF POST DEVELOPMENT 100 YEAR STORM EVENT OVERLAND FLOW
- EX. CONTOUR AND ELEVATION
- DIRECTION OF EXISTING EXTERNAL OVERLAND FLOW
- MUNICIPAL ADDRESS
- LOT NUMBER
- POOLS AND RIFLES (BY TATHAM)
- PROP. CREEK CENTERLINE (BY TATHAM)

## STORM DRAINAGE NOTES

- 100'S SERIES OF SUBCATCHMENT AREA ID NUMBER DRAIN INTO SWMF#12
- 200'S SERIES OF SUBCATCHMENT AREA ID NUMBER DRAIN INTO SWMF#11
- 300'S SERIES OF SUBCATCHMENT AREA ID NUMBER DRAIN INTO SWMF#17

## REFERENCES:

1. CITY OF BARRIE LATEST MANUALS AND GUIDELINES
2. GRID AND ORIS
3. CRYSTAL HOMES SUBDIVISION DEVELOPMENT BY TATHAM ENGINEERING LIMITED
4. SANDY CLOVE CREEK REALIGNMENT BY TATHAM ENGINEERING LIMITED
5. BUILT LANDS SUBDIVISION DEVELOPMENT BY SCHAEFFERS CONSULTING ENGINEERING
6. DRAFT PLAN OF MAPLEVIEW SOUTH SUBDIVISION BY JONES CONSULTING GROUP LTD.
7. MAPLEVIEW DRIVE EAST WIDENING BY R.J. BURNSIDE & ASSOCIATES LIMITED
8. A/S PLAN BY RUDY MAX SURVEYING LTD.
9. A/S PLAN BY RUDY MAX SURVEYING LTD.
10. HEWITT'S GATE EAST PHASE 3 BRADLEY HOMES BY JONES CONSULTING GROUP LTD.
11. SECTECHNICAL INVESTIGATION REPORT BY CAMBRIDGE INCORPORATION
12. HYDROLOGICAL ASSESSMENT REPORT BY R.J. BURNSIDE & ASSOCIATES LIMITED
13. HEWITT'S SECONDARY PLAN AREA S/S BY R.J. BURNSIDE & ASSOCIATES LIMITED
14. LSRCA LATEST MANUALS AND GUIDELINES

## BENCHMARK:

BENCHMARK NO. 03120080055 LOCATED APPROXIMATELY 1.9m EAST OF YONGE STREET, APPROXIMATELY 6m NORTH OF CENTERLINE OF MAPLEVIEW DRIVE EAST AND 30m WEST OF CITY BOUNDARY LINE. N4912122.801 E811241.154

BENCHMARK NO. 03120101022 LOCATED ON MAPLEVIEW DRIVE EAST ON THE SOUTH SIDE OF THE BOULEVARD, APPROXIMATELY 7.9m WEST OF THE MAPLEVIEW DRIVE EAST AND 20TH SIDE ROAD INTERSECTION. N4912284.547 E811717.298

BENCHMARK NO. 03120080008 LOCATED ON THE NORTH SIDE OF MAPLEVIEW DRIVE EAST (12TH CONCESSION ROAD), APPROXIMATELY 0.8m EAST OF YONGE STREET (HWY #11) AND APPROXIMATELY 10.0m NORTH OF MAPLEVIEW DRIVE EAST CENTERLINE. N4911763.816 E810187.698

BENCHMARK NO. 03120080054 LOCATED ON THE SOUTH LIMIT OF MAPLEVIEW DRIVE WEST APPROXIMATELY 1m EAST OF HURON ROAD. N4910578.122 E807601.952 ELEV 248.996

NO.	REVISIONS	DATE	INITIAL
3.	DETAILED DESIGN SUBMISSION	JUN 2023	RC
2.	FSR SUBMISSION - UPDATED	JUN 2022	MF
1.	FSR SUBMISSION FOR DRAFT PLAN	JUN 2021	DR



70 COLLIER STREET  
BARRIE, ONTARIO, L4M 4T5  
TEL: (705) 726-4242  
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MAPLEVIEW SOUTH (INNISFIL) LTD  
953 MAPLEVIEW DRIVE EAST  
CITY OF BARRIE

## STORM SEWER SUBCATCHMENT PLAN



229 Maplevue Dr. E. Unit 1  
Barrie, ON L4N 0W6  
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DESIGN	VBS	SCALE: 1:1000	DATE	FEB 2023
DRAWN	VBS	PROJECT	DWG. NO	
CHECKED	RC/DR	REI-17055	STM-1	



**WATER BALANCE CALCULATIONS**

Mapleview South - Block 193  
Mapleview South (Innisfil) Ltd.  
Barrie, ON  
PROJECT No.300042309

**TABLE F-3**

**Water Balance for Pre- and Post-Development Land Use Conditions (with no SWM/LID measures in place)**  
**Site Plan Block 193**

Land Use Description	Approx. Land Area* (m <sup>2</sup> )	Estimated Impervious Fraction for Land Use*	Estimated Impervious Area (m <sup>2</sup> )	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m <sup>3</sup> /a)	Estimated Pervious Area (m <sup>2</sup> )	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m <sup>3</sup> /a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m <sup>3</sup> /a)	Total Runoff Volume (m <sup>3</sup> /a)	Total Infiltration Volume (m <sup>3</sup> /a)
<b>Pre-Development Land Use</b>												
Open Space /Agricultural	4,620	0.00	0	0.793	0	4,620	0.136	628	0.204	942	628	942
Rural Residential	1,680	0.25	420	0.793	333	1,260	0.132	167	0.246	310	500	310
<b>TOTAL PRE-DEVELOPMENT</b>	<b>6,300</b>		<b>420</b>		<b>333</b>	<b>5,880</b>		<b>795</b>		<b>1,251</b>	<b>1,127</b>	<b>1,251</b>
<b>Post-Development Land Use (with no LID measures in place)</b>												
Buildings	1,800	1.00	1,800	0.793	1,427	0	0.132	0	0.246	0	1,427	0
Pavement	3,000	1.00	3,000	0.793	2,379	0	0.132	0	0.246	0	2,379	0
Landscaped	1,400	0.00	0	0.793	0	1,400	0.132	185	0.246	344	185	344
Landscaped with Underground Parking	100	1.00	100	0.793	79	0	0.132	0	0.246	0	79	0
<b>TOTAL POST-DEVELOPMENT</b>	<b>6,300</b>		<b>4,900</b>		<b>3,886</b>	<b>1,400</b>		<b>185</b>		<b>344</b>	<b>4,071</b>	<b>344</b>
% Change from Pre to Post											361	73
Effect of development (with no mitigation)											3.6 times increase in runoff	73% reduction of infiltration

\* data provided by Jones Consulting Group Ltd.

\*\* figures from Tables F-1 and F-2

To balance pre- to post-,  
the infiltration target (m<sup>3</sup>/a)=

**907**

**WATER BALANCE CALCULATIONS**

Mapleview South - Block 193  
Mapleview South (Innisfil) Ltd.  
Barrie, ON  
PROJECT No.300042309

**TABLE F-4**

<b>Water Balance Mitigation Strategy Direct Runoff to Infiltration Facility</b>					
<b>Total Area (m<sup>2</sup>)</b>	<b>Total Annual Precipitation (m)*</b>	<b>Runoff Volume from Impervious Area (m<sup>3</sup>/a)***</b>	<b>Runoff Volume from Pervious Area (m<sup>3</sup>/a)***</b>	<b>Total Runoff Volume (m<sup>3</sup>/a)</b>	<b>Potential Infiltration (m<sup>3</sup>/a) in Facility (assume 72% capture of annual runoff volume)**</b>
6,300	0.933	3,886	185	4,071	2,931

\* values from Barrie WPCC climate station

\*\* based on data Lake Simcoe Watershed Precipitation Frequency

\*\*\* figures from Table F-3

Infiltration gallery - will accommodate up to a 25 mm storm; 25 mm storms account for 95% of total rainfall\*\* (72% of total precipitation); therefore 72% of annual runoff from site will be captured for infiltration.