

**FUNCTIONAL SERVICING & STORMWATER
MANAGEMENT REPORT**

**GLENELG RESIDENTIAL DEVELOPMENT – PHASE 2
SOUTHGATE MEADOWS INC.**

TOWNSHIP OF SOUTHGATE

PREPARED BY:

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1.0 INTRODUCTION

C.F. Crozier & Associates Inc. ("Crozier") has been retained by Southgate Meadows Inc. ("the Developer") to prepare a Functional Servicing and Stormwater Management Report in support of a Draft Plan of Subdivision Application for Phase 2 of the Glenelg Residential Development located in the west end of the Community of Dundalk, Township of Southgate, County of Grey. The proposed development is herein referred to as the Subject Development.

The Developer's overall property is approximately 33 ha property and is bounded by Glenelg Street to the south, the CP Rail Trail to the east, agricultural lands to the north and Ida Street and residential properties to the west. The Subject Development is located north of Glenelg Residential Development – Phase 1. This property is legally described as Part of Lots 225, 226, 227 and 228, Concession 2, Southwest of Toronto Sydenham Road, All of Lot Y and Part of the Unnamed Street Lying Northeast of Part Lot 3, Block S, Registered Plan 480, Geographic Township of Proton, Township of Southgate, County of Grey. Phase 2 of the Developer's overall property is approximately 18.4 ha of which approximately 8.6 ha is developable. Refer to **Figure 1** for the Site Location Plan.

The proposed development will consist of 87 single-detached units, 62 townhouse units, 6 future lots, open space/ park blocks, walkways/ trails, a stormwater management block, and approximately 1.1 km of urban Right-of-Way (ROW). The Draft Plan prepared by MHBC Planning (December 2, 2021) has been included as **Figure 2**.

The Developer has assembled a multi-disciplinary consulting team to assist with the technical studies in support of this development. The consulting team includes:

- SLR Consulting Ltd. (SLR) (environmental and hydrogeological)
- Soil Engineers Ltd. (SEL) (geotechnical)
- MHBC (planning)
- CF Crozier & Associates Inc. (civil and transportation engineering)

This report should be read in conjunction with the studies, plans and reports prepared by the other members of the development team.

This report has been prepared to provide information concerning the servicing (water, sewer, utilities and roads) and stormwater management strategy for the development.

2.0 DEVELOPMENT BACKGROUND

The Subject Property is currently zoned as Deferred Development, and Environmental Protection per the Township of Southgate Zoning By-law (2009). The lands will be designated as Natural Heritage, and Neighborhood Area, within the Township of Southgate Official Plan Update coming in 2022.

The 183 unit (approximately 14.6 ha) Glenelg Phase 1 Development, located on the southern half of the subject property, was Draft Plan Approved in December 2019 and has since been constructed and now working towards registration.

3.0 SITE DESCRIPTION

The overall 33 ha property consists largely of agricultural fields, and the Draft Plan Approved Glenelg Phase 1 Development Lands. A natural heritage area exists in the western portion of the site; the limits of which have been staked and an appropriate development setback has been applied from the natural heritage area/ dripline through consultation with the Grand River and Saugeen Valley Conservation Authorities. The natural heritage constraints on site have been investigated in detail by SLR. Refer to the Environmental Impact Study (SLR, December 2021) which has been provided under separate cover for more information.

The property is relatively flat with rolling hills contouring towards the west, and high points along the eastern boundary of the site. Onsite elevations range from approximately 515.5 to 520 masl. The site lies within the regulatory boundary of the Saugeen Valley Conservation Authority (SVCA). Site drainage is further discussed in Section 7.2.1.

A soil investigation for the property was completed in 2016 by Sirati & Partners Consultants Limited. Within this investigation a total of eight (8) boreholes were advanced across the site. These boreholes revealed that the site is underlain by water bearing cohesionless soils between 0.8 and 3.14 m below existing grade, overlying sandy silt till. The cohesionless soil strata is composed of silt, sandy silt, silty sand, sand and gravel. These findings are supplemented by the Soil Survey Map of Grey County (1962) which indicates that the site is underlain by Parkhill Loam and Listowel Silty Loam soils. The Geotechnical Investigation also indicated that the stabilized groundwater table post drilling was found within the boreholes at depths ranging from 0.7 m to 2.1 m below existing grade. Refer to **Appendix A** for the Geotechnical Investigation.

4.0 ROAD STANDARD

Access to the development is proposed to be provided through two entrances along Glenelg Street. Connection to the Phase 2 Lands will be provided via connection to the Glenelg Phase 1 Development at Aitchison Avenue and Corbett Street. Roadways and entrances will be constructed in conformance with the Township of Southgate Engineering Standards.

A Traffic Impact Study has been prepared by our office under separate cover, which details transportation engineering considerations and mitigative measures related to the development. Roadway slopes will range between 0.5% and 8% in conformance with Township of Southgate Engineering Standards. The general grading strategy for the development is presented in **Figure 3**.

Design criteria for the entrances will meet municipal guidelines as well as the applicable sections from the Ontario Building Code (i.e. fire routes).

The internal roadways of the development will be assumed by the Municipality upon registration of the subdivision.

5.0 SANITARY SEWAGE SYSTEM

5.1 Existing Sanitary Sewer Infrastructure

5.1.1 Wastewater Treatment Plant Capacity

The existing wastewater treatment plant (WWTP) is located on Eco Parkway at the south end of Dundalk. The plant treats sewage and discharges the treated effluent to the Foley Drain/ Grand River. Per the Township of Southgate 2021 Reserve Capacity Study (Triton Engineering, 2021), the plant

currently operates on average at 1127 m³/day. The uncommitted reserve capacity for the sewage treatment facility is 127 new development ERU's (Equivalent Residential Units).

An Assimilative Capacity Study was completed by the Township Engineer. The results of the study yielded an increase in the amount of treated effluent available to discharge to the Foley Drain from 1,832 m³/day to 3,025 m³/day. This increase in permitted effluent discharge has since triggered the municipality to proceed with implementing necessary WWTP upgrades that increase the WWTP's design capacity. Upon the completion of the WWTP revisions the number of available uncommitted units will increase from the current 127 to 1408 upon completion in 2023. Refer to **Appendix B** for relevant wastewater treatment plant capacity calculations.

5.1.2 Existing Infrastructure

The existing sewage infrastructure within the vicinity of the Subject Development includes the following:

- Two (2) 200mm diameter sanitary sewer stubs located at Aitchison Avenue and Corbett Street (Glenelg Residential Development – Phase 1 Lands).

5.2 **Proposed Sanitary Sewer Infrastructure**

Sanitary servicing for the development will be supplied by way of connection the existing Dundalk sanitary sewer collection network. Flows from the Subject Development will be conveyed to the existing Dundalk Wastewater Treatment Plant.

The Subject Development will be serviced via a gravity sanitary sewer system that follows the alignment of the internal roadway network, with individual service connections to each lot. Upon subdivision registration, sewers and associated roadways will be assumed by the Municipality.

The proposed sanitary sewer for the development will connect to the two (2) 200mm diameter sanitary sewer stubs on Aitchison Avenue and Corbett Street, respectively. Conveyance capacity of all downstream infrastructure will be subject to confirmation by the Township's Engineering Consultant. Sanitary infrastructure for the proposed development is illustrated in **Figure 4**.

Sanitary flow estimates for the development were estimated in conjunction with the Township of Southgate Engineering Design Standards and the "New Development Unit Flow Rates" as described within the 2021 Reserve Capacity, per direction of the Township's Engineering Consultant. The estimated sanitary flow was found to be 7.99 L/s. Refer to **Appendix B** for the sanitary flow calculations.

6.0 **POTABLE WATER SUPPLY**

6.1 **Existing Potable Water Supply Infrastructure**

6.1.1 Water Treatment Capacity

Potable water for the development will be supplied by the Township's municipal water distribution system.

The existing water treatment plant system in Dundalk includes three existing production wells. Per the 2021 Reserve Capacity Study, the well system operates at a maximum daily flow of 918 m³/day. This value represents approximately 33% of the system's allowable withdrawal capacity of 2,817 m³/day, as specified in the Township's Permit to Take Water. Based on this, the existing system has ample

capacity to support Phase 2 of the Glenelg Residential Development. Refer to **Appendix C** for relevant water capacity calculations.

6.1.2 Existing Infrastructure

The existing water distribution infrastructure within the vicinity of the Subject Development includes the following:

- Two (2) 150mm diameter watermain connection stubs located at Aitchison Avenue and Corbett Street (Glenelg Residential Development – Phase 1 Lands).

6.2 Existing Potable Water Supply Infrastructure

The Subject Development will be serviced via connection to the two (2) 150mm diameter watermain stubs located at Aitchison Avenue and Corbett Street, respectively.

Watermain with individual service connections for each unit will follow the alignment of the internal roadways according to Township Standards and will service the development through both the east and west entrances along Glenelg Street. This will facilitate a looped distribution network and satisfy the Township and Ministry of Environment, Conservation and Parks' requirements for a looped water distribution system. The Draft Plan does not include any watermain dead-ends and therefore there should be no issue with respect to providing adequate water circulation and preventing the potential for stagnant potable water.

Fire hydrants will be spaced as required to provide the necessary fire protection per municipal standards. Required domestic water flows have been calculated in conformance with the Township of Southgate's Engineering Design Standards and the "New Development Unit Flow Rates" specified within the 2021 Reserve Capacity Study, per direction of the Township's Engineering Consultant. The maximum day and peak hour water demands have been estimated to be 4.34 L/s and 6.52 L/s, respectively. Additional water supply considerations including fire suppression requirements will be determined during the detailed design phase. Internal watermain sizing will be subject to detailed design and confirmation by the Township's Engineering Consultant.

Refer to **Appendix C** for relevant water demand calculations. The proposed watermain layout is illustrated on **Figure 4**.

7.0 PROPOSED STORMWATER MANAGEMENT, SITE GRADING AND DRAINAGE

7.1 Stormwater Management (SWM) Criteria

The management of stormwater and site drainage for the proposed development must comply with the policies and standards of the various agencies including the Township of Southgate, Saugeen Valley Conservation Authority (SVCA), and the Ministry of Environment, Conservation and Parks (MECP).

The stormwater management criteria for the Subject Development includes:

- Water Quantity Control
 - Control of post development peak flows to pre-development levels for all storms up to and including the 100 year event.

- Water Quality Control
 - 80% removal efficiency of total suspended solids per MECP “enhanced protection” requirements.
- Erosion Control
 - 24 hour detention of the 25mm event.
- Development Standards
 - Urban cross section for public roadway with 5 year storm sewer system.
 - Lot grading at 2% optimum.
 - Minor and major drainage system to convey frequent and infrequent rainfall/runoff events, respectively.

In meeting the applicable policies and standards of the aforementioned agencies, the development will also be required to meet the following criteria:

- Manage the internal stormwater by safely conveying peak flows to suitable outlets and provide the necessary water quality controls.
- Manage any external drainage entering the site by providing safe conveyance across the Subject Development.
- Ensuring the development lands are not susceptible to flood inundation during the more conservative of the 100 Year and Hurricane Hazel storm events.

7.2 Existing Drainage Conditions

The existing drainage patterns of the site have been reflected in the Pre-Development Drainage Plan (**Figure 5**). Topographic survey indicates that the entire developable area (8.6 ha) drains west towards the Natural Heritage Wetland Feature. This natural heritage area is characterized by a significant number of enclosed depressions and channels which provide for abstraction of runoff. This area exhibits significant storage characteristics and poor drainage. Culverts exist along both Ida Street and Glenelg Street however significant ponding would need to occur prior to drainage through these culverts. Consequently, there is likely little surface discharge from the natural heritage area during rainfall events, with runoff in this area is retained/ infiltrated/ evapotranspired. Nevertheless, local topography trends northwest towards Ida Street, and in the event of significant precipitation/ snowmelt which surcharges the area's natural storage capacity, runoff would drain northward along Ida street through a series of roadside ditches and culverts.

To the east of the development lies the CP Rail Trail. This trail represents an elevated linear structure bounding the property line and has been constructed with side ditches preventing external flows from the east from entering the development site.

The Subject Development lies at the headwaters of two watersheds. No watercourses traverse the property nor do any significant external drainage areas. Natural hazards associated with a watercourse floodplain are defined by a minimum drainage area of 125 ha according to the Ministry of Natural Resources and Forestry. To avoid flood impacts from the wetland on the proposed development, all lots will be floodproofed 0.3 meters above the high-water level within the wetland. The wetland high-water level will be confirmed through the wetland water balance assessment.

7.3 Proposed Drainage Conditions

The Subject Development will be constructed to a fully urbanized system complete with curb and gutter and storm sewers. A dual drainage approach will consist of minor and major stormwater flow routes to ensure adequate conveyance for runoff. The minor drainage system will consist of storm

sewers and catchbasins sized to convey the 5-year design storm event. The major drainage system will provide overland stormwater flow routes within the road allowance.

Refer to **Figure 3** for proposed storm sewer layout.

The majority of the site will have flows from the development directed during both the minor and major drainage systems towards the proposed SWM Facility located at the northern end of the Subject Development. Due to grading constraints within the development the rear yards of the lots along Aitchison Ave and Street C will be directed uncontrolled towards the Western Wetland Feature however, will not require quality control measures as this runoff is considered clean.

The stormwater management (SWM) block has been adequately sized to provide quantity, quality, and erosion control.

As the proposed development area currently drains to the Western Natural Heritage Feature, it will be necessary to complete a post-development water balance. In order to ensure that post-development volumes (of the Natural Heritage Feature) meet pre-development levels, two outlets for the SWM Facility have been specified. The first outlet discharges to the Western Natural Heritage Feature and the second to the existing Ida Street ditch via a proposed channel. Refer to **Figure 6** for the Post-Development Drainage Plan.

Prior to the completion of a wetland water balance, the outlet to the existing Ida Street ditch will be sized to control post-development flows to the 5-year SCS storm pre-development target. Regulatory Storm flows will be directed to the wetland. The wetland water balance will calculate the target runoff volume to be directed to the wetland during the 2- through 100-year storms. The control structure for the outlet to the wetland will be sized accordingly at the detailed design stage.

The Ida Street ditch will require regrading to provide positive drainage from the proposed stormwater management facility to the existing culvert below Ida Street. Proposed ditch grading is included in **Figure 6** and the ditch is sized to convey the controlled 100-year post development storm flows.

Surrounding topography (to the west and south) generally trends away from the development. To the east, the CP Rail Trail presents an elevated and ditched obstacle to flows entering the site. To the south, the drainage from existing rear lots is captured into a storm sewer system which directs drainage to the existing wetland. This existing storm sewer will also capture the rear lot drainage from Lots 58, 76-87 and Blocks 99-100 under post-development drainage conditions. In consideration of these facts, external drainage from the west and south is not anticipated to require mitigative measures to ensure conveyance around or through the site. Drainage from the north sheet drains south of the proposed stormwater management facility. Under post development conditions, a culvert will convey this drainage below the proposed pond outlet ditch.

7.3.1 Quantity Control

Quantity control for the Subject Development will be provided by the SWM Facility. The stormwater management hydrologic computer program SWMHYMO (Sabourin, 1998) was used to the model the pre and post-development drainage areas. Pre and post-development drainage areas have been reflected in **Figure 5** and **Figure 6**.

Rainfall was simulated using a 24-hour SCS Type II distribution and a 3-hour Chicago distribution consistent with Township Standards. Rainfall depths and intensities were obtained from the MTO IDF Look Up Tool based on the location of the Subject Development. The MTO IDF data and hydrologic modelling parameter sheets have been provided in **Appendix D**. SWMHYMO modelling files, including input and output have been provided in **Appendix E**.

A summary of the release rates and storage volumes for the SWM Facility has been provided in **Table 1** below.

Table 1: Summary of SWM Facility Release Rate & Storage Volumes

Storm	Release Rate (m ³ /s)	Water Surface Elevation (m)	Maximum Storage (m ³)
2 yr Chicago	0.02	517.125	875
5 yr Chicago	0.028	517.370	1924
10 yr Chicago	0.03	517.500	1924
25 yr Chicago	0.033	517.650	2429
50 yr Chicago	0.035	517.750	3370
100 yr Chicago	0.037	517.850	3153
2 yr SCS	0.029	517.50	2032
5 yr SCS	0.034	517.70	2298
10 yr SCS	0.037	517.85	4070
25 yr SCS	0.041	518.05	4528
50 yr SCS	0.044	518.25	5494
100 yr SCS	0.046	518.35	6002

A summary of the pre and post-development stormwater flows for the Subject Development has been provided in **Table 2** below.

Table 2: Summary of “Post to Pre” Peak Flows

Return Period (Years)	Pre-Development (m ³ /s) [9.4 ha]	Post-Development (m ³ /s) [8.6 ha]
2 yr Chicago	0.094	0.057
5 yr Chicago	0.225	0.124
10 yr Chicago	0.310	0.166
25 yr Chicago	0.425	0.220
50 yr Chicago	0.521	0.274
100 yr Chicago	0.655	0.319
2 yr SCS	0.335	0.136
5 yr SCS	0.550	0.213
10 yr SCS	0.707	0.270
25 yr SCS	0.909	0.336
50 yr SCS	1.067	0.394
100 yr SCS	1.222	0.445

As evidenced by **Table 2**, the proposed SWM Facility provides ‘Post-to-Pre’ peak flow control for all storm events up to and including the 100-year storm event. The Regional event will outlet to by an overland flow route from the pond to the wetland.

7.3.2 Stormwater Quality & Erosion Control

Stormwater management quality and erosion control will be provided by the SWM Facility. The conceptual design of the proposed SWM Facility has incorporated a permanent pool and sediment forebay to provide appropriate water quality treatment. As the Saugeen River is the ultimate receiver

from the Subject Lands, the development must incorporate measures to provide “enhanced protection” (*Stormwater Management Planning and Design Manual*, Ministry of the Environment, 2003).

Erosion control will be principally achieved by incorporating extended detention into the operation of the hybrid pond. Sizing was based on providing minimum 24 hour drawdown of the runoff volume produced during the 25mm event.

The Subject Development drainage area for the SWM Facility is 54% impervious and 7.1 ha. As such, the minimum water quality volume for a stormwater hybrid wet pond is 148 m³/ha (*Stormwater Management Planning and Design Manual*, Ministry of the Environment, 2003). The total water quality volume consists of 148 m³/ha for permanent pool and 40 m³/ha for extended detention. The required and provided extended detention and permanent pool values have been summarized in **Table 3**. Refer to **Appendix F** for the water quality and extended detention calculations.

Table 3: Stormwater Management Facility Quality Control Characteristics

	SWM Facility	
	Required Volume (m ³)	Provided Volume (m ³)
Permanent Pool	766	1493
MOE Extended Detention	284	1013
Erosion Control	829	1013

7.3.3 Wetland Water Balance

At the detailed design stage, a wetland water balance will be completed to establish the existing hydrologic regime to the wetland. Storm drainage and infiltration facilities will be designed to direct clean runoff to the wetland to mimic pre-development conditions. Sources of clean water include treated stormwater management pond effluent as well as roof and rear lot drainage. Wetland monitoring has been in progress since October 2019 to establish existing conditions.

The proposed stormwater management pond is currently designed to direct effluent to the existing Ida Street ditch. As such, the pond is overcontrolled to demonstrate a conservative design approach. Once the wetland water balance assessment is complete, a portion of those flows will be directed to the wetland and away from the Ida Street ditch and the reduction in flows to Ida Street will be modeled.

8.0 UTILITIES

The development will be serviced with natural gas, telephone, cable TV and hydro. All such utilities are available in the area of development. Coordination for extension of and connection to existing services will be undertaken as development approvals advance. Utilities are proposed to follow the alignment of the internal road network, with individual service connections to each lot.

9.0 CONCLUSIONS & RECOMMENDATIONS

Based on the foregoing, we conclude that Phase 2 of the Glenelg Residential Development can be adequately serviced.

- Access to the Subject Development will be provided by two entrances along Glenelg Street (through the Phase 1 Lands). The internal roadways will meet Township Standards and provide access for emergency vehicles.
- Gravity sanitary services for the Subject Development will be provided via connection to the Phase 1 Lands.
- An internal watermain system will be provided through the Subject Development with two connections to the Phase 1 Lands.
- The development will be fully serviced by hydro, natural gas, cable and telecommunications.
- The Stormwater Management Facility will provide both quality and quantity control. The proposed hybrid SWM Facility is adequately sized to provide "enhanced protection" level treatment while controlling post-development 100 year storm flows to pre-development 5 year flows. The facility will incorporate 24 hour retention of the 25mm event to provide erosion control.
- Natural hazard constraints (floodplain) do not exist for the Subject Development.

Based on the above, we recommend approval of the Planning Applications for the Subject Lands from the perspective of engineering servicing requirements.

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https://cfcrozier.sharepoint.com/sites/GlenelgPhase2/Shared Documents/General/2021.12.03_FSRSWM Report.docx

APPENDIX A

Geotechnical Investigation

**PRELIMINARY REPORT ON
GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
231 GLENELG STREET
TOWNSHIP OF SOUTHGATE
DUNDALK, ONTARIO**

Prepared for:

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1. INTRODUCTION

Sirati & Partners Consultants Limited (SPCL) was retained by Flato Developments Inc. to undertake a preliminary geotechnical investigation at the property located at 231 Glenelg Street in Township of Southgate, Dundalk, Ontario.

It is understood that the project will entail a residential subdivision consisting of single family houses, roads and sewers. The design details of the proposed development are not available to us at the time of writing this report. This geotechnical report is preliminary, prepared on the basis of limited number of boreholes for the pre-purchase due diligence period. Additional boreholes may be required when design details are available for the proposed development.

This report deals with geotechnical issues only. Environmental studies for the subject site are reported under separate covers.

The purpose of this preliminary geotechnical investigation was to obtain information about the subsurface conditions at borehole locations and from the findings in the boreholes to make preliminary recommendations pertaining to the geotechnical design of underground utilities, subdivision roads and to comment on the foundation conditions for general house construction.

This report is provided based on the terms of reference presented above and on the assumption that the design will be in accordance with the applicable codes and standards. If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, this office should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the recommendations of this office can be relied upon.

The recommendations follow generally accepted practice for geotechnical consultants in Ontario. The format and contents are guided by client specific needs and economics and do not conform to generalized standards for services. Laboratory testing for most part follows ASTM or CSA Standards or modifications of these standards that have become standard practice.

This report has been prepared for the Flato Development Inc. and its architect and designers. Third party use of this report without Sirati & Partners Consultants Limited (SPCL) consent is prohibited. The limitation conditions presented in **Appendix B** form an integral part of the report and they must be considered in conjunction with this report.

2. FIELD AND LABORATORY WORK

A total of eight boreholes (BH1 to BH8, see Drawing 1 for location plan) were drilled to depths ranging from 7.8 to 8.0m below the existing grade. Boreholes were drilled with solid and hollow stem continuous flight auger equipment by a drilling sub-contractor under the direction and

supervision of SPCL personnel. Samples were retrieved at regular intervals with a 50 mm O.D. split-barrel sampler driven with a hammer weighing 624 N and dropping 760 mm in accordance with the Standard Penetration Test (SPT) method. The samples were logged in the field and returned to the SPCL laboratory for detailed examination by the project engineer and for laboratory testing.

As well as visual examination in the laboratory, all soil samples were tested for moisture content. Selected four soil samples were subjected to grain size analyses and gradation curves are presented on Figure 10.

Water level observations were made during drilling and in the open boreholes at the completion of the drilling operations. Monitoring wells were installed in two boreholes (BH1 and BH8) for the long-term (stabilized) groundwater level monitoring.

The elevations at the borehole locations were surveyed by the SPCL personnel using differential GPS system.

3. SITE AND SUBSURFACE CONDITIONS

The entire Property is an approximately 81 acres' irregular shaped parcel of land. The Property is located to the north of Glenelg Street, between Ida Street and Grey County CP Rail Trail. The site topography slopes in a north-northwesterly direction. Groundwater flow direction at the property is expected to follow the ground topography, i.e. towards the north west direction.

The borehole location plan is shown on Drawing 1. Notes on soil descriptions are presented on Drawing 1A. The subsurface conditions in the boreholes are presented in the individual borehole logs (Encl. 2 to 9 inclusive). The subsurface conditions in the boreholes are summarized in the following paragraphs.

3.1 SOIL CONDITIONS:

Topsoil/Possible Fill: A 200 to 325 mm thick surficial layer of topsoil was found at borehole locations. The thickness of the topsoil in each borehole was shown in the borehole log. It should be noted that the thickness of the topsoil explored at the borehole locations may not be representative for the site and should not be relied on to calculate the amount of topsoil at the site.

A layer of possible fill material consisting of sandy silt to silty sand mixed with topsoil was found in BH3 and BH4, extending to a depth of about 0.8m. Generally, in all the boreholes, the upper 0.8 to 1.0 m of the native soil was weathered/disturbed.

Water Bearing Cohesionless Soils (Silt, Sandy Silt, Silty Sand, Sand and Gravel): The native soil below the surficial topsoil layer generally consisted of cohesionless soils (Silt, Sandy Silt, Silty Sand, Sand and Gravel) extending to depths varying from 0.8 to 3.1m below existing grade, overlying sandy silt till. The cohesionless soils were water bearing and present in a loose to very dense state, with measured SPT 'N' values ranging from 6 to 54 blows per 300mm penetration.

Grain size analysis of three (3) samples from cohesionless soils (BH1/SS2, BH1/SS4, and BH8/SS3) were conducted and the results are presented in Figure 10, with the following fractions:

Clay: 7 to 19%
Silt: 12 to 74%
Sand: 7 to 40%

Sandy Silt Till: Sandy silt till deposit was encountered in the boreholes below the upper cohesionless soils and extended to the maximum explored depth of boreholes. Sandy silt till contained occasional to frequent cobbles and occasional boulders. Sandy silt till was present in a compact to very dense state, with measured SPT 'N' values ranging from 10 to over 50 blows for 300mm of penetration.

Grain size analysis of one (1) sandy silt till sample (BH3/SS4) was conducted and the results are presented in Figure 10, with the following fractions:

Clay: 14%
Silt: 46%
Sand: 32%
Gravel: 8%

3.2 GROUNDWATER CONDITIONS

During drilling (short-term), groundwater was found in the boreholes at depths ranging from 0.8 to 1.5m below the existing grade. The stabilized groundwater table observed in the monitoring wells on November 25, 2016 was at depths ranging from 0.7 to 2.1 mbgs, corresponding to elevations ranging from 514.5 to 518.0 m, as listed on Table 1.

Table 1: Groundwater Levels Observed in Monitoring Wells

BH No.	Date of Drilling	Date of Observation	Depth of Groundwater (m)	Elevation of Groundwater (m)
BH1	Nov. 18, 2016	Nov. 25, 2016	0.7	516.5
		Nov. 29, 2016	0.3	517.0
BH2	Nov. 18, 2016	Nov. 25, 2016	1.3	518.0
		Nov. 29, 2016	0.4	518.9
BH6	Nov. 15, 2016	Nov. 25, 2016	2.1	514.5
		Nov. 29, 2016	1.2	515.4

Further monitoring of the groundwater table is recommended. It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events.

4. DISCUSSION AND RECOMMENDATIONS

It is proposed to develop the site as a residential subdivision. The lots will therefore be serviced by a network of roads, storm and sanitary sewers and watermain.

The groundwater table at the subject site is generally high, at about 0.3 to 1.2m below the existing grade. Groundwater control will be required during the construction of underground services. The basements for the proposed houses must be kept at least 0.3m above the seasonal high groundwater table to avoid the permanent (underfloor drainage) groundwater control. Further monitoring of groundwater table is recommended to establish the seasonally high groundwater table.

A hydrogeological study is recommended for the subject site to evaluate the type and extent of groundwater control required during the construction and permanent groundwater control upon completion of the construction. The seasonally high groundwater table must be established by the hydrogeologist.

4.1 ROADS

The investigation has shown that the predominant subgrade soil at the site, after stripping the topsoil, fill and any other organic and otherwise unsuitable (weather/disturbed) subsoil, will generally consist of cohesionless sandy soils.

Based on the above and assuming that traffic usage will be residential minor local or local, the following minimum pavement thickness is recommended:

40 mm HL3 Asphaltic Concrete
50 mm HL8 Asphaltic Concrete
150 mm Granular 'A'
450 mm Granular 'B'

These values may need to be adjusted according to the Township of Southgate Standards. The pavement structure recommended above assumes that the subgrade has sufficient bearing capacity to accommodate the applied pavement structure and local traffic. The site subgrade and weather conditions (i.e. if wet) at the time of construction may necessitate the placement of thicker granular sub-base layer in order to facilitate the construction. Furthermore, heavy construction equipment may have to be kept off the newly constructed roads before the placement of asphalt and/or immediately thereafter, to avoid damaging the weak subgrade by heavy truck traffic.

4.1.1 Stripping, Subexcavation and Grading

The site should be stripped of all topsoil, loose soil/fill and any organic or otherwise unsuitable soils to the full depth of the roads, both in cut and fill areas.

Following stripping, the site should be graded to the subgrade level and approved. The subgrade should then be proof-rolled, in the presence of the Geotechnical Engineer, by at least several passes

of a heavy compactor having a rated capacity of at least 8 tonnes. Any soft spots thus exposed should be removed and replaced by select fill material, similar to the existing subgrade soil and approved by the Geotechnical Engineer. The subgrade should then be recomacted from the surface to at least 98% of its Standard Proctor Maximum Dry Density (SPMDD). The final subgrade should be cambered or otherwise shaped properly to facilitate rapid drainage and to prevent the formation of local depressions in which water could accumulate.

Proper cambering and allowing the water to escape towards the sides (where it can be removed by means of subdrains) is considered to be beneficial for this project. Otherwise, any water collected in the granular sub-base materials could be trapped thus causing problems due to softened subgrade, differential frost heave, etc. For the same reason damaging the subgrade during and after placement of the granular materials by heavy construction traffic should be avoided. If the moisture content of the local material cannot be maintained at $\pm 2\%$ of the optimum moisture content, imported granular material must be used.

Any fill required for regrading the site or backfill should be select, clean material, free of topsoil, organic or other foreign and unsuitable matter. The fill should be placed in thin layers and compacted to at least 95% of its SPMDD. The degree of compaction should be increased to 98% within the top 1.0 m of the subgrade, as per Town Standards. The compaction of the new fill should be checked by frequent field density tests.

4.1.2 Construction

Once the subgrade has been inspected and approved, the granular base and sub-base course materials should be placed in layers not exceeding 200 mm (uncompacted thickness) and should be compacted to at least 100% of their respective SPMDD. The grading of the material should conform to current OPS Specifications.

The placing, spreading and rolling of the asphalt should be in accordance with OPS Specifications or, as required by the local authorities.

Frequent field density tests should be carried out on both the asphalt and granular base and sub-base materials to ensure that the required degree of compaction is achieved.

4.1.3 Drainage

The Township of Southgate requires the installation of full-length subdrains on all roads. The subdrains should be properly filtered to prevent the loss of (and clogging by) soil fines.

All paved surfaces should be sloped to provide satisfactory drainage towards catchbasins. As discussed in Section 4.1.1, by means of good planning any water trapped in the granular sub-base materials should be drained rapidly towards subdrains or other interceptors.

4.2 SEWERS

As a part of the site development, a network of new storm and sanitary sewers is to be constructed.

4.2.1 Trenching

It is expected that in most cases the trenches will be dug through the water bearing cohesionless soils and sandy silt till. Based on the borehole information, wet water bearing silt/sandy soils are present below depths varying from 0.8 to 1.5m below the existing grade. Positive dewatering such as well points will be required prior to any trenching/excavation in cohesionless sandy soils below the groundwater table, otherwise it will result into flowing sides and unstable base. Water table must be lowered to 1m below the lowest excavation level.

A hydrogeological study is recommended for the subject site to evaluate the type and extent of groundwater control required during the construction. A Permit to Take Water (PTTW) will be required for the subject site for the proposed development.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). In accordance with OHSA, the overburden can be classified as Type 3 soil above the groundwater table and Type 4 Soil below the groundwater table.

4.2.2 Bedding

The boreholes show that in their undisturbed state, the undisturbed native soils will provide adequate support for the sewer pipes and allow the use of normal Class B type bedding. The recommended minimum thickness of granular bedding below the invert of the pipes is 250 mm. The thickness of the bedding may, however, have to be increased depending on the pipe diameter or if weak subgrade conditions are encountered. The bedding material should consist of well graded granular material such as Granular 'A' or equivalent. After installing the pipe on the bedding, a granular surround of approved bedding material, which extends at least 300 mm above the obvert of the pipe, or as set out by the local Authority, should be placed.

To avoid the loss of soil fines from the subgrade, uniformly graded clear stone should not be used unless, below the granular bedding material, a suitable, approved filter fabric (geotextile) is placed. The geotextile should extend along the sides of the trench and should be wrapped all around the poorly graded bedding material.

4.2.3 Backfilling of Trenches

Based on visual and tactile examination, and the measured moisture contents of the soil samples, the onsite excavated soils will generally be too wet to be re-used as backfill material in the service trenches and will therefore require significant aeration prior to their use as backfill material. Unless the materials are properly aerated, pulverized and compacted in sufficiently thin lifts, post-construction settlements could occur. The backfill should be placed in maximum 200 mm thick

layers at or near ($\pm 2\%$) their optimum moisture content, and each layer should be compacted to at least 95% SPMDD. Unsuitable materials such as organic soils, boulders, cobbles, frozen soils, etc. should not be used for backfilling. Otherwise imported selected inorganic fill will be required for backfilling at this site.

The onsite excavated soils should not be used in confined areas (e.g. around catchbasins and laterals under roadways) where heavy compaction equipment cannot be operated. The use of imported granular fill together with an appropriate frost taper would be preferable in confined areas and around structures, such as catchbasins.

4.3 SITE GRADING AND ENGINEERED FILL

In the areas where earth fill is required for site grading purposes, an engineered fill may be constructed below house/building foundations, roads, boulevards, etc.

The engineered fill supporting footings should be constructed in accordance with the guidelines presented in Appendix A.

Prior to the construction of engineered fill, all topsoil, fill material, weak weathered / disturbed and any other unsuitable materials must be removed in this area. After the removal of all unsuitable materials, the excavation base consisting of native soil deposits must be inspected and approved by a qualified geotechnical engineer prior to any placement of engineered fill. The base of the excavation should be compacted and proof rolled with heavy compactors (minimum 10,000 kg). During proof rolling, spongy, wet or soft/loose spots should be sub-excavated to stable subgrade and replaced with approved soil, compatible with subgrade conditions, as directed by the geotechnical engineer.

The material for engineered fill should consist of approved inorganic soil, compacted to 100 percent of Standard Proctor Maximum Dry Density (SPMDD). Recommendations regarding engineered fill placement are provided in Appendix B of this report.

To reduce the risk of improperly placed engineered compacted fill, full-time supervision of the contractor is essential by SPCL to certify the engineered fill. Despite full time supervision, it has been found that contractors frequently bulldoze loose fill into areas and compact only the surface. The inspector, either busy on other portions of the site or absent during “off hours” will be unaware of this condition. This potential problem must be recognized and discussed at a pre-construction meeting.

4.4 FOUNDATION CONDITIONS

The boreholes show that provided the foundation soil is undisturbed during the construction, in general, allowable soil bearing values of 75 to 150 kPa at SLS are feasible in the undisturbed inorganic natural soils. The bearing value would be suitable for the use of normal spread footing foundations to support normal single family dwellings.

All footings must be founded below the frost depth of 1.7m.

Where the grade needs to be raised, proposed structures can be supported by conventional footings founded on engineered fill for bearing pressure of 150 kPa at SLS. The engineered fill supporting footings should be constructed in accordance with the guidelines presented in Appendix A.

5. GENERAL COMMENTS ON REPORT

This geotechnical report is preliminary, prepared on the basis of limited number of boreholes for the pre-purchase due diligence period. Additional boreholes may be required when design details are available for the proposed development.

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

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

The limitation conditions presented in **Appendix B** form an integral part of the report and they must be considered in conjunction with this report.

We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

Yours truly,

SIRATI & PARTNERS CONSULTANTS LIMITED


Alka Sangar, M.Eng., P. Eng.





Archie Sirati, Ph.D., P.Eng.

Drawings

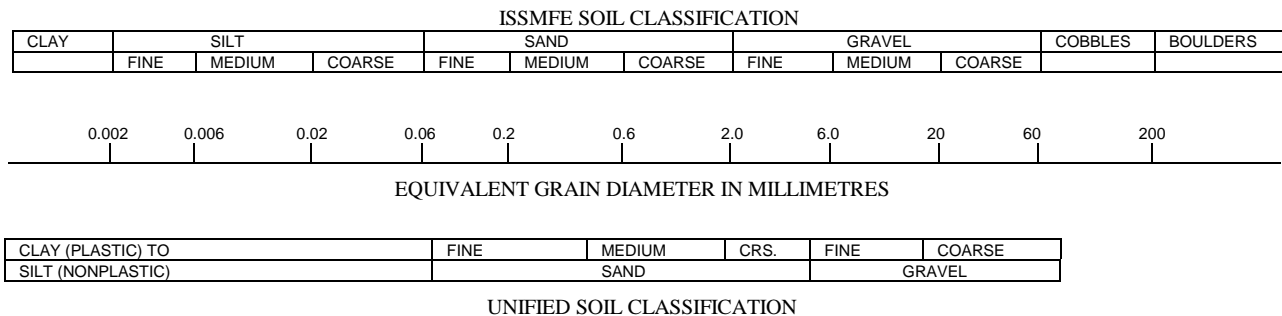


- NOTES:
- 1. The boundaries and soil types have been established only at borehole locations. Between and beyond boreholes they are assumed and may be subject to considerable error.
 - 2. Soil samples will be retained in storage for 3 months and then destroyed unless the client advises an extended time period is required.
 - 3. Topsoil / granular quantities should not be established from the information provided at the borehole locations.
 - 4. Borehole elevations should not be used to design building(s) or floor slab(s) or parking lot(s) grades.
 - 5. This drawing forms part of the report (project number as referenced) and should only be used in conjunction with

Client: Flato Developments Inc.		Project No: SP-16-174-10	Drawing No: 1
Drawn: JD		Title: Borehole Location Plan	
Approved: AS		Project: 231 Glenelg Street, Southgate, ON	
Date: Nov. 28, 2016	Scale: N.T.S	 Sirati & Partners Consultants Ltd. Geotechnical & Environmental Services Engineering Solutions	
Original Size: Tabloid	Rev: N/A		

Drawing 1A: Notes On Sample Descriptions

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



2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.
3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

PROJECT: Pre. Geotechnical Investigation - Proposed Residential Subdivision
CLIENT: Flato Development Inc.
PROJECT LOCATION: 231 Glenelg Street, Southgate, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150mm
Date: Nov/18/2016

REF. NO.: SP16-174-10
ENCL NO.: 2

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT			POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)				W _p	W	W _L			
517.3								20	40	60	80	100					
0.0	TOPSOIL: 300mm		1	SS	6		517.0										
0.3	SILT: trace to some clay, trace sand, occasional gravel, brown, moist to wet, loose to compact		2	SS	12		516.6										
			3	SS	45		516										
			4	SS	54		515										
514.3	SANDY SILT TILL: trace to some clay, trace gravel, occasional cobble/boulder, brown, wet, dense to very dense		5	SS	50/75mm		514										
			6	SS	50/150mm		513										
			7	SS	50/150mm		512										
			8	SS	50/75mm		511										
509.3	END OF BOREHOLE Notes: 1) 50mm dia. monitoring well installed in the borehole upon completion. 2) Water level in monitoring well at 0.7mbgs on Nov. 25, 2016. 3) Water level in monitoring well at 0.3mbgs on Nov. 29, 2016.						510										

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+3, X3: Numbers refer to Sensitivity

○ = 3% Strain at Failure

SPCL SOIL LOG SP16-174-10 - 231 GLENELG ST., DUNDALK GPJ SPCL GDT 1/17/17

LOG OF BOREHOLE BH2

1 OF 1

PROJECT: Pre. Geotechnical Investigation - Proposed Residential Subdivision
CLIENT: Flato Development Inc.
PROJECT LOCATION: 231 Glenelg Street, Southgate, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150mm
Date: Nov/17/2016

REF. NO.: SP16-174-10
ENCL NO.: 3

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT			POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)				W _p	W	W _L			
519.3								20 40 60 80 100				10 20 30					GR SA SI CL
0.0	TOPSOIL: 325mm							20 40 60 80 100				10 20 30					
519.0	SILTY SAND: trace clay, brown, wet, loose		1	SS	7		519	20 40 60 80 100				10 20 30					
0.3							W. L. 518.9 m Nov 29, 2016	20 40 60 80 100				10 20 30					
518.5	SANDY SILT: trace clay, trace gravel, brown, wet, loose to compact		2	SS	16		518	20 40 60 80 100				10 20 30					
0.8							W. L. 518.0 m Nov 25, 2016	20 40 60 80 100				10 20 30					
1			3	SS	6		517	20 40 60 80 100				10 20 30					
2								20 40 60 80 100				10 20 30					
516.8	SANDY SILT TILL: trace to some clay, trace gravel, occasional cobble/boulder, brown, moist, compact to very dense		4	SS	24		516	20 40 60 80 100				10 20 30					
2.5			5	SS	32		515	20 40 60 80 100				10 20 30					
3								20 40 60 80 100				10 20 30					
4			6	SS	50/ 100mm		514	20 40 60 80 100				10 20 30					
6								20 40 60 80 100				10 20 30					
7			7	SS	50/ 125mm		513	20 40 60 80 100				10 20 30					
8								20 40 60 80 100				10 20 30					
511.3			8	SS	50/ 125mm		512	20 40 60 80 100				10 20 30					
8.0	END OF BOREHOLE Notes: 1) 50mm Dia. monitoring well installed in the borehole. 2) Water level in monitoring well at 1.3mbgs on Nov. 25, 2016. 3) Water level in monitoring well at 0.4mbgs on Nov. 29, 2016.							20 40 60 80 100				10 20 30					

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ s=3% Strain at Failure

SPCL SOIL LOG SP16-174-10 - 231 GLENELG ST., DUNDALK GPJ SPCL GDT 1/17/17

PROJECT: Pre. Geotechnical Investigation - Proposed Residential Subdivision
CLIENT: Flato Development Inc.
PROJECT LOCATION: 231 Glenelg Street, Southgate, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150mm
Date: Nov/17/2016

REF. NO.: SP16-174-10
ENCL NO.: 4

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT			POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)				W _p	W	W _L			
518.5								20	40	60	80	100					
0.0	TOPSOIL: 300mm		1	SS	8		518										
0.3	POSSIBLE FILL: silty sand, weathered/disturbed with trace topsoil, brown, moist, loose																
0.8	SILT: trace topsoil pockets upto 1.5m, trace to some clay, trace sand, brown, wet, compact		2	SS	11		517										
	a layer of sand and gravel at 1.5m		3	SS	16												
516.2							516										
2.3	SANDY SILT TILL: some clay, trace gravel, occasional cobble/boulder, brown, wet, compact to very dense		4	SS	26												
			5	SS	24		515										
			6	SS	50/75mm		514										
							513										
			7	SS	50/75mm		512										
							511										
510.5			8	SS	50/100mm												
8.0	END OF BOREHOLE Notes: 1) Water level at 0.8m during drilling. 2) Water level at 1.7m and borehole caved to 2.0m upon completion.																

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3 , × 3 : Numbers refer to Sensitivity

○ s=3% Strain at Failure

SPCL SOIL LOG SP16-174-10 - 231 GLENELG ST., DUNDALK GPJ SPCL GDT 1/17/17

PROJECT: Pre. Geotechnical Investigation - Proposed Residential Subdivision
CLIENT: Flato Development Inc.
PROJECT LOCATION: 231 Glenelg Street, Southgate, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1





DRILLING DATA
Method: Solid Stem Augers
Diameter: 150mm
Date: Nov/17/2016

REF. NO.: SP16-174-10
ENCL NO.: 5

[illegible]

SPCL SOIL LOG SP16-174-10 - 231 GLENELG ST., DUNDALK.GPJ SPCL.GDT 1/17/17

GROUNDWATER ELEVATIONS

	1st	2nd	3rd	4th
Measurement				

GRAPH
NOTES

$+^3, \times^3$: Numbers refer to Sensitivity

○ $\epsilon = 3\%$ Strain at Failure

PROJECT: Pre. Geotechnical Investigation - Proposed Residential Subdivision
CLIENT: Flato Development Inc.
PROJECT LOCATION: 231 Glenelg Street, Southgate, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150mm
Date: Nov/17/2016

REF. NO.: SP16-174-10
ENCL NO.: 6

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (G _p) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)				
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)										
516.2								20	40	60	80	100	PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L			
516.0	TOPSOIL: 200mm							20	40	60	80	100	WATER CONTENT (%)					
0.2	SILTY SAND: trace clay, brown, moist, loose		1	SS	9		516											
515.4																		
0.8	SANDY SILT TILL: trace to some clay, trace gravel, occasional cobble/boulder, occasional wet sand seams, brown, moist, compact		2	SS	26		515											
			3	SS	12		514											
	very dense below 2.3m		4	SS	72		513											
			5	SS	50/ 125mm		512											
			6	SS	50/ 150mm		511											
			7	SS	50/ 150mm		510											
							509											
508.2			8	SS	50/ 150mm													
8.0	END OF BOREHOLE Notes: 1) Borehole was wet at bottom upon completion.																	

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3, X 3: Numbers refer to Sensitivity

○ s=3% Strain at Failure

SPCL SOIL LOG SP16-174-10 - 231 GLENELG ST., DUNDALK GPJ SPCL GDT 1/17/17

PROJECT: Pre. Geotechnical Investigation - Proposed Residential Subdivision
CLIENT: Flato Development Inc.
PROJECT LOCATION: 231 Glenelg Street, Southgate, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150mm
Date: Nov/15/2016

REF. NO.: SP16-174-10
ENCL NO.: 7

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT			POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)				W _p	W	W _L			
516.6								20	40	60	80	100					
516.4	TOPSOIL: 200mm																
0.2	SILTY SAND: trace clay, trace topsoil, brown, moist, loose		1	SS	8		516										
515.7																	
0.9	SANDY SILT TO SILTY SAND TILL: trace to some clay, trace gravel, brown, moist, compact wet below 1.5m		2	SS	26		515										
			3	SS	13		515										
	frequent cobble/boulder, very dense below 2.3m		4	SS	75		514										
	spoon hit a boulder at 3m and broke down No SPT below 3m, straight auger to 8m to install monitoring well						513										
							512										
							511										
							510										
509.3	END OF BOREHOLE Notes: 1) Water level during drilling at 1.5m. 2) 50mm dia. monitoring well installed in the borehole upon completion. 3) Water level in monitoring well at 2.1mbgs on Nov. 25, 2016. 4) Water level in monitoring well at 1.2mbgs on Nov. 29, 2016.																

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+3, X3: Numbers refer to Sensitivity

○ = 3% Strain at Failure

SPCL SOIL LOG SP16-174-10 - 231 GLENELG ST., DUNDALK GPJ SPCL GDT 1/17/17

LOG OF BOREHOLE BH7

1 OF 1

PROJECT: Pre. Geotechnical Investigation - Proposed Residential Subdivision
CLIENT: Flato Development Inc.
PROJECT LOCATION: 231 Glenelg Street, Southgate, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150mm
Date: Nov/15/2016

REF. NO.: SP16-174-10
ENCL NO.: 8

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT			POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)				W _p	W	W _L			
515.6								20	40	60	80	100					
0.0	TOPSOIL: 250mm																
515.4																	
0.3	SANDY SILT TO SILTY SAND: trace topsoil pockets upto 1.5m, brown to grey, moist to wet, loose to compact		1	SS	7		515										
			2	SS	9		514										
			3	SS	15		513										
513.3			4	SS	10		512										
2.3	SANDY SILT TO SILTY SAND TILL: trace to come clay, trace gravel, occasional cobble/boulder, grey, wet, compact		5	SS	10		511										
			6	SS	50/ 75mm		510										
			7	SS	50/ 100mm		509										
			8	SS	50/ 150mm		508										
8.0	END OF BOREHOLE Notes: 1) Water level at 0.8m during drilling.																

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3, X 3: Numbers refer to Sensitivity

○ s=3% Strain at Failure

SPCL SOIL LOG SP16-174-10 - 231 GLENELG ST., DUNDALK GPJ SPCL GDT 1/17/17

PROJECT: Pre. Geotechnical Investigation - Proposed Residential Subdivision
CLIENT: Flato Development Inc.
PROJECT LOCATION: 231 Glenelg Street, Southgate, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150mm
Date: Nov/15/2016

REF. NO.: SP16-174-10
ENCL NO.: 9

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT			POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)				W _p	W	W _L			
515.2								20	40	60	80	100					
515.0	TOPSOIL: 200mm							20	40	60	80	100					
0.2	SANDY SILT: trace clay, brown, moist, loose to compact		1	SS	8		515										
514.4																	
0.8	SANDY SILT TILL: trace to some clay, trace gravel, brown, moist, compact		2	SS	20		514										
513.7																	
1.5	SAND & GRAVEL: some silt, trace clay, greyish brown, wet, compact to dense		3	SS	37		513										
			4	SS	17		512										
512.1																	
3.1	SANDY SILT TILL: trace to some clay, trace gravel, occasional cobble/boulder, greyish brown, wet, very dense		5	SS	15		511										
			6	SS	67		510										
			7	SS	50/ 125mm		509										
			8	SS	50/ 150mm		508										
507.2																	
8.0	END OF BOREHOLE Notes: 1) Water level at 1.2m upon completion.																

GROUNDWATER ELEVATIONS

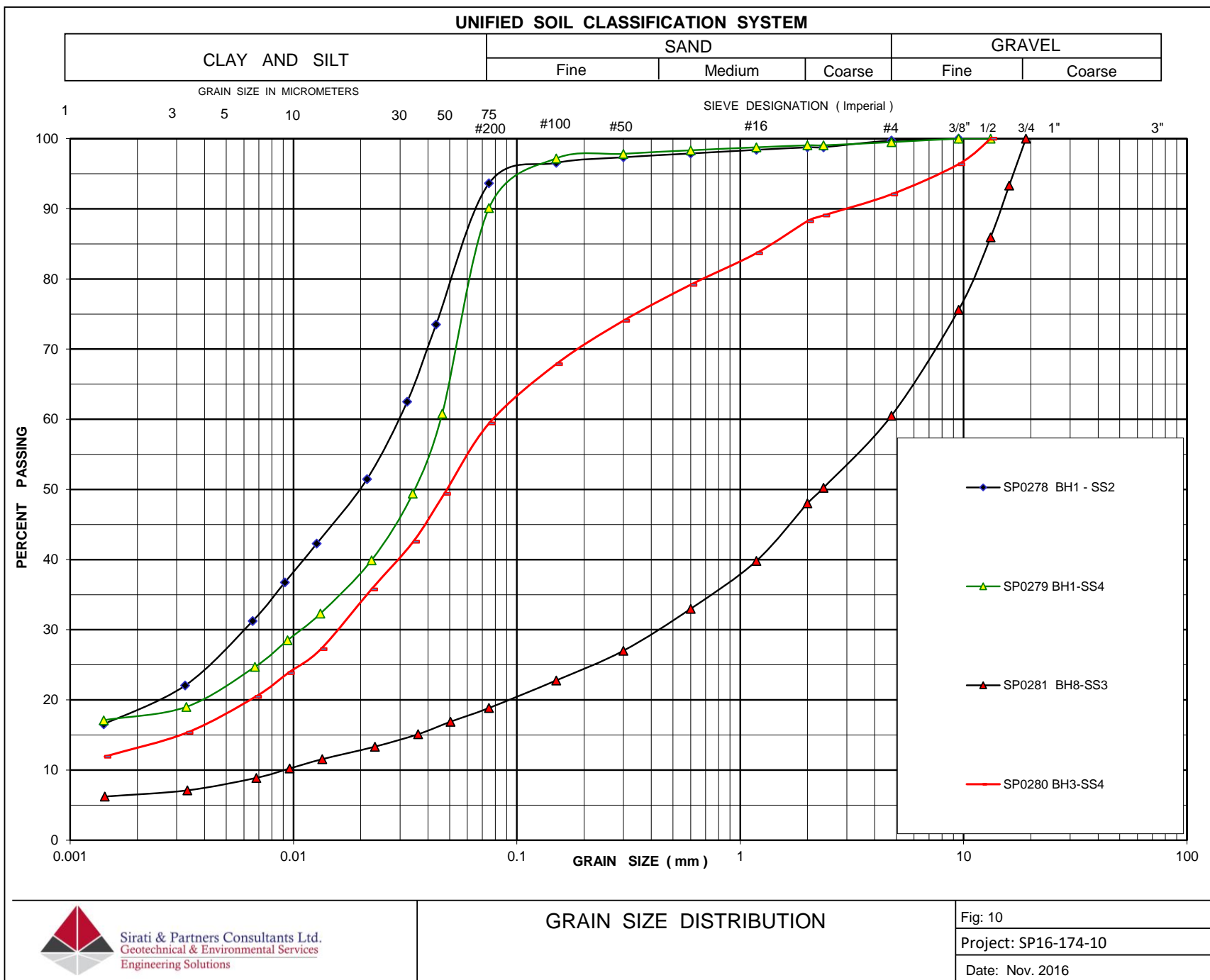
Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3, X 3: Numbers refer to Sensitivity

○ s=3% Strain at Failure

SPCL SOIL LOG SP16-174-10 - 231 GLENELG ST., DUNDALK GPJ SPCL GDT 1/17/17



Appendix A1:

Guidelines for Engineered Fill

GENERAL REQUIREMENTS FOR ENGINEERED FILL

Compacted imported soil that meets specific engineering requirements and is free of organics and debris and that has been continually monitored on a full-time basis by a qualified geotechnical representative is classified as engineered fill. Engineered fill that meets these requirements and is bearing on suitable native subsoil can be used for the support of foundations.

Imported soil used as engineered fill can be removed from other portions of a site or can be brought in from other sites. In general, most of Ontario soils are too wet to achieve the 100% Standard Proctor Maximum Dry Density (SPMDD) and will require drying and careful site management if they are to be considered for engineered fill. Imported non-cohesive granular soil is preferred for all engineered fill. For engineered fill, we recommend use of OPSS Granular 'B' sand and gravel fill material.

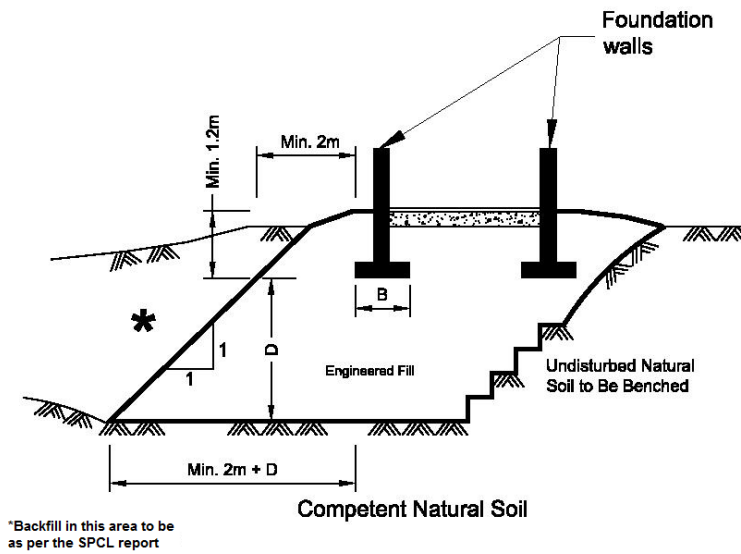
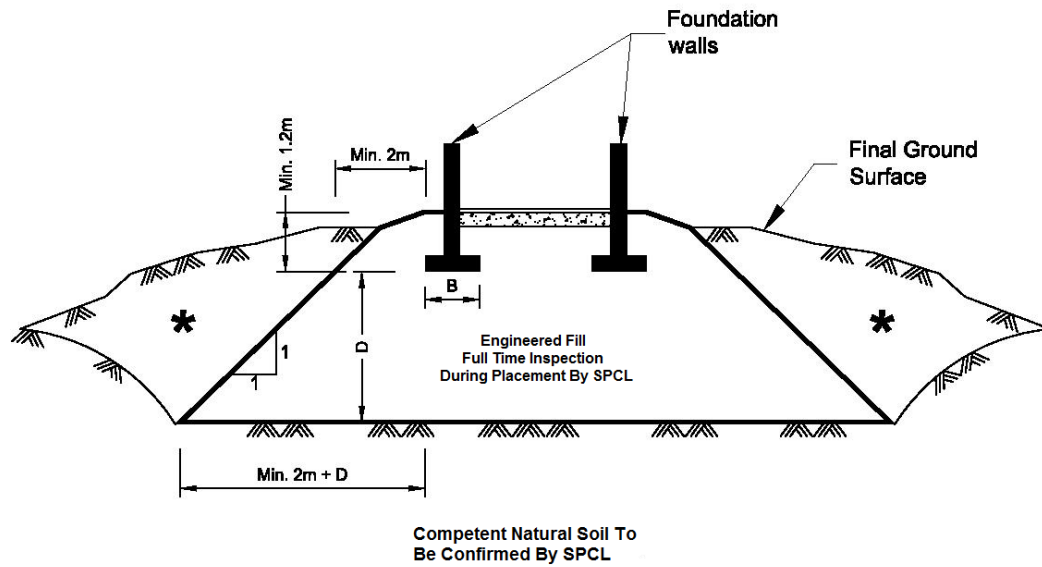
Adverse weather conditions such as rain make the placement of engineered fill to the required degree of density difficult or impossible; engineered fill cannot be placed during freezing conditions, i.e. normally not between December 15 and April 1 of each year.

The location of the foundations on the engineered fill pad is critical and certification by a qualified surveyor that the foundations are within the stipulated boundaries is mandatory. Since layout stakes are often damaged or removed during fill placement, offset stakes must be installed and maintained by the surveyors during the course of fill placement so that the contractor and engineering staff are continually aware of where the engineered fill limits lie. Excavations within the engineered fill pad must be backfilled with the same conditions and quality control as the original pad.

To perform satisfactorily, engineered fill requires the cooperation of the designers, engineers, contractors and all parties must be aware of the requirements. The minimum requirements are as follows, however, the geotechnical report must be reviewed for specific information and requirements.

1. Prior to site work involving engineered fill, a site meeting to discuss all aspects must be convened. The surveyor, contractor, design engineer and geotechnical engineer must attend the meeting. At this meeting, the limits of the engineered fill will be defined. The contractor must make known where all fill material will be obtained from and samples must be provided to the geotechnical engineer for review, and approval before filling begins.
2. Detailed drawings indicating the lower boundaries as well as the upper boundaries of the engineered fill must be available at the site meeting and be approved by the geotechnical engineer.
3. The building footprint and base of the pad, including basements, garages, etc. must be defined by offset stakes that remain in place until the footings and service connections are all constructed. Confirmation that the footings are within the pad, service lines are in place, and that the grade conforms to drawings, must be obtained by the owner in writing from the surveyor and Sirati & Partners Consultants Limited. Without this confirmation no responsibility for the performance of the structure can be accepted by Sirati & Partners Consultants Limited (SPCL). Survey drawing of the pre and post fill location and elevations will also be required.
4. The area must be stripped of all topsoil and fill materials. Subgrade must be proof-rolled. Soft spots must be dug out. The stripped native subgrade must be examined and approved by a SPCL engineer prior to placement of fill.

5. The approved engineered fill material must be compacted to 100% Standard Proctor Maximum Dry Density throughout. Engineered fill should not be placed during the winter months. Engineered fill compacted to 100% SPMDD will settle under its own weight approximately 0.5% of the fill height and the structural engineer must be aware of this settlement. In addition to the settlement of the fill, additional settlement due to consolidation of the underlying soils from the structural and fill loads will occur and should be evaluated prior to placing the fill.
6. Full-time geotechnical inspection by SPCL during placement of engineered fill is required. Work cannot commence or continue without the presence of the SPCL representative.
7. The fill must be placed such that the specified geometry is achieved. Refer to the attached sketches for minimum requirements. Take careful note that the projection of the compacted pad beyond the footing at footing level is a minimum of 2 m. The base of the compacted pad extends 2 m plus the depth of excavation beyond the edge of the footing.
8. A bearing capacity of 150 kPa at SLS (225 kPa at ULS) can be used provided that all conditions outlined above are adhered to. A minimum footing width of 500 mm (20 inches) is suggested and footings must be provided with nominal steel reinforcement.
9. All excavations must be done in accordance with the Occupational Health and Safety Regulations of Ontario.
10. After completion of the engineered fill pad a second contractor may be selected to install footings. The prepared footing bases must be evaluated by engineering staff from SPCL prior to footing concrete placements. All excavations must be backfilled under full time supervision by SPCL to the same degree as the engineered fill pad. Surface water cannot be allowed to pond in excavations or to be trapped in clear stone backfill. Clear stone backfill can only be used with the approval of SPCL.
11. After completion of compaction, the surface of the engineered fill pad must be protected from disturbance from traffic, rain and frost. During the course of fill placement, the engineered fill must be smooth-graded, proof-rolled and sloped/crowned at the end of each day, prior to weekends and any stoppage in work in order to promote rapid runoff of rainwater and to avoid any ponding surface water. Any stockpiles of fill intended for use as engineered fill must also be smooth-bladed to promote runoff and/or protected from excessive moisture take up.
12. If there is a delay in construction, the engineered fill pad must be inspected and accepted by the geotechnical engineer. The location of the structure must be reconfirmed that it remains within the pad.
13. The geometry of the engineered fill as illustrated in these General Requirements is general in nature. Each project will have its own unique requirements. For example, if perimeter sidewalks are to be constructed around the building, then the projection of the engineered fill beyond the foundation wall may need to be greater.
14. These guidelines are to be read in conjunction with Sirati & Partners Consultants Limited (SPCL) report attached.



Appendix B: Limitation and Use of the Report

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to Sirati & Partners Consultants Limited (SPCL) at the time of preparation. Unless otherwise agreed in writing by SPCL, it shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

The conclusions and recommendations given in this report are based on information determined at the borehole locations. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the boreholes may differ from those encountered at the borehole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the borehole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc. Professional judgement was exercised in gathering and analyzing data and formulation of recommendations using current industry guidelines and standards. Similar to all professional persons rendering advice, SPCL cannot act as absolute insurer of the conclusion we have reached. No additional warranty or representation, expressed or implied, is included or intended in this report other than stated herein the report.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of boreholes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. SPCL accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time. Any user of this report specifically denies any right to claims against the Consultant, Sub-Consultants, their officers, agents and employees in excess of the fee paid for professional services.

SPCL engagement hereunder is subject to and condition upon, that SPCL not being required by the Client, or any other third party to provide evidence or testimony in any legal proceedings pertaining to this finding of this report, or providing litigations support services which may arise to be required in respect of the work produced herein by SPCL. It is prohibited to publish, release or disclose to any third party the report produced by SPCL pursuant to this engagement and such report is produced solely for the Client own internal purposes and which shall remain the confidential proprietary property of SPCL for use by the Client, within the context of the work agreement. The Client will and does hereby remise and forever absolutely release SPCL, its directors, officers, agents and shareholders of and from any and all claims, obligations, liabilities, expenses, costs, charges or other demands or requirements of any nature pertaining to the report produced by SPCL hereunder. The Client will not commence any claims against any Person who may make a claim against SPCL in respect of work produced under this engagement.

APPENDIX B

Sanitary Demand & WWTP Capacity Calculations



105 Queen Street West, Unit 14
Fergus
Ontario N1M 1S6
Tel: (519) 843-3920
Fax: (519) 843-1943
Email: info@tritoneng.on.ca

ORANGEVILLE • FERGUS • GRAVENHURST

April 14, 2021

Township of Southgate
R.R. #1
185667 Grey Road 9
DUNDALK, Ontario
N0C 1B0

ATTENTION: Jim Ellis,
Public Works Manager

RE: TOWNSHIP OF SOUTHGATE
DUNDALK WATER SUPPLY AND
SEWAGE TREATMENT SYSTEMS
HYDRAULIC RESERVE CAPACITY
OUR FILE: A4160(21)-R04

Dear Sir:

The attached tables outline the 2021 reserve capacity calculations for the water supply and sewage treatment systems in Dundalk. The reserve capacities have been calculated in accordance with Ministry of Environment and Conservation and Parks (MECP) guidelines. **139** new residential units were occupied and connected to the municipal systems in Dundalk in 2020.

Table 3 provides a summary of Committed Developments which include Flato Phases 3-6, Flato Glenelg Development Phase 1 and the Flato West Apartment Building, totalling **631** equivalent residential units (ERUs). As Committed Development, these ERUs will not come out of the Uncommitted Reserve Capacity figures indicated on Tables 1 and Table 2. Table 3 also outlines the various potential developments that have been granted Draft Plan Approval, however have not been granted allocation.

Water System:

The three (3) year average maximum day demand of the water system increased from 786m³/d to **918m³/d** over the past year. The 2021 uncommitted reserve capacity of the water system is **1,526 ERU**. This is based on the Townships' amount of water taking permitted by the Permit to Take Water and draft plan approved/committed developments as outlined in Table 3. The Permit to Take Water, indicates an allowable water taking of 2,817m³/day.

Refer to Table 1 for additional information regarding water system reserve capacity calculations.



Sewage Treatment Facility:

Table 2 summarizes the sewage treatment reserve capacity calculations for 2021. The three-year annual average day flow decreased from 1,129 m³/d to **1,127m³/d**. The 2020 uncommitted reserve capacity for the sewage treatment facility is **127** new development ERUs.

Refer to Table 2 for additional information regarding sewage treatment system reserve capacity calculations.

Extraneous Flow:

Additionally, in conjunction with the reserve capacity calculations, we have completed a high-level assessment of the extraneous flows within the Dundalk sewage collection system. This assessment compares the precipitation, temperature, average day demand of water and the average day sewage flow measured at the WWTP on a monthly basis. The results indicate that the extraneous flows over and above the expected amount within a typical system is, on average, **356m³/day**, which equates to an estimated **383 ERUs**. The relationship between the wastewater flows, precipitation and temperature is indicative of a system that is subject to groundwater infiltration, as opposed to direct inflow. This is based on peaking of wastewater flows noted during the spring melt (i.e. March & April) with little correlation noted to times of high precipitation but lower groundwater levels (i.e. July & August). Sump pump connections are likely a significant contributor.

Recommendation:

Following Council's review and adoption of the attached report, we would recommend that a copy of the report be forwarded to the MECP District Office in Owen Sound and the Grey County Planning Department. We trust you will find the enclosed to be in order. Should you have any questions, please do not hesitate to contact this office.

Yours very truly,

TRITON ENGINEERING SERVICES LIMITED



Dustin Lyttle, P. Eng.

cc: Dave Milliner, Township of Southgate
Clinton Stredwick, Township of Southgate
Bev Fisher, Township of Southgate

TABLE 1
TOWNSHIP OF SOUTHGATE
2021 RESERVE CAPACITY
DUNDALK WATER SYSTEM

DESCRIPTION	2020
1 Available Capacity ¹	2,817
2 Max Day Flow (m ³ /d) ²	918
3 Reserve Capacity (m ³ /d) (1) - (2)	1,899
4 Serviced Households ³	1,067
5 Persons Per Existing Residential Unit (2016 Census Data)	2.60
6 Population Served (4) x (5)	2,774
7 Maximum Day Per Capita Flow (m ³ /d) (2) ÷ (6)	0.331
8 Additional Population that can be Served (3) ÷ (7)	5,739
9 Person Per New Equivalent Residential Unit (2017 DC Background Study)	2.66
10 Additional ERUs that can be served. (8) ÷ (9)	2,157
11 Committed Development ERUs (Table 3)	631
12 Uncommitted Reserve Capacity (ERUs) (10) - (11)	1,526
¹ Available Capacity is based on lesser of Firm Capacity or Permit to Take Water. Firm capacity is 2,817m ³ /day, PTTW is 2,817m ³ /d, Well Production is 4,778m ³ /day.	
² Max day flow is the average of the maximum day flows from 2018, 2019 and 2020 (742, 913 and 905m ³ /d respectively). Maximum day flows have been adjusted based on extenuating circumstances.	
³ Serviced households as reported in the 2020 Annual Water Report.	

TABLE 2
TOWNSHIP OF SOUTHGATE
2021 RESERVE CAPACITY
DUNDALK SEWAGE TREATMENT FACILITY

DESCRIPTION	2020
¹ Design Capacity of Sewage Treatment Facility (m ³ /d)	1,832
² Average Day Flow ¹ (m ³ /d) (Average of 2018, 2019 and 2020 Average Day Flows)	1,127
³ Reserve Capacity (m ³ /d) (1) - (4)	705
⁴ Average New Development Per Capita Flow ² (m ³ /d)	0.350
⁵ Additional Population that can be Served (3) ÷ (4)	2,015
⁶ Person Per Equivalent Residential Unit (2017 DC Background Study)	2.66
⁷ ERU Flow Rate (m ³ /d) (4) x (6)	0.931
⁸ Additional ERUs that can be Served (5) ÷ (6)	758
⁹ Committed Development ERUs (Table 3)	631
¹⁰ Uncommitted Reserve Capacity (ERUs) (7) - (8)	127
¹ Average of the average day flows in 2018, 2019 and 2020 (1,105, 1,114 and 1,161m ³ /day respectively).	
² As determined by new development flow analysis supported by flow monitoring program.	

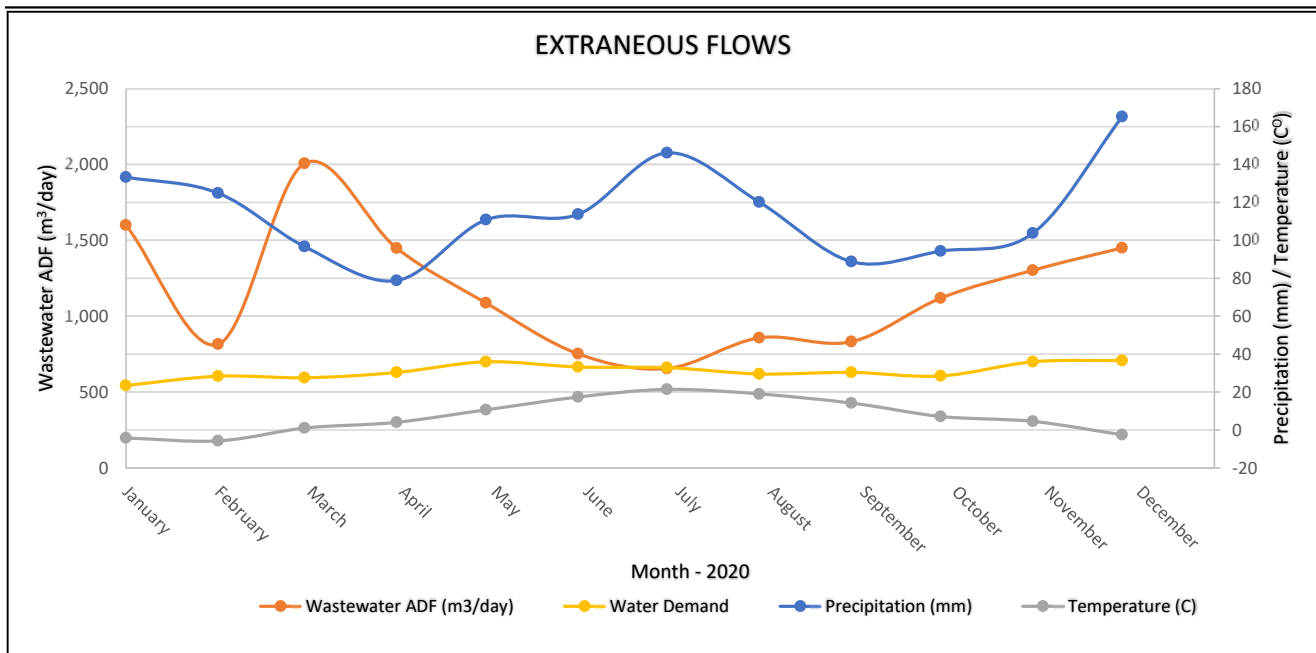
TABLE 3
TOWNSHIP OF SOUTHGATE
2021 RESERVE CAPACITY
SUMMARY OF DUNDALK DEVELOPMENTS

COMMITTED DEVELOPMENTS	TOTAL UNITS	UNITS OCCUPIED IN 2020	REMAINING UNITS AT END OF 2020
White Rose (Phase 1 & 2)	66	52	14
Flato East (Phase 2B)	38	38	0
Flato North (Phase 2A)	72	72	0
Flato North (Phase 3)	46	8	38
Flato North (Phase 4)	22	0	22
Flato North (Phase 5)	59	0	59
Flato North (Phase 6)	68	0	68
Flato Glenelg (Phase 1)	183	0	183
Flato West Block 75 (Phase 2) Apartment Building ¹	56	0	56
Flato East (7, 8 & 10)	188	0	188
SUB-TOTAL		170	628
INFILL LOTS ²	3		3
TOTAL COMMITTED UNITS			631
UNCOMMITTED DEVELOPMENT (DRAFT PLAN APPROVED)	TOTAL UNITS		
White Rose (Phase 3)	101		
Flato East (Phase 9)	47		
Flato East (11, 12 & 13)	227		
SUB-TOTAL	375		
¹ Apartment units based on assumption that each unit is 0.7 ERU.			
² 3 Infill Lots allocated annually.			



TABLE 4
TOWNSHIP OF SOUTHGATE
2021 RESERVE CAPACITY
DUNDALK EXTRANEEOUS FLOWS

MONTH	PRECIPITATION (mm)	AMBIENT TEMP. (C°)	WASTEWATER ADF (m ³ /day)	WATER ADD (m ³ /day)	EXTRANEEOUS FLOW (m ³ /day) ¹
January-2020	133.4	-4.15	1,600	544	1,056
February-2020	125	-5.68	816	605	211
March-2020	96.8	1.02	2,008	595	1,413
April-2020	78.8	4.06	1,449	629	820
May-2020	110.9	10.66	1,087	700	387
June-2020	113.8	17.40	752	665	87
July-2020	146.2	21.38	656	661	0
August-2020	120.2	19.00	857	620	237
September-2020	88.8	14.26	832	630	202
October-2020	94.4	7.16	1,120	606	514
November-2020	103.8	4.54	1,304	700	604
December-2020	165.2	-2.48	1,450	708	742
AVERAGE			1,161	639	523
REASONABLE EXTRANEEOUS FLOW BASED ON POPULATION(m³/day)¹					166
EXTRANEEOUS FLOW OVER AND ABOVE REASONABLE AMOUNT(m³/day)					356
EQUIVALENT RESIDENTIAL UNITS USED BY EXTRANEEOUS FLOWS (ERU)²					383
¹ This is the Wastewater ADF minus the Water ADD, used to determine Sanitary Flow over and above expected.					
² Expected infiltration is 60 Litres per person per day based on modified historic MOE Standard.					
³ Based on New Development Equivalent Residential Unit Sanitary Flow Rate					





Project: Glenelg Phase 2
Project No.: 1060-5545
Date: 15-Dec-21
By: JL'A
Check: BR

Dundalk Sanitary Capacity Evaluation

DESCRIPTION	DECEMBER 2021	POST WWTP UPGRADES	UNITS
Available Capacity	1,832	3,025	m3/day
Average Day Flow	1,127	1,127	m3/day
Reserve Capacity	705	1,898	m3/day
Serviced Households	1,067	1,067	ERUs
Persons Per Existing Residential Unit (2016 Census Data)	2.6	2.6	Persons
Maximum Day Per Capita Flow	0.331	0.331	m3/day
Persons Per New Equivalent Residential Unit (2017 DC Background Study)	2.66	2.66	Persons
Average New Development Per Capita Flow	0.35	0.35	m3/day
Equivalent Flow Per Residential Unit	0.931	0.931	m3/day
Additional ERUs that can be serviced	<u>758</u>	<u>2039</u>	ERUs

TOTAL EQUIVALENT RESIDENTIAL UNIT (ERU) SUMMARY OF OCCUPIED, COMMITTED AND UNCOMMITTED UNITS

DEVELOPMENT	OCCUPIED UNITS 2020	COMMITTED UNITS	UNCOMMITTED UNITS
White Rose (Phase 1 & 2)	52	14	0
Flato East (Phase 2B)	38	0	0
Flato North (Phase 2A)	72	0	0
Flato North (Phase 3)	8	38	0
Flato North (Phase 4)	0	22	0
Flato North (Phase 5)	0	59	0
Flato North (Phase 6)	0	68	0
Glenelg (Phase 1)	0	183	0
Flato West Block 75	0	56	0
Flato East (Phase 7, 8 & 10)	0	188	0
Infill Lots	0	3	0
TOTAL COMMITTED UNITS 2020		<u>631</u>	0
White Rose (Phase 3)	0	0	101
Flato East (Phase 9)	0	0	47
Flato East (Phase 11)	0	0	193
Glenelg (Phase 2)	0	0	155
Dundalk Commercial	0	0	24
TOTAL UNCOMMITTED UNITS			<u>520</u>
<u>Total Number of Available ERUs Upon Completion of WWTP Upgrades</u>			2039
<u>Total Projected ERUs of Reserve Capacity Available Upon Occupation of Committed Units</u>			1408
<u>Projected ERUs of Reserve Capacity Available Upon Occupation of The Above Uncommitted Units</u>			888



File: 1060-5545

Date: 2021.12.16

By: JL'A

Check By: NO

Glenelg Residential Development - Phase 2: Sanitary Design Criteria

Developed Site Area	8.58	ha
Number of Residential Units		
Single Residential	93	units
Townhouse	62	units
	TOTAL:	155 units
Person Per Unit	2.66	persons/unit
Residential Population	412	persons

Unit Sewage flows

Residential (Per New Development Unit Flow Rates, Triton Engineering (2019	350	L/C-day
Infiltration (typical)	0.15	L/s/ha

Total Design Sewage Flows

Infiltration/Inflow Residential	1.29	L/sec
Average Daily Residential Flow	1.67	L/sec
Residential Peak Factor (Harmon Formula)	4.0	
Total Peak Daily Flow	7.99	L/sec

APPENDIX C

Water Demand & WTP Capacity Calculations



File: 1060-5545
Date: 2021.12.16
By: JL'A
Check By: NO

Glenelg Residential Development - Phase 2 - Domestic Water Design Criteria

Developed Site Area	8.58 ha
Number of Residential Units- Single Detached	93 units
Number of Residential Units- Townhouse	62 units
Total Number of Units	155 units
Persons Per Unit	2.66 persons/unit
Residential Population	412 persons

Domestic Water Design Flows

Residential [Per New Development Unit Flow Rates, Triton Engineering (2021)]	331 L/C-day
--	-------------

Total Domestic Water Design Flows

Average Residential Daily Flow	1.58 L/sec
Max Day Peak Factor	2.75
Max Day Demand Flow	4.34 L/sec
Peak Hour Factor	4.13
Peak Hour Flow	6.52 L/sec

TABLE 1
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2021 RESERVE CAPACITY
DUNDALK WATER SYSTEM

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6 Population Served (4) x (5)	2,774
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8 Additional Population that can be Served (3) ÷ (7)	5,739
9 Person Per New Equivalent Residential Unit (2017 DC Background Study)	2.66
10 Additional ERUs that can be served. (8) ÷ (9)	2,157
11 Committed Development ERUs (Table 3)	631
12 Uncommitted Reserve Capacity (ERUs) (10) - (11)	1,526
¹ Available Capacity is based on lesser of Firm Capacity or Permit to Take Water. Firm capacity is 2,817m ³ /day, PTTW is 2,817m ³ /d, Well Production is 4,778m ³ /day.	
² Max day flow is the average of the maximum day flows from 2018, 2019 and 2020 (742, 913 and 905m ³ /d respectively). Maximum day flows have been adjusted based on extenuating circumstances.	
³ Serviced households as reported in the 2020 Annual Water Report.	

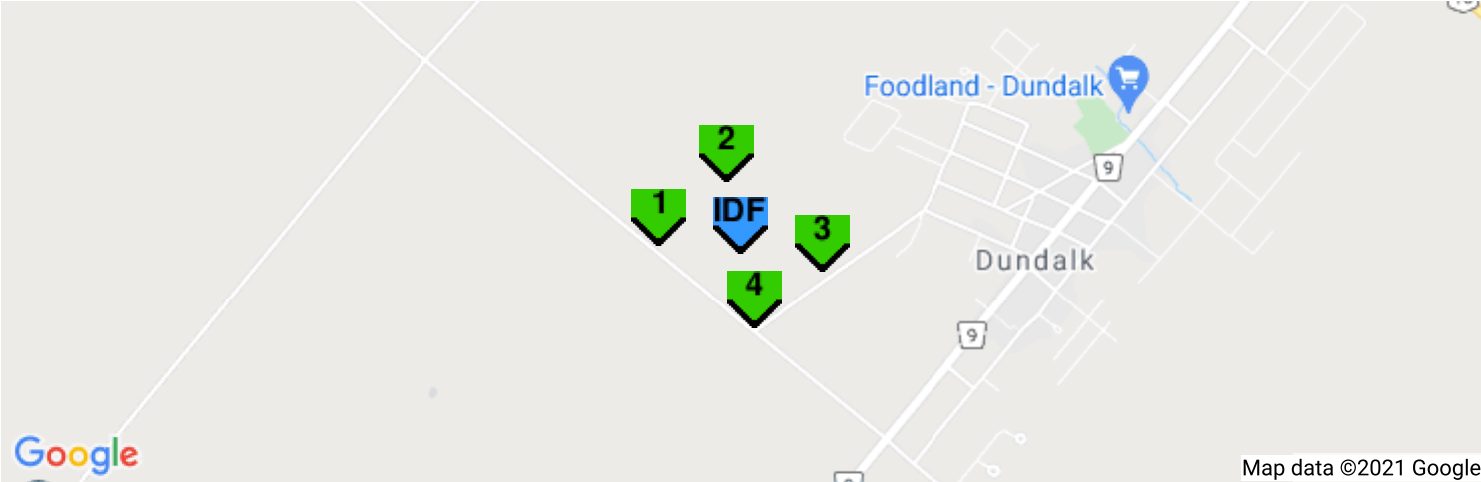
APPENDIX D

Hydrologic Parameter Sheets

Active coordinate

44° 10' 15" N, 80° 24' 15" W (44.170833,-80.404167)

Retrieved: Thu, 16 Dec 2021 20:36:54 GMT



Location summary

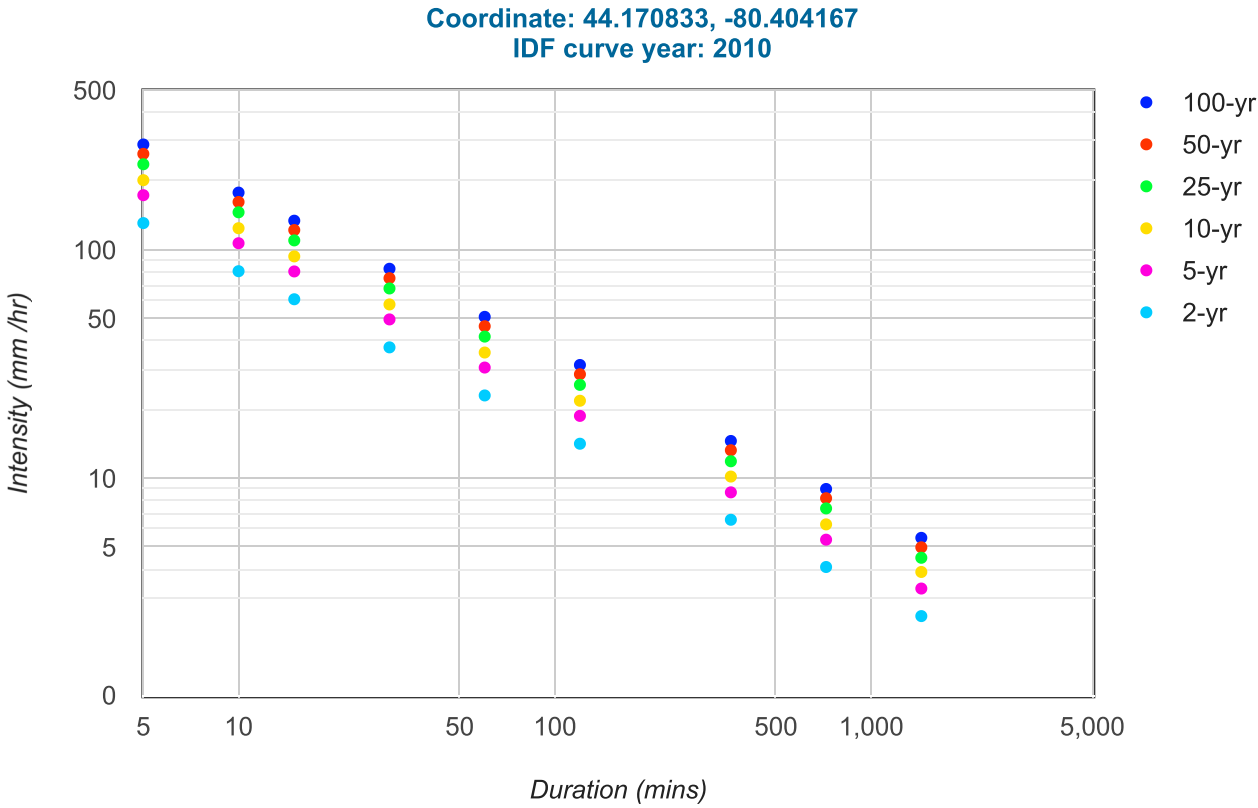
These are the locations in the selection.

IDF Curve: 44° 10' 15" N, 80° 24' 15" W (44.170833,-80.404167)

Location	Coordinates
1	44.168079,-80.409744
2	44.170079,-80.406826
3	44.167278,-80.402642
4	44.165585,-80.40556

Results

An IDF curve was found.



Coefficient summary**IDF Curve:** 44° 10' 15" N, 80° 24' 15" W (44.170833,-80.404167)

Retrieved: Thu, 16 Dec 2021 20:36:54 GMT

Data year: 2010**IDF curve year:** 2010

Return period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
A	23.1	30.6	35.6	41.8	46.4	51.0
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

Statistics**Rainfall intensity (mm hr⁻¹)**

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	131.2	80.8	60.9	37.5	23.1	14.2	6.6	4.1	2.5
5-yr	173.8	107.1	80.6	49.7	30.6	18.8	8.7	5.4	3.3
10-yr	202.2	124.6	93.8	57.8	35.6	21.9	10.2	6.3	3.9
25-yr	237.4	146.3	110.2	67.9	41.8	25.7	11.9	7.4	4.5
50-yr	263.6	162.3	122.3	75.3	46.4	28.6	13.3	8.2	5.0
100-yr	289.7	178.4	134.4	82.8	51.0	31.4	14.6	9.0	5.5

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	10.9	13.5	15.2	18.8	23.1	28.5	39.6	48.8	60.1
5-yr	14.5	17.8	20.2	24.8	30.6	37.7	52.5	64.6	79.6
10-yr	16.9	20.8	23.5	28.9	35.6	43.9	61.0	75.2	92.7
25-yr	19.8	24.4	27.5	33.9	41.8	51.5	71.7	88.3	108.8
50-yr	22.0	27.1	30.6	37.7	46.4	57.2	79.6	98.0	120.8
100-yr	24.1	29.7	33.6	41.4	51.0	62.8	87.5	107.7	132.7

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Last Modified: September 2016



Project Name: GlenElg Phase 2
 Project Number: 1060-5545
 Date: 2020.09.25
 By: HB

D.A. NAME 101
 D.A. AREA (ha) 9.36

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 101

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Parkhill Loam	Pal	BC	100.0%	9.4
				0
				0
				0
Total Area				9.36

Impervious Landuses Present:

Soils	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
Pal	0	98	0	98	0	98	0.000	98	0	98	0.00	0.00
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area											0	0

Pervious Landuses Present:

Soils	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
Pal	0.00	67	0.00	71	0.00	50	0.00	74	9.4	78	9.36	730.08
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area											9.4	

Composite Area Calculations		Total Pervious Area	9.36
		Total Impervious Area	0.0
		% Impervious	0.0%
		Composite Curve Number	78.0
Total Area Check			9.36

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number							
Landuse	IA (mm)	Area (ha)	A * IA	Parkhill Loam		0		0		0	
				RC	Area	RC	Area	RC	Area	RC	Area
Woodland	10	0.00	0	0.25	0		0		0		0
Meadow	8	0	0	0.28	0		0		0		0
Wetland	16	0	0	0.05	0		0		0		0
Lawn	5	0	0	0.13	0		0		0		0.000
Cultivated	7	9	65.52	0.35	9		0		0		3.276
Impervious	2	0	0	0.70	0		0		0		0.000
Composite IA		9.36	7	Composite Runoff Coefficient							0.350

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	V/S ^{0.5}	Velocity (m/s)	Tc (hr)	Tp (hr)	TOTAL Tp (hr)	Tc (hr)	Tp (hr)	Tc (hr)	Tp (hr)
Pasture/ Meadow	250	3.5	1.40%	2.7	0.32	0.22	0.15	0.15	0.18	0.12	0.58	0.39

Appropriate calculated time to 0.39 Appropriate Method: Airport



Project Name: GlenElg Phase 2
 Project Number: 1060-5545
 Date: 2020.09.25
 By: JK

D.A. NAME 201
D.A. AREA (ha) 5.87

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 201
Controlled Area to SWMF

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Parkhill Loam	Pal	B/C	100	5.87
				0
				0
Total Area Check				5.87

Impervious Landuses Present:												Subtotals	
Soils	Roadway		Sidewalk		Driveway		Building		SWMF			Area	A*CN
Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN		
Pal	1.72	98	0.13	98	0.31	98	1.25	98		50		3.405	333.6802
		98		98		98		98		50		0	0
		98		98		98		98		98		0	0
		98		98		98		98		98		0	0
Subtotal Area	1.72		0.13		0.31		1.25		0				

Pervious Landuses Present:												Subtotals	
Soils	Woodland		Meadow		Wetland		Lawn		Cultivated			Area	A*CN
Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN		
Pal	0	67	0	71	0	50	2.47	74	0	78		2.465	182.4174
	0		0		0		0		0			0	0
	0		0		0		0		0			0	0
	0		0		0		0		0			0	0
Subtotal Area	0		0		0		2.47		0				

	Pervious Area Calculations	Total Pervious Area	2.47
		Composite Pervious Curve Number	74
	Impervious Area Calculations	Total Directly Connected Area	2.2
		Total Indirectly Connected Area	1.25
		Total Impervious Area	3.40
		% X imp	37
		% T imp	58
Total Area Check		5.87	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	2.47	12.33
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	0.5	198	0.013



Project Name: GlenElg Phase 2
Project Number: 1060-5545
Date: 2020.09.25
By: HB

D.A. NAME
D.A. AREA (ha) 1.22

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment SWMF

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Parkhill Loam	Pal	B/C	100	1.22
				0
				0
Total Area Check				1.22

Impervious Landuses Present:

Soils	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Pal		98	0	98	0	98	0.000	98	0.61	50	0.6100	30.50
	0	98		98		98		98		50	0	0
	0	98		98		98		98		98	0	0
	0	98		98		98		98		98	0	0
Subtotal Area	0		0		0		0.000		0.61			

Pervious Landuses Present:

Soils	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Pal	0	67	0	71	0	50	0.610	74	0	78	0.610	45.14
	0		0		0		0		0		0	0
	0		0		0		0		0		0	0
	0		0		0		0		0		0	0
Subtotal Area	0		0		0		0.610		0			

	Pervious Area Calculations		Total Pervious Area	0.610
			Composite Pervious Curve Number	74
			Total Directly Connected Area	0.61
			Total Indirectly Connected Area	0.000
			Total Impervious Area	0.610
		Impervious Area Calculations	% X imp	50.0
			% T imp	50.0
			Total Area Check	1.22

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.610	3.050
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	0.5	90	0.013



Project Name: GlenElg Phase 2
Project Number: 1060-5545
Date: 2021-12-15
By: JK

D.A. NAME UNCTRL
D.A. AREA (ha) 1.42

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment UNCTRL
Uncontrolled Area to Wetland

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Parkhill Loam	Pal	B/C	100	1.42
				0
				0
Total Area Check				1.42

Impervious Landuses Present:												
Soils	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Pal	0.00	98	0.00	98	0.14	98	0.52	98		50	0.66	64.26
		98		98		98		98		50	0	0
		98		98		98		98		98	0	0
		98		98		98		98		98	0	0
Subtotal Area	0.00		0.00		0.14		0.52		0			

Pervious Landuses Present:													
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals		
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN	
Pal	0	67	0	71	0	50	0.76	74	0	78	0.76	56.56	
	0		0		0		0		0		0	0	
	0		0		0		0		0		0	0	
	0		0		0		0		0		0	0	
Subtotal Area	0		0		0		0.76		0				

	Pervious Area Calculations	Total Pervious Area	0.76
		Composite Pervious Curve Number	74
	Impervious Area Calculations	Total Directly Connected Area	0.1
		Total Indirectly Connected Area	0.52
		Total Impervious Area	0.66
		% X imp	10
		% T imp	46
Total Area Check			1.42

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.76	3.82
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	0.5	97	0.013

APPENDIX E

SWMHYMO Model Input & Output Files

Glenelg Phase 2 Pre-Development Model

Project Number: 1060-5545
Project Name: Glenelg Phase 2
Date: 2021/12/08

Catchment 101

CALIB NASHYD
“101”
ID = 1

Legend

CATCHMENT

ROUTE
CHANNEL

SWMHYMO
COMMAND

```
00001-2 Metric units
00002-#-----
00003-# Project Name: [GlenElg] Project Number: [1060-4171]
00004-# Date : 2021.12.15
00005-# Modified
00006-# Modeller : [J Werschbaum]
00007-# Company : C.F. Crozier & Associates Inc.
00008-# License # : 3737016
00009-#-----
00010-START TIER0=[0.0], METOUT=[2], NSTORM=[0], NRHM=[0]
00011-# [ ] <-storm filename, one per line for NSTORM time
00012-#-----
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Page 0

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00542# 3:30 .927 7:30 1.854 11:30 10.197 15:30 2.317 19:30 1.391 23:30 .927
00543# 3:36 .927 7:36 1.854 11:36 10.197 15:36 2.317 19:36 1.391 23:36 .927
00544# 3:42 .927 7:42 1.854 11:42 24.565 15:42 2.317 19:42 1.854 23:42 1.391
00545# 3:48 .927 7:48 1.854 11:48 24.565 15:48 2.317 19:48 1.854 23:48 1.391
00546# 3:54 .927 7:54 1.854 11:54 50.985 15:54 2.317 19:54 1.391 23:54 1.854
00547# 4:00 .927 8:00 1.854 12:00 50.985 16:00 2.317 20:00 1.391 24:00 1.854
00548#
00549# R0001C00015-----
00550#
00551# CALIN NASHYD Area (ha)= 9.360 Curve Number (CN)= 78.00
00552# 01: 101 DT= 1.00 Ia (mm)= 7.000 # of Linear Rse. (N)= 3.00
00553# U.H. T(hrs)= .390
00554#
00555# Unit Hyd Qpeak (cms)= .917
00556#
00557# PEAK FLOW (cms)= .707 (i)
00558# TIME TO PEAK (hrs)= 12.500
00559# DURATION (hrs)= 26.650 (dddd(hh:mm))= 1|02:39
00560# AVERAGE FLOW (cms)= .056
00561# RUNOFF VOLUME (mm)= 46.679
00562# TOTAL RAINFALL (mm)= 92.700
00563# RUNOFF COEFFICIENT = .504
00564#
00565# (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00566#
00567#
00568# R0001C00016-----
00569#
00570# 2222 5555 Y Y RRRR CCCC H H I III
00571# 2 5 Y Y R R C H H H H H
00572# 2 5 Y Y R R C H H H H H
00573# 2 5 Y Y R R C H H H H H
00574# 2 5 Y Y R R C H H H H H
00575# 2222 5555 Y Y RRRR CCCC H H I III
00576#
00577#
00578# -----CH25r 24-hr storm-----
00579#
00580#
00581# CHICAGO STORM IDF curve parameters: A= 660.602
00582# Pctol= 59.15 mm B= 1.500
00583# used in: INTENSITY = A / (t + B)^C
00584#
00585# Duration of storm = 3.00 hrs
00586# Storm time step = 5.00 min
00587# Time to peak ratio =
00588#
00589# The CORRELATION coefficient is = .9996833
00590#
00591#
00592# TIME ENTERED COMPUTED
00593# hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr
00594# 5 237.40 22.12
00595# 10 146.20 14.13
00596# 15 110.20 12.44
00597# 30 67.90 70.31
00598# 60 41.80 43.26
00599# 120 25.70 26.39
00600# 180 19.80 21.55
00601# 240 7.40 7.28
00602# 1440 4.50 4.34
00603#
00604# TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN
00605# hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr
00606# 0:05 5.916 0:35 10.869 1:05 63.818 1:35 13.797 2:05 8.676 2:35 6.549
00607# 0:10 6.359 0:40 12.999 1:10 36.779 1:40 10.476 2:10 8.211 2:40 6.306
00608# 0:15 6.889 0:45 14.649 1:15 26.434 1:45 11.419 2:15 7.802 2:45 6.008
00609# 0:20 7.538 0:50 23.559 1:20 21.147 1:50 12.552 2:20 7.437 2:50 5.878
00610# 0:25 8.044 0:55 49.800 1:25 17.818 1:55 9.826 2:25 6.111 2:55 5.464
00611# 0:30 9.416 1:00 221.120 1:30 15.507 2:00 9.209 2:30 6.816 3:00 5.513
00612#
00613#
00614# R0001C00017-----
00615#
00616# CALIN NASHYD Area (ha)= 9.360 Curve Number (CN)= 78.00
00617# 01: 101 DT= 1.00 Ia (mm)= 7.000 # of Linear Rse. (N)= 3.00
00618# U.H. T(hrs)= .390
00619#
00620# Unit Hyd Qpeak (cms)= .917
00621#
00622# PEAK FLOW (cms)= .425 (i)
00623# TIME TO PEAK (hrs)= 1.517
00624# DURATION (hrs)= 5.650 (dddd(hh:mm))= 0|05:39
00625# AVERAGE FLOW (cms)= .101
00626# RUNOFF VOLUME (mm)= 21.967
00627# TOTAL RAINFALL (mm)= 59.14
00628# RUNOFF COEFFICIENT = .71
00629#
00630# (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00631#
00632#
00633# R0001C00018-----
00634#
00635# 2222 5555 Y Y RRRR SSSS CCCC SSSS
00636# 2 5 Y Y R R S S C S S
00637# 2222 5555 Y Y RRRR SSSS C S S
00638# 2 5 Y Y R R S S C S S
00639# 2222 5555 Y Y RRRR SSSS CCCC SSSS
00640#
00641# -----SCS 25yr 24-hr storm-----
00642#
00643#
00644#
00645# MASS STORM Filename: D:\10060\1606-Peotat\5545-Glenn Ph. 2\Design\Civil_Rater\VER8
00646# Pctol=108.80 mm Comments: 24 hour SCS II storm mass curve
00647#
00648# Duration of storm = 24.00 hrs
00649# Mass curve time step = 12.00 min
00650# Selected storm time step = 6.00 min
00651# Volume of derived storm = 108.80 mm
00652#
00653# TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN
00654# hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr
00655# 0:04 1.088 0:06 2.176 8:06 3.264 12:06 122.400 16:06 2.720 20:06 2.176
00656# 0:12 .000 4:12 1.088 8:12 2.176 12:12 122.400 16:12 2.720 20:12 2.176
00657# 0:18 1.088 4:18 2.176 8:18 3.264 12:18 121.760 16:18 2.720 20:18 1.632
00658# 0:24 1.088 4:24 2.176 8:24 3.264 12:24 121.760 16:24 2.720 20:24 1.632
00659# 0:30 1.088 4:30 2.176 8:30 3.264 12:30 13.600 16:30 2.720 20:30 1.632
00660# 0:36 1.088 4:36 2.176 8:36 3.264 12:36 13.600 16:36 2.720 20:36 1.632
00661# 0:42 1.088 4:42 2.176 8:42 3.264 12:42 9.792 16:42 2.720 20:42 1.088
00662# 0:48 1.088 4:48 2.176 8:48 3.264 12:48 9.792 16:48 2.720 20:48 1.088
00663# 0:54 1.088 4:54 2.176 8:54 3.264 12:54 9.792 16:54 2.720 20:54 1.632
00664# 1:00 1.088 5:00 2.176 9:00 3.264 13:00 9.792 17:00 2.720 21:00 1.632
00665# 1:06 1.088 5:06 2.176 9:06 3.264 13:06 6.528 17:06 1.632 21:06 1.632
00666# 1:12 1.088 5:12 2.176 9:12 3.264 13:12 6.528 17:12 1.632 21:12 1.632
00667# 1:18 1.088 5:18 2.176 9:18 3.264 13:18 5.440 17:18 1.632 21:18 1.088
00668# 1:24 1.088 5:24 2.176 9:24 3.264 13:24 5.440 17:24 1.632 21:24 1.088
00669# 1:30 1.088 5:30 2.176 9:30 3.264 13:30 5.440 17:30 2.176 21:30 1.632
00670# 1:36 1.088 5:36 2.176 9:36 3.264 13:36 5.440 17:36 2.176 21:36 1.632
00671# 1:42 1.088 5:42 2.176 9:42 3.264 13:42 5.440
```

```
007211 * 5 0 0 Y R R C H H I
007222 * 5555 000 Y R R CCCC H H H I
007233 * -----
007244 * -----
007255 * -----
007266 * -----
007277 * -----
007288 * CHICAGO STORM IDF curve parameters: A= 957.619
007299 * Ptotal= 65.81 mm B= 1.500
007300 * C= 724
007311 * used in: INTENSITY= A / (t + B)^C
007322 * -----
007333 * Duration of storm = 3.00 hrs
007344 * Storm time step = 5.00 min
007355 * Time to peak ratio = .33
007366 * -----
007377 * The CORRELATION coefficient is = .9996866
007388 * -----
007399 * TIME ENTERED COMPUTED
007400 * (min) (mm/hr) (mm/hr)
007411 * 5. 264.10 264.05
007422 * 10. 162.60 162.60
007433 * 15. 122.50 122.11
007444 * 20. 75.50 78.24
007455 * 30. 46.50 48.14
007466 * 120. 28.60 29.36
007477 * 360. 13.30 13.30
007488 * 720. 8.20 8.06
007499 * 1440. 5.00 4.87
007500 * -----
007511 * TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN
007522 * hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr
007533 * 0:05 6.583 0:35 12.094 1:05 71.013 1:35 15.353 2:05 9.654 2:35 7.087
007544 * 0:10 7.075 0:40 14.464 1:10 40.480 1:40 13.882 2:10 9.137 2:40 7.027
007555 * 0:15 7.165 0:45 18.118 1:15 29.414 1:45 12.706 2:15 8.681 2:45 6.769
007566 * 0:20 8.387 0:50 26.214 1:20 23.331 1:50 11.742 2:20 8.276 2:50 6.541
007577 * 0:25 9.297 0:55 35.414 1:25 19.827 1:55 10.934 2:25 7.912 2:55 6.300
007588 * 0:30 10.478 1:00 246.047 1:30 17.255 2:00 10.247 2:30 7.585 3:00 6.134
007599 * -----
007600 * -----
007611 * R0001:C00021-----
007622 * -----
007633 * CALIB NASHYD Area (ha)= 9.360 Curve Number (CN)= 78.00
007644 * 01: 101 DT= 1.00 Ia (mm)= 7.000 # of Linear Res.(N)= 3.00
007655 * U.N. Tp(hrs)= .390
007666 * -----
007677 * Unit Hyd Opeak (cms)= .917
007688 * -----
007699 * PEAK FLOW (cms)= .521 (i)
007700 * TIME TO PEAK (hrs)= 1.200
007711 * DURATION (hrs)= 5.655, dddd(hh:mm)= 0|05:39
007722 * AVERAGE FLOW (cms)= .139
007733 * RUNOFF VOLUME (mm)= 26.516
007744 * TOTAL RAINFALL (mm)= 65.815
007755 * RUNOFF COEFFICIENT = .454
007766 * -----
007777 * (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
007788 * -----
007799 * -----
007800 * R0001:C00022-----
007811 * -----
007822 * 5555 000 Y Y RRRR SSSS CCCC SSSS
007833 * 5 0 0 Y Y R R R S S C S SSS
007844 * 5555 0 0 Y Y RRRR SSSS C S SSS
007855 * 5 Y R R R S S C S S
007866 * 5555 000 Y R R SSSS CCCC SSSS
007877 * -----
007888 * -----
007899 * -----
007900 * -----
007911 * -----
007922 * -----
007933 * -----
007944 * -----
007955 * -----
007966 * -----
007977 * -----
007988 * -----
007999 * -----
008000 * -----
008011 * TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN
008022 * hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr
008033 * 0:12 .000 4:12 1.210 8:12 2.420 12:12 136.125 16:12 3.025 20:12 2.420
008044 * 0:18 .000 4:18 2.420 8:18 3.630 12:18 24.200 16:18 3.025 20:18 1.815
008055 * 0:24 .000 4:24 3.630 8:24 4.840 12:24 24.200 16:24 3.025 20:24 1.815
008066 * 0:30 .000 4:30 4.840 8:30 6.050 12:30 15.150 16:30 3.025 20:30 1.815
008077 * 0:36 .000 4:36 6.050 8:36 7.260 12:36 15.150 16:36 3.025 20:36 1.815
008088 * 0:42 .000 4:42 7.260 8:42 8.470 12:42 10.890 16:42 3.025 20:42 1.210
008099 * 0:48 .000 4:48 8.470 8:48 9.680 12:48 10.890 16:48 3.025 20:48 1.210
008100 * 0:54 .000 4:54 9.680 8:54 10.890 12:54 10.890 16:54 3.025 20:54 1.815
008111 * 1:00 .000 5:00 10.890 9:00 12.100 13:00 10.890 17:00 3.025 21:00 1.815
008122 * 1:06 .000 5:06 12.100 9:06 13.310 13:06 10.890 17:06 3.025 21:06 1.815
008133 * 1:12 .000 5:12 13.310 9:12 14.520 13:12 9.650 17:12 1.815 21:12 1.815
008144 * 1:18 .000 5:18 14.520 9:18 15.730 13:18 9.650 17:18 1.815 21:18 1.210
008155 * 1:24 .000 5:24 15.730 9:24 16.940 13:24 9.650 17:24 1.815 21:24 1.210
008166 * 1:30 .000 5:30 16.940 9:30 18.150 13:30 6.050 17:30 2.420 21:30 1.815
008177 * 1:36 .000 5:36 18.150 9:36 19.360 13:36 6.050 17:36 3.025 21:36 1.815
008188 * 1:42 .000 5:42 19.360 9:42 20.570 13:42 6.050 17:42 3.025 21:42 1.210
008199 * 1:48 .000 5:48 20.570 9:48 21.780 13:48 6.050 17:48 3.025 21:48 1.210
008200 * 1:54 .000 5:54 21.780 9:54 22.990 13:54 6.050 17:54 3.025 21:54 1.815
008211 * 2:00 .000 6:00 22.990 10:00 24.200 14:00 6.050 18:00 2.420 22:00 1.815
008222 * 2:06 .000 6:06 24.200 10:06 25.410 14:06 6.050 18:06 3.025 22:06 1.210
008233 * 2:12 .000 6:12 25.410 10:12 26.620 14:12 6.050 18:12 3.025 22:12 1.210
008244 * 2:18 .000 6:18 26.620 10:18 27.830 14:18 6.050 18:18 3.025 22:18 1.210
008255 * 2:24 .000 6:24 27.830 10:24 29.040 14:24 6.050 18:24 3.025 22:24 1.210
008266 * 2:30 .000 6:30 29.040 10:30 30.250 14:30 3.630 18:30 1.815 22:30 1.815
008277 * 2:36 .000 6:36 30.250 10:36 31.460 14:36 3.630 18:36 1.815 22:36 1.815
008288 * 2:42 .000 6:42 31.460 10:42 32.670 14:42 3.630 18:42 2.420 22:42 1.210
008299 * 2:48 .000 6:48 32.670 10:48 33.880 14:48 3.630 18:48 2.420 22:48 1.210
008300 * 2:54 .000 6:54 33.880 10:54 35.090 14:54 3.630 18:54 3.025 22:54 1.815
008311 * 3:00 .000 7:00 35.090 11:00 36.300 15:00 3.630 19:00 1.815 23:00 1.815
008322 * 3:06 .000 7:06 36.300 11:06 37.510 15:06 3.630 19:06 1.815 23:06 1.210
008333 * 3:12 .000 7:12 37.510 11:12 38.720 15:12 3.630 19:12 1.815 23:12 1.210
008344 * 3:18 .000 7:18 38.720 11:18 39.930 15:18 3.025 19:18 2.420 23:18 1.210
008355 * 3:24 .000 7:24 39.930 11:24 41.140 15:24 3.025 19:24 2.420 23:24 1.210
008366 * 3:30 .000 7:30 41.140 11:30 42.350 15:30 3.025 19:30 1.815 23:30 1.210
008377 * 3:36 .000 7:36 42.350 11:36 43.560 15:36 3.025 19:36 1.815 23:36 1.210
008388 * 3:42 .000 7:42 43.560 11:42 44.770 15:42 3.025 19:42 2.420 23:42 1.815
008399 * 3:48 .000 7:48 44.770 11:48 45.980 15:48 3.025 19:48 2.420 23:48 1.815
008400 * 3:54 .000 7:54 45.980 11:54 47.190 15:54 3.025 19:54 3.025 23:54 1.210
008411 * 4:00 .000 8:00 47.190 12:00 48.400 16:00 3.025 20:00 1.815 24:00 2.420
008422 * -----
008433 * -----
008444 * -----
008455 * -----
008466 * CALIB NASHYD Area (ha)= 9.360 Curve Number (CN)= 78.00
008477 * 01: 101 DT= 1.00 Ia (mm)= 7.000 # of Linear Res.(N)= 3.00
008488 * U.N. Tp(hrs)= .390
008499 * -----
008500 * Unit Hyd Opeak (cms)= .917
008511 * -----
008522 * PEAK FLOW (cms)= 1.067 (i)
008533 * TIME TO PEAK (hrs)= 12.483
008544 * DURATION (hrs)= 26.655, dddd(hh:mm)= 1|02:39
008555 * AVERAGE FLOW (cms)= .668
008566 * RUNOFF VOLUME (mm)= 70.007
008577 * TOTAL RAINFALL (mm)= 121.001
008588 * RUNOFF COEFFICIENT = .579
008599 * -----
008600 * (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
008611 * -----
008622 * -----
008633 * R0001:C00024-----
008644 * -----
008655 * 11 000 000 Y Y RRRR CCCC H H IIIII
008666 * 1 1 0 0 0 0 Y Y R R C H H I
008677 * 1 0 0 0 0 Y Y RRRR C H H I
008688 * 1 0 0 0 0 Y Y R R CCCC H H IIIII
008699 * 11111 000 000 Y R R CCCC H H IIIII
008700 * -----
008711 * -----
008722 * -----
008733 * -----
008744 * -----
008755 * CHICAGO STORM IDF curve parameters: A=1049.088
008766 * Ptotal= 78.14 mm B= 1.500
008777 * C= 724
008788 * used in: INTENSITY= A / (t + B)^C
008799 * -----
008800 * Duration of storm = 4.00 hrs
008811 * Storm time step = 5.00 min
008822 * Time to peak ratio = .33
008833 * -----
008844 * The CORRELATION coefficient is = .9996834
008855 * -----
008866 * TIME ENTERED COMPUTED
008877 * (min) (mm/hr) (mm/hr)
008888 * 5. 289.70 269.55
008899 * 10. 178.40 178.13
008900 * 15. 134.40 137.06
008911 * 30. 82.80 85.71
008922 * 60. 42.70 45.79
008933 * 120. 31.40 32.17
008944 * 360. 14.60 14.58
008955 * 720. 8.00 8.83
008966 * 1440. 5.50 5.34
008977 * -----
008988 * TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN
008999 * hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr
009000 * 0:05 5.713 0:45 10.183 1:25 77.794 2:05 13.920 2:45 8.468 3:25 5.822
```

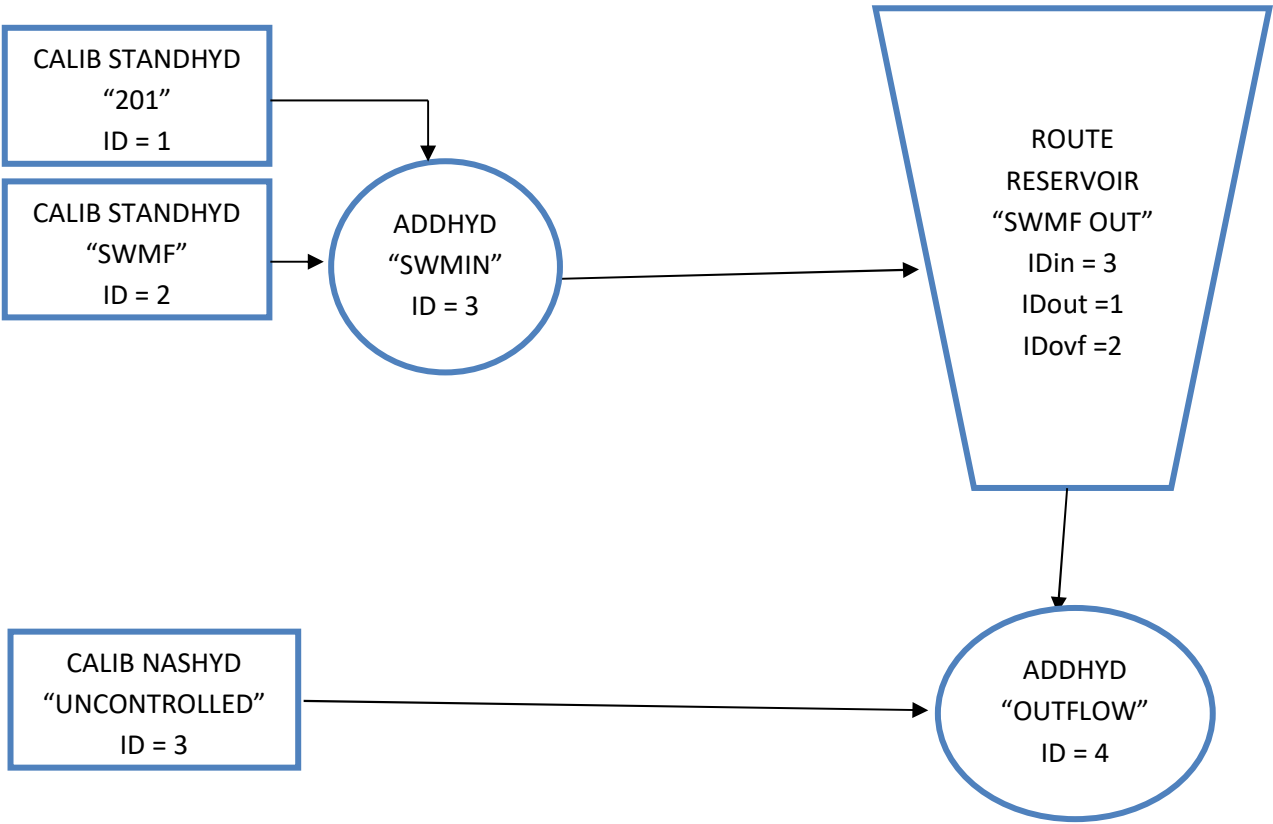

01081> TIME TO PEAK (hrs)= 10.150
01082> DURATION (hrs)= 14.650 (ddd[hh:mm])= 0|14:39
01083> AVERAGE FLOW (cms)= .320
01084> RUNOFF VOLUME (mm)= 180.192
01085> TOTAL RAINFALL (mm)= 212.000
01086> RUNOFF COEFFICIENT = .850
01087>
01088> (1) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01089>
01090>-----
01091> R0001C00032-----
01092>-----
01093> | FINISH |
01094>-----
01095>-----
01096>*****
01097> WARNINGS / ERRORS / NOTES
01098>-----
01099> R0001C00006 MASS STORM
01100> *** WARNING: Using a storm DT which is larger than the mass curve DT may produce a storm with
01101> lower intensities. Check the hyetograph.
01102> Simulation ended on 2021-12-15 at 15:45:04
01103>-----
01104>

Post-Development Full Buildout Model

Project Number: 1060-5545
Project Name: Glenelg Phase 2
Date: 2021/12/08

WEST SITE AREA

SWM Facility Area



Legend

CATCHMENT

ROUTE
CHANNEL

SWMHYMO
COMMAND

```
00001> 2 Metric units
00002> *****
00003> # Project Name: [GlenElg FHZ] Project Number: [1060-0545]
00004> # Date : 2020.09.25
00005> # Modified : 2021.12.08
00006> # Modeler : JK
00007> # Company : C.F. Crozier & Associates Inc.
00008> # License # : 3737016
00009> *****
00010> START TSEB=[0.5], METOUT=[2], NSTORM=[0], NRUN=[0]
00011> [ ] <- storm filename, one per line for NSTORM time
00012> *****
00013> *****
00014> *****
00015> *****
00016> *****
00017> *****
00018> *****
00019> *****
00020> *****
00021> *****
00022> *****
00023> *****
00024> READ STORM STORM_FILENAME=[*25mm.stm*]
00025> *****
00026> *****
00027> *****
00028> *****
00029> *****
00030> *****
00031> CALIB STANDHYD ID=[1], NYHD=[*201*], DT=[1] (min), AREA=[5.87] (ha),
00032> XIMP=[0.37], TIMP=[0.58], DMF=[0] (cms), LOSS=[2],
00033> SCS curve number CN=[74],
00034> Pervious surfaces: IAPer=[5] (mm), SLPF=[2.0] (%),
00035> LGP=[30] (m), MNP=[0.25], SCF=[0] (min),
00036> Impervious surfaces: IAlp=[2] (mm), SLP=[0.5] (%),
00037> LGI=[198] (m), MNI=[0.013], SCI=[0] (min),
00038> RAINFALL=[ , , , ] (mm/hr) , END=1
00039> *****
00040> CALIB STANDHYD ID=[2], NYHD=[*SWMP*], DT=[1] (min), AREA=[1.22] (ha),
00041> XIMP=[0.50], TIMP=[0.50], DMF=[0] (cms), LOSS=[2],
00042> SCS curve number CN=[74],
00043> Pervious surfaces: IAPer=[5] (mm), SLPF=[2.0] (%),
00044> LGP=[30] (m), MNP=[0.25], SCF=[0] (min),
00045> Impervious surfaces: IAlp=[2] (mm), SLP=[0.5] (%),
00046> LGI=[90] (m), MNI=[0.013], SCI=[0] (min),
00047> RAINFALL=[ , , , ] (mm/hr) , END=1
00048> *****
00049> ADD HYD IDsum=[3], NYHD=[*SWMF*], IDs to add=[1+2]
00050> *****
00051> *****
00052> *****
00053> ROUTE RESERVOIR IDout=[1], NYHD=[*SWMFOut*], IDin=[3],
00054> ROR=[1] (min),
00055> *****
00056> *****
00057> *****
00058> *****
00059> *****
00060> *****
00061> *****
00062> *****
00063> *****
00064> *****
00065> *****
00066> *****
00067> *****
00068> *****
00069> *****
00070> *****
00071> *****
00072> CALIB STANDHYD ID=[3], NYHD=[*UNCONTROLLED*], DT=[1] (min), AREA=[1.42] (ha),
00073> XIMP=[0.10], TIMP=[0.46], DMF=[0] (cms), LOSS=[2],
00074> SCS curve number CN=[74],
00075> Pervious surfaces: IAPer=[5] (mm), SLPF=[2.0] (%),
00076> LGP=[30] (m), MNP=[0.25], SCF=[0] (min),
00077> Impervious surfaces: IAlp=[2] (mm), SLP=[0.5] (%),
00078> LGI=[97] (m), MNI=[0.013], SCI=[0] (min),
00079> RAINFALL=[ , , , ] (mm/hr) , END=1
00080> *****
00081> *****
00082> ADD HYD IDsum=[4], NYHD=[*OUTFLOW*], IDs to add=[3 + 1]
00083> *****
00084> *****
00085> *****
00086> *****
00087> *****
00088> *****
00089> *****
00090> *****
00091> *****
00092> *****
00093> *****
00094> *****
00095> *****
00096> *****
00097> *****
00098> *****
00099> *****
00100> *****
00101> *****
00102> *****
00103> *****
00104> *****
00105> *****
00106> *****
00107> *****
00108> *****
00109> *****
00110> *****
00111> *****
00112> *****
00113> *****
00114> *****
00115> *****
00116> *****
00117> CALIB STANDHYD ID=[1], NYHD=[*201*], DT=[1] (min), AREA=[5.87] (ha),
00118> XIMP=[0.37], TIMP=[0.58], DMF=[0] (cms), LOSS=[2],
00119> SCS curve number CN=[74],
00120> Pervious surfaces: IAPer=[5] (mm), SLPF=[2.0] (%),
00121> LGP=[30] (m), MNP=[0.25], SCF=[0] (min),
00122> Impervious surfaces: IAlp=[2] (mm), SLP=[0.5] (%),
00123> LGI=[198] (m), MNI=[0.013], SCI=[0] (min),
00124> RAINFALL=[ , , , ] (mm/hr) , END=1
00125> *****
00126> CALIB STANDHYD ID=[2], NYHD=[*SWMP*], DT=[1] (min), AREA=[1.22] (ha),
00127> XIMP=[0.50], TIMP=[0.50], DMF=[0] (cms), LOSS=[2],
00128> SCS curve number CN=[74],
00129> Pervious surfaces: IAPer=[5] (mm), SLPF=[2.0] (%),
00130> LGP=[30] (m), MNP=[0.25], SCF=[0] (min),
00131> Impervious surfaces: IAlp=[2] (mm), SLP=[0.5] (%),
00132> LGI=[90] (m), MNI=[0.013], SCI=[0] (min),
00133> RAINFALL=[ , , , ] (mm/hr) , END=1
00134> *****
00135> ADD HYD IDsum=[3], NYHD=[*SWMF*], IDs to add=[1+2]
00136> *****
00137> *****
00138> *****
00139> ROUTE RESERVOIR IDout=[1], NYHD=[*SWMFOut*], IDin=[3],
00140> ROR=[1] (min),
00141> *****
00142> *****
00143> *****
00144> *****
00145> *****
00146> *****
00147> *****
00148> *****
00149> *****
00150> *****
00151> *****
00152> *****
00153> *****
00154> *****
00155> *****
00156> *****
00157> *****
00158> *****
00159> CALIB STANDHYD ID=[3], NYHD=[*UNCONTROLLED*], DT=[1] (min), AREA=[1.42] (ha),
00160> XIMP=[0.10], TIMP=[0.46], DMF=[0] (cms), LOSS=[2],
00161> SCS curve number CN=[74],
00162> Pervious surfaces: IAPer=[5] (mm), SLPF=[2.0] (%),
00163> LGP=[30] (m), MNP=[0.25], SCF=[0] (min),
00164> Impervious surfaces: IAlp=[2] (mm), SLP=[0.5] (%),
00165> LGI=[97] (m), MNI=[0.013], SCI=[0] (min),
00166> RAINFALL=[ , , , ] (mm/hr) , END=1
00167> *****
00168> *****
00169> ADD HYD IDsum=[4], NYHD=[*OUTFLOW*], IDs to add=[3 + 1]
00170> *****
00171> *****
00172> *****
00173> *****
00174> *****
00175> *****
00176> *****
00177> *****
00178> *****
00179> *****
00180> *****
00181> MASS STORM FTOTAL=[60.1] (mm), CSDT=[15] (min),
00182> CURVE_FILENAME=[*SCS24011.net*]
00183> *****
00184> *****
00185> *****
00186> *****
00187> *****
00188> *****
00189> CALIB STANDHYD ID=[1], NYHD=[*201*], DT=[1] (min), AREA=[5.87] (ha),
00190> XIMP=[0.37], TIMP=[0.58], DMF=[0] (cms), LOSS=[2],
00191> SCS curve number CN=[74],
00192> Pervious surfaces: IAPer=[5] (mm), SLPF=[2.0] (%),
00193> LGP=[30] (m), MNP=[0.25], SCF=[0] (min),
00194> Impervious surfaces: IAlp=[2] (mm), SLP=[0.5] (%),
00195> LGI=[198] (m), MNI=[0.013], SCI=[0] (min),
00196> RAINFALL=[ , , , ] (mm/hr) , END=1
00197> *****
00198> CALIB STANDHYD ID=[2], NYHD=[*SWMP*], DT=[1] (min), AREA=[1.22] (ha),
00199> XIMP=[0.50], TIMP=[0.50], DMF=[0] (cms), LOSS=[2],
00200> SCS curve number CN=[74],
00201> Pervious surfaces: IAPer=[5] (mm), SLPF=[2.0] (%),
00202> LGP=[30] (m), MNP=[0.25], SCF=[0] (min),
00203> Impervious surfaces: IAlp=[2] (mm), SLP=[0.5] (%),
00204> LGI=[90] (m), MNI=[0.013], SCI=[0] (min),
00205> RAINFALL=[ , , , ] (mm/hr) , END=1
00206> *****
00207> ADD HYD IDsum=[3], NYHD=[*SWMF*], IDs to add=[1+2]
00208> *****
00209> *****
00210> *****
00211> ROUTE RESERVOIR IDout=[1], NYHD=[*SWMFOut*], IDin=[3],
00212> ROR=[1] (min),
00213> *****
00214> *****
00215> *****
00216> *****
00217> *****
00218> *****
00219> *****
00220> *****
00221> *****
00222> *****
00223> *****
00224> *****
00225> *****
00226> *****
00227> *****
00228> *****
00229> *****
00230> *****
00231> CALIB STANDHYD ID=[3], NYHD=[*UNCONTROLLED*], DT=[1] (min), AREA=[1.42] (ha),
00232> XIMP=[0.10], TIMP=[0.46], DMF=[0] (cms), LOSS=[2],
00233> SCS curve number CN=[74],
00234> Pervious surfaces: IAPer=[5] (mm), SLPF=[2.0] (%),
00235> LGP=[30] (m), MNP=[0.25], SCF=[0] (min),
00236> Impervious surfaces: IAlp=[2] (mm), SLP=[0.5] (%),
00237> LGI=[97] (m), MNI=[0.013], SCI=[0] (min),
00238> RAINFALL=[ , , , ] (mm/hr) , END=1
00239> *****
00240> *****
00241> ADD HYD IDsum=[4], NYHD=[*OUTFLOW*], IDs to add=[3 + 1]
00242> *****
00243> *****
00244> *****
00245> *****
00246> *****
00247> *****
00248> *****
00249> *****
00250> *****
00251> *****
00252> *****
00253> *****
00254> *****
00255> *****
00256> CHICAGO STORM UNITS=[2], ID=[3] (hrs), TPAT=[0.333], CSDT=[5] (min),
00257> ICAES=[2],
00258> Enter ordinates of IDF curve below, at least seven points
00259> TIME (min) Intensity (mm/hr)
00260> [5] [117.8]
00261> [10] [107.1]
00262> [15] [100.6]
00263> [30] [84.7]
00264> [60] [70.6]
00265> [120] [58.8]
00266> [1440] [3.3]
00267> *****
00268> *****
00269> *****
00270> *****
00271> *****
00272> *****
00273> *****
00274> *****
00275> *****
00276> *****
00277> CALIB STANDHYD ID=[1], NYHD=[*201*], DT=[1] (min), AREA=[5.87] (ha),
00278> XIMP=[0.37], TIMP=[0.58], DMF=[0] (cms), LOSS=[2],
00279> SCS curve number CN=[74],
00280> Pervious surfaces: IAPer=[5] (mm), SLPF=[2.0] (%),
00281> LGP=[30] (m), MNP=[0.25], SCF=[0] (min),
00282> Impervious surfaces: IAlp=[2] (mm), SLP=[0.5] (%),
00283> LGI=[198] (m), MNI=[0.013], SCI=[0] (min),
00284> RAINFALL=[ , , , ] (mm/hr) , END=1
00285> *****
00286> CALIB STANDHYD ID=[2], NYHD=[*SWMP*], DT=[1] (min), AREA=[1.22] (ha),
00287> XIMP=[0.50], TIMP=[0.50], DMF=[0] (cms), LOSS=[2],
00288> SCS curve number CN=[74],
00289> Pervious surfaces: IAPer=[5] (mm), SLPF=[2.0] (%),
00290> LGP=[30] (m), MNP=[0.25], SCF=[0] (min),
00291> Impervious surfaces: IAlp=[2] (mm), SLP=[0.5] (%),
00292> LGI=[90] (m), MNI=[0.013], SCI=[0] (min),
00293> RAINFALL=[ , , , ] (mm/hr) , END=1
00294> *****
00295> ADD HYD IDsum=[3], NYHD=[*SWMF*], IDs to add=[1+2]
00296> *****
00297> *****
00298> *****
00299> ROUTE RESERVOIR IDout=[1], NYHD=[*SWMFOut*], IDin=[3],
00300> ROR=[1] (min),
00301> *****
00302> *****
00303> *****
00304> *****
00305> *****
00306> *****
00307> *****
00308> *****
00309> *****
00310> *****
00311> *****
00312> *****
00313> *****
00314> *****
00315> *****
00316> *****
00317> *****
00318> *****
00319> CALIB STANDHYD ID=[3], NYHD=[*UNCONTROLLED*], DT=[1] (min), AREA=[1.42] (ha),
00320> XIMP=[0.10], TIMP=[0.46], DMF=[0] (cms), LOSS=[2],
00321> SCS curve number CN=[74],
00322> Pervious surfaces: IAPer=[5] (mm), SLPF=[2.0] (%),
00323> LGP=[30] (m), MNP=[0.25], SCF=[0] (min),
00324> Impervious surfaces: IAlp=[2] (mm), SLP=[0.5] (%),
00325> LGI=[97] (m), MNI=[0.013], SCI=[0] (min),
00326> RAINFALL=[ , , , ] (mm/hr) , END=1
00327> *****
00328> *****
00329> ADD HYD IDsum=[4], NYHD=[*OUTFLOW*], IDs to add=[3 + 1]
00330> *****
00331> *****
00332> *****
00333> *****
00334> *****
00335> *****
00336> *****
00337> *****
00338> *****
00339> *****
00340> *****
00341> MASS STORM FTOTAL=[79.6] (mm), CSDT=[5] (min),
00342> CURVE_FILENAME=[*SCS24011.net*]
00343> *****
00344> *****
00345> *****
00346> *****
00347> *****
00348> *****
00349> *****
00350> CALIB STANDHYD ID=[1], NYHD=[*201*], DT=[1] (min), AREA=[5.87] (ha),
00351> XIMP=[0.37], TIMP=[0.58], DMF=[0] (cms), LOSS=[2],
00352> SCS curve number CN=[74],
00353> Pervious surfaces: IAPer=[5] (mm), SLPF=[2.0] (%),
00354> LGP=[30] (m), MNP=[0.25], SCF=[0] (min),
00355> Impervious surfaces: IAlp=[2] (mm), SLP=[0.5] (%),
00356> LGI=[198] (m), MNI=[0.013], SCI=[0] (min),
00357> RAINFALL=[ , , , ] (mm/hr) , END=1
00358> *****
00359> CALIB STANDHYD ID=[2], NYHD=[*SWMP*], DT=[1] (min), AREA=[1.22] (ha),
00360> XIMP=[0.50], TIMP=[0.50], DMF=[0] (cms), LOSS=[2],
```

```
00361# SCS curve number CN=74,
00362# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00363# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00364# Impervious surfaces: IAlmp=[2](mm), SLPF=[0.5](%),
00365# LGI=[90](m), MHI=[0.013], SCI=[0](min),
00366# RAINFALL=[ , , , ](mm/hr) , END=-1
00367#
00368# ADD HYD IDsum=[3], NHYD=["SMFOUT"], IDs to add=[1+2]
00369#
00370# SWM FACILITY
00371#
00372# ROUTE RESERVOIR IDout=[1], NHYD=["SMFOUT"], IDin=[3],
00373# ROT=[1](min),
00374# TABLE of ( OUTFLOW-STORAGE ) values
00375# (cms) - (ha-m)
00376# [ 0.0 , 0.0 ]
00377# [ 0.014 , 0.4555 ]
00378# [ 0.028 , 0.1606 ]
00379# [ 0.036 , 0.2985 ]
00380# [ 0.043 , 0.4555 ]
00381# [ 0.048 , 0.5899 ]
00382# [ 0.050 , 0.6376 ]
00383# [ 1.286 , 0.7893 ]
00384#
00385# IDovf=[2], NHYDovf=["SMFOWv"]
00386#
00387#
00388# TO WETLAND
00389#
00390#
00391#
00392# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00393# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00394# SCS curve number CN=74,
00395# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00396# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00397# Impervious surfaces: IAlmp=[2](mm), SLPF=[0.5](%),
00398# LGI=[97](m), MHI=[0.013], SCI=[0](min),
00399# RAINFALL=[ , , , ](mm/hr) , END=-1
00400#
00401# ADD HYD IDsum=[4], NHYD=["OUTFLOW"], IDs to add=[3 + 1]
00402#
00403#
00404#
00405#
00406# 11 000 Y Y RRRR CCCC H H IIIII
00407# 1 1 0 0 Y Y R R R C H H H I
00408# 1 0 0 Y Y RRRR C HHHH I
00409# 1 0 0 Y R R C C H H I
00410# 1111 000 Y Y R R CCCC H H IIIII
00411#
00412#
00413# 15-YEAR, 3 HOUR CHICAGO STORM
00414#
00415# CHICAGO STORM UNITS=[2], TD=[3](hrs), TPAT=[0.333], CSDT=[5](min),
00416# ICAUSE=[2],
00417# Enter ordinates of IDF curve below, at least seven points
00418# TIME (min) Intensity(mm/hr)
00419# [5] [202.2]
00420# [10] [124.6]
00421# [15] [93.8]
00422# [30] [57.8]
00423# [60] [35.6]
00424# [120] [21.9]
00425# [180] [16.2]
00426# [720] [7.4]
00427# [1440] [4.5]
00428# -1
00429# -1
00430#
00431# GLENELG STREET POI-
00432#
00433# TO SWMF (CONTROLLED)
00434#
00435#
00436# CALIB STANDHYD ID=[1], NHYD=["201"], DT=[1](min), AREA=[5.87](ha),
00437# XIMP=[0.37], TIMP=[0.58], DMF=[0](cms), LOSS=[2],
00438# SCS curve number CN=74,
00439# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00440# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00441# Impervious surfaces: IAlmp=[2](mm), SLPF=[0.5](%),
00442# LGI=[198](m), MHI=[0.013], SCI=[0](min),
00443# RAINFALL=[ , , , ](mm/hr) , END=-1
00444#
00445# CALIB STANDHYD ID=[2], NHYD=["SMWF"], DT=[1](min), AREA=[1.22](ha),
00446# XIMP=[0.50], TIMP=[0.50], DMF=[0](cms), LOSS=[2],
00447# SCS curve number CN=74,
00448# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00449# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00450# Impervious surfaces: IAlmp=[2](mm), SLPF=[0.5](%),
00451# LGI=[90](m), MHI=[0.013], SCI=[0](min),
00452# RAINFALL=[ , , , ](mm/hr) , END=-1
00453#
00454# ADD HYD IDsum=[3], NHYD=["SMFOUT"], IDs to add=[1+2]
00455#
00456# SWM FACILITY
00457#
00458# ROUTE RESERVOIR IDout=[1], NHYD=["SMFOUT"], IDin=[3],
00459# ROT=[1](min),
00460# TABLE of ( OUTFLOW-STORAGE ) values
00461# (cms) - (ha-m)
00462# [ 0.0 , 0.0 ]
00463# [ 0.014 , 0.4578 ]
00464# [ 0.028 , 0.1606 ]
00465# [ 0.036 , 0.2985 ]
00466# [ 0.043 , 0.4555 ]
00467# [ 0.048 , 0.5899 ]
00468# [ 0.050 , 0.6376 ]
00469# [ 1.286 , 0.7893 ]
00470#
00471# IDovf=[2], NHYDovf=["SMFOWv"]
00472#
00473#
00474# TO WETLAND
00475#
00476#
00477#
00478# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00479# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00480# SCS curve number CN=74,
00481# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00482# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00483# Impervious surfaces: IAlmp=[2](mm), SLPF=[0.5](%),
00484# LGI=[97](m), MHI=[0.013], SCI=[0](min),
00485# RAINFALL=[ , , , ](mm/hr) , END=-1
00486#
00487# ADD HYD IDsum=[4], NHYD=["OUTFLOW"], IDs to add=[3 + 1]
00488#
00489#
00490#
00491#
00492# 11 000 Y Y RRRR SSSS CCCC SSSS
00493# 1 1 0 0 Y Y R R S C S C S S
00494# 1 0 0 Y Y RRRR SSSS C SSSS
00495# 1 0 0 Y R R R SSSS C S S
00496# 1111 000 Y Y R SSSS CCCC SSSS
00497#
00498# 10 YEAR
00499#
00500# MASS STORM FTOTAL=[92.7](mm), CSDT=[5](min),
00501# CURVE_FILE_NAME=["SC24H11.MGT"]
00502#
00503# GLENELG STREET POI-
00504#
00505# TO SWMF (CONTROLLED)
00506#
00507#
00508#
00509#
00510# CALIB STANDHYD ID=[1], NHYD=["201"], DT=[1](min), AREA=[5.87](ha),
00511# XIMP=[0.37], TIMP=[0.58], DMF=[0](cms), LOSS=[2],
00512# SCS curve number CN=74,
00513# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00514# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00515# Impervious surfaces: IAlmp=[2](mm), SLPF=[0.5](%),
00516# LGI=[198](m), MHI=[0.013], SCI=[0](min),
00517# RAINFALL=[ , , , ](mm/hr) , END=-1
00518#
00519# CALIB STANDHYD ID=[2], NHYD=["SMWF"], DT=[1](min), AREA=[1.22](ha),
00520# XIMP=[0.50], TIMP=[0.50], DMF=[0](cms), LOSS=[2],
00521# SCS curve number CN=74,
00522# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00523# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00524# Impervious surfaces: IAlmp=[2](mm), SLPF=[0.5](%),
00525# LGI=[90](m), MHI=[0.013], SCI=[0](min),
00526# RAINFALL=[ , , , ](mm/hr) , END=-1
00527#
00528# ADD HYD IDsum=[3], NHYD=["SMFOUT"], IDs to add=[1+2]
00529#
00530# SWM FACILITY
00531#
00532# ROUTE RESERVOIR IDout=[1], NHYD=["SMFOUT"], IDin=[3],
00533# ROT=[1](min),
00534# TABLE of ( OUTFLOW-STORAGE ) values
00535# (cms) - (ha-m)
00536# [ 0.0 , 0.0 ]
00537# [ 0.014 , 0.4578 ]
00538# [ 0.028 , 0.1606 ]
00539# [ 0.036 , 0.2985 ]
00540# [ 0.043 , 0.4555 ]
00541# [ 0.048 , 0.5899 ]
00542# [ 0.050 , 0.6376 ]
00543# [ 1.286 , 0.7893 ]
00544#
00545# IDovf=[2], NHYDovf=["SMFOWv"]
00546#
00547#
00548# TO WETLAND
00549#
00550#
00551#
00552# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00553# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00554# SCS curve number CN=74,
00555# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00556# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00557# Impervious surfaces: IAlmp=[2](mm), SLPF=[0.5](%),
00558# LGI=[97](m), MHI=[0.013], SCI=[0](min),
00559# RAINFALL=[ , , , ](mm/hr) , END=-1
00560#
00561# ADD HYD IDsum=[4], NHYD=["OUTFLOW"], IDs to add=[3 + 1]
00562#
00563#
00564#
00565# 2222 5555 Y Y RRRR CCCC H H IIIII
00566# 2 5 Y Y R R C C H H I
00567# 2222 5555 Y RRRR C HHHH I
00568# 2 5 Y R R C C C H H I
00569# 2222 5555 Y R R CCCC H H IIIII
00570#
00571# 25-YEAR, 3 HOUR CHICAGO STORM
00572# CHICAGO STORM UNITS=[2], TD=[3](hrs), TPAT=[0.333], CSDT=[5](min),
00573# ICAUSE=[2],
00574# Enter ordinates of IDF curve below, at least seven points
00575# TIME (min) Intensity(mm/hr)
00576# [5] [237.4]
00577# [10] [146.2]
00578# [15] [110.2]
00579# [30] [67.9]
00580# [60] [41.8]
00581# [120] [25.7]
00582# [180] [11.9]
00583# [720] [7.4]
00584# [1440] [4.5]
00585# -1
00586# -1
00587#
00588# GLENELG STREET POI-
00589#
00590# TO SWMF (CONTROLLED)
00591#
00592#
00593# CALIB STANDHYD ID=[1], NHYD=["201"], DT=[1](min), AREA=[5.87](ha),
00594# XIMP=[0.37], TIMP=[0.58], DMF=[0](cms), LOSS=[2],
00595# SCS curve number CN=74,
00596# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00597# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00598# Impervious surfaces: IAlmp=[2](mm), SLPF=[0.5](%),
00599# LGI=[198](m), MHI=[0.013], SCI=[0](min),
00600# RAINFALL=[ , , , ](mm/hr) , END=-1
00601#
00602# CALIB STANDHYD ID=[2], NHYD=["SMWF"], DT=[1](min), AREA=[1.22](ha),
00603# XIMP=[0.50], TIMP=[0.50], DMF=[0](cms), LOSS=[2],
00604# SCS curve number CN=74,
00605# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00606# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00607# Impervious surfaces: IAlmp=[2](mm), SLPF=[0.5](%),
00608# LGI=[90](m), MHI=[0.013], SCI=[0](min),
00609# RAINFALL=[ , , , ](mm/hr) , END=-1
00610#
00611# ADD HYD IDsum=[3], NHYD=["SMFOUT"], IDs to add=[1+2]
00612#
00613# SWM FACILITY
00614#
00615# ROUTE RESERVOIR IDout=[1], NHYD=["SMFOUT"], IDin=[3],
00616# ROT=[1](min),
00617# TABLE of ( OUTFLOW-STORAGE ) values
00618# (cms) - (ha-m)
00619# [ 0.0 , 0.0 ]
00620# [ 0.014 , 0.4578 ]
00621# [ 0.028 , 0.1606 ]
00622# [ 0.036 , 0.2985 ]
00623# [ 0.043 , 0.4555 ]
00624# [ 0.048 , 0.5899 ]
00625# [ 0.050 , 0.6376 ]
00626# [ 1.286 , 0.7893 ]
00627#
00628# IDovf=[2], NHYDovf=["SMFOWv"]
00629#
00630#
00631# TO WETLAND
00632#
00633#
00634#
00635# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00636# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00637# SCS curve number CN=74,
00638# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00639# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00640# Impervious surfaces: IAlmp=[2](mm), SLPF=[0.5](%),
00641# LGI=[97](m), MHI=[0.013], SCI=[0](min),
00642# RAINFALL=[ , , , ](mm/hr) , END=-1
00643#
00644# ADD HYD IDsum=[4], NHYD=["OUTFLOW"], IDs to add=[3 + 1]
00645#
00646#
00647#
00648# 2222 5555 Y Y RRRR SSSS CCCC SSSS
00649# 2 5 Y Y R R S S C S S S
00650# 2222 5555 Y RRRR SSSS C SSSS
00651# 2 5 Y R R SSSS CCCC SSSS
00652# 2222 5555 Y R R SSSS CCCC SSSS
00653#
00654# 25 YEAR
00655# FTOTAL=[108.8](mm), CSDT=[5](min),
00656# CURVE_FILE_NAME=["SC24H11.MGT"]
00657#
00658# GLENELG STREET POI-
00659#
00660# TO SWMF (CONTROLLED)
00661#
00662#
00663# CALIB STANDHYD ID=[1], NHYD=["201"], DT=[1](min), AREA=[5.87](ha),
00664# XIMP=[0.37], TIMP=[0.58], DMF=[0](cms), LOSS=[2],
00665# SCS curve number CN=74,
00666# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00667# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00668# Impervious surfaces: IAlmp=[2](mm), SLPF=[0.5](%),
00669# LGI=[198](m), MHI=[0.013], SCI=[0](min),
00670# RAINFALL=[ , , , ](mm/hr) , END=-1
00671#
00672# ADD HYD IDsum=[3], NHYD=["SMFOUT"], IDs to add=[1+2]
00673#
00674# SWM FACILITY
00675#
00676# ROUTE RESERVOIR IDout=[1], NHYD=["SMFOUT"], IDin=[3],
00677# ROT=[1](min),
00678# TABLE of ( OUTFLOW-STORAGE ) values
00679# (cms) - (ha-m)
00680# [ 0.0 , 0.0 ]
00681# [ 0.014 , 0.4578 ]
00682# [ 0.028 , 0.1606 ]
00683# [ 0.036 , 0.2985 ]
00684# [ 0.043 , 0.4555 ]
00685# [ 0.048 , 0.5899 ]
00686# [ 0.050 , 0.6376 ]
00687# [ 1.286 , 0.7893 ]
00688#
00689# IDovf=[2], NHYDovf=["SMFOWv"]
00690#
00691#
00692# TO WETLAND
00693#
00694#
00695# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00696# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00697# SCS curve number CN=74,
00698# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00699# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00700# Impervious surfaces: IAlmp=[2](mm), SLPF=[0.5](%),
00701# LGI=[97](m), MHI=[0.013], SCI=[0](min),
00702# RAINFALL=[ , , , ](mm/hr) , END=-1
00703#
00704# IDovf=[2], NHYDovf=["SMFOWv"]
00705#
00706#
00707# TO WETLAND
00708#
00709#
00710# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00711# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00712# SCS curve number CN=74,
00713# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00714# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00715# RAINFALL=[ , , , ](mm/hr) , END=-1
00716#
00717# IDovf=[2], NHYDovf=["SMFOWv"]
00718#
00719#
00720# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00721# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00722# SCS curve number CN=74,
00723# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00724# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00725# RAINFALL=[ , , , ](mm/hr) , END=-1
00726#
00727# IDovf=[2], NHYDovf=["SMFOWv"]
00728#
00729#
00730# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00731# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00732# SCS curve number CN=74,
00733# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00734# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00735# RAINFALL=[ , , , ](mm/hr) , END=-1
00736#
00737# IDovf=[2], NHYDovf=["SMFOWv"]
00738#
00739#
00740# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00741# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00742# SCS curve number CN=74,
00743# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00744# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00745# RAINFALL=[ , , , ](mm/hr) , END=-1
00746#
00747# IDovf=[2], NHYDovf=["SMFOWv"]
00748#
00749#
00750# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00751# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00752# SCS curve number CN=74,
00753# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00754# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00755# RAINFALL=[ , , , ](mm/hr) , END=-1
00756#
00757# IDovf=[2], NHYDovf=["SMFOWv"]
00758#
00759#
00760# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00761# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00762# SCS curve number CN=74,
00763# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00764# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00765# RAINFALL=[ , , , ](mm/hr) , END=-1
00766#
00767# IDovf=[2], NHYDovf=["SMFOWv"]
00768#
00769#
00770# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00771# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00772# SCS curve number CN=74,
00773# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00774# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00775# RAINFALL=[ , , , ](mm/hr) , END=-1
00776#
00777# IDovf=[2], NHYDovf=["SMFOWv"]
00778#
00779#
00780# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00781# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00782# SCS curve number CN=74,
00783# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00784# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00785# RAINFALL=[ , , , ](mm/hr) , END=-1
00786#
00787# IDovf=[2], NHYDovf=["SMFOWv"]
00788#
00789#
00790# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00791# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00792# SCS curve number CN=74,
00793# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00794# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00795# RAINFALL=[ , , , ](mm/hr) , END=-1
00796#
00797# IDovf=[2], NHYDovf=["SMFOWv"]
00798#
00799#
00800# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00801# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00802# SCS curve number CN=74,
00803# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00804# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00805# RAINFALL=[ , , , ](mm/hr) , END=-1
00806#
00807# IDovf=[2], NHYDovf=["SMFOWv"]
00808#
00809#
00810# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00811# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00812# SCS curve number CN=74,
00813# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00814# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00815# RAINFALL=[ , , , ](mm/hr) , END=-1
00816#
00817# IDovf=[2], NHYDovf=["SMFOWv"]
00818#
00819#
00820# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00821# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00822# SCS curve number CN=74,
00823# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00824# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00825# RAINFALL=[ , , , ](mm/hr) , END=-1
00826#
00827# IDovf=[2], NHYDovf=["SMFOWv"]
00828#
00829#
00830# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00831# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00832# SCS curve number CN=74,
00833# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00834# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00835# RAINFALL=[ , , , ](mm/hr) , END=-1
00836#
00837# IDovf=[2], NHYDovf=["SMFOWv"]
00838#
00839#
00840# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00841# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00842# SCS curve number CN=74,
00843# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00844# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00845# RAINFALL=[ , , , ](mm/hr) , END=-1
00846#
00847# IDovf=[2], NHYDovf=["SMFOWv"]
00848#
00849#
00850# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00851# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00852# SCS curve number CN=74,
00853# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00854# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00855# RAINFALL=[ , , , ](mm/hr) , END=-1
00856#
00857# IDovf=[2], NHYDovf=["SMFOWv"]
00858#
00859#
00860# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00861# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00862# SCS curve number CN=74,
00863# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00864# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00865# RAINFALL=[ , , , ](mm/hr) , END=-1
00866#
00867# IDovf=[2], NHYDovf=["SMFOWv"]
00868#
00869#
00870# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00871# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00872# SCS curve number CN=74,
00873# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00874# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00875# RAINFALL=[ , , , ](mm/hr) , END=-1
00876#
00877# IDovf=[2], NHYDovf=["SMFOWv"]
00878#
00879#
00880# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00881# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00882# SCS curve number CN=74,
00883# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00884# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00885# RAINFALL=[ , , , ](mm/hr) , END=-1
00886#
00887# IDovf=[2], NHYDovf=["SMFOWv"]
00888#
00889#
00890# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00891# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00892# SCS curve number CN=74,
00893# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00894# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00895# RAINFALL=[ , , , ](mm/hr) , END=-1
00896#
00897# IDovf=[2], NHYDovf=["SMFOWv"]
00898#
00899#
00900# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00901# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00902# SCS curve number CN=74,
00903# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00904# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00905# RAINFALL=[ , , , ](mm/hr) , END=-1
00906#
00907# IDovf=[2], NHYDovf=["SMFOWv"]
00908#
00909#
00910# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00911# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00912# SCS curve number CN=74,
00913# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00914# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00915# RAINFALL=[ , , , ](mm/hr) , END=-1
00916#
00917# IDovf=[2], NHYDovf=["SMFOWv"]
00918#
00919#
00920# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00921# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00922# SCS curve number CN=74,
00923# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00924# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00925# RAINFALL=[ , , , ](mm/hr) , END=-1
00926#
00927# IDovf=[2], NHYDovf=["SMFOWv"]
00928#
00929#
00930# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00931# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00932# SCS curve number CN=74,
00933# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00934# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00935# RAINFALL=[ , , , ](mm/hr) , END=-1
00936#
00937# IDovf=[2], NHYDovf=["SMFOWv"]
00938#
00939#
00940# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00941# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00942# SCS curve number CN=74,
00943# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00944# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00945# RAINFALL=[ , , , ](mm/hr) , END=-1
00946#
00947# IDovf=[2], NHYDovf=["SMFOWv"]
00948#
00949#
00950# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00951# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00952# SCS curve number CN=74,
00953# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00954# LGP=[30](m), MWP=[0.25], SCF=[0](min),
00955# RAINFALL=[ , , , ](mm/hr) , END=-1
00956#
00957# IDovf=[2], NHYDovf=["SMFOWv"]
00958#
00959#
00960# CALIB STANDHYD ID=[3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
00961# XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
00962# SCS curve number CN=74,
00963# Pervious surfaces: IApex=[5](mm), SLPF=[2.0](%),
00964# LGP=[30](m), MWP=[0.25], SCF=[0](min),

```

```

007212 Impervious surfaces: IAlimp=[2] (mm), SLP=[0.5] (%),
007222 LGI=[97] (mm), MH=[0.013], SCI=[0] (min),
007232 RAINFALL=[ , , , ] (mm/hr), END=1
007242 *
007252 *
007262 ADD HYD IDsum=[4], NHYD=[*OUTFLOW*], IDs to add=[3 + 1]
007272 *
007282 *
007292 *
007302 *
007312 *
007322 *
007332 *
007342 *
007352 *
007362 *
007372 *
007382 *
007392 *
007402 CHICAGO STORM
007412 IUNITS=[2], TD=[3] (hrs), TPRAT=[0.33], CSDT=[5] (min),
007422 ICASEC=[2],
007432 Enter ordinates of IDF curve below, at least seven points
007442 TIME (min) Intensity (mm/hr)
007452 [5] [289.7]
007462 [10] [178.4]
007472 [15] [134.4]
007482 [30] [82.8]
007492 [60] [51.0]
007502 [120] [31.4]
007512 [360] [14.6]
007522 [720] [9.0]
007532 [1440] [5.5]
007542 *
007552 *
007562 *
007572 *
007582 *
007592 *
007602 *
007612 CALIB STANDHYD ID=[1], NHYD=[*201*], DT=[1] (min), AREA=[5.87] (ha),
007622 XIMP=[0.37], TIMP=[0.58], DMF=[0] (cms), LOSS=[2],
007632 SCV curve number CN=[74],
007642 Pervious surfaces: IAperv=[5] (mm), SLP=[2.0] (%),
007652 LGP=[30] (m), MHP=[0.25], SCF=[0] (min),
007662 Impervious surfaces: IAlimp=[2] (mm), SLP=[0.5] (%),
007672 LGI=[198] (mm), MH=[0.013], SCI=[0] (min),
007682 RAINFALL=[ , , , ] (mm/hr), END=1
007692 *
007702 CALIB STANDHYD ID=[2], NHYD=[*SWMP*], DT=[1] (min), AREA=[1.22] (ha),
007712 XIMP=[0.50], TIMP=[0.50], DMF=[0] (cms), LOSS=[2],
007722 SCV curve number CN=[74],
007732 Pervious surfaces: IAperv=[5] (mm), SLP=[2.0] (%),
007742 LGP=[30] (m), MHP=[0.25], SCF=[0] (min),
007752 Impervious surfaces: IAlimp=[2] (mm), SLP=[0.5] (%),
007762 LGI=[90] (mm), MH=[0.013], SCI=[0] (min),
007772 RAINFALL=[ , , , ] (mm/hr), END=1
007782 *
007792 ADD HYD IDsum=[3], NHYD=[*SWMF*], IDs to add=[1+2]
007802 *
007812 *
007822 *
007832 ROUTE RESERVOIR IDout=[1], NHYD=[*SWMF*], IDin=[3],
007842 ROT=[1] (min),
007852 TABLE of (OUTFLOW-STORAGE) values
007862 (cms) - (ha-m)
007872 [0.0, 0.0]
007882 [0.014, 0.0478]
007892 [0.028, 0.1606]
007902 [0.036, 0.2965]
007912 [0.043, 0.4555]
007922 [0.048, 0.5899]
007932 [0.050, 0.6376]
007942 [1.286, 0.7893]
007952 [-1, -1] (max twenty pts)
007962 IDovf=[2], NHYDOvf=[*SWMF*]
007972 *
007982 *
007992 *
008002 *
008012 *
008022 *
008032 *
008042 CALIB STANDHYD ID=[3], NHYD=[*UNCONTROLLED*], DT=[1] (min), AREA=[1.42] (ha),
008052 XIMP=[0.10], TIMP=[0.46], DMF=[0] (cms), LOSS=[2],
008062 SCV curve number CN=[74],
008072 Pervious surfaces: IAperv=[5] (mm), SLP=[2.0] (%),
008082 LGP=[30] (m), MHP=[0.25], SCF=[0] (min),
008092 Impervious surfaces: IAlimp=[2] (mm), SLP=[0.5] (%),
008102 LGI=[198] (mm), MH=[0.013], SCI=[0] (min),
008112 RAINFALL=[ , , , ] (mm/hr), END=1
008122 *
008132 *
008142 ADD HYD IDsum=[4], NHYD=[*OUTFLOW*], IDs to add=[3 + 1]
008152 *
008162 *
008172 *
008182 *
008192 *
008202 *
008212 *
008222 *
008232 *
008242 *
008252 *
008262 *
008272 MASS STORM POTIAL=[121.0] (mm), CSDT=[5] (min),
008282 CURVE_FILENAME=[*SCS24H1.mst*]
008292 *
008302 *
008312 *
008322 *
008332 *
008342 *
008352 *
008362 CALIB STANDHYD ID=[1], NHYD=[*201*], DT=[1] (min), AREA=[5.87] (ha),
008372 XIMP=[0.37], TIMP=[0.58], DMF=[0] (cms), LOSS=[2],
008382 SCV curve number CN=[74],
008392 Pervious surfaces: IAperv=[5] (mm), SLP=[2.0] (%),
008402 LGP=[30] (m), MHP=[0.25], SCF=[0] (min),
008412 Impervious surfaces: IAlimp=[2] (mm), SLP=[0.5] (%),
008422 LGI=[198] (mm), MH=[0.013], SCI=[0] (min),
008432 RAINFALL=[ , , , ] (mm/hr), END=1
008442 *
008452 CALIB STANDHYD ID=[2], NHYD=[*SWMP*], DT=[1] (min), AREA=[1.22] (ha),
008462 XIMP=[0.50], TIMP=[0.50], DMF=[0] (cms), LOSS=[2],
008472 SCV curve number CN=[74],
008482 Pervious surfaces: IAperv=[5] (mm), SLP=[2.0] (%),
008492 LGP=[30] (m), MHP=[0.25], SCF=[0] (min),
008502 Impervious surfaces: IAlimp=[2] (mm), SLP=[0.5] (%),
008512 LGI=[90] (mm), MH=[0.013], SCI=[0] (min),
008522 RAINFALL=[ , , , ] (mm/hr), END=1
008532 *
008542 ADD HYD IDsum=[3], NHYD=[*SWMF*], IDs to add=[1+2]
008552 *
008562 *
008572 *
008582 ROUTE RESERVOIR IDout=[1], NHYD=[*SWMF*], IDin=[3],
008592 ROT=[1] (min),
008602 TABLE of (OUTFLOW-STORAGE) values
008612 (cms) - (ha-m)
008622 [0.0, 0.0]
008632 [0.014, 0.0478]
008642 [0.028, 0.1606]
008652 [0.036, 0.2965]
008662 [0.043, 0.4555]
008672 [0.048, 0.5899]
008682 [0.050, 0.6376]
008692 [1.286, 0.7893]
008702 [-1, -1] (max twenty pts)
008712 IDovf=[2], NHYDOvf=[*SWMF*]
008722 *
008732 *
008742 *
008752 *
008762 *
008772 *
008782 *
008792 CALIB STANDHYD ID=[3], NHYD=[*UNCONTROLLED*], DT=[1] (min), AREA=[1.42] (ha),
008802 XIMP=[0.10], TIMP=[0.46], DMF=[0] (cms), LOSS=[2],
008812 SCV curve number CN=[74],
008822 Pervious surfaces: IAperv=[5] (mm), SLP=[2.0] (%),
008832 LGP=[30] (m), MHP=[0.25], SCF=[0] (min),
008842 Impervious surfaces: IAlimp=[2] (mm), SLP=[0.5] (%),
008852 LGI=[198] (mm), MH=[0.013], SCI=[0] (min),
008862 RAINFALL=[ , , , ] (mm/hr), END=1
008872 *
008882 *
008892 ADD HYD IDsum=[4], NHYD=[*OUTFLOW*], IDs to add=[3 + 1]
008902 *
009002 *
009012 *
009022 *
009032 *
009042 CHICAGO STORM
009052 IUNITS=[2], TD=[3.0] (hrs), TPRAT=[0.33], CSDT=[5] (min),
009062 ICASEC=[2],
009072 Enter ordinates of IDF curve below, at least seven points
009082 TIME (min) Intensity (mm/hr)
009092 [5] [289.7]
009102 [10] [178.4]
009112 [15] [134.4]
009122 [30] [82.8]
009132 [60] [51.0]
009142 [120] [31.4]
009152 [360] [14.6]
009162 [720] [9.0]
009172 [1440] [5.5]
009182 *
009192 *
009202 *
009212 *
009222 *
009232 *
009242 *
009252 CALIB STANDHYD ID=[1], NHYD=[*201*], DT=[1] (min), AREA=[5.87] (ha),
009262 XIMP=[0.37], TIMP=[0.58], DMF=[0] (cms), LOSS=[2],
009272 SCV curve number CN=[74],
009282 Pervious surfaces: IAperv=[5] (mm), SLP=[2.0] (%),
009292 LGP=[30] (m), MHP=[0.25], SCF=[0] (min),
009302 Impervious surfaces: IAlimp=[2] (mm), SLP=[0.5] (%),
009312 LGI=[198] (mm), MH=[0.013], SCI=[0] (min),
009322 RAINFALL=[ , , , ] (mm/hr), END=1
009332 *
009342 CALIB STANDHYD ID=[2], NHYD=[*SWMP*], DT=[1] (min), AREA=[1.22] (ha),
009352 XIMP=[0.50], TIMP=[0.50], DMF=[0] (cms), LOSS=[2],
009362 SCV curve number CN=[74],
009372 Pervious surfaces: IAperv=[5] (mm), SLP=[2.0] (%),
009382 LGP=[30] (m), MHP=[0.25], SCF=[0] (min),
009392 Impervious surfaces: IAlimp=[2] (mm), SLP=[0.5] (%),
009402 LGI=[90] (mm), MH=[0.013], SCI=[0] (min),
009412 RAINFALL=[ , , , ] (mm/hr), END=1
009422 *
009432 ADD HYD IDsum=[3], NHYD=[*SWMF*], IDs to add=[1+2]
009442 *
009452 *
009462 *
009472 *
009482 *
009492 *
009502 *
009512 *
009522 *
009532 *
009542 *
009552 *
009562 *
009572 *
009582 *
009592 *
009602 *
009612 *
009622 *
009632 *
009642 *
009652 *
009662 *
009672 *
009682 CALIB STANDHYD ID=[3], NHYD=[*UNCONTROLLED*], DT=[1] (min), AREA=[1.42] (ha),
009692 XIMP=[0.10], TIMP=[0.46], DMF=[0] (cms), LOSS=[2],
009702 SCV curve number CN=[74],
009712 Pervious surfaces: IAperv=[5] (mm), SLP=[2.0] (%),
009722 LGP=[30] (m), MHP=[0.25], SCF=[0] (min),
009732 Impervious surfaces: IAlimp=[2] (mm), SLP=[0.5] (%),
009742 LGI=[97] (mm), MH=[0.013], SCI=[0] (min),
009752 RAINFALL=[ , , , ] (mm/hr), END=1
009762 *
009772 *
009782 ADD HYD IDsum=[4], NHYD=[*OUTFLOW*], IDs to add=[3 + 1]
009792 *
009802 *
009812 *
009822 *
009832 *
009842 *
009852 *
009862 *
009872 *
009882 *
009892 *
009902 *
009912 *
009922 *
009932 *
009942 *
009952 *
009962 *
009972 *
009982 *
009992 *
010002 *
010012 *
010022 *
010032 *
010042 *
010052 *
010062 *
010072 *
010082 CALIB STANDHYD ID=[2], NHYD=[*SWMP*], DT=[1] (min), AREA=[1.22] (ha),
010092 XIMP=[0.50], TIMP=[0.50], DMF=[0] (cms), LOSS=[2],
010102 SCV curve number CN=[74],
010112 Pervious surfaces: IAperv=[5] (mm), SLP=[2.0] (%),
010122 LGP=[30] (m), MHP=[0.25], SCF=[0] (min),
010132 Impervious surfaces: IAlimp=[2] (mm), SLP=[0.5] (%),
010142 LGI=[90] (mm), MH=[0.013], SCI=[0] (min),
010152 RAINFALL=[ , , , ] (mm/hr), END=1
010162 *
010172 ADD HYD IDsum=[3], NHYD=[*SWMF*], IDs to add=[1+2]
010182 *
010192 *
010202 *
010212 ROUTE RESERVOIR IDout=[1], NHYD=[*SWMF*], IDin=[3],
010222 ROT=[1] (min),
010232 TABLE of (OUTFLOW-STORAGE) values
010242 (cms) - (ha-m)
010252 [0.0, 0.0]
010262 [0.014, 0.0478]
010272 [0.028, 0.1606]
010282 [0.036, 0.2965]
010292 [0.043, 0.4555]
010302 [0.048, 0.5899]
010312 [0.050, 0.6376]
010322 [1.286, 0.7893]
010332 [-1, -1] (max twenty pts)
010342 IDovf=[2], NHYDOvf=[*SWMF*]
010352 *
010362 *
010372 *
010382 *
010392 *
010402 *
010412 *
010422 CALIB STANDHYD ID=[3], NHYD=[*UNCONTROLLED*], DT=[1] (min), AREA=[1.42] (ha),
010432 XIMP=[0.10], TIMP=[0.46], DMF=[0] (cms), LOSS=[2],
010442 SCV curve number CN=[74],
010452 Pervious surfaces: IAperv=[5] (mm), SLP=[2.0] (%),
010462 LGP=[30] (m), MHP=[0.25], SCF=[0] (min),
010472 Impervious surfaces: IAlimp=[2] (mm), SLP=[0.5] (%),
010482 LGI=[97] (mm), MH=[0.013], SCI=[0] (min),
010492 RAINFALL=[ , , , ] (mm/hr), END=1
010502 *
010512 *
010522 ADD HYD IDsum=[4], NHYD=[*OUTFLOW*], IDs to add=[3 + 1]
010532 *
010542 *
010552 *
010562 *
010572 *
010582 *
010592 *
010602 *
010612 *
010622 *
010632 *
010642 *
010652 *
010662 *
010672 *
010682 *
010692 CALIB STANDHYD ID=[1], NHYD=[*201*], DT=[1] (min), AREA=[5.87] (ha),
010702 XIMP=[0.37], TIMP=[0.58], DMF=[0] (cms), LOSS=[2],
010712 SCV curve number CN=[88],
010722 Pervious surfaces: IAperv=[5] (mm), SLP=[2.0] (%),
010732 LGP=[30] (m), MHP=[0.25], SCF=[0] (min),
010742 Impervious surfaces: IAlimp=[2] (mm), SLP=[0.5] (%),
010752 LGI=[198] (mm), MH=[0.013], SCI=[0] (min),
010762 RAINFALL=[ , , , ] (mm/hr), END=1
010772 *
010782 CALIB STANDHYD ID=[2], NHYD=[*SWMP*], DT=[1] (min), AREA=[1.22] (ha),
010792 XIMP=[0.50], TIMP=[0.50], DMF=[0] (cms), LOSS=[2],
010802 SCV curve number CN=[88],

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01081>          Pervious surfaces: Iaper=5(mm), SLPP=2.0(%) ,
01082>          LSP=30(m), MNP=0.25], SCP=0(min),
01083>          Impervious surfaces: IAlmp=2(mm), SLI=0.5(%) ,
01084>          LLI=90(m), MNI=0.013], SCI=0(min),
01085>          RAINFALL=[ , , , ](mm/hr) , EMD=-1
01086> *#-----|-----|
01087> ADD HYD |IDsum=3], NHYD=["SMMGTN"], IDS to add=[42]|
01088> *#-----|-----|
01089> *#-----|-----|
01090> *#-----|-----|
01091> ROUTE RESERVOIR |IDout=1], NHYD=["SMMFOut"], IDIn=3],
01092> RDT=[1](min),
01093>          TABLE of ( OUTFLOW-STORAGE ) values
01094>          (cms) - (ha-m)
01095>          [ 0.0 , 0.0]
01096>          [ 0.014 , 0.0478]
01097>          [ 0.028 , 0.1606]
01098>          [ 0.036 , 0.2965]
01099>          [ 0.043 , 0.4555]
01100>          [ 0.048 , 0.5899]
01101>          [ 0.050 , 0.6376]
01102>          [ 1.266 , 0.7893]
01103>          [ -1 , -1 ] (max twenty pts)
01104>          IDovf=[2], NHYDovf=["SMMFOver"]
01105>
01106> *#-----|-----|
01107> *#-----|-----|
01108> *#-----|-----|
01109> *#-----|-----|
01110> *#-----|-----|
01111> *#-----|-----|
01112> CALIB STANDWYD |ID=3], NHYD=["UNCONTROLLED"], DT=[1](min), AREA=[1.42](ha),
01113>          XIMP=[0.10], TIMP=[0.46], DMF=[0](cms), LOSS=[2],
01114>          SCS curve number Cn=[88],
01115>          Pervious surfaces: Iaper=5(mm), SLPP=2.0(%) ,
01116>          LSP=30(m), MNP=0.25], SCP=0(min),
01117>          Impervious surfaces: IAlmp=2(mm), SLI=0.5(%) ,
01118>          LLI=97(m), MNI=0.013], SCI=0(min),
01119>          RAINFALL=[ , , , ](mm/hr) , EMD=-1
01120> *#-----|-----|
01121> *#-----|-----|
01122> ADD HYD |IDsum=4], NHYD=["OUTFLOW"], IDS to add=[3 + 1]|
01123> *#-----|-----|
01124>
01125> FINISH
```

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00721# R0001C00073-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00722# CALIS STANDHYD 1.0 01:201 5.87 1.535 No_date 12:13 93.27 .772 .000
00723# [XIMP=.37;Timp=.58]
00724# [LOSS= 2 :CN= 74.0]
00725# [Previous area: IApwr= 5.00;SLFP=2.00;LGP= 30.0;MNP=.250;SCF=.0]
00726# [Impervious area: IAlmp= 2.00;SLFI=.50;LGI= 198.0;MW=.013;SCI=.0]
00727#-----
00728# R0001C00074-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00729# CALIS STANDHYD 1.0 02:SNMF 1.22 .332 No_date 12:12 92.28 .763 .000
00730# [XIMP=.50;Timp=.50]
00731# [LOSS= 2 :CN= 74.0]
00732# [Previous area: IApwr= 5.00;SLFP=2.00;LGP= 30.0;MNP=.250;SCF=.0]
00733# [Impervious area: IAlmp= 2.00;SLFI=.50;LGI= 90.0;MW=.013;SCI=.0]
00734#-----
00735# R0001C00075-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00736# ADD HYD 1.0 01:201 5.87 1.535 No_date 12:13 93.27 n/a .000
00737# + 1.0 02:SNMF 1.22 .332 No_date 12:12 92.28 n/a .000
00738# SUM= 1.0 03:SNMFIN 7.09 1.857 No_date 12:12 93.10 n/a .000
00739#-----
00740#-----
00741#-----
00742#-----
00743#-----
00744#-----
00745#-----
00746#-----
00747#-----
00748#-----
00749#-----
00750#-----
00751#-----
00752#-----
00753# R0001C00077-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00754# CALIS STANDHYD 1.0 03:UNCONTROL 1.42 .360 No_date 12:13 84.95 .702 .000
00755# [XIMP=.10;Timp=.46]
00756# [LOSS= 2 :CN= 74.0]
00757# [Previous area: IApwr= 5.00;SLFP=2.00;LGP= 30.0;MNP=.250;SCF=.0]
00758# [Impervious area: IAlmp= 2.00;SLFI=.50;LGI= 97.0;MW=.013;SCI=.0]
00759# R0001C00078-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00760# ADD HYD 1.0 03:UNCONTROL 1.42 .360 No_date 12:13 84.95 n/a .000
00761# + 1.0 01:SNMFOut 7.09 .044 No_date 17:08 93.10 n/a .000
00762# SUM= 1.0 04:OUTFLOW 8.51 .294 No_date 12:13 91.74 n/a .000
00763#-----
00764#-----
00765#-----
00766#-----
00767#-----
00768#-----
00769#-----
00770#-----
00771#-----
00772#-----
00773#-----
00774#-----
00775#-----
00776#-----
00777#-----
00778#-----
00779#-----
00780#-----
00781#-----
00782#-----
00783#-----
00784# R0001C00080-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00785# CALIS STANDHYD 1.0 01:201 5.87 1.588 No_date 1:01 49.17 .682 .000
00786# [XIMP=.37;Timp=.58]
00787# [LOSS= 2 :CN= 74.0]
00788# [Previous area: IApwr= 5.00;SLFP=2.00;LGP= 30.0;MNP=.250;SCF=.0]
00789# [Impervious area: IAlmp= 2.00;SLFI=.50;LGI= 198.0;MW=.013;SCI=.0]
00790#-----
00791# R0001C00081-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00792# CALIS STANDHYD 1.0 02:SNMF 1.22 .442 No_date 1:00 49.45 .686 .000
00793# [XIMP=.50;Timp=.50]
00794# [LOSS= 2 :CN= 74.0]
00795# [Previous area: IApwr= 5.00;SLFP=2.00;LGP= 30.0;MNP=.250;SCF=.0]
00796# [Impervious area: IAlmp= 2.00;SLFI=.50;LGI= 90.0;MW=.013;SCI=.0]
00797#-----
00798# R0001C00082-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00799# ADD HYD 1.0 01:201 5.87 1.588 No_date 1:01 49.17 n/a .000
00800# + 1.0 02:SNMF 1.22 .442 No_date 1:00 49.45 n/a .000
00801# SUM= 1.0 03:SNMFIN 7.09 1.999 No_date 1:01 49.21 n/a .000
00802#-----
00803#-----
00804#-----
00805#-----
00806#-----
00807#-----
00808#-----
00809#-----
00810#-----
00811#-----
00812#-----
00813#-----
00814#-----
00815#-----
00816# R0001C00084-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00817# CALIS STANDHYD 1.0 03:UNCONTROL 1.42 .296 No_date 1:05 42.05 .583 .000
00818# [XIMP=.10;Timp=.46]
00819# [LOSS= 2 :CN= 74.0]
00820# [Previous area: IApwr= 5.00;SLFP=2.00;LGP= 30.0;MNP=.250;SCF=.0]
00821# [Impervious area: IAlmp= 2.00;SLFI=.50;LGI= 97.0;MW=.013;SCI=.0]
00822# R0001C00085-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00823# ADD HYD 1.0 03:UNCONTROL 1.42 .296 No_date 1:05 42.05 n/a .000
00824# + 1.0 01:SNMFOut 7.09 .037 No_date 3:10 49.21 n/a .000
00825# SUM= 1.0 04:OUTFLOW 8.51 .319 No_date 1:05 48.02 n/a .000
00826#-----
00827#-----
00828#-----
00829#-----
00830#-----
00831#-----
00832#-----
00833#-----
00834# R0001C00086-----
00835#-----
00836#-----
00837#-----
00838#-----
00839#-----
00840#-----
00841#-----
00842#-----
00843#-----
00844#-----
00845#-----
00846#-----
00847#-----
00848#-----
00849#-----
00850#-----
00851#-----
00852#-----
00853# R0001C00088-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00854# CALIS STANDHYD 1.0 02:SNMF 1.22 .376 No_date 12:12 102.93 .776 .000
00855# [XIMP=.50;Timp=.50]
00856# [LOSS= 2 :CN= 74.0]
00857# [Previous area: IApwr= 5.00;SLFP=2.00;LGP= 30.0;MNP=.250;SCF=.0]
00858# [Impervious area: IAlmp= 2.00;SLFI=.50;LGI= 90.0;MW=.013;SCI=.0]
00859#-----
00860# R0001C00089-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00861# ADD HYD 1.0 01:201 5.87 1.727 No_date 12:13 104.19 n/a .000
00862# + 1.0 02:SNMF 1.22 .376 No_date 12:12 102.93 n/a .000
00863# SUM= 1.0 03:SNMFIN 7.09 2.094 No_date 12:12 103.97 n/a .000
00864#-----
00865#-----
00866#-----
00867#-----
00868#-----
00869#-----
00870#-----
00871#-----
00872#-----
00873#-----
00874#-----
00875#-----
00876#-----
00877#-----
00878#-----
00879#-----
00880#-----
00881#-----
00882#-----
00883#-----
00884# R0001C00091-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00885# CALIS STANDHYD 1.0 03:UNCONTROL 1.42 .409 No_date 12:13 95.69 .721 .000
00886# [XIMP=.10;Timp=.46]
00887# [LOSS= 2 :CN= 74.0]
00888# [Previous area: IApwr= 5.00;SLFP=2.00;LGP= 30.0;MNP=.250;SCF=.0]
00889# [Impervious area: IAlmp= 2.00;SLFI=.50;LGI= 97.0;MW=.013;SCI=.0]
00890# R0001C00092-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00891# ADD HYD 1.0 03:UNCONTROL 1.42 .409 No_date 12:13 95.69 n/a .000
00892# + 1.0 01:SNMFOut 7.09 .046 No_date 17:09 103.97 n/a .000
00893# SUM= 1.0 04:OUTFLOW 8.51 .445 No_date 12:13 102.59 n/a .000
00894#-----
00895#-----
00896#-----
00897#-----
00898#-----
00899#-----
00900#-----
00901#-----
00902#-----
00903#-----
00904# R0001C00094-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00905# CALIS STANDHYD 1.0 01:201 5.87 .847 No_date 10:00 196.06 .325 .000
00906# [XIMP=.37;Timp=.58]
00907# [LOSS= 2 :CN= 88.0]
00908# [Previous area: IApwr= 5.00;SLFP=2.00;LGP= 30.0;MNP=.250;SCF=.0]
00909# [Impervious area: IAlmp= 2.00;SLFI=.50;LGI= 198.0;MW=.013;SCI=.0]
00910#-----
00911# R0001C00095-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00912# CALIS STANDHYD 1.0 02:SNMF 1.22 .176 No_date 10:00 193.66 n/a .000
00913# [XIMP=.50;Timp=.50]
00914# [LOSS= 2 :CN= 88.0]
00915# [Previous area: IApwr= 5.00;SLFP=2.00;LGP= 30.0;MNP=.250;SCF=.0]
00916# [Impervious area: IAlmp= 2.00;SLFI=.50;LGI= 90.0;MW=.013;SCI=.0]
00917#-----
00918# R0001C00096-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00919# ADD HYD 1.0 01:201 5.87 .847 No_date 10:00 196.06 n/a .000
00920# + 1.0 02:SNMF 1.22 .176 No_date 10:00 193.66 n/a .000
00921# SUM= 1.0 03:SNMFIN 7.09 1.023 No_date 10:00 195.65 n/a .000
00922#-----
00923#-----
00924#-----
00925# R0001C00097-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00926# ROUTE RESERVOIR -> 1.0 03:SNMFIN 7.09 1.023 No_date 10:00 195.65 n/a .000
00927# out <= 1.0 01:SNMFOut 7.09 .890 No_date 10:11 195.65 n/a .000
00928# overflow <= 1.0 02:SNMFOver .00 .000 No_date 0:00 .00 n/a .000
00929# (MxStoUsed=.7407E+00 m3, TotDurVol=.0000E+00 m3, N-Over= 0, TotDurOver= 0.hrs)
00930#-----
00931#-----
00932#-----
00933#-----
00934#-----
00935#-----
00936# R0001C00098-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00937# CALIS STANDHYD 1.0 03:UNCONTROL 1.42 .203 No_date 10:00 192.09 .906 .000
00938# [XIMP=.10;Timp=.46]
00939# [LOSS= 2 :CN= 88.0]
00940# [Previous area: IApwr= 5.00;SLFP=2.00;LGP= 30.0;MNP=.250;SCF=.0]
00941# [Impervious area: IAlmp= 2.00;SLFI=.50;LGI= 97.0;MW=.013;SCI=.0]
00942# R0001C00099-----DTain-ID:INHYD-----AREaha-QFEARcGms-TpeakDate_hh:mm-----Rvmm-R.C-----DWfcm
00943# ADD HYD 1.0 03:UNCONTROL 1.42 .203 No_date 10:00 192.09 n/a .000
00944# + 1.0 01:SNMFOut 7.09 .890 No_date 10:11 195.65 n/a .000
00945# SUM= 1.0 04:OUTFLOW 8.51 1.076 No_date 10:07 195.05 n/a .000
00946# R0001C00100-----
00947#-----
00948#-----
00949#-----
00950#-----
00951#-----
00952#-----
00953#-----
00954#-----
00955#-----
00956#-----
00957#-----
```

APPENDIX F

SWM Facility Calculations

Water Quality Requirements

Project #: 1060-5545
Project: Glenelg Phase 2
Date: 2021-12-16
By: JK

Water Quality Requirements for Hybrid Wet Pond

Areas Contributing	Area (ha)	% Imp	25mm RV (mm)	25mm RV (m ³)
201	5.87	55.0	11.35	666
SWMF	1.22	50.0	13.36	163
WEIGHTED IMP	7.09	54		829
MOE Total WQ Volume (m ³ /ha)				148
MOE ED Volume (m ³ /ha)				40
MOE ED Volume (m ³)				284
MOE PP Volume (m ³ /ha)				108
MOE PP Volume (m ³)				766
Pond Required ED Volume (m ³)				829
Pond Required PP Volume (m ³)				766
Available ED Volume (m ³)				1013
Provided PP Volume (m ³)				1493



**CROZIER
& ASSOCIATES**
Consulting Engineers

Project: 1060-5545
Project No.: Glenelg Phase 2
File: Extended Detention
Design by: JK
Date: 2021-12-16

EXTENDED DETENTION SPECIFICATIONS - SWM FACILITY (PER MECP)

Extended Detention Volume (Area x runoff from 25mm storm event)	829
t (drawdown time - seconds, <i>hours in italics</i>)	24.0 86400
Ao (cross section area of orifice - sqm)	0.0133
(maximum water elevation above orifice for extended detention- m)	0.35
C (discharge coefficient)	0.64
Ap (average surface area for extended detention - sqm)	2821
$t = 2 \cdot A_p \cdot (h^{0.5}) / (C \cdot A_o \cdot (g \cdot 2)^{0.5})$	
Ao =	0.01362795 sqm
d =	132 mm
Extended Detention Orifice Diameter (as designed)	d = 130 mm

SWM Facility Pond Stage Storage Outflow Calculations

Outlet Structure Dimensions

E.D. Orifice Diameter: 0.13 m
E.D. Orifice Invert Elevation: 516.8 m
Spillway Elev. 518.60 m
Spillway Bot. Width 4 m
Trap Side Slopes 3:1

ED

Spillway

Pond Dimensions				Outlet Structure Discharge						
Elev. (m)	Depth Above PP (m)	Area (sqm)	Storage Volume (cu.m)	V-Notch		Rectangular Weir	Spillway	Spillway	Storage	Total
				ED Orifice Discharge (cu.m/s)	Weir Discharge (cu.m/s)	Discharge (m)	Width (m)	Discharge (cu.m/s)	(ha-m)	Discharge (cu.m/s)
516.80	0.00	2244.00	0.00	0.000	0.00	0.00	0.00	0.00	0.0000	0.000
516.85	0.05	2316.13	114.00	0.000	0.00	0.00	0.00	0.00	0.0114	0.000
516.90	0.10	2388.26	231.61	0.007	0.00	0.00	0.00	0.00	0.0232	0.007
516.95	0.15	2460.39	352.83	0.011	0.00	0.00	0.00	0.00	0.0353	0.011
517.00	0.20	2532.52	477.65	0.014	0.00	0.00	0.00	0.00	0.0478	0.014
517.10	0.30	2676.78	738.12	0.018	0.00	0.00	0.00	0.00	0.0738	0.018
517.20	0.40	2821.04	1013.01	0.022	0.00	0.00	0.00	0.00	0.1013	0.022
517.30	0.50	2965.30	1302.33	0.025	0.00	0.00	0.00	0.00	0.1302	0.025
517.40	0.60	3109.57	1606.07	0.028	0.00	0.00	0.00	0.00	0.1606	0.028
517.50	0.70	3253.83	1924.24	0.030	0.00	0.00	0.00	0.00	0.1924	0.030
517.60	0.80	3398.09	2256.83	0.032	0.00	0.00	0.00	0.00	0.2257	0.032
517.70	0.90	3542.35	2603.86	0.034	0.00	0.00	0.00	0.00	0.2604	0.034
517.80	1.00	3686.61	2965.30	0.036	0.00	0.00	0.00	0.00	0.2965	0.036
517.90	1.10	3830.87	3341.18	0.038	0.00	0.00	0.00	0.00	0.3341	0.038
518.00	1.20	3975.13	3731.48	0.040	0.00	0.00	0.00	0.00	0.3731	0.040
518.10	1.30	4119.39	4136.20	0.042	0.00	0.00	0.00	0.00	0.4136	0.042
518.20	1.40	4263.65	4555.36	0.043	0.00	0.00	0.00	0.00	0.4555	0.043
518.30	1.50	4407.91	4988.93	0.045	0.00	0.00	0.00	0.00	0.4989	0.045
518.40	1.60	4552.17	5436.94	0.047	0.00	0.00	0.00	0.00	0.5437	0.047
518.50	1.70	4696.43	5899.37	0.048	0.00	0.00	0.00	0.00	0.5899	0.048
518.60	1.80	4840.70	6376.23	0.050	0.00	0.00	4.00	0.00	0.6376	0.050
518.70	1.90	4984.96	6867.51	0.051	0.00	0.00	4.03	0.23	0.6868	0.285
518.80	2.00	5129.22	7373.22	0.052	0.00	0.00	4.05	0.67	0.7373	0.719
518.90	2.10	5273.48	7893.35	0.054	0.00	0.00	4.08	1.23	0.7893	1.286
519.00	2.20	5417.74	8427.91	0.055	0.00	0.23	4.10	1.91	0.8428	2.200
519.10	2.30	5562.00	8976.90	0.056	0.01	0.66	4.13	2.68	0.8977	3.407



**CROZIER
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Project No: 1060-5545
Project: Glenelg Phase 2
File: Forebay Design
Design by: JK
Checked by:
Date: 2021-12-10

FOREBAY DESIGN CALCULATIONS

	Variable	Value
Forebay Settling Length	Length of forebay (m)	15.0
	Width of forebay (m)	3.0
	Length-to-width ratio of forebay	5.0
	Peak flow rate from forebay in quality event (m ³ /s)	0.052
	Settling velocity (m/s)	0.0003
	Required Forebay Length (m)	29
Dispersion Length	Inlet flowrate in 5 year event (m ³ /s)	1.03
	Depth of of the permanent pool in the forebay (m)	1.00
	Desired velocity in the forebay (m/s)	0.5
	Length of Dispersion (m)	17
Velocity in Forebay Check	Depth of forebay in 10 year event (m)	1.20
	Cross sectional area (m ²)	7.2
	10 year event flowrate (m ³ /s)	1.29
	Velocity in Forebay (m/s)*	0.18
Forebay Bottom Width	Length of forebay (m)	15.0
	Minimum Forbay Bottom Width (m)	1.88
DESIGN FOREBAY LENGTH (m)		29
DESIGN BOTTOM WIDTH (m)		3.0

* Desired maximum average velocity in the forebay is 0.15 m/s, per MOE, 2003, Page 4-56



**CROZIER
& ASSOCIATES**
Consulting Engineers

Project No: 1060-5545
Project: Glenelg Phase 2
File: Stage-Storage-Discharge
Design by: JK
Checked by:
Date: 2021-12-16

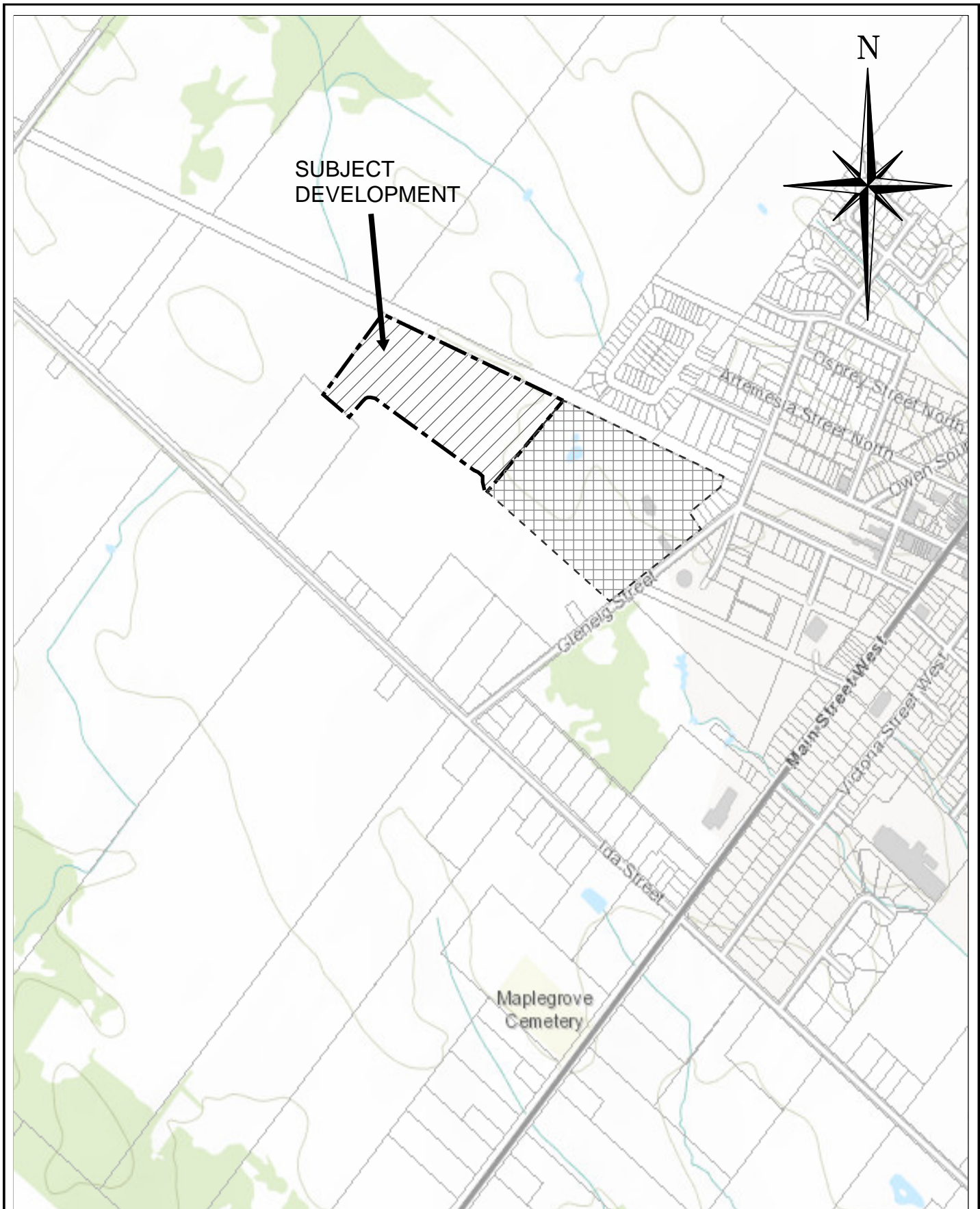
Permanent Pool Check



Pond Dimensions			
Elev.	Depth	Area	Storage
	Above PP		Volume
(m)	(m)	(sqm)	(cu.m)
515.80	0.00	741	0
516.80	1.00	2244	1493

LIST OF FIGURES

LIST OF FIGURES

Figure 1:	Site Location Plan
Figure 2:	Draft Plan
Figure 3:	Grading and Drainage Plan
Figure 4:	General Servicing Plan
Figure 5:	Pre-Development Drainage Conditions
Figure 6:	Post-Development Drainage Conditions



	= SUBJECT DEVELOPMENT
	= PHASE I

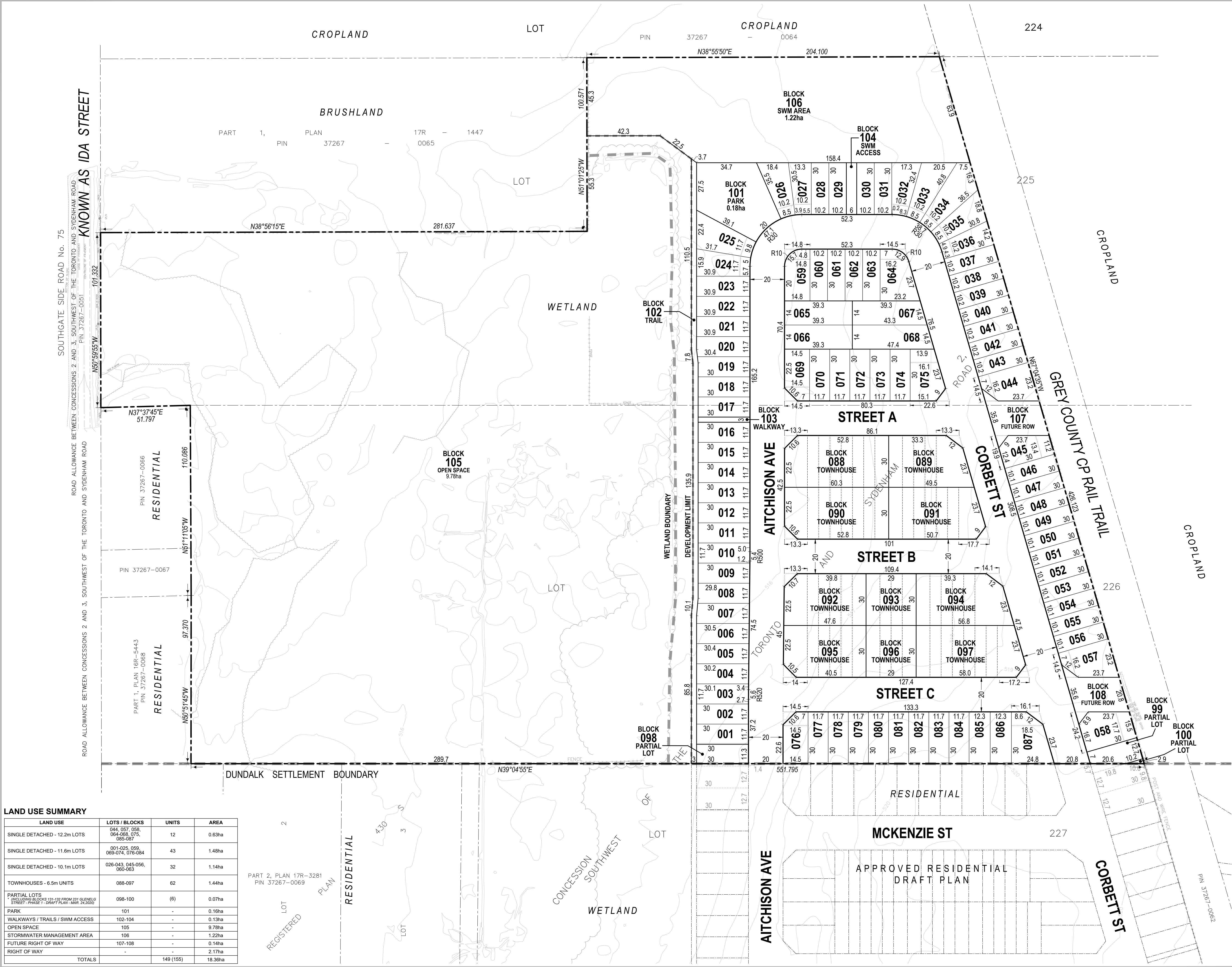
Project	GLENELG TOWNSHIP OF SOUTHGATE		
Drawing	SITE LOCATION		



CROZIER
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THE HARBOUREDGE BUILDING,
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INFO@CROZIER.CA

Drawn By	V.M.	Design By		Project	1060-4171
Scale	N.T.S.	Date	2020/09/29	Check By	
					Drawing FIG. 1



LAND USE SUMMARY			
LAND USE	LOTS / BLOCKS	UNITS	AREA
SINGLE DETACHED - 12.2m LOTS	044-087, 088-097, 098-107	12	0.63ha
SINGLE DETACHED - 11.6m LOTS	001-025, 026-050, 051-074, 075-094	43	1.48ha
SINGLE DETACHED - 10.1m LOTS	026-043, 045-056, 057-083	32	1.14ha
TOWNHOUSES - 6.5m UNITS	088-097	62	1.44ha
PARTIAL LOTS (INCLUDING BLOCKS 131-133 FROM 231 GLENELG STREET - PHASE 1 - DRAFT PLAN - MAR. 24, 2020)	098-100	(6)	0.07ha
PARK	101	-	0.16ha
WALKWAYS / TRAILS / SWM ACCESS	102-104	-	0.13ha
OPEN SPACE	105	-	9.78ha
STORMWATER MANAGEMENT AREA	106	-	1.22ha
FUTURE RIGHT OF WAY	107-108	-	0.14ha
RIGHT OF WAY	-	-	2.17ha
TOTALS		149 (155)	18.36ha

PART 2, PLAN 17R-3281
PIN 37267-0069

LEGAL DESCRIPTION

PART OF LOTS 225 AND 226
CONCESSION 2, SOUTHWEST OF THE TORONTO AND SYDENHAM ROAD
TOWNSHIP OF SOUTHGATE
COUNTY OF GREY

OWNER'S CERTIFICATE

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

DATE: _____ SHAKIR REHMATULLAH - PRESIDENT
2358737 ONTARIO INC.

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: _____ DAN DZALDOV - OLS
SCHAEFFER DZALDOV BENNETT LTD.
P: 416-987-0101

KEY PLAN

Subject Site

0 0.3 0.6 0.9 1.2km

LEGEND

— RIGHT OF WAY LINE — PROJECT BOUNDARY LINE
— BLOCK LINE — PARCEL FABRIC
— LOT LINE

REVISION No.	DATE	ISSUED / REVISION	BY
ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT R.S.O. 1990 C.P.13 AS AMENDED			
A. AS SHOWN	E. AS SHOWN	J. AS SHOWN	
B. AS SHOWN	F. AS SHOWN	K. ALL MUNICIPAL SERVICES	
C. AS SHOWN	G. AS SHOWN	L. AS SHOWN	
D. 87 (93) SINGLE DETACHED LOTS & 62 TOWNHOUSE UNITS	H. MUNICIPAL WATER SUPPLY		
	I. LOAM/SILT LOAM		

PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE MHBC PLANNING

113 COLLIER STREET
BARRIE, ON, L4M 1H2
P: 705 728 0045 F: 705 728 2010
WWW.MHBCPLAN.COM

STAMP	DATE	DEC. 2, 2021
FILE No.	15184H	
SCALE	1:1,000 (ARCH D)	
DRAWN BY	M.M.	
CHECKED BY	K.M.	
OTHER		

PROJECT

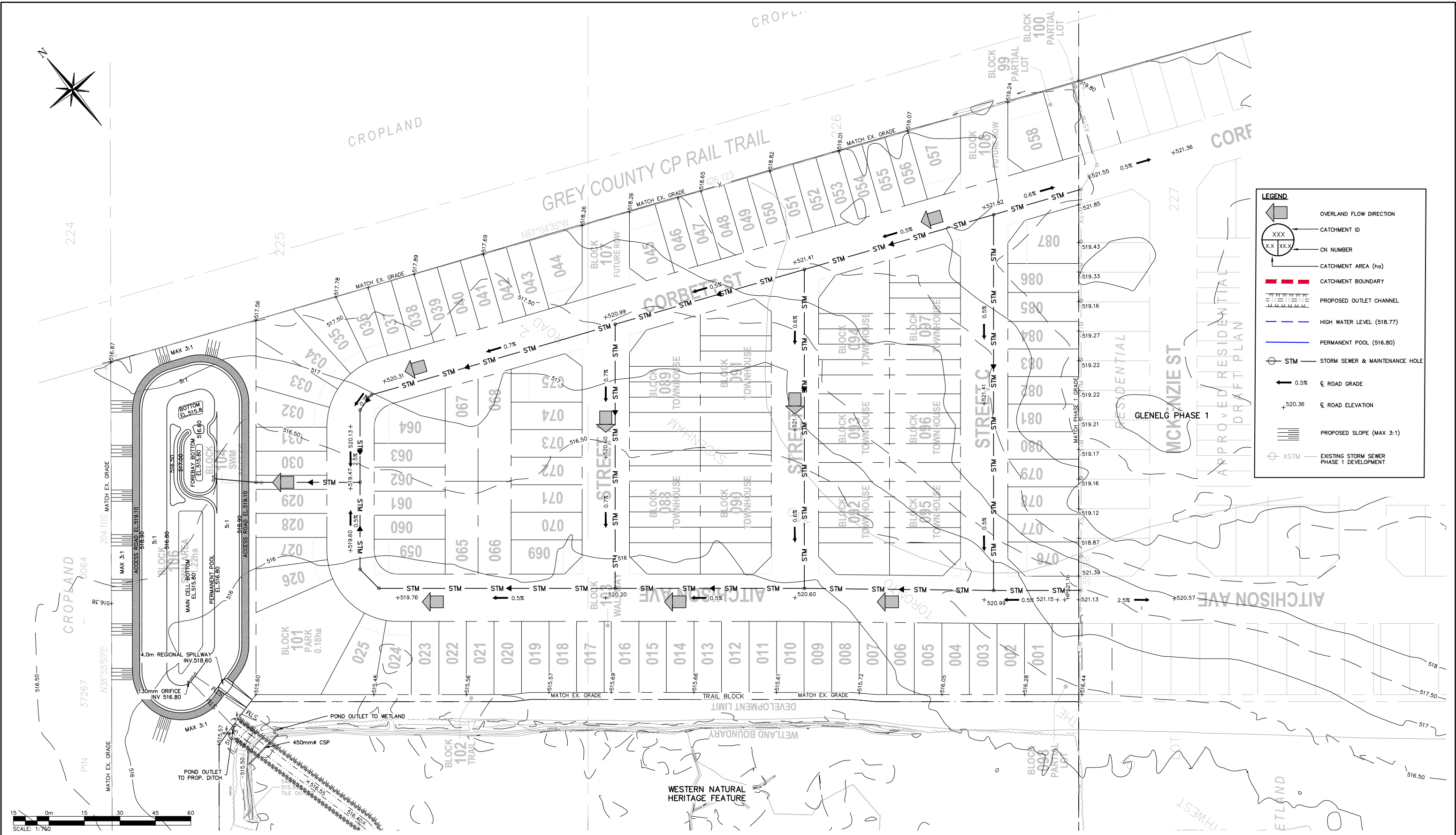
231 GLENELG STREET PHASE 2

2358737 ONTARIO INC.
3621 HIGHWAY 7 EAST, SUITE 503
MARKHAM, ON L3R 0G6
P: (905) 479-9292 F: (905) 429-9165
WWW.FLATOGROUP.COM

FILE NAME	DRAFT PLAN OF SUBDIVISION	DWG No.	1 of 1
SCALE BAR	0 5 10 15 20 25 37.5 50 75 100m		

MEASUREMENTS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

N:\Southgate\231 Glenelg Street - 15184H\Drawings\Draft Plan - Phase 2\CAD\15184H - Draft Plan - Phase 2 - 2021-12-02.dwg



LEGEND

- OVERLAND FLOW DIRECTION
- CATCHMENT ID
- CN NUMBER
- CATCHMENT AREA (ha)
- CATCHMENT BOUNDARY
- PROPOSED OUTLET CHANNEL
- HIGH WATER LEVEL (518.77)
- PERMANENT POOL (516.80)
- STM — STORM SEWER & MAINTENANCE HOLE
- 0.5% — ROAD GRADE
- +520.36 — ROAD ELEVATION
- PROPOSED SLOPE (MAX 3:1)
- XSTM — EXISTING STORM SEWER PHASE 1 DEVELOPMENT

1. THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.

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3. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.

4. DO NOT SCALE THE DRAWINGS.

5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1ST SUBMISSION	30/09/2020
1	ISSUED FOR 2ND SUBMISSION	16/12/2021

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

Project: GLENELG RESIDENTIAL DEVELOPMENT – PHASE 2
TOWNSHIP OF SOUTHGATE

Drawing: GRADING AND DRAINAGE PLAN

CROZIER CONSULTING ENGINEERS

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705 446-3510 T
705 446-3520 F
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Drawn By: J.K./V.P. Design By: J.K./V.P. Project: 1060-5545

Check By: N.O./J.L. Check By: N.O./J.L. Scale: 1:750 Drawing: FIG 3

