Guelph Innovation District (GID) Lands, Blocks 1 & 2

Engineering Master Servicing Plan

Project Location:
328 Victoria Road South and 588 Stone Road East,
Guelph, Ontario

Prepared for:
Fusion Homes
500 Hanlon Creek Boulevard
Guelph, Ontario, N1C 0A1

Prepared by:
MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, ON N2B 3X9

April 19, 2024

MTE File No.: 46927-104

Engineers, Scientists, Surveyors.

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MTE Drawings

1.0 INTRODUCTION

1.1 Overview

MTE Consultants Inc. (MTE) was retained by Fusion Homes (Fusion) to complete an Engineering Master Servicing Plan (MSP) in support of the development and approval of the Block Plan for the Guelph Innovation District (GID) Lands. The GID Lands are part of a Secondary Plan, as identified in the City of Guelph's (City) *Official Plan Amendment 54* (OPA 54). As shown in Schedule D (Block Plan Areas), the Fusion owned areas are part of Block Plan Areas 1 and 2.

Blocks 1 and 2 comprise a total area of approximately 131.00ha, of which approximately 116.00ha represents the developable area in question, herein referred to as the 'subject lands', and 15.00ha are designated Significant Natural Areas and Natural Areas; not proposed for development. The subject lands are currently agricultural/open space and part of the University of Guelph's Agroforestry Research facility. They are bounded by Stone Road East to the south, Victoria Road South to the west, and the Guelph Junction Railway and the Eramosa River to the north and east. Refer to **Figure 1.1** for a site location plan.

Development plans for the subject lands include the construction of street-oriented residential units, multiple residential and mixed-use blocks, a school site, commercial and employment blocks, park lands, stormwater management facilities, open space blocks, and the required roads and municipal services (storm, sanitary, and water). A Draft Plan of Subdivision (dated March 27, 2024) for the proposed development has been prepared by MHBC Planning and forms the basis for this study. Refer to **Appendix A** for more details.

1.2 Background Documents

The following documents were reviewed to establish design criteria and a preliminary design strategy for the subject lands:

- *Torrance Creek Subwatershed Study, Management Strategy* (GRCA, 1998);
- *Eramosa-Blue Springs Watershed Study Report* (Beak International Inc. and Aquafor Beech Ltd., 1999);
- *Technical Guide, River & Stream Systems: Flooding Hazard Limit (*MNRF, 2002);
- *Stormwater Management Planning and Design Manual* (MECP formerly MOE, 2003);
- *Stormwater Management Plan – Pond 1, Sections and Details Drawing* (City, 2003);
- *Victoria Road Class EA Study, Environmental Study Report* (McCormick Rankin Corporation and Gamsby and Mannerow Ltd., 2005);
- *Victoria Road Reconstruction* (R.V. Anderson Associates Ltd., 2006);
- *Design Guidelines for Drinking Water Systems* (MECP formerly MOE, 2008);
- *Guelph Natural Heritage Strategy, Phase 2: Terrestrial Inventory & Natural Heritage System – Volume 1 Report* (Dougan & Associates, 2009);
- *Stormwater Management Master Plan* (AMEC, 2012);
- *Staff Report, Official Plan Amendment No. 54: Guelph Innovation District Secondary Plan* (City, 2014);

- *Guelph Innovation District, Stormwater Management Study* (AMEC, 2015);
- *Guelph Innovation District, Water and Wastewater Study* (AMEC, 2015);
- *Policies for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation – Ontario Regulation 150/06* (GRCA, 2015);
- *2016 Water Efficiency Strategy Update* (C3 Water and Gauley Associates Ltd., 2016);
- *City of Guelph Official Plan* (City, 2017);
- *Official Plan Amendment 54, Guelph Innovation District Secondary Plan* (City, 2017);
- *Guelph Noise Control Guidelines* (City, 2018);
- *Guelph Innovation District, Guidance for Preparation of Block Plans* (City, 2019);
- *Stormwater Management Study, Guelph Innovation District (Wood, 2020);*
- *GID Preliminary Constraints Map 1* (Natural Resource Solutions Inc., 2022);
- *Master Environmental Servicing Plan, Clair-Maltby* (Wood, 2022);
- *Stormwater Management Master Plan: Final Stormwater Infiltration Policy Recommendations* (Aquafor Beech Ltd., 2022);
- *Grand River Source Protection Plan, Volume II* (GRCA, 2022);
- *Development Engineering Manual,* (City, 2023); and,
- *Design Guidelines and Supplemental Specifications for Municipal Services* (DGSSMS) (Region of Waterloo, 2024).

1.3 Objectives

The objective of the *Engineering Master Servicing Plan* (MSP) is to guide the development of the subject lands and develop a comprehensive design strategy that is acceptable to the City, the Grand River Conservation Authority (GRCA), and the Ministry of the Environment, Conservation and Parks (MECP), taking into consideration the findings and recommendations of previously completed and related studies.

The *MSP* will inform the Block Plan process through:

- Review of relevant background policies and documents to incorporate objectives and recommendations into the site servicing and grading design;
- Identification and assessment of the relevant environmental, servicing, and engineering design considerations and recommendations for design of a preferred development plan; and,
- Development of a framework to be followed by subsequent submissions, including the Draft Plan of Subdivision Application and the Final Engineering Submissions.

The *MSP* highlights the existing site conditions and engineering design criteria/constraints, to which future plans will need to adhere. A preliminary design strategy, including considerations for grading, servicing, stormwater management (SWM), and an environmental noise assessment has been outlined. This design approach will be refined during future detailed design stages of the proposed development.

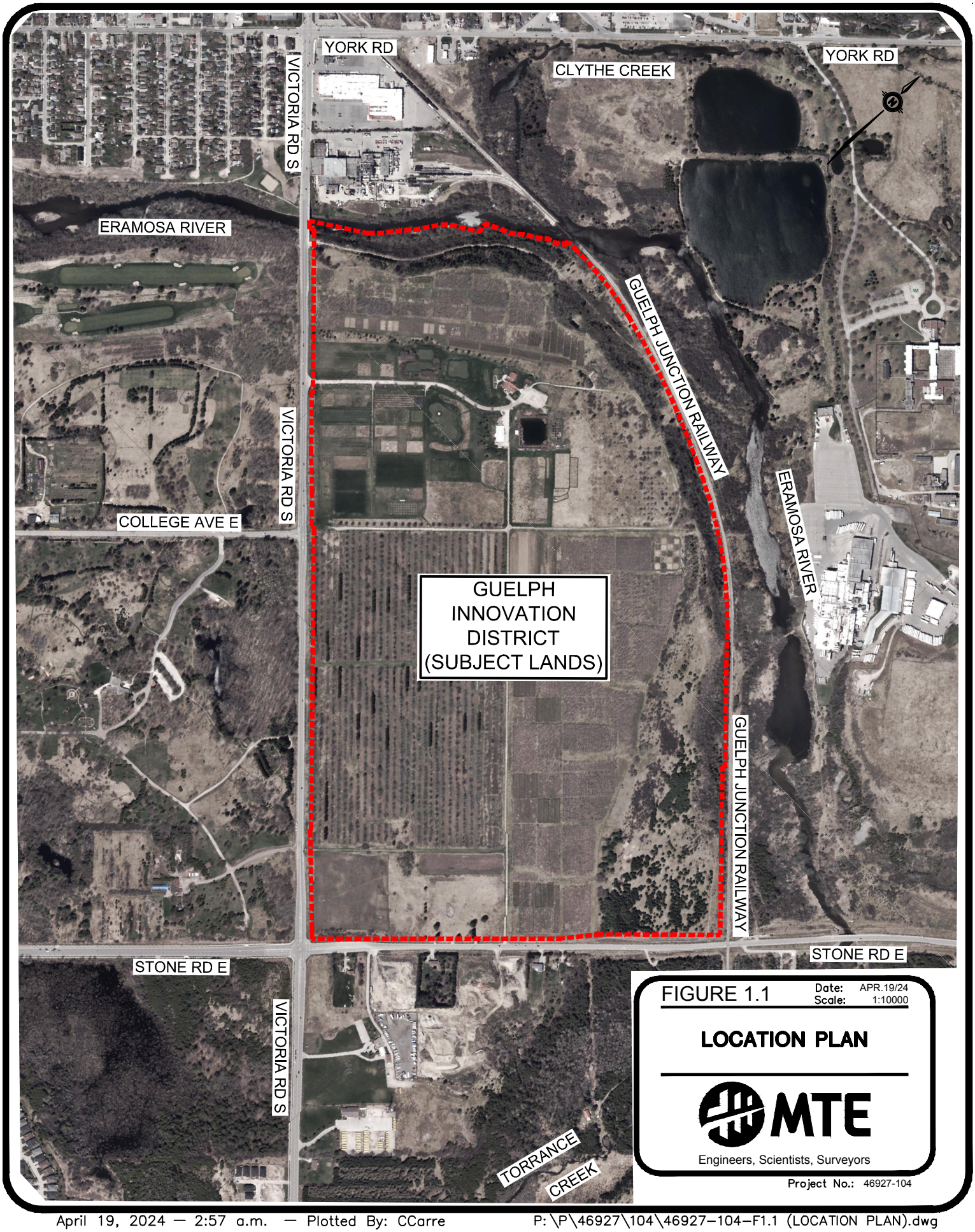

FIGURE 1.1

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LOCATION PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 46927-104

April 19, 2024 — 2:57 a.m. — Plotted By: CCarre

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2.0 EXISTING CONDITIONS

2.1 Topographical Information

MTE conducted a detailed topographical survey of the subject lands in 2022. Existing topographical conditions for the subject lands, as well as the adjacent surrounding lands, are shown in **MTE Drawing 46927-104-EC1.1**.

There are two large existing nobs onsite, at approximate elevations of 343.0m-345.0m, creating a ridge near the center of the property in a north-south orientation. As such, existing surface runoff drains in all directions; south towards Stone Road East, west towards Victoria Road South, and north and east towards the Eramosa River.

There is significant topographic relief onsite, with upwards of 15.0m of difference within the developable 'tablelands' alone. There is also approximately 10.0m of relief within the adjacent Valleylands down to the river, not slated for development. The average slopes onsite range from approximately 2.0% – 8.0%, with steeper sections to the north ranging from 10.0% – 20.0%.

2.2 Geotechnical and Hydrogeological Information

MTE has conducted geotechnical investigations for the subject lands in 2022 and 2023. The latest 2024 report, *Guelph Innovation District (GID) Lands – Blocks 1 & 2 – Geotechnical Investigation Report*, summarizes the work performed, the findings of the investigations, and makes recommendations in support of future development plans, to be further discussed in this *MSP*. The fieldwork for this investigation involved drilling of 22 borehole locations (boreholes MW501-22 to MW520-22, BH654-22, and BH655-22) to depths of 1.4m to 11.1m. Soil conditions found in the boreholes generally show a mixture of silt till, sandy till, gravelly till, sand, and gravel. Auger refusal on bedrock occurred at boreholes MW501-22 to MW507-22, BH654-22, and BH655-22. The bedrock elevations varied from 1.4m to 11.1m below the ground surface, indicating shallow bedrock along the east adjacent to the Natural Areas, and much deeper bedrock depths along the northern extent of the subject lands. Refer to MTE's *Geotechnical Investigation Report* for more details.

Concurrently with the geotechnical investigations discussed above, MTE has also been conducting ongoing hydrogeological investigations and monitoring. The work performed to date includes: the construction of monitoring wells in some of the earlier boreholes drilled for the aforementioned geotechnical investigations (MW501-22, MW507A-22, MW507B-22, MW512A-22, MW512B-22, MW514-22, and MW520-22), the advancement of an additional 51 boreholes (MW601-22 to MW651-22) to depths of 0.9m to 12.2m, the construction of an additional seven monitoring wells (MW601-22 to MW607-22), and the installation of a minipiezometer (MP101-23) within the wetland onsite. The analysis of this additional data has confirmed the original assessments of the existing soil stratigraphy, location of the underlying bedrock, and provided additional information regarding the groundwater elevations encountered throughout. Refer to MTE's 2024 *Guelph Innovation District (GID) Lands – Blocks 1 & 2 – Hydrogeological Characterization Report* for more details.

Similarly to the existing topography, more specifically the previously discussed high topographic nobs onsite, the groundwater mimics the surface contours and concentric mounds are present near those locations. As identified in MTE's 2024 *Hydrogeological Characterization Report*, the latest measured groundwater levels near the mounds are above the proposed preliminary finished grades in those locations. As such, once grading operations have been performed and finished grades have been established, appropriate groundwater separation shall be managed by a proposed groundwater collection system; to be further discussed in Section 3.1.3.

Through additional review of GRCA mapping, it was confirmed that the subject lands are within the Eramosa-Blue Springs Creek subwatershed. Based on the *Eramosa-Blue Springs Watershed Study Report* (Beak International Inc. and Aquafor Beech Ltd., 1999), the subject lands are in a low stress diverse warm/cool water community. A large portion of the Eramosa-Blue Springs Creek subwatershed is considered an important recharge area to local streams and rivers. Within this subwatershed, infiltration techniques are encouraged to achieve a sitewide water balance. The subject lands are also within a Source Water Wellhead Protection Area B, with a vulnerability score of 8-10. Therefore, special attention is required for the protection of the groundwater resource and its interaction with any proposed development.

Details involving infiltration criteria, proposed water balance measures, and stormwater quality management will be further discussed in subsequent sections.

2.3 Slope Stability Assessment

As part of the geotechnical investigation, a slope stability assessment was completed for the Valleylands slope along the north and east limits of the subject lands. Various failure modes of this slope were investigated. An Erosion Hazard Setback Limit (EHSL) was established based on the recommendations for the Stable Top of Slope, as well as development setbacks following the GRCA and Ministry of Natural Resources and Forestry (MNRF) guidelines. The Stable Top of Slope and the associated 6.0m setback from the EHSL was established. The following Slope Stability Setback recommendations are proposed for the development:

- No additional fill shall be placed within the EHSL or on the face of the slope;
- No excavation work should be carried out along the face or the bottom of the slope without geotechnical review;
- No new infiltration or stormwater management infrastructure shall be placed within the EHSL areas;
- Surface runoff should be directed away from the slope to prevent gullies from forming and expanding; and,
- Though the conservation areas are currently well-vegetated, periodic planting might be required to maintain vegetation across the slope face.

2.4 Environmental Buffers

There are regulated GRCA wetland complexes located north and east of the subject lands, adjacent to the Eramosa River and the Guelph Junction Railway corridor. Through site walks and specific OPA policy review, site-specific environmental buffers were established by NRSI. These buffers establish a Development Limit, beyond which development may not occur. This Development Limit was used to establish a functional Draft Plan of Subdivision and help delineate pre-development and post-development catchment areas used in the SWM assessment. The buffers established onsite are as follows, of which, a combination of the most restrictive is what defines the Development Limit:

- Surveyed Dripline and associated 10.0m Buffer;
- Surveyed Wetland and associated 30.0m Buffer; and,
- Erosion Hazard Setback Limit and associated 6.0m Buffer.

3.0 PROPOSED DEVELOPMENT

Generally speaking, construction of the proposed development will be phased in a north-south direction. This would begin with the construction and establishment of the required stormwater management facility (SWMF) to the north, followed by the development lands within its contributing catchment area.

3.1.1 Municipal Right-of-ways and Roadworks

As shown in the proposed Draft Plan, the subject lands are serviced by collector and local roads. The roadways will be constructed to a full urban cross-section including asphalt pavement, concrete curb and gutter, concrete sidewalk, on-street parking, on-street bike lanes (collectors), roadway illumination, and boulevard landscaping all in accordance with Township standards and the proposed Masterplan Framework prepared by Sasaki Associates Inc. The right-of-way width for collector roads is 26.0m, whereas local roads have an 18.0m width.

MTE's preliminary geotechnical investigation provides a proposed pavement structure based on underlying soil conditions, proposed roadway usage, and the City's standards. **Table 3.1** below provides the proposed pavement structure based on road classification.

Table 3.1 – Proposed Pavement Structure

Pavement Component	Thickness (mm)	
	Local Road	Collector Road
HL3 Surface Course Asphalt	40	45
HL8 Binder Course Asphalt	50	90
Granular 'A' Base	175	175
Granular 'B' Subbase	350	450

3.1.2 Proposed Widening of Victoria Road South and Stone Road East

The 2005 *Victoria Road Class EA Study, Environmental Study Report* was completed to address the existing conditions and future needs of Victoria Road South in Guelph. The report highlights key considerations, among others, for the future development of what is now considered the GID Lands. Some of the considerations include traffic volume growth, intersection design and improvements, and additional land requirements for the proposed widening. Furthermore, the following information was concluded and proved relevant to the development of the subject lands:

- The preferred alternative includes a 4-laned rural cross-section with on-street bike lanes in both directions;
- The entire widening (12.0m) is proposed along the east side of Victoria Road South, to avoid the Arboretum lands to the west;
- At the Victoria-Stone intersection, an infiltration stormwater management facility (SWMF No. 104) has been designed to accommodate runoff from the intersection and immediately adjacent lands; and,
- From Stone Road East to the Eramosa River, a linear SWM system is proposed along the east side of Victoria Road South to provide the required stormwater quality and quantity control prior to recharge to the groundwater or discharge to the Eramosa River.

It should be noted that the latest proposed cross-section for Victoria Road South incorporates the design elements listed above. However, the widening is now proposed at 15.0m and includes the linear SWM system and a 5.0m wide multi-use path.

Future upgrades are also proposed along Stone Road East. Although the existing right-of-way width is not intended to change, the existing road surface is to be widened to accommodate two additional travel lanes. The road is also proposed to be developed to a full urban cross-section, as described in Section 3.1.1 above. Similarly to Vicotria Road South, the final road cross-sections will be determined through respective EA processes that are proposed for both roads.

3.1.3 Proposed Area Grading

A Preliminary Grading Contour Plan illustrating road grades is enclosed (**MTE Drawing 46927-104-AG1.1**). The grading design of the subject lands is controlled by many factors, which include:

- Matching to centreline of road elevations of existing surrounding roads;
- Compatibility with the proposed widening and grading of Victoria Road South and Stone Road East;
- Matching to existing and proposed boundary grades around the perimeter of the Development Limit, while respecting existing natural features (established buffers);
- Drainage of major storm event overland flows towards the road right-of-ways, where applicable, and ultimately the proposed SWMFs;
- Compliance with municipal standards for minimum and maximum road grades;
- Servicing constraints (sanitary and storm), while maintaining adequate cover over municipal services; and,
- Optimizing proposed earthworks to minimize the cut/fill imbalance as much as possible.

Utilizing the proposed road layout, preliminary road grades range from 0.5% (minimum) to 5.0% (maximum). Preliminary residential lot grades typically are 2.0% (minimum) to 6.0% (maximum), with a combination of traditional back-to-front drainage, split drainage, and walk-out type lots.

As previously discussed, existing grades exceed the maximum municipal standard grades, therefore, proposed area grading operations will generate a significant surplus of soil to be removed from the subject lands. Routine coordination with a Qualified Professional (QP) in excess soil management will be conducted to effectively manage this surplus and the associated requirements, per O. Reg. 406/19.

As discussed in Section 2.2, a large portion of this excess soil to be removed will come from the two large existing high points onsite. Existing measurements indicate that these locations are also prone to high groundwater levels. Therefore, dedicated pipe groundwater collection/management systems are proposed near the southwestern and northeastern quadrants of the subject lands (mimicking the locations of the pre-development high nobs/high groundwater), to effectively establish adequate separation between the development and the anticipated seasonal high groundwater. Independent from each other, these networks would function by intercepting groundwater flow, directing it to respective dedicated infiltration galleries downstream, where clean groundwater will be reintroduced to the underlying aquifer. These proposed systems are for groundwater separation management only and their associated proposed infiltration is not to be accounted for in the overall site water balance analysis.

4.0 MUNICIPAL SERVICING

4.1 Sanitary Servicing

The subject lands are proposed to be serviced by three connections to the existing 750mm diameter sanitary trunk sewer along Victoria Road South. This sanitary trunk conveys wastewater from the Kortright Heights Sewage Pumping Station located at Victoria Road South and MacAlister Blvd. The sanitary trunk crosses the Eramosa River and gets reduced to 600mm and 675mm diameter further downstream, ultimately discharging to the Guelph Wastewater Treatment Plant.

Based on AMEC's 2015 *GID Water and Wastewater Study*, the existing 750mm diameter trunk has a total capacity of 747.0L/s, of which 131.0L/s is currently used by the Kortright Heights Sewage Pumping Station. This equates to an existing availability of approximately 616.0L/s within the trunk sewer.

A sanitary drainage area plan was developed to determine contributing drainage areas to each sewer within the subject lands. The preliminary sanitary catchment areas are identified in **Figure 4.1**. Furthermore, **Figure 4.2** illustrates the proposed sanitary sewer network. Both figures should be read in conjunction with the sanitary sewer design sheet included in **Appendix B**.

Based on the analysis, the proposed development is projected to generate approximately 187.0L/s of total flow through the three combined connections. Therefore, the analysis confirms that the existing sanitary sewer network can adequately convey the projected flows.

In general, proposed sanitary sewer sizes range from 200mm – 525mm in diameter. Most local sewers are in the 200mm – 300mm diameter range, whereas a larger proposed 'trunk' runs along the northern and eastern limits. This 'trunk' sewer is meant to service the southeastern corner of the subject lands, with sufficient size and depth to maintain adequate minimum and maximum cover and slopes. The 'trunk' begins in the southeastern corner as a 200mm diameter sewer and progressively grows to 525mm diameter at the Victoria Road South connection point. To adequately service the furthest extent of its contributing area, this 'trunk' is the deepest proposed sewer onsite; 5.5m – 6.0m at the east and north ends of the subject lands. Along the east, where the deep sanitary sewer is fronting proposed single family residential blocks, a local 200mm diameter sanitary sewer is proposed at the minimum depth of cover of 2.7m, per City standards. Similarly, the remainder of the sanitary sewer network is generally at the minimum cover depth of 2.7m. Refer to **Figure 4.2** for more details.

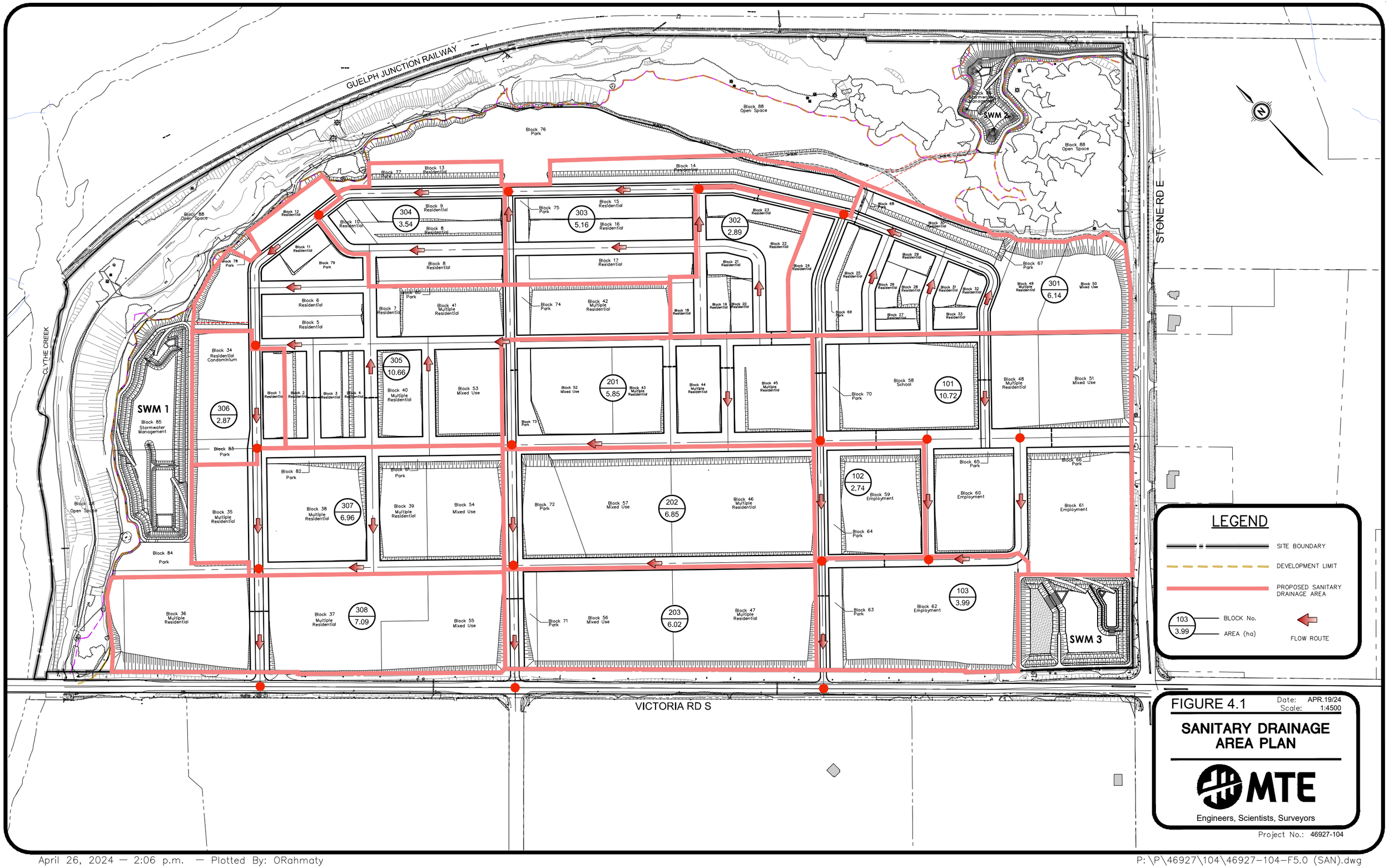

FIGURE 4.1 Date: APR.19/24 Scale: 1:4500

SANITARY DRAINAGE AREA PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 46927-104

April 26, 2024 — 2:06 p.m. — Plotted By: ORahmaty

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GUELPH JUNCTION RAILWAY

CLYTHE CREEK

STONE RD E

VICTORIA RD S

F/G=337.00
SAN OBV.=331.64±
DEPTH=5.36m±

F/G=338.14
SAN OBV.=334.57±
DEPTH=3.57m±

F/G=339.73
SAN OBV.=337.03±
DEPTH=2.70m±

F/G=331.93
SAN OBV.=327.32±
DEPTH=4.61m±

F/G=342.56
SAN OBV.=339.86±
DEPTH=2.70m±

F/G=331.79
SAN OBV.=327.06±
DEPTH=4.73m±

F/G=341.35
SAN OBV.=338.65±
DEPTH=2.70m±

F/G=343.14
SAN OBV.=340.44±
DEPTH=2.70m±

F/G=341.03
SAN OBV.=338.33±
DEPTH=2.70m±

F/G=340.50
SAN OBV.=337.80±
DEPTH=2.70m±

F/G=339.82
SAN OBV.=337.12±
DEPTH=2.70m±

F/G=332.51
SAN OBV.=326.58±
DEPTH=5.93m±

F/G=337.40
SAN OBV.=334.70±
DEPTH=2.70m±

F/G=335.50
SAN OBV.=332.80±
DEPTH=2.70m±

F/G=331.47
SAN OBV.=326.00±
DEPTH=5.47m±

F/G=333.13
SAN OBV.=329.95±
DEPTH=3.18m±

F/G=335.65
SAN OBV.=332.15±
DEPTH=3.50m±

F/G=330.21
SAN OBV.=325.50±
DEPTH=4.71m±

F/G=330.51
SAN OBV.=327.31±
DEPTH=3.21m±

F/G=332.44
SAN OBV.=329.36±
DEPTH=3.08m±

EX. SAN.
INV=325.73m

EX. SAN.
INV=326.60m

EX. SAN.
INV=329.00m

EX. 750mmø SAN

SWM 1

SWM 2

SWM 3

LEGEND

- SITE BOUNDARY
- DEVELOPMENT LIMIT
- EX. SAN. MH — EXISTING SANITARY SEWER
- SAN. MH — PROPOSED SANITARY SEWER
- LOCAL SEWER
- F/G=360.35 / SAN OBV.=357.46± / DEPTH=2.90m± — C/L ROAD FINISHED GRADE / PROPOSED LOCAL SANITARY OBVERT / SANITARY COVER

FIGURE 4.2

Date: APR.19/24
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SANITARY SERVICING PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 46927-104

April 24, 2024 — 8:06 a.m. — Plotted By: ORahmaty

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4.2 Water Distribution

The purpose of the water distribution strategy is to develop a watermain design suitable to meet the development requirements. Through correspondence with the City, it was confirmed that the only available information at this time is the 2015 *Water and Wastewater Study* (WWS). This study was reviewed to confirm that the existing municipal infrastructure can support the development.

The subject lands lie within the City's Pressure Zone 1. Based on the modelling results from the WWS, the current hydraulic grade line (HGL) of Pressure Zone 1 is approximately 379.0m, with a serviceability range of approximately 323.0m to 343.0m within recommended pressure guidelines.

Based on the preliminary grading strategy for the development, relevant finished grade elevations generally fall within the Pressure Zone 1 serviceability range. Therefore, the daily pressures are expected the be within the recommended guidelines.

As per City requirements, the average daily demand is 300L/c/day for residential, institutional, commercial, and industrial uses. However, as part of the *Water Conservation and Efficiency Strategy Update* (City, 2009), and policies adopted within the OPA 54, institutional, industrial, and commercial developments shall be required to decrease water use to a target of 250L/c/day via greywater reuse and rainwater harvesting strategies.

The peaking factors to be used in the watermain design are from the WWS and the *Design Guidelines for Drinking Water Systems* (MECP, 2008). It should be noted that the values published in the WWS for Maximum Day and Peak Hour scenarios are low compared to the recommended MECP values, which are based on total population estimates. As such, the Minimum Hour peaking factor is taken from Table 3-1 of the MECP document, based on the total estimated population for all four Block Plan Areas. The peaking factors presented in **Table .1** are to be used during future analyses.

Table 4.1 – Peaking Factors for Watermain Design

Demand Scenario	Factor
Average Day	1.0
Maximum Day	1.5
Peak Hour	2.5
Minimum Hour	0.6

Since development plans were not available at the time of the WWS, a fire flow demand of 250L/s was applied at two conceptual major intersections within the GID Lands. The results of the WWS generally indicate that there is upwards of 700L/s available at fire flow notes and that fire flow availability should not be a constraint for the development.

It can reasonably be assumed that all new watermains constructed within the GID Lands will be constructed from PVC pipe. Therefore, moving forward, a friction factor of 150 should be used for all new pipe.

The recommended minimum and maximum operating pressures outlined in the WWS are taken from the MECP guidelines. The following **Table 4.2** demonstrate the minimum and maximum recommended pressures for all demand scenarios.

Table 4.2 – Pressure Guidelines for Watermain Design

Demand Scenario	Pressure Guideline (kPa)	
	Minimum	Maximum
Average Day	350	550
Maximum Day	350	550
Peak Hour	275	700
Minimum Hour	275	700
Max Day + Fire Flow	140	700

The WWS identified that pressures for the single unidentified modelling scenario presented are within the recommended normal operating pressures presented above.

The DGSSMS and WWS recommend that velocities throughout the distribution system should not exceed 5.0m/s under all flow conditions. Resulting pipe velocities will be assessed during future modelling and development stages. Adjustments should be made, to maintain pipe velocities within the recommended range.

Although the land use concentrations vary between the plan used in the WWS and the latest plan, it can be reasonably concluded that the subject lands can be adequately serviced by the surrounding existing water distribution system. The proposed internal distribution network can be designed and sized appropriately to accommodate localized increased demands and meet the worst-case future needs in terms of Maximum Day + Fire Flow demands.

Proposed connections to the existing distribution network will be available along the 400mm diameter watermain along Stone Road East and the 500mm diameter watermain along Victoria Road South. There is also a 1050mm transmission main located near the Guelph Junction Railway corridor in the Valleylands east of the subject lands. This transmission main conveys water from the Arkell Spring Grounds to the City's distribution network. The proposed watermain network will not be connected to the transmission main.

Overall, based on the review of the WWS, the following water distribution conclusions can be made:

- Direct connections to the existing 400mm diameter watermain along Stone Road East and the existing 500mm diameter watermain along Victoria Road South will adequately service the subject lands;
- The proposed water distribution system will adequately provide the required daily demands generally within the respective recommended minimum and maximum pressure ranges for all demand scenarios; and,
- Water modelling results from the WWS indicate that there is a surplus of available flow throughout the development and that fire flow demands should be met for all proposed land uses.

Detailed water distribution analyses will be performed during future development stages to confirm the conclusions above. The proposed water distribution network is shown in **Figure 4.3.**

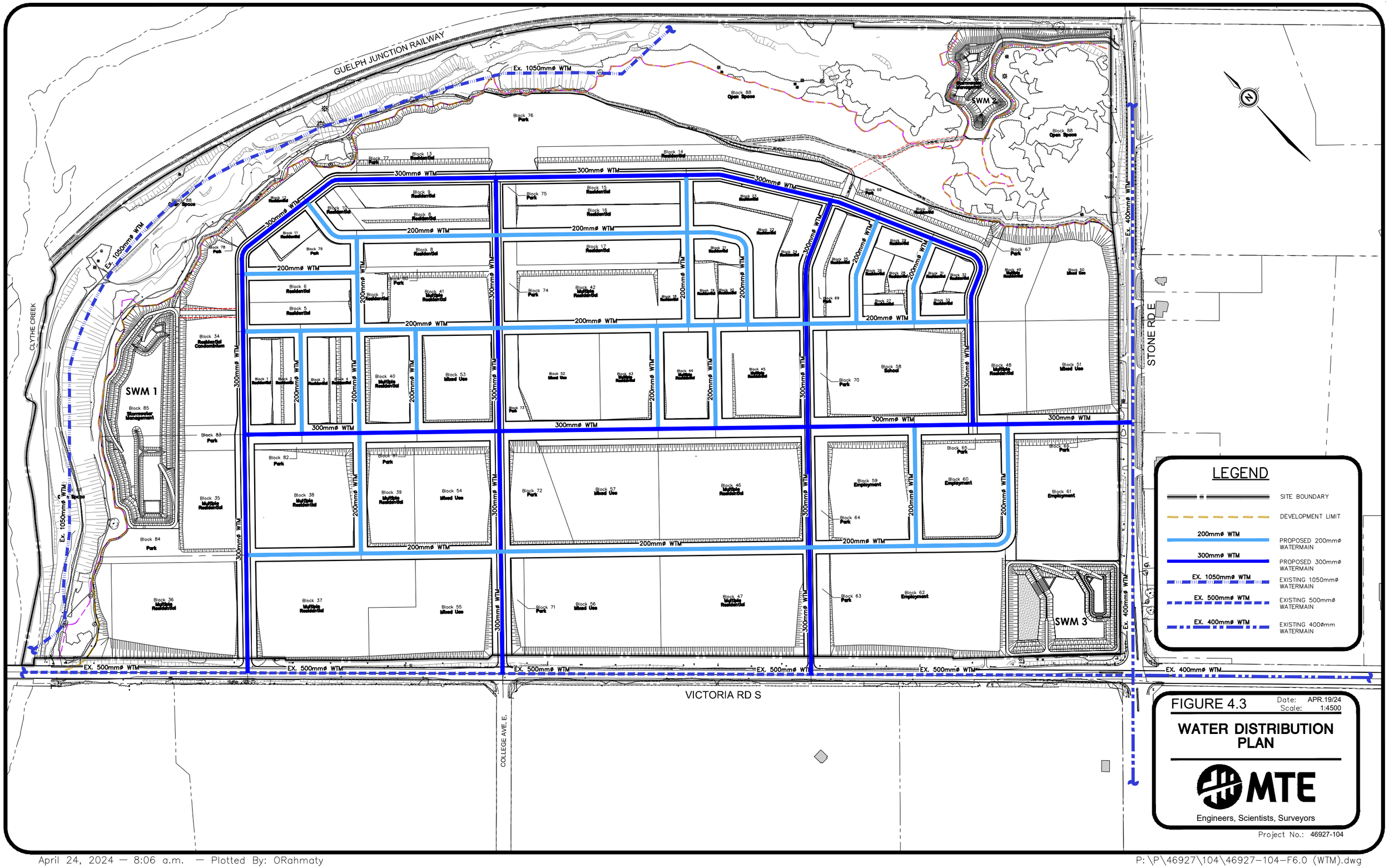

FIGURE 4.3 Date: APR.19/24 Scale: 1:4500

WATER DISTRIBUTION PLAN

MTE Engineers, Scientists, Surveyors

Project No.: 46927-104

April 24, 2024 — 8:06 a.m. — Plotted By: ORahmaty

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4.3 Storm Servicing

There are three main storm drainage boundaries within the subject lands, each contributing stormwater flows to separate SWMFs; ultimately discharging to the Eramosa River. Specifics about the respective SWMFs will be further discussed in subsequent sections.

Minor and major storm events will be conveyed by the proposed storm sewers and road allowances to the SWMFs. Local storm sewers will be sized to accept runoff from a 5-year storm event utilizing the City's rainfall intensity-duration-frequency (IDF) parameters and will be constructed to typical depths with a minimum of 2.7m, per City standards.

A storm drainage area plan was developed to determine contributing drainage areas to each sewer. The preliminary storm catchment areas are identified in **Figure 4.4**. Furthermore, **Figure 4.5** illustrates the proposed storm sewer network. Both figures should be read in conjunction with the storm sewer design sheet included in **Appendix C**, which confirms that the storm sewer network can adequately convey the 5-year storm event.

The proposed storm sewer sizes vary quite drastically throughout the development; from 300mm – 450mm diameter local sewers at the upstream ends of the system to 1350mm – 1650mm diameter inlets to the SWMFs. A splitter manhole is proposed at each SWMF to convey small storm event flows to the forebay and divert the larger storm events directly to the wet cell; which effectively reduces the incoming pipes to the SWMF after the split.

Under existing conditions, the Victoria-Stone intersection is serviced by a storm sewer network which outlets to the existing SWMF No. 104 through three inlet pipes. These existing inlets will be integrated into the design and construction of SWMF 3, such that runoff from the Victoria-Stone intersection continues to be treated and controlled.

GUELPH JUNCTION RAILWAY

CLYTHE CREEK

STONE RD E

VICTORIA RD S

SWM 1

SWM 2

SWM 3

LEGEND

- SITE BOUNDARY
- DEVELOPMENT LIMIT
- PROPOSED STORM DRAINAGE AREA
- NODES
- MAJOR OVERLAND FLOW ROUTE
- EXISTING CULVERT
- 9 / 3.13 / 2.0 — AREA No. / AREA (ha) / RUNOFF COEFFICIENT

FIGURE 4.4

Date: APR.19/24
Scale: 1:4500

STORM DRAINAGE AREA PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 46927-104

April 26, 2024 — 1:46 p.m. — Plotted By: ORahmaty

P:\P\46927\104\46927-104-F4.0 (STM).dwg

GUELPH JUNCTION RAILWAY

CLYTHE CREEK

STONE RD E

VICTORIA RD S

F/G=332.82
STM OBV.=330.12±
DEPTH=2.70m±

F/G=331.64
STM OBV.=328.94±
DEPTH=2.70m±

F/G=332.48
STM OBV.=329.78±
DEPTH=2.70m±

F/G=338.00
STM OBV.=335.30±
DEPTH=2.70m±

F/G=343.40
STM OBV.=340.70±
DEPTH=2.70m±

F/G=339.87
STM OBV.=337.17±
DEPTH=2.70m±

F/G=339.76
STM OBV.=337.06±
DEPTH=2.70m±

F/G=338.93
STM OBV.=336.23±
DEPTH=2.70m±

F/G=341.03
STM OBV.=338.33±
DEPTH=2.70m±

F/G=335.54
STM OBV.=332.84±
DEPTH=2.70m±

F/G=331.47
STM OBV.=328.80±
DEPTH=2.70m±

F/G=333.20
STM OBV.=330.00±
DEPTH=3.20m±

F/G=335.65
STM OBV.=332.95±
DEPTH=2.70m±

F/G=321.63
STM OBV.=318.93±
DEPTH=2.70m±

F/G=330.35
STM OBV.=326.35±
DEPTH=4.00m±

F/G=330.60
STM OBV.=327.90±
DEPTH=2.70m±

F/G=332.41
STM OBV.=329.61±
DEPTH=2.80m±

F/G=334.00
STM OBV.=331.10±
DEPTH=2.90m±

SWM 1

SWM 2

SWM 3

900mmø STM @ 0.8%
1200mmø STM @ 0.5%
675mmø STM @ 1.5%
675mmø STM @ 1.0%
600mmø STM @ 2.0%
525mmø STM @ 0.5%
975mmø STM @ 1.0%
975mmø STM @ 0.4%
450mmø STM @ 1.5%
1200mmø STM @ 0.5%
300mmø STM @ 2.0%
450mmø STM @ 2.0%
525mmø STM @ 2.0%
450mmø STM @ 2.0%
450mmø STM @ 1.5%
825mmø STM @ 0.4%
1200mmø STM @ 1.0%
825mmø STM @ 3.0%
750mmø STM @ 2.0%
750mmø STM @ 0.4%
975mmø STM @ 0.4%
375mmø STM @ 1.0%
375mmø STM @ 1.0%
1050mmø STM @ 1.2%
900mmø STM @ 0.4%
825mmø STM @ 0.4%
1200mmø STM @ 0.5%
1650mmø STM @ 1.0%
1650mmø STM @ 0.4%
1350mmø STM @ 0.5%
525mmø STM @ 2.0%
825mmø STM @ 2.2%
900mmø STM @ 0.5%
1350mmø STM @ 0.5%
750mmø STM @ 1.0%
750mmø STM @ 0.4%
825mmø STM @ 1.5%
675mmø STM @ 0.85%
675mmø STM @ 5.0%
675mmø STM @ 0.4%
675mmø STM @ 0.4%
675mmø STM @ 0.4%

LEGEND

- SITE BOUNDARY
- DEVELOPMENT LIMIT
- MH STM. PROPOSED STORM SEWER
- EXISTING CULVERT
- F/G=336.51 / STM OBV.=331.81± / DEPTH=2.70m± — C/L ROAD FINISHED GRADE / PROPOSED LOCAL STORM OBVERT / STORM COVER

FIGURE 4.5

Date: APR.19/24
Scale: 1:4500

STORM SERVICING PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 46927-104

April 26, 2024 — 4:12 p.m. — Plotted By: CCarre

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5.0 PROPOSED SWM STRATEGY

5.1 SWM Criteria

New developments are required to provide stormwater management in accordance with provincial and municipal policies. Relevant documents, which have been previously listed, have been referenced in the design of the SWM plan for the subject lands, including:

- *Stormwater Management Planning and Design Manual* (MECP formerly MOE, 2003);
- *Policies for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation – Ontario Regulation 150/06* (GRCA, 2015);
- *Stormwater Management Study, Guelph Innovation District (Wood, 2020);*
- *Stormwater Management Master Plan: Final Stormwater Infiltration Policy Recommendations* (Aquafor Beech Ltd., 2022); and,
- *Development Engineering Manual,* (City, 2023).

Based on the above policies and relevant documents, the following SWM criteria have been established for the subject lands:

- **Water Quality Control** – Provide an Enhanced level of stormwater quality treatment prior to discharging to surface or groundwater systems.
- **Water Quantity Control** – Control peak flow rates to the Eramosa River to existing levels for the 5-year storm event. For the 25-year and 100-year storm events, control peak flow rates to the allowable Unitary Rates specified in the 2020 *GID SWM Study*. This will minimize flooding and preserve hydraulic and hydrologic functions.
- **Water Balance** – 27mm rainfall capture in infiltrative Low Impact Development measures (LIDs) and maintain or enhance existing recharge rates across the development area.
- **Thermal Mitigation** – Implement thermal preventative and mitigation measures to maintain cool water fish habitat (Eramosa River).

It should be noted that the overall SWM design criteria established in the 2020 *GID SWM Study* includes a treatment train approach, with distributed LID Best Management Practices (BMPs) coupled with end-of-pipe SWM facilities. To aid in the overall quality and quantity control for the subject lands, the goal of the LID BMPs is to be adequately sized to capture 27mm of rainfall depth over the entire development area, whereas the resulting excess flows are conveyed to the respective SWMFs.

It should also be noted that the City is currently undertaking an update to the *Stormwater Management Master Plan*. Once completed, this revised document shall be reviewed to confirm governing SWM criteria for the subject lands.

5.1.1 Water Quality Control

All new SWMFs proposed for the development will need to provide an Enhanced level (80% TSS reduction) of water quality protection prior to discharging to surface or groundwater systems. Furthermore, a chloride mitigation strategy should be designed to protect groundwater from chloride loading during winter months. Consideration should be given to a winter bypass for infiltration measures that receive runoff from roadways and/or parking areas (i.e. surfaces that receive winter maintenance). Site specific Salt Management Plans shall be developed to align with *Source Water Protection Policies.* Additionally, end-of-pipe SWMFs should be lined.

Erosion and Sediment Control (ESC) Plans shall be designed to incorporate flexible ESC measures, to accommodate required changes resulting from specific rainfall events or site conditions. The ESC measures should aim to protect the downstream features from sediment-laden runoff during construction, until such time that the contributing drainage areas have been vegetated and established. Refer to Section 6.0 for more details.

5.1.2 Water Quantity Control

As described in the foregoing studies, the overall SWM strategy for the GID Lands is to maintain existing hydraulic and hydrologic conditions. As such, allowable post-development flow rates to the Eramosa River were developed in two ways.

First, the 2020 *GID SWM Study* established Unitary Storage Volumes and Discharge Rates to the Eramosa River for GID and proposed the post-development allowable flow rates for the 25-year and 100-year storm events.

Secondly, since a Unitary Rate is not available in the 2020 study for a 5-year storm event, a pre-development hydrologic model was developed using SWMHYMO to confirm the existing flow rates offsite. It is assumed that a post-to-pre-development peak flow rate maintenance would be appropriate for the 5-year storm event. This additional analysis helps appropriately size receiving sewers, ensuring capacity for the 5-year event flows.

The appropriate quantity control is to be provided by the proposed SWMFs; ultimately discharging to the Eramosa River.

The post-development total allowable peak flow rates outlined in **Table 5.1** below include a combination of flow from the respective SWMF and any other additional uncontrolled flow, if applicable.

Table 5.1 – Allowable Post-Development Peak Flow Rates (m^3/s)

Storm Event	Unitary Discharge ($m^3/s/ha$)*	Outlet 1 - North to Eramosa River	Outlet 2 - East to Eramosa River	Outlet 3 - (SWMF No. 104)
5-year	-	1.603	0.798	0.533
25-year	0.069	4.227	1.041	1.559
100-year	0.131	8.025	1.975	2.959

*Note: 1. Taken from Table 5.4.4 of the 2020 *Stormwater Management Study, Guelph Innovation District* by Wood.
2. Areas used to determine the allowable release rates are the post-development catchments. See Section 5.3.

As identified in the 2020 *GID SWM Study* and subsequent studies, additional erosion controls are not required due to the implementation of upstream LID BMPs (i.e. the 27mm capture).

5.1.3 Water Balance

Water Balance criteria are set out by the policies and analyses conducted for the 2020 *GID SWM Study* and 2022 *Stormwater Management Master Plan: Final Stormwater Infiltration Policy Recommendations*.

The studies outline requirements for infiltration and the protection of groundwater and surface water features. In a general sense, the requirement is to maintain pre-development infiltration in post-development conditions, while protecting the groundwater resources.

The following recommendations have been outlined specifically for the subject lands:

- LID BMPs are recommended to reduce stormwater runoff and promote groundwater recharge;
- LID integration in the public right-of-ways, open spaces, and amenity areas are encouraged; and,
- Design a distributed infiltration strategy such that 27mm of capture over pre-development conditions is maintained in post-development conditions.

5.1.4 Thermal Mitigation

According to the City's latest SWM Master Plan, the Eramosa River has been classified as having a cool water regime. Therefore, the following criteria should be applied:

- Pre-development water balance is to be maintained;
- Infiltration and filtration measures should be maximized, where possible; and,
- All end-of-pipe facilities should be designed to implement appropriate thermal mitigation measures.

5.2 Pre-Development Conditions

The subject lands are located in the southeastern end of the Eramosa River watershed, adjacent to the confluence of the Torrance Creek, Clythe Creek, and Hadati Creek with the Eramosa River. The pre-development catchment areas are shown in **Figure 5.1** and summarized as follows:

Catchment 101 (Outlet 1) – this catchment is 54.91ha in size with an agricultural/open space land use. For modelling purposes, the average slope is approximately 6.0%, with steeper localized slopes to the north. The majority of overland flow drains west towards Victoria Road South, where roadside ditches and culverts convey flow northward. The ultimate outlet is considered to be the Eramosa River to the north; east of Victoria Road South.

Catchment 102 (Outlet 2) – this catchment is 27.50ha in size with an agricultural/open space land use. For modelling purposes, the average slope is approximately 4.0%, with steeper localized slopes to the north. The majority of overland flow drains east towards the adjacent Natural Areas. The ultimate outlet is considered to be the Eramosa River to the east.

Catchment 103 (Outlet 3) – this catchment is 16.55ha in size, which includes approximately 7.90ha of external lands (Victoria Road South right-of-way, Stone Road East right-of-way, and some developed lands to the south). For modelling purposes, the average slope is approximately 2.0%. Overland flow from this catchment drains to the northeastern corner of the Victoria-Stone intersection, where an existing storm sewer network and overland conveyance directs flow towards an infiltration drypond (SWMF No. 104 – refer to 2020 *GID SWM Study*).

Ex. 1000mmø CMP
N. Obv.=310.163
S. Obv.=310.391

Ex. 650mmø CSP
NW. Obv.=310.607
SE. Obv.=310.857

Ex. 300mmø CSP
E. Inv.=309.389
W. Inv.=310.333

Ex. 650mmø CSP
NE. Inv.=309.74
SW. Inv.=327.67

Ex. 600mmø CMP
NE. Inv.=316.79
SW. Inv.=317.05

Ex. 600mmø CONC
N. Inv.=317.53
S. Inv.=317.61

Ex. 400mmø CMP
NE. Inv.=317.78
SW. Inv.=317.96

Ex. 500mmø CMP
NE. Inv.=322.587
SW. Inv.=322.764

Ex. 400mmø CMP
NE. Inv.=334.940
SW. Inv.=335.340

Ex. 400mmø CMP
NE. Inv.=336.449
SW. Inv.=336.628

Ex. 350mmø HDPE
NE. Inv.=332.83
SW. Inv.=333.44

Ex. 350mmø HDPE
NE. Inv.=335.37
SW. Inv.=335.64

Ex. 400mmø CMP
NE. Inv.=334.372
SW. Inv.=333.939

Ex. 300mmø CMP
NE. Inv.=308.528
SW. Inv.=308.568

Ex. 1100mmø CMP
NE. Inv.=327.90
SW. Inv.=327.67

Ex. CMP
NE. Inv.=330.10
SW. Inv.=330.12

GUELPH JUNCTION RAILWAY

CLYTHE CREEK

STONE RD E

VICTORIA RD S

102
27.50

101
54.91

103
16.55

101
2.02

LEGEND

- SITE BOUNDARY
- ID No.
- CATCHMENT AREA (HA)
- EXISTING GRADE CONTOURS
- EXISTING CULVERT
- LIMIT OF PRE-DEVELOPMENT CATCHMENT AREA
- GRCA REGULATION LIMIT
- EXISTING DIRECTION OF DRAINAGE/SWALE
- TOP OF SLOPE
- 6m OFFSET TOP OF SLOPE
- FLAGGED DRIPLINE-OCT 2022
- NRSI 10.0m DRIPLINE BUFFER (OCT. 2022)
- NRSI SURVEYED WETLAND BOUNDARY
- NRSI 30m WETLAND BUFFER
- GRCA FLOODLINE
- GRCA WETLAND
- WATERBODY
- IMPERVIOUS AREA

FIGURE 5.1

Date: APR.19/24
Scale: 1:4500

PRE-DEVELOPMENT DRAINAGE AREA PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 46927-104

April 24, 2024 — 8:08 a.m. — Plotted By: ORahmaty

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5.3 Post-Development Conditions

The preferred SWM solution for the subject lands requires the implementation of at-source distributed infiltration measures, end-of-pipe infiltration measures, LIDs, and three proposed SWMFs. These facilities are generally aligned with the drainage patterns and SWMF locations recommended in the 2020 *GID SWM Study*. Effort was made to locate SWMFs to optimize the proposed grading, sanitary sewer servicing, and storm sewer servicing. The SWM plan is designed to meet the criteria presented in Section 5.1 of this report.

Minor storm event runoff from all respective contributing areas will be conveyed by the proposed storm sewer system to the SWMFs. Excess runoff from major storm events will flow overland to the facilities, via the proposed right-of-ways and designed overland flow routes, where applicable.

For modelling and analysis purposes, as mentioned in Section 5.2, flow to the Eramosa River has been divided into three distinct 'Outlets'. Outlet 1 flows north, Outlet 2 flows east, and Outlet 3 is considered the existing infiltration facility (SWMF No. 104), which ultimately flows north along Victoria Road South once the infiltration capacity is exceeded. These Outlets are still maintained under post-development conditions and summarize a combination of flows from the respective SWMFs and the associated uncontrolled areas from their contributing catchments. The post-development drainage catchments are shown in **Figure 5.2** and are summarized as follows:

Outlet 1

- **Catchment 201-1** – Catchment 201-1 consists of the northeastern portion of the developed tablelands and is proposed to drain to the eastern forebay of SWMF 1. The drainage area contains a combination of single-family residential blocks, multiple residential blocks, mixed-use blocks, park blocks, and a portion of the SWMF. The average overland slope is approximately 2.0% and the drainage area is approximately 22.06ha.
- **Catchment 201-2** – Catchment 201-2 consists of the northwestern portion of the developed tablelands and is proposed to drain to the western forebay of SWMF 1. The drainage area contains a combination of single-family residential blocks, multiple residential blocks, mixed-use blocks, employment blocks, park blocks, and a portion of the SWMF. The average overland slope is approximately 1.5% and the drainage area is approximately 36.14ha.
- **Catchment 201-3 –** Catchment 201-3 consists of development block embankments and proposed road sections that drain uncontrolled towards Victoria Road South; ultimately northward to the Eramosa River. The average overland slope is approximately 5.0% and the drainage area is approximately 2.34ha.
- **Catchment 201-4** – Catchment 201-4 consists of SWM and development block embankments that drain uncontrolled northward towards the Eramosa River. The average overland slope is approximately 25.0% and the drainage area is approximately 0.72ha.

Outlet 2

- **Catchment 202-1** – Catchment 202-1 consists of the southeastern portion of the developed tablelands and is proposed to drain to SWMF 2. The drainage area contains a combination of single-family residential blocks, multiple residential blocks, mixed-use blocks, park blocks, and SWMF 2 itself. The average overland slope is approximately 4.0% and the drainage area is approximately 9.32ha.
- **Catchment 202-2** – Catchment 202-2 consists of the largest park block, along the east, and the rear yards of some single-family residential blocks. The catchment drains uncontrolled eastward towards the Eramosa River. The average overland slope is approximately 5.0% and the drainage area is approximately 4.62ha.
- **Catchment 202-3** – Catchment 202-3 consists of the outlet easement and eastern embankment of SWMF 2. The catchment drains uncontrolled eastward towards the Eramosa River. The average overland slope is approximately 30.0% and the drainage area is approximately 0.52ha.
- **Catchment 202-4** – Catchment 202-4 consists of development block embankments in the southeastern corner of the subject lands that drain uncontrolled eastward towards the Eramosa River. The average overland slope is approximately 30.0% and the drainage area is approximately 0.62ha.

Outlet 3

- **Catchment 203** – Catchment 203 consists of the southwestern portion of the developed tablelands and external lands surrounding the Victoria-Stone intersection. This catchment is proposed to drain to SWMF 3. The drainage area contains a combination of existing single-family residential and aggregate extraction land uses, with proposed multiple residential blocks, mixed-use blocks, employment blocks, park blocks, a school block, and SWMF 3 itself. The average overland slope is approximately 2.0% and the drainage area is approximately 22.59ha.

All SWMFs are designed to outlet to the Eramosa River, through a combination of piped and overland flows. SWMF 3 includes the amalgamation of existing SWMF No. 104 and is designed as a wet pond with an infiltration cell. This will help maintain existing groundwater recharge in the area during non-winter months, currently being provided by the existing facility. To help protect the groundwater quality, SWMF 3 will also include a winter bypass, such that chloride-laden runoff during the winter months will be diverted directly to the Eramosa River.

5.4 Hydrologic Modelling

As previously mentioned in Section 5.1.2, a 5-year storm event existing conditions model for the subject lands was developed using the SWMHYMO modelling platform. The model was then updated to reflect assumed proposed conditions and SWM strategies within the subject lands to create a proposed hydrologic model. The proposed development conditions were modelled for the 5, 25, and 100-year return period rainfall events (3-hour Chicago distribution derived from the City's IDF parameters).

It should be noted that pre-development models were not created for the 25-year and 100-year storm events. As previously mentioned, allowable release rates for these storm events are calculated using the established Unitary Discharge Rates from the 2020 *GID SWM Study*.

The pre- and post-development modelling is included in **Appendix D**. The IDF and hydrologic parameters for each of the pre- and post-development catchment areas are included in **Appendix E**.

Ex. 1000mmø CMP
N. Obv.=310.163
S. Obv.=310.391

Ex. 650mmø CSP
NW. Obv.=310.607
SE. Obv.=310.857

Ex. 300mmø CSP
E. Inv.=309.389
W. Inv.=310.333

Ex. 650mmø CSP
NE. Inv.=309.74
SW. Inv.=327.67

Ex. 600mmø CMP
NE. Inv.=316.79
SW. Inv.=317.05

Ex. 600mmø CONC
N. Inv.=317.53
S. Inv.=317.61

Ex. 400mmø CMP
NE. Inv.=317.78
SW. Inv.=317.96

Ex. 500mmø CMP
NE. Inv.=322.587
SW. Inv.=322.764

PROPOSED GRADES
ALONG VICTORIA ROAD
ASSUMED FOUR LANES
URBAN CROSS-SECTION

Ex. 400mmø CMP
NE. Inv.=334.940
SW. Inv.=335.340

Ex. 400mmø CMP
NE. Inv.=336.449
SW. Inv.=336.628

Ex. 350mmø HDPE
NE. Inv.=332.83
SW. Inv.=333.44

Ex. 350mmø HDPE
NE. Inv.=335.37
SW. Inv.=335.64

Ex. 400mmø CMP
NE. Inv.=334.372
SW. Inv.=333.939

Ex. 300mmø CMP
NE. Inv.=308.528
SW. Inv.=308.568

Ex. 1100mmø CMP
NE. Inv.=327.90
SW. Inv.=327.67

Ex. 700mmø CMP
NE. Inv.=330.10
SW. Inv.=330.12

PROPOSED GRADES
ALONG VICTORIA ROAD
ASSUMED FOUR LANES
URBAN CROSS-SECTION

201-4 / 0.72
202-2 / 4.62
202-3 / 0.52
202-4 / 0.62
201-1 / 22.06
202-1 / 9.32
203 / 22.59
201-2 / 36.14
201-3 / 2.34

SWM 1
SWM 3

GUELPH JUNCTION RAILWAY
CLYTHE CREEK
STONE RD E
VICTORIA RD S

STREET A
STREET B
STREET C
STREET D
STREET E
STREET F
STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
STREET 6
STREET 7
STREET 8
STREET 9
STREET 10
STREET 11

Block 85 Stormwater Management
Block 84 PARK 2 Park
Block 34 Residential Condominium
Block 35 Multiple Residential
Block 36 Multiple Residential
Block 38 Multiple Residential
Block 39 Multiple Residential
Block 40 Multiple Residential
Block 41 Multiple Residential
Block 45 Multiple Residential
Block 46 Multiple Residential
Block 47 Multiple Residential
Block 53 Mixed Use
Block 54 Mixed Use
Block 55 Mixed Use
Block 56 Mixed Use
Block 57 Mixed Use
Block 58 School
Block 59 Employment
Block 60 Employment
Block 61 Employment
Block 62 Employment
Block 67 Park
Block 70 Park
Block 72 Park
Block 82 Park
Block 88 Open Space

LEGEND

- SITE BOUNDARY
- EXISTING CULVERT
- EXISTING GRADE CONTOURS (326.0)
- PROPOSED GRADE CONTOURS (333)
- MAJOR OVERLAND FLOW
- LIMIT OF POST-DEVELOPMENT CATCHMENT AREA
- GRCA REGULATION LIMIT
- PROPOSED DIRECTION OF DRAINAGE
- TOP OF SLOPE
- 6m OFFSET TOP OF SLOPE
- FLAGGED DRIPLINE-OCT 2022
- NRSI 10.0m DRIPLINE BUFFER (OCT. 2022)
- NRSI SURVEYED WETLAND BOUNDARY
- NRSI 30m WETLAND BUFFER
- 201 / 0.90 — ID No. / CATCHMENT AREA (Ha)
- GRCA FLOODLINE
- GRCA WETLAND
- WATERBODY
- SWM EASEMENT

FIGURE 5.2
Date: APR.19/24
Scale: 1:4500

POST-DEVELOPMENT DRAINAGE AREA PLAN

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Project No.: 46927-104

5.5 Water Quality Control

The proposed SWMFs are designed as wet ponds with permanent pool depths of 1.5m. The facilities will incorporate sediment forebays with a depth of 1.5m, which offer benefits of dilution and settling of sediment. A planting scheme will be prepared that carefully selects plant species and their location in and around the basins to stabilize banks, mitigate temperature increases, deter waterfowl from nesting within the area, and provide aesthetics and safety benefits.

Since the majority of annual rainfall occurs in storms less than or equal to a 25mm event, the majority of water borne sediment is also transported to the stormwater management facilities in these less intense events. Therefore, the sediment forebays are designed targeting the smaller flow events. Furthermore, since larger storm events will have greater peak flows, there is potential for re-suspension of accumulated sediment. Thus, the smaller flows into the forebays should be separated from the larger flows, which should enter the main pond directly. To achieve this objective, appropriately sized splitter structures upstream of the forebays are proposed where possible.

Sizing of a splitter structure by simply sizing the outlet pipes based on their free flowing (Manning's) capacities often results in 'washout' of the forebay (and costly remediation) due to larger flows that result from surcharging of the splitter structure. The design of the splitter structures for this development shall incorporate both free flowing pipe capacities (i.e. assuming no surcharge and using Manning's equation) as well as the effects of head buildup within the splitter structure and associated discharge pipes.

The forebay design is based on classic particle settling and flow dispersion equations as presented in the MECP's 2003 *SWM Manual*. The methodology presented in that document suggests that the design flow for the forebay should be taken as the peak outflow from the facility. The main cell will essentially be empty (or at its permanent pool level) and there will be no mass of water at the outlet of the forebay that would control the flow through the forebay to the main pond's discharge rate.

This being the case, the design of the forebay should be based on the notion that the flow into the forebay equals the flow through the forebay, which equals the flow out of the forebay. In using this approach, the recommended settling velocity of 0.0003m/s (from MECP, 2003) results in extremely large and un-achievable forebay lengths. Therefore, the forebay is designed to satisfy the following four conditions:

- Settling length based on a settling velocity of 0.0003m/s using the main pond peak discharge for the 25mm event;
- Settling length based on a settling velocity of 0.0055m/s using the forebay inflow/outflow for the 25mm event;
- Dispersion length such that, based on flow and depth of water, the velocity through the forebay is less than 0.5m/s; and,
- Velocity based on flow divided by cross-sectional area is less than 0.15m/s to prevent scouring.

The 2003 MOE document suggests that the clean-out frequency for a stormwater management facility be based on the sediment loading within the entire pond, however, it is recommended that the clean-out frequency be based on the loadings within the forebay only. While this typically results in more frequent clean-out, it is restricted to the forebay area only and avoids disturbance of the main pond. The clean-out frequency for the proposed SWM facilities can be found in the respective forebay design calculations in **Appendix E**.

5.5.1 SWM Facility 1

The total drainage area for SWMF 1 (Catchments 201-1 and 201-2) is 58.20ha at 81.0% imperviousness. The MECP requires 243m^3/ha of total storage for an Enhanced level wet pond, 40m^3/ha of which is extended detention, so the required permanent pool and extended detention volumes for SWMF 1 are 11,833m^3 and 2,328m^3, respectively.

The combined forebays and main pond have permanent pool volumes of 4,456m^3 and 12,651m^3, respectively, for a total permanent pool volume of 17,107m^3. Therefore, SWMF 1 has adequately provided the minimum required permanent pool volume per MECP guidelines.

The SWMF 1 design characteristics are summarized in **Table 5.2** below. Refer to **Figure 5.3** and **Figure 5.4** for plan and profile details of the SWMF and associated hydraulic controls.

This SWMF will outlet through a dedicated storm sewer within an easement along the northern limits of the subject lands. Similarly, a conveyance channel will be graded within the same easement, with the capacity for the excess flow leaving the pond. The combination of these two outlets will be designed to convey the 100-year storm event flow from the facility. The ultimate Outlet 1 is north to the Eramosa River, along the eastern side of Voctoria Road South.

Refer to **Appendix E** for the appropriate SWMF design sheets and calculations.

Table 5.2 – SWM Facility 1 Design Characteristics

General	Facility Characteristics
Stormwater Management Facility Type	Wet pond
Required MECP Water Quality Protection	Enhanced
Total Contributing Area	58.20ha
Imperviousness	81.0%
Bottom Elevation (of main facility)	325.00m
Storage	
Unit Area Storage Volume Requirements as per SWMMP (MOE, 2003)	243m^3/ha
Required Total Volume	14,161m^3
Permanent Pool	
Required Permanent Pool Volume	11,833m^3
Permanent Pool Volume Provided	17,107m^3
Permanent Pool Elevation	326.50m
Water Quantity Control – 5-year Major Storm Event	
Required Storage Volume	15,610m^3
Ponding Elevation	327.48m
Peak Outflow	1.512m^3/s
Water Quantity Control – 100-year Major Storm Event	
Required Storage Volume	26,030m^3
Ponding Elevation	328.06m
Peak Outflow	7.006m^3/s
Forebay	
Required Forebay Length (East / West)	39.0m / 72.7m
Actual Forebay Length (East / West)	53.9m / 92.0m
Permanent Pool Elevation	326.50m
Bottom Elevation	325.00m
Outlet Controls	
Orifice 1 Diameter	900mm
Orifice 1 Elevation	326.30m
Cutout Weir Width	8.0m
Cutout Weir Elevation	327.50m
Emergency Overflow Weir Width	7.0m
Emergency Overflow Weir Elevation	328.80m

STORMWATER MANAGEMENT FACILITY 1
BOTTOM ELEVATION =325.00
PERMANENT POOL ELEVATION =326.50

WET CELL

FOREBAY 1

FOREBAY 2

4m WIDE ASPHALT ACCESS ROAD

MICROPOOL ELEV.=324.50

WEIR ELEV.=326.80

EMERGENCY WEIR ELEV.=329.50

45.0m–750mmø STM. @ 1.00%

29.9m–750mmø STM. @ 1.00%

13.4m–750mmø STM. @ 1.00%

33.9m–750mmø STM. @ 1.00%

17.0m–1350mmø STM. @ 1.00%

36.9m–1650mmø STM. @ 0.25%

18.1m–1950mmø STM. @ 0.30%

16.3m–1200mmø STM. @ 0.76%

14.9m–1050mmø STM. @ 1.00%

11.9m–1650mmø STM. @ 0.25%

80.4m–1650mmø STM. @ 0.30%

97.9m–1650mmø STM. @ 0.25%

25.8m–1200mmø STM. @ 1.00%

83.5m–1200mmø STM. @ 0.63%

MH124 MH125 MH126 MH105 MH106 SPLITTER MH104 MH103 MH113 MH114

HW123 HW102 HW101 HW112 HW111

12m WIDE PROPOSED EASEMENT FOR STORM PIPE INLET

3.0m WIDE TRAIL

2.0m WIDE BLOCK

Block 84
Park

Block 35
Multiple
Residential

Block 83
Park

Block 34
Residential
Condominium

LEGEND

- SITE BOUNDARY
- LIMIT OF GRADING
- EXISTING SPOT ELEVATIONS/CONTOURS
- FINISHED GRADE CONTOURS
- PROPOSED GRADE
- EXISTING GRADE
- EMBANKMENT (SLOPE AS NOTED)
- DIRECTION OF DRAINAGE/SWALE
- OVERLAND FLOW ROUTE (MAJOR STORM)
- STORM SEWER
- SHALLOW PIPE INSULATION (SEE DETAIL)
- PERMANENT POOL
- SWM POND ACCESS ROAD
- ARTICULATED CONCRETE CABLE MAT
- TURFSTONE CONCRETE PAVING BLOCKS
- 300mm GABION BLOCK MATS
- PROPOSED EASEMENT
- GRCA REGULATION LIMIT
- GRCA FLOODPLAIN
- TOP OF SLOPE
- TOP OF SLOPE 6m OFFSET
- EXISTING DRIPLINE SURVEYED BY MTE
- NRSI DRIPLINE
- NRSI 10m DRIPLINE BUFFER
- DEVELOPMENT LIMIT

FIGURE 5.3
Date: APR.19/24
Scale: 1:1000

SWM FACILITY 1 PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 46927-104

April 24, 2024 — 8:10 a.m. — Plotted By: ORahmaty

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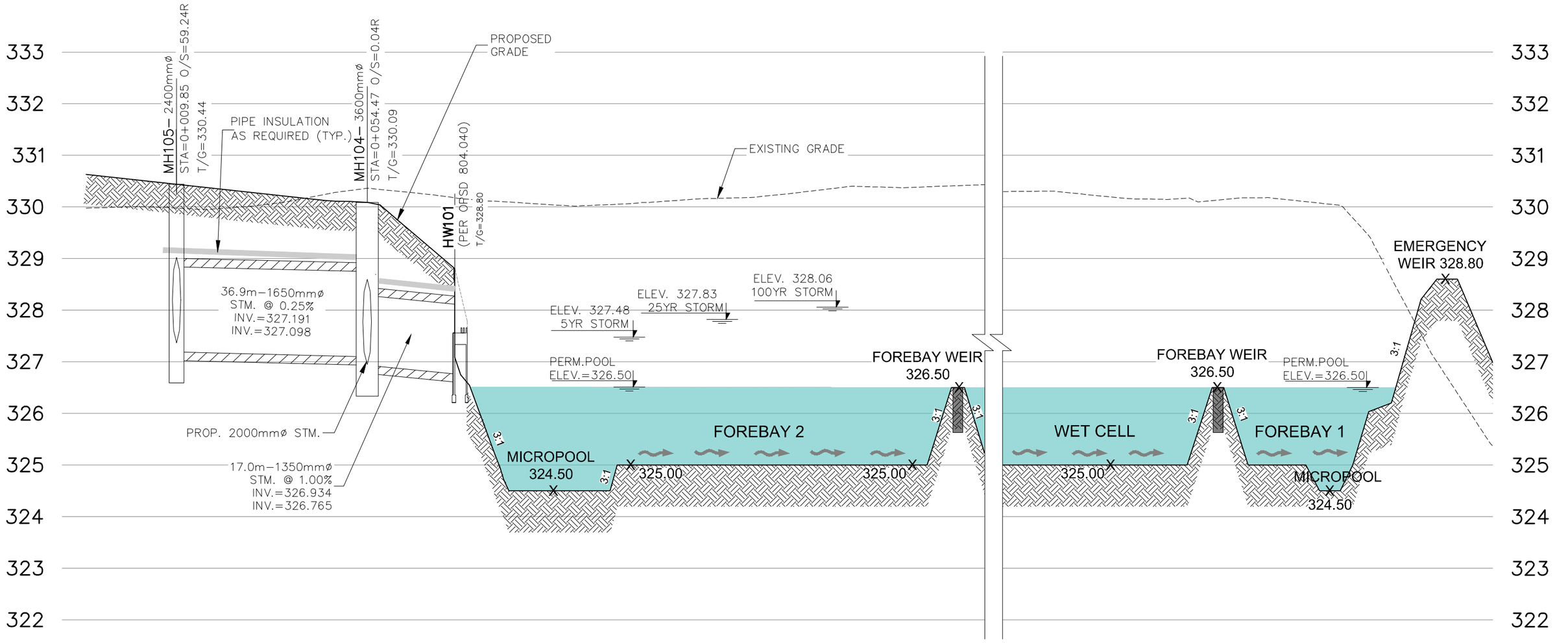

FIGURE 5.4 Date: APR.19/24 Scale: H 1:750 V 1:75

SWM FACILITY 1 SECTION

MTE

Engineers, Scientists, Surveyors

Project No.: 46927-104

April 24, 2024 – 8:11 a.m. – Plotted By: ORahmaty

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5.5.2 SWM Facility 2

The total drainage area for SWMF 2 (Catchment 202-1) is 9.32ha at 80.8% imperviousness. The MECP requires 243m^3/ha of total storage for an Enhanced level wet pond, 40m^3/ha of which is extended detention, so the required permanent pool and extended detention volumes for SWMF 2 are 1,892m^3 and 373m^3, respectively.

The forebay and main pond have permanent pool volumes of 1,120m^3 and 1,758m^3, respectively, for a total permanent pool volume of 2,877m^3. Therefore, SWMF 2 has adequately provided the minimum required permanent pool volume per MECP guidelines.

The SWMF 2 design characteristics are summarized in **Table 5.3** below. Refer to **Figure 5.5** and **Figure 5.6** for plan and profile details of the SWMF and associated hydraulic controls.

The outlet pipe from this SWMF will outlet to a constructed channel, located within a proposed easement along the southeastern limit of the property boundary. Flow will be conveyed eastward along the north side of Stone Road East, to the existing 600mm diameter CMP culvert under the railway. This culvert will then direct flow to Outlet 2, east to the Eramosa River. Through investigations of the existing conditions of the culvert, it was confirmed that it is undersized. Therefore, this culvert will need to be upsized, or possibly twinned, under proposed conditions.

Refer to **Appendix E** for the appropriate SWMF design sheets and calculations.

Table 5.3 – SWM Facility 2 Design Characteristics

General	Facility Characteristics
Stormwater Management Facility Type	Wet pond
Required MECP Water Quality Protection	Enhanced
Total Contributing Area	9.32ha
Imperviousness	80.8%
Bottom Elevation (of main facility)	321.50m
Storage	
Unit Area Storage Volume Requirements as per SWMMP (MOE, 2003)	243m^3/ha
Required Total Volume	2,477m^3
Permanent Pool	
Required Permanent Pool Volume	2,265m^3
Permanent Pool Volume Provided	2,877m^3
Permanent Pool Elevation	323.00m
Water Quantity Control – 5-year Major Storm Event	
Required Storage Volume	2,080m^3
Ponding Elevation	323.68m
Peak Outflow	0.380m^3/s
Water Quantity Control – 100-year Major Storm Event	
Required Storage Volume	4,232m^3
Ponding Elevation	324.27m
Peak Outflow	0.993m^3/s
Forebay	
Required Forebay Length	22.5m
Actual Forebay Length	42.6m
Permanent Pool Elevation	323.00m
Bottom Elevation	321.50m
Outlet Controls	
Orifice 1 Diameter	465mm
Orifice 1 Elevation	322.80m
Cutout Weir Width	8.0m
Cutout Weir Elevation	324.15m
Emergency Overflow Weir Width	10.0m
Emergency Overflow Weir Elevation	324.90m

STORMWATER
MANAGEMENT FACILITY 2
BOTTOM ELEVATION=321.50
PERMANENT POOL ELEVATION =323.00

Block 86
Stormwater
Management

WET

FOREBAY

MICROPOOL
ELEV.=321.20

4m WIDE ASPHALT ACCESS ROAD

4m WIDE ASPHALT ACCESS ROAD

3.0m WIDE TRAIL

6.0m WIDE BLOCK

Block 88
Open Space

STONE ROAD EAST

Ex. Edge Concrete

Ex. Steel Guiderail

Ex. Markers

Ex. CMP

Ex. HPLS

Ex. Shoulder

Ex. Fence

Ex. RRS

Ex. CL Road

Ex. 400mmø CMP
NE. Inv.=317.78
SW. Inv.=317.96

HW209

HW207

HW201

HW200

MH208

MH202

MH203

MH204

MH205

38.9m–600mmø STM. @ 1.00%

29.4m–600mmø STM. @ 5.00%

8.9m–1500mmø STM. @ 0.80%

29.1m–1500mmø STM. @ 0.80%

13.0m–1500mmø STM. @ 0.80%

12.1m–1050mmø STM. @ 0.80%

72.6m–1500mmø STM. @ 0.80%

79.2m–1500mmø STM. @ 1.95%

10% MAX

LEGEND

- SITE BOUNDARY
- LIMIT OF GRADING
- EXISTING SPOT ELEVATIONS/CONTOURS
- FINISHED GRADE CONTOURS
- (322.00) PROPOSED GRADE
- (322.00)EX. EXISTING GRADE
- MH 21.3m–300mmø STM @ 1.30% STORM SEWER
- SHALLOW PIPE INSULATION (SEE DETAIL)
- (TOP) 3:1 (BOTTOM) EMBANKMENT (SLOPE AS NOTED)
- DIRECTION OF DRAINAGE/SWALE
- OVERLAND FLOW ROUTE (MAJOR STORM)
- PERMANENT POOL
- SWM POND ACCESS ROAD
- ARTICULATED CONCRETE CABLE MAT
- TURFSTONE CONCRETE PAVING BLOCKS
- 300mm GABION BLOCK MATS
- GRCA REGULATION LIMIT
- GRCA FLOODPLAIN
- TOP OF SLOPE
- TOP OF SLOPE 6m OFFSET
- EXISTING DRIPLINE SURVEYED BY MTE
- NRSI DRIPLINE
- NRSI 10m DRIPLINE BUFFER
- NRSI SURVEYED WETLAND
- NRSI 30m WETLAND BUFFER
- DEVELOPMENT LIMIT
- PROPOSED EASEMENT LIMIT
- PROPOSED EASEMENT

FIGURE 5.5
Date: APR.19/24
Scale: 1:750

SWM FACILITY 2 PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 46927-104

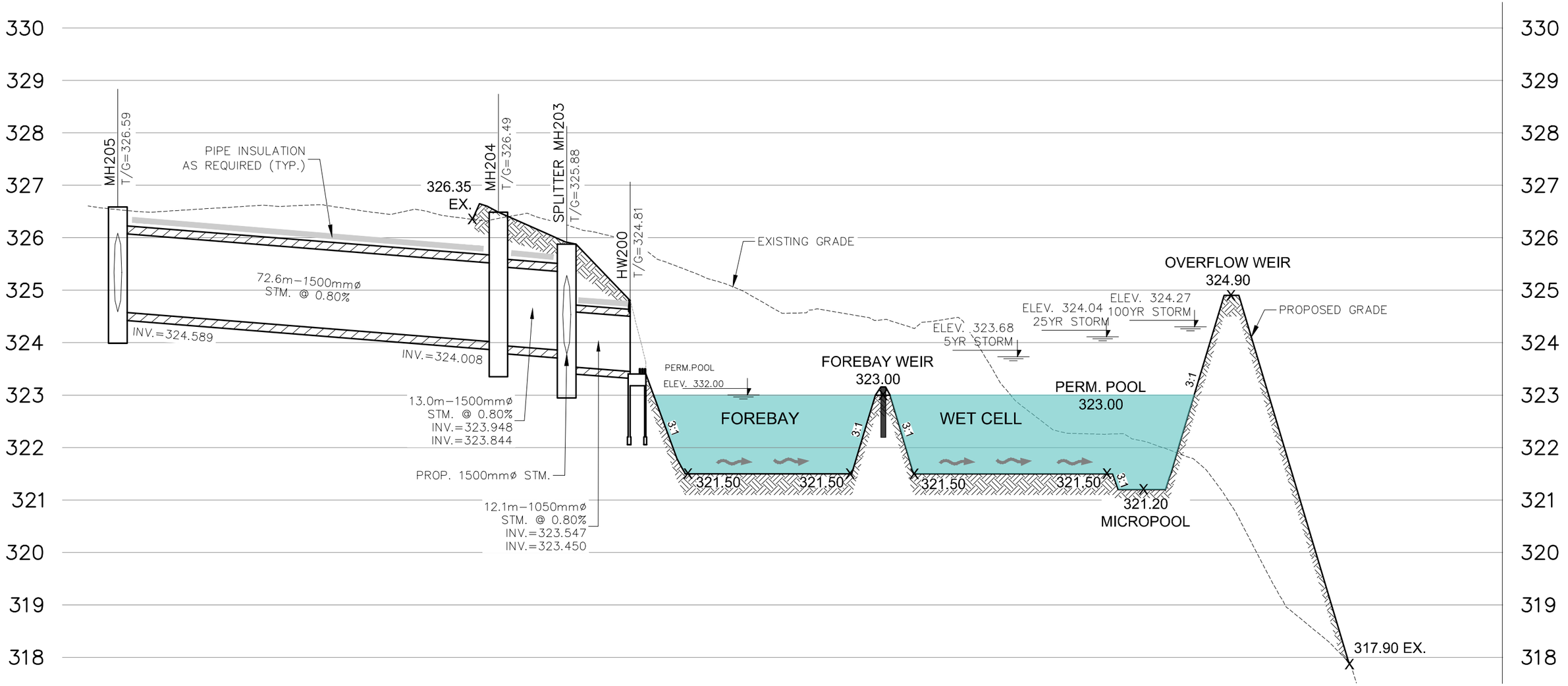

FIGURE 5.6

Date: APR.19/24
Scale: H 1:750 V 1:75

SWM FACILITY 2 SECTION

MTE
Engineers, Scientists, Surveyors

Project No.: 46927-104

5.5.3 SWM Facility 3

The total drainage area for SWMF 3 (Catchment 203) is 22.59ha at 84.7% imperviousness. The MECP requires 250m^3/ha of total storage for an Enhanced level wet pond, 40m^3/ha of which is extended detention, so the required permanent pool and extended detention volumes for SWMF 3 are 4,734m^3 and 904m^3, respectively.

The forebay and main pond have permanent pool volumes of 1,698m^3 and 7,456m^3, respectively, for a total permanent pool volume of 9,154m^3. Therefore, SWMF 3 has adequately provided the minimum required permanent pool volume per MECP guidelines.

The SWMF 3 design characteristics are summarized in **Table 5.4** below. Refer to **Figure 5.7** and **Figure 5.8** for plan and profile details of the SWMF and associated hydraulic controls.

During non-winter months, all storm events up to and including the 100-year storm event will be fully infiltrated within the proposed infiltration cell of the facility. Therefore, no surface runoff will be generated or outlet from the facility.

During winter months, the SWMF has been designed with a winter bypass to direct flows northward to the Eramosa River. A dedicated 675mm diameter storm outlet along Victoria Road South will combine with the outflow from SWMF 1; ultimately discharging at Outlet 1. This winter bypass is essential for diverting chloride-laden runoff away from the infiltration cell, in turn protecting the groundwater resource.

The design of SWMF 3 also includes the ‘retrofit’ (or amalgamation) of the existing SWMF No. 104 at the Victoria-Stone intersection. The three existing inlets to SWMF No. 104 will be combined to a single pipe and outlet through a newly proposed inlet headwall located within SWMF 3’s forebay.

Refer to **Appendix E** for the appropriate SWMF design sheets and calculations.

Table 5.4 – SWM Facility 3 Design Characteristics

General	Facility Characteristics	
Stormwater Management Facility Type	Wet pond	
Required MECP Water Quality Protection	Enhanced	
Total Contributing Area	22.59ha	
Imperviousness	84.7%	
Bottom Elevation (of main facility)	330.00m	
Storage		
Unit Area Storage Volume Requirements as per SWMMP (MOE, 2003)	250m^3/ha	
Required Total Volume	5,638m^3	
Permanent Pool		
Required Permanent Pool Volume	4,734m^3	
Permanent Pool Volume Provided	9,154m^3	
Permanent Pool Elevation	331.50m	
Water Quantity Control – 5-year Major Storm Event	**Winter**	**Non-Winter**
Required Storage Volume (Wet Cell)	6,398m^3	6,621m^3
Required Storage Volume (Infiltration Cell)	-	4,168m^3
Ponding Elevation (Wet Cell)	332.28m	332.30m
Ponding Elevation (Infiltration Cell)	-	331.59m
Peak Outflow	0.526m^3/s	0.000m^3/s*
Water Quantity Control – 100-year Major Storm Event		
Required Storage Volume (Wet Cell)	10,800m^3	8,959m^3
Required Storage Volume (Infiltration Cell)	-	11,960m^3
Ponding Elevation (Wet Cell)	332.71m	332.56m
Ponding Elevation (Infiltration Cell)	-	332.82m
Peak Outflow	2.513m^3/s	0.000m^3/s*
Forebay		
Required Forebay Length	31.7m	
Actual Forebay Length	72.0m	
Permanent Pool Elevation	331.50m	
Bottom Elevation	330.00m	
Outlet Controls		
Orifice 1 Diameter	535mm	600mm
Orifice 1 Elevation	331.30m	331.50m
Cutout Weir / Infiltration Weir Width	6.0m	16.0m
Cutout Weir / Infiltration Weir Elevation	332.35m	332.50m
Emergency Overflow Weir Width	10.0m	
Emergency Overflow Weir Elevation	333.80m	

*Note: There is no outflow from SWMF 3 during non-winter events. All storms are fully infiltrated within the infiltration cell.

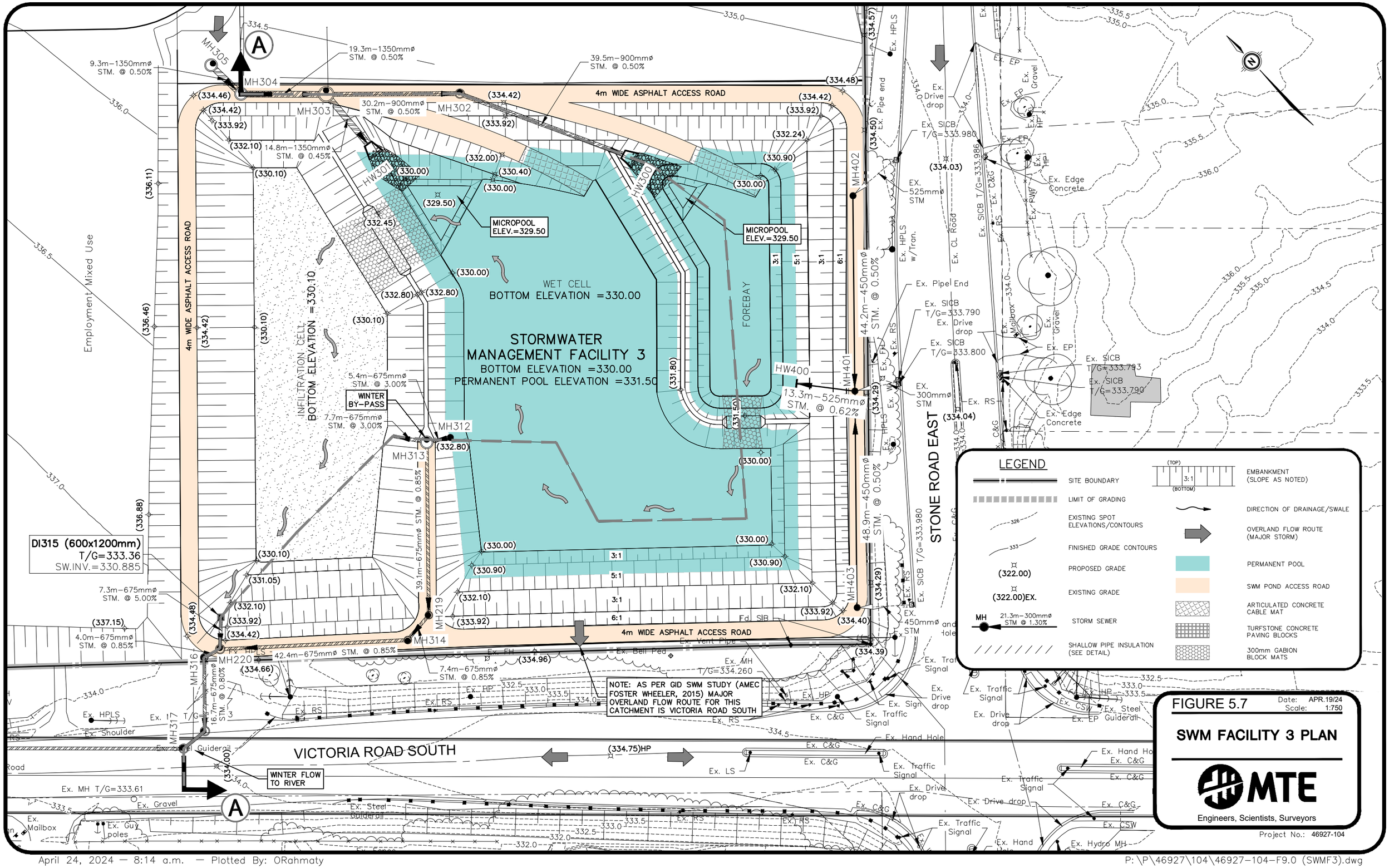

FIGURE 5.7 Date: APR.19/24 Scale: 1:750

SWM FACILITY 3 PLAN

MTE Engineers, Scientists, Surveyors

Project No.: 46927-104

April 24, 2024 — 8:14 a.m. — Plotted By: ORahmaty

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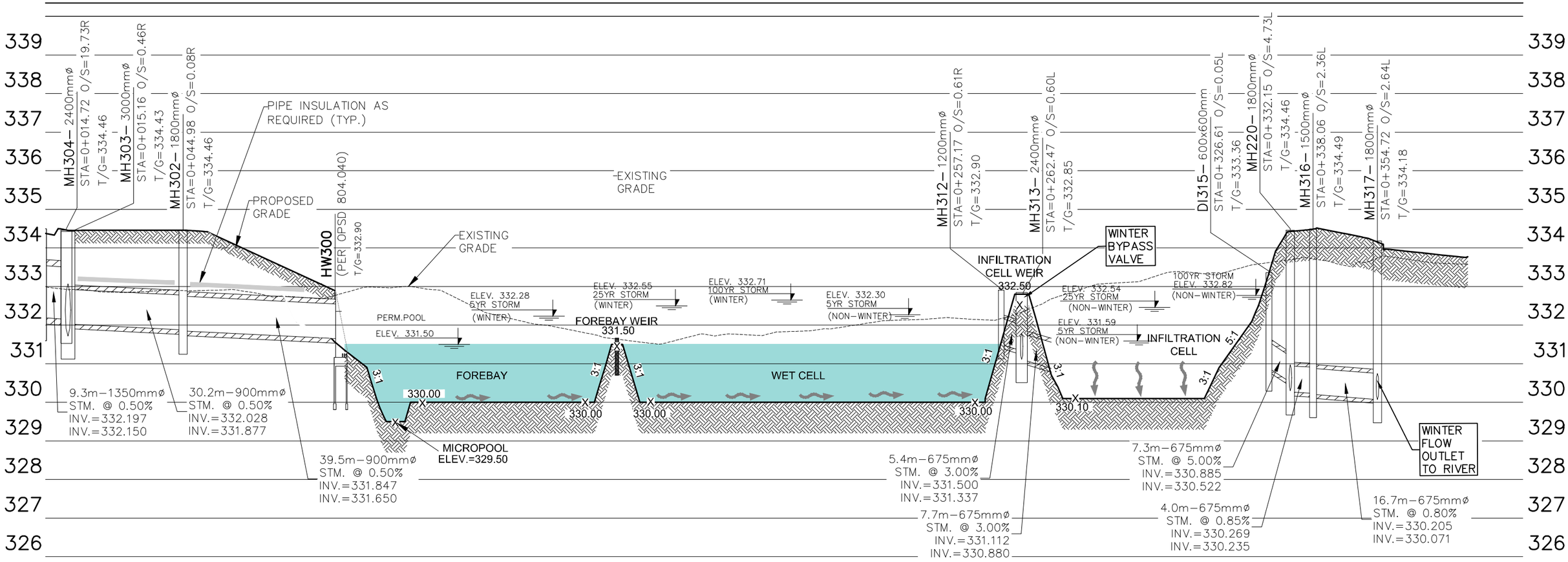

FIGURE 5.8 Scale: H 1:1000 V 1:100 Date: APR.19/24

SWM FACILITY 3 SECTION

MTE

Engineers, Scientists, Surveyors

Project No.: 46927-104

5.6 Water Quantity Control

Flows for all storm events will be conveyed to the SWMFs by a combination of storm sewers (sized for the 5-year storm event) and overland flow routes (road right-of-ways and designed channels). Similarly, the outlets from all SWMFs include a combination of piped flow and overflow channel design, to appropriately convey all storm event flows to their respective Outlet locations. The post-development SWMHYMO design event modelling output is included in **Appendix D**.

5.6.1 SWM Facility 1

SWMF 1 incorporates a typical reverse slope pipe from within the permanent pool, which outlets into an outlet control manhole through a 900mm diameter orifice plate at an elevation of 326.30m. Additional controls include an 8.0m wide cutout weir at an elevation of 327.50m to convey events larger than the 5-year storm event.

Smaller storm event outlet flows, up to and including the 5-year storm event, will be conveyed north to Outlet 1 (Eramosa River) through a 750mm diameter pipe at a 1.0% slope. Excess flow from larger storm events will be conveyed to the same Outlet location through a designed overflow channel, constructed along the northwestern property limits. A summary of the stage-storage-discharge relationship for SWMF 1 is provided in **Table 5.5** below. Refer to **Appendix E** for more details.

Table 5.5 – SWMF 1 Stage-Storage-Discharge Summary

Elevation (m)	Discharge (m^3/s)	Volume (m^3)	Remarks
326.30	0.000	0	900mm orifice
326.50	0.093	0	Permanent Pool
326.80	0.507	4,434	Contour
327.10	1.055	9,243	Contour
327.50	1.537	16,014	8.0m Cutout Weir
327.80	3.760	21,310	Contour
328.10	7.552	26,792	Contour
328.80	20.050	40,339	7.0m Emergency Overflow Weir
329.00	25.498	44,417	Freeboard

A summary of the peak flows from the facility and the associated maximum ponding elevations for the post-development conditions is summarized in **Table 5.6**. The results in this table also indicate the combined peak flows at Outlet 1, which include the additional uncontrolled areas previously discussed in Section 5.3. The results demonstrate that post-development peak flows can be attenuated to the SWM criteria outlined in Section 5.1.2. Active storage volume has been provided for the 100-year storm event to a maximum elevation of 328.06m, or 1.56m above the permanent pool elevation. Refer to the SWMHYMO output in **Appendix D** for more details.

Table 5.6 – SWMF 1 Peak Flow and Maximum Ponding Elevations

Storm Event	Ponding Elevation (m)	SWMF Release Rate (m^3/s)	Outlet 1 Combined Release Rate (m^3/s)	Allowable Release Rate (m^3/s)
5-year	327.48	1.512	1.578	1.603
25-year	327.83	4.004	4.185	4.227
100-year	328.06	7.006	7.341	8.025

5.6.2 *SWM Facility 2*

SWMF 2 incorporates a typical reverse slope pipe from within the permanent pool, which outlets into an outlet control manhole through a 465mm diameter orifice plate at an elevation of 322.80m. Additional controls include an 8.0m wide cutout weir at an elevation of 324.15m to convey events larger than the 5-year storm event.

Smaller storm event outlet flows, up to and including the 5-year storm event, will be conveyed east to Outlet 2 (Eramosa River) through a 600mm diameter pipe at a 1.0% slope. Excess flow from larger storm events will be conveyed to the same Outlet location through a designed overflow channel, constructed along the southeastern property limits. A summary of the stage-storage-discharge relationship for SWMF 2 is provided in **Table 5.7** below. Refer to **Appendix E** for more details.

Table 5.7 – SWMF 2 Stage-Storage-Discharge Summary

Elevation (m)	Discharge (m^3/s)	Volume (m^3)	Remarks
322.80	0.000	0	465mm orifice
323.00	0.062	0	Permanent Pool
323.30	0.245	859	Contour
323.70	0.387	2,156	Contour
324.15	0.567	3,798	8.0m Cutout Weir
324.40	2.031	4,794	Contour
324.70	5.430	6,076	Contour
324.90	8.320	6,994	10.0m Emergency Overflow Weir
325.10	13.003	7,971	Freeboard

A summary of the peak flows from the facility and the associated maximum ponding elevations for the post-development conditions is summarized in **Table 5.8**. The results in this table also indicate the combined peak flows at Outlet 2, which include the additional uncontrolled areas previously discussed in Section 5.3. The results demonstrate that post-development peak flows can be attenuated to the SWM criteria outlined in Section 5.1.2. Active storage volume has been provided for the 100-year storm event to a maximum elevation of 324.27m, or 1.27m above the permanent pool elevation. Refer to the SWMHYMO output in **Appendix D** for more details.

Table 5.8 – SWMF 2 Peak Flow and Maximum Ponding Elevations

Storm Event	Ponding Elevation (m)	SWMF Release Rate (m^3/s)	Outlet 2 Combined Release Rate (m^3/s)	Allowable Release Rate (m^3/s)
5-year	323.68	0.380	0.661	0.798
25-year	324.04	0.475	1.033	1.041
100-year	324.27	0.993	1.668	1.975

5.6.3 *SWM Facility 3*

Flow from SWMF 3 is controlled in various ways, depending on the time of year. During non-winter months, flow travels within a reverse slope 675mm diameter pipe and is conveyed from the wet cell through the control manhole located within the infiltration cell weir. All storm events are conveyed to the infiltration cell, where they are ultimately fully infiltrated back into the ground. The infiltration cell is equipped with a ditch-inlet structure and outlet pipe, which only becomes relevant under emergency situations.

During winter months, a winter bypass valve located within the aforementioned control manhole is closed so that flow from the wet cell does not reach the infiltration cell. Winter storm events are controlled by a 535mm diameter orifice plate at an elevation of 331.30m. Additional controls include a 6.0m wide cutout weir at an elevation of 332.35m to convey events larger than the 5-year storm event.

Smaller storm event outlet flows, up to and including the 5-year storm event, will be conveyed (as Outlet 3) northward to Outlet 1 (Eramosa River) through a 675mm diameter pipe at a 0.4% slope. This outlet pipe is considered the dedicated winter bypass from the facility.

Excess flow from larger storm events will be conveyed to the same Outlet location through a designed SWM channel, constructed along the eastern side of Victoria Road South. As previously discussed, the proposed road widening of Victoria Road South (by others) will include this roadside SWM swale. This dedicated treatment and conveyance swale is to be utilized for major overland flow from SWMF 3.

A summary of the stage-storage-discharge relationship for SWMF 3 is provided in **Table 5.9** below. Refer to **Appendix E** for more details.

Table 5.9 – SWMF 3 Stage-Storage-Discharge Summary

Elevation (m)	**Discharge (m^3/s)** NW Wet Cell / NW Infiltration Cell / Winter	**Volume (m^3)** NW Wet Cell / NW Infiltration Cell / Winter	**Remarks**
330.10	- / 0.000 / -	- / 0 / -	Bottom of Infiltration Cell
330.70	- / 0.158 / -	- / 1,113 / -	Contour (Infiltration Cell)
331.30	- / 0.158 / 0.000	- / 2,419 / 0	535mm orifice (Winter)
331.50	0.000 / 0.158 / 0.068	0 / 3,869 / 0	Permanent Pool / 600mm orifice (NW)
331.80	0.153 / 0.158 / 0.305	2,349 / 4,896 / 2,349	Contour
332.10	0.432 / 0.158 / 0.458	4,888 / 6,001 / 4,888	Contour
332.35	0.585 / 0.158 / 0.604	7,106 / 6,981 / 7,106	6.0m Cutout Weir (Winter)
332.50	0.660 / 0.158 / 1.120	8,471 / 7,592 / 8,471	16.0m Infiltration Cell Weir
332.80	4.846 / 0.158 / 3.371	8,971 / 11,702 / 11,965	Contour
333.40	- / 0.158 / 10.381	- / 20,447 / 19,398	Contour
333.80	- / 0.158 / 16.405	- / 26,624 / 24,648	10.0m Emergency Overflow Weir
334.00	- / 1.690 / 21.286	- / 29,819 / 27,364	Freeboard

A summary of the peak flows from the facility and the associated maximum ponding elevations for the post-development conditions is summarized in **Table 5.10**. The results in this table also indicate the combined peak flows at Outlet 3, which include the additional uncontrolled areas previously discussed in Section 5.3. The results demonstrate that post-development peak flows can be attenuated to the SWM criteria outlined in Section 5.1.2. Active storage volume has been provided for the 100-year storm event to a maximum elevation of 328.06m, or 1.56m above the permanent pool elevation. Refer to the SWMHYMO output in **Appendix D** for more details.

Table 5.10 – SWMF 3 Peak Flow and Maximum Ponding Elevations

Storm Event	Ponding Elevation (m)		SWMF Release Rate (m^3/s)		Outlet 3 Combined Release Rate (m^3/s)	Allowable Release Rate (m^3/s)
	Winter	NW*	Winter	NW*	Winter	
5-year	332.28	331.59	0.526	0.000	0.526	0.533
25-year	332.55	332.54	1.401		1.401	1.559
100-year	332.71	332.82	2.513		2.513	2.959

*Note: Ponding elevations shown reflect the infiltration gallery only. All storm events are fully infiltrated; therefore no outlet flow is recorded.

5.7 Water Balance

During typical urban developments, the conversion of previous vegetated area to impervious surfaces leads to a decrease in evapotranspiration and infiltration volumes and an increase in runoff volumes. As stated in previous studies and in the City's SWM Master Plan, inputs to key natural features, e.g. groundwater resources and the Eramosa River, are to be maintained in post-development conditions. Therefore, a number of SWM practices are proposed within the development lands to achieve infiltration and water balance targets.

One such target is set by the requirement for the 27mm capture in post-development conditions. The pre-development infiltration of 27mm/yr/m^2 over the total drainage catchment area (101+102+103) was calculated to establish a target infiltration volume for post-development conditions. This results in an infiltration volume of 26,719m^3/yr to be infiltrated from impervious surfaces. This volume is to be achieved through a combination of infiltration measures, including at-source distributed infiltration, treatment train designs to utilize all the proposed greenscapes and longitudinal/linear parks, and end-of-pipe infiltration (e.g. SWMF 3).

In addition to this initial capture requirement, the proposed development shall maintain existing hydraulic and hydrologic functions. Therefore, the yearly infiltration rate under post-development conditions should match the pre-development values. **Table 5.11** and **Table 5.12** below summarize the infiltration water balance in pre-development and post-development conditions, respectively.

Table 5.11 – Site Water Balance – Pre-Development Condition

Area Draining to Location (ha)	Pervious Percentage (%)	Infiltration Rate ($mm/yr/m^2$)*	Total Infiltration Volume (m^3/yr)
98.96	96.4	245	**233,724**

*Note: Infiltration Rate taken from standard ET Rate tables for Guelph. Existing conditions assume Rolling Lands and Moderately Rooted crops.

Table 5.12 – Site Water Balance – Post-Development Condition

Area Draining to Location (ha)	Pervious Percentage (%)	Infiltration Rate (mm/yr/m^2)*	Total Infiltration Volume (m^3/yr)
98.96	25.0	271	**67,045**

*Note: Infiltration Rate taken from standard ET Rate tables for Guelph. Proposed conditions assume Flat Lands and Urban Lawns.

The infiltration deficit of approximately 166,679m^3/yr currently identified in **Table 5.12** is a representation of only passive infiltration along pervious and landscaped areas being calculated. The remaining post-development infiltration will be achieved utilizing a combination of previously discussed infiltration measures. Preliminary estimates suggest that the majority of development roof areas will be required for infiltration and water balance calculations, utilizing at-source galleries to capture clean roof runoff. Supplemental measures include treatment train LID designs to utilize all the proposed linear parks and green boulevards, as well as end-of-pipe infiltration (e.g. SWMF 3).

Further analyses will be required at future final design stages, once more specific lot and building details become available, so that final water balance volumes and proposed implementation measures can be confirmed.

5.8 Thermal Mitigation

Thermal preventative and mitigation measures are important components of water quality treatment. During future detailed design stages of the subject lands, the development plans and studies will include details of the proposed thermal mitigation measures to be put in place to ensure the existing cool water regime present in the Eramosa River is not negatively impacted. Examples of such measures include, but are not limited to:

- Bottom draw outlets from SWMFs;
- Diverting SWMF outlets to cooling trenches;
- Enhanced SWMF landscaping to increase permanent pool shading;
- Improved SWMF design (which includes location and orientation to minimize sun exposure, increasing length-to-width ratios, and selective planting species); and,
- Consideration for infiltration and dry pond facilities (i.e. eliminating the permanent pool).

6.0 EROSION AND SEDIMENT CONTROL MEASURES

Precautions will be taken during construction to limit erosion and sedimentation. Erosion and Sediment Control Plans will be prepared and provided during the detailed design stage. The plans will illustrate the erosion and sediment control measures to be implemented during construction, which will limit impacts associated with development.

Typically, the recommended construction sequence for erosion and sediment control measures are as follows:

- Placement of all sediment control fencing where required;
- Topsoil stripping within the permanent SWMF and temporary sedimentation basin footprints, and strategic placement of topsoil stockpiles. Placement of sediment control fencing around all stockpile areas;
- Construction of temporary sediment control ponds outside of the permanent SWMF, which will serve as sedimentation basins for the site during construction;
- Construction of the permanent SWMFs, and any associated infiltration measures, prior to area grading;
- Construction of temporary swales to direct runoff to sedimentation basins, with rock check dams as required to control velocities; and
- Re-vegetation of completed areas as soon as possible after construction, including those areas not slated for construction within 60 days.

The permanent SWMFs will be constructed prior to their respective catchment's area grading. Temporary sediment basins will be constructed outside of the SWMFs to address runoff during area grading operations. Storage consistent with the GRCA's requirement of 125m^3/ha of live and dead storage, respectively (total 250m^3/ha), will be provided. This storage will be provided to ensure that suspended material will have ample time to settle out. In addition, the sediment basins will be sized with sufficient capacity to allow flows to pass without breaching. Once the active construction and grading activities have been completed, the sedimentation basins can be cleaned out.

Where rock check dams are proposed to promote sedimentation and reduce velocities, clean aggregate is to be placed perpendicular to the direction of flow in the swale, with a small volume of excavation on the upstream side to provide storage for accumulated sediment.

Sediment control fencing shall consist of filter fabric attached to page wire fencing and sealed at ground level. It will be installed at the perimeter of the work areas and intermittently on sloped areas where required. Sediment control fencing will be placed around all topsoil stockpiles.

Access to topsoil or fill storage areas will be located on the upstream side of storage piles. This practice will ensure continuity of the sediment control fencing in the downslope direction; which is most vulnerable to erosion and sediment deposition. Further, topsoil and hydroseed will be placed on all exposed areas following the completion of grading activities.

It is recommended that during construction, monitoring and inspection of the erosion and sediment controls be conducted to ensure the satisfactory performance of these measures. Reporting of the inspection and monitoring results should be distributed to the City and GRCA. If it is found that the erosion and sediment control measures are not working adequately, they shall be augmented to the satisfaction of the City and the GRCA, based on field decisions.

7.0 NOISE IMPACT ASSESSMENT

This section discusses the potential noise impacts on the subject lands from the existing Guelph Junction Railway, Victoria Road South, Stone Road East, and the proposed internal Street A. This analysis includes determination of noise impacts from the various sources and identification of noise control measures to meet the MECP's and the City's guidelines.

7.1 Noise Criteria

The assessment has been completed following the *Guelph Noise Control Guidelines (*City, *2018)* and the *Publication NPC-300: Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning* (MECP, 2013).

Outdoor Noise Level Limits

The recommended outdoor daytime noise levels, taken from Table C-1 in the Publication NPC-300 are:

Usage	Between Hours	Noise Levels
Outdoor Amenity Area	07:00 to 23:00	55dBA L_{eq}

Table 7.1 summarizes the noise control measures required for road and rail traffic noise sources.

Table 7.1 – Required Noise Control Measures for Outdoor Living Areas

Daytime (07:00-23:00)	Exceeds Objective By	Noise Control Measures
≤ 55dBA	0dBA	No requirements or conditions
56-60dBA	1-5dBA	Noise Warning Clause
> 60dBA	> 5dBA	Alternative Land Use Alternative Draft Plan Designs Barriers

Indoor Noise Level Limits

The recommended indoor noise levels taken from Table C-2 in the Publication NPC-300 are:

Usage	Between Hours	Noise Levels (L_{eq})	
		Road	Rail
Indoor Living Area	07:00 to 23:00	45dBA	40dBA
Indoor Living Area (Sleeping Quarters)	23:00 to 07:00	40dBA	35dBA

Outdoor sound levels (calculated at the plane of window) are used to determine if acoustical mitigation measures are required. **Table 7.2** and **Table 7.3** summarize control measures, for indoor living area sound levels, based on a 10dBA reduction for a standard wall section applied to the outdoor sound levels due to road and rail traffic, respectively.

Table 7.2 – Required Noise Control Measures for Indoor Living Areas (Road)

Daytime (07:00-23:00)	Nighttime (23:00-07:00)	Exceeds Objective By	Noise Control Measures
≤ 45dBA	≤ 40dBA	0dBA	No requirements or conditions
46-55dBA	41-50dBA	1-10dBA	Noise Warning Clause Provisions for central A/C
> 55dBA	> 50dBA	> 10dBA	Noise Warning Clause Central A/C installed prior to occupancy Building components designed to achieve indoor sound level criteria

Table 7.3 – Required Noise Control Measures for Indoor Living Areas (Rail)

Daytime (07:00-23:00)	Nighttime (23:00-07:00)	Exceeds Objective By	Noise Control Measures
≤ 45dBA	≤ 40dBA	≤ 5dBA	No requirements or conditions
46-55dBA	41-50dBA	5-15dBA	Noise Warning Clause Provisions for central A/C
> 50dBA*	> 45dBA*	> 10dBA*	Building components designed to achieve indoor sound level criteria*
> 55dBA	> 50dBA	> 15dBA	Noise Warning Clause Central A/C installed prior to occupancy Building components designed to achieve indoor sound level criteria

*Note: Includes road crossing whistle analysis.

7.2 Traffic Data

Road Traffic Data

The road traffic noise sources considered for this analysis include:

- Victoria Road South – between York Road and College Avenue East (Segment 1);
- Victoria Road South – between College Avenue East and Stone Road East (Segment 2);
- Stone Road East – between Victoria Road South and Watson Parkway (Segment 3); and,
- Internal Street A – between Stone Road East and internal Street E (Segment 5).

Forecasted road traffic volumes for years 2036 and 2041 were provided by GHD, on April 12, 2024. This information included the AM and PM peak volumes. As such, the Average Annual Daily Traffic (AADT) volumes (vpd - vehicles per day) were estimated by multiplying the worst-case peak traffic counts by 10. For the purposes of this analysis, the 2041 full buildout traffic projections represent the worst-case horizon year.

GHD also provided road traffic movement data on January 10, 2023. This information included a breakdown of medium and heavy truck counts and was used in conjunction with the information above. Furthermore, a 90/10 day/night split was assumed.

The forecasted road traffic volume breakdowns are summarized in the **Table 7.4** below.

Table 7.4 – Ultimate Traffic Volume Breakdown

	Victoria Road South (Segment 1)	Victoria Road South (Segment 2)	Stone Road East (Segment 3)	Internal Street A (Segment 5)
Current AADT	21,630vpd	16,230vpd	8,690vpd	N/A
Ultimate 2041 AADT	52,470vpd	41,520vpd	22,200vpd	6,350vpd
Medium Trucks	2.8%	3.9%	8.0%	1.0%
Heavy Trucks	0.6%	1.5%	2.4%	0.0%
Posted Speed Limit	50km/h	50km/h	60km/h	50km/h

Rail Traffic Data

The rail traffic noise source considered for this analysis included:

- Guelph Junction Railway, GJR Mileage 28.73, Goderich Subdivision (Segment 4)

Existing conditions railway traffic information was supplied by GJR on January 18, 2023. The rail traffic was forecasted to the year 2035 (representing a 10-year horizon) using a 2.5% growth rate per year. The projected rail traffic volume breakdowns are summarized below.

- 6 freight trains per 24 hours (2023) – 8 freight trains per 24 hours (2035) (conservatively applied at night);
- 2 locomotives per train (maximum) and 35 cars per train (maximum); and
- Speed limit – 40km/h (maximum permissible)

7.3 Noise Level Calculations

Resulting road and rail noise levels were calculated using the Stamson v5.03 computer program, approved by the MECP. For modelling purposes, it is assumed that worst-case daytime and nighttime living areas (bedroom or living/dining room) are represented at the building envelope face, 4.5m above ground level. Noise levels have also been calculated for outdoor living areas, at a height of 1.5m above finished grade. The elevations used were based on the *Preliminary Grading Contour Plan* (**MTE Drawing 46927-104-AG1.1**). Refer to **Appendix F** for resulting Stamson noise calculations.

Setback Lines (SBL)

Noise calculations were completed to determine the minimum source-receiver distance to achieve adequate noise attenuation as follows:

- With central A/C, special building components, and a noise warning clause.
- With provisions for central A/C and a noise warning clause.
- With control measures for outdoor living areas and a noise warning clause.
- With a noise warning clause.

Setback line distances that are located within the road and rail right-of-ways, or within environmental buffers, are considered not to impact the proposed development. Therefore, no noise mitigation measures are required. The resulting setback lines that do impact the development have been included in **Figure 7.1**.

GUELPH JUNCTION RAILWAY

CLYTHE CREEK

STONE RD E

VICTORIA RD S

SETBACK LINE 1 - BRICK VENEER REQUIRMENT - 100m

SETBACK LINE 2 - NIGHTTIME INDOOR (50dBA) - 120.9m

SETBACK LINE 3 - NIGHTTIME INDOOR (55dBA) - 212.0m

SETBACK LINE 4 - RAIL NWC SETBACK LIINE- 300m

SETBACK LINE 8 - DAYTIME INDOOR (55dBA) - 19.6m

SETBACK LINE 8 - DAYTIME INDOOR (55dBA) - 118.5m

SETBACK LINE 7- DAYTIME OUTDOOR (55dBA) - 102.9m

SETBACK LINE 6 - DAYTIME OUTDOOR (60dBA) - 49.5m

SETBACK LINE 5 - DAYTIME INDOOR (65dBA) - 25.2m

SETBACK LINE 8 - DAYTIME INDOOR (55dBA) - 105.0m

SETBACK LINE 7 - DAYTIME OUTDOOR (55dBA) - 94.1m

SETBACK LINE 6 - DAYTIME OUTDOOR (60dBA) - 47.0m

SETBACK LINE 5 - DAYTIME INDOOR (65dBA) - 24.5m

SETBACK LINE 8 - DAYTIME INDOOR (55dBA) - 128.5m

SETBACK LINE 7 - DAYTIME OUTDOOR (55dBA) - 112.6m

SETBACK LINE 6 - DAYTIME OUTDOOR (60dBA) - 56.6m

SETBACK LINE 5 - DAYTIME INDOOR (65dBA) - 29.9m

SEGMENT 1

SEGMENT 2

SEGMENT 3

SEGMENT 5

SWM 1

SWM 2

SWM 3

PARK 2

STREET A

STREET B

STREET C

STREET D

STREET E

STREET F

LEGEND

- SITE BOUNDARY
- DEVELOPMENT LIMIT
- PROPOSED ROW
- ROAD SETBACK LINE
- RAIL SETBACK LINE
- TRAFFIC SEGMENT ASSESSED
- EXISTING EMBANKMENT
- PROPOSED EMBANKMENT

FIGURE 7.1

Date: APR.19/24

Scale: 1:4500

NOISE ASSESSMENT PLAN

MTE

Engineers, Scientists, Surveyors

Project No.: 46927-104

April 24, 2024 — 8:15 a.m. — Plotted By: ORahmaty

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7.4 Recommended Mitigation Measures

Building Components

Dwellings proposed between the GJR line and Setback Line 3 will require an assessment for building components designed to achieve indoor sounds level criteria for rail noise (40dBA in daytime living spaces, 35dBA in nighttime living spaces). Similarly, dwellings proposed between the respective road centrelines and Setback Line 5 will require an additional assessment for building components designed to achieve indoor sounds level criteria for road noise (45dBA in daytime living spaces, 40dBA in nighttime living spaces). The parameters and components required to meet these indoor criteria are the type, thickness, and total surface area of windows, doors, and wall sections. Furthermore, a Type D Noise Warning Clause shall be registered on title for the respective units.

Architectural plans are not yet available for the development, as such, Sound Transmission Class calculations have not been completed. These calculations will be completed and verified by a qualified Acoustical Professional prior to the issuance of building permits.

Additionally, based on the MECP's Publication NPC-300, EW5 (brick veneer) or a masonry equivalent wall section is required for the exterior walls, from the foundation to the rafters, of the first row of houses located within 100.0m of a railway, when the outdoor rail traffic 24-hour equivalent sound level (L_{eq} 24) estimated at a location of a nighttime receptor is greater than 60dBA. As indicated in **Figure 7.1**, portions of some proposed blocks are located within this 100.0m setback (SBL 1), which require an EW5 or masonry equivalent exterior finish.

It should be noted that the multi-residential blocks requiring an analysis for special building components will undergo an Environmental Noise Assessment during their respective Site Plan Approval processes.

Noise Attenuation Barrier

Blocks with outdoor amenity spaces located between the respective road centrelines and Setback Line 6 will require an assessment to determine if noise attenuating barriers are required. During the Site Plan development of these blocks, the orientation of OLAs and buildings can be strategically selected to ensure additional shielding is provided and attenuating measures (barriers) are not required. Similarly to above, these blocks will undergo additional assessments as part of their SPA processes to determine to final requirements. A Type B Noise Warning Clause shall be registered on title for all affected blocks.

Noise Warning Clauses and Ventilation Requirements

Dwellings located within the following setback lines shall be constructed with a forced air heating system to allow for the future installation of central air conditioning and a Type C Noise Warning Clause shall be registered on title:

- Between the GJR line and Setback Line 2; and,
- Between the respective road centrelines and Setback Line 8.

Blocks with outdoor living areas proposed between Setback Lines 6 and 7 will have unattenuated outdoor daytime noise levels greater than 55dBA, which will require a Type A Noise Warning Clause to be registered on title.

Finally, dwellings located within 300.0m of the railway (SBL 4) require a specific railway Noise Warning Clause to be registered on title.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the foregoing analysis, it is concluded that:

- The proposed site grading strategy will meet City of Guelph standards, is compatible with the future widening and grading of Victoria Road South / Stone Road East, provides major overland flow routes to the end-of-pipe SWMFs, and respects environmental buffers.
- The proposed sanitary sewer network will service the required wastewater flows onsite and will outlet to the sanitary trunk sewer on Victoria Road South, which has capacity to convey the subject lands' wastewater flows.
- The proposed watermain distribution network will provide water servicing to the subject lands and will meet fire flow demands for all proposed land uses. This water distribution network will connect to the existing watermains along Stone Road East and Victoria Road South.
- The proposed storm sewer network will direct minor flow events to the end-of-pipe SWMFs and will meet City of Guelph standards.
- 'Enhanced' water quality control will be provided through the proposed end-of-pipe SWMFs. Furthermore, the capture and infiltration of 27mm of rainfall sitewide will help recharge groundwater and reduce peak flow and erosion considerations downstream.
- Water quantity control will be provided by the end-of-pipe SWMFs to ensure that the offsite peak flow rates in post-development conditions will match the prescribed allowable flow rates.
- The proposed water balance approach will meet City of Guelph water balance criteria and will provide infiltration augmentation onsite.
- The proposed Noise Impact Mitigation measures will meet design criteria and will mitigate noise from the GJR, Victoria Road South, and Stone Road East traffic onsite.

The findings of this report and the above conclusions lead to the recommendation that the subject lands be candidate for a Draft Plan of Subdivision submission. Subsequent reports following this *MSP* may be developed and submitted in support of necessary Official Plan Amendment, Plan of Subdivision, and Zoning By-law Amendment applications.

All of which is respectfully submitted,

MTE Consultants Inc.

Charles Carré, P. Eng
Design Engineer
519-743-6500 ext. 1232
ccarre@mte85.com

Valentina Lazic, P.Eng.
Design Engineer
519-743-6500 ext. 1233
vlazic@mte85.com

CJC:jng
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Appendix A

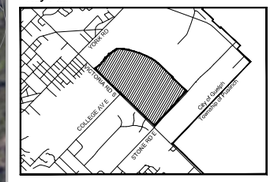
Draft Plan of Subdivision (11x17 Reduced)

DRAFT PLAN OF SUBDIVISION

Legal Description

PART OF BROKEN FRONT LOTS 10, 11 & 12
CONCESSION 1, DIVISION 'G'
GEOGRAPHIC TOWNSHIP OF GUELPH
IN THE CITY OF GUELPH
COUNTY OF WELLINGTON

Key Plan



Area Schedule

Subject Lands - 116.596 ha

Residential

- Low Density Residential - 13.859 ha
- Low Density Residential (Condominium) - 1.809 ha
- Medium Density Residential - 20.973 ha
- Mixed-use - 12.869 ha
- School - 2.214 ha
- Employment - 8.607 ha
- Parks - 8.491 ha
- Stormwater Management - 5.764 ha
- Open Space - 25.349 ha

No.	Date	Issued / Revision	By

Notes

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN
2. SURVEY INFORMATION PROVIDED BY CALLON DIETZ LAND SURVEYING ONTARIO, NOV. 2016
3. TOPOGRAPHIC INFORMATION PROVIDED BY MTE
4. WETLAND, DRIPLINE, AND BUFFERS PROVIDED BY NRSI INC. OCT. 2022
5. CONTAINS INFORMATION MADE AVAILABLE UNDER GRAND RIVER CONSERVATION AUTHORITY'S OPEN DATA LICENCE V1.0
6. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE – ONTARIO.
7. ESRI SATELLITE IMAGERY

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
200-540 BINGEMANS CENTRE DR. KITCHENER, ON. N2B 3X9 | P. 519.576.3650 F. 519.576.0121 | WWW.MHBCPLAN.COM

Approval Stamp	
Date	March 27, 2024
File No.	1405G
Plan Scale	1:2,500 (Arch D)
Drawn By	JB
Checked By	DA

Project

Guelph Innovation District
Block 1 & 2
Fusion Homes
Guelph, Ontario

north

File Name	Draft Plan of Subdivision	Dwg No.	1 of 1

Scale Bar

0 25 50 100 150 200m

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DRAFT PLAN OF SUBDIVISION

Legal Description

PART OF BROKEN FRONT LOTS 10, 11 & 12
CONCESSION 1, DIVISION 'G'
GEOGRAPHIC TOWNSHIP OF GUELPH
IN THE CITY OF GUELPH
COUNTY OF WELLINGTON

Owner's Certificate

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

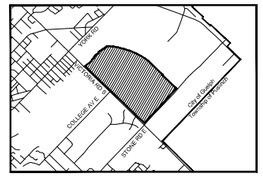
DATE: _____ _____
OWNER

Surveyor's Certificate

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

DATE: _____ _____
SURVEYOR

Key Plan



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 SUPPLY	I. TBD
J. AS SHOWN	K. ALL SERVICES AS REQUIRED	L. AS SHOWN

Area Schedule

Description	Block	Area (ha)	Units*
Residential	1-33	13.859	831
Residential Condominium	34	1.809	108
Multiple Residential	35-49	20.973	2,097
Mixed Use	50-57	12.869	1,930
School	58	2.214	
Employment	59-62	8.607	
Park	63-84	8.491	
Stormwater Management	85-87	5.764	
Open Space	88	25.349	
Roads		16.661	
TOTAL	88	116.596	4,966

*Based on maximum densities permitted in the Secondary Plan

No.	Date	Issued / Revision	By

Notes

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN
2. SURVEY INFORMATION PROVIDED BY CALLON DIETZ LAND SURVEYING ONTARIO, NOV. 2016
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Approval Stamp

Date	March 27, 2024
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Plan Scale	1:2,500 (Arch D)
Drawn By	JB
Checked By	DA

Project
Guelph Innovation District
Block 1 & 2
Fusion Homes
Guelph, Ontario

north

File Name Draft Plan of Subdivision

Dwg No. 1 of 1

Scale Bar
0 25 50 100 150 200m

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Appendix B

Sanitary Design Calculations

GID
CITY OF GUELPH

SANITARY SEWER DESIGN SHEET

ENGINEERING AND PUBLIC WORKS

Project Number: 46927-104
Date: April 19, 2024
Design By: AFF
Checked By: ALN/VAL
File: Q:\46927\104\SAN\46927-104_Sanitary Sewer Design Sheet.xls

Drainage Area Plan No: 46927-104-F4.1

Design Parameters

Average Daily Flow

Residential	0.00347	L/s/p
Commercial	0.95	L/s/ha
Industrial	0.40	L/s/ha
Inst. / School	0.25	L/s/ha

Mannings "*n*" 0.013
Min. Velocity 0.6 m/sec
Max. Velocity 3.0 m/sec
Residential Harmon Peaking Factor (F) $F = 1 + 14/(4 + P^{0.5})$
Commercial Peaking Factor = 2.5
Residential Areas Infiltration 0.25 L/s/ha

LOCATION				DENSITIES			RESIDENTIAL AREAS AND POPULATION						SCHOOL, INSTITUTIONAL			COMMERCIAL			INDUSTRIAL				PARK	INFILTRATION			DESIGN					
													HECTARES AND FLOW OF EACH ZONING																			
													0.25 *L/s/ha*			0.95 *L/s/ha*			0.40 *L/s/ha*													
STREET	AREA NO.	MANHOLE LOCATION FROM MH	MANHOLE LOCATION TO MH	LOW 35 UPH	MED 100 UPH	HIGH 150 UPH	No. UNITS @ 3.40 PPU	No. UNITS @ 2.45 PPU	No. UNITS @ 1.86 PPU	POPUL.	CUMUL POPUL.	PEAK FACTOR "F"	PEAK RES. FLOW	AREA	CUMUL AREA	PEAK FLOW	AREA	CUMUL AREA	PEAK FLOW	AREA	CUMUL AREA	PEAK FLOW	TOTALS-C-I FLOW	AREA	AREA	CUMUL AREA	INFIL FLOW	TOTAL VOLUME FLOW	LENGTH	SLOPE	PIPE SIZE	CAPACITY	FULL FLOW VELOCITY
				ha	*ha*	*ha*				*1000s*	*1000s*		*L/sec*	*ha*	*ha*	*L/sec*	*ha*	*ha*	*L/sec*	*ha*	*ha*	*L/sec*	*L/sec*	*ha*	*ha*	*ha*	*L/sec*	*L/sec*	*m*	*%*	*mm*	*L/sec.*	*m/s*
	101	1-6	9		1.02	1.75	0.00	102.00	262.50	0.738	0.738	3.881158	9.9475	2.75	2.75	0.6875	4.23	4.23	10.0463		0.00	0.0000	10.7338	0.9700	10.72	10.72	2.6800	23.3612	550.0	0.60	250	46.0400	0.938
	102	7,8	9				0.00	0.00	0.00	0.000	0.000	4	0.0000		0.00	0.0000	1.68	1.68	3.9900		0.00	0.0000	3.9900	1.0600	2.74	2.74	0.6850	4.6750	165.0	0.60	200	25.3927	0.809
	103	9	10				0.00	0.00	0.00	0.000	0.738	3.881158	9.9475		2.75	0.6875	3.59	9.50	22.5625		0.00	0.0000	23.2500	0.4000	3.99	17.45	4.3625	37.5600	180.0	0.60	300	74.8660	1.060
	201	11-16	17		1.09	4.33	0.00	109.00	649.50	1.475	1.475	3.684798	18.8733		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.4300	5.85	5.85	1.4625	20.3358	395.0	0.60	250	46.0400	0.938
	202	17,18	19		2.89	1.94	0.00	289.00	291.00	1.249	2.724	3.47762	32.8977		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	2.0200	6.85	12.70	3.1750	36.0727	395.0	0.60	300	74.8660	1.060
	203	19	20		2.96	2.62	0.00	296.00	393.00	1.456	4.181	3.316096	48.1365		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.4400	6.02	18.72	4.6800	52.8165	170.0	0.60	375	135.7412	1.230
	301	21-28	29	3.19	0.93	1.37	111.65	93.00	205.50	0.990	0.990	3.802897	13.0684		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.6500	6.14	6.14	1.5350	14.6034	380.0	0.60	200	25.3927	0.809
	302	29-32	33	2.86			100.10	0.00	0.00	0.340	1.330	3.716722	17.1644		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.0330	2.89	9.03	2.2583	19.4227	270.0	0.60	250	46.0400	0.938
	303	33-35	36	4.60			161.00	0.00	0.00	0.547	1.877	3.606982	23.5134		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.5600	5.16	14.19	3.5483	27.0616	327.0	0.60	250	46.0400	0.938
	304	36,37	38	3.37			117.95	0.00	0.00	0.401	2.278	3.541085	28.0147		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.1700	3.54	17.73	4.4333	32.4479	270.0	0.60	300	74.8660	1.060
	305	38-47	48	4.35	3.71	1.56	152.25	371.00	234.00	1.862	4.140	3.319889	47.7269		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	1.0400	10.66	28.39	7.0983	54.8251	565.0	0.30	375	95.9835	0.869
	306	48	49	0.55	2.02		19.25	202.00	0.00	0.560	4.701	3.269743	53.3678		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.3000	2.87	31.26	7.8158	61.1835	140.0	0.30	450	156.0798	0.982
	307	49, 50-52	53		4.70	1.47	0.00	470.00	220.50	1.562	6.262	3.153033	68.5596		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.7900	6.96	38.22	9.5558	78.1154	283.0	0.30	450	156.0798	0.982
	308	53	54		5.22	1.87	0.00	522.00	280.50	1.801	8.063	3.046925	85.3024		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.0000	7.09	45.31	11.3283	96.6306	168.0	0.30	525	235.4352	1.088

Appendix C

Storm Design Calculations

GID
CITY OF GUELPH

STORM SEWER DESIGN SHEET

ENGINEERING AND PUBLIC WORKS

Project Number: 46927-104
Date: April 19, 2024
Design By: AFF
Checked By: ALN/VAL
File: Q:\46927\104\STM\46927-104_Storm Sewer Design Sheet.xlsx

Drainage Area Plan No: 46927-104-F4.4

Design Parameters

5 YEAR STORM

Q=kAIC, k=0.00278
Intensity (I) = a/(tc+b)^c
a = 1593
b = 11.0
c = 0.8789

Manning's "n" 0.013
Min. Velocity 0.60 m/s
Max. Velocity 6.00 m/s

MTE

LOCATION				STORMWATER FLOW 5 YEAR STORM								DESIGN						
STREET	AREA NUMBER	MANHOLE LOCATION FROM MH	MANHOLE LOCATION TO MH	AREA (A)	RUNOFF COEFF. (C)	A x C	CUMUL. A x C	CONCENTRATION TIME TOTAL	CONCENTRATION TIME IN PIPE	RAIN INTENSITY (I)	FLOW (Q)	PIPE SIZE	LENGTH	SLOPE	CAPACITY	FULL FLOW VELOCITY	ACTUAL VELOCITY	PIPE FULL
				ha		*ha*	*ha*	*min*	*min*	*mm/hr*	*L/s*	*mm*	*m*	*%*	*L/s*	*m/s*	*m/s*	*%*
SWM 1 NE FB																		
	101	1-4	5	2.750	0.70	1.9250	1.9250	10.0000	1.4734	109.67742	586.93873	600	260.0	1.50	752.00749	2.6597	2.9411	78.05
	102	5-7	8	3.440	0.70	2.4080	4.3330	11.4734	2.8803	103.33185	1244.70858	900	485.0	0.80	1619.19152	2.5452	2.8064	76.87
								14.3537										
	103	9	10	3.450	0.70	2.4150	2.4150	10.0000	2.7057	109.67742	736.34131	675	430.0	1.00	840.58815	2.3490	2.6487	87.60
								12.7057										
	104	8,10-13	14	2.500	0.70	1.7500	8.4980	14.3537	1.4782	92.94019	2195.65985	1200	240.0	0.50	2756.81862	2.4376	2.7059	79.64
								15.8320										
	105	15	16	2.520	0.80	2.0160	2.0160	10.0000	2.3198	109.67742	614.68492	750	250.0	0.40	704.09820	1.5938	1.7962	87.30
	106	16	17	1.950	0.83	1.6185	3.6345	12.3198	0.8371	100.02830	1010.67697	750	190.0	2.00	1574.41143	3.5637	3.7827	64.19
								13.1569										
	107	14,18-22	23	3.850	0.75	2.8875	15.0200	15.8320	0.2975	88.42462	3692.22287	1050	100.0	2.50	4317.65566	4.9863	5.6016	85.51
								16.1295										
	to SWM 1	23	SWM	0.000	0.00	0.0000	15.0200	16.1295	0.3828	87.57171	3656.60937	1200	90.0	1.00	3898.73028	3.4472	3.9182	93.79
								16.5123										
SWM 1 SW FB																		
	401	24	25	12.400	0.83	10.2920	10.2920	10.0000	2.3173	109.67742	3138.06410	1350	410.0	0.50	3774.11318	2.6367	2.9489	83.15
	402	25	30	9.350	0.77	7.1995	17.4915	12.3173	1.8749	100.03775	4864.47282	1650	340.0	0.40	5764.48325	2.6959	3.0224	84.39
								14.1922										
	403	26	27	3.950	0.83	3.2785	3.2785	10.0000	2.8759	109.67742	999.62526	900	350.0	0.40	1144.94130	1.7997	2.0283	87.31
	404	27	28	4.960	0.80	3.9680	7.2465	12.8759	2.1683	97.97748	1973.78277	1050	480.0	1.20	2991.35959	3.4546	3.6896	65.98
	405	28	30	1.490	0.75	1.1175	8.3640	15.0442	0.9929	90.77100	2110.60011	1200	160.0	0.50	2756.81862	2.4376	2.6856	76.56
								16.0371										
	406	29	30	2.760	0.75	2.0700	2.0700	10.0000	1.2021	109.67742	631.14970	750	130.0	0.40	704.09820	1.5938	1.8024	89.64
								11.2021										
	to SWM 1	30	SWM				27.9255	16.0371	0.4813	87.83455	6818.84962	1650	135.0	1.00	9114.44831	4.2626	4.6752	74.81
								16.5184										
SWM 2																		
	201	32	33	3.020	0.83	2.5066	2.5066	10.0000	1.5324	109.67742	764.27045	825	175.0	0.40	907.84922	1.6983	1.9033	84.18
	202	33-36	40	2.910	0.70	2.0370	4.5436	11.5324	1.6534	103.09385	1302.19989	975	235.0	0.50	1584.66395	2.1225	2.3689	82.18
								13.1858										
	203	37-39	40	2.590	0.70	1.8130	1.8130	10.0000	1.2566	109.67742	552.78957	525	240.0	2.00	608.19990	2.8096	3.1832	90.89
								11.2566										
	to SWM 2	40	SWM				6.3566	13.1858	1.2100	96.87335	1711.88271	975	240.0	1.00	2241.05325	3.0016	3.3057	76.39
								14.3958										
SWM 3																		
	301	41,42	43	3.460	0.70	2.4220	2.4220	10.0000	1.1010	109.67742	738.47564	825	125.0	0.40	907.84922	1.6983	1.8922	81.34
	302	43	46	4.760	0.85	4.0460	6.4680	11.1010	0.5744	104.86039	1885.49889	825	155.0	2.20	2129.09515	3.9829	4.4973	88.56
								11.6755										
	303	44	45	1.880	0.83	1.5604	1.5604	10.0000	0.8580	109.67742	475.77101	525	160.0	2.00	608.19990	2.8096	3.1081	78.23
	304	45	46	2.330	0.85	1.9805	3.5409	10.8580	0.8548	105.88459	1042.29635	900	115.0	0.50	1280.08329	2.0122	2.2422	81.42
								11.7128										
	to SWM 3	46	SWM				10.0089	11.7128	0.1726	102.37405	2848.53167	1350	30.0	0.50	3774.11318	2.6367	2.8972	75.48

Appendix D

Hydrologic Modelling

EXISTING CONDITIONS

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

   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO       999    999    =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O     9   9  9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
       S   W W   M   M  H   H    Y    M   M  O   O      9999   9999   Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO          9      9   =========
                                                        9   9  9   9   # 3053466
        StormWater Management HYdrologic Model          999    999    =========

********************************************************************************
*************************** SWMHYMO Ver/4.05  ****************************
*********  A single event and continuous hydrologic simulation model  *********
*********     based on the principles of HYMO and its successors      *********
*********                 OTTHYMO-83 and OTTHYMO-89.                  *********
********************************************************************************
********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
*********                  Ottawa,  Ontario: (613) 836-3884           *********
*********                  Gatineau, Quebec: (819) 243-6858           *********
*********                  E-Mail: swmhymo@jfsa.Com                   *********
********************************************************************************

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++++++++ Licensed user: MTE Consultants Inc.                          +++++++++
+++++++++                Burlington            SERIAL#:3053466        +++++++++
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

********************************************************************************
*********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *********
*********           Maximum value for ID numbers  :     10           *********
*********           Max. number of rainfall points: 105408           *********
*********           Max. number of flow points    : 105408           *********
********************************************************************************

***** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) ******
*****-------------------------------------------------------------------*******
*****    ID:  Hydrograph IDentification numbers, (1-10).                *******
*****  NHYD:  Hydrograph reference numbers, (6 digits or characters).   *******
*****  AREA:  Drainage area associated with hydrograph, (ac.) or (ha.).  *******
***** QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s).   *******
***** TpeakDate_hh:mm is the date and time of the peak flow.            *******
*****  R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).      *******
*****  R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).      *******
*****     *:  see WARNING or NOTE message printed at end of run.        *******
*****    **:  see  ERROR  message printed at end of run.                *******
********************************************************************************
********************************************************************************

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

********************************************************************************

**********************   S U M M A R Y   O U T P U T   **********************
********************************************************************************
*         DATE: 2024-04-30     TIME: 07:34:31     RUN COUNTER: 000364         *
********************************************************************************
* Input   filename: Q:\46927\104\SWM\SWMHYMO\PRE\pre.dat                        *
* Output  filename: Q:\46927\104\SWM\SWMHYMO\PRE\pre.out                        *
* Summary filename: Q:\46927\104\SWM\SWMHYMO\PRE\pre.sum                        *
* User comments:                                                               *
* 1:_____________________________________________________________________________*
* 2:_____________________________________________________________________________*
* 3:_____________________________________________________________________________*
********************************************************************************



#*******************************************************************************
#  Project Name: [Guelph Innovation District]    Project Number: [46927-104]
#  Date        : 04-19-2024
#  Modeller    : [CJC]
#  Company     : MTE Consultants Ltd.
#  License #   : 3057174
#*******************************************************************************
# EXISTING CONDITIONS ANALYSIS
#*******************************************************************************
 RUN:COMMAND#
 001:0001--------------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   1 ]
 001:0002--------------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT= 5.00:SDUR=   3.00:PTOT=  47.26]
#*******************************************************************************
# Existing Catchment 1 - Existing drainage north to Eramosa River
#*******************************************************************************
 001:0003--------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      01:101           54.91    1.603 No_date    1:29   11.86 .251
      [CN= 66.0: N= 3.00]
      [Tp=  .35:DT= 1.00]
#*******************************************************************************
# Existing Catchment 2 - Existing drainage east to Eramosa River
#*******************************************************************************
 001:0004--------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      02:102           27.50     .798 No_date    1:28   11.59 .245
      [CN= 65.3: N= 3.00]
      [Tp=  .34:DT= 1.00]
#*******************************************************************************
# Existing Catchment 3 - Existing drainage to Victoria and Stone Road Intersect
#*******************************************************************************
 001:0005--------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      03:103           16.55     .533 No_date    1:28   12.80 .271
      [CN= 68.3: N= 3.00]
      [Tp=  .34:DT= 1.00]
#*******************************************************************************
# Existing SWMF No. 104 at Victoria and Stone Road Intersection
#*******************************************************************************
 001:0006--------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 03:103           16.55     .533 No_date    1:28   12.80  n/a
      [RDT= 1.00] out<- 04:SWM104        16.55     .533 No_date    1:29   12.80  n/a
            overflow <= 05:ovflw-bio       .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.2474E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*******************************************************************************
# Total Flow from SWMF No. 104
#*******************************************************************************
 001:0007--------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            04:SWM104       16.55     .533 No_date    1:29   12.80  n/a
                      +  05:ovflw-bio       .00     .000 No_date    0:00     .00  n/a
```

```
      [DT= 1.00]  SUM=  06:103-OUT       16.55     .533 No_date    1:29   12.80  n/a
#*******************************************************************************
# Total Flow Off-Site to Eramosa River
#*******************************************************************************
 001:0008--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:101           54.91    1.603 No_date    1:29   11.86  n/a
                      +  02:102           27.50     .798 No_date    1:28   11.59  n/a
                      +  06:103-OUT       16.55     .533 No_date    1:29   12.80  n/a
      [DT= 1.00]  SUM=  07:Total         98.96    2.933 No_date    1:28   11.94  n/a
 001:0009--------------------------------------------------------------------------------
      FINISH
--------------------------------------------------------------------------------------------
********************************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2024-04-30     at 07:34:32
============================================================================================
```

PROPOSED
CONDITIONS

STORM 001 = 5-yr

STORM 002 = 25-yr

STORM 003 = 100-yr

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

  SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO       999    999    =========
  S      W W W  MM MM  H   H   Y Y   MM MM  O   O     9   9  9   9
  SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
      S   W W   M   M  H   H    Y    M   M  O   O      9999   9999   Sept 2011
  SSSSS   W W   M   M  H   H    Y    M   M   OOO          9      9   =========
                                                      9   9  9   9   # 3053466
       StormWater Management HYdrologic Model          999    999    =========

********************************************************************************
*************************** SWMHYMO Ver/4.05  ****************************
*********  A single event and continuous hydrologic simulation model  *********
*********     based on the principles of HYMO and its successors      *********
*********                  OTTHYMO-83 and OTTHYMO-89.                 *********
********************************************************************************
********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
*********                   Ottawa,  Ontario: (613) 836-3884          *********
*********                   Gatineau, Quebec: (819) 243-6858          *********
*********                   E-Mail: swmhymo@jfsa.Com                  *********
********************************************************************************

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++++++++ Licensed user: MTE Consultants Inc.                          +++++++++
+++++++++                Burlington            SERIAL#:3053466        +++++++++
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

********************************************************************************
*********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *********
*********           Maximum value for ID numbers  :     10           *********
*********           Max. number of rainfall points: 105408           *********
*********           Max. number of flow points    : 105408           *********
********************************************************************************

***** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) *****
*****------------------------------------------------------------------*****
*****    ID:  Hydrograph IDentification numbers, (1-10).                *****
*****  NHYD:  Hydrograph reference numbers, (6 digits or characters).   *****
*****  AREA:  Drainage area associated with hydrograph, (ac.) or (ha.).  *****
***** QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s).    *****
***** TpeakDate_hh:mm is the date and time of the peak flow.             *****
*****  R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).       *****
*****  R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).       *****
*****    *:  see WARNING or NOTE message printed at end of run.          *****
*****   **:  see  ERROR  message printed at end of run.                  *****
********************************************************************************
********************************************************************************

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

********************************************************************************

**********************   S U M M A R Y   O U T P U T   **********************
********************************************************************************
*         DATE: 2024-04-18     TIME: 06:31:29     RUN COUNTER: 000362         *
********************************************************************************
* Input   filename: Q:\46927\104\SWM\SWMHYMO\POST\post.dat                      *
* Output  filename: Q:\46927\104\SWM\SWMHYMO\POST\post.out                     *
* Summary filename: Q:\46927\104\SWM\SWMHYMO\POST\post.sum                     *
* User comments:                                                               *
* 1:_____________________________________________________________________________*
* 2:_____________________________________________________________________________*
* 3:_____________________________________________________________________________*
********************************************************************************


#*******************************************************************************
#  Project Name: [Guelph Innovation District]    Project Number: [46927-104]
#  Date        : 04-19-2024
#  Modeller    : [CJC]
#  Company     : MTE Consultants Ltd.
#  License #   : 3057174
#*******************************************************************************
# PROPOSED CONDITIONS ANALYSIS
#*******************************************************************************
 RUN:COMMAND#
 001:0001--------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   1 ]
 001:0002--------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT= 5.00:SDUR=   3.00:PTOT=  47.26]
#*******************************************************************************
# Proposed Catchment 201 - Outlet is North to Eramosa River
#*******************************************************************************
 001:0003--------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    01:201-1         22.06    5.057 No_date    1:02   39.03 .826
      [XIMP=.78:TIMP=.78]
      [SLP=2.00:DT= 1.00]
      [LOSS= 2 :CN= 68.0]
 001:0004--------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    02:201-2         36.14    8.061 No_date    1:03   40.72 .862
      [XIMP=.83:TIMP=.83]
      [SLP=1.50:DT= 1.00]
      [LOSS= 2 :CN= 68.0]
#*******************************************************************************
# Post-Development - Total Flow to SWMF 1
#*******************************************************************************
 001:0005--------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:201-1         22.06    5.057 No_date    1:02   39.03  n/a
                      +  02:201-2         36.14    8.061 No_date    1:03   40.72  n/a
      [DT= 1.00]  SUM=  03:Inlet-1       58.20   13.007 No_date    1:03   40.07  n/a
#*******************************************************************************
# Preliminary SWMF 1 Design
#*******************************************************************************
 001:0006--------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 03:Inlet-1       58.20   13.007 No_date    1:03   40.07  n/a
   *   [RDT= 1.00] out<- 01:SWMF-1       58.20    1.512 No_date    1:45   40.08  n/a
            overflow <= 02:ovflw-1         .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1561E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*******************************************************************************
# Uncontrolled Flow North to Eramosa River
#*******************************************************************************
 001:0007--------------ID:NHYD----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      03:201-3          2.34     .107 No_date    1:16   13.32 .282
      [CN= 69.5: N= 3.00]
      [Tp=  .20:DT= 1.00]
```

```
 001:0008--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:201-4           .72     .055 No_date    1:02   12.92 .273
      [CN= 68.6: N= 3.00]
      [Tp=  .05:DT= 1.00]
#*******************************************************************************
# Post-Development - Total Flow to Outlet 1
#*******************************************************************************
 001:0009--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:SWMF-1        58.20    1.512 No_date    1:45   40.08  n/a
                    +  02:ovflw-1         .00     .000 No_date    0:00     .00  n/a
                    +  03:201-3          2.34     .107 No_date    1:16   13.32  n/a
                    +  04:201-4           .72     .055 No_date    1:02   12.92  n/a
      [DT= 1.00]  SUM=  05:Total-1       61.26    1.578 No_date    1:32   38.73  n/a
#*******************************************************************************
# Proposed Catchment 202 - Outlet is East to Eramosa River
#*******************************************************************************
 001:0010--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    08:202-1          9.32    2.540 No_date    1:01   40.04 .847
      [XIMP=.81:TIMP=.81]
      [SLP=4.00:DT= 1.00]
      [LOSS= 2 :CN= 68.0]
#*******************************************************************************
#*******************************************************************************
# Preliminary SWMF 2 Design
#*******************************************************************************
 001:0011--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 08:202-1          9.32    2.540 No_date    1:01   40.04  n/a
   *   [RDT= 1.00] out<- 02:SWMF-2        9.32     .380 No_date    1:28   40.04  n/a
           overflow <= 01:ovflw-2         .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.2080E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*******************************************************************************
# Uncontrolled Flow East to Eramosa River
#*******************************************************************************
 001:0012--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      03:202-2          4.62     .252 No_date    1:11   13.32 .282
      [CN= 69.5: N= 3.00]
      [Tp=  .14:DT= 1.00]
 001:0013--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:202-3           .52     .042 No_date    1:01   12.67 .268
      [CN= 68.0: N= 3.00]
      [Tp=  .04:DT= 1.00]
 001:0014--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      06:202-4           .62     .052 No_date    1:01   13.32 .282
      [CN= 69.5: N= 3.00]
      [Tp=  .04:DT= 1.00]
#*******************************************************************************
#*******************************************************************************
# Post-Development - Total Flow to Target 2
#*******************************************************************************
 001:0015--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:ovflw-2         .00     .000 No_date    0:00     .00  n/a
                    +  02:SWMF-2          9.32     .380 No_date    1:28   40.04  n/a
                    +  03:202-2           4.62     .252 No_date    1:11   13.32  n/a
                    +  04:202-3            .52     .042 No_date    1:01   12.67  n/a
                    +  06:202-4            .62     .052 No_date    1:01   13.32  n/a
      [DT= 1.00]  SUM=  07:Total-2       15.08     .661 No_date    1:11   29.81  n/a
#*******************************************************************************
# Proposed Catchment 203 - Outlet is Victoria and Stone Road Intersection
#*******************************************************************************
 001:0016--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    01:203           22.59    5.615 No_date    1:02   41.39 .876
      [XIMP=.85:TIMP=.85]
      [SLP=2.00:DT= 1.00]
      [LOSS= 2 :CN= 68.0]
#*******************************************************************************
# Preliminary SWMF 3 Design - Non-Winter Condition
# Forebay and Wet Cell Component of SWMF 3
#*******************************************************************************
 001:0017--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 01:203           22.59    5.615 No_date    1:02   41.39  n/a
      [RDT= 1.00] out<- 02:SWM3NW        22.59     .556 No_date    1:46   41.39  n/a
           overflow <= 03:ovflw-3NW       .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.6621E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*******************************************************************************
# Remainder of SWMF 3 - including the Infiltration Cell
#*******************************************************************************
 001:0018--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            02:SWM3NW        22.59     .556 No_date    1:46   41.39  n/a
                    +  03:ovflw-3NW       .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  04:Infil3        22.59     .556 No_date    1:46   41.39  n/a
#*******************************************************************************
 001:0019--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 04:Infil3        22.59     .556 No_date    1:46   41.39  n/a
      [RDT= 1.00] out<- 02:Inf3NW        22.59     .158 No_date    1:11   41.39  n/a
           overflow <= 03:ovflw-3NW       .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.4168E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*******************************************************************************
#*******************************************************************************
# Preliminary SWMF 3 Design - Winter Condition
#*******************************************************************************
 001:0020--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 01:203           22.59    5.615 No_date    1:02   41.39  n/a
   *   [RDT= 1.00] out<- 04:SWMF3W        22.59     .526 No_date    1:48   41.39  n/a
           overflow <= 06:ovflw-3W        .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.6398E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*******************************************************************************
# Total Flow to Outlet 3 - Non-Winter Condition
#*******************************************************************************
 001:0021--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            02:Inf3NW        22.59     .158 No_date    1:11   41.39  n/a
                    +  03:ovflw-3NW       .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  01:Out3NW        22.59     .158 No_date    1:11   41.39  n/a
#*******************************************************************************
# Total Flow to Outlet 3 - Winter Condition
#*******************************************************************************
 001:0022--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            04:SWMF3W        22.59     .526 No_date    1:48   41.39  n/a
                    +  06:ovflw-3W        .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  02:Out3W         22.59     .526 No_date    1:48   41.39  n/a
#*******************************************************************************
#*******************************************************************************
# Total from Site - Non-Winter Condition
#*******************************************************************************
 001:0023--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:Out3NW        22.59     .158 No_date    1:11   41.39  n/a
                    +  05:Total-1       61.26    1.578 No_date    1:32   38.73  n/a
                    +  07:Total-2       15.08     .661 No_date    1:11   29.81  n/a
      [DT= 1.00]  SUM=  03:TotalNW       98.93    2.299 No_date    1:20   37.98  n/a
#*******************************************************************************
#*******************************************************************************
# Total from Site - Winter Condition
#*******************************************************************************
```

```
 001:0024--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            02:Out3W         22.59     .526 No_date    1:48   41.39  n/a
                      +  05:Total-1       61.26    1.578 No_date    1:32   38.73  n/a
                      +  07:Total-2       15.08     .661 No_date    1:11   29.81  n/a
      [DT= 1.00]  SUM=  04:TotalW        98.93    2.643 No_date    1:22   37.98  n/a
#*******************************************************************************
  ** END OF RUN :   1

*******************************************************************************
```

```
 RUN:COMMAND#
 002:0001--------------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   2 ]
#*******************************************************************************
#  Project Name: [Guelph Innovation District]    Project Number: [46927-104]
#  Date        : 04-19-2024
#  Modeller    : [CJC]
#  Company     : MTE Consultants Ltd.
#  License #   : 3057174
#*******************************************************************************
# PROPOSED CONDITIONS ANALYSIS
#*******************************************************************************
 002:0002--------------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT= 5.00:SDUR=   3.00:PTOT=  68.26]
#*******************************************************************************
# Proposed Catchment 201 - Outlet is North to Eramosa River
#*******************************************************************************
 002:0003--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    01:201-1         22.06    7.415 No_date    1:02   57.88 .848
      [XIMP=.78:TIMP=.78]
      [SLP=2.00:DT= 1.00]
      [LOSS= 2 :CN= 68.0]
 002:0004--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    02:201-2         36.14   11.921 No_date    1:03   60.06 .880
      [XIMP=.83:TIMP=.83]
      [SLP=1.50:DT= 1.00]
      [LOSS= 2 :CN= 68.0]
#*******************************************************************************
# Post-Development - Total Flow to SWMF 1
#*******************************************************************************
 002:0005--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:201-1         22.06    7.415 No_date    1:02   57.88  n/a
                      +  02:201-2         36.14   11.921 No_date    1:03   60.06  n/a
      [DT= 1.00]  SUM=  03:Inlet-1       58.20   19.165 No_date    1:03   59.23  n/a
#*******************************************************************************
# Preliminary SWMF 1 Design
#*******************************************************************************
 002:0006--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 03:Inlet-1       58.20   19.165 No_date    1:03   59.23  n/a
  *   [RDT= 1.00] out<- 01:SWMF-1        58.20    4.004 No_date    1:30   59.24  n/a
            overflow <= 02:ovflw-1         .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.2168E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*******************************************************************************
# Uncontrolled Flow North to Eramosa River
#*******************************************************************************
 002:0007--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      03:201-3          2.34     .209 No_date    1:16   25.01 .366
      [CN= 69.5: N= 3.00]
      [Tp=  .20:DT= 1.00]
 002:0008--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:201-4           .72     .103 No_date    1:02   24.35 .357
      [CN= 68.6: N= 3.00]
      [Tp=  .05:DT= 1.00]
#*******************************************************************************
# Post-Development - Total Flow to Outlet 1
#*******************************************************************************
 002:0009--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:SWMF-1        58.20    4.004 No_date    1:30   59.24  n/a
                      +  02:ovflw-1         .00     .000 No_date    0:00     .00  n/a
                      +  03:201-3          2.34     .209 No_date    1:16   25.01  n/a
                      +  04:201-4           .72     .103 No_date    1:02   24.35  n/a
      [DT= 1.00]  SUM=  05:Total-1       61.26    4.185 No_date    1:29   57.52  n/a
#*******************************************************************************
# Proposed Catchment 202 - Outlet is East to Eramosa River
#*******************************************************************************
 002:0010--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    08:202-1          9.32    3.740 No_date    1:00   59.19 .867
      [XIMP=.81:TIMP=.81]
      [SLP=4.00:DT= 1.00]
      [LOSS= 2 :CN= 68.0]
#*******************************************************************************
#*******************************************************************************
# Preliminary SWMF 2 Design
#*******************************************************************************
 002:0011--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 08:202-1          9.32    3.740 No_date    1:00   59.19  n/a
  *   [RDT= 1.00] out<- 02:SWMF-2         9.32     .475 No_date    1:32   59.20  n/a
            overflow <= 01:ovflw-2         .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.3372E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*******************************************************************************
# Uncontrolled Flow East to Eramosa River
#*******************************************************************************
 002:0012--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      03:202-2          4.62     .490 No_date    1:11   25.01 .366
      [CN= 69.5: N= 3.00]
      [Tp=  .14:DT= 1.00]
 002:0013--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:202-3           .52     .078 No_date    1:01   23.92 .350
      [CN= 68.0: N= 3.00]
      [Tp=  .04:DT= 1.00]
 002:0014--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      06:202-4           .62     .098 No_date    1:01   25.01 .366
      [CN= 69.5: N= 3.00]
      [Tp=  .04:DT= 1.00]
#*******************************************************************************
#*******************************************************************************
# Post-Development - Total Flow to Target 2
#*******************************************************************************
 002:0015--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:ovflw-2         .00     .000 No_date    0:00     .00  n/a
                      +  02:SWMF-2         9.32     .475 No_date    1:32   59.20  n/a
```

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                  +  03:202-2          4.62     .490 No_date    1:11   25.01  n/a
                  +  04:202-3           .52     .078 No_date    1:01   23.92  n/a
                  +  06:202-4           .62     .098 No_date    1:01   25.01  n/a
      [DT= 1.00]  SUM=  07:Total-2       15.08    1.033 No_date    1:11   46.10  n/a
#*******************************************************************************
# Proposed Catchment 203 - Outlet is Victoria and Stone Road Intersection
#*******************************************************************************
 002:0016--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    01:203           22.59    8.205 No_date    1:02   60.93 .893
      [XIMP=.85:TIMP=.85]
      [SLP=2.00:DT= 1.00]
      [LOSS= 2 :CN= 68.0]
#*******************************************************************************
# Preliminary SWMF 3 Design - Non-Winter Condition
# Forebay and Wet Cell Component of SWMF 3
#*******************************************************************************
 002:0017--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 01:203           22.59    8.205 No_date    1:02   60.93  n/a
      [RDT= 1.00] out<- 02:SWM3NW        22.59    2.520 No_date    1:20   60.93  n/a
            overflow <= 03:ovflw-3NW       .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.8695E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*******************************************************************************
# Remainder of SWMF 3 - including the Infiltration Cell
#*******************************************************************************
 002:0018--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            02:SWM3NW        22.59    2.520 No_date    1:20   60.93  n/a
                  +  03:ovflw-3NW          .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  04:Infil3        22.59    2.520 No_date    1:20   60.93  n/a
#*******************************************************************************
 002:0019--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 04:Infil3        22.59    2.520 No_date    1:20   60.93  n/a
      [RDT= 1.00] out<- 02:Inf3NW        22.59     .158 No_date    1:06   60.93  n/a
            overflow <= 03:ovflw-3NW       .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.8038E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*******************************************************************************
#*******************************************************************************
# Preliminary SWMF 3 Design - Winter Condition
#*******************************************************************************
 002:0020--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 01:203           22.59    8.205 No_date    1:02   60.93  n/a
   *   [RDT= 1.00] out<- 04:SWMF3W        22.59    1.401 No_date    1:31   60.93  n/a
            overflow <= 06:ovflw-3W        .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.8986E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*******************************************************************************
# Total Flow to Outlet 3 - Non-Winter Condition
#*******************************************************************************
 002:0021--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            02:Inf3NW        22.59     .158 No_date    1:06   60.93  n/a
                  +  03:ovflw-3NW          .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  01:Out3NW        22.59     .158 No_date    1:06   60.93  n/a
#*******************************************************************************
# Total Flow to Outlet 3 - Winter Condition
#*******************************************************************************
 002:0022--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            04:SWMF3W        22.59    1.401 No_date    1:31   60.93  n/a
                  +  06:ovflw-3W           .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  02:Out3W         22.59    1.401 No_date    1:31   60.93  n/a
#*******************************************************************************
#*******************************************************************************
# Total from Site - Non-Winter Condition
#*******************************************************************************
 002:0023--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:Out3NW        22.59     .158 No_date    1:06   60.93  n/a
                  +  05:Total-1       61.26    4.185 No_date    1:29   57.52  n/a
                  +  07:Total-2       15.08    1.033 No_date    1:11   46.10  n/a
      [DT= 1.00]  SUM=  03:TotalNW       98.93    5.123 No_date    1:27   56.56  n/a
#*******************************************************************************
#*******************************************************************************
# Total from Site - Winter Condition
#*******************************************************************************
 002:0024--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            02:Out3W         22.59    1.401 No_date    1:31   60.93  n/a
                  +  05:Total-1       61.26    4.185 No_date    1:29   57.52  n/a
                  +  07:Total-2       15.08    1.033 No_date    1:11   46.10  n/a
      [DT= 1.00]  SUM=  04:TotalW        98.93    6.353 No_date    1:28   56.56  n/a
#*******************************************************************************
  ** END OF RUN :   2

*******************************************************************************




 RUN:COMMAND#
 003:0001--------------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   3 ]
#*******************************************************************************
#  Project Name: [Guelph Innovation District]    Project Number: [46927-104]
#  Date        : 04-19-2024
#  Modeller    : [CJC]
#  Company     : MTE Consultants Ltd.
#  License #   : 3057174
#*******************************************************************************
# PROPOSED CONDITIONS ANALYSIS
#*******************************************************************************
 003:0002--------------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT= 5.00:SDUR=   3.00:PTOT=  87.07]
#*******************************************************************************
# Proposed Catchment 201 - Outlet is North to Eramosa River
#*******************************************************************************
 003:0003--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    01:201-1         22.06    9.775 No_date    1:01   75.15 .863
      [XIMP=.78:TIMP=.78]
      [SLP=2.00:DT= 1.00]
      [LOSS= 2 :CN= 68.0]
 003:0004--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    02:201-2         36.14   15.685 No_date    1:02   77.67 .892
      [XIMP=.83:TIMP=.83]
      [SLP=1.50:DT= 1.00]
      [LOSS= 2 :CN= 68.0]
#*******************************************************************************
# Post-Development - Total Flow to SWMF 1
#*******************************************************************************
 003:0005--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
```

```
     ADD HYD            01:201-1         22.06    9.775 No_date    1:01   75.15  n/a
                    +  02:201-2         36.14   15.685 No_date    1:02   77.67  n/a
      [DT= 1.00]  SUM=  03:Inlet-1       58.20   25.269 No_date    1:02   76.72  n/a
#*************************************************************************
# Preliminary SWMF 1 Design
#*************************************************************************
 003:0006--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 03:Inlet-1       58.20   25.269 No_date    1:02   76.72  n/a
  *   [RDT= 1.00] out<- 01:SWMF-1        58.20    7.006 No_date    1:23   76.72  n/a
           overflow <= 02:ovflw-1         .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.2603E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*************************************************************************
# Uncontrolled Flow North to Eramosa River
#*************************************************************************
 003:0007--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      03:201-3          2.34     .317 No_date    1:16   37.16 .427
      [CN= 69.5: N= 3.00]
      [Tp=  .20:DT= 1.00]
 003:0008--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:201-4           .72     .155 No_date    1:02   36.28 .417
      [CN= 68.6: N= 3.00]
      [Tp=  .05:DT= 1.00]
#*************************************************************************
# Post-Development - Total Flow to Outlet 1
#*************************************************************************
 003:0009--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:SWMF-1        58.20    7.006 No_date    1:23   76.72  n/a
                    +  02:ovflw-1         .00     .000 No_date    0:00     .00  n/a
                    +  03:201-3          2.34     .317 No_date    1:16   37.16  n/a
                    +  04:201-4           .72     .155 No_date    1:02   36.28  n/a
      [DT= 1.00]  SUM=  05:Total-1       61.26    7.341 No_date    1:23   74.73  n/a
#*************************************************************************
# Proposed Catchment 202 - Outlet is East to Eramosa River
#*************************************************************************
 003:0010--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    08:202-1          9.32    4.800 No_date    1:00   76.66 .880
      [XIMP=.81:TIMP=.81]
      [SLP=4.00:DT= 1.00]
      [LOSS= 2 :CN= 68.0]
#*************************************************************************
#*************************************************************************
# Preliminary SWMF 2 Design
#*************************************************************************
 003:0011--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 08:202-1          9.32    4.800 No_date    1:00   76.66  n/a
  *   [RDT= 1.00] out<- 02:SWMF-2         9.32     .993 No_date    1:22   76.67  n/a
           overflow <= 01:ovflw-2         .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.4232E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*************************************************************************
# Uncontrolled Flow East to Eramosa River
#*************************************************************************
 003:0012--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      03:202-2          4.62     .742 No_date    1:11   37.16 .427
      [CN= 69.5: N= 3.00]
      [Tp=  .14:DT= 1.00]
 003:0013--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:202-3           .52     .118 No_date    1:01   35.70 .410
      [CN= 68.0: N= 3.00]
      [Tp=  .04:DT= 1.00]
 003:0014--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      06:202-4           .62     .147 No_date    1:01   37.16 .427
      [CN= 69.5: N= 3.00]
      [Tp=  .04:DT= 1.00]
#*************************************************************************
#*************************************************************************
# Post-Development - Total Flow to Target 2
#*************************************************************************
 003:0015--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:ovflw-2          .00     .000 No_date    0:00     .00  n/a
                    +  02:SWMF-2          9.32     .993 No_date    1:22   76.67  n/a
                    +  03:202-2           4.62     .742 No_date    1:11   37.16  n/a
                    +  04:202-3            .52     .118 No_date    1:01   35.70  n/a
                    +  06:202-4            .62     .147 No_date    1:01   37.16  n/a
      [DT= 1.00]  SUM=  07:Total-2       15.08    1.668 No_date    1:18   61.53  n/a
#*************************************************************************
# Proposed Catchment 203 - Outlet is Victoria and Stone Road Intersection
#*************************************************************************
 003:0016--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    01:203           22.59   10.792 No_date    1:01   78.69 .904
      [XIMP=.85:TIMP=.85]
      [SLP=2.00:DT= 1.00]
      [LOSS= 2 :CN= 68.0]
#*************************************************************************
# Preliminary SWMF 3 Design - Non-Winter Condition
# Forebay and Wet Cell Component of SWMF 3
#*************************************************************************
 003:0017--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 01:203           22.59   10.792 No_date    1:01   78.69  n/a
      [RDT= 1.00] out<- 02:SWM3NW        22.20    4.845 No_date    1:09   78.68  n/a
           overflow <= 03:ovflw-3NW       .39    2.060 No_date    1:09   78.69  n/a
     {MxStoUsed=.8959E+00, TotOvfVol=.3086E-01, N-Ovf=    2, TotDurOvf=    0.hrs}
#*************************************************************************
# Remainder of SWMF 3 - including the Infiltration Cell
#*************************************************************************
 003:0018--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            02:SWM3NW        22.20    4.845 No_date    1:09   78.68  n/a
                    +  03:ovflw-3NW        .39    2.060 No_date    1:09   78.69  n/a
      [DT= 1.00]  SUM=  04:Infil3        22.59    6.906 No_date    1:09   78.68  n/a
#*************************************************************************
 003:0019--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 04:Infil3        22.59    6.906 No_date    1:09   78.68  n/a
      [RDT= 1.00] out<- 02:Inf3NW        22.59     .158 No_date    1:03   78.68  n/a
           overflow <= 03:ovflw-3NW       .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1196E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*************************************************************************
#*************************************************************************
# Preliminary SWMF 3 Design - Winter Condition
#*************************************************************************
 003:0020--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 01:203           22.59   10.792 No_date    1:01   78.69  n/a
  *   [RDT= 1.00] out<- 04:SWMF3W        22.59    2.513 No_date    1:24   78.69  n/a
           overflow <= 06:ovflw-3W         .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1080E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
#*************************************************************************
# Total Flow to Outlet 3 - Non-Winter Condition
#*************************************************************************
 003:0021--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            02:Inf3NW        22.59     .158 No_date    1:03   78.68  n/a
                    +  03:ovflw-3NW        .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  01:Out3NW        22.59     .158 No_date    1:03   78.68  n/a
#*************************************************************************
# Total Flow to Outlet 3 - Winter Condition
```

```
#*******************************************************************************
 003:0022--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            04:SWMF3W        22.59    2.513 No_date    1:24   78.69  n/a
                      +  06:ovflw-3W        .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  02:Out3W         22.59    2.513 No_date    1:24   78.69  n/a
#*******************************************************************************
#*******************************************************************************
# Total from Site - Non-Winter Condition
#*******************************************************************************
 003:0023--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:Out3NW        22.59     .158 No_date    1:03   78.68  n/a
                      +  05:Total-1       61.26    7.341 No_date    1:23   74.73  n/a
                      +  07:Total-2       15.08    1.668 No_date    1:18   61.53  n/a
      [DT= 1.00]  SUM=  03:TotalNW       98.93    9.100 No_date    1:22   73.62  n/a
#*******************************************************************************
#*******************************************************************************
# Total from Site - Winter Condition
#*******************************************************************************
 003:0024--------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            02:Out3W         22.59    2.513 No_date    1:24   78.69  n/a
                      +  05:Total-1       61.26    7.341 No_date    1:23   74.73  n/a
                      +  07:Total-2       15.08    1.668 No_date    1:18   61.53  n/a
      [DT= 1.00]  SUM=  04:TotalW        98.93   11.444 No_date    1:22   73.62  n/a
#*******************************************************************************
 003:0002--------------------------------------------------------------------------
      FINISH
--------------------------------------------------------------------------------
********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 001:0006 ROUTE RESERVOIR
      *** WARNING: First OUTFLOW value in table should be ZERO.
 001:0011 ROUTE RESERVOIR
      *** WARNING: First OUTFLOW value in table should be ZERO.
 001:0020 ROUTE RESERVOIR
      *** WARNING: First OUTFLOW value in table should be ZERO.
 002:0006 ROUTE RESERVOIR
      *** WARNING: First OUTFLOW value in table should be ZERO.
 002:0011 ROUTE RESERVOIR
      *** WARNING: First OUTFLOW value in table should be ZERO.
 002:0020 ROUTE RESERVOIR
      *** WARNING: First OUTFLOW value in table should be ZERO.
 003:0006 ROUTE RESERVOIR
      *** WARNING: First OUTFLOW value in table should be ZERO.
 003:0011 ROUTE RESERVOIR
      *** WARNING: First OUTFLOW value in table should be ZERO.
 003:0020 ROUTE RESERVOIR
      *** WARNING: First OUTFLOW value in table should be ZERO.
   Simulation ended on 2024-04-18     at 06:31:32
================================================================================
```

Appendix E

SWM Design Calculations

GID

STORMWATER MANAGEMENT

Guelph, Ontario

Project Number: 46927-104
Date: April 19, 2024
Design By: CJC
File: Q:\46927\104\SWM\SWMF 3\46927-104_SWMF 3 Master Design Sheet.xlsx

HYDROLOGIC PARAMETERS

Pre-Development Conditions

Sub-Catchment Number	Area	Overland Slope	Overland Length	SCS Curve Number		Percent Impervious	Weighted Curve Number	Runoff Coefficient		Weighted Runoff Coefficient	Time of Concentration	Time to Peak	Land Use	Design Command	Comment
				Pervious (AMC II)	Impervious		CN	Pervious	Impervious	RC	ToC	Tp			
	(ha)	*(%)*	*(m)*			*(%)*					*(hr)*	*(hr)*			
101	54.91	6.0	500	65.0	98.0	3.0	66.0	0.20	0.90	0.22	0.59	0.35	Agricultural	NASHYD	Existing drainage north to Eramosa River
102	27.50	4.0	350	65.0	98.0	1.0	65.3	0.20	0.90	0.21	0.57	0.34	Agricultural	NASHYD	Existing drainage east to Eramosa River
103	16.55	2.0	250	65.0	98.0	10.0	68.3	0.20	0.90	0.27	0.57	0.34	Agricultural	NASHYD	Existing drainage to Victoria at Stone Rd. (existing infiltration facility)
Total	**98.96**														

IDF PARAMETERS

Frequency	a	b	c
25mm (4hr)	538	8.1	0.808
2	743	6.0	0.799
5	1,593	11.0	0.879
10	2,221	12.0	0.908
25	3,158	15.0	0.936
50	3,886	16.0	0.95
100	4,688	17.0	0.962

Post-Development Conditions

Sub-Catchment Number	Area	Overland Slope	Overland Length	SCS Curve Number		Percent Impervious	Weighted Curve Number	Runoff Coefficient		Weighted Runoff Coefficient	Time of Concentration	Peak Flow	Land Use	Design Command	Comment
				Pervious (AMC II)	Impervious		CN	Pervious	Impervious	RC	ToC	Tp			
	(ha)	*(%)*	*(m)*			*(%)*					*(hr)*	*(hr)*			
Outlet 1 - Drainage North to Eramosa River															
201-1	22.06	2.0	750	68.0	98.0	78.4	68.0	0.20	0.90	0.75	0.46	0.27	Mix of residential and 'mixed land use'	STANDHYD	Proposed drainage to SWMF1 east forebay
201-2	36.14	1.5	800	68.0	98.0	82.6	68.0	0.20	0.90	0.78	0.49	0.29	Mix of residential and 'mixed land use'	STANDHYD	Proposed drainage to SWMF1 west forebay
Total to SWMF 1	**58.20**					**81.0**									
201-3	2.34	5.0	150	68.0	98.0	5.0	69.5	0.20	0.90	0.24	0.34	0.20	Embankment and roadway	NASHYD	Uncontrolled drainage to Victoria Road - north to River
201-4	0.72	25.0	25	68.0	98.0	2.0	68.6	0.20	0.90	0.21	0.08	0.05	Residential rear lots	NASHYD	Uncontrolled drainage directly north to Eramosa River
Total Uncontrolled	**3.06**					**4.3**									
Total North to River	**61.26**					**77.2**									
Outlet 2 - Drainage East to Eramosa River															
202-1	9.32	4.0	250	68.0	98.0	80.8	68.0	0.20	0.90	0.77	0.14	0.09	Mix of residential and 'mixed land use'	STANDHYD	Proposed drainage to SWMF2
Total to SWMF 2	**9.32**					**80.8**									
202-2	4.62	5.0	75	68.0	98.0	5.0	69.5	0.20	0.90	0.24	0.24	0.14	Park and residential rear lots	NASHYD	Uncontrolled drainage directly east to Eramosa River
202-3	0.52	30.0	20	68.0	98.0	0.0	68.0	0.20	0.90	0.20	0.07	0.04	Embankment of SWMF2	NASHYD	Uncontrolled drainage directly east to Eramosa River
202-4	0.62	30.0	20	68.0	98.0	5.0	69.5	0.20	0.90	0.24	0.07	0.04	Mixed-use embankment	NASHYD	Uncontrolled drainage directly east to Eramosa River
Total Uncontrolled	**5.76**					**4.5**									
Total East to River	**15.08**					**51.7**									
Outlet 3 - Drainage to Victoria and Stone Intersection (Outlet to River North along Victoria)															
203	22.59	2.0	275	68.0	98.0	84.7	68.0	0.20	0.90	0.79	0.17	0.10	Employment, mixed-use, and mixed existing uses	STANDHYD	Proposed and existing drainage to SWMF3
Total to SWMF3	**22.59**					**84.7**									
Total Offsite	**98.93**					**75.0**									

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STORMWATER MANAGEMENT
Guelph, Ontario

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SWM Facility 1

Step 1: Choose Level of Water Quality Control

Enhanced 80% long-term S.S. removal

Step 2: Choose Type of Facility

Wet Pond

Step 3: Define Catchment area and Imperviousness

Catchment Area (ha)	Imperviousness (%)
58.20	80.99

Interpolated Storage Volume Requirement (m^3/ha)

243.32

Permanent Pool Required (m^3)

11833.44

Extended Detention Volume Required (m^3)

2328.00

Table 3.2 Water Quality Storage Requirements based on Receiving Waters (from MOE Stormwater Management Planning and Design Manual, March 2003)

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35	55	70	85
Enhanced 80% long-term S.S. removal	*Wetlands*	80	105	120	140
	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
Normal 70% long-term S.S. Removal	*Wetlands*	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
Basic 60% long-term S.S. Removal	*Wetlands*	60	60	60	60
	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

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STAGE-STORAGE RELATIONSHIP
SWM Facility 1

Stage	Active Depth	East Forebay			West Forebay			Main Pond			Total Pond Volume	Active Storage Volume	Volume Summary	Ponding Elevation	Comments	Stage
		Area	Volume	Cumulative Volume	Area	Volume	Cumulative Volume	Area	Volume	Cumulative Volume						
m	*m*	m^2	m^3	m^3	m^2	m^3	m^3	m^2	m^3	m^3	m^3	m^3	m^3	*m*		*m*
325.00		347	0	0	1804	0	0	7017	0	0	0					325.00
325.10		384	37	37	1866	183	183	7189	710	710	930					325.10
325.20		418	40	77	1932	190	373	7362	728	1438	1888					325.20
325.30		454	44	120	1999	197	570	7536	745	2183	2873					325.30
325.40		490	47	167	2066	203	773	7711	762	2945	3886					325.40
325.50		526	51	218	2135	210	983	7887	780	3725	4926					325.50
325.60		563	54	273	2203	217	1200	8065	798	4523	5995					325.60
325.70		601	58	331	2272	224	1424	8243	815	5338	7093					325.70
325.80		640	62	393	2342	231	1655	8425	833	6171	8219					325.80
325.90		679	66	459	2414	238	1892	8610	852	7023	9374					325.90
326.00		728	70	529	2498	246	2138	8859	873	7897	10564					326.00
326.10		779	75	605	2584	254	2392	9116	899	8795	11792					326.10
326.20		832	81	685	2671	263	2655	9375	925	9720	13060					326.20
326.30		887	86	771	2759	271	2926	9635	951	10670	14368					326.30
326.40		943	91	862	2848	280	3207	9897	977	11647	15716					326.40
326.50		1005	97	960	2950	290	3497	10178	1004	12651	17107		**17107**		**Permanent Pool**	326.50
326.50	0.00							14134	0	12651	17107	0				326.50
326.60	0.10							14544	1434	14085	18541	1434				326.60
326.70	0.20							14954	1475	15560	20016	2909	2328	326.67	MOE Extended Detention	326.70
326.80	0.30							15558	1526	17085	21542	4434				326.80
326.90	0.40							15866	1571	18656	23113	6006				326.90
327.00	0.50							16183	1602	20259	24715	7608				327.00
327.10	0.60							16513	1635	21894	26350	9243				327.10
327.20	0.70							16723	1662	23555	28012	10905				327.20
327.30	0.80							16929	1683	25238	29694	12587				327.30
327.40	0.90							17134	1703	26941	31398	14290				327.40
327.50	1.00							17341	1724	28665	33121	16014	15610	327.48	5y	327.50
327.60	1.10							17548	1744	30409	34866	17759				327.60
327.70	1.20							17755	1765	32174	36631	19524				327.70
327.80	1.30							17962	1786	33960	38417	21310				327.80
327.90	1.40							18170	1807	35767	40223	23116	21680	327.83	25y	327.90
328.00	1.50							18378	1827	37594	42051	24944				328.00
328.10	1.60							18586	1848	39442	43899	26792	26030	328.06	100y	328.10
328.20	1.70							18793	1869	41311	45768	28661				328.20
328.30	1.80							19012	1890	43202	47658	30551				328.30
328.40	1.90							19237	1912	45114	49570	32463				328.40
328.50	2.00							19464	1935	47049	51506	34398				328.50
328.60	2.10							19694	1958	49007	53463	36356				328.60
328.70	2.20							19913	1980	50987	55444	38337				328.70
328.80	2.30							20142	2003	52990	57447	40339				328.80
328.90	2.40							20327	2023	55014	59470	42363				328.90
329.00	2.50							20760	2054	57068	61524	44417				329.00

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Orifice Calculations

$Q_o = C_d * A_o * (2 * g * H_o)^{0.5}$

	Orifice 1	Orifice 2	Orifice 3
C_d	0.63	0.63	0.63
Invert (m)	326.30	500.00	500.00
Width (m)			
Diameter/Height (m)	0.900		
Type (H/V)	V	V	V

C_d	Description
0.63	Orifice Plate
0.80	Orifice Tube

Weir Calculations

$Q_w = 2/3 * C_d * (2g)^{1/2} * L * H_w^{3/2} + 8/15 * C_d * (2g)^{1/2} * \tan\theta * H_w^{5/2}$

	Notch Weir	Emergency Overflow
C_d	0.50	0.50
Invert (m)	327.50	328.80
Length (m)	8.000	7.000
Side Slope (H:V)	0	10
Side Slope (rad)	0.000	1.471

STAGE-DISCHARGE RELATIONSHIP
SWM Facility 1

Stage	Active Volume	Orifice 1			Orifice 2			Orifice 3			Weir 1 Flow	Weir 2 Flow	Total Flow
		Area	H_o	Flow	Area	H_o	Flow	Area	H_o	Flow			
m	m^3	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^3/s		m^3/s
326.50	0	0.11	0.10	0.0929	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0929
326.60	1434	0.19	0.15	0.2006	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.2006
326.70	2909	0.27	0.20	0.3409	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.3409
326.80	4434	0.36	0.25	0.5065	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.5065
326.90	6006	0.45	0.30	0.6886	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.6886
327.00	7608	0.53	0.35	0.8765	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.8765
327.10	9243	0.60	0.40	1.0546	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	1.0546
327.20	10905	0.64	0.45	1.1909	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	1.1909
327.30	12587	0.64	0.55	1.3166	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	1.3166
327.40	14290	0.64	0.65	1.4313	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	1.4313
327.50	16014	0.64	0.75	1.5374	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	1.5374
327.60	17759	0.64	0.85	1.6367	0.00	0.00	0.0000	0.00	0.00	0.0000	0.3735	0.0000	2.0102
327.70	19524	0.64	0.95	1.7303	0.00	0.00	0.0000	0.00	0.00	0.0000	1.0565	0.0000	2.7868
327.80	21310	0.64	1.05	1.8191	0.00	0.00	0.0000	0.00	0.00	0.0000	1.9409	0.0000	3.7600
327.90	23116	0.64	1.15	1.9038	0.00	0.00	0.0000	0.00	0.00	0.0000	2.9882	0.0000	4.8920
328.00	24944	0.64	1.25	1.9848	0.00	0.00	0.0000	0.00	0.00	0.0000	4.1761	0.0000	6.1609
328.10	26792	0.64	1.35	2.0627	0.00	0.00	0.0000	0.00	0.00	0.0000	5.4897	0.0000	7.5523
328.20	28661	0.64	1.45	2.1377	0.00	0.00	0.0000	0.00	0.00	0.0000	6.9178	0.0000	9.0555
328.30	30551	0.64	1.55	2.2102	0.00	0.00	0.0000	0.00	0.00	0.0000	8.4519	0.0000	10.6621
328.40	32463	0.64	1.65	2.2804	0.00	0.00	0.0000	0.00	0.00	0.0000	10.0851	0.0000	12.3655
328.50	34398	0.64	1.75	2.3485	0.00	0.00	0.0000	0.00	0.00	0.0000	11.8119	0.0000	14.1603
328.60	36356	0.64	1.85	2.4146	0.00	0.00	0.0000	0.00	0.00	0.0000	13.6272	0.0000	16.0419
328.70	38337	0.64	1.95	2.4790	0.00	0.00	0.0000	0.00	0.00	0.0000	15.5271	0.0000	18.0061
328.80	40339	0.64	2.05	2.5418	0.00	0.00	0.0000	0.00	0.00	0.0000	17.5079	0.0000	20.0497
328.90	42363	0.64	2.15	2.6031	0.00	0.00	0.0000	0.00	0.00	0.0000	19.5664	0.3642	22.5336
329.00	44417	0.64	2.25	2.6629	0.00	0.00	0.0000	0.00	0.00	0.0000	21.6998	1.1357	25.4984

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STORMWATER MANAGEMENT
Guelph, Ontario

Project Number:	46927-104
Date:	April 19, 2024
Design By:	CJC
File:	Q:\46927\104\SWM\SWMF 1\46927-104_SWMF 1 Master Design Sheet.xlsx

SWMF 1 - EAST FOREBAY DESIGN CALCULATIONS
MOE SWM Planning and Design Manual, 2003

Forebay Design Flows

Flow into forebay during the 1:5-year return period event	3.657	m^3/s
Flow into forebay during the 25 mm - 4 hour design storm event	2.349	m^3/s
Peak flow from main pond outlet for the 25mm design storm (from MIDUSS)		m^3/s

Forebay Characteristics

b =	12.0	*m*	bottom width
y =	1.5	*m*	depth
z =	3	:1	side slope
w =	16.5	*m*	average width
R =	1.15	*m*	hydraulic radius
A =	24.8	m^2	cross-sectional area

1. Length Calculation Based on Settling Velocity

L = forebay flow length *(m)*
r = length-to-width ratio
Q_p = peak flow rate through forebay (m^3/s)
v_s = settling velocity *(m/s)*

Equation 4.5: Forebay Settling Length

a) Required Settling Length (assuming Q_p = forebay through-flow & v_s = 0.0055 m/s)

Q_p =	2.35	m^3/s	peak flow rate through forebay
v_s =	0.0055	*m/s*	settling velocity
r =	1.57		length-to-width ratio
L =	25.9	*m*	required settling length
L =	25.9	*m*	*trial length*

b) Required Settling Length (assuming Q_p = pond discharge & v_s = 0.0003 m/s)

Q_p =	0.000	m^3/s	peak flow rate through forebay
v_s =	0.0003	*m/s*	settling velocity
r =	0.00		length-to-width ratio
L =	0.0	*m*	required settling length
L =		*m*	*trial length*

Table 1: Average settling velocities

	Mass Removed	Particle Size Range	Average Settling Velocity
	%	*µm*	*m/s*
	80 - 100	x ≤ 20	0.00000254
Enhanced:	70 - 80	20 < x ≤ 40	0.00001300
Normal:	60 - 70	40 < x ≤ 60	0.00002540
Basic:	40 - 60	60 < x ≤ 130	0.00012700
Medium Sand:	20 - 40	130 < x ≤ 400	0.00059267
Gross Grit:	0 - 20	400 < x ≤ 4000	0.00550333

2. Length Calculation Based on Flow Dispersion Length

Q =	3.66	m^3/s	inlet flow rate
d =	1.5	*m*	depth of permanent pool in forebay
V_f =	0.50	*m/s*	desired velocity in forebay (typical value ≤ 0.50 *m/s*)
L =	39.0	m	required length of dispersion

Equation 4.6: Dispersion Length

3. Required Forebay Length

L =	**39.0**	***m***	**design length**
r =	2.36		design length-to-width ratio (typical minimum of 2.0)

4. Scour Velocity

v_s =	0.15	*m/s*	scour velocity (typical value = 0.15 *m/s*)
v =	**0.148**	***m/s***	**actual velocity**

OK The actual velocity through the forebay is less than the scour velocity.

5. Weir Flow From Forebay

L =	14	*m*	length of crest of weir
α =	1.65		coefficient
H =	0.3	*m*	head
Q =	**3.80**	***m³/s***	**discharge**

Equation 4.4: Weir Flow

OK The weir flow from the forebay exceeds the flow entering the forebay

6. Estimated Cleanout Frequencies

a) Forebay

Forebay volume	960	m^3
Estimated TSS removal efficiency	80%	
Impervious level	78%	
Estimated annual sediment loading	3.4	m^3/ha
Contributing area	22.06	*ha*
Annual sediment volume	59	m^3/yr
Cleanout frequency for 33% volume reduction	**5.3**	***years***

b) Stormwater Management Pond

Wetpond volume (excluding forebay)	12651	m^3
Estimated TSS removal efficiency	30%	
Impervious level	78%	
Estimated annual sediment loading	3.4	m^3/ha
Contributing area	22.06	*ha*
Annual sediment volume	22	m^3/yr
Cleanout frequency for 33% volume reduction	**187.8**	***years***

Table 2: Annual sediment loading

Impervious Level	Annual Loading
%	m^3/ha
35%	0.6
55%	1.9
70%	2.8
85%	3.8

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STORMWATER MANAGEMENT
Guelph, Ontario

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SWMF 1 - WEST FOREBAY DESIGN CALCULATIONS
MOE SWM Planning and Design Manual, 2003

Forebay Design Flows

Flow into forebay during the 1:5-year return period event	6.819	m^3/s
Flow into forebay during the 25 mm - 4 hour design storm event	3.571	m^3/s
Peak flow from main pond outlet for the 25mm design storm (from MIDUSS)		m^3/s

Forebay Characteristics

b =	26.0	*m*	bottom width
y =	1.5	*m*	depth
z =	3	:1	side slope
w =	30.5	*m*	average width
R =	1.29	*m*	hydraulic radius
A =	45.8	m^2	cross-sectional area

1. Length Calculation Based on Settling Velocity

L = forebay flow length *(m)*
r = length-to-width ratio
Q_p = peak flow rate through forebay (m^3/s)
v_s = settling velocity *(m/s)*

Equation 4.5: Forebay Settling Length

a) Required Settling Length (assuming Q_p = forebay through-flow & v_s = 0.0055 m/s)

Q_p =	3.57	m^3/s	peak flow rate through forebay
v_s =	0.0055	*m/s*	settling velocity
r =	0.70		length-to-width ratio
L =	21.3	*m*	required settling length
L =	*21.3*	*m*	*trial length*

b) Required Settling Length (assuming Q_p = pond discharge & v_s = 0.0003 m/s)

Q_p =	0.000	m^3/s	peak flow rate through forebay
v_s =	0.0003	*m/s*	settling velocity
r =	0.00		length-to-width ratio
L =	0.0	*m*	required settling length
L =		*m*	*trial length*

Table 1: Average settling velocities

	Mass Removed	Particle Size Range	Average Settling Velocity
	%	*µm*	*m/s*
	80 - 100	x ≤ 20	0.00000254
Enhanced:	70 - 80	20 < x ≤ 40	0.00001300
Normal:	60 - 70	40 < x ≤ 60	0.00002540
Basic:	40 - 60	60 < x ≤ 130	0.00012700
Medium Sand:	20 - 40	130 < x ≤ 400	0.00059267
Gross Grit:	0 - 20	400 < x ≤ 4000	0.00550333

2. Length Calculation Based on Flow Dispersion Length

Q =	6.82	m^3/s	inlet flow rate
d =	1.5	*m*	depth of permanent pool in forebay
V_f =	0.50	*m/s*	desired velocity in forebay (typical value ≤ 0.50 *m/s*)
L =	72.7	m	required length of dispersion

Equation 4.6: Dispersion Length

3. Required Forebay Length

L =	**72.7**	***m***	**design length**
r =	2.38		design length-to-width ratio (typical minimum of 2.0)

4. Scour Velocity

v_s =	0.15	*m/s*	scour velocity (typical value = 0.15 *m/s*)
v =	**0.149**	***m/s***	**actual velocity**

OK The actual velocity through the forebay is less than the scour velocity.

5. Weir Flow From Forebay

L =	26	*m*	length of crest of weir
α =	1.65		coefficient
H =	0.3	*m*	head
Q =	**7.05**	m^3/s	**discharge**

Equation 4.4: Weir Flow

OK The weir flow from the forebay exceeds the flow entering the forebay

6. Estimated Cleanout Frequencies

a) Forebay

Forebay volume	3497	m^3
Estimated TSS removal efficiency	80%	
Impervious level	83%	
Estimated annual sediment loading	3.6	m^3/ha
Contributing area	36.14	*ha*
Annual sediment volume	105	m^3/yr
Cleanout frequency for 33% volume reduction	**11.0**	***years***

b) Stormwater Management Pond

Wetpond volume (excluding forebay)	12651	m^3
Estimated TSS removal efficiency	30%	
Impervious level	83%	
Estimated annual sediment loading	3.6	m^3/ha
Contributing area	36.14	*ha*
Annual sediment volume	39	m^3/yr
Cleanout frequency for 33% volume reduction	**105.8**	***years***

Table 2: Annual sediment loading

Impervious Level	Annual Loading
%	m^3/ha
35%	0.6
55%	1.9
70%	2.8
85%	3.8

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STORMWATER MANAGEMENT
Guelph, Ontario

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SWM Facility 2

Step 1: Choose Level of Water Quality Control

Enhanced 80% long-term S.S. removal

Step 2: Choose Type of Facility

Wet Pond

Step 3: Define Catchment area and Imperviousness

Catchment Area (ha)	Imperviousness (%)
9.32	80.81

Interpolated Storage Volume Requirement (m^3/ha)

243.02

Permanent Pool Required (m^3)

1892.12

Extended Detention Volume Required (m^3)

372.80

Table 3.2 Water Quality Storage Requirements based on Receiving Waters (from MOE Stormwater Management Planning and Design Manual, March 2003)

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35	55	70	85
Enhanced 80% long-term S.S. removal	*Wetlands*	80	105	120	140
	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
Normal 70% long-term S.S. Removal	*Wetlands*	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
Basic 60% long-term S.S. Removal	*Wetlands*	60	60	60	60
	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

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STAGE-STORAGE RELATIONSHIP
SWM Facility 2

Stage	Active Depth	Forebay			Main Pond			Total Pond Volume	Active Storage Volume	Volume Summary	Ponding Elevation	Comments	Stage
		Area	Volume	Cumulative Volume	Area	Volume	Cumulative Volume						
m	*m*	m^2	m^3	m^3	m^2	m^3	m^3	m^3	m^3	m^3	*m*		*m*
321.50		501	0	0	738	0	0	0					321.50
321.60		529	52	52	791	76	76	128					321.60
321.70		559	54	106	845	82	158	264					321.70
321.80		590	57	163	900	87	245	409					321.80
321.90		621	61	224	956	93	338	562					321.90
322.00		654	64	288	1013	98	437	724					322.00
322.10		687	67	355	1071	104	541	896					322.10
322.20		721	70	425	1131	110	651	1076					322.20
322.30		756	74	499	1191	116	767	1266					322.30
322.40		791	77	576	1235	121	888	1465					322.40
322.50		828	81	657	1317	128	1016	1673					322.50
322.60		865	85	742	1382	135	1151	1893					322.60
322.70		903	88	830	1448	141	1293	2123					322.70
322.80		943	92	923	1515	148	1441	2363					322.80
322.90		982	96	1019	1583	155	1596	2614					322.90
323.00		1034	101	1120	1662	162	1758	2877		**2877**		**Permanent Pool**	323.00
323.00	0.00				2696	0	1758	2877	0				323.00
323.10	0.10				2807	275	2033	3153	275				323.10
323.20	0.20				2917	286	2319	3439	561	372.80	323.14	MOE Extended Detention	323.20
323.30	0.30				3045	298	2617	3737	859				323.30
323.40	0.40				3144	309	2927	4046	1169				323.40
323.50	0.50				3244	319	3246	4366	1488				323.50
323.60	0.60				3337	329	3575	4695	1817				323.60
323.70	0.70				3431	338	3913	5033	2156	2080	323.68	5y	323.70
323.80	0.80				3527	348	4261	5381	2504				323.80
323.90	0.90				3622	357	4619	5738	2861				323.90
324.00	1.00				3719	367	4986	6105	3228				324.00
324.10	1.10				3816	377	5363	6482	3605	3372	324.04	25y	324.10
324.20	1.20				3915	387	5749	6869	3991				324.20
324.30	1.30				4014	396	6146	7265	4388	4232	324.27	100y	324.30
324.40	1.40				4115	406	6552	7672	4794				324.40
324.50	1.50				4216	417	6969	8088	5211				324.50
324.60	1.60				4319	427	7395	8515	5638				324.60
324.70	1.70				4449	438	7834	8953	6076				324.70
324.80	1.80				4587	452	8286	9405	6528				324.80
324.90	1.90				4741	466	8752	9872	6994				324.90
325.00	2.00				4882	481	9233	10353	7475				325.00
325.10	2.10				5024	495	9728	10848	7971				325.10

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Orifice Calculations

$Q_o = C_d * A_o * (2 * g * H_o)^{0.5}$

	Orifice 1	Orifice 2	Orifice 3
C_d	0.63	0.63	0.63
Invert (m)	322.80	500.00	500.00
Width (m)			
Diameter/Height (m)	0.465		
Type (H/V)	V	V	V

C_d	Description
0.63	Orifice Plate
0.80	Orifice Tube

Weir Calculations

$Q_w = 2/3 * C_d * (2g)^{1/2} * L * H_w^{3/2} + 8/15 * C_d * (2g)^{1/2} * \tan\theta * H_w^{5/2}$

	Notch Weir	Emergency Overflow
C_d	0.50	0.50
Invert (m)	324.15	324.90
Length (m)	8.000	10.000
Side Slope (H:V)	0	3
Side Slope (rad)	0.000	1.249

STAGE-DISCHARGE RELATIONSHIP
SWM Facility 2

Stage	Active Volume	Orifice 1			Orifice 2			Orifice 3			Weir 1 Flow	Weir 2 Flow	Total Flow
		Area	H_o	Flow	Area	H_o	Flow	Area	H_o	Flow			
m	m^3	m^2	m	m^3/s	m^2	m	m^3/s	m^2	m	m^3/s	m^3/s		m^3/s
323.00	0	0.07	0.10	0.0616	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0616
323.10	275	0.12	0.15	0.1252	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.1252
323.20	561	0.16	0.20	0.1939	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.1939
323.30	859	0.17	0.27	0.2451	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.2451
323.40	1169	0.17	0.37	0.2873	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.2873
323.50	1488	0.17	0.47	0.3240	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.3240
323.60	1817	0.17	0.57	0.3570	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.3570
323.70	2156	0.17	0.67	0.3872	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.3872
323.80	2504	0.17	0.77	0.4152	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.4152
323.90	2861	0.17	0.87	0.4414	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.4414
324.00	3228	0.17	0.97	0.4661	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.4661
324.10	3605	0.17	1.07	0.4896	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.4896
324.20	3991	0.17	1.17	0.5121	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1321	0.0000	0.6441
324.30	4388	0.17	1.27	0.5335	0.00	0.00	0.0000	0.00	0.00	0.0000	0.6862	0.0000	1.2197
324.40	4794	0.17	1.37	0.5542	0.00	0.00	0.0000	0.00	0.00	0.0000	1.4765	0.0000	2.0307
324.50	5211	0.17	1.47	0.5741	0.00	0.00	0.0000	0.00	0.00	0.0000	2.4458	0.0000	3.0199
324.60	5638	0.17	1.57	0.5933	0.00	0.00	0.0000	0.00	0.00	0.0000	3.5656	0.0000	4.1590
324.70	6076	0.17	1.67	0.6120	0.00	0.00	0.0000	0.00	0.00	0.0000	4.8179	0.0000	5.4299
324.80	6528	0.17	1.77	0.6300	0.00	0.00	0.0000	0.00	0.00	0.0000	6.1900	0.0000	6.8200
324.90	6994	0.17	1.87	0.6476	0.00	0.00	0.0000	0.00	0.00	0.0000	7.6720	0.0000	8.3196
325.00	7475	0.17	1.97	0.6647	0.00	0.00	0.0000	0.00	0.00	0.0000	9.2565	0.4781	10.3993
325.10	7971	0.17	2.07	0.6814	0.00	0.00	0.0000	0.00	0.00	0.0000	10.9371	1.3840	13.0025

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SWMF 2 - FOREBAY DESIGN CALCULATIONS

MOE SWM Planning and Design Manual, 2003

Forebay Design Flows

Flow into forebay during the 1:5-year return period event	1.712	m^3/s
Flow into forebay during the 25 mm - 4 hour design storm event	1.237	m^3/s
Peak flow from main pond outlet for the 25mm design storm (from MIDUSS)		m^3/s

Forebay Characteristics

b =	5.5	*m*	bottom width
y =	1.5	*m*	depth
z =	3	:1	side slope
w =	10.0	*m*	average width
R =	1.00	*m*	hydraulic radius
A =	15.0	m^2	cross-sectional area

1. Length Calculation Based on Settling Velocity

L = forebay flow length *(m)*
r = length-to-width ratio
Q_p = peak flow rate through forebay (m^3/s)
v_s = settling velocity *(m/s)*

Equation 4.5: Forebay Settling Length

a) Required Settling Length (assuming Q_p = forebay through-flow & v_s = 0.0055 m/s)

Q_p =	1.24	m^3/s	peak flow rate through forebay
v_s =	0.0055	*m/s*	settling velocity
r =	2.25		length-to-width ratio
L =	22.5	*m*	required settling length
L =	22.5	*m*	*trial length*

b) Required Settling Length (assuming Q_p = pond discharge & v_s = 0.0003 m/s)

Q_p =	0.000	m^3/s	peak flow rate through forebay
v_s =	0.0003	*m/s*	settling velocity
r =	0.00		length-to-width ratio
L =	0.0	*m*	required settling length
L =		*m*	*trial length*

Table 1: Average settling velocities

	Mass Removed	Particle Size Range	Average Settling Velocity
	%	*µm*	*m/s*
	80 - 100	x ≤ 20	0.00000254
Enhanced:	70 - 80	20 < x ≤ 40	0.00001300
Normal:	60 - 70	40 < x ≤ 60	0.00002540
Basic:	40 - 60	60 < x ≤ 130	0.00012700
Medium Sand:	20 - 40	130 < x ≤ 400	0.00059267
Gross Grit:	0 - 20	400 < x ≤ 4000	0.00550333

2. Length Calculation Based on Flow Dispersion Length

Q =	1.71	m^3/s	inlet flow rate
d =	1.5	*m*	depth of permanent pool in forebay
V_f =	0.50	*m/s*	desired velocity in forebay (typical value ≤ 0.50 *m/s*)
L =	18.3	m	required length of dispersion

Equation 4.6: Dispersion Length

3. Required Forebay Length

L =	**22.5**	***m***	**design length**
r =	2.25		design length-to-width ratio (typical minimum of 2.0)

4. Scour Velocity

v_s =	0.15	*m/s*	scour velocity (typical value = 0.15 *m/s*)
v =	**0.114**	***m/s***	**actual velocity**

OK The actual velocity through the forebay is less than the scour velocity.

5. Weir Flow From Forebay

L =	8	*m*	length of crest of weir
α =	1.65		coefficient
H =	0.3	*m*	head
Q =	**2.17**	***m³/s***	**discharge**

Equation 4.4: Weir Flow

OK The weir flow from the forebay exceeds the flow entering the forebay

6. Estimated Cleanout Frequencies

a) Forebay

Forebay volume	1120	m^3
Estimated TSS removal efficiency	80%	
Impervious level	81%	
Estimated annual sediment loading	3.5	m^3/ha
Contributing area	9.32	*ha*
Annual sediment volume	26	m^3/yr
Cleanout frequency for 33% volume reduction	**14.1**	***years***

b) Stormwater Management Pond

Wetpond volume (excluding forebay)	1758	m^3
Estimated TSS removal efficiency	30%	
Impervious level	81%	
Estimated annual sediment loading	3.5	m^3/ha
Contributing area	9.32	*ha*
Annual sediment volume	10	m^3/yr
Cleanout frequency for 33% volume reduction	**58.9**	***years***

Table 2: Annual sediment loading

Impervious Level	Annual Loading
%	m^3/ha
35%	0.6
55%	1.9
70%	2.8
85%	3.8

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SWM Facility 3

Step 1: Choose Level of Water Quality Control
Enhanced 80% long-term S.S. removal

Step 2: Choose Type of Facility
Wet Pond

Step 3: Define Catchment area and Imperviousness

Catchment Area (ha): 22.59

Imperviousness (%): 84.73

Interpolated Storage Volume Requirement (m^3/ha)
249.55

Permanent Pool Required (m^3)
4733.73

Extended Detention Volume Required (m^3)
903.60

Table 3.2 Water Quality Storage Requirements based on Receiving Waters (from MOE Stormwater Management Planning and Design Manual, March 2003)

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level 35	55	70	85
Enhanced 80% long-term S.S. removal	*Wetlands*	80	105	120	140
	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
Normal 70% long-term S.S. Removal	*Wetlands*	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
Basic 60% long-term S.S. Removal	*Wetlands*	60	60	60	60
	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

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STAGE-STORAGE RELATIONSHIP - WINTER
SWM Facility 3

Stage	Active Depth	Forebay			Main Pond			Active Storage Volume	Infiltration Cell			15% Reduction		Total Pond Volume	Active Storage Volume	Volume Summary	Ponding Elevation	Comments	Stage
		Area	Volume	Cumulative Volume	Area	Volume	Cumulative Volume		Area	Volume	Cumulative Volume	Infil. Cell Area	Active Volume						
m	*m*	m^2	m^3	m^3	m^2	m^3	m^3	m^3	m^2	m^3	m^3	m^2	m^3	m^3	m^3	m^3	*m*		*m*
330.00		756	0	0	4218	0	0							0					330.00
330.10		802	78	78	4285	425	425							503					330.10
330.20		847	82	160	4381	433	858							1019					330.20
330.30		892	87	247	4479	443	1301							1549					330.30
330.40		938	92	339	4579	453	1754							2093					330.40
330.50		985	96	435	4679	463	2217							2652					330.50
330.60		1032	101	536	4780	473	2690							3226					330.60
330.70		1080	106	641	4882	483	3173							3815					330.70
330.80		1129	110	752	4987	493	3667							4419					330.80
330.90		1169	115	867	5096	504	4171							5038					330.90
331.00		1239	120	987	5213	515	4686							5673					331.00
331.10		1310	127	1115	5340	528	5214							6328					331.10
331.20		1383	135	1249	5470	541	5754							7004					331.20
331.30		1457	142	1391	5602	554	6308							7699					331.30
331.40		1531	149	1541	5736	567	6875							8416					331.40
331.50		1617	157	1698	5883	581	7456							9154		**9154**		**Permanent Pool**	331.50
331.50	0.00				7500	738	9154	0						9154	0				331.50
331.60	0.10				7711	761	9914	761						9914	761				331.60
331.70	0.20				7924	782	10696	1542						10696	1542	904	331.62	MOE Extended Detention	331.70
331.80	0.30		*Forebay and Wet Cell		8216	807	11503	2349						11503	2349				331.80
331.90	0.40		Combined		8380	830	12333	3179						12333	3179				331.90
332.00	0.50				8546	846	13179	4025						13179	4025				332.00
332.10	0.60				8711	863	14042	4888						14042	4888				332.10
332.20	0.70				8832	877	14919	5765						14919	5765				332.20
332.30	0.80				8955	889	15808	6655						15808	6655	6398	332.28	5y	332.30
332.40	0.90				9079	902	16710	7556						16710	7556				332.40
332.50	1.00				9226	915	17625	8471	13388	0	0	11380	0	17625	8471				332.50
332.50	1.00								13388	0	0		0	17625	8471			**Infiltration Cell Weir**	332.50
332.60	1.10								13590	1349	1349		1147	18974	9618	8986	332.55	25y	332.60
332.70	1.20								13792	1369	2718		2310	20343	10782				332.70
332.80	1.30								14044	1392	4110		3493	21735	11965	10800	332.71	100y	332.80
332.90	1.40								14226	1414	5523		4695	23149	13166				332.90
333.00	1.50								14402	1431	6955		5911	24580	14383				333.00
333.10	1.60								14577	1449	8404		7143	26029	15615				333.10
333.20	1.70								14752	1466	9870		8390	27495	16861				333.20
333.30	1.80								14925	1484	11354		9651	28979	18122				333.30
333.40	1.90								15098	1501	12855		10927	30480	19398				333.40
333.50	2.00								15269	1518	14373		12217	31999	20689				333.50
333.60	2.10								15442	1536	15909		13523	33534	21994				333.60
333.70	2.20								15613	1553	17462		14842	35087	23314				333.70
333.80	2.30								15784	1570	19032		16177	36657	24648				333.80
333.90	2.40								15956	1587	20619		17526	38244	25997				333.90
334.00	2.50								16211	1608	22227		18893	39852	27364				334.00

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STAGE-STORAGE RELATIONSHIP - NON-WINTER
SWM Facility 3

Stage	Active Depth	Forebay			Main Pond			Active Storage Volume	Volume Summary	Ponding Elevation	Comments	Infiltration Cell			25% Reduction		Volume Summary	Ponding Elevation	Comments	Total Active Storage	Stage
		Area	Volume	Cumulative Volume	Area	Volume	Cumulative Volume					Area	Volume	Cumulative Volume	Infil. Cell Area	Active Volume					
m	*m*	m^2	m^3	m^3	m^2	m^3	m^3	m^3	m^3	*m*		m^2	m^3	m^3	m^2	m^3	m^3	*m*		m^3	*m*
330.00		756	0	0	4218	0	0														330.00
330.10		802	78	78	4285	425	425					2279	0	0	1709	0				0	330.10
330.20		847	82	160	4381	433	858					2335	231	231		173				173	330.20
330.30		892	87	247	4479	443	1301					2403	237	468		351				351	330.30
330.40		938	92	339	4579	453	1754					2471	244	711		534				534	330.40
330.50		985	96	435	4679	463	2217					2540	251	962		721				721	330.50
330.60		1032	101	536	4780	473	2690					2610	257	1219		915				915	330.60
330.70		1080	106	641	4882	483	3173					2680	264	1484		1113				1113	330.70
330.80		1129	110	752	4987	493	3667					2750	272	1755		1317				1317	330.80
330.90		1169	115	867	5096	504	4171					2828	279	2034		1526				1526	330.90
331.00		1239	120	987	5213	515	4686					2899	286	2321		1740				1740	331.00
331.10		1310	127	1115	5340	528	5214					2977	294	2614		1961				1961	331.10
331.20		1383	135	1249	5470	541	5754					3056	302	2916		2187				2187	331.20
331.30		1457	142	1391	5602	554	6308					3136	310	3226		2419				2419	331.30
331.40		1531	149	1541	5736	567	6875					3217	318	3543		2657				2657	331.40
331.50		1617	157	1698	5883	581	7456	**9154**			**Permanent Pool**	3299	326	3869		3869				3869	331.50
331.50	0.00				7500	738	9154	0				3299	0	3869		3869				3869	331.50
331.60	0.10				7711	761	9914	761				3382	334	4203		4203	4168	331.59	5y	4964	331.60
331.70	0.20				7924	782	10696	1542	904	331.62	MOE Extended Detention	3467	342	4546		4546				6088	331.70
331.80	0.30				8216	807	11503	2349				3552	351	4896		4896				7246	331.80
331.90	0.40				8380	830	12333	3179				3639	360	5256		5256				8435	331.90
332.00	0.50				8546	846	13179	4025				3726	368	5624		5624				9650	332.00
332.10	0.60				8711	863	14042	4888				3814	377	6001		6001				10889	332.10
332.20	0.70				8832	877	14919	5765				3892	385	6387		6387				12152	332.20
332.30	0.80				8955	889	15808	6655	6621	332.30	5 Year Event	3973	393	6780		6780				13434	332.30
332.40	0.90				9079	902	16710	7556				4056	401	7181		7181				14737	332.40
332.50	1.00				9226	915	17625	8471				4162	411	7592		7592				16064	332.50
332.50	1.00				9226	0	17625	8471				13388	411	7592		7592				16064	332.50
332.60	1.10								*8695*	*332.53*	*25 Year Event*	13590	1349	8941		8941	8038	332.54	25y	17413	332.60
332.70	1.20								*8959*	*332.56*	*100 Year Event*	13792	1369	10310		10310				18782	332.70
332.80	1.30											14044	1392	11702		11702				20173	332.80
332.90	1.40											14226	1414	13115		13115	11960	332.82	100y	21587	332.90
333.00	1.50											14402	1431	14547		14547				23018	333.00
333.10	1.60											14577	1449	15996		15996				24467	333.10
333.20	1.70											14752	1466	17462		17462				25934	333.20
333.30	1.80											14925	1484	18946		18946				27418	333.30
333.40	1.90											15098	1501	20447		20447				28919	333.40
333.50	2.00											15269	1518	21966		21966				30437	333.50
333.60	2.10											15442	1536	23501		23501				31973	333.60
333.70	2.20											15613	1553	25054		25054				33525	333.70
333.80	2.30											15784	1570	26624		26624				35095	333.80
333.90	2.40											15956	1587	28211		28211				36682	333.90
334.00	2.50											16211	1608	29819		29819				38291	334.00

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Orifice Calculations

$Q_o = C_d * A_o * (2 * g * H_o)^{0.5}$

	Orifice 1	Orifice 2	Orifice 3
C_d	0.63	0.63	0.63
Invert (m)	331.30	500.00	500.00
Width (m)			
Diameter/Height (m)	0.535		
Type (H/V)	V	V	V

C_d	Description
0.63	Orifice Plate
0.80	Orifice Tube

Weir Calculations

$Q_w = 2/3 * C_d * (2g)^{1/2} * L * H_w^{3/2} + 8/15 * C_d * (2g)^{1/2} * \tan\theta * H_w^{5}$

	Notch Weir	Emergency Weir
C_d	0.50	0.50
Invert (m)	332.35	333.80
Length (m)	6.000	10.000
Side Slope (H:V)	0	10
Side Slope (rad)	0.000	1.471

STAGE-DISCHARGE RELATIONSHIP - WINTER
SWM Facility 3

Stage	Active Volume	Orifice 1			Orifice 2			Orifice 3			Weir 1 Flow	Weir 2 Flow	Total Flow
		Area	H_o	Flow	Area	H_o	Flow	Area	H_o	Flow			
m	m^3	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^3/s		m^3/s
331.50	0	0.08	0.10	0.0677	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0677
331.60	761	0.13	0.15	0.1402	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.1402
331.70	1542	0.18	0.20	0.2250	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.2250
331.80	2349	0.22	0.25	0.3049	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.3049
331.90	3179	0.22	0.33	0.3617	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.3617
332.00	4025	0.22	0.43	0.4126	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.4126
332.10	4888	0.22	0.53	0.4578	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.4578
332.20	5765	0.22	0.63	0.4989	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.4989
332.30	6655	0.22	0.73	0.5369	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.5369
332.40	7556	0.22	0.83	0.5724	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0990	0.0000	0.6714
332.50	8471	0.22	0.93	0.6058	0.00	0.00	0.0000	0.00	0.00	0.0000	0.5147	0.0000	1.1204
332.60	9618	0.22	1.03	0.6374	0.00	0.00	0.0000	0.00	0.00	0.0000	1.1074	0.0000	1.7448
332.70	10782	0.22	1.13	0.6676	0.00	0.00	0.0000	0.00	0.00	0.0000	1.8343	0.0000	2.5019
332.80	11965	0.22	1.23	0.6964	0.00	0.00	0.0000	0.00	0.00	0.0000	2.6742	0.0000	3.3707
332.90	13166	0.22	1.33	0.7241	0.00	0.00	0.0000	0.00	0.00	0.0000	3.6135	0.0000	4.3376
333.00	14383	0.22	1.43	0.7508	0.00	0.00	0.0000	0.00	0.00	0.0000	4.6425	0.0000	5.3933
333.10	15615	0.22	1.53	0.7766	0.00	0.00	0.0000	0.00	0.00	0.0000	5.7540	0.0000	6.5306
333.20	16861	0.22	1.63	0.8015	0.00	0.00	0.0000	0.00	0.00	0.0000	6.9424	0.0000	7.7439
333.30	18122	0.22	1.73	0.8257	0.00	0.00	0.0000	0.00	0.00	0.0000	8.2029	0.0000	9.0286
333.40	19398	0.22	1.83	0.8492	0.00	0.00	0.0000	0.00	0.00	0.0000	9.5315	0.0000	10.3807
333.50	20689	0.22	1.93	0.8721	0.00	0.00	0.0000	0.00	0.00	0.0000	10.9251	0.0000	11.7972
333.60	21994	0.22	2.03	0.8943	0.00	0.00	0.0000	0.00	0.00	0.0000	12.3807	0.0000	13.2750
333.70	23314	0.22	2.13	0.9161	0.00	0.00	0.0000	0.00	0.00	0.0000	13.8957	0.0000	14.8118
333.80	24648	0.22	2.23	0.9373	0.00	0.00	0.0000	0.00	0.00	0.0000	15.4679	0.0000	16.4052
333.90	25997	0.22	2.33	0.9581	0.00	0.00	0.0000	0.00	0.00	0.0000	17.0953	0.5043	18.5576
334.00	27364	0.22	2.43	0.9784	0.00	0.00	0.0000	0.00	0.00	0.0000	18.7761	1.5319	21.2864

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Orifice Calculations

$Q_o = C_d * A_o * (2 * g * H_o)^{0.5}$

	Orifice 1	Orifice 2	Orifice 3
C_d	0.63	0.63	0.63
Invert (m)	331.50	500.00	500.00
Width (m)			
Diameter/Height (m)	0.600		
Type (H/V)	V	V	V

C_d	Description
0.63	Orifice Plate
0.80	Orifice Tube

Weir Calculations

$Q_w = 2/3 * C_d * (2g)^{1/2} * L * H_w^{3/2} + 8/15 * C_d * (2g)^{1/2} * \tan\theta * H$

		Infiltration Weir
C_d	0.50	0.50
Invert (m)	500.00	332.50
Length (m)		16.000
Side Slope (H:V)	1	3
Side Slope (rad)	0.785	1.249

STAGE-DISCHARGE RELATIONSHIP - NON-WINTER
SWM Facility 3

Stage	Active Volume	Orifice 1			Orifice 2			Orifice 3			Weir 1 Flow	Weir 2 Flow	Total Flow
		Area	H_o	Flow	Area	H_o	Flow	Area	H_o	Flow			
m	m^3	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^3/s		m^3/s
331.50	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0000
331.60	761	0.03	0.05	0.0193	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0193
331.70	1542	0.08	0.10	0.0728	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0728
331.80	2349	0.14	0.15	0.1528	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.1528
331.90	3179	0.20	0.20	0.2499	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.2499
332.00	4025	0.25	0.25	0.3513	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.3513
332.10	4888	0.28	0.30	0.4322	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.4322
332.20	5765	0.28	0.40	0.4990	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.4990
332.30	6655	0.28	0.50	0.5579	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.5579
332.40	7556	0.28	0.60	0.6112	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.6112
332.50	8471	0.28	0.70	0.6601	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.6601
332.80	8971	0.28	1.00	0.7890	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	4.0565	4.8455

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Orifice Calculations

$Q_o = C_d * A_o * (2 * g * H_o)^{0.5}$

	Orifice 1	Orifice 2	Orifice 3
C_d	0.63	0.63	0.63
Invert (m)	500.00	500.00	500.00
Width (m)			
Diameter/Height (m)			
Type (H/V)	V	V	V

C_d	Description
0.63	Orifice Plate
0.80	Orifice Tube

Weir Calculations

$Q_w = 2/3 * C_d * (2g)^{1/2} * L * H_w^{3/2} + 8/15 * C_d * (2g)^{1/2} * \tan\theta * H_w$

		Emergency Weir
C_d	0.50	0.50
Invert (m)	500.00	333.80
Length (m)		10.000
Side Slope (H:V)	1	10
Side Slope (rad)	0.785	1.471

STAGE-DISCHARGE RELATIONSHIP - NON-WINTER
SWM Facility 3

Stage	Active Volume	Orifice 1			Orifice 2			Orifice 3			Infiltration	Weir 2 Flow	Total Flow
		Area	H_o	Flow	Area	H_o	Flow	Area	H_o	Flow			
m	m^3	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^3/s		m^3/s
330.10	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0000
330.20	173	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
330.30	351	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
330.40	534	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
330.50	721	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
330.60	915	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
330.70	1113	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
330.80	1317	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
330.90	1526	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
331.00	1740	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
331.10	1961	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
331.20	2187	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
331.30	2419	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
331.40	2657	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
331.50	3869	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
331.60	4203	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
331.70	4546	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
331.80	4896	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
331.90	5256	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
332.00	5624	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
332.10	6001	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
332.20	6387	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
332.30	6780	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
332.40	7181	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
332.50	7592	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
332.60	8941	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
332.70	10310	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
332.80	11702	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
332.90	13115	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
333.00	14547	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
333.10	15996	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
333.20	17462	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
333.30	18946	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
333.40	20447	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
333.50	21966	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
333.60	23501	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
333.70	25054	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
333.80	26624	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.0000	0.1583
333.90	28211	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	0.5043	0.6625
334.00	29819	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.1583	1.5319	1.6902

GID
STORMWATER MANAGEMENT
Guelph, Ontario

Project Number:	46927-104
Date:	April 19, 2024
Design By:	CJC
File:	Q:\46927\104\SWM\SWMF 3\46927-104_SWMF 3 Master Design Sheet.xlsx

SWMF 3 - FOREBAY DESIGN CALCULATIONS
MOE SWM Planning and Design Manual, 2003

Forebay Design Flows

Flow into forebay during the 1:5-year return period event	2.849	m^3/s
Flow into forebay during the 25 mm - 4 hour design storm event	2.612	m^3/s
Peak flow from main pond outlet for the 25mm design storm (from MIDUSS)		m^3/s

Forebay Characteristics

b =	10.5	*m*	bottom width
y =	1.5	*m*	depth
z =	3	:1	side slope
w =	15.0	*m*	average width
R =	1.13	*m*	hydraulic radius
A =	22.5	m^2	cross-sectional area

1. Length Calculation Based on Settling Velocity

L = forebay flow length *(m)*
r = length-to-width ratio
Q_p = peak flow rate through forebay (m^3/s)
v_s = settling velocity *(m/s)*

Equation 4.5: Forebay Settling Length

a) Required Settling Length (assuming Q_p = forebay through-flow & v_s = 0.0055 m/s)

Q_p =	2.61	m^3/s	peak flow rate through forebay
v_s =	0.0055	*m/s*	settling velocity
r =	2.11		length-to-width ratio
L =	31.7	*m*	required settling length
L =	*31.7*	*m*	*trial length*

b) Required Settling Length (assuming Q_p = pond discharge & v_s = 0.0003 m/s)

Q_p =	0.000	m^3/s	peak flow rate through forebay
v_s =	0.0003	*m/s*	settling velocity
r =	0.00		length-to-width ratio
L =	0.0	*m*	required settling length
L =		*m*	*trial length*

Table 1: Average settling velocities

	Mass Removed	Particle Size Range	Average Settling Velocity
	%	*µm*	*m/s*
	80 - 100	x ≤ 20	0.00000254
Enhanced:	70 - 80	20 < x ≤ 40	0.00001300
Normal:	60 - 70	40 < x ≤ 60	0.00002540
Basic:	40 - 60	60 < x ≤ 130	0.00012700
Medium Sand:	20 - 40	130 < x ≤ 400	0.00059267
Gross Grit:	0 - 20	400 < x ≤ 4000	0.00550333

2. Length Calculation Based on Flow Dispersion Length

Q =	2.85	m^3/s	inlet flow rate
d =	1.5	*m*	depth of permanent pool in forebay
V_f =	0.50	*m/s*	desired velocity in forebay (typical value ≤ 0.50 *m/s*)
L =	30.4	m	required length of dispersion

Equation 4.6: Dispersion Length

3. Required Forebay Length

L =	**31.7**	***m***	**design length**
r =	2.11		design length-to-width ratio (typical minimum of 2.0)

4. Scour Velocity

v_s =	0.15	*m/s*	scour velocity (typical value = 0.15 *m/s*)
v =	**0.127**	***m/s***	**actual velocity**

OK The actual velocity through the forebay is less than the scour velocity.

5. Weir Flow From Forebay

L =	11	*m*	length of crest of weir
α =	1.65		coefficient
H =	0.3	*m*	head
Q =	**2.98**	m^3/s	**discharge**

Equation 4.4: Weir Flow

OK The weir flow from the forebay exceeds the flow entering the forebay

6. Estimated Cleanout Frequencies

a) Forebay

Forebay volume	1698	m^3
Estimated TSS removal efficiency	80%	
Impervious level	85%	
Estimated annual sediment loading	3.8	m^3/ha
Contributing area	22.59	*ha*
Annual sediment volume	68	m^3/yr
Cleanout frequency for 33% volume reduction	**8.2**	***years***

Table 2: Annual sediment loading

Impervious Level	Annual Loading
%	m^3/ha
35%	0.6
55%	1.9
70%	2.8
85%	3.8

b) Stormwater Management Pond

Wetpond volume (excluding forebay)	7456	m^3
Estimated TSS removal efficiency	30%	
Impervious level	85%	
Estimated annual sediment loading	3.8	m^3/ha
Contributing area	22.59	*ha*
Annual sediment volume	26	m^3/yr
Cleanout frequency for 33% volume reduction	**96.0**	***years***

Appendix F

Noise Impact Calculations

ROAD TRAFFIC
SETBACK LINES

STAMSON 5.0 NORMAL REPORT Date: 30-04-2024 11:31:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s155dout.te Time Period: 16 hours
Description: 55dBA Daytime Outdoor Setback (York - College)

Road data, segment # 1: S1 Victoria

Car traffic volume	45617	veh/TimePeriod *
Medium truck volume	1322	veh/TimePeriod *
Heavy truck volume	283	veh/TimePeriod *
Posted speed limit	50	km/h
Road gradient	4	%
Road pavement	1	(Typical asphalt or concrete)

Data for Segment # 1: S1 Victoria

Angle1 Angle2	-90.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	0	
Surface	1	(Absorptive ground surface)
Receiver source distance	102.86 m	
Receiver height	1.50 m	
Topography	3	(Elevated; no barrier)
Elevation	3.50 m	
Reference angle	0.00	

Results segment # 1: S1 Victoria

Source height = 0.88 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	69.46	0.00	-13.16	-1.31	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

TOTAL Leq FROM ALL SOURCES: 55.00

STAMSON 5.0 NORMAL REPORT Date: 30-04-2024 11:33:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s160dout.te Time Period: 16 hours
Description: 60dBA Daytime Outdoor Setback (York - College)

Road data, segment # 1: S1 Victoria

Car traffic volume	45617	veh/TimePeriod *
Medium truck volume	1322	veh/TimePeriod *
Heavy truck volume	283	veh/TimePeriod *
Posted speed limit	50	km/h
Road gradient	4	%
Road pavement	1	(Typical asphalt or concrete)

Data for Segment # 1: S1 Victoria

Angle1 Angle2	-90.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	0	
Surface	1	(Absorptive ground surface)
Receiver source distance	49.46 m	
Receiver height	1.50 m	
Topography	3	(Elevated; no barrier)
Elevation	3.50 m	
Reference angle	0.00	

Results segment # 1: S1 Victoria

Source height = 0.88 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	69.46	0.00	-8.15	-1.31	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES: 60.00

STAMSON 5.0 NORMAL REPORT Date: 30-04-2024 11:34:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s15550in.te Time Period: Day/Night 16/8 hours
Description: 55/50dBA Indoor Setback (York - College)

Road data, segment # 1: S1VN (day/night)

Car traffic volume : 45617/5069 veh/TimePeriod *
Medium truck volume : 1322/147 veh/TimePeriod *
Heavy truck volume : 283/31 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 4 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 52470
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.80
Heavy Truck % of Total Volume : 0.60
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: S1VN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 118.49 / 93.27 m
Receiver height : 4.50 / 4.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 3.50 m
Reference angle : 0.00

Results segment # 1: S1VN (day)

Source height = 0.88 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	69.46	0.00	-13.32	-1.14	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: S1VN (night)

Source height = 0.88 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	62.92	0.00	-11.78	-1.14	0.00	0.00	0.00	50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 50.00

STAMSON 5.0 NORMAL REPORT Date: 30-04-2024 11:35:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s16560in.te Time Period: Day/Night 16/8 hours
Description: 65/60dBA Indoor Setback (York - College)

Road data, segment # 1: S1 Victoria (day/night)

Car traffic volume : 45617/5069 veh/TimePeriod *
Medium truck volume : 1322/147 veh/TimePeriod *
Heavy truck volume : 283/31 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 4 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 52470
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.80
Heavy Truck % of Total Volume : 0.60
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: S1 Victoria (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.12 / 19.74 m
Receiver height : 4.50 / 4.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 3.50 m
Reference angle : 0.00

Results segment # 1: S1 Victoria (day)

Source height = 0.88 m

ROAD (0.00 + 65.00 + 0.00) = 65.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	69.46	0.00	-3.32	-1.14	0.00	0.00	0.00	65.00

Segment Leq : 65.00 dBA

Total Leq All Segments: 65.00 dBA

Results segment # 1: S1 Victoria (night)

Source height = 0.88 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	62.92	0.00	-1.77	-1.14	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.00
(NIGHT): 60.00

STAMSON 5.0 NORMAL REPORT Date: 30-04-2024 11:37:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s255dout.te Time Period: 16 hours
Description: 55dBA Daytime Outdoor Setback (College - Stone)

Road data, segment # 1:

Car traffic volume : 35350 veh/TimePeriod *
Medium truck volume : 1457 veh/TimePeriod *
Heavy truck volume : 561 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1:

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 94.10 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1:

Source height = 1.11 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	69.69	0.00	-13.24	-1.46	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

TOTAL Leq FROM ALL SOURCES: 55.00

STAMSON 5.0 NORMAL REPORT Date: 30-04-2024 11:37:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s260dout.te Time Period: 16 hours
Description: 60dBA Daytime Outdoor Setback (College - Stone)

Road data, segment # 1: S2 Victoria

Car traffic volume : 35350 veh/TimePeriod *
Medium truck volume : 1457 veh/TimePeriod *
Heavy truck volume : 561 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: S2 Victoria

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 46.97 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: S2 Victoria

Source height = 1.11 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	69.69	0.00	-8.23	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES: 60.00

STAMSON 5.0 NORMAL REPORT Date: 30-04-2024 11:38:31
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s25550in.te Time Period: Day/Night 16/8 hours
Description: 55/50dBA Indoor Setback (College - Stone)

Road data, segment # 1: S2 Victoria (day/night)

Car traffic volume : 35350/3928 veh/TimePeriod *
Medium truck volume : 1457/162 veh/TimePeriod *
Heavy truck volume : 561/62 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 41520
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.90
Heavy Truck % of Total Volume : 1.50
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: S2 Victoria (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 104.99 / 83.91 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: S2 Victoria (day)

Source height = 1.11 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	69.69	0.00	-13.37	-1.32	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: S2 Victoria (night)

Source height = 1.11 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	63.15	0.00	-11.83	-1.32	0.00	0.00	0.00	50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 50.00

STAMSON 5.0 NORMAL REPORT Date: 30-04-2024 11:39:29
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s26560in.te Time Period: Day/Night 16/8 hours
Description: 65/60dBA Indoor Setback (College - Stone)

Road data, segment # 1: S2 Victoria (day/night)

Car traffic volume : 35350/3928 veh/TimePeriod *
Medium truck volume : 1457/162 veh/TimePeriod *
Heavy truck volume : 561/62 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 41520
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.90
Heavy Truck % of Total Volume : 1.50
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: S2 Victoria (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 24.48 / 19.56 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: S2 Victoria (day)

Source height = 1.11 m

ROAD (0.00 + 65.00 + 0.00) = 65.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	69.69	0.00	-3.36	-1.32	0.00	0.00	0.00	65.00

Segment Leq : 65.00 dBA

Total Leq All Segments: 65.00 dBA

Results segment # 1: S2 Victoria (night)

Source height = 1.11 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	63.15	0.00	-1.82	-1.32	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.00
(NIGHT): 60.00

STAMSON 5.0 NORMAL REPORT Date: 30-04-2024 11:42:50
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s355dout.te Time Period: 16 hours
Description: 55dBA Daytime Outdoor Setback (Victoria - Watson

Road data, segment # 1: S3 Stone

Car traffic volume : 17741 veh/TimePeriod *
Medium truck volume : 1584 veh/TimePeriod *
Heavy truck volume : 475 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 6 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: S3 Stone

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 112.57 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: S3 Stone

Source height = 1.24 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.99	0.00	-14.53	-1.46	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

TOTAL Leq FROM ALL SOURCES: 55.00

STAMSON 5.0 NORMAL REPORT Date: 30-04-2024 11:43:24
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s360dout.te Time Period: 16 hours
Description: 60dBA Daytime Outdoor Setback (Victoria - Watson

Road data, segment # 1: S3 Stone

Car traffic volume : 17902 veh/TimePeriod *
Medium truck volume : 1598 veh/TimePeriod *
Heavy truck volume : 480 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 6 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: S3 Stone

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 56.56 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: S3 Stone

Source height = 1.24 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	71.03	0.00	-9.57	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES: 60.00

STAMSON 5.0 NORMAL REPORT Date: 30-04-2024 11:42:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s35550in.te Time Period: Day/Night 16/8 hours
Description: 55/50dBA Indoor Setback (Victoria - Watson)

Road data, segment # 1: S3 Stone (day/night)

Car traffic volume : 17902/1989 veh/TimePeriod *
Medium truck volume : 1598/178 veh/TimePeriod *
Heavy truck volume : 480/53 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 6 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 22200
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 8.00
Heavy Truck % of Total Volume : 2.40
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: S3 Stone (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 128.44 / 102.50 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: S3 Stone (day)

Source height = 1.24 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	71.03	0.00	-14.71	-1.32	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: S3 Stone (night)

Source height = 1.24 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	64.49	0.00	-13.17	-1.32	0.00	0.00	0.00	50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 50.00

STAMSON 5.0 NORMAL REPORT Date: 30-04-2024 11:41:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s36560in.te Time Period: Day/Night 16/8 hours
Description: 65/60dBA Indoor Setback (Victoria - Watson)

Road data, segment # 1: S3 Stone (day/night)

Car traffic volume : 17902/1989 veh/TimePeriod *
Medium truck volume : 1598/178 veh/TimePeriod *
Heavy truck volume : 480/53 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 6 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 22200
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 8.00
Heavy Truck % of Total Volume : 2.40
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: S3 Stone (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 29.83 / 23.82 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: S3 Stone (day)

Source height = 1.24 m

ROAD (0.00 + 65.00 + 0.00) = 65.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	71.03	0.00	-4.71	-1.32	0.00	0.00	0.00	65.00

Segment Leq : 65.00 dBA

Total Leq All Segments: 65.00 dBA

Results segment # 1: S3 Stone (night)

Source height = 1.24 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	64.49	0.00	-3.17	-1.32	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.00
(NIGHT): 60.00

STAMSON 5.0 NORMAL REPORT Date: 29-04-2024 22:49:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s555dout.te Time Period: 16 hours
Description: 55dBA Daytime Outdoor Setback (Street A)

Road data, segment # 1: S5 Street A

Car traffic volume : 5658 veh/TimePeriod *
Medium truck volume : 57 veh/TimePeriod *
Heavy truck volume : 0 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: S5 Street A

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 19.06 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: S5 Street A

Source height = 0.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	58.19	0.00	-1.73	-1.46	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

TOTAL Leq FROM ALL SOURCES: 55.00

STAMSON 5.0 NORMAL REPORT Date: 29-04-2024 22:50:43
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s560dout.te Time Period: 16 hours
Description: 60dBA Daytime Outdoor Setback (Street A)

Road data, segment # 1: S5 Street A

Car traffic volume : 5658 veh/TimePeriod *
Medium truck volume : 57 veh/TimePeriod *
Heavy truck volume : 0 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: S5 Street A

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: S5 Street A

Source height = 0.50 m

ROAD (0.00 + 56.73 + 0.00) = 56.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	58.19	0.00	0.00	-1.46	0.00	0.00	0.00	56.73

Segment Leq : 56.73 dBA

Total Leq All Segments: 56.73 dBA

TOTAL Leq FROM ALL SOURCES: 56.73

STAMSON 5.0 NORMAL REPORT Date: 29-04-2024 23:14:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s55550in.te Time Period: Day/Night 16/8 hours
Description: 55/50dBA Indoor Setback (Street A)

Road data, segment # 1: S1VN (day/night)

Car traffic volume : 5658/629 veh/TimePeriod *
Medium truck volume : 57/6 veh/TimePeriod *
Heavy truck volume : 0/0 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 6350
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 1.00
Heavy Truck % of Total Volume : 0.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: S1VN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 19.53 / 15.59 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: S1VN (day)

Source height = 0.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	58.19	0.00	-1.83	-1.35	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: S1VN (night)

Source height = 0.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	51.63	0.00	-0.27	-1.35	0.00	0.00	0.00	50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 50.00

STAMSON 5.0 NORMAL REPORT Date: 29-04-2024 23:15:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s56560in.te Time Period: Day/Night 16/8 hours
Description: 65/60dBA Indoor Setback (Street A)

Road data, segment # 1: S5 Street A (day/night)

Car traffic volume : 5658/629 veh/TimePeriod *
Medium truck volume : 57/6 veh/TimePeriod *
Heavy truck volume : 0/0 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 6350
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 1.00
Heavy Truck % of Total Volume : 0.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: S5 Street A (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: S5 Street A (day)

Source height = 0.50 m

ROAD (0.00 + 56.83 + 0.00) = 56.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	58.19	0.00	0.00	-1.35	0.00	0.00	0.00	56.83

Segment Leq : 56.83 dBA

Total Leq All Segments: 56.83 dBA

Results segment # 1: S5 Street A (night)

Source height = 0.50 m

ROAD (0.00 + 50.27 + 0.00) = 50.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	51.63	0.00	0.00	-1.35	0.00	0.00	0.00	50.27

Segment Leq : 50.27 dBA

Total Leq All Segments: 50.27 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.83
(NIGHT): 50.27

RAIL TRAFFIC
SETBACK LINES

STAMSON 5.0 NORMAL REPORT Date: 24-01-2023 14:12:22
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s455dout.te Time Period: 16 hours
Description: 55dBA Daytime Outdoor Setback (GJR)

Rail data, segment # 1: GJR

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
* 1. GJR	8.1/2.3	40.0	2.0	35.0	Diesel	No

* The identified number of trains have been adjusted for future growth using the following parameters:

Train type: No	Name	Unadj. Trains	Annual % Increase	Years of Growth
1.	GJR	6.0/1.7	2.50	12.00

Data for Segment # 1: GJR

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 1	(Wood depth 30 to less than 60 metres)
No of house rows	: 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 24.65 m	
Receiver height	: 1.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
No Whistle		
Reference angle	: 0.00	

Results segment # 1: GJR

LOCOMOTIVE (0.00 + 53.80 + 0.00) = 53.80 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.28	62.31	-2.77	-0.74	-5.00	0.00	0.00	53.80

WHEEL (0.00 + 48.82 + 0.00) = 48.82 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.39	57.78	-3.00	-0.96	-5.00	0.00	0.00	48.82

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

TOTAL Leq FROM ALL SOURCES: 55.00

STAMSON 5.0 NORMAL REPORT Date: 24-01-2023 14:13:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s460dout.te Time Period: 16 hours
Description: 60dBA Daytime Outdoor Setback (GJR)

Rail data, segment # 1: GJR

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
* 1. GJR	8.1/2.3	40.0	2.0	35.0	Diesel	No

* The identified number of trains have been adjusted for future growth using the following parameters:

Train type: No	Name	Unadj. Trains	Annual % Increase	Years of Growth
1.	GJR	6.0/1.7	2.50	12.00

Data for Segment # 1: GJR

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 1	(Wood depth 30 to less than 60 metres)
No of house rows	: 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 15.00 m	
Receiver height	: 1.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
No Whistle		
Reference angle	: 0.00	

Results segment # 1: GJR

LOCOMOTIVE (0.00 + 56.57 + 0.00) = 56.57 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.28	62.31	0.00	-0.74	-5.00	0.00	0.00	56.57

WHEEL (0.00 + 51.82 + 0.00) = 51.82 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.39	57.78	0.00	-0.96	-5.00	0.00	0.00	51.82

Segment Leq : 57.82 dBA

Total Leq All Segments: 57.82 dBA

TOTAL Leq FROM ALL SOURCES: 57.82

STAMSON 5.0 NORMAL REPORT Date: 24-01-2023 12:36:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s45550in.te Time Period: Day/Night 16/8 hours
Description: 55/50dBA Indoor Setback (GJR)

Rail data, segment # 1: GJR (day/night)

Train Type	Trains	Speed (km/h)	# loc / Train	# Cars / Train	Eng type	Cont weld
1. GJR	0.0/8.1	40.0	2.0	35.0	Diesel	No

Data for Segment # 1: GJR (day/night)

Angle1 Angle2	-90.00 deg	90.00 deg
Wood depth	1	(Wood depth 30 to less than 60 metres)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	30.00 / 120.86	m
Receiver height	4.50 / 4.50	m
Topography	1	(Flat/gentle slope; no barrier)
No Whistle		
Reference angle	0.00	

Results segment # 1: GJR (day)

LOCOMOTIVE (0.00 + -9.12 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.19	0.00	-3.60	-0.52	-5.00	0.00	0.00	-9.12

WHEEL (0.00 + -9.68 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.30	0.00	-3.91	-0.77	-5.00	0.00	0.00	-9.68

Segment Leq : 0.00 dBA

Total Leq All Segments: 0.00 dBA

Results segment # 1: GJR (night)

LOCOMOTIVE (0.00 + 48.97 + 0.00) = 48.97 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.19	65.32	-10.83	-0.52	-5.00	0.00	0.00	48.97

WHEEL (0.00 + 43.24 + 0.00) = 43.24 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.30	60.79	-11.78	-0.77	-5.00	0.00	0.00	43.24

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 0.00
(NIGHT): 50.00

STAMSON 5.0 NORMAL REPORT Date: 24-01-2023 12:17:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s46560in.te Time Period: Day/Night 16/8 hours
Description: 65/60dBA Indoor Setback (GRJ)

Rail data, segment # 1: GJR (day/night)

Train Type	Trains	Speed (km/h)	# loc / Train	# Cars / Train	Eng type	Cont weld
1. GJR	0.0/8.1	40.0	2.0	35.0	Diesel	No

Data for Segment # 1: GJR (day/night)

Angle1 Angle2	-90.00 deg	90.00 deg
Wood depth	1	(Wood depth 30 to less than 60 metres)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	30.00 / 18.26	m
Receiver height	4.50 / 4.50	m
Topography	1	(Flat/gentle slope; no barrier)
No Whistle		
Reference angle	0.00	

Results segment # 1: GJR (day)

LOCOMOTIVE (0.00 + -9.12 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.19	0.00	-3.60	-0.52	-5.00	0.00	0.00	-9.12

WHEEL (0.00 + -9.68 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.30	0.00	-3.91	-0.77	-5.00	0.00	0.00	-9.68

Segment Leq : 0.00 dBA

Total Leq All Segments: 0.00 dBA

Results segment # 1: GJR (night)

LOCOMOTIVE (0.00 + 58.77 + 0.00) = 58.77 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.19	65.32	-1.02	-0.52	-5.00	0.00	0.00	58.77

WHEEL (0.00 + 53.91 + 0.00) = 53.91 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.30	60.79	-1.11	-0.77	-5.00	0.00	0.00	53.91

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 0.00
(NIGHT): 60.00

STAMSON 5.0 NORMAL REPORT Date: 24-01-2023 12:58:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s46055in.te Time Period: Day/Night 16/8 hours
Description: 60/55dBA Indoor Setback (GJR) Whistle

Rail data, segment # 1: GJR (day/night)

Train Type	Trains (Left)	Trains (Right)	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. GJR	0.0/4.1	0.0/4.1	40.0	2.0	35.0	Diesel	No

Data for Segment # 1: GJR (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 1	(Wood depth 30 to less than 60 metres)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 212.03 / 212.03 m	
Receiver height	: 4.50 / 4.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
Whistle Angle	: 0 deg	Track 1
Reference angle	: 0.00	

Results segment # 1: GJR (day)

LOCOMOTIVE (0.00 + -19.27 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.19	0.00	-13.75	-0.52	-5.00	0.00	0.00	-19.27

WHEEL (0.00 + -20.72 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.30	0.00	-14.95	-0.77	-5.00	0.00	0.00	-20.72

LEFT WHISTLE (0.00 + 51.22 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-62	0	0.19	0.00	-13.75	-4.81	-5.00	0.00	0.00	51.22

Segment Leq : 0.00 dBA

Total Leq All Segments: 0.00 dBA

Results segment # 1: GJR (night)

LOCOMOTIVE (0.00 + 46.10 + 0.00) = 46.10 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.19	65.37	-13.75	-0.52	-5.00	0.00	0.00	46.10

WHEEL (0.00 + 40.12 + 0.00) = 40.12 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.30	60.84	-14.95	-0.77	-5.00	0.00	0.00	40.12

LEFT WHISTLE (0.00 + 51.22 + 0.00) = 51.22 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-62	0	0.19	74.78	-13.75	-4.81	-5.00	0.00	0.00	51.22

RIGHT WHISTLE (0.00 + 51.22 + 0.00) = 51.22 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	62	0.19	74.78	-13.75	-4.81	-5.00	0.00	0.00	51.22

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 0.00
(NIGHT): 55.00

MTE FILE PATH: P:\P\46927\104\46927-104-EC1

April 19, 2024 - 2:04:12 PM - Plotted By: Abdul Barakzoy

LEGEND

- VARIOUS TESTPITS, BOREHOLE / MONITORING WELLS, MTE SURVEYED 2006
- VARIOUS TESTPITS, BOREHOLE / MONITORING WELLS, MTE SURVEYED 2010
- VARIOUS TESTPITS, BOREHOLE / MONITORING WELLS, MTE SURVEYED 2011
- VARIOUS TESTPITS, BOREHOLE / MONITORING WELLS, MTE SURVEYED 2017
- VARIOUS TESTPITS, BOREHOLE / MONITORING WELLS, MTE SURVEYED 2019
- VARIOUS TESTPITS, BOREHOLE / MONITORING WELLS, MTE SURVEYED 2020
- VARIOUS TESTPITS, BOREHOLE / MONITORING WELLS, MTE SURVEYED 2022

GUELPH JUNCTION RAILWAY

CLYTHE CREEK

VICTORIA RD S

STONE RD E

LEGEND

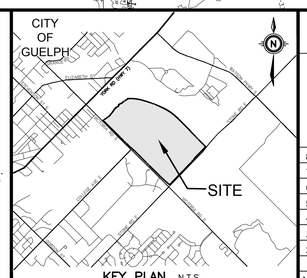
- SITE BOUNDARY
- EXISTING CONTOURS
- EXISTING EMBANKMENT (SLOPE AS NOTED)
- EXISTING WATERMAIN
- EXISTING SANITARY
- EXISTING STORM
- EXISTING FENCE
- EXISTING DRAINAGE DIRECTION
- EXISTING DRIPLINE
- GRCA REGULATION LIMIT
- TOP OF SLOPE
- 6m OFFSET TOP OF SLOPE
- FLAGGED DRIPLINE-OCT 2022
- DEVELOPMENT LIMIT
- NRSI 10.0m BUFFER (OCT. 2022)
- NRSI SURVEYED WETLAND BOUNDARY
- NRSI 30m WETLAND BUFFER
- GRCA FLOODLINE
- GRCA WETLAND
- WATERBODY
- HH HAND HOLE
- MW602-22 MONITORING WELL
- WELL
- BH502-22 BOREHOLE

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.



KEY PLAN N.T.S.

CITY of GUELPH

No.	REVISION	BY	YYYY-MM-DD
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.			

GEODETIC BM ELEV. = m

SITE BENCHMARK ELEV. = 341.866m
CUT CROSS PN CONCRETE TRANSFORMER PAD LOCATED AT SOUTHEAST CORNER OF ADMINISTRATION BUILDING MTE PNO 9205

OWNER
FUSION HOMES
500 HANLON CREEK BOULEVARD GUELPH, ONTARIO

PROJECT
GUELPH INNOVATION DISTRICT LANDS
588 STONE ROAD EAST GUELPH, ONTARIO

DRAWING
EXISTING CONDITIONS PLAN

MTE
Engineers, Scientists, Surveyors
519-743-6500

Project Manager: D.HICKS	Project No.: 46927-104
Design By: ALN	Checked By: VAL
Drawn By: AXB	Checked By: ALN/CVP
Surveyed By: MTE	Drawing No.: EC1.1
Date: Jan.12/23	
Scale: 1:2000	Sheet of

LEGEND

- SITE BOUNDARY
- EXISTING EMBANKMENT (SLOPE AS NOTED) — (TOP) / (BOTTOM)
- PROPOSED EMBANKMENT — (TOP) / 3:1 / (BOTTOM)
- Ex. 200mmø WTM. — Ex. HYD.
- Ex. 300mmø SAN. — Ex. MH.
- Ex. 375mmø STM. — Ex. MH.
- EXISTING WATERMAIN
- EXISTING SANITARY
- EXISTING STORM
- EXISTING FENCE
- EXISTING DRIPLINE
- PROPOSED EASEMENT
- EXISTING GRADE CONTOURS (326.0)
- PROPOSED GRADE CONTOURS (333)
- MAJOR OVERLAND FLOW
- EXISTING DIRECTION OF DRAINAGE/SWALE
- PROPOSED DIRECTION OF DRAINAGE/SWALE
- GRCA FLOODLINE
- GRCA WETLAND
- WATERBODY
- GRCA REGULATION LIMIT
- TOP OF SLOPE
- 6m OFFSET TOP OF SLOPE
- FLAGGED DRIPLINE-OCT 2022
- NRSI 10.0m BUFFER (OCT. 2022)
- NRSI SURVEYED WETLAND BOUNDARY
- NRSI 30m WETLAND BUFFER
- BH101 BOREHOLE
- EX WELL
- HH HANDHOLE
- MW8 MONITORING WELL

GUELPH JUNCTION RAILWAY

VICTORIA RD S

STONE RD E

SWM 1 — Block 85 Stormwater Management

SWM 2 — Block 86 Stormwater Management

SWM 3

PARK 2 — Block 84 Park

PROPOSED 12.0m WIDE EASEMENT FOR STORM PIPE OUTLET

PROPOSED EASEMENT FOR SWM OUTLET WIDTH VARIES

PROPOSED 6.0m WIDE EASEMENT FOR SWM STORM PIPE INLET

PROPOSED BLOCK FOR SWM2 OUTLET

APPROXIMATE 75.0m LONG RETAINING WALL MAX. HEIGHT=3.60m

APPROXIMATE 55.0m LONG RETAINING WALL MAX. HEIGHT=1.0m

CONCEPTUAL TRAIL LOCATION

EXISTING TRAIL

LIMIT OF GRADING

PROPOSED GRADES ALONG STONE ROAD EAST ASSUMED FOUR LANES URBAN CROSS-SECTION.

PROPOSED GRADES ALONG VICTORIA ROAD ASSUMED FOUR LANES URBAN CROSS-SECTION.

CITY OF GUELPH

KEY PLAN N.T.S.

SITE

GEODETIC BM ELEV. = m

SITE BENCHMARK ELEV. = 341.866m
CUT CROSS PN CONCRETE TRANSFORMER PAD LOCATED AT SOUTHEAST CORNER OF ADMINISTRATION BUILDING
MTE PNO 9205

OWNER
FUSION HOMES
500 HANLON CREEK BOULEVARD GUELPH, ONTARIO

PROJECT
GUELPH INNOVATION DISTRICT LANDS
588 STONE ROAD EAST GUELPH, ONTARIO

DRAWING
PRELIMINARY GRADING CONTOUR PLAN

MTE
Engineers, Scientists, Surveyors
519-743-6500

Project Manager: D.HICKS	Project No.: 46927-104
Design By: ALN	Checked By:
Drawn By: AXB	Checked By: ALN
Surveyed By: MTE	Drawing No.:
Date: Mar.25/24	
Scale: 1:2000	Sheet of