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969, 979 & 989 Mapleview Drive East Phase 1

FUNCTIONAL SERVICING & STORMWATER MANAGEMENT REPORT

Sandy Creek Estates Inc.

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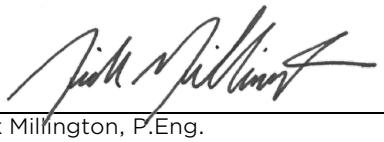
Prepared by:

Tatham Engineering Limited
41 King Street, Unit 4
Barrie, Ontario L4N 6B5

T 705-733-9037
tathameng.com

Prepared for:

Sandy Creek Estates Inc.
2031 James Street
Burlington, Ontario L7R 1H2

Authored by:	Reviewed by:
	 
Lisa Cowan, C.Tech. Senior Technologist, Project Manager	Nick Millington, P.Eng. Senior Engineer, Group Leader

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Issue	Date	Description
1.	February 4, 2022	Issued for Draft Plan Approval

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1 Introduction

Tatham Engineering Limited (Tatham) has been retained by Sandy Creek Estates Inc. (SCEI) to prepare a Functional Servicing & Stormwater Management Report (FSSWMR) in support of a Draft Plan of Subdivision (Draft Plan) application for Phase 1 of 969, 979 and 989 Mapleview Drive East a proposed mixed-use development, located in the City of Barrie.

1.1 OBJECTIVES

This report was prepared to demonstrate the feasibility of the proposed development with respect to servicing including site grading, stormwater management (SWM), sewage collection and treatment, water supply and distribution, site grading, transportation, and utility distribution. The report provides a summary of the traffic recommendations detailed in a report prepared by Tatham under separate cover.

1.2 HEWITT'S SECONDARY PLAN SUBWATERSHED IMPACT STUDY

The site is located within the Hewitt's Secondary Plan Area (HSPA). *The Hewitt's Secondary Plan Area Subwatershed Impact Study (SIS)*, prepared by R.J. Burnsides & Associates Ltd. (September 2016) established an integrated servicing strategy for the developable lands within the HSPA. This FSSWMR considers and generally conforms to the criteria and overall servicing strategies related to the subject lands as presented in the SIS.

1.3 GUIDELINES AND BACKGROUND REPORTS

This report is prepared in consideration of the following municipal, provincial and agency guideline documents:

- The Ministry of the Environment, Conservation, and Parks (MECP, formerly known as Ministry of Environment), *Stormwater Management Practices Planning and Design Manual* (2003);
- The Ministry of the Environment, Conservation, and Parks (MECP, formerly known as Ministry of Environment), *Lake Simcoe Protection Plan* (LSPP) (2009);
- Lake Simcoe Region Conservation Authority (LSRCA), *Technical Guidelines for SWM Submissions* (2016);
- Lake Simcoe Region Conservation Authority (LSRCA), *Phosphorous Offsetting Policy* (2019);
- City of Barrie, *Storm Drainage and Stormwater Management Policies and Design Guidelines* (2020);
- City of Barrie, *Sanitary Sewage Collection System Policies and Design Guideline* (2017); and

- City of Barrie, *Water Transmission and Distribution Design Standard* (2021).

This report is prepared in consideration of the following City of Barrie reports and publications:

- City of Barrie, *Hewitt's Secondary Plan Area Subwatershed Impact Study Lover's, Hewitt's and Sandy Cove Creeks Report Addendum No. 1* (prepared by R.J. Burnside & Associates Ltd.) (2016);
- City of Barrie, *Wastewater Collection Master Plan Update* (prepared by Cole Engineering Group Ltd.) (2019);
- City of Barrie, *Wastewater Treatment Master Plan* (prepared by WSP) (2019);
- City of Barrie, *Water Storage and Distribution Master Plan Update* (prepared by WSP) (2019); and
- City of Barrie, *Water Supply Master Plan Update* (prepared by WSP) (2019).

This report is prepared in consideration of the following site-specific studies and reports:

- Geotechnical Investigation (prepared by Soil Engineers Ltd., December 2006);
- Letter of Opinion - Geotechnical Investigation Report (prepared by Soil Engineers Ltd., January 26, 2022);
- Hydrogeological Study (prepared by Azimuth Environmental Consulting, Inc. February 2022); and
- Traffic Impact Study (prepared by Tatham Engineering Limited, February 2022).

2 Site Description

2.1 SITE DESCRIPTION

The subject property (site) is located at 969, 979 and 989 Mapleview Drive East in the City of Barrie, approximately 620 m west of the existing intersection of Mapleview Drive East and 20th Sideroad. The site is bound by Mapleview Drive East to the north, future development lands to the east (Dorsay lands), future development lands to the west (Mapleview Drive South lands) and undeveloped lands to the south which are also owned by SCEI. The site is bisected by Sandy Cove Creek.

The subject property is legally described as:

PART OF LOT 19 (RP 51R35948 PARTS 1 AND 2) IN CONCESSION 11 OF THE GEOGRAPHIC TOWNSHIP OF INNISFIL (ANNEX LANDS), NOW IN THE CITY OF BARRIE, COUNTY OF SIMCOE

Refer to Figure 1: Site Location Plan.

2.2 LAND USE

Based on the City of Barrie's current Official Plan the property is designated as Neighbourhood Mixed Use Node (north of Sandy Cove Creek), Natural Heritage System (the creek area) and Residential Area, all within the Hewitt's Secondary Plan.

2.3 TOPOGRAPHY

Information relating to existing topography, ground cover, and drainage patterns was obtained through a review of relevant background studies, available plans, base mapping, and topographic surveys, and was confirmed during site visits.

A detailed topographic survey of the site was completed by Holding Jones Vanderveen Inc. in July 2015. This survey has been reviewed and compared to other available contour mapping and appears to be sufficient for preliminary design. If required, additional topographic survey will be completed during the detailed design stage to reflect recent surrounding construction activity.

The subject property is approximately 20 ha of undeveloped lands. Most of the site, excluding a small area at the very south of the site drains towards the existing creek. The north half of the property slopes moderately (5-8%) towards the creek while the southern half slopes gently (0-3%) towards the creek. The existing site is mainly plowed agricultural fields. An existing dwelling is located at the northwest corner of the site.

Based on the Ontario Soil Survey the existing soils are classified as Sargent Sand Loam, Hydrologic Soil Group A.

2.4 GEOTECHNICAL

The Geotechnical Investigation (2006), prepared by Soil Engineers Ltd. was completed to identify the subsurface conditions and determine the engineering properties of the in-situ soils for the design and construction of the proposed development. Soil Engineers Ltd. prepared a Letter of Opinion (January 26, 2022) confirming the original 2006 can be relied upon in support of preliminary design.

The report describes the existing soils as silty clay till, sandy silt till, silty sand till; lenses, layers and strata of silty clay, fine to medium sand and silty fine sand extending to the borehole termination depths of 6.6 mbg. Topsoil was found at depths ranging from 0.25 m to 0.60 mbg.

A Hydrogeological Investigation Report (2022), prepared by Azimuth Environmental Consulting, Inc. was completed to assess the presence of groundwater and impact on the construction of the proposed site. During the monitoring seasons groundwater was present at depths ranging from 0 m to 5.1 mbg. Based on Azimuth's preliminary dewatering assessment, a Permit to Take Water may be required in support of dewatering activities. This will be confirmed during detailed design.

969, 979 & 989 Mapleview Drive East – Phase 1

Figure 1 Site Location Plan

3 Proposed Development

3.1 SANDY COVE CREEK NATURAL CHANNEL REALIGNMENT

Sandy Cove Creek is an existing channel, historically used a mutual 'Municipal Drain'. The 'Municipal Drain' has been abandoned in support of the proposed development applications in the HSPA. A realignment and naturalization of the existing channel is proposed to better suit the developments within the HSPA. The design includes an approximately 1.6 km long, 60 m wide natural heritage corridor designed to meet natural channel and floodplain design requirements. The design has been completed by Tatham on behalf of a benefitting landowner group (including SCEI). The design has been through several iterations of review with the City and LSRCA, with approvals either already obtained, or expected to be issued once construction timing is confirmed. This report assumes the realignment works will be complete prior to development as Sandy Cove Creek will serve as the outlet for the proposed development. The proposed development lands, including the SWM pond, will be located outside of the associated floodplain.

3.2 PROPOSED DEVELOPMENT - PHASE 1 OF 969, 979 & 989 MAPLEVIEW DRIVE EAST

The subject lands represent Phase 1 of a larger development plan and includes the Sandy Cove Creek corridor blocks and the lands to the north of the Creek. Separate draft plan application(s) will be submitted for the future development phase(s).

Phase 1 is approximately 6.6 ha and consists of:

- (2) Mixed-use Residential Blocks: 2.4 ha (30 Commercial Units, 120 Residential Units)
- (2) Free-hold Townhouse Blocks): 0.17 ha (13 Residential Units)
- (2) Natural Heritage Blocks: 1.68 ha
- (1) Stormwater Management Facility Block: 1.26 ha
- (1) Road Widening Block: 0.27 ha
- Municipal Right-of-Way: 0.74 ha
- Temporary Cul-de-Sac (Future Free-hold Townhouse): 0.06 ha

The remainder of the site, approximately 13.4 ha, will comprise a future development block.

Access to the site will be provided from Mapleview Drive East via Terry Fox Drive (27.0 m road allowance) which extends north into the development currently under construction on the north side of Mapleview Drive East. An 18.0 m road allowance will tee off to the east of Terry Fox and terminate at the limit of development. A temporary cul-de-sac is proposed at the terminus of

the 18.0 m ROW and within a townhouse block to the south to allow for vehicle turnaround until the 18.0 m ROW is extended east into the neighbouring development lands.

Refer to Appendix A for the Draft Plan of Subdivision and Temporary Residential Cul-de-Sac Figure (Drawing FIG-1).

3.3 MAPLEVIEW DRIVE SOUTH LANDS & DORSAY LANDS

The Draft Plan has been prepared in coordination with the adjacent developments. Specifically, the SWM Block has been sized to accommodate runoff (pipe and overland flow) from the Mapleview Drive South lands and the location of the 18.0 m ROW has been provided to owners of the Dorsay lands to incorporate into future designs.

3.4 MAPLEVIEW DRIVE EAST IMPROVEMENTS

The City is planning for road improvements on Mapleview Drive East fronting the site. The proposed reconstruction design includes adding a two way left turn lane increasing the total road allowance width to 34.0 m, encumbering the site frontage with an 8.95 m road widening block.

More recently, the City has installed new sanitary sewer across the site frontage to accommodate sanitary flow from future developments, including SCEI Phase 1.

3.5 DEVELOPMENT CONCEPT

Subsequent to Draft Plan Approval, the mixed-use blocks and street townhouse blocks will be developed and approved through the City's Site Plan Control process and/or part lot control. A Concept Site Plan available at the time of this report has been used to calculate expected unit counts, building sizes, and impervious lot coverage.

Block 1 (East Half) includes:

- 2 Mixed-use Townhouse Buildings (10 Commercial Units, 20 Residential Units);
- 3 Townhouse Buildings (24 Residential Units);
- 6.4 m Condo Road, one access provided via Terry Fox Drive; and
- 23 On-street parking stalls.

Block 2 (West Half) includes:

- 3 Mixed-use Townhouse Buildings (20 Commercial Units, 40 Residential Units);
- 3 Townhouse Buildings (36 Residential Units);
- 6.4 m Condo Road, one access provided via Terry Fox Drive; and
- 44 On-street parking stalls.

Residential Blocks (Block 3 and 4):

- 13 townhouses fronting Street ‘A’ (18.0 m municipal road allowance).

Refer to Appendix B for the Concept Site Plan, prepared by Hunt Design Associates Inc., dated January 27, 2022.

4 Water Supply & Distribution

4.1 EXISTING WATER SYSTEM

The site is located within an area of the City serviced by the municipal water system. Specifically, the site is located within Pressure Zone 2S, supplied by the City's surface water system. The City's Surface Water Treatment Plant (SWTP) is located on the southern shore of Kempenfelt Bay at 20 Royal Parkside Drive and draws water supply from Lake Simcoe.

The City's surface water system (supplying Pressure Zone 2S and 3S) has a firm capacity of 60 ML/day (60,000 m^3/day). As per the Water Supply Master Plan Update, prepared by WSP Canada Inc., the maximum combined average day demand (ADD) for Zones 2S and 3S between 2011 and 2017 was 11,998 m^3/day, while the highest Maximum Day Demand (MDD) was 19,378 m^3/day, resulting in significant residual capacity within the existing supply system.

Estimated ADDs and MDDs based on projected growth within Pressure Zone 2S and 3S (i.e. the areas of the City supplied via the SWTP) are summarized in Table 1.

Under existing conditions there is sufficient capacity to service additional development within Pressure Zone 2S and 3S. Future improvements are proposed to increase the SWTP firm capacity to support population growth projections beyond 2036.

Table 1: Municipal Water Supply - Projected Zone 2S and 3S Demands

SCENARIO	ADD (m^3)	MDD (m^3)	RESIDUAL (m^3)
2021	20,870	41,378	18,622
2026	25,030	48,763	11,237
2031	28,216	54,440	5,560
2036	31,838	60,168	-168
2041	35,937	67,289	-7,289

As reported in the Water Supply and Distribution Master Plan Update (2019) prepared by WSP Canada Inc., under existing conditions there is a total storage surplus of 11.89 ML for the SWTP supplied zones and sufficient storage capacity for the proposed development. There is expected to be sufficient storage volume to service Pressure Zone 2S under the 2041 growth scenario.

4.1.1 Existing Infrastructure

An existing 300 mm diameter watermain is located within the north side of Mapleview Drive East.

4.2 PROPOSED WATER SYSTEM

4.2.1 Population

Based on a total of 133 units and utilizing the City's medium density person per unit (ppu) of 2.57, the estimated Phase 1 residential population is 342 persons.

4.2.2 Domestic Demands

Water demands for the proposed development have been estimated by applying relevant City standards and criteria, including the following:

- Per capita ADD = 225 L/person/day
- Medium Density Person Per Unit (PPU) = 2.57
- Commercial ADD = 28,000 L/ha/day

MDD and peak hour demand (PHD) factors of have been applied in accordance with Table 3-3 of the MECP Design Guidelines for Drinking Water Systems (2008).

Refer to Appendix C for Water Demand Calculations.

Table 2: Summary of Proposed Phase 1 Water Demands

SCENARIO	m^3	L/S
Average Day Demand	80.94	0.94
Maximum Day Demand	291.38	3.37
Peak Hour Demand	437.07	5.06

4.2.3 Fire Protection

Firefighting water demands have been estimated for the site using Water Supply Public Fire Protection (1999) prepared by the Fire Underwriters Survey (FUS). The required fire flows for the largest townhouse building is calculated to be 67 L/s.

Reasonable assumptions have been made with respect to building design and construction methods, recognizing the preliminary stage of the development. It is assumed the units will be provided with 2-hour fire separation. Should these assumptions change during the building design process, the calculations will be updated accordingly.

Refer to Appendix C for FUS Calculations.

4.2.4 Proposed Infrastructure

The proposed development will be serviced with a domestic watermain connected to the existing 300 mm diameter trunk watermain on Mapleview Drive East. The watermain will have two temporary dead-ends, one at the terminus of Terry Fox Drive and one at the terminus of the 18.0 m ROW. The mixed-use blocks will be serviced with a 150 mm dia. domestic watermain connection to the municipal watermain within the road allowance.

The water system will be design in accordance with City and MECP design criteria, including but not limited to the following:

- Minimum watermain size for residential areas is 150 mm dia.;
- The minimum depth of watermain and water services is 1.7 m, measured to the top of pipe;
- Townhouse units will be service with individual 25 mm dia. water services;
- Maximum fire hydrant spacing of 150 m in residential areas;
- Maximum watermain velocity of 1.5 m/s under normal operating conditions (ADD and MDD flows); and
- Maximum watermain velocity of 5.0 m/s under fire flow conditions.

The water distribution system will be incorporated into the City's water model to confirm adequate service pressure, pipe diameters and fire flows. Watermain sizing will be completed during detailed design.

The preliminary watermain layout is shown on the Conceptual Site Servicing Plan (Drawing SS-1) in Appendix D.

5 Sewage Collection & Treatment

5.1 EXISTING SANITARY SYSTEM

The site is located in an area of the City serviced with a municipal sanitary sewer collection system that conveys flows to the Barrie Wastewater Treatment Facility (WWTF) located at the west end of Kempenfelt Bay on Lake Simcoe.

Recently the City installed a 450 mm dia. sanitary trunk sewer along south side of Mapleview Drive East to accommodate future development within the HSPA. The existing trunk sewer flows west approximately 1.4 km where it discharges to an existing 825 mm dia. sanitary trunk sewer which ultimately drains to the WWTF. The trunk sewer was sized assuming peak flows from the Phase 1 of the development would be 2.9 L/s.

5.1.1 WWTF Capacity

As per the Wastewater Treatment Master Plan (2019) prepared by WSP Canada Inc., the Barrie WWTF has a rated average daily flow (ADF) capacity of 76,000 m^3/day, and a peak flow capacity of 156,000 m^3/day. Based on historical flow data, the WWTF has received between 48,000 m^3/day to 50,700 m^3/day between 2014 and 2017. Based on population growth projections the ADF in 2021 is 60,019 m^3/day. Therefore, under existing conditions there is an estimated residual capacity of 16,000 m^3/day.

The WWTF is expected to reach its current rated capacity of 76,000 m^3/day in 2031. Future improvements are proposed to increase the capacity of the plant to support population growth projections beyond 2031.

5.2 PROPOSED SANITARY SYSTEM

5.2.1 Average Day Flow

The following City design criteria have been utilized to establish the ADF for the subject site:

- Per capita ADD = 225 L/person/day
- Medium Density Person Per Unit (PPU) = 2.57
- Commercial ADD = 28,000 L/ha/day

The estimated ADF for the Phase 1 is 33.8 m^3.

Refer to Appendix E for Sanitary ADF Calculations.

5.2.2 Peak Flow (WWTF Capacity)

Peak day flow (PDF) with respect to capacity within the WWTF has been calculated utilizing peaking factors which consider the entirety of the population contributing to the WWTF. Based on the Wastewater Treatment Master Plan, peaking factor of 2.05 is to be utilized when assessing plant capacity. This results in a total PDF of 161.1 m^3. As mentioned above, the existing WWTF in understood to have sufficient capacity to service addition development, with an estimated residual capacity of 16,000 m^3/day. Therefore, the WWTF has sufficient capacity to service the subject development.

5.2.3 Peak Flow (Sewer Design)

Under proposed conditions the instantaneous residential peak sanitary flow from the subject site is calculated to be 4.08 L/s. Peak flow calculations include an extraneous flow of 0.1 L/s/ha and apply Harmon peaking factors. Commercial flows are calculated to be 0.05 L/s and are added to the residential peak flow resulting in a total of 4.13 L/s.

The proposed development will include two connections to the existing 450 mm dia. sanitary trunk sewer on Mapleview Drive East (one via Terry Fox Drive, and one for the western mixed-use development block). Although the proposed development plan yields a higher peak flow than previously contemplated (4.08 L/s vs. 2.9 L/s), the available capacity of the trunk sewer is only reduced from 93.7 L/s to 89.6 L/s, and therefore has sufficient capacity to service the proposed development.

Refer to Appendix E for the Sanitary Sewer Catchment Plan (Drawing SAN-1).

5.2.4 Proposed Infrastructure

The site will be serviced by municipal gravity sanitary sewers which will connect to the existing 450 mm dia. sanitary sewer on Mapleview Drive East. The subject development (Phase 1) does not rely on a sanitary pumping station to convey sewage flows to the Mapleview Drive East sewer.

Refer to Appendix D for the Preliminary Servicing Design (Drawing SS-1).

6 Stormwater Management

6.1 BACKGROUND INFORMATION

The subject lands are located within the Lake Simcoe Region Conservation Authority (LSRCA) watershed. Due to the site's proximity to an existing watercourse (Sandy Cove Creek) a portion of the site is located within the LSRCA's regulated area. It is also noted the subject lands are partially located within a Significant Groundwater Recharge Area (SGRA) based on review of available source water protection mapping.

As previously mentioned, a Subwatershed Impact Study (SIS) report was completed to ensure a comprehensive SWM plan was provided for across the entirety of the HSPA. The SIS expanded upon the findings of the Intensification and Annexed Lands Drainage and Stormwater Management Master Plan (DSWMMP) prepared by AMEC in 2013. Based on review of the SIS, the subject lands are located within proposed drainage Catchment 12 within the eastern portion of the HSPA, identified as the Sandy Cove Creek Study Area. Catchment 12 consists of the subject lands and a portion of developments to the west of the subject lands (Mapleview Drive South Lands and the Bulut Development Lands) as shown on Figure 11: Proposed Storm Sewer Plan (3 of 3) provided in Appendix F. The SIS suggested that water quality and water quantity controls for the entirety of Catchment 12 are to be provided by an end of pipe SWM facility located on the subject lands, identified as SWMF#12.

For the purpose of this report, assumptions and design criteria included in the SIS report have been used to develop the proposed SWM plan. A summary of assumptions and criteria set by the SIS is provided in the following section.

6.1.1 HSPA Subwatershed Impact Study (SIS) – SWM Design Criteria - Catchment 12

Hydrology & Water Quantity Control

The SIS included an existing condition PCSWMM model used to establish pre-development peak flows. The SIS determined the 24 Hour SCS Type II storm produced the highest peak flows and volumes and should be used as the design storm for the site. Allowable post-development unitary discharge rates were established based on the conventional approach of ensuring post development peak flows do not exceed pre-development discharge rates. Therefore, for the purpose of this report, an existing conditions hydrologic model has not been prepared. Post-development peak flows will be attenuated to unitary discharge rates established by the SIS.

Per the SIS, Catchment 12 (area contributing to SWMF#12) had a total drainage area of 9.6 ha. However, based on coordination with the neighbouring developments, the actual drainage area

contributing to SWMF#12 is approximately 9.4 ha. As such, a summary of allowable post-development peak flows from Catchment 12 is provided in Table 3 below. Relevant excerpts from the SIS are provided in Appendix F.

Table 3: Allowable Discharge Rates – Catchment 12

STORM RETURN PERIOD	UNIT DISCHARGE RATE ($m^3/s/ha$)	SIS ALLOWABLE DISCHARGE RATE (m^3/s)	REVISED ALLOWABLE DISCHARGE RATE (m^3/s)
1:2-Year	0.002	0.02	0.02
1:5-Year	0.008	0.08	0.08
1:10-Year	0.015	0.14	0.14
1:25-Year	0.024	0.23	0.23
1:50-Year	0.032	0.31	0.30
1:100-Year	0.040	0.39	0.38

Note 1: Unit Discharge Rates as per Table 13 of the SIS report.
Note 2: SIS Allowable Discharge Rate based on a Catchment 12 area of 9.6 ha per the SIS.
Note 3: Revised Allowable Discharge Rate based on current drainage area of 9.4 ha and actual land use parameters for lands contributing to SWMF#12.

Water Quality Controls

Enhanced level water quality controls corresponding to 80% TSS removal must be provided for Catchment 12.

Low Impact Development (LID) Measures

Per the SIS, recommendations for LID implementation in Catchment 12 include:

- 5 mm infiltration target;
- the remainder (20 mm) should be achieved through filtration and attenuation measures;
- due to the presence of an SGRA, infiltration LID's must consider water quality issues;
- use of shallow LID options should be investigated at detailed design to increase opportunities for additional infiltration;
- placement of LID facilities where feasible within the Sandy Cove Creek corridor should be investigated at detailed design;
- Consideration of the use of 3rd pipe roof drainage clean water exfiltration in SGRA areas where pre-treatment is not feasible or cost prohibitive;

- LID practices are to be provided to achieve groundwater balance volumes to the maximum extent possible; and
- additional topsoil depths of 300 mm on all proposed lots could provide some level of infiltration and peak flow reduction.

Additional discussion and application of the SIS SWM design criteria is presented in the following sections.

6.2 PROPOSED STORMWATER MANAGEMENT PLAN DESIGN CRITERIA

This preliminary SWM plan is subject to the review and approval of the City and the LSRCA. In addition to the above, applicable SWM design criteria for the proposed development are presented below.

- As per City and LSRCA requirements, water quantity controls must be provided to ensure post-development peak flow rates do not exceed unitary discharge rates established by the SIS for Catchment 12 to protect against flooding and ensure no adverse impacts to downstream landowners.
- Water quality controls must be provided to satisfy the MECP's Stormwater Management Practices Planning and Design Manual. This corresponds to providing Enhanced Protection Level water quality protection of 80% total suspended solids (TSS) removal.
- In accordance with LSRCA policies, any works meeting the definition of 'major development' are required to meet the volume control requirements as outlined in Section 2.2.2 of the LSRCA SWM Guidelines (2016). Best efforts must be demonstrated to infiltrate, filter or re-use the 25 mm storm event runoff from impervious areas on site.
- In accordance with policies outlined in the Lake Simcoe Protection Plan (LSPP), any works designated as 'major development' (where the development area is over 500 m^2) must demonstrate that best efforts have been made to minimize changes in water balance due to the proposed development through the completion of a water balance assessment.
- The proposed development is expected to be subject to the Lake Simcoe Phosphorous Offsetting Policy (LSPOP), which requires all 'major development' projects to control 100% of the phosphorous generated from the site. Any remaining phosphorous load that cannot be controlled/removed will require a cash contribution for off-site mitigation.
- A preliminary siltation and erosion control strategy will be provided for implementation during construction.

6.3 PRELIMINARY STORMWATER MANAGEMENT PLAN

The preliminary SWM plan is comprised of a dry SWM facility which will provide the required water quantity controls for the contributing drainage area. Water quality controls will be provided via a treatment train comprised of a bioretention cell and the dry pond SWM facility. LID features, including the bioretention cell within the SWM facility, are proposed where feasible to mitigate changes in site runoff volumes, water balance and phosphorous loadings to the maximum extent possible.

6.4 PROPOSED HYDROLOGY

Post-development site conditions have been modelled using Visual OTTHYMO (VO6.2) hydrologic modelling software using City of Barrie rainfall data. Peak flow rates have been generated for the 1:2-year through 1:100-year return periods under AMC II conditions using the 24-Hour SCS Type II (SCS) storm distribution per the SIS. In addition, the regional (Hurricane Hazel) storm event has also been modelled under AMC III conditions in accordance with City and LSRCA requirements.

Under post-development conditions, four site drainage catchment areas (12-201, 12-202, 12-203 & 12-204) and one external catchment area (301) have been delineated and assessed at one drainage point of interest (Outlet #1). Catchments 12-201 & 12-202 are approximately 1.7 ha and 1.3 ha respectively and contain the majority of the site area. Minor storm runoff from Catchments 12-201 & 12-202 is collected and conveyed via the proposed storm sewer network and conveyed to SWMF#12 while major storm event runoff is conveyed via the proposed ROW's to SWMF#12. Catchment 12-203 is approximately 1.3 ha and consists of the proposed SWM block. Catchment 12-204 is approximately 0.2 ha and consist of a small portion of the Terry Fox ROW and flows uncontrolled to Sandy Cove Creek. Ultimately, runoff from the majority of Catchment 12-204 may be collected in storm sewers within Terry Fox and conveyed to a downstream SWM pond which will be required to provide controls for the future SCEI developments lands (pond located within the Dorsay lands as per the SIS). Catchment 301 is approximately 5.0 ha and consists of 4.9 ha of development area from the MVS development lands and 0.1 ha of mostly pervious area from the Bulut development lands originally delineated as Catchments 12-A and 12-C per the Mapleview South Subdivision (953 Mapleview Drive East) Functional Servicing & Stormwater Management Report, 2021 prepared by Jones Consulting Group Ltd. Similarly, minor storm event runoff from Catchment 301 is conveyed to SWMF#12 via the proposed storm sewer network while major storm event runoff is conveyed to SWMF#12 via an overland flow channel.

Outlet #1 is defined as outflows from SWMF#12 to Sandy Cove Creek.

Proposed drainage patterns are depicted on the Post-Development Drainage Plan (Drawing DP-1) provided in Appendix F. Relevant excepts from applicable background reports are also provided in Appendix F.

6.4.1 Catchment Parameters

Proposed catchment parameters including total impervious area (TIMP) and directly connected impervious area (XIMP) have been established based on review of the Conceptual Site Plan prepared by Hunt Design Associates Inc., City design standards and engineering judgement. A summary of land use areas for Catchments 12-201, 12-202, 12-203 & 12-204 is provided in Appendix F while a summary of considerations used to set TIMP and XIMP values is provided below:

- TIMP of 100% has been applied to rooftop, road pavement and hardscape (sidewalk & driveway) areas;
- XIMP for rooftop areas vary between 100% and 59% to reflect areas where downspouts can be discharged to pervious areas 5.0 m in width and have a gradual slope between 1.0% to 5.0% in accordance with STEP LID guidelines and/or directly connected to infiltration based LIDs;
- XIMP of 100% applied to all road pavement areas;
- XIMP of 0% applied to sidewalk areas assuming that 100% of runoff will be directed to pervious areas;
- TIMP & XIMP of 0% assigned to sand media filter surface; and
- TIMP of 100% assigned to base of dry pond assuming completely saturated conditions to be conservative.

These design parameters will be confirmed during the detailed design stage.

Catchment parameters for the external drainage area (Catchment 301) have been established based on the parameters utilized by Jones Consulting in the Functional Servicing and SWM Report prepared for the Mapleview South Subdivision, as mentioned above.

6.4.2 SWMF#12

Flow Conveyance

Minor storm event runoff from the subject lands and external lands will be collected and conveyed to SWMF#12 via a network of storm sewers. Major storm runoff will be conveyed within overland and discharge to SWMF#12. Additional details with respect to overland flow conveyance capacity calculations will be provided during detailed design.

Water Quantity Control

Water quantity controls for Catchments 12-201, 12-202, 12-203 & 301 will be provided via SWMF#12. A summary of the operation of SWMF#12 including storage volumes, release rates and water surface elevations for each storm event is provided in Table 4 while detailed model output and preliminary design details are provided in Appendix F.

Table 4: SWM Facility #12 Operating Characteristics Summary

STORM RETURN PERIOD	DISCHARGE RATE (m^3/s)	STORAGE VOLUME REQUIRED (m^3)	WATER SURFACE ELEVATION (m)
1:2-Year	0.02	2,425	253.59
1:5-Year	0.07	3,288	254.01
1:10-Year	0.13	3,799	254.16
1:25-Year	0.22	4,537	254.37
1:50-Year	0.28	5,132	254.53
1:100-Year	0.32	5,780	254.66
25mm	0.01	1,037	253.20
Regional (Hazel)	1.34	7,138	254.88

Note: Uncontrolled peak flows and storage volumes generated under the AMC II conditions.

The total water quantity storage volume required to control the 1:100-year storm is 5,780 m^3. This volume is provided at an elevation of 254.66 m, providing 0.76 m of freeboard. The regional storm event (Hurricane Hazel) can be conveyed through the pond at an elevation of 254.88 m, providing 0.54 m of freeboard.

The detention and release rates from SWMF#12 will be governed by two-stage outlet control. Frequent storm events will be controlled by a 95 mm dia. orifice plate at elevation 252.67 m. Infrequent storm events will be controlled by a 400 mm dia. orifice plate at elevation 253.79 m. Refer to Appendix F for additional stage-storage-discharge information.

Preliminary design details of SWMF#12 are summarized below:

- bottom of dry cell: 252.67 m;
- bottom of bioretention cell: 252.97 m;
- surface of bioretention cell: 254.52 m;

- bioretention cell weir sill elevation: 254.82 m;
- top of pond elevation: 255.42 m;
- 5:1 side slopes;
- 5.0 m access road width;
- total active storage volume of 10,510 m^3 at 255.42 m; and
- total infiltration volume of 903 m^3.

An emergency overflow weir has been conceptually designed to provide safe conveyance of the uncontrolled peak flow into the pond, in the event the outlet structure becomes blocked. The uncontrolled peak flow occurs during the 1:100-year SCS storm event at a rate of 2.91 m^3/s. An overflow weir with a 5.5 m wide bottom width at elevation 254.75 m provides a conveyance capacity of 8.74 m^3/s at the top of pond (elevation 255.42). Therefore, the uncontrolled peak flow can be safely conveyed in an emergency situation at elevation 255.10, providing 0.32 m of freeboard.

It is noted that the proposed SWM facility will need to be lined to avoid groundwater interaction. It is also noted that the base of pond and primary outlet will be approximately 0.60 m above the regional and 100-year Sandy Cove Creek flood elevation of 252.05.

Preliminary design details of SWMF#12 are depicted on the Drawing SS-1 and Drawing GP-1, appended.

The design of the proposed SWM facility will be further advanced and refined during the detailed design process.

6.4.3 Post-Development Peak Flow Summary

Due to the implementation of on-site water quantity controls, post-development peak flow rates discharging from Catchment 12 to Outlet #1 are less than or equal to the allowable discharge rates established by the SIS for a drainage area of approximately 9.4 ha. A summary of post-development peak flows is provided in Table 5 while additional details are provided in Appendix F.

Table 5: Proposed Conditions Peak Flow Summary

STORM RETURN PERIOD	PEAK FLOW (m^3/s)
1:2-Year	0.02 *(0.02)*
1:5-Year	0.07 *(0.08)*
1:10-Year	0.13 *(0.14)*
1:25-Year	0.22 *(0.23)*
1:50-Year	0.29 *(0.30)*
1:100-Year	0.32 *(0.38)*

Note 1: Values in (italics) represent allowable discharge rates from Catchment 12 per the SIS for 9.4 ha

6.4.4 Water Quality

Enhanced level water quality control (corresponding to 80% TSS removal) is required for the site and external drainage area. Water quality controls will be provided for Catchments 12-201, 12-202, 12-203 & 301 via a treatment train comprised of a bioretention cell and a dry pond. Treatment train calculations are provided in Appendix F to demonstrate Enhanced level water quality treatment is provided for the site and external areas with removal rates of 90% anticipated utilizing TSS removal rates presented in Table 3.2 of the MECP SWM Manual and Low Impact Development Treatment Train Tool User Guide. Additional detailed of the proposed water quality controls are provided below.

Bioretention Cell

The bioretention cell is located within the SWM facility and has been designed to provide filtration of the equivalent runoff volume generated during the 20 mm storm event. As mentioned, the SWM facility and bioretention cell will be lined to avoid interaction with the groundwater table. As such, an underdrain will be used to convey treated flow from the bioretention cell to the dry cell. The cell will be approximately 1.5 m in depth, 1,458 m^2 and consist of media blend conducive to water quality treatment.

Extended Detention

Per City and MECP standards, extended detention within a dry SWM facility is provided by detaining the greater of; the volume generated from Table 3.2 of the MECP SWM Planning & Design manual for basic level treatment or the 25 mm 4-Hour Chicago storm event, between 24 and 48 hours. Based on a drainage area of 9.3 ha and overall imperviousness of 66.9%, the 25 mm storm event runoff volume is approximately 1,037 m^3 which occurs at elevation 253.20 m

(depth of 0.53 m). The 95 mm dia. orifice plate provides a drawdown time of 36.1 hours and is therefore sufficient.

6.4.5 LSRCA Volume Control & LID Design

In accordance with LSRCA requirements, projects defined as 'major development' are required to meet the volume control requirements outlined in Section 2.2.2 of the LSRCA 2016 SWM guidelines. As such, best efforts must be provided to infiltrate, filter, or re-use runoff generated from impervious areas on site. However, based on review of the SIS, and as mentioned previously, the 5 mm storm runoff volume was the infiltration target for Catchment 12 with the remaining 20 mm to be controlled via filtration-based measures. It is assumed that runoff volume control for the external catchment areas (Mapleview South and Bulut Lands) will be provided within their respective developments.

As such, LID infiltration practices will be provided to infiltrate the equivalent 5 mm runoff volume generated from the impervious areas of the subject site. The bioretention cell within SWMF#12 has been sized to provide filtration of the remaining 20 mm storm runoff volume. A summary of runoff volume requirements for each catchment area is provided in Appendix F while additional details are provided below.

6.4.6 LID Infiltration Measures

Based on a site impervious area of 2.68 ha, the equivalent 5 mm storm event runoff volume is approximately 134 m^3. Two LID infiltration practices (LID #1 and LID #2) have been proposed to infiltrate the equivalent 5 mm storm event runoff volume and are illustrated on Drawing SS-1. It is noted that as the site is located partially within a SGRA, pre-treatment of runoff not generated from rooftop areas is required and will be provided via an oil grit separator (OGS) unit.

LID #1

LID #1 is a proposed stone trench soakaway pit designed to capture the 25 mm runoff volume from the rooftops of Buildings 10 & 11. A summary of preliminary design details is provided below:

- total impervious contributing to LID: 1,200 m^2;
- target runoff depth to be infiltrated: 25 m;
- required runoff volume to be infiltrated: 30.0 m^3;
- footprint: 77 m^2;
- depth: 1.5 m;

- void ratio of clear stone: 40%; and
- provided infiltration volume of 31 m^3.

The base of the stone underneath the pit will be located at minimum 1.0 m above the groundwater table elevation. Additional information will be provided during detailed design stage.

LID #2

LID #2 is a proposed infiltration trench designed to capture runoff from a catchment area of approximately 1.0 ha with an imperviousness area (exclusive of the rooftop areas of buildings 10 & 11) of 0.56 ha. The trench will be comprised of StormTank ST-24 modules situated on a clear stone base. A summary of preliminary design details are provided below:

- total impervious area contributing to trench: 5,600 m^2;
- target runoff depth to be infiltrated: 18.5 mm;
- required runoff volume to be infiltrated: 104.0 m3;
- footprint: 74.0 m^2;
- depth: 2.1 m;
- void ratio of module: 96%;
- void ratio of clear stone: 40%;
- height of modules: 1.5 m; and
- approximate infiltration volume provided: 105.0 m^3.

Similarly, the base of the stone underneath the trench system will be located at minimum 1.0 m above the groundwater table elevation. Additional information will be provided during detailed design.

As shown the total provided infiltration volume is 136 m^3 which exceeds the minimum requirements set by the SIS and is therefore sufficient.

6.4.7 LID Filtration Measures

As mentioned, a bioretention cell will be provided as part of SWMF#12 to provide water quality treatment for the contributing 20 mm rainfall event. Therefore, considering a total impervious area of 2.68 ha, the equivalent 20 mm runoff volume is approximately 536 m^3. The proposed bioretention cell has been designed with a total depth of 1.55 m and an area of 1,458 m^2. Therefore, assuming a media porosity of 40%, the total anticipated filtration provided is

approximately 903 m^3. Thereby exceeding minimum runoff volume control requirements and is therefore sufficient.

6.4.8 Water Balance

A water balance analysis has been completed by Azimuth to assess the potential impact of the development on local groundwater and surface water resources. Their analysis determined the pre-development water balance condition results in approximately 11,979 m^3/year of infiltration volume. Under post-development conditions (without mitigation), due to the increase in impervious area, there is approximately 4,270 m^3/year of infiltration resulting in an infiltration deficit of 7,709 m^3/year.

Best efforts have been provided to mitigate this infiltration deficit. As mentioned, infiltration practices will be provided to the maximum extent feasible to provide infiltration of the equivalent 5 mm runoff volume resulting in an additional 4,412 m^3/year of annual infiltration volume. Therefore, the annual infiltration deficit is reduced to 3,585 m^3/year which is equivalent to approximately 30% reduction in pre-development volume and represents best efforts.

It is noted that as the site is only partially located within an SGRA and partially located within lands subject to the Lake Simcoe Protection Plan (LSPP) 4.8-DP, we understand that the infiltration deficit in the post-development does not warrant meeting requirements set by the LSPP Water Balance Offsetting Policy. In addition, as the infiltration target set by the SIS has been achieved, we believe this further excludes the development from being subject to additional requirements.

Refer to the Azimuth report for additional details.

6.4.9 Phosphorous Mitigation

In order to comply with LSPOP requirements, an assessment of the phosphorous loading from the site under proposed conditions has been completed using the loading rates and removal efficiencies from the MECP Phosphorous Budget Tool and removal efficiencies per the Sustainable Technologies Evaluation Program (STEP) Low Impact Development Treatment Train Tool (LID TTT).

Proposed Conditions

The site has been modelled as three land use categories; Turf-Sod, High Intensity Development – Residential and Low Intensity Development with loading rates of 0.12 kg/year, 1.32 kg/year, 0.13 kg/year respectively. Rooftop areas and the proposed SWM block area have been modelled as low intensity development. Hardscape and road pavement areas have been modelled as High Intensity Development – Residential, while the assumed landscaped areas have been modelled

as Turf-Sod. Applying these loading rates, the annual post-development phosphorous load is 2.41 kg/year.

Best efforts for phosphorus mitigation for the site will be provided via the LID infiltration practices, bioretention cell and dry pond which have phosphorous removal efficiency rates of 60%, 25% and 20% respectively.

Therefore, the estimated total annual post-development phosphorous load is reduced to 1.19 kg/year. A summary of the phosphorous loading under the post-development and post-development with mitigation scenarios is provided in Table 6 below. Detailed model output is provided in Appendix F.

Table 6: Phosphorous Loading Summary

SCENARIO	AREA (HA)	PHOSPHOROUS LOADING (KG/YEAR)
Post-Development (Without Controls)	4.48	2.41
Post-Development (With Controls)	4.48	1.19

During the detailed design process, additional phosphorous reduction controls will be implemented if feasible to further reduce phosphorous loading from the site.

6.5 SWM FACILITY MAINTENANCE

Ongoing maintenance of SWM facilities is necessary to ensure continued effectiveness. The LID practices and SWM facility should be inspected regularly and particularly after large rainfall events to ensure the system and all its component parts are functioning properly and are in good repair.

7 Roadways & Transportation

7.1 ROADWAYS

Terry Fox Drive will be designed in accordance with BSD-307 (27.0 m Arterial Road Allowance – 15.2 m Asphalt) and Street 'A' will be designed in accordance with BSD-301 (18.0 m Local Road Allowance - Residential). The roads will be assumed by the City who will undertake routine maintenance and snowplowing activities. Private condo roads (6.4 m minimum platform width) will provide access to the mixed-use residential blocks.

A temporary residential cul-de-sac in accordance with BSD-329 will be installed at the terminus of Street 'A'.

7.2 TRAFFIC IMPACT STUDY

A Traffic Impact Study, prepared by Tatham Engineering (February 2022) is provided under separate cover and should be read in conjunction with this report.

8 Grading & Landscaping

8.1 GRADING

The overall site grading design is driven by proposed grading of Sandy Cove Creek, the design of the SWM facility and through coordination with the future Mapleview Drive East design and adjacent future development lands.

The preliminary grading along the common property line with Sandy Cove Creek Natural Heritage Blocks are based on the maximum allowable elevation as shown on the approved design drawings prepared by Tatham.

Internal road grading has been developed to ensure stormwater runoff is conveyed to proposed storm sewers designed. Proposed road grading will also provide sufficient overland flow routes contained within the road allowances.

Grading will be refined at the detailed design stage and in accordance with the City's Engineering Standards:

- Minimum road slope 0.5%
- Maximum road slope 5%
- Minimum lot grade 2%
- Maximum lot grade 5%
- Minimize the need for retaining walls
- Achieve SWM objectives

Refer to Appendix G for the Conceptual Grading Plan (Drawing GP-1).

8.2 LANDSCAPING

A detailed landscaping design will be completed at the detailed design stage and in accordance with the City's Urban Design Guidelines. It is expected street trees will be provided throughout the municipal road allowances while landscaping designs will be prepared in support of Site Plan applications for the mixed-use residential blocks.

Locations of retaining walls, if required, will be confirmed during detailed design.

9 Erosion & Sediment Control

Erosion and sediment control measures will be implemented for all construction activities within the development site including vegetation clearing, topsoil stripping, grading, servicing, road construction and lot development. The basic principles considered to minimize erosion and sedimentation transport include:

- All erosion control measures will be designed in accordance with relevant City, LSRCA and OPSD standards;
- Silt fences to be constructed prior to commencement of any grading operations;
- Designated construction vehicle entrance(s) with stone mud mat;
- Temporary swales, silt ponds, and check dams will be constructed to control runoff during construction by reducing velocities and promoting settlement of particulates;
- Catch basins will be provided with filter screens during construction;
- Long term siltation and erosion control will be enhanced with a re-vegetation strategy for disturbed areas; and
- Confine refueling and servicing of equipment sufficiently away from existing drainage systems.

Regular inspection of control measures will be completed through a monitoring and mitigation plan, with regular repairs made as necessary. A detailed erosion and sediment control plan will be completed at detailed design stage.

Refer to Appendix H for the Conceptual Erosion & Sediment Control Plan (Drawing ESC-1).

10 Utilities

The following utility agencies provide services to the proposed development:

- InnPower;
- Enbridge Inc.;
- Bell Canada; and
- Rogers Communication Inc.

All utilities (electrical, gas, telecommunications) are expected to be available from Mapleview Drive East to service the proposed development. Utility coordination will be initiated at the detailed design stage.

11 Summary

Water Supply & Distribution

The site will be serviced with municipal watermain from the existing 300 mm dia. trunk watermain on Mapleview Drive East.

Sewage Collection & Treatment

The site will be serviced with a 200 mm dia. sanitary sewer connecting to the existing 450 mm dia. trunk sanitary sewer at two locations on Mapleview Drive East. The existing trunk sewer has been adequately sized to accept flows from the proposed development. The Barrie WWTP has sufficient capacity to service the proposed development.

Stormwater Management Plan

The preliminary SWM plan demonstrates the proposed development will not result in negative impacts with respect to stormwater and meets the design criteria previously established in the SIS report.

Roadways & Transportation

The proposed municipal local and industrial road allowances will be designed in accordance with the City's Engineering Standards and in accordance with the recommendations of the geotechnical consultant.

A separate traffic study was completed to confirm significant external improvements are not required for the site and the internal networks are sufficient for the proposed use.

Grading & Landscaping

The conceptual grading design was prepared in accordance with the City's Engineering Standards to achieve the objectives of the SWM plan and tying into surrounding grades.

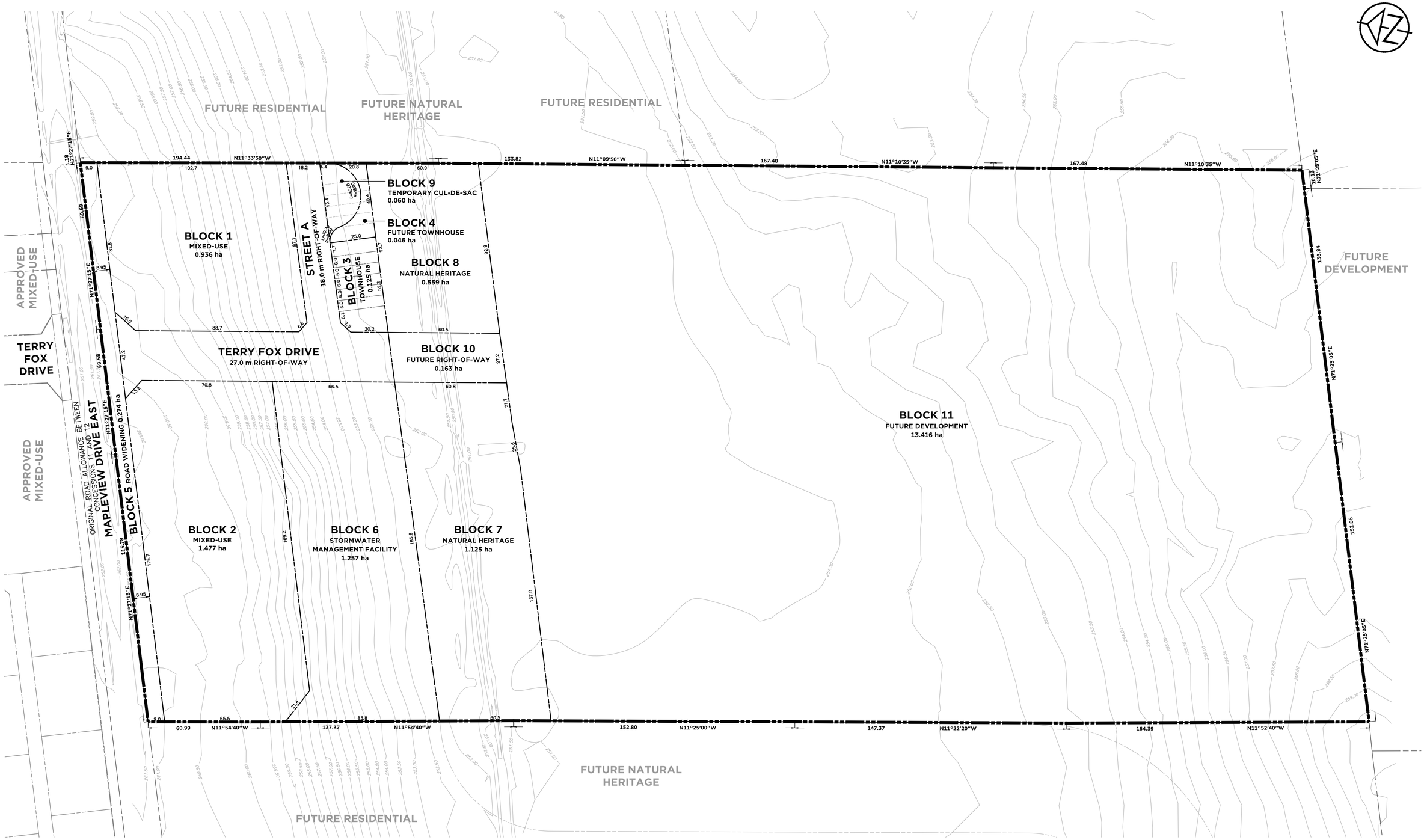
Erosion & Sediment Control

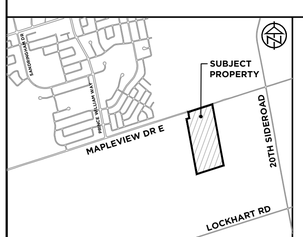
A detailed erosion and sediment control plan will be prepared and executed prior to construction in accordance with the City, LSRCA and OPSD standards.

Utilities

Utilities are expected to be available to service the proposed development. Utility coordination and designs will be initiated during the detailed design stage.

Appendix A:
Draft Plan of Subdivision





KEY PLAN
NOT TO SCALE

DRAFT PLAN OF SUBDIVISION

PART OF LOT 19
CONCESSION 11
GEOGRAPHIC TOWNSHIP OF INNISFIL
NOW IN THE CITY OF BARRIE
FORMERLY IN THE TOWN OF INNISFIL
COUNTY OF SIMCOE

OWNER'S CERTIFICATE

I, THE UNDERSIGNED, BEING THE REGISTERED OWNER OF THE SUBJECT LANDS, HEREBY AUTHORIZE TATHAM ENGINEERING LIMITED TO PREPARE THIS DRAFT PLAN OF SUBDIVISION AND TO SUBMIT TO THE CITY OF BARRIE FOR DRAFT PLAN APPROVAL.

KATHY DI SILVESTRO
SANDY CREEK ESTATES INC.

DATE

SURVEYOR'S CERTIFICATE

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

PIER DE ROSA, OLS, OLIP
JD BARNES LTD

DATE

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT R.S.O. 1990 C.P.13 AS AMENDED

a) AS SHOWN
b) AS SHOWN
c) AS SHOWN
d) AS SHOWN
e) AS SHOWN
f) AS SHOWN
g) AS SHOWN
h) MUNICIPAL WATER & SANITARY SUPPLY
i) SARGENT SANDY LOAM
j) AS SHOWN
k) ALL SERVICES AS REQUIRED (WATER, SANITARY, STORM, HYDRO, CABLE)
l) AS SHOWN

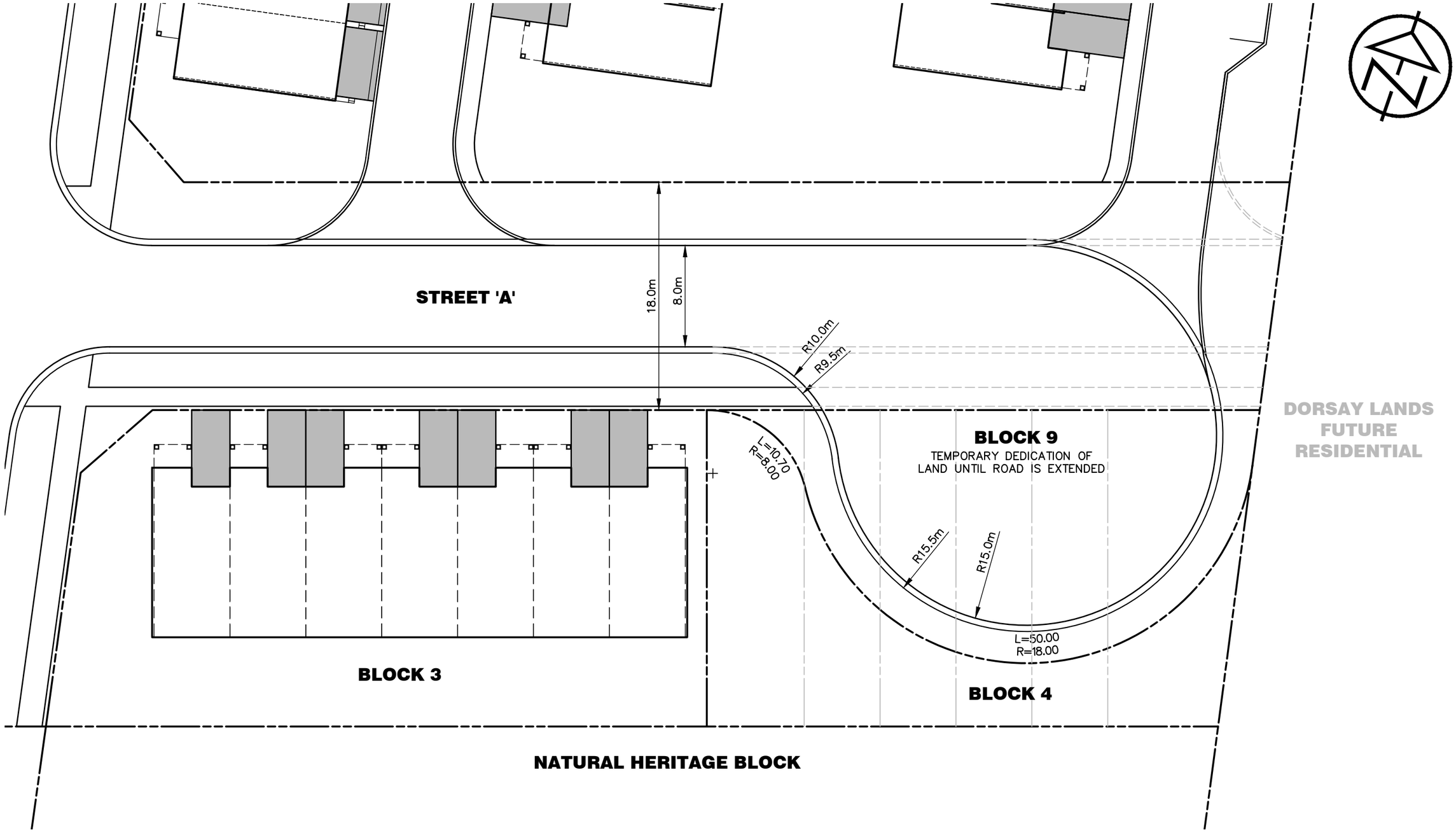
LAND USE SUMMARY

LAND USE	BLOCK	UNITS	AREA (ha)
MIXED-USE	BLOCK 1	10 COMMERCIAL, 44 RESIDENTIAL	0.936
MIXED-USE	BLOCK 2	20 COMMERCIAL, 76 RESIDENTIAL	1.477
RESIDENTIAL	BLOCK 3	7 RESIDENTIAL	0.125
RESIDENTIAL	BLOCK 4	6 RESIDENTIAL	0.046
ROAD WIDENING	BLOCK 5	-	0.274
STORMWATER MANAGEMENT FACILITY	BLOCK 6	-	1.257
NATURAL HERITAGE	BLOCK 7, 8	-	1.684
TEMPORARY CUL-DE-SAC	BLOCK 9	-	0.060
MUNICIPAL RIGHT-OF-WAY	-	-	0.576
MUNICIPAL RIGHT-OF-WAY (FUTURE)	BLOCK 10	-	0.163
TOTAL PHASE 1	-	30 COMMERICAL, 133 RESIDENTIAL	6.598
FUTURE DEVELOPMENT	BLOCK 11	-	13.416
TOTAL			20.014

TATHAM ENGINEERING

No.	REVISION DESCRIPTION	DATE
1.	ISSUED FOR DRAFT PLAN APPROVAL	FEB. 4/22

DRAWN: LMB	FILE: 420406	DWG:	DP
CHECK: NM	DATE: FEBRUARY 2022		



969, 979 and 989 MAPLEVIEW DRIVE EAST
PHASE 1
SANDY CREEK ESTATES INC.
CITY OF BARRIE

TEMPORARY RESIDENTIAL CUL-DE-SAC
ISSUED FOR DRAFT PLAN APPROVAL

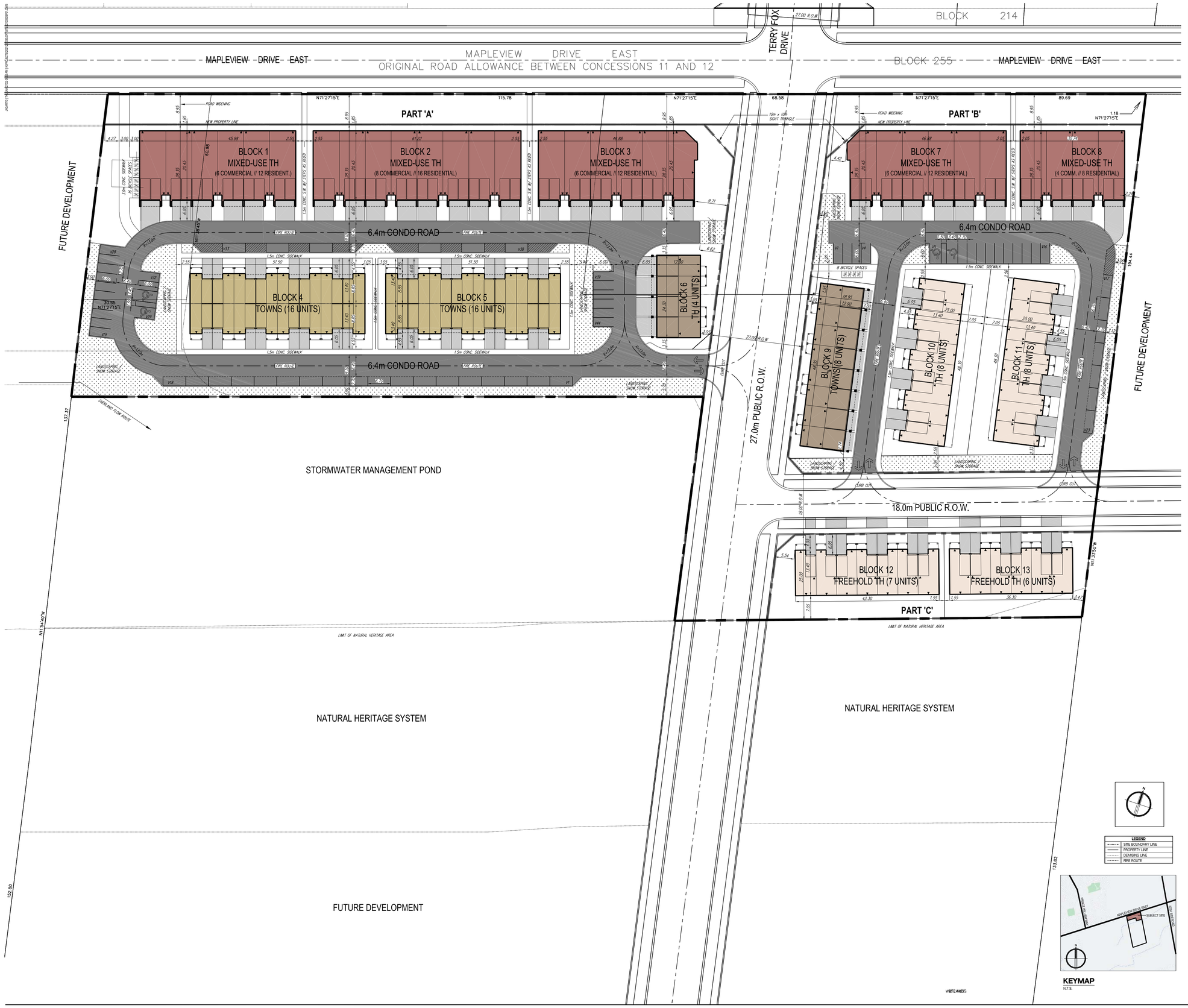
TATHAM ENGINEERING

DWG. **FIG. 1**

DATE: FEB 2022	DRAWN BY: LC	SCALE: 1:300	TATHAM FILE: 420406

Drawing Name: 420406-FIG01.dwg, Plotted: Feb 04, 2022

Appendix B:
Concept Site Plan



SITE STATISTICS - SITE TOTALS

1. SITE AREAS

	HECTARE	ACRE
PART 'A' - MIXED-USE CONDO TH	1.4896	3.6809
PART 'B' - MIXED-USE CONDO TH	0.9363	2.3136
PART 'C' - FREEHOLD TH	0.2303	0.5690
NET DEV. AREA	**2.6561**	**6.5634**

2. UNIT COUNT

UNIT TYPE	#
TYPE 'M' - 3 STOREY, 7.62M MIXED-USE STACKED TOWNHOUSE	
COMMERCIAL G.F.A. ; 48 SM PER MODULE MAX	30
RESIDENTIAL G.F.A. ; SUITE 1	30
RESIDENTIAL G.F.A. ; SUITE 2	30
TYPE 'B' - 3 STOREY, 6.4M BACK-TO-BACK TOWNHOUSE	32
TYPE 'C' - 3 STOREY, 6.0M REAR-LANE DECK TOWNHOUSE	12
TYPE 'D' - 3 STOREY, 6.0M CONVENTIONAL TOWNHOUSE	29
TOTAL	**163**

3. DENSITY

	UNITS / HECTARE	UNITS / ACRE
# OF UNITS / NET DEV. AREA	61.37	24.83

4. COMMERCIAL G.F.A.

PART	COMMERCIAL UNIT COUNT	G.F.A. (48 SM PER COMM. UNIT)
PART 'A'	20	960 SM
PARTS 'B' + 'C'	10	480 SM
TOTAL	**30**	**1,440 SM**

5. COMMERCIAL FSI

	REQUIRED	PROVIDED (COMM. G.F.A. / LOT AREA)
PART 'A'	0.27	960 SM / 14,896 SM = **0.06**
PARTS 'B' + 'C'	0.27	480 SM / 11,665 SM = **0.04**

OTHER REQUIREMENTS

1. BICYCLE PARKING

PART A

REQUIRED:

A) MIN. 0.2 SPACES PER APARTMENT UNIT (MIXED-USE RESIDENTIAL UNITS)
0.2 * 40 UNITS = 8 SPACES REQUIRED

B) ADDITIONAL 1 SPACE FOR EVERY 7% OF REQUIRED COMMERCIAL PARKING
7% * 40 COMMERCIAL PARKING REQ'D = 3 SPACES REQUIRED

TOTAL = 11 SPACES REQUIRED

PROVIDED = 16 SPACES PROPOSED

PART B

REQUIRED:

A) MIN. 0.2 SPACES PER APARTMENT UNIT (MIXED-USE RESIDENTIAL UNITS)
0.2 * 20 UNITS = 4 SPACES REQUIRED

B) ADDITIONAL 1 SPACE FOR EVERY 7% OF REQUIRED COMMERCIAL PARKING
7% * 20 COMMERCIAL PARKING REQ'D = 2 SPACES REQUIRED

TOTAL = 6 SPACES REQUIRED

PROVIDED = 8 SPACES PROPOSED

2. SNOW STORAGE

PART A

PAVED ROADWAY AND STREET PARKING AREA: 3601 SM
PROPOSED SNOW STORAGE AREA: 1564 SM (43.4%)

PART B

PAVED ROADWAY AND STREET PARKING AREA: 1871 SM
PROPOSED SNOW STORAGE AREA: 742 SM (39.7%)

PAVED ROADWAY AND STREET PARKING AREA

PROPOSED SNOW STORAGE AREA

SITE STATISTICS - PART A

1. SITE AREAS

	HECTARE	ACRE
PART 'A' - MIXED-USE CONDO TH	1.4896	3.6809
NET DEV. AREA	**1.4896**	**3.6809**

2. UNIT COUNT

UNIT TYPE	#
TYPE 'M' - 3 STOREY, 7.62M MIXED-USE STACKED TOWNHOUSE	
COMMERCIAL G.F.A. ; 48 SM PER MODULE MAX	20
RESIDENTIAL G.F.A. ; SUITE 1	20
RESIDENTIAL G.F.A. ; SUITE 2	20
TYPE 'B' - 3 STOREY, 6.4M BACK-TO-BACK TOWNHOUSE	32
TYPE 'C' - 3 STOREY, 6.0M REAR-LANE DECK TOWNHOUSE	4
TYPE 'D' - 3 STOREY, 6.0M CONVENTIONAL TOWNHOUSE	0
TOTAL	**96**

3. DENSITY

	UNITS / HECTARE	UNITS / ACRE
# OF UNITS / NET DEV. AREA	64.45	26.08

4. RESIDENT PARKING

UNIT TYPE	REQUIRED (1.5)	PROVIDED
TYPE 'M' - SUITE 1 (2 SP. PER UNIT PROV.)	30.00	40.00
TYPE 'M' - SUITE 2 (2 SP. PER UNIT PROV.)	30.00	40.00
TYPE 'B' (2 SP. PER UNIT PROV.)	48.00	64.00
TYPE 'C' (2 SP. PER UNIT PROV.)	6.00	8.00
TYPE 'D' (2 SP. PER UNIT PROV.)	0.00	0.00
TOTAL	**114.00**	**152.00**

5. VISITOR PARKING

UNIT TYPE	REQUIRED	PROVIDED
TYPE 'M' - COMMERCIAL (1 SP / 24 sm REQ'D)	40	40.00
RESIDENTIAL UNITS	-	4.00
TOTAL	**40**	**44.00**

SITE STATISTICS - PART B

1. SITE AREAS

	HECTARE	ACRE
PART 'B' - MIXED-USE CONDO TH	0.9363	2.3136
NET DEV. AREA	**0.9363**	**2.3136**

2. UNIT COUNT

UNIT TYPE	#
TYPE 'M' - 3 STOREY, 7.62M MIXED-USE STACKED TOWNHOUSE	
COMMERCIAL G.F.A. ; 48 SM PER MODULE MAX	10
RESIDENTIAL G.F.A. ; SUITE 1	10
RESIDENTIAL G.F.A. ; SUITE 2	10
TYPE 'B' - 3 STOREY, 6.4M BACK-TO-BACK TOWNHOUSE	0
TYPE 'C' - 3 STOREY, 6.0M REAR-LANE DECK TOWNHOUSE	8
TYPE 'D' - 3 STOREY, 6.0M CONVENTIONAL TOWNHOUSE	16
TOTAL	**54**

3. DENSITY

	UNITS / HECTARE	UNITS / ACRE
# OF UNITS / NET DEV. AREA	57.68	23.34

4. RESIDENT PARKING

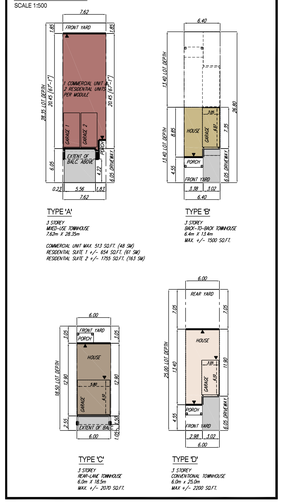
UNIT TYPE	REQUIRED (1.5)	PROVIDED
TYPE 'M' - SUITE 1 (2 SP. PER UNIT PROV.)	15.00	20.00
TYPE 'M' - SUITE 2 (2 SP. PER UNIT PROV.)	15.00	20.00
TYPE 'B' (2 SP. PER UNIT PROV.)	0.00	0.00
TYPE 'C' (2 SP. PER UNIT PROV.)	12.00	16.00
TYPE 'D' (2 SP. PER UNIT PROV.)	24.00	32.00
TOTAL	**66.00**	**88.00**

5. VISITOR PARKING

UNIT TYPE	REQUIRED	PROVIDED
TYPE 'M' - COMMERCIAL (1 SP / 24 sm REQ'D)	20.00	20.00
RESIDENTIAL UNITS	-	3.00
TOTAL	**20**	**23.00**

UNIT TYPES

SCALE 1:500



SITE STATISTICS - PART C

1. SITE AREAS

	HECTARE	ACRE
PART 'C' - FREEHOLD TH	0.2303	0.5690
NET DEV. AREA	**0.2303**	**0.5690**

2. UNIT COUNT

UNIT TYPE	#
TYPE 'M' - 3 STOREY, 7.62M MIXED-USE STACKED TOWNHOUSE	
COMMERCIAL G.F.A. ; 48 SM PER MODULE MAX	0
RESIDENTIAL G.F.A. ; SUITE 1	0
RESIDENTIAL G.F.A. ; SUITE 2	0
TYPE 'B' - 3 STOREY, 6.4M BACK-TO-BACK TOWNHOUSE	0
TYPE 'C' - 3 STOREY, 6.0M REAR-LANE DECK TOWNHOUSE	0
TYPE 'D' - 3 STOREY, 6.0M CONVENTIONAL TOWNHOUSE	13
TOTAL	**13**

3. DENSITY

	UNITS / HECTARE	UNITS / ACRE
# OF UNITS / NET DEV. AREA	56.46	22.85

4. RESIDENT PARKING

UNIT TYPE	REQUIRED (1.5)	PROVIDED
TYPE 'M' - SUITE 1 (2 SP. PER UNIT PROV.)*	0.00	0.00
TYPE 'M' - SUITE 2 (2 SP. PER UNIT PROV.)	0.00	0.00
TYPE 'B' (2 SP. PER UNIT PROV.)	0.00	0.00
TYPE 'C' (2 SP. PER UNIT PROV.)	0.00	0.00
TYPE 'D' (2 SP. PER UNIT PROV.)	19.50	26.00
TOTAL	**19.50**	**26.00**

5. VISITOR PARKING

NOT REQUIRED FOR FREEHOLD LOTS

Appendix C:
Water Supply & Distribution

TATHAM ENGINEERING

PROJECT	969, 979 & 989 Mapleview Drive East - Phase 1	FILE	420406
		DATE	January 8, 2022
SUBJECT	Water Demands	NAME	JLM/LC
		PAGE	1 OF

Design Criteria

Medium Density PPU	=	2.57	
Per Capita Demand	=	225	L/cap/day
Commercial Demand	=	28,000	L/ha/day

Peaking Factors

Max Day Demand	=	2.5
Peak Hour Demand	=	3.75

(MECP Guidelines for Drinking Water Systems Table 3-3)

Residential Flow

No. Townhouse Units = 133 Population = 342 persons

Average Day Demand	=	76,907	L	=	76.91	m^3	=	0.89 L/s
Max Day Demand (MDD)	=	192,268	L	=	192.27	m^3	=	2.23 L/s
Peak Hour Demand (PHD)	=	288,402	L	=	288.40	m^3	=	3.34 L/s
Max Fire Flow	=	300	L/s	(refer to FUS calculations)				
MDD + Fire	=	302.23	L/s					
PHD + Fire	=	303.34	L/s					

Commercial Flow

Commercial Units	=	30		Equiv. Population	= 1 persons
GFA Per Unit	=	48	m^2	(Area x 28,000 L/ha/day / 225 L/cap/day)	
Total Commercial Area	=	1,440.0	m^2		

Average Day Demand	=	4,032.00	L	=	4.03	m^3	=	0.05 L/s
Max Day Demand	=	10,080	L	=	10.08	m^3	=	0.12 L/s
Peak Hour Demand	=	15,120	L	=	15.12	m^3	=	0.18 L/s
Max Fire Flow	=	67	L/s	(refer to FUS calculations)				
MDD + Fire	=	67.12	L/s					
PHD + Fire	=	67.18	L/s					

Total Fow

Average Day Demand	=	80,939	L	=	80.94	m^3	=	0.94 L/s
Max Day Demand	=	202,348	L	=	202.35	m^3	=	2.34 L/s
Peak Hour Demand	=	303,522	L	=	303.52	m^3	=	3.51 L/s
Max Fire Flow	=	67	L/s	(refer to FUS calculations)				
MDD + Fire	=	69.34	L/s					
PHD + Fire	=	70.51	L/s					

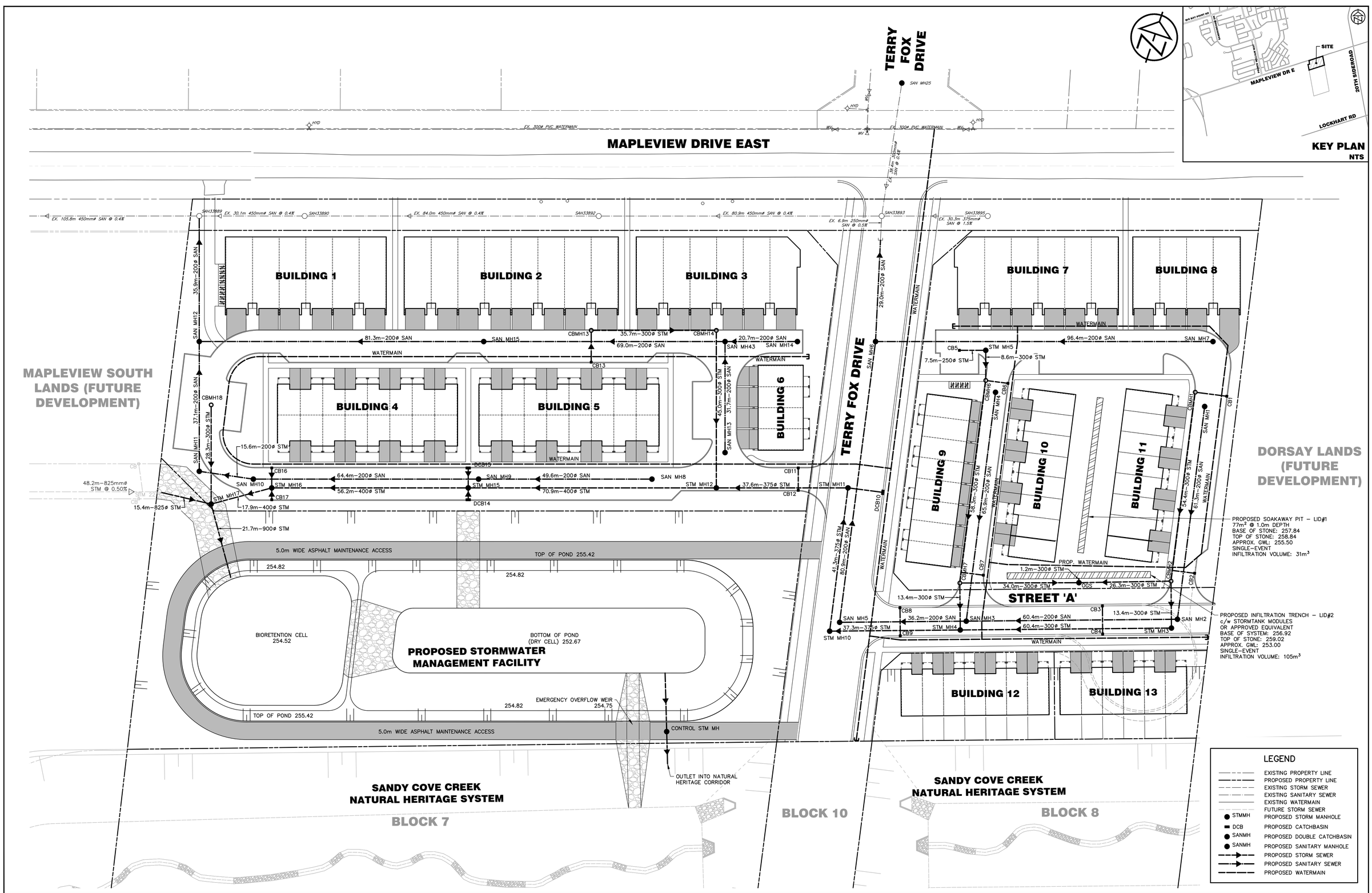
TATHAM ENGINEERING	Project: 969, 979 & 989 Mapleview Drive East - Phase 1	Date: January 8, 2022
	File No.: 421406	Designed: JLM/LC
	Subject: FUS Calculation - Townhouse Building 2	Checked
	Revisions:	

Fire Underwriters Survey Fire Flow Calculations
Long Method

Calculation Based on 1999 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)	
		Framing Material							
1	Frame Use for Construction of Unit	Coefficient related to type of construction (C)	Wood Frame	1.5	Ordinary Construction	**1**	-	N/A	
			Ordinary Construction	1					
			Non-combustible construction	0.8					
			Fire resistive construction (< 2 hrs)	0.7					
			Fire resistive construction (> 2 hrs)	0.6					
		Floor Space Area							
2	Type of Housing (if Townhouse, enter number of units per TH block)	Type of Housing	Single Family	1		**0**	Units	N/A	
			Townhouse / Apartment- inform # of units	1		**8**			
			Other (Comm. Ind., etc.)	1					
			2 hour Fire Separation Between Units	1	Yes	**1**			
2.1	Number of Storeys	Number of Floors / Storeys in the unit (do not include basement)				**3**	Storeys	N/A	
3	Floor Area (exclude basements, per unit for townhouses, per single family dwelling or per building for apartments, commercial or institutional)	Ground Floor Area				**160**	Square Metres (m2)	N/A	
		Total Floor Area - One Storey of Townhouse/Apartment Block				**160**			
		Total Floor Area - All Storeys				**480**			
		Does the building have fire-resistive design?			No	**480**			
		Are vertical openings/communications properly protected (1 hour rating)?			Yes	**240**			
		Total Floor Area (A) - for all storeys excluding basement - Single Family				**240**			
		Measurement Unis	Square Feet (ft^2)	0.093		**240**	m^2		
			Square Metres (m^2)	1					
			Hectares (ha)	10000					
4	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS): (FF= 220 x C x $A^{0.5}$)					L/min	3,000	
5	Factors Affecting Burning	**Reductions / Increases Due to Factors Affecting Burning**							
5.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Non-combustible	-0.25	N/A	(750)	2,250
			Limited combustible	-0.15					
			Combustible	0.00					
			Free burning	0.15					
			Rapid burning	0.25					
5.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	Fully supervised system	-0.5	None	0.0	N/A	-	2,250
			Water supply system/hose connections	-0.4					
			Automatic sprinkler protection	-0.3					
			None	0					
5.3	Separation Distance Between Units (Use 10% for 2 hour Fire Separation between adjacent units)	Exposure distance between units	North Side	10.1 to 20.0 m	0.15	0.75	%	1,688	3,938
			East Side	0 to 3.0 m	0.25				
			South Side	10.1 to 20.0 m	0.15				
			West Side	0 to 3.0 m	0.25				
5.4	Combustibility of Wood Shingle or Shake Roof Material	Surcharge for potential to spread fire	Non-combustible roofing material	0	Non-combustible roofing material	0	L/min	0	3,938
			Low risk of fire spread	2000					
			Moderate risk of fire spread	3000					
			High risk of fire spread	4000					
		Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:							4,000
6	Required Fire Flow, Duration and Volume	Total Required Fire Flow (above) in L/s:							67
		Required Duration of Fire Flow of 4,000 L/min (hrs):							1.5
		Required volume for Fire Flow of 4,000 L/min (m^3):							360

Appendix D:
Preliminary Site Servicing Plan



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DRAWING REFERENCES

SITE PROPERTY LINES SHOWN BASED ON PLAN 51R–33948 PREPARED BY HOLDING JONES VANDERVEEN INC., O.L.S., DATED FEBRUARY 13, 2008. EXISTING PROPERTY LINES SHOWN ARE APPROXIMATE BASED ON SIMCOE COUNTY GIS.

TOPOGRAPHIC INFORMATION SHOWN BASED ON SURVEY COMPLETED BY HOLDING JONES VANDERVEEN INC., O.L.S., JULY 27, 2015.

SITE PLAN SHOWN PREPARED BY HUNT DESIGN ASSOCIATES INC., MAY 2021.

BENCHMARKS

TBM#1 ELEV. 261.551 m
CITY OF BARRIE BENCHMARK #03120110020

TBM#2 ELEV. 268.852 m
CITY OF BARRIE BENCHMARK #03120110016

No.	REVISION DESCRIPTION	DATE
1.	ISSUED FOR DRAFT PLAN APPROVAL	FEB. 4/22

ENGINEER STAMP

969, 979 & 989 MAPLEVIEW DRIVE EAST
PHASE 1
SANDY CREEK ESTATES INC.
CITY OF BARRIE

TATHAM ENGINEERING

PRELIMINARY SERVICING PLAN

DESIGN: LMB	FILE: 420406–1	DWG:	
DRAWN: LMB	DATE: JANUARY 2022	SS-1	
CHECK: NM	SCALE: 1:500		

Drawing Name: 420406–SS01.dwg, Plotted: Feb 04, 2022

Appendix E:
Sewage Treatment & Collection

TATHAM ENGINEERING

PROJECT	969, 979 & 989 Mapleview Drive East - Phase 1	FILE	420406
		DATE	January 8, 2022
SUBJECT	Sanitary ADF Calculations	NAME	JLM/LC
		PAGE	1 OF 1

Design Criteria (as per City Standards)

Demands

Per Capita Flow	=	225	L/cap/day
Commercial	=	28	m^3/ha/day
Extraneous (infil.)	=	0.1	L/s/ha

Peak Factors

Commercial	=	2
Residential	=	Harmon

Population Density (ppu)

Medium Density PPU = 2.57

Site Information

Total Population = 342

Medium Density Units	=	133	
Commercial Area	=	0.05	ha
Total Area (Infiltration)	=	6.6	ha

=

Average Day Design Flow

ADF (Residential)	=	76,907	L/day	=	76.9	m^3 =	0.89	L/s
ADF (Commercial)	=	1,344	L/day	=	1.3	m^3 =	0.02	L/s
Total ADF	=	78,251	L	=	78.3	m^3 =	0.91	L/s

Peak Flow Design

Adjusted PDF for WWTF Population

Peak Flow Peaking Factor as per *Wastewater Treatment Master Plan (2019)* prepared by WSP = 2.05

Therefore, total peak flow received at Barrie WWTF = 160.4 m^3 (excl. extraneous)

Therefore, total peak flow received at Barrie WWTF = 161.1 m^3 (incl. extraneous)

SANITARY SEWER DESIGN

Development Details Basis

DESIGN SHEET Functional Servicing Report
FILE NO 420406
CONTRACT / PROJECT 969, 979 & 989 Mapleview Drive East - Phase 1

n ≥ 0.013
M = 5/P^0.2 Babbit

Numbers in blue or text in red are equations
(Harmon or Babbitt peaking factor where; M ≥ 2), the greater of the two is used in the spreadsheet. Please refer to Section 3.3.1.1 of the Barrie Sanitary Design Guidelines for additional guidance on which peaking factor to use.

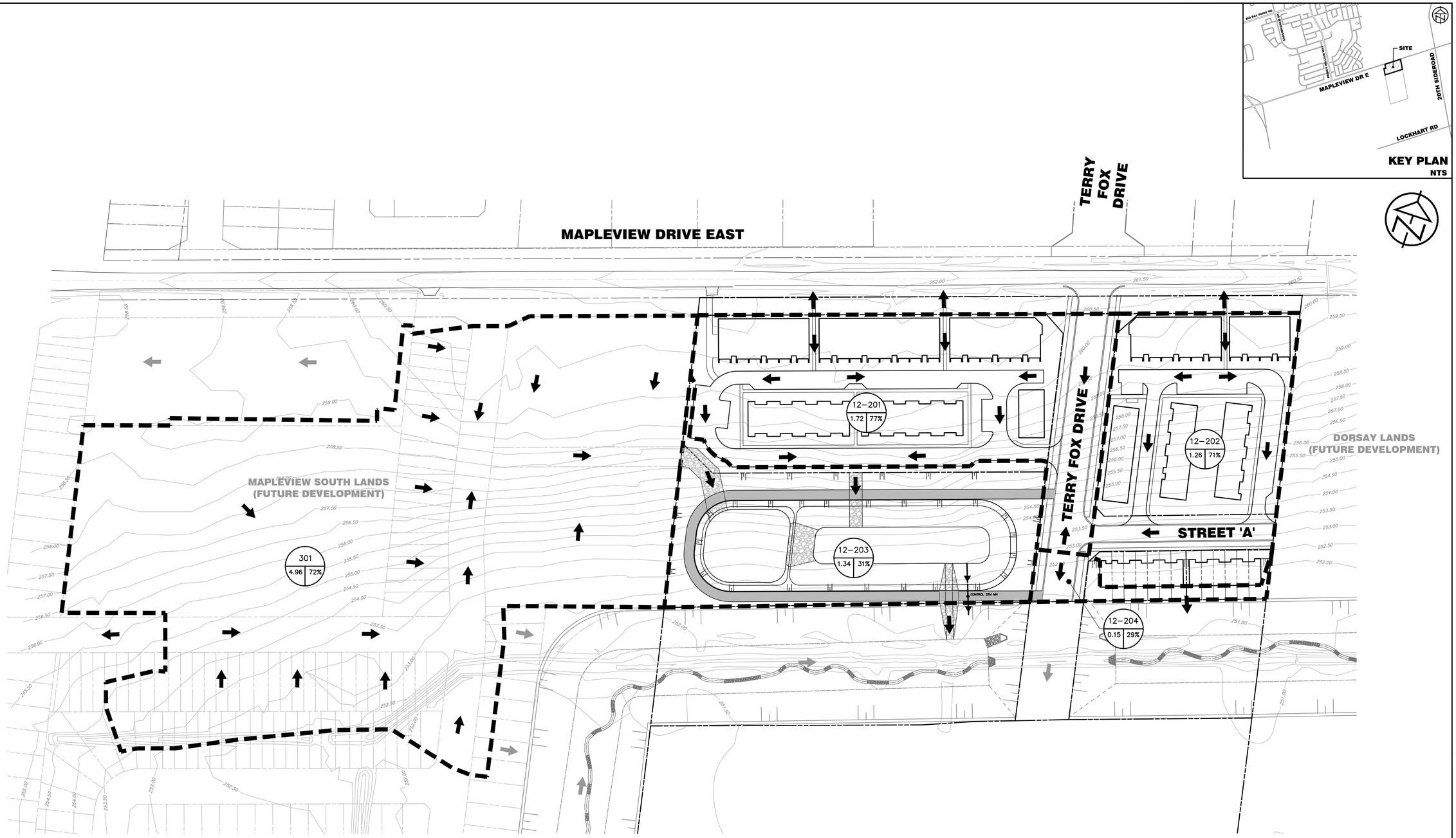
$Q_p = P*q*M/86400$ (Peak population flow where; q = 225 L/day/person; P = population) 225 litres/person/day.
$Q_i = I*A$ (Peak extraneous flow: I= 0.1L/s/ha over development area)
$Q_{tot} = Q_p + Q_i$ (Total peak flow as the sum of peak population flow and peak extraneous flow)

STREET / AREA	MAINTENANCE HOLE FROM	MAINTENANCE HOLE TO	DWELL UNITS	DWELL (ACC) UNITS	DENSITY P.P.U.	POP. (P)	POP. (ACC)	M PEAKING FACTOR BABBIT	M PEAKING FACTOR HARMON	Max PEAKING FACTOR	Q_p (l/s)	AREA (ha)	AREA (ACC) (ha)	Q_i (l/s)	Q_{tot} (l/s)	L (m)	D (mm)	S (%)	Qf FULL (l/s)	d/D[2]	d/D[3] >0.5 or >0.70	Velocity FULL (m/s)	Velocity Partial[1] (m/s)	Velocity[4] > 0.6 (m/s)
101	SAN MH1	SAN MH6	37	37	2.57	96	96		4.248	4.248	1.063	1.27	1.27	0.127	1.190	238	200	0.40%	20.744	0.162	Ok	0.660	0.345	Check
102	SAN MH7	SAN MH6	20	20	2.57	52	52		4.311	4.311	0.588	0.38	0.38	0.038	0.626	97	200	1.00%	32.798	0.095	Ok	1.044	0.400	Check
103	SAN MH6	SAP33893	0	57	2.57	0	148		4.192	4.192	1.621	0.09	1.74	0.174	1.795	36	200	0.40%	20.744	0.198	Ok	0.660	0.393	Check
104	SAN MH8	SAN MH12	16	16	2.57	42	42		4.329	4.329	0.475	0.49	0.49	0.049	0.524	258	200	0.40%	20.744	0.109	Ok	0.660	0.272	Check
105	SAN MH13	SAN MH12	60	60	2.57	155	155		4.186	4.186	1.692	0.96	0.96	0.096	1.788	171	200	0.40%	20.744	0.198	Ok	0.660	0.398	Check
106	SAN MH12	SAP33889	0	76	2.57	0	197		4.150	4.150	2.133	0.04	1.49	0.149	2.282	36	200	0.40%	20.744	0.223	Ok	0.660	0.425	Check

DATE: Jan 26, 2022 CALCULATED BY: LC CHECKED BY: NM

Notes:
(1) without extraneous flow
(2) with extraneous flow
(3) d/D>0.5 for pipes 375 and less, d/D>0.70 for pipes greater than 375
(4) Velocity check based on the lesser of full flow or partial velocity

Appendix F:
Stormwater Management Plan



LEGEND

- 280.0 — EXISTING CONTOURS
- CATCHMENT BOUNDARY
- OVERLAND FLOW DIRECTION
- 12–201 / 1.00 / 77% — CATCHMENT ID, % IMPERVIOUS, AREA (ha)

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SITE PLAN SHOWN PREPARED BY HUNT DESIGN ASSOCIATES INC., MAY 2021.

BENCHMARKS

TBM#1 ELEV. 261.551 m
CITY OF BARRIE BENCHMARK #03120110020

TBM#2 ELEV. 268.852 m
CITY OF BARRIE BENCHMARK #03120110016

No.	REVISION DESCRIPTION	DATE
1.	ISSUED FOR DRAFT PLAN APPROVAL	FEB. 4/22

ENGINEER STAMP

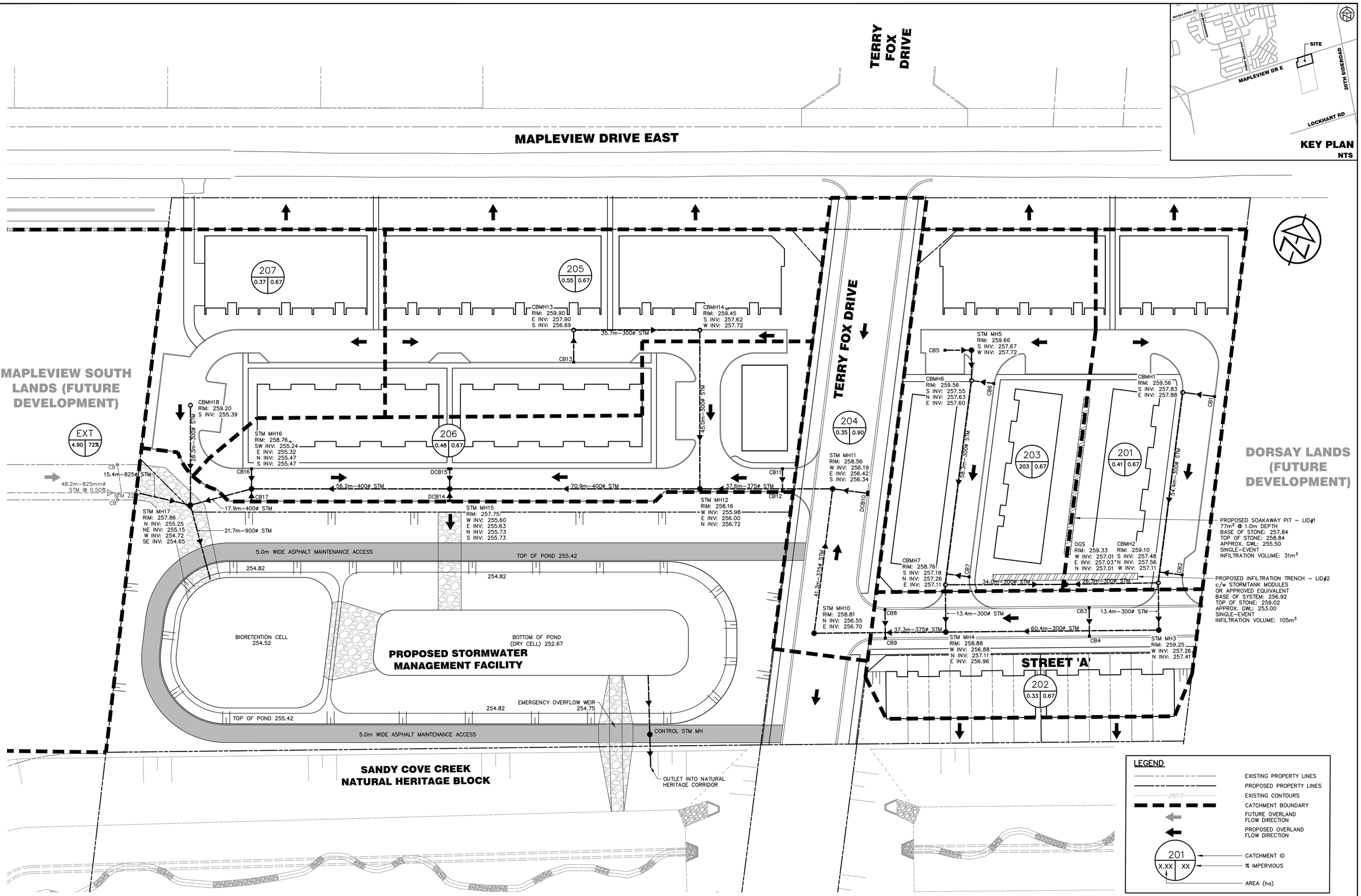
969, 979 & 989 MAPLEVIEW DRIVE EAST
PHASE 1
SANDY CREEK ESTATES INC.
CITY OF BARRIE

POST–DEVELOPMENT DRAINAGE PLAN

TATHAM ENGINEERING

DESIGN: LB	FILE: 420406–1	DWG:	**DP-1**
DRAWN: LMB	DATE: JANUARY 2022		
CHECK: NM	SCALE: 1:1,000		

Drawing Name: 420406–DP01.dwg, Plotted: Feb 04, 2022



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SITE PLAN SHOWN PREPARED BY HUNT DESIGN ASSOCIATES INC., MAY 2021.

BENCHMARKS

TBM#1 ELEV. 261.551 m
CITY OF BARRIE BENCHMARK #03120110020

TBM#2 ELEV. 268.852 m
CITY OF BARRIE BENCHMARK #03120110016

No.	REVISION DESCRIPTION	DATE
1.	ISSUED FOR DRAFT PLAN APPROVAL	FEB. 4/22

ENGINEER STAMP

969, 979 & 989 MAPLEVIEW DRIVE EAST
PHASE 1
SANDY CREEK ESTATES INC.
CITY OF BARRIE

STORM CATCHMENT PLAN

TATHAM ENGINEERING

DESIGN: LMB	FILE: 420406–1	DWG:	
DRAWN: LMB	DATE: JANUARY 2022	**STM–1**	
CHECK: NM	SCALE: 1:500		

Drawing Name: 420406–STM01.dwg, Plotted: Feb 04, 2022

CITY OF BARRIE
STORM SEWER DESIGN - 5 YEAR STORM

Q (cms) = (C*I*A)/360

I = A / (td + B)^c, td = Storm Duration (mins.)

C = Runoff Coefficient
I = Rainfall Intensity (mm/hr)
A = Area (Ha)

	5 Year	100 Year
A =	853.608	1426.408
B =	4.699	5.273
C =	0.766	0.759

Design Sheet: Draft Plan of Subdivision

File No.: 420406
Project: 969, 979 & 989 Mapleview Drive East, Barrie - Phase 1

Calculated By: JLM/LC
Checked by:
Date: 2022-02-01

Area ID #	Street	MAINTENANCE HOLE		INCREMENT			TOTAL AREA	TOTAL CA	TIME OF CONC.	TIME OF FLOW	RAINFALL INTENSITY (I)	TOTAL Q	MANNING'S ROUGHNESS COEFFICIENT	PIPE LENGTH	SLOPE	PIPE DIAMETER	FULL FLOW VELOCITY	FULL FLOW CAPACITY	ACTUAL VELOCITY
		FROM	TO	C	A	CA	Ha	CA	min	min	mm/hr	m³/s		m	%	mm	m/s	m³/s	m/s
201	Mixed-Use	CBMH1	STM MH3	0.67	0.41	0.275	0.410	0.275	10.00	1.01	108.92	0.083	0.013	67.8	0.5%	375	1.12	0.124	1.12
202	Street A	STM MH3	STM MH4	0.67	0.33	0.221	0.740	0.496	11.01	0.79	103.53	0.143	0.013	60.4	0.5%	450	1.27	0.202	1.27
203	Mixed-Use	STM MH5	STM MH4	0.67	0.54	0.362	0.540	0.362	10.00	1.06	108.92	0.109	0.013	71.7	0.5%	375	1.12	0.124	1.12
204	Terry Fox Drive	STM MH4	STM MH12	0.90	0.35	0.898	1.630	1.756	11.80	1.10	99.69	0.486	0.013	116.2	0.5%	750	1.78	0.787	1.76
205	Mixed-Use	CBMH13	STM MH12	0.67	0.55	0.369	0.550	0.369	10.00	1.22	108.92	0.111	0.013	82.5	0.5%	375	1.12	0.124	1.12
206	Mixed-Use	STM MH12	STM MH17	0.67	0.48	1.588	2.660	3.712	12.90	1.20	94.89	0.978	0.013	145.0	0.5%	900	2.01	1.280	2.01
207	Mixed-Use	CBMH18	STM MH17	0.67	0.33	0.221	0.330	0.221	10.00	0.49	108.92	0.067	0.013	28.3	0.5%	300	0.97	0.068	0.97
EXT (5)	*Mapleview Drive South*	*FUT STM MH*	*STM MH17*	*0.70*	*4.90*	*3.450*	*4.900*	*3.450*	*15.00*	*0.14*	*87.04*	*0.834*	*0.013*	*15.4*	*0.5%*	*825*	*1.90*	*1.015*	*1.90*
-	SWM POND	STM MH17	OUT	-	-	-	7.890	7.383	14.10	0.13	90.21	1.850	0.013	17.9	0.5%	1050	2.23	1.931	2.23

Notes:
1. Refer to Storm Drainage Plan (drawing STM-1) for catchment areas and pipe details.
2. Runoff coefficients calculated based on the City of Barrie engineering standards.
3. Runoff coefficient for Catchment 204 is more conservative than C=0.95 for roadways per City standards in order to account for landscaped area.
4. Time of Concentration calculated based on the Airport method.
5. *External flow data to be confirmed during detailed design.*

Proposed Conditions Hydrology

TATHAM ENGINEERING

PROJECT	969, 979 & 989 Mapleview Drive East Phase 1	FILE	420406
		DATE	02-03-2022
SUBJECT	Land Use Allocation - StandHyd	NAME	LB
		PAGE	1 OF 2

CATCHMENT 12-201

Land Use Category	Total Area	Total Impervious (TIMP)	Total Impervious Area	Directly Connected Impervious	Total Directly Connected Impervious Area	Pervious Area	Pervious CN	Pervious IA
	ha	%	ha	%	ha	ha		
Grass	0.39					0.39	69	5
Rooftop	0.53	100%	0.53	100%	0.53	0.00	69	5
Road Pavement	0.59	100%	0.59	100%	0.59	0.00	69	5
Hardscape	0.21	100%	0.21	50%	0.11	0.00	69	5
Total	**1.72**	**77%**	**1.33**	**71%**	**1.23**	**0.39**	**69**	**5**

CATCHMENT 12-202

Land Use Category	Total Area	Total Impervious (TIMP)	Total Impervious Area	Directly Connected Impervious	Total Directly Connected Impervious Area	Pervious Area	Pervious CN	Pervious IA
	ha	%	ha	%	ha	ha		
Grass	0.37					0.37	69	5
Rooftop	0.45	100%	0.45	59%	0.27	0.00	69	5
Road Pavement	0.29	100%	0.29	100%	0.29	0.00	69	5
Hardscape	0.16	100%	0.16	63%	0.10	0.00	69	5
Total	**1.27**	**71%**	**0.90**	**52%**	**66%**	**0.37**	**69**	**5**

CATCHMENT 12-203

Land Use Category	Total Area	Total Impervious (TIMP)	Total Impervious Area	Directly Connected Impervious	Total Directly Connected Impervious Area	Pervious Area	Pervious CN	Pervious IA
	ha	%	ha	%	ha	ha		
Grass	0.81					0.81	69	5
Water Surface	0.16	100%	0.16	100%	0.16	0.00	69	5
Sand	0.12	0%	0.00	100%	0.00	0.12	69	5
Hardscape	0.25	100%	0.25	100%	0.25	0.00	69	5
Total	**1.34**	**31%**	**0.41**	**31%**	**0.41**	**0.93**	**69**	**5**

TATHAM ENGINEERING

PROJECT	969, 979 & 989 Mapleview Drive East Phase 1	FILE	420406
		DATE	02-03-2022
SUBJECT	Land Use Allocation - StandHyd	NAME	LB
		PAGE	2 OF 2

CATCHMENT 12-204

Land Use Category	Total Area	Total Impervious (TIMP)	Total Impervious Area	Directly Connected Impervious	Total Directly Connected Impervious Area	Pervious Area	Pervious CN	Pervious IA
	ha	%	ha	%	ha	ha		
Grass	0.11					0.11	69	5
Road Pavement	0.04	100%	0.04	100%	0.04	0.00	69	5
Hardscape	0.01	100%	0.01	0%	0.00	0.00	69	5
Total	**0.15**	**29%**	**0.04**	**23%**	**0.04**	**0.11**	**69**	**5**

CATCHMENT 301 (MVS CATCHMENT 12-A + 12-C)

Land Use Category	Total Area	Total Impervious (TIMP)	Total Impervious Area	Directly Connected Impervious	Total Directly Connected Impervious Area	Pervious Area	Pervious CN	Pervious IA
	ha	%	ha	%	ha	ha		
	4.96	72%	3.57	17%	0.61	1.39	69	5
Total	**4.96**	**72%**	**3.57**	**12%**	**0.61**	**1.39**	**69**	**5**

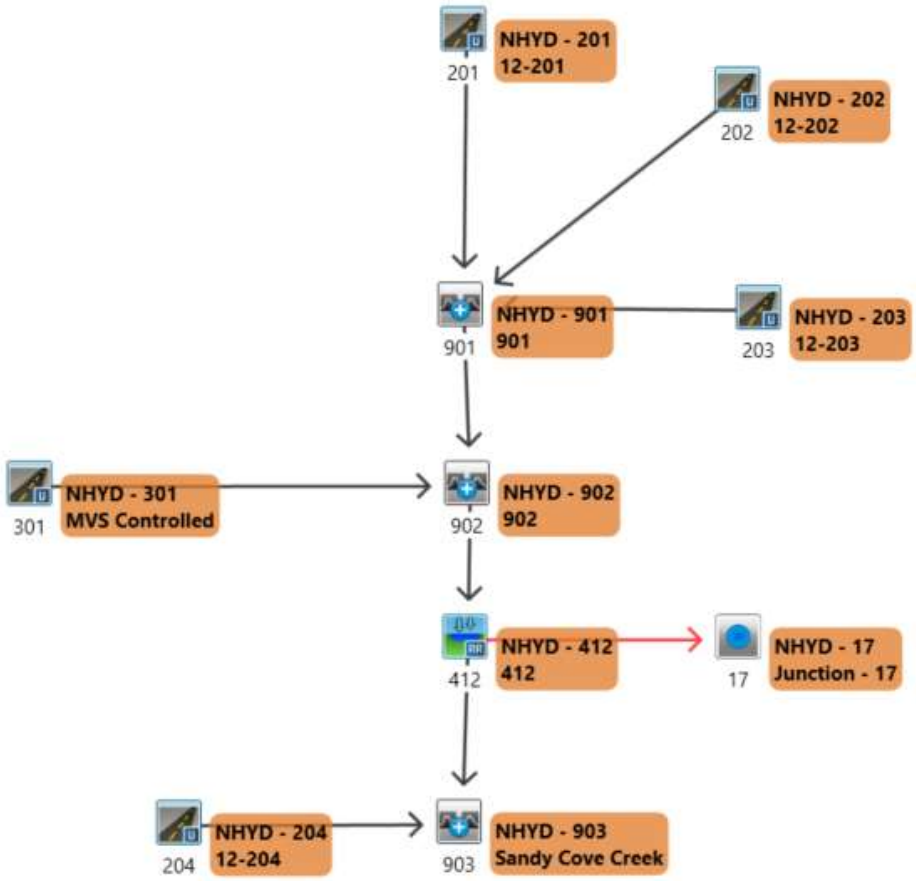
CATCHMENT 302 (MAPLEVIEW DRIVE EAST ROAD WIDENING)

Land Use Category	Total Area	Total Impervious (TIMP)	Total Impervious Area	Directly Connected Impervious	Total Directly Connected Impervious Area	Pervious Area	Pervious CN	Pervious IA
	ha	%	ha	%	ha	ha		
Road Widening	0.27	0%	0.00	0%	0.00	0.27	69	5
Total	**0.27**	**0%**	**0.00**	**0%**	**0.00**	**0.27**	**69**	**5**

SITE TOTAL

Land Use Category	Total Area	Total Impervious (TIMP)	Total Impervious Area	Directly Connected Impervious	Total Directly Connected Impervious Area	Pervious Area	Pervious CN	Pervious IA
	ha	%	ha	%	ha	ha		
Grass	1.67					1.67	69	5
Rooftop	0.98	100%	0.98		0.80	0.00	69	5
Road Pavement	0.92	100%	0.92		0.92	0.00	69	5
Water Surface	0.16	100%	0.16		0.16	0.00	69	5
Sand	0.12	0%	0.00		0.00	0.12	69	5
Hardscape	0.63	100%	0.63		0.46	0.01	69	5
Total	**4.48**	**60%**	**2.68**	**52%**	**2.33**	**1.80**	**69**	**5**

PROJECT	969, 979 & 989 Mapleview Drive East Phase 1	FILE	416437
		DATE	2022-02-03
SUBJECT	Proposed Conditions VO Model	NAME	LB
		PAGE	1 OF 1



NASHYD

ROUTE PIPE

DUHYD

STANDHYD

ROUTE CHANNEL

DIVERT HYD

ADDHYD

ROUTE RESERVOIR

```
================================================================================================================

       V    V   I    SSSSS  U   U    A    L             (v 6.2.2008)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\a03fb642-1fd6
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\a03fb642-1fd6


DATE: 02-02-2022                          TIME: 09:26:38

USER:

COMMENTS: _____________________________________________________


  **************************************
  ** SIMULATION : Run 19 - 2Y24H.STM           **
  **************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                15.0
    [ Ptot= 55.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\a6ea0dcc-3d44-45ef-8607-f44
    remark: 2Y24H.STM
*
 ** CALIB STANDHYD       0201  1  2.0    1.72    0.23 12.23  43.68 0.79   0.000
    [I%=71.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 55.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\a6ea0dcc-3d44-45ef-8607-f44
    remark: 2Y24H.STM
*
 ** CALIB STANDHYD       0202  1  2.0    1.27    0.14 12.23  38.80 0.71   0.000
    [I%=52.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 55.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\a6ea0dcc-3d44-45ef-8607-f44
    remark: 2Y24H.STM
*
 ** CALIB STANDHYD       0203  1  2.0    1.34    0.09 12.23  27.25 0.50   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0201+  0202]  0901  3  2.0    2.99    0.37 12.23  41.61  n/a   0.000
*
    ADD [  0901+  0203]  0901  1  2.0    4.33    0.45 12.23  37.16  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 55.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\a6ea0dcc-3d44-45ef-8607-f44
    remark: 2Y24H.STM
*
  * CALIB STANDHYD       0301  1  2.0    4.96    0.42 12.27  34.46 0.63   0.000
    [I%=12.0:S%= 2.00]
*
    ADD [  0301+  0901]  0902  3  2.0    9.29    0.86 12.27  35.72  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0412  1  2.0    9.29    0.02 20.30  32.53  n/a   0.000
    OVERFLOW:             0412  3  2.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 55.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\a6ea0dcc-3d44-45ef-8607-f44
    remark: 2Y24H.STM
*
  * CALIB STANDHYD       0204  1  2.0    0.15    0.01 12.23  24.92 0.45   0.000
    [I%=23.0:S%= 2.00]
*
    ADD [  0204+  0412]  0903  3  2.0    9.44    0.02 12.27  32.41  n/a   0.000
*
================================================================================================================

       V    V   I    SSSSS  U   U    A    L             (v 6.2.2008)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\1cb8de62-783d
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\1cb8de62-783d


DATE: 02-02-2022                          TIME: 09:26:38

USER:

COMMENTS: _____________________________________________________


  **************************************
  ** SIMULATION : Run 20 - 5Y24H.STM           **
  **************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                15.0
    [ Ptot= 76.01 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\2059c71d-85d7-4ad0-88f2-613
    remark: 5Y24H.STM
*
 ** CALIB STANDHYD       0201  1  2.0    1.72    0.33 12.23  62.51 0.82   0.000
    [I%=71.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 76.01 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\2059c71d-85d7-4ad0-88f2-613
    remark: 5Y24H.STM
*
 ** CALIB STANDHYD       0202  1  2.0    1.27    0.21 12.23  57.01 0.75   0.000
    [I%=52.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 76.01 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\2059c71d-85d7-4ad0-88f2-613
    remark: 5Y24H.STM
*
 ** CALIB STANDHYD       0203  1  2.0    1.34    0.14 12.23  42.04 0.55   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0201+  0202]  0901  3  2.0    2.99    0.54 12.23  60.18  n/a   0.000
*
    ADD [  0901+  0203]  0901  1  2.0    4.33    0.68 12.23  54.56  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 76.01 mm ]
```

```
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\2059c71d-85d7-4ad0-88f2-613
    remark: 5Y24H.STM
*
 *  CALIB STANDHYD       0301  1  2.0    4.96    0.72 12.27  53.01 0.70   0.000
    [I%=12.0:S%= 2.00]
*
    ADD [  0301+  0901]  0902  3  2.0    9.29    1.36 12.23  53.74  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0412  1  2.0    9.29    0.07 14.50  49.40  n/a   0.000
    OVERFLOW:            0412  3  2.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 76.01 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\2059c71d-85d7-4ad0-88f2-613
    remark: 5Y24H.STM
*
 *  CALIB STANDHYD       0204  1  2.0    0.15    0.01 12.23  39.43 0.52   0.000
    [I%=23.0:S%= 2.00]
*
    ADD [  0204+  0412]  0903  3  2.0    9.44    0.07 14.47  49.24  n/a   0.000
*
================================================================================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\8faddb88-bc7d
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\8faddb88-bc7d


DATE: 02-02-2022                          TIME: 09:26:38

USER:


COMMENTS: ________________________________________________________


  ************************************************
  ** SIMULATION : Run 21 - 10Y24H.STM           **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot= 89.94 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\209f1201-8fc6-4329-9d18-248
    remark: 10Y24H.STM
*
 ** CALIB STANDHYD       0201  1  2.0    1.72    0.39 12.23  75.29 0.84   0.000
    [I%=71.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 89.94 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\209f1201-8fc6-4329-9d18-248
    remark: 10Y24H.STM
*
 ** CALIB STANDHYD       0202  1  2.0    1.27    0.26 12.23  69.51 0.77   0.000
    [I%=52.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 89.94 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\209f1201-8fc6-4329-9d18-248
    remark: 10Y24H.STM
*
 ** CALIB STANDHYD       0203  1  2.0    1.34    0.18 12.23  52.57 0.58   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0201+  0202]  0901  3  2.0    2.99    0.65 12.23  72.83  n/a   0.000
*
    ADD [  0901+  0203]  0901  1  2.0    4.33    0.83 12.23  66.56  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 89.94 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\209f1201-8fc6-4329-9d18-248
    remark: 10Y24H.STM
*
 *  CALIB STANDHYD       0301  1  2.0    4.96    0.91 12.27  65.77 0.73   0.000
    [I%=12.0:S%= 2.00]
*
    ADD [  0301+  0901]  0902  3  2.0    9.29    1.71 12.23  66.14  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0412  1  2.0    9.29    0.13 13.30  61.51  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 89.94 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\209f1201-8fc6-4329-9d18-248
    remark: 10Y24H.STM
*
 *  CALIB STANDHYD       0204  1  2.0    0.15    0.02 12.23  49.84 0.55   0.000
    [I%=23.0:S%= 2.00]
*
    ADD [  0204+  0412]  0903  3  2.0    9.44    0.13 13.27  61.33  n/a   0.000
*
================================================================================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\f0db7ffb-2ec8
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\f0db7ffb-2ec8


DATE: 02-02-2022                          TIME: 09:26:39

USER:


COMMENTS: ________________________________________________________


  ************************************************
  ** SIMULATION : Run 22 - 25Y24H.STM           **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot=107.47 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\eeafbba4-251a-4a6c-906c-e6d
    remark: 25Y24H.STM
*
 ** CALIB STANDHYD       0201  1  2.0    1.72    0.48 12.23  91.61 0.85   0.000
    [I%=71.0:S%= 2.00]
*
    READ STORM                 15.0
```

```
    [ Ptot=107.47 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\eeafbba4-251a-4a6c-906c-e6d
    remark: 25Y24H.STM
*
 ** CALIB STANDHYD       0202  1  2.0    1.27    0.33 12.23  85.56 0.80   0.000
    [I%=52.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=107.47 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\eeafbba4-251a-4a6c-906c-e6d
    remark: 25Y24H.STM
*
 ** CALIB STANDHYD       0203  1  2.0    1.34    0.23 12.23  66.45 0.62   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0201+  0202]  0901  3  2.0    2.99    0.81 12.23  89.04  n/a   0.000
*
    ADD [  0901+  0203]  0901  1  2.0    4.33    1.04 12.23  82.05  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=107.47 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\eeafbba4-251a-4a6c-906c-e6d
    remark: 25Y24H.STM
*
 *  CALIB STANDHYD       0301  1  2.0    4.96    1.19 12.27  82.16 0.76   0.000
    [I%=12.0:S%= 2.00]
*
    ADD [  0301+  0901]  0902  3  2.0    9.29    2.21 12.23  82.11  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0412  1  2.0    9.29    0.22 13.00  77.23  n/a   0.000
    OVERFLOW:            0412  3  2.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=107.47 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\eeafbba4-251a-4a6c-906c-e6d
    remark: 25Y24H.STM
*
 *  CALIB STANDHYD       0204  1  2.0    0.15    0.03 12.23  63.61 0.59   0.000
    [I%=23.0:S%= 2.00]
*
    ADD [  0204+  0412]  0903  3  2.0    9.44    0.22 12.97  77.01  n/a   0.000
*
================================================================================================


       V    V   I    SSSSS  U   U    A    L             (v 6.2.2008)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\f2cb0fc6-049b
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\f2cb0fc6-049b


DATE: 02-02-2022                          TIME: 09:26:39

USER:


COMMENTS: _____________________________________________________


  ************************************************
  ** SIMULATION : Run 23 - 50Y24H.STM           **
  ************************************************

  W/E COMMAND             HYD ID   DT     AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min      ha   '  cms   hrs     mm          cms
```

```
      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot=120.63 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\757dba48-db96-4bd1-8f96-504
    remark: 50Y24H.STM
*
 ** CALIB STANDHYD       0201  1  2.0    1.72    0.55 12.23 103.98 0.86   0.000
    [I%=71.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=120.63 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\757dba48-db96-4bd1-8f96-504
    remark: 50Y24H.STM
*
 ** CALIB STANDHYD       0202  1  2.0    1.27    0.38 12.23  97.79 0.81   0.000
    [I%=52.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=120.63 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\757dba48-db96-4bd1-8f96-504
    remark: 50Y24H.STM
*
 ** CALIB STANDHYD       0203  1  2.0    1.34    0.27 12.23  77.23 0.64   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0201+  0202]  0901  3  2.0    2.99    0.92 12.23 101.35  n/a   0.000
*
    ADD [  0901+  0203]  0901  1  2.0    4.33    1.20 12.23  93.89  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=120.63 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\757dba48-db96-4bd1-8f96-504
    remark: 50Y24H.STM
*
 *  CALIB STANDHYD       0301  1  2.0    4.96    1.38 12.27  94.62 0.78   0.000
    [I%=12.0:S%= 2.00]
*
    ADD [  0301+  0901]  0902  3  2.0    9.29    2.55 12.23  94.28  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0412  1  2.0    9.29    0.28 12.93  89.24  n/a   0.000
    OVERFLOW:            0412  3  2.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=120.63 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\757dba48-db96-4bd1-8f96-504
    remark: 50Y24H.STM
*
 *  CALIB STANDHYD       0204  1  2.0    0.15    0.03 12.23  74.32 0.62   0.000
    [I%=23.0:S%= 2.00]
*
    ADD [  0204+  0412]  0903  3  2.0    9.44    0.29 12.83  89.00  n/a   0.000
*
================================================================================================


       V    V   I    SSSSS  U   U    A    L             (v 6.2.2008)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\dce3e786-e5c0
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\dce3e786-e5c0


DATE: 02-02-2022                          TIME: 09:26:39

USER:
```

```
COMMENTS: ____________________________________________________________

  ************************************************
  ** SIMULATION : Run 24 - 100Y24H.STM          **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot=133.60 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\cd310584-9e78-4ee0-8024-dff
    remark: 100Y24H.STM
*
 ** CALIB STANDHYD       0201  1  2.0    1.72    0.61 12.23 116.28 0.87   0.000
    [I%=71.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=133.60 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\cd310584-9e78-4ee0-8024-dff
    remark: 100Y24H.STM
*
 ** CALIB STANDHYD       0202  1  2.0    1.27    0.42 12.23 109.97 0.82   0.000
    [I%=52.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=133.60 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\cd310584-9e78-4ee0-8024-dff
    remark: 100Y24H.STM
*
 ** CALIB STANDHYD       0203  1  2.0    1.34    0.32 12.23  88.11 0.66   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0201+  0202]  0901  3  2.0    2.99    1.04 12.23 113.60  n/a   0.000
*
    ADD [  0901+  0203]  0901  1  2.0    4.33    1.36 12.23 105.71  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=133.60 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\cd310584-9e78-4ee0-8024-dff
    remark: 100Y24H.STM
*
  * CALIB STANDHYD       0301  1  2.0    4.96    1.57 12.27 107.02 0.80   0.000
    [I%=12.0:S%= 2.00]
*
    ADD [  0301+  0901]  0902  3  2.0    9.29    2.91 12.23 106.41  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0412  1  2.0    9.29    0.32 12.90 101.24  n/a   0.000
    OVERFLOW:            0412  3  2.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=133.60 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\cd310584-9e78-4ee0-8024-dff
    remark: 100Y24H.STM
*
  * CALIB STANDHYD       0204  1  2.0    0.15    0.04 12.23  85.16 0.64   0.000
    [I%=23.0:S%= 2.00]
*
    ADD [  0204+  0412]  0903  3  2.0    9.44    0.32 12.80 100.98  n/a   0.000
*
================================================================================================


       V    V   I    SSSSS  U   U    A    L             (v 6.2.2008)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\ba87fb11-d66a
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\ba87fb11-d66a

DATE: 02-02-2022                          TIME: 09:26:39

USER:

COMMENTS: ____________________________________________________________

  ************************************************
  ** SIMULATION : Run 25 - 25mm                 **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\d3084c52-ea18-46f2-aecc-361
    remark: 25MMCHI
*
 ** CALIB STANDHYD       0201  1  2.0    1.72    0.13  1.50  18.21 0.73   0.000
    [I%=71.0:S%= 2.00]
*
    READ STORM                 10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\d3084c52-ea18-46f2-aecc-361
    remark: 25MMCHI
*
 ** CALIB STANDHYD       0202  1  2.0    1.27    0.08  1.50  15.04 0.60   0.000
    [I%=52.0:S%= 2.00]
*
    READ STORM                 10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\d3084c52-ea18-46f2-aecc-361
    remark: 25MMCHI
*
 ** CALIB STANDHYD       0203  1  2.0    1.34    0.05  1.50   9.49 0.38   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0201+  0202]  0901  3  2.0    2.99    0.21  1.50  16.86  n/a   0.000
*
    ADD [  0901+  0203]  0901  1  2.0    4.33    0.25  1.50  14.58  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\d3084c52-ea18-46f2-aecc-361
    remark: 25MMCHI
*
  * CALIB STANDHYD       0301  1  2.0    4.96    0.12  1.70  10.97 0.44   0.000
    [I%=12.0:S%= 2.00]
*
    ADD [  0301+  0901]  0902  3  2.0    9.29    0.35  1.50  12.65  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0412  1  2.0    9.29    0.01  4.27  12.54  n/a   0.000
    OVERFLOW:            0412  3  2.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 25.02 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\71997214-abca-4335-9171-ab91c09f633a\d3084c52-ea18-46f2-aecc-361
    remark: 25MMCHI
*
  * CALIB STANDHYD       0204  1  2.0    0.15    0.00  1.50   7.95 0.32   0.000
    [I%=23.0:S%= 2.00]
*
    ADD [  0204+  0412]  0903  3  2.0    9.44    0.01  4.00  12.46  n/a   0.000
*
 FINISH

================================================================================================
```

```
================================================================================================================

       V    V   I    SSSSS  U   U    A    L             (v 6.2.2008)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\5bd025a0-5061
  Summary filename: C:\Users\LBuss\AppData\Local\Civica\VH5\2042467f-c6c6-4fbc-ad68-e29ef90dffc4\5bd025a0-5061


DATE: 02-02-2022                          TIME: 10:07:43

USER:


COMMENTS: _____________________________________________________


  ************************************************
  ** SIMULATION : Run 01 - Hazel                **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                12.0
    [ Ptot=212.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\e98151e6-7d39-4f8a-bfde-f3d3591be8ea\5ad99da5-29bf-4875-b1b6-e0b
    remark: HAZEL.STM
*
 *  CALIB STANDHYD       0204  1  2.0    0.15    0.02 10.00 179.90 0.85   0.000
    [I%=23.0:S%= 2.00]
*
    READ STORM                12.0
    [ Ptot=212.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\e98151e6-7d39-4f8a-bfde-f3d3591be8ea\5ad99da5-29bf-4875-b1b6-e0b
    remark: HAZEL.STM
*
 *  CALIB STANDHYD       0201  1  2.0    1.72    0.25 10.00 200.25 0.94   0.000
    [I%=46.0:S%= 2.00]
*
    READ STORM                12.0
    [ Ptot=212.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\e98151e6-7d39-4f8a-bfde-f3d3591be8ea\5ad99da5-29bf-4875-b1b6-e0b
    remark: HAZEL.STM
*
 *  CALIB STANDHYD       0202  1  2.0    1.27    0.18 10.00 197.71 0.93   0.000
    [I%=52.0:S%= 2.00]
*
    READ STORM                12.0
    [ Ptot=212.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\e98151e6-7d39-4f8a-bfde-f3d3591be8ea\5ad99da5-29bf-4875-b1b6-e0b
    remark: HAZEL.STM
*
 *  CALIB STANDHYD       0203  1  2.0    1.34    0.19 10.00 181.17 0.85   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0201+  0202]  0901  3  2.0    2.99    0.43 10.00 199.17  n/a   0.000
*
    ADD [  0901+  0203]  0901  1  2.0    4.33    0.62 10.00 193.60  n/a   0.000
*
    READ STORM                12.0
    [ Ptot=212.00 mm ]
    fname : C:\Users\LBuss\AppData\Local\Temp\e98151e6-7d39-4f8a-bfde-f3d3591be8ea\5ad99da5-29bf-4875-b1b6-e0b
    remark: HAZEL.STM
*
 *  CALIB STANDHYD       0301  1  2.0    4.96    0.72 10.00 197.85 0.93   0.000
    [I%=12.0:S%= 2.00]
*
    ADD [  0301+  0901]  0902  3  2.0    9.29    1.34 10.00 195.87  n/a   0.000
*
    ADD [  0204+  0902]  0903  3  2.0    9.44    1.36 10.00 195.62  n/a   0.000
*
 FINISH

================================================================================================================
```

Water Quantity Control

TATHAM ENGINEERING

PROJECT	969, 979, & 989 Mapleview Drive East - Phase 1	420406
		2022-02-03
SUBJECT	SWM Facility #12	LB
		1 5

Bioretention Cell

Bottom Elevation	252.97
Weir Sill Elevation	254.82
Max. Ponding Depth	1.85

Dry Cell

Bottom Elevation	252.67
Weir Sill Elevation	254.75
Active Storage Depth	2.08
Top of Pond Elevation	255.42

Extended Detention for Water Quality & Erosion Control

25 mm Runoff Volume	1037.00 (from VO)
25 mm Runoff Volume Elevation	253.20

		Areas						Volumes						
Elevation	Depth	Bioretention Cell (BC) Area	Dry Cell Area	Above 254.82	BC Avg. Area	Dry Cell Avg. Area	Above 254.82 Avg. Area	BC Ponding Volume	Accum. BRC Ponding Volume	Dry Cell Volume	Accum. Dry Cell Volume	Above 253.75 Volume	Accum. Volume Above 254.82	Total Available Storage Volume
m	m	m^2	m^2	m^2	m^2	m^2	m^2	m^3	m^3	m^3	m^3	m^3	m^3	m^3
252.67	0.00	**-**	**1619.00**	-	-	1619.00	-	-	-	-	-			-
252.77	0.10	-	1743.14	-	-	1681.07	-	-	-	168.11	168.11			168.11
252.87	0.20	-	1867.28	-	-	1805.21	-	-	-	180.52	348.63			348.63
252.97	0.30	-	1991.42	-	-	1929.35	-	-	-	192.93	541.56			541.56
253.07	0.40	-	2115.56	-	-	2053.49	-	-	-	205.35	746.91			746.91
253.17	0.50	-	2239.70	-	-	2177.63	-	-	-	217.76	964.67			964.67
253.20	0.53	-	2276.94	-	-	2258.32	-	-	-	67.75	1032.42			1032.42
253.27	0.60	-	2363.84	-	-	2301.77	-	-	-	230.18	1194.85			1194.85
253.37	0.70	-	2487.98	-	-	2425.91	-	-	-	242.59	1437.44			1437.44
253.47	0.80	-	2612.12	-	-	2550.05	-	-	-	255.00	1692.45			1692.45
253.57	0.90	-	2736.26	-	-	2674.19	-	-	-	267.42	1959.87			1959.87
253.67	1.00	-	2860.40	-		2798.33	-	-	-	279.83	2239.70			2239.70
253.77	1.10	-	2984.53	-		2922.47	-			292.25	2531.94			2531.94
253.79	1.12	-	3009.36	-		2996.95	-			59.94	2591.88			2591.88
253.87	1.20	-	3108.67	-		3046.60	-			304.66	2836.60			2836.60
253.97	1.30	-	3232.81	-		3170.74	-			317.07	3153.68			3153.68
254.07	1.40	-	3356.95	-		3294.88	-			329.49	3483.17			3483.17
254.17	1.50	-	3481.09	-		3419.02	-			341.90	3825.07			3825.07
254.27	1.60	-	3605.23	-	-	3543.16	-	-	-	354.32	4179.39			4179.39
254.37	1.70	-	3729.37	-	-	3667.30	-	-	-	366.73	4546.12			4546.12
254.47	1.80	-	3853.51	-	-	3791.44	-	-	-	379.14	4925.26			4925.26
254.52	1.85	**1458.00**	3915.58	-	1458.00	3884.55	-	-	-	194.23	5119.49			5119.49
254.57	1.90	1499.00	3977.65	-	1478.50	3946.62	-	29.57	29.57	197.33	5316.82			5346.39
254.67	2.00	1581.00	4101.79	-	1540.00	4039.72	-	61.60	91.17	403.97	5720.79			5811.96
254.77	2.10	1663.00	4225.93	-	1622.00	4163.86	-	64.88	156.05	416.39	6137.18			6293.23
254.82	**2.15**	**1704.00**	**4288.00**	**6054.00**	**1683.50**	**4256.97**	**6054.0**	**33.67**	**189.72**	**212.85**	**6350.03**	**-**	**-**	**6539.75**
254.87	2.20	-	-	6147.96	-	-	6101.0	-	-	-	-	305.05	305.05	6844.79
254.97	2.30	-	-	6335.89	-	-	6241.9	-	-	-	-	624.19	929.24	7468.99
255.07	2.40	-	-	6523.82	-	-	6429.9	-	-	-	-	642.99	1572.23	8111.97
255.17	2.50	-	-	6711.75	-	-	6617.8	-	-	-	-	661.78	2234.01	8773.75
255.27	2.60	-	-	6899.68	-	-	6805.7	-	-	-	-	680.57	2914.58	9454.32
255.37	2.70	-	-	7087.61	-	-	6993.6	-	-	-	-	699.36	3613.94	10153.69
255.42	**2.75**	**-**	**-**	**7181.57**	**-**	**-**	**7134.59**	**-**	**-**	**-**	**-**	**356.73**	**3970.67**	**10510.42**

TATHAM ENGINEERING

PROJECT	969, 979, & 989 Mapleview Drive East - Phase 1	FILE	420406
		DATE	02-03-2022
SUBJECT	Stage Discharge Table	NAME	LB
		PAGE	2 OF 5

Stage Discharge Table

Outlet Control #1		**Outlet Control #2**		Orifice Equation
Orifce Plate #1		Orifice Plate #2		Q = C x A x (2gH)^0.5
Orifice Dia. (mm)	95	Orifice Dia. (mm)	400	Q = flow rate (m^3)
Orifice Invert (m)	252.67	Orifice Invert (m)	253.79	C = constant
Orifice Area (m)	0.007	Orifice Area (m)	0.126	A = area of opening (m^2)
Orifice Coef.	0.63	Orifice Coef.	0.63	H = net head on the orifice
				g = Acceleration due to gravity

Emergency Control	
Emergency Spillway	
Length of Weir:	5.00 m
Weir Sill Elevation	254.70
Weir Constant	Varies
Sideslope:	10:1
Refer to Trapezoidal & Triangular Weir Control Calculation Sheet	

Elevation (masl)	Head (m)	Orifice Plate #1 Discharge (m^3/s)	Head (m)	Orifice Plate #2 Discharge (m^3/s)	Emergency Spillway (m^3/s)	Hydraulic Control	Total Discharge (m^3/s)
252.67	0.00	0.000	0.00	0.000	0.000	Orifice Plate #1	0.000
252.77	0.05	0.004	0.00	0.000	0.000	Orifice Plate #1	0.004
252.87	0.15	0.008	0.00	0.000	0.000	Orifice Plate #1	0.008
252.97	0.25	0.010	0.00	0.000	0.000	Orifice Plate #1	0.010
253.07	0.35	0.012	0.00	0.000	0.000	Orifice Plate #1	0.012
253.17	0.45	0.013	0.00	0.000	0.000	Orifice Plate #1	0.013
253.20	0.48	0.014	0.00	0.000	0.000	Orifice Plate #1	0.014
253.27	0.55	0.015	0.00	0.000	0.000	Orifice Plate #1	0.015
253.37	0.65	0.016	0.00	0.000	0.000	Orifice Plate #1	0.016
253.47	0.75	0.017	0.00	0.000	0.000	Orifice Plate #1	0.017
253.57	0.85	0.018	0.00	0.000	0.000	Orifice Plate #1	0.018
253.67	0.95	0.019	0.00	0.000	0.000	Orifice Plate #1	0.019
253.77	1.05	0.020	0.00	0.000	0.000	Orifice Plate #1	0.020
253.79	1.07	0.020	0.00	0.000	1.000	mergency Spillwa	0.020
253.87	1.15	0.021	0.00	0.006	0.000	Orifice Plate #1	0.027
253.97	1.25	0.022	0.00	0.030	0.000	Orifice Plate #2	0.053
254.07	1.35	0.023	0.08	0.069	0.000	Orifice Plate #2	0.092
254.17	1.45	0.024	0.18	0.112	0.000	Orifice Plate #2	0.136
254.27	1.55	0.025	0.28	0.155	0.000	Orifice Plate #2	0.180
254.37	1.65	0.025	0.38	0.194	0.000	Orifice Plate #2	0.219
254.47	1.75	0.026	0.48	0.243	0.000	Orifice Plate #2	0.269
254.52	1.80	0.027	0.53	0.255	0.000	Orifice Plate #2	0.282
254.57	1.85	0.027	0.58	0.267	0.000	Orifice Plate #2	0.294
254.67	1.95	0.028	0.68	0.289	0.000	Orifice Plate #2	0.317
254.77	2.05	0.028	0.78	0.310	0.000	Orifice Plate #2	0.338
254.82	2.10	0.029	0.83	0.319	0.000	Orifice Plate #2	0.348
254.87	2.15	0.029	0.88	0.329	0.000	Orifice Plate #2	0.358
254.97	2.25	0.030	0.98	0.347	0.000	Orifice Plate #2	0.377
255.07	2.35	0.030	1.08	0.364	0.000	Orifice Plate #2	0.395
255.17	2.45	0.031	1.18	0.381	0.000	Orifice Plate #2	0.412
255.27	2.55	0.032	1.28	0.397	0.000	Orifice Plate #2	0.428
255.37	2.65	0.032	1.38	0.412	0.000	Orifice Plate #2	0.444
255.42	2.70	0.033	1.43	0.419	0.000	Orifice Plate #2	0.452

Note: Values in shaded cells have been calculated using partially full orifice outlet control equations (Hydraulic Structure, C.D. Smith, University of Saskatchewan
Emergency Spillway Discharge Rates calculated using Weir Control equations for Trapezoidal and Rectangular Weir Equations (Hydraulic Structures, C.D. Smieth, University of Saskatchewan)

TATHAM ENGINEERING

PROJECT	969, 979, & 989 Mapleview Drive East - Phase 1	FILE	420406
		DATE	02-03-2022
SUBJECT	Stage-Storage-Discharge	NAME	LB
		PAGE	3 OF 5

Stage Storage Table

Elevation (masl)	Orifice Plate #1 Discharge (m^3/s)	Orifice Plate #2 Discharge (m^3/s)	Emergency Spillway (m^3/s)	Hydraulic Control	Total Discharge (m^3/s)	Total Storage (m^3)
252.67	0.000	0.000	0.000	Orifice Plate #1	0.000	-
252.77	0.004	0.000	0.000	Orifice Plate #1	0.004	0.017
252.87	0.008	0.000	0.000	Orifice Plate #1	0.008	0.035
252.97	0.010	0.000	0.000	Orifice Plate #1	0.010	0.054
253.07	0.012	0.000	0.000	Orifice Plate #1	0.012	0.075
253.17	0.013	0.000	0.000	Orifice Plate #1	0.013	0.096
253.20	0.014	0.000	0.000	Orifice Plate #1	0.014	0.103
253.27	0.015	0.000	0.000	Orifice Plate #1	0.015	0.119
253.37	0.016	0.000	0.000	Orifice Plate #1	0.016	0.144
253.47	0.017	0.000	0.000	Orifice Plate #1	0.017	0.169
253.57	0.018	0.000	0.000	Orifice Plate #1	0.018	0.196
253.67	0.019	0.000	0.000	Orifice Plate #1	0.019	0.224
253.77	0.020	0.000	0.000	Orifice Plate #1	0.020	0.253
253.79	0.021	0.006	0.000	Orifice Plate #1	0.027	0.259
253.87	0.021	0.006	0.000	Orifice Plate #1	0.027	0.284
253.97	0.022	0.030	0.000	Orifice Plate #2	0.053	0.315
254.07	0.023	0.069	0.000	Orifice Plate #2	0.092	0.348
254.17	0.024	0.112	0.000	Orifice Plate #2	0.136	0.383
254.27	0.025	0.155	0.000	Orifice Plate #2	0.180	0.418
254.37	0.025	0.194	0.000	Orifice Plate #2	0.219	0.455
254.47	0.026	0.243	0.000	Orifice Plate #2	0.269	0.493
254.52	0.027	0.255	0.000	Orifice Plate #2	0.282	0.512
254.57	0.027	0.267	0.000	Orifice Plate #2	0.294	0.535
254.67	0.028	0.289	0.000	Orifice Plate #2	0.317	0.581
254.77	0.028	0.310	0.000	Orifice Plate #2	0.338	0.629
254.82	0.029	0.319	0.000	Orifice Plate #2	0.348	0.654
254.87	0.029	0.329	0.000	Orifice Plate #2	0.358	0.684
254.97	0.030	0.347	0.000	Orifice Plate #2	0.377	0.747
255.07	0.030	0.364	0.000	Orifice Plate #2	0.395	0.811
255.17	0.031	0.381	0.000	Orifice Plate #2	0.412	0.877
255.27	0.032	0.397	0.000	Orifice Plate #2	0.428	0.945
255.37	0.032	0.412	0.000	Orifice Plate #2	0.444	1.015
255.42	0.033	0.419	0.000	Orifice Plate #2	0.452	1.051

TATHAM ENGINEERING	Project:	989, 979 and 989 Mapleview Drive East	Designed By:	LB
	File:	420406	Checked By:	NM
	Municipality:	City of Barrie	Date:	2022-03-02

Stormwater Pond Outlet Hydraulics - Orifice Plate #1

Orifice Plate = C x A x (2gH)^0.5 C= 0.63

Depth Increment m	(invert of Control) Min Elevation m	(Top of Pond) Max Elevation Max
0.1	252.67	256.07

Pipe Flowing Partially Full or full

Coefficient Metric = 1, Imperial=1.49	1
Pipe Diameter (m)	0.095
Mannings N Full	0.013
Pipe Slope (m/m)	
Elevation (m)	252.67
Inlet Type: 1= Projecting 2= Flush	2

Inlet Control (Smith) Projecting Inlet

MMF Model: y=(a*b+c*x^d)/(b+x^d)

Coefficient Data:

a =	1.68E-02
b =	1.77E+00
c =	3.06E+00
d =	2.27E+00

Inlet Control (Smith) Flush Inlet

MMF Model: y=(a*b+c*x^d)/(b+x^d)

Coefficient Data:

a =	-1.08E-03
b =	2.30E+00
c =	3.95E+00
d =	2.08E+00

Water Elevation m	Depth from Min. Elevation m	Pipe Partially Full Inlet Control Flow (Smith) m^3/s
252.67	0.00	
252.77	0.10	0.004
252.87	0.20	0.008
252.97	0.30	0.010
253.07	0.40	0.012
253.17	0.50	0.013
253.27	0.60	0.015
253.37	0.70	0.016
253.47	0.80	0.017
253.57	0.90	0.018
253.67	1.00	0.019
253.77	1.10	0.020
253.87	1.20	0.021

TATHAM ENGINEERING	Project:	989, 979 and 989 Mapleview Drive East	Designed By:	LB
	File:	420406	Checked By:	NM
	Municipality:	City of Barrie	Date:	2022-03-02

Stormwater Pond Outlet Hydraulics - Orifice Plate #2

Orifice Plate = C x A x (2gH)^0.5 C= 0.63

Depth Increment m	(invert of Control) Min Elevation m	(Top of Pond) Max Elevation Max
0.1	253.79	256.07

Pipe Flowing Partially Full or full

Coefficient Metric = 1, Imperial=1.49	1
Pipe Diameter (m)	0.4
Mannings N Full	0.013
Pipe Slope (m/m)	
Elevation (m)	253.79
Inlet Type: 1= Projecting 2= Flush	2

Inlet Control (Smith) Projecting Inlet

MMF Model: y=(a*b+c*x^d)/(b+x^d)

Coefficient Data:

a =	1.68E-02
b =	1.77E+00
c =	3.06E+00
d =	2.27E+00

Inlet Control (Smith) Flush Inlet

MMF Model: y=(a*b+c*x^d)/(b+x^d)

Coefficient Data:

a =	-1.08E-03
b =	2.30E+00
c =	3.95E+00
d =	2.08E+00

Water Elevation m	Depth from Min. Elevation m	Pipe Partially Full Inlet Control Flow (Smith) m^3/s
253.79	0.00	
253.87	0.10	0.006
253.97	0.20	0.030
254.07	0.30	0.069
254.17	0.40	0.112
254.27	0.50	0.155
254.37	0.60	0.194
254.47	0.70	0.243
254.57	0.80	0.267
254.67	0.90	0.289
254.77	1.00	0.310
254.87	1.10	0.329
254.97	1.20	0.347

```
************************************
** SIMULATION:Run 19 - 2Y24H.STM **
************************************
--------------------
| RESERVOIR(  0412)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  2.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1360     0.3830
                         0.0040     0.0170   |   0.1800     0.4180
                         0.0100     0.0540   |   0.2190     0.4550
                         0.0130     0.0960   |   0.2820     0.5120
                         0.0150     0.1190   |   0.2940     0.5350
                         0.0190     0.2240   |   0.3170     0.5810
                         0.0200     0.2530   |   0.3340     0.6200
                         0.0270     0.2590   |   0.5040     0.6540
                         0.0530     0.3150   |   2.4540     0.8110
                         0.0920     0.3480   |   9.1920     1.0510

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0902)      9.290     0.856     12.27      35.72
   OUTFLOW: ID= 1 (  0412)      9.290     0.020     20.30      32.53
   OVERFLOW:ID= 3 (  0003)      0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.29
                  TIME SHIFT OF PEAK FLOW          (min)=482.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2425

--------------------------------------------------------------------------------
************************************
** SIMULATION:Run 20 - 5Y24H.STM **
************************************
--------------------
| RESERVOIR(  0412)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  2.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1360     0.3830
                         0.0040     0.0170   |   0.1800     0.4180
                         0.0100     0.0540   |   0.2190     0.4550
                         0.0130     0.0960   |   0.2820     0.5120
                         0.0150     0.1190   |   0.2940     0.5350
                         0.0190     0.2240   |   0.3170     0.5810
                         0.0200     0.2530   |   0.3340     0.6200
                         0.0270     0.2590   |   0.5040     0.6540
                         0.0530     0.3150   |   2.4540     0.8110
                         0.0920     0.3480   |   9.1920     1.0510

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0902)      9.290     1.364     12.23      53.74
   OUTFLOW: ID= 1 (  0412)      9.290     0.069     14.50      49.40
   OVERFLOW:ID= 3 (  0003)      0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.09
                  TIME SHIFT OF PEAK FLOW          (min)=136.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3288

--------------------------------------------------------------------------------
************************************
** SIMULATION:Run 21 - 10Y24H.STM **
************************************
--------------------
| RESERVOIR(  0412)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  2.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1360     0.3830
                         0.0040     0.0170   |   0.1800     0.4180
                         0.0100     0.0540   |   0.2190     0.4550
                         0.0130     0.0960   |   0.2820     0.5120
                         0.0150     0.1190   |   0.2940     0.5350
                         0.0190     0.2240   |   0.3170     0.5810
                         0.0200     0.2530   |   0.3340     0.6200
                         0.0270     0.2590   |   0.5040     0.6540
                         0.0530     0.3150   |   2.4540     0.8110
                         0.0920     0.3480   |   9.1920     1.0510

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0902)      9.290     1.707     12.23      66.14
   OUTFLOW: ID= 1 (  0412)      9.290     0.132     13.30      61.51
   OVERFLOW:ID= 3 (  0003)      0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.73
                  TIME SHIFT OF PEAK FLOW          (min)= 64.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3799

--------------------------------------------------------------------------------
************************************
** SIMULATION:Run 22 - 25Y24H.STM **
************************************
--------------------
| RESERVOIR(  0412)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  2.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1360     0.3830
                         0.0040     0.0170   |   0.1800     0.4180
                         0.0100     0.0540   |   0.2190     0.4550
                         0.0130     0.0960   |   0.2820     0.5120
                         0.0150     0.1190   |   0.2940     0.5350
                         0.0190     0.2240   |   0.3170     0.5810
                         0.0200     0.2530   |   0.3340     0.6200
                         0.0270     0.2590   |   0.5040     0.6540
                         0.0530     0.3150   |   2.4540     0.8110
                         0.0920     0.3480   |   9.1920     1.0510

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0902)      9.290     2.205     12.23      82.11
   OUTFLOW: ID= 1 (  0412)      9.290     0.218     13.00      77.23
   OVERFLOW:ID= 3 (  0003)      0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.87
                  TIME SHIFT OF PEAK FLOW          (min)= 46.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4537

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************************************
** SIMULATION:Run 23 - 50Y24H.STM **
************************************
--------------------
| RESERVOIR(  0412)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  2.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1360     0.3830
                         0.0040     0.0170   |   0.1800     0.4180
                         0.0100     0.0540   |   0.2190     0.4550
                         0.0130     0.0960   |   0.2820     0.5120
                         0.0150     0.1190   |   0.2940     0.5350
                         0.0190     0.2240   |   0.3170     0.5810
                         0.0200     0.2530   |   0.3340     0.6200
                         0.0270     0.2590   |   0.5040     0.6540
                         0.0530     0.3150   |   2.4540     0.8110
                         0.0920     0.3480   |   9.1920     1.0510

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0902)      9.290     2.551     12.23      94.28
   OUTFLOW: ID= 1 (  0412)      9.290     0.283     12.93      89.24
   OVERFLOW:ID= 3 (  0003)      0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.08
                  TIME SHIFT OF PEAK FLOW          (min)= 42.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.5132
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**************************************
** SIMULATION:Run 24 - 100Y24H.STM **
**************************************
--------------------
| RESERVOIR(  0412)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  2.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1360      0.3830
                          0.0040     0.0170   |   0.1800      0.4180
                          0.0100     0.0540   |   0.2190      0.4550
                          0.0130     0.0960   |   0.2820      0.5120
                          0.0150     0.1190   |   0.2940      0.5350
                          0.0190     0.2240   |   0.3170      0.5810
                          0.0200     0.2530   |   0.3340      0.6200
                          0.0270     0.2590   |   0.5040      0.6540
                          0.0530     0.3150   |   2.4540      0.8110
                          0.0920     0.3480   |   9.1920      1.0510

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0902)      9.290     2.909     12.23     106.41
   OUTFLOW: ID= 1 (  0412)      9.290     0.315     12.90     101.24
   OVERFLOW:ID= 3 (  0003)      0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.84
                  TIME SHIFT OF PEAK FLOW         (min)= 40.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.5780

--------------------------------------------------------------------------------
*******************************
** SIMULATION:Run 25 - 25mm   **
*******************************
--------------------
| RESERVOIR(  0412)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  2.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1360      0.3830
                          0.0040     0.0170   |   0.1800      0.4180
                          0.0100     0.0540   |   0.2190      0.4550
                          0.0130     0.0960   |   0.2820      0.5120
                          0.0150     0.1190   |   0.2940      0.5350
                          0.0190     0.2240   |   0.3170      0.5810
                          0.0200     0.2530   |   0.3340      0.6200
                          0.0270     0.2590   |   0.5040      0.6540
                          0.0530     0.3150   |   2.4540      0.8110
                          0.0920     0.3480   |   9.1920      1.0510

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0902)      9.290     0.346      1.50      12.65
   OUTFLOW: ID= 1 (  0412)      9.290     0.014      4.27      12.54
   OVERFLOW:ID= 3 (  0003)      0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.95
                  TIME SHIFT OF PEAK FLOW         (min)=166.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1037

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TATHAM ENGINEERING

PROJECT	969, 979 & 989 Mapleview Drive East - Phase 1	FILE	420406
		DATE	02-03-2022
SUBJECT	Overflow Weir	NAME	LB
		PAGE	1 OF 1

Trapezoidal Broad Crested Weir

Source: Hydraulic Structures, C.D.Smith, University of Saskatchewan

Trapezoidal Weir

The trapezoidal weir is a combination of the rectangular weir and the triangular weir

Enter

W	Weir Bottom Width (m)	6
H	Head (m)	0
L	Weir Downstream Length	#
S	Side Slope (horizontal):1	#

Rectangular Weir $Q = CWH^{3/2}$

H/L 0.049

C 1.5127

Result

Q Rectangular Weir Flow (m^3/s) 2.8537

Triangular Weir $Q = CH^{5/2}\tan(\theta/2)$

Notch Angle (one side) 84.289 degrees

Notch Angle (one side) 1.4711 radians

$\tan(\theta/2)$ ####

Triangular H/L 0.049

C 1.0662

Result

Q Triangular Wei Flow (m^3/s) 1.792

Total Rectangular + Triangular Weir

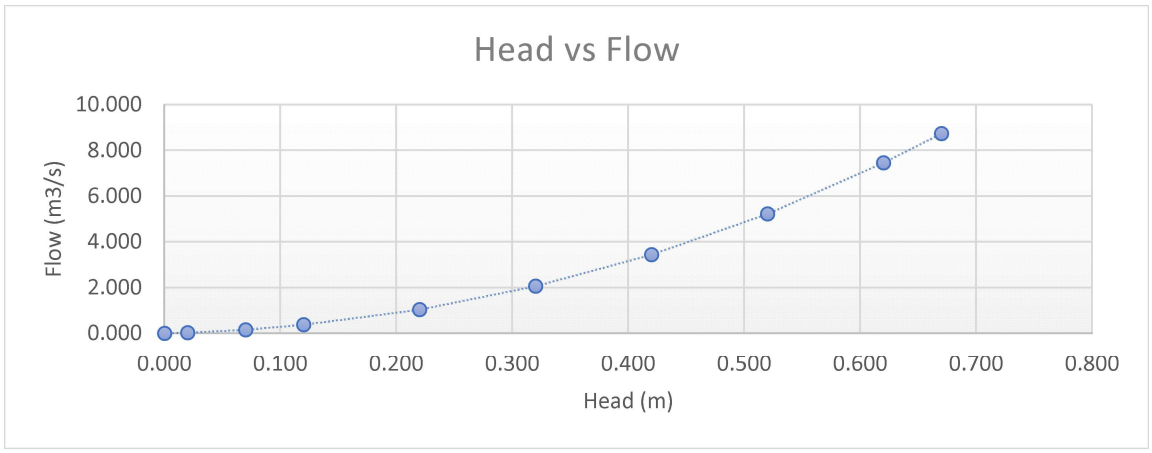
Q Total Flow (m^3/s) **4.6457**

Variable Head Spreadsheet

W	5.5
L	10
S	10
Angle	1.471
$\tan(\theta/2)$	10.000

	Rectangle	Triangle
a	-1.04E+04	-1.01E-05
b	3.42E+06	1.44E+02
c	2.13E+06	1.15E+02
d	-2.35E+05	-4.77E+00

H	H/L	C Rectangle	C Triangle	Q Rectangle	Q Triangle	Total Q
0.000	0.000	1.400	1.050	0.000	0.000	0.000
0.020	0.002	1.400	1.050	0.022	0.001	0.022
0.070	0.007	1.400	1.050	0.143	0.014	0.156
0.120	0.012	1.400	1.050	0.320	0.052	0.372
0.220	0.022	1.400	1.050	0.795	0.238	1.033
0.320	0.032	1.457	1.050	1.450	0.608	2.059
0.420	0.042	1.495	1.050	2.238	1.200	3.438
0.520	0.052	1.519	1.076	3.133	2.098	5.230
0.620	0.062	1.536	1.102	4.124	3.335	7.459
0.670	0.067	1.543	1.112	4.653	4.087	8.740


Head vs Flow
10.000
8.000
6.000
4.000
2.000
0.000
Flow (m3/s)
0.000
0.100
0.200
0.300
0.400
0.500
0.600
0.700
0.800
Head (m)

****
** SIMULATION:Run 01 - Hazel **
****

Hazel - Controlled

| RESERVOIR(0412)|
| IN= 2---> OUT= 1 |
| DT= 2.0 min |

OVERFLOW IS ON

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.1360	0.3830
0.0040	0.0170	0.1800	0.4180
0.0100	0.0540	0.2190	0.4550
0.0130	0.0960	0.2820	0.5120
0.0150	0.1190	0.2940	0.5350
0.0190	0.2240	0.3170	0.5810
0.0200	0.2530	0.3340	0.6200
0.0270	0.2590	0.5040	0.6540
0.0530	0.3150	2.4540	0.8110
0.0920	0.3480	9.1920	1.0510

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2	(0902)	9.290	1.343	10.00	195.87
OUTFLOW: ID= 1	(0412)	9.290	1.246	10.10	192.66
OVERFLOW:ID= 3	(0003)	0.000	0.000	0.00	0.00

TOTAL NUMBER OF SIMULATION OVERFLOW =   0
CUMULATIVE TIME OF OVERFLOW (HOURS) = 0.00
PERCENTAGE OF TIME OVERFLOWING   (%) = 0.00

PEAK   FLOW   REDUCTION [Qout/Qin](%)= 92.79
TIME SHIFT OF PEAK FLOW   (min)= 6.00
MAXIMUM STORAGE   USED   (ha.m.)= 0.7138

Water Quality Requirements

Project Details

Phase 1 of 969, 979, 989 Mapleview Drive East	420406

Prepared By

LB	02-01-2022

Water Quality Sizing Criteria

Methodology & Data Source	Volumetric water quality criteria as presented in Table 3.2 in Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning & Design Manual (SWMPDM) March 2003.

Contributing Catchments

Catchment ID	Area (ha)	Impervious (%)
12-201	1.72	77.00%
12-202	1.27	71.00%
12-203	1.34	31.00%
301	4.96	72.00%
Total	**9.29**	**66.9%**

Treatment Method Details

SWM Facility Type	Dry Pond
Target Treatment Level	Basic Level
Treatment Percentage	60%

Treatment

Water Quality Storage Requirement	1,734	m^3
Extended Detention Volume	1,734	m^3
Permanent Pool Volume Required	-	m^3
25 mm Storm Runoff Depth	13	mm
25 mm Storm Runoff Volume	1,175	m^3
Required Extended Detention Volume	1,734	m^3
Erosion Control Storage Required	-	m^3

Permanent Pool Volume Provided	-	**Provided** >	**Required**
Extended Detention Storage Provided	2,591	**Provided** >	**Required**
Active Storage Provided		**Provided** =	**Required**

TATHAM ENGINEERING

PROJECT	Phase 1 of 969, 979 and 989 Mapleview Drive East	FILE	420406
		DATE	2022-02-01
SUBJECT	Orifice Drawdown Time - 25 mm SWMF#12	DESIGNED	LB
		CHECKED	NHF

Drawdown Time, $t = \frac{2 A_p}{C A_o (2g)^{0.5}} (h_1^{0.5} - h_2^{0.5})$

where:
- t = drawdown time (seconds)
- A_p = surface area of pond (m^2)
- c = discharge coefficient
- A_o = cross-sectional area of orifices (m^2)
- g = gravitational acceleration constant (9.81 m/s^2)
- h_1 = starting water elevation above the orifice (m)
- h_2 = ending water elevation above the orifice (m)

where:

A_p =	1948	m^2
c =	0.63	
A_o =	0.007	m^2
g =	9.81	m/s^2
h_1 =	0.44	
h_2 =	0.00	

t = 129906 seconds

t = 36.09 hours

Notes

Extended detention volume and corresponding elevation determined from MECP Quality Storage Sheet

Orifice Diameter	=	95	mm
Extended Detention	=	253.20	mm
Orifice Obvert	=	252.77	mm

Q = 0.013 m^3/s

Water Quality Control

TATHAM ENGINEERING

PROJECT	Phase 1 of 969, 979 and 989 Mapleview Drive East	FILE	420406
		DATE	02-01-2022
SUBJECT	Water Quality - Treatment Train Calculation	NAME	LB
		PAGE	1 OF 2

Water Quality Treatment Train Calculation

Site Area

Drainage Area to SWM #12: 4.33 ha Imperviousness of Drainage Area to Controls= 67%

Device		Target Total Suspended Solids (TSS) Removal
Primary Treatment	Bioretention Cell	75%
Secondary Treatment	Dry Pond	60%

Note: Proposed Bioretention cell to be comprised of media strata in accordance with the Sustainable Technologies Evaluation Program (STEP) Low Impact Development SWM Planning and Design Guide

$$\boldsymbol{TSS\ Removal} = \ (\mathbf{1} - ((\mathbf{1} - \boldsymbol{R_P}) * (\mathbf{1} - \boldsymbol{R_S}))$$

where:

R_P = % TSS Removal provided by Primary Treatment Strategy

R_S = % TSS Removal provided by Secondary Treatment Strategy

TSS Removal Provided By Controls = 90% %

Water Quality Treatment Train Calculation

External Drainage Area

Drainage Area to SWM #12: 4.96 ha Imperviousness of Drainage Area to Controls= 72%

Device		Target Total Suspended Solids (TSS) Removal
Primary Treatment	Bioretention Cell	75%
Secondary Treatment	Dry Pond	60%

Note: Proposed Bioretention cell to be comprised of media strata in accordance with the Sustainable Technologies Evaluation Program (STEP) Low Impact Development SWM Planning and Design Guide

$$\boldsymbol{TSS\ Removal} = \ (\mathbf{1} - ((\mathbf{1} - \boldsymbol{R_P}) * (\mathbf{1} - \boldsymbol{R_S}))$$

where:

R_P = % TSS Removal provided by Primary Treatment Strategy

R_S = % TSS Removal provided by Secondary Treatment Strategy

TSS Removal Provided By Controls = 90% %

Runoff Volume Control

TATHAM ENGINEERING

PROJECT	969, 979 & 989 Mapleview Drive East Phase 1	FILE	420406
		DATE	02-03-2022
SUBJECT	Runoff Volume Requirements	NAME	LB
		PAGE	1 OF 2

CATCHMENT 12-201									
Land Use Category	Total Area	Total Impervious Area	Area Conveyed to LID Practice	25 mm Volume Target	12.5 mm Volume Target	5 mm Volume Target	Volume Controlled by Feature	Type of Control	Equiv. Rainfall Depth
	ha	ha	ha	m^3	m^3	m^3	m^3		mm
Impervious	1.33	1.33	2.00	333	166	67			
Pervious	0.39			(Not Contributed towards Volume Control Requirements)				Filtr.	
Total	**1.72**	**1.33**	**2.00**	**333**	**166**	**67**	**0**		**0.0**

CATCHMENT 12-202									
Land Use Category	Total Area	Total Impervious Area	Area Conveyed to LID Practice	25 mm Volume Target	12.5 mm Volume Target	5 mm Volume Target	Volume Controlled by Feature	Type of Control	Equiv. Rainfall Depth
	ha	ha	ha	m^3	m^3	m^3	m^3		mm
Impervious	0.90	0.90	0.38	225	113	45	136		**15.1**
Pervious	0.37			(Not Contributed towards Volume Control Requirements)				Infil.	
Total	**1.27**	**0.90**	**0.38**	**225**	**113**	**45**	**136**		**15.1**

CATCHMENT 12-203									
Land Use Category	Total Area	Total Impervious Area	Area Conveyed to LID Practice	25 mm Volume Target	12.5 mm Volume Target	5 mm Volume Target	Volume Controlled by Feature	Type of Control	Equiv. Rainfall Depth
	ha	ha	ha	m^3	m^3	m^3	m^3		mm
Impervious	0.41	0.41	0.00	103	51	21			
Pervious	0.93			(Not Contributed towards Volume Control Requirements)				Filtr.	
Total	**1.34**	**0.41**	**0.00**	**103**	**51**	**21**	**0**		**0.0**

CATCHMENT 12-204									
Land Use Category	Total Area	Total Impervious Area	Area Conveyed to LID Practice	25 mm Volume Target	12.5 mm Volume Target	5 mm Volume Target	Volume Controlled by Feature	Type of Control	Equiv. Rainfall Depth
	ha	ha	ha	m^3	m^3	m^3	m^3		mm
Impervious	0.04	0.04	0.00	10	5	2			
Pervious	0.11			(Not Contributed towards Volume Control Requirements)				Filtr.	
Total	**0.15**	**0.04**	**0.00**	**10**	**5**	**2**	**0**		**0.0**

TATHAM ENGINEERING

PROJECT	969, 979 & 989 Mapleview Drive East Phase 1	FILE	420406
		DATE	02-03-2022
SUBJECT	Runoff Volume Requirements	NAME	LB
		PAGE	2 OF 2

CATCHMENT 301

Land Use Category	Total Area	Total Impervious Area	Area Conveyed to LID Practice	25 mm Volume Target	12.5 mm Volume Target	5 mm Volume Target	Volume Controlled by Feature	Type of Control	Equiv. Rainfall Depth
	ha	ha	ha	m^3	m^3	m^3	m^3		mm
Impervious	3.57	3.57	0.00	893	446	179			
Pervious	1.39			(Not Contributed towards Volume Control Requirements)					
Total	**4.96**	**3.57**	**0.00**	**893**	**446**	**179**	**0**		**0.0**

CATCHMENT 302

Land Use Category	Total Area	Total Impervious Area	Area Conveyed to LID Practice	25 mm Volume Target	12.5 mm Volume Target	5 mm Volume Target	Volume Controlled by Feature	Type of Control	Equiv. Rainfall Depth
	ha	ha	ha	m^3	m^3	m^3	m^3		mm
Impervious	0.00	0.00	0.00	0	0	0			
Pervious	0.27			(Not Contributed towards Volume Control Requirements)					
Total	**0.27**	**0.00**	**0.00**	**0**	**0**	**0**	**0**		

SITE TOTAL - to be Controlled

Land Use Category	Total Area	Total Impervious Area	Area Conveyed to LID Practice	25 mm Volume Target	12.5 mm Volume Target	5 mm Volume Target	Volume Controlled by Feature	Type of Control	Equiv. Rainfall Depth
	ha	ha	ha	m^3	m^3	m^3	m^3		mm
Impervious	2.68	2.68	0.00	670	335	134	670		25.0
Pervious	1.80			(Not Contributed towards Volume Control Requirements)				Filt. & Infil.	
Total	**4.48**	**2.68**	**0.00**	**670**	**335**	**134**	**670**		**25.0**

Phosphorous Mitigation

TATHAM ENGINEERING

PROJECT	969, 979 & 989 Mapleview Drive East Phase 1	FILE	420406
		DATE	2022-02-06
SUBJECT	Phosphorus Budget Assessment	DESIGNED	LB
		CHECKED	NM

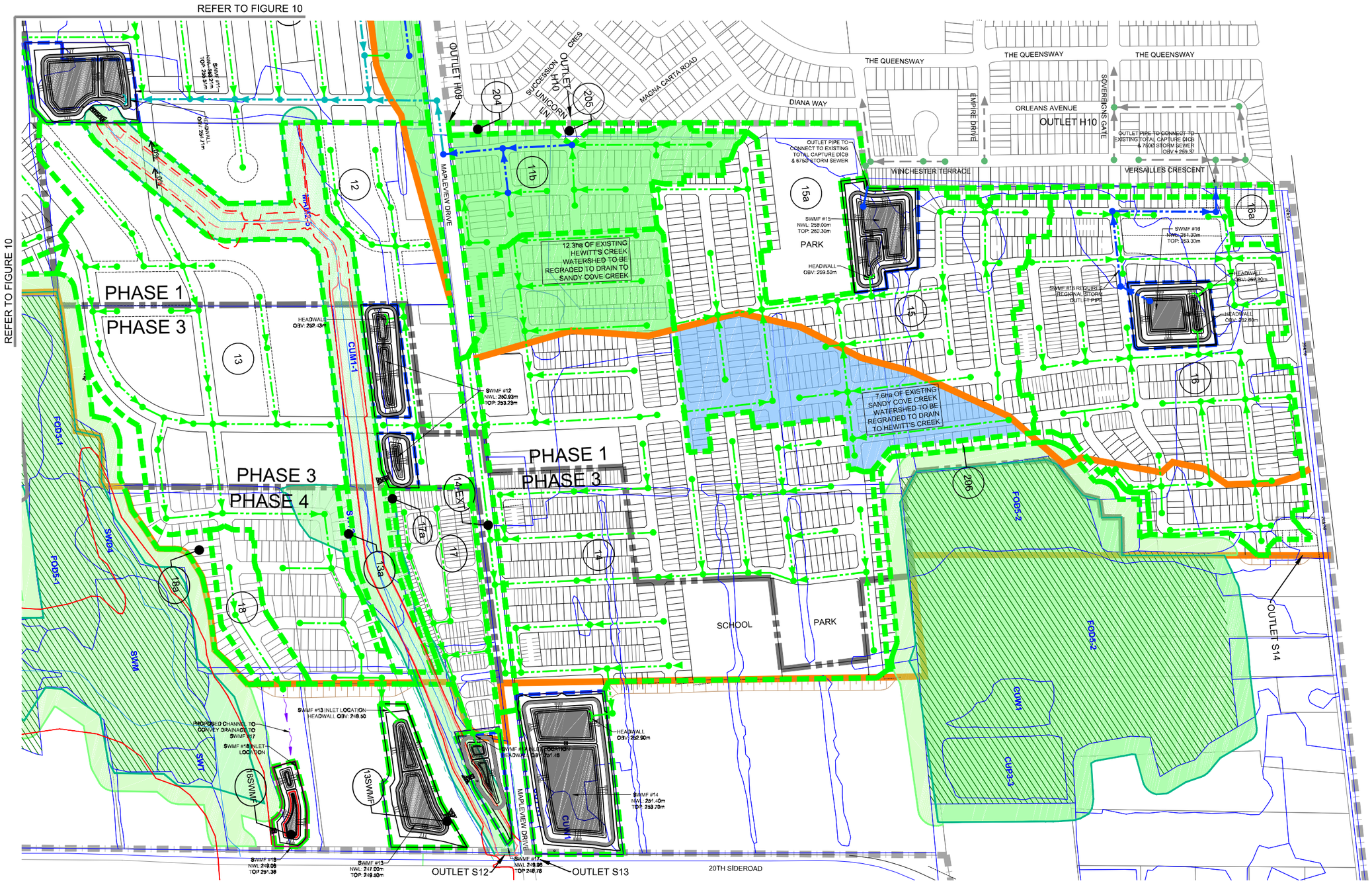
Phosphorus Loading

		Proposed	
LAND USE CATEGORY	Future Phosphorous Loading Rate (kg/ha/year)	Area (ha)	Phosphorous Load (kg/year)
Cropland	0.19	0.00	0.00
Hay-Pasture	0.07	0.00	0.00
Turf -Sod	0.12	1.95	0.23
High Intensity Development - C/I	1.82	0.00	0.00
High Intensity Development - R	1.32	1.55	2.05
Low Intensity Development	0.13	0.98	0.13
Quarry	0.08	0.00	0.00
Unpaved Road	0.83	0.00	0.00
Forest	0.05	0.00	0.00
Transition	0.06	0.00	0.00
Wetland	0.05	0.00	0.00
Open Water	0.26	0.00	0.00
Total		4.48	2.41

Controls

	Removal Efficiency (%)			Proposed	
Area contributing to Infiltration control	Infiltration LID	Bioretention Cell	Dry Pond	Area (ha)	Phosphorous Load (kg/year)
Low Intensity Development (to LID)	60%	-	-	0.34	0.02
High Intensity Development - Residential (to LID)	60%	-	-	0.24	0.13
Turf-Sod (to LID)	60%	-	-	0.37	0.02
Low Intensity Development (Rooftop)	-	25%	20%	0.64	0.05
Low Intensity Development (SWM Block)	-	25%	20%	1.34	0.10
High Intensity Development - Residential	-	25%	20%	1.02	0.81
Turf-Sod (excludes SWM Block & Turf to LID)	-	25%	20%	0.38	0.03
Remaining Areas					
Turf-Sod				0.11	0.01
High Intensity Development - Residential				0.04	0.03
Total Phosphorous pre - mitigation					2.41
Total Phosphorous post - mitigation					1.19

Excerpts from SIS



LEGEND

- NHS LIMITS
- NHS BUFFER LIMITS
- 100 YEAR CAPTURE AREA
- 2031 PHASE LIMITS
- EXISTING 100 YR FLOOD LIMITS
- EXISTING REGIONAL FLOOD LIMITS
- PROPOSED 100 YR FLOOD LIMITS
- PROPOSED REGIONAL FLOOD LIMITS
- PROPOSED DRAINAGE BOUNDARY
- ORIGINAL WATERSHED BOUNDARY

DASHED FLOOD LINES ARE APPROXIMATE ONLY, BASED ON INTERPOLATED DATA BETWEEN FINGERLAKES AND 1091369 ONTARIO INC. DETAILED TOPOGRAPHIC DATA. FLOODLINES ARE SUBJECT TO CHANGE BASED ON ADDITION OF DETAILED TOPOGRAPHIC SURVEY.

FLOW DIRECTION

STORM SEWER SYSTEM

- 100 YR CAPTURE SEWER, MANHOLE
- 100YR CONVEYANCE SYSTEM WITH 5YR CAPTURE
- 5 YR CAPTURE SEWER, MANHOLE
- EXISTING STORM SEWER, MANHOLE

0 40 80 160 240 320 Metres

NOTE: "SCALE ONLY VALID FOR 24" x 36" SIZED PLOTS"

BURNSIDE

Client: HEWITT'S CREEK LANDOWNERS GROUP INC.

Figure Title: HEWITT'S SECONDARY PLAN AREA SUBWATERSHED IMPACT STUDY
PROPOSED STORM SEWER PLAN (3 OF 3)

Drawn	Checked	Date
BH	CC	16/09/07
Scale: H 1:3,000"		Project No.: 300032860

Figure No.: FIG 11

In the post-development condition the contributing area has been reduced to 0.3 ha, and the proposed peak flows have been reduced dramatically. The maximum discharge in this location is 0.04 cms in the 100 year event.

5.4.7.3 Sandy Cove Creek

Table 13 Sandy Cove Creek, Proposed Condition Modelling Results

Sandy Cove Creek Proposed Model Summary		24 - Year SCS					
	Area(ha)	2 - Year	5 - Year	10 - Year	25 - Year	50 - Year	100 - Year
RJB Allowable Unitary Discharge Rate ($m^3/s/ha$)		0.002	0.008	0.015	0.024	0.032	0.040
Catchment 11 Total Allowable Discharge (m^3/s)	***36.3***	***0.07***	***0.29***	***0.54***	***0.87***	***1.16***	***1.45***
Uncontrolled Flows to SWMF 11 (m^3/s)	36.3	3.22	4.82	6.00	7.51	8.67	9.85
Proposed Flows from SWMF 11 (m^3/s)		0.04	0.08	0.22	0.51	0.79	1.10
Catchment 11 Total Proposed Discharge (m^3/s)		***0.04***	***0.08***	***0.22***	***0.51***	***0.79***	***1.10***
Catchment 12 Total Allowable Discharge (m^3/s)	***9.6***	***0.02***	***0.08***	***0.14***	***0.23***	***0.31***	***0.39***
Uncontrolled Flows to SWMF 12 (m^3/s)	9.6	0.88	1.34	1.70	2.14	2.47	2.81
Proposed Flows from SWMF 12 (m^3/s)		0.01	0.03	0.09	0.18	0.26	0.35
Catchment 12 Total Proposed Discharge (m^3/s)		***0.01***	***0.03***	***0.09***	***0.18***	***0.26***	***0.35***
Catchment 13 Total Allowable Discharge (m^3/s)	***27.2***	***0.05***	***0.22***	***0.41***	***0.65***	***0.87***	***1.09***
Uncontrolled Flows to SWMF 13 (m^3/s)	26.8	2.02	3.12	3.95	4.95	5.72	6.49
Proposed Flows from SWMF 13 (m^3/s)		0.03	0.12	0.21	0.35	0.47	0.61
Uncontrolled Flows to SWMF 13a (m^3/s)	0.4	0.00	0.01	0.06	0.08	0.10	0.12
Catchment 13 Total Proposed Discharge (m^3/s)	***27.2***	***0.03***	***0.13***	***0.27***	***0.43***	***0.57***	***0.73***
Catchment 14 Total Allowable Discharge (m^3/s)	***42.4***	***0.08***	***0.34***	***0.64***	***1.02***	***1.36***	***1.70***
Uncontrolled Flows to SWMF 14 (m^3/s)	42.4	3.32	5.04	6.36	7.99	9.25	10.52
Proposed Flows from SWMF 14 (m^3/s)		0.06	0.11	0.28	0.61	0.91	1.25
Catchment 14 Total Proposed Discharge (m^3/s)		***0.06***	***0.11***	***0.28***	***0.61***	***0.91***	***1.25***
Catchment 17 Total Allowable Discharge (m^3/s)	***5.6***	***0.01***	***0.04***	***0.08***	***0.13***	***0.18***	***0.22***
Uncontrolled Flows to SWMF 17 (m^3/s)	5.2	0.51	0.78	1.00	1.26	1.46	1.66
Proposed Flows from SWMF 17 (m^3/s)		0.01	0.01	0.01	0.01	0.02	0.03
[A]Uncontrolled Flows to SWMF 17a (m^3/s)	0.4	0.00	0.06	0.09	0.12	0.14	0.16
Catchment 17 Total Proposed Discharge (m^3/s)	***5.6***	***0.01***	***0.07***	***0.10***	***0.13***	***0.16***	***0.19***
Catchment 18 Total Allowable Discharge (m^3/s)	***4.3***	***0.01***	***0.03***	***0.06***	***0.10***	***0.14***	***0.17***
Uncontrolled Flows to SWMF 18 (m^3/s)	2.7	0.26	0.42	0.53	0.66	0.76	0.86
Proposed Flows from SWMF 18 (m^3/s)		0.01	0.01	0.02	0.04	0.06	0.08
Uncontrolled Flows to SWMF 18a (m^3/s)	1.7	0.00	0.01	0.02	0.04	0.05	0.07
Catchment 18 Total Proposed Discharge (m^3/s)	***4.3***	***0.01***	***0.02***	***0.04***	***0.08***	***0.11***	***0.15***
Discharge to Existing Subdivisions							
Catchment 206 Discharge to Big Bay Point [B]							
Allowable Flows to Big Bay Point (m^3/s)	*1.39*	0.00	0.01	0.02	0.03	0.04	0.06
Post-Dev. Catchment 206 Flows to Big Bay Point (m^3/s)	**1.39**	**0.00**	**0.03**	**0.17**	**0.26**	**0.33**	**0.40**

Notes
A - Catchment 17a requires LID controls to meet the total unitary discharge rates for the 5 and 10 year design storms
B - Discharge is to NHS area which flows overland to Big Bay Point Drive at 20th Sideroad

Catchment 11 & 11B/SWMF#11

SWMF#11 is proposed to be located in the southeast corner of the Phase 1 Bulut lands, at the head of the southern limb of Sandy Cove Creek. The July 2015 OMB decision identified the start of Sandy Cove Creek to be at the eastern edge of the Bulut lands, with the 30 m buffer of the Creek extending west into the Bulut lands and into the SWMF

Catchment 12

A summary of LID considerations and recommendations for the catchment are outlined below.

Table 24 LID Considerations – Catchment 12

Catchment ID	**12**
Catchment Area	9.63
Impervious %	53%
Dominant Soil Type	Sandy Loam
Effective Soil Type	Sandy Loam
Hydraulic Conductivity	21.8 mm/hr
LSRCA Hydraulic Conductivity[A]	8.72 mm/hr
25 mm Runoff Volume (m^3)	1283
Required Infiltration Storage Volume[B]	
25 mm Runoff (m^3)	3500
12.5 mm Runoff (m^3)	2000
5 mm Runoff (m^3)	700
Recommended Infiltration Target	
	5 mm Runoff
Recommended Filtration Target	
	20 mm
LID Opportunities	
Park Block (m^2)	None
School/Community Centre (m^2)	None
Accessible NHS Buffer (Linear m)	319
ROW (Linear m)	1109
Pervious Area available for Additional Topsoil (m^2)	45261
SWM Control	SWMF 12
Discharge Point	Sandy Cove Creek

Notes

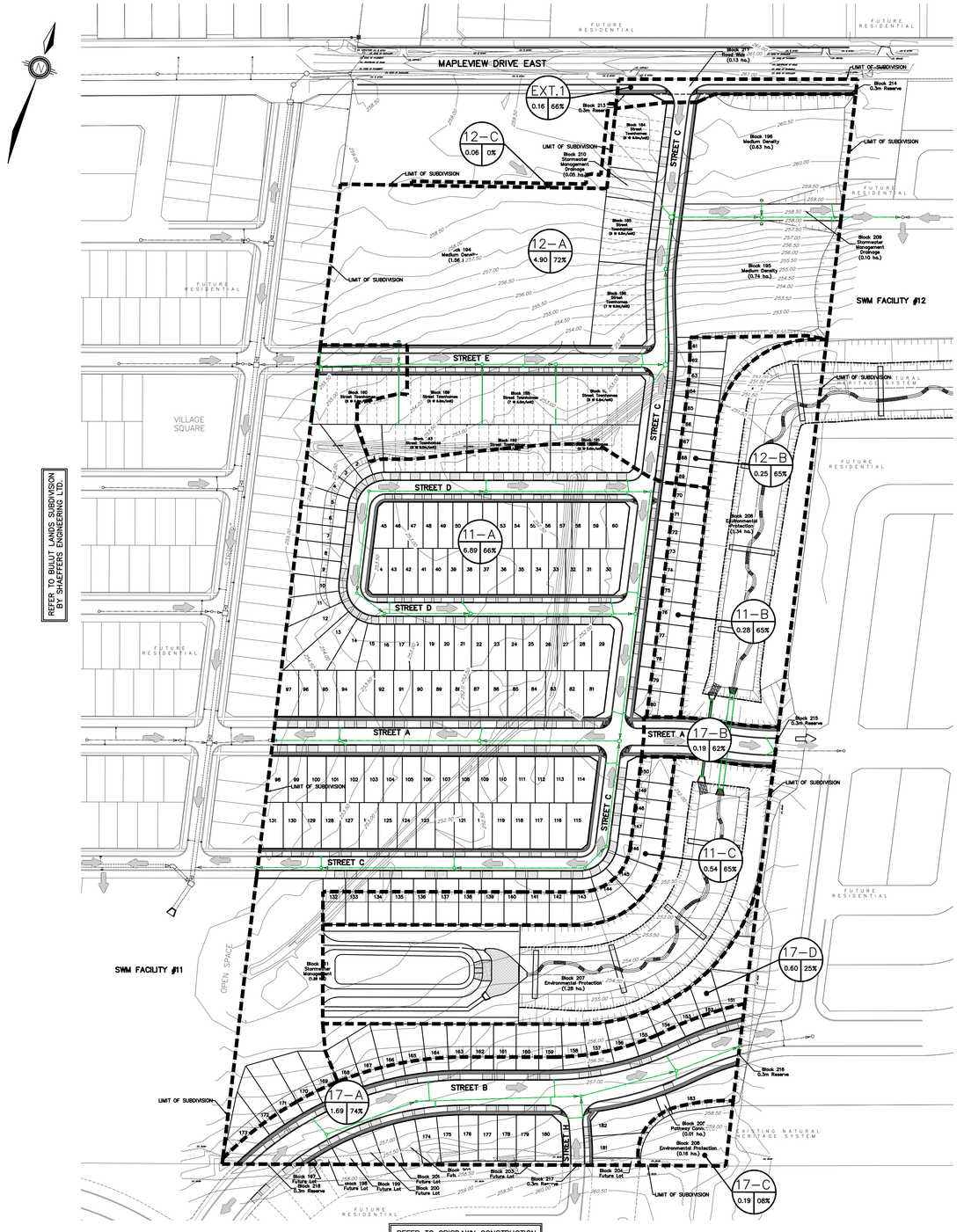
[A]LSRCA Factor of Safety Required = 2.5 (Divide measured Hydraulic Conductivity by 2.5)

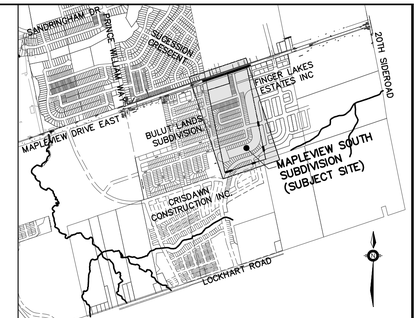
[B]Assumes 24 hr drawdown, 1.0 m tall stone trench with bottom set at 1.2 m below grade, 0.4 void ratio

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 SGRA and there are no park or school blocks to utilize for LID The following are the LID recommendations for this 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 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 stream corridor.
- Consider the use of 3rd 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 300 mm, 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.

Excerpts from MVS FSR





KEY PLAN
NTS

LEGEND

- STM MH 91 — STORM MAINTENANCE HOLE
- CB — STORM SINGLE CATCHBASIN
- DCB — STORM DOUBLE CATCHBASIN
- STORM SEWER & DIRECTION OF FLOW
- SAN 01A (B.O.) — SANITARY MAINTENANCE HOLE (B.O.)
- 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.)
- CATCHMENT BOUNDARY
- LIMIT OF SUBDIVISION
- CATCHMENT AREA ID NUMBER
- IMPERVIOUSNESS
- AREA (ha.)
- DIRECTION OF POST DEVELOPMENT 100 YEAR STORM EVENT OVERLAND FLOW
- EX. CONTOUR AND ELEVATION

BENCHMARK:

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 790m WEST OF THE MAPLEVIEW DRIVE EAST AND 20TH SIDE ROAD INTERSECTION. N4912264.547 E611717.298 ELEV 225.549
BENCHMARK NO. 03120080008. LOCATED ON THE NORTH SIDE OF MAPLEVIEW DRIVE EAST (12TH CONCESSION ROAD), APROXIMATELY 0.8km EAST OF YONGE STREET (HWY #11) AND APPROXIMATELY 10.0m NORTH OF MAPLEVIEW DRIVE EAST CENTERLINE. N4911763.816 E610187.698 ELEV 211.834
BENCHMARK NO: 03120080054 LOCATED ON THE SOUTH LIMIT OF MAPLEVIEW DRIVE WEST APPROXIMATELY 1km EAST OF HURONIA ROAD. N4910878.122 E607601.062 ELEV 248.996

NO.	REVISIONS	DATE	INITIAL
1.	FSR SUBMISSION FOR DRAFT PLAN	JUN 2021	DR

MAPLEVIEW SOUTH (INNISFIL) LTD
953 MAPLEVIEW DRIVE EAST

POST–DEVELOPMENT DRAINAGE AREA 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

DESIGN	VBS	SCALE: 1:1500	DATE MAY 2021
DRAWN	VBS	PROJECT REI–17055	DWG. Nº SWM–2
CHECKED	JB/DR		

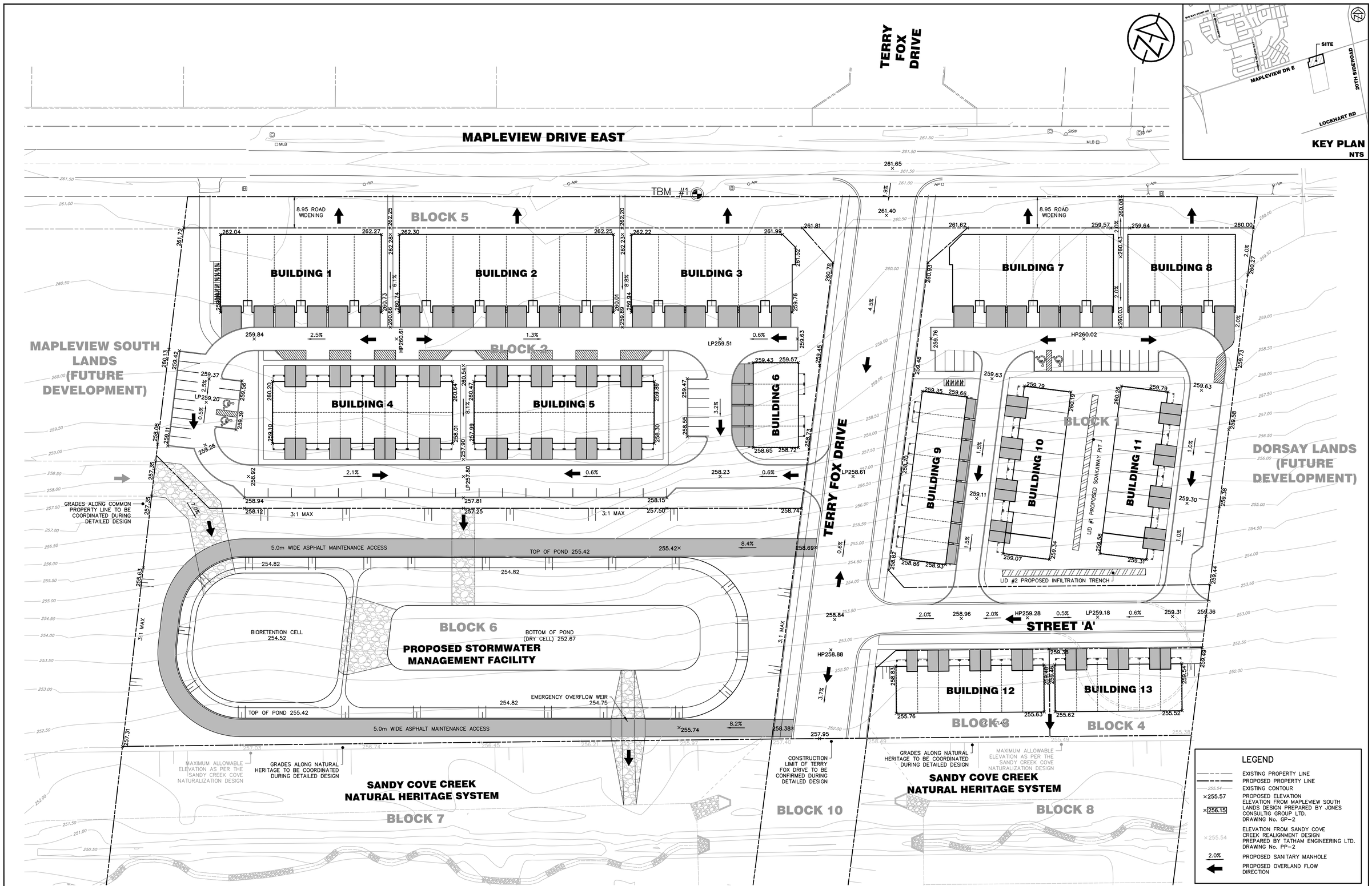
Storm Sewer Subcatchments (As per Drawing STM-1: Storm Drainage Plan)

Relationship	Catchment Area		Pervious	Impervious		TOTAL		SWM parameters		
	STM-1 Subcatchm.	SWM-2	Grass	Building	Paved		Run-off coef	Imperviousness	Ximp	SAR
	101	12-A	3,906	11,718	0	15,624	0.74	0.75	0.00	1.00
	102	12-A	634	1,177	0	1,811	0.67	0.65	0.00	1.00
	103	12-A	490	909	0	1,399	0.67	0.65	0.00	1.00
	104	12-A	703	718	957	2,378	0.71	0.70	0.40	0.43
	105	12-A	339	630	0	969	0.67	0.65	0.00	1.00
	106	12-A	974	1,189	1,086	3,249	0.71	0.70	0.33	0.52
	107	12-A	966	1,084	971	3,021	0.69	0.68	0.32	0.53
	109	12-A	2,536	2,164	1,817	6,517	0.65	0.61	0.28	0.54
	110	12-A	1,588	4,764	0	6,352	0.74	0.75	0.00	1.00
	111	12-A	1,674	5,023	0	6,697	0.74	0.75	0.00	1.00
	112	12-A	0	0	963	963	0.90	1.00	1.00	0.00
	123	11-A	323	599	0	922	0.67	0.65	0.00	1.00
	201	11-A	2,156	2,809	2,426	7,391	0.71	0.71	0.33	0.54
	202	11-A	670	595	835	2,100	0.69	0.68	0.40	0.42
	203	11-A	806	870	1,121	2,797	0.71	0.71	0.40	0.44
	204	11-A	3,058	4,739	2,163	9,960	0.70	0.69	0.22	0.69
	205	11-A	806	673	1,034	2,513	0.69	0.68	0.41	0.39
	206	11-A	761	704	1,064	2,529	0.70	0.70	0.42	0.40
	207	11-A	1,682	2,545	1,520	5,747	0.71	0.71	0.26	0.63
	208	11-A	2,177	3,391	1,665	7,233	0.70	0.70	0.23	0.67
	209	11-A	1,368	1,976	1,176	4,520	0.70	0.70	0.26	0.63
	210	11-A	1,857	2,837	1,147	5,841	0.69	0.68	0.20	0.71
	301	17-A	355	360	843	1,558	0.75	0.77	0.54	0.30
	302	17-A	2,186	3,073	3,362	8,621	0.74	0.75	0.39	0.48
	303	17-A	540	579	609	1,728	0.70	0.69	0.35	0.49
	304	17-A	716	722	1,426	2,864	0.74	0.75	0.50	0.34
	CHN1		29,935	8,525	0	38,460	0.39	0.22	0.00	1.00
	CHN2		15,748	3,035	0	18,783	0.36	0.16	0.00	1.00
	EXT.1	11-A	572	600	715	1,887	0.70	0.70	0.38	0.46
	EXT.2	11-A	980	1,820	0	2,800	0.67	0.65	0.00	1.00
	EXT.3	11-A	1,048	1,589	824	3,461	0.70	0.70	0.24	0.66
	EXT.4	11-A	693	845	458	1,996	0.67	0.65	0.23	0.65
	EXT.5	17-A	566	620	979	2,165	0.73	0.74	0.45	0.39
	EXT.6	17-B	729	0	1,210	1,939	0.66	0.62	0.62	0.00
	EXT.7	EXT.1	553	119	967	1,639	0.68	0.66	0.59	0.11
	EXT.8	17-C	1,720	159	0	1,879	0.30	0.08	0.00	1.00

Storm Sewer catchments (As per Drawing SWM-2: Post development Drainage plan)

	Pervious	Impervious		TOTAL		SWM parameters		
SWM-2	Grass	Building	Paved		Run-off coef	Imperviousness	Ximp	SAR
11-A	18,956	26,593	16,148	61,697	0.70	0.69	0.26	0.62
11-B	993	1,845	0	2,838	0.67	0.65	0.00	1.00
11-C	1,898	3,524	0	5,422	0.67	0.65	0.00	1.00
12-A	13,810	29,376	5,794	48,980	0.72	0.72	0.12	0.84
12-B	878	1,631	0	2,509	0.67	0.65	0.00	1.00
17-A	4,363	5,354	7,219	16,936	0.73	0.74	0.43	0.43
17-B	729	0	1,210	1,939	0.66	0.62	0.62	0.00
17-C	1,720	159	0	1,879	0.30	0.08	0.00	1.00
EXT.1	553	119	967	1,639	0.68	0.66	0.59	0.11

Appendix G:
Preliminary Grading Plan



LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- EXISTING CONTOUR
- ×255.57 PROPOSED ELEVATION
- ×256.15 ELEVATION FROM MAPLEVIEW SOUTH LANDS DESIGN PREPARED BY JONES CONSULTIG GROUP LTD. DRAWING No. GP–2
- ×255.54 ELEVATION FROM SANDY COVE CREEK REALIGNMENT DESIGN PREPARED BY TATHAM ENGINEERING LTD. DRAWING No. PP–2
- 2.0% PROPOSED SANITARY MANHOLE
- PROPOSED OVERLAND FLOW DIRECTION

DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

DRAWING REFERENCES

SITE PROPERTY LINES SHOWN BASED ON PLAN 51R–33948 PREPARED BY HOLDING JONES VANDERVEEN INC., O.L.S., DATED FEBRUARY 13, 2008. EXISTING PROPERTY LINES SHOWN ARE APPROXIMATE BASED ON SIMCOE COUNTY GIS.

TOPOGRAPHIC INFORMATION SHOWN BASED ON SURVEY COMPLETED BY HOLDING JONES VANDERVEEN INC., O.L.S., JULY 27, 2015.

SITE PLAN SHOWN PREPARED BY HUNT DESIGN ASSOCIATES INC., MAY 2021.

BENCHMARKS

TBM#1 ELEV. 261.551 m
CITY OF BARRIE BENCHMARK #03120110020

TBM#2 ELEV. 268.852 m
CITY OF BARRIE BENCHMARK #03120110016

No.	REVISION DESCRIPTION	DATE
1.	ISSUED FOR DRAFT PLAN APPROVAL	FEB. 4/22

ENGINEER STAMP

969, 979 & 989 MAPLEVIEW DRIVE EAST
PHASE 1
SANDY CREEK ESTATES INC.
CITY OF BARRIE

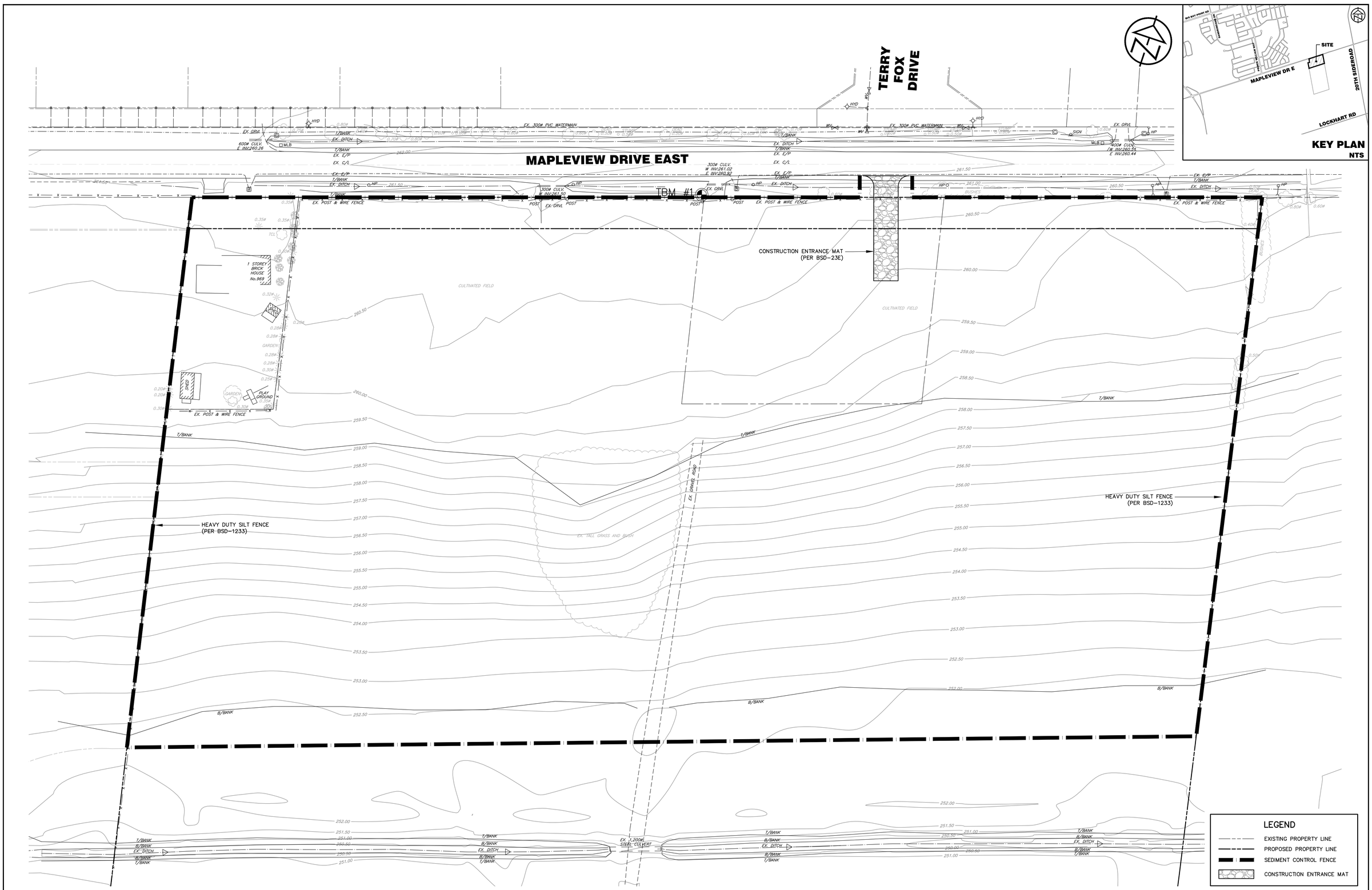
TATHAM ENGINEERING

PRELIMINARY GRADING PLAN

DESIGN: LMB	FILE: 420406–1	DWG:	
DRAWN: LMB	DATE: JANUARY 2022	**GP-1**	
CHECK: NM	SCALE: 1:500		

Drawing Name: 420406–GP01.dwg, Plotted: Feb 04, 2022

Appendix H:
Erosion & Sediment Control



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SITE PLAN SHOWN PREPARED BY HUNT DESIGN ASSOCIATES INC., MAY 2021.

BENCHMARKS

TBM#1 ELEV. 261.551 m
CITY OF BARRIE BENCHMARK #03120110020

TBM#2 ELEV. 268.852 m
CITY OF BARRIE BENCHMARK #03120110016

No.	REVISION DESCRIPTION	DATE
1.	ISSUED FOR DRAFT PLAN APPROVAL	FEB. 4/22

ENGINEER STAMP

969, 979 & 989 MAPLEVIEW DRIVE EAST
PHASE 1
SANDY CREEK ESTATES INC.
CITY OF BARRIE

EROSION AND SEDIMENT CONTROL PLAN

TATHAM ENGINEERING

DESIGN: LMB	FILE: 420406-1	DWG:	
DRAWN: LMB	DATE: JANUARY 2022	**ESC-1**	
CHECK: NM	SCALE: 1:500		

Drawing Name: 420406-ESC01.dwg, Plotted: Feb 04, 2022