URBAN SOLUTIONS
PLANNING & LAND DEVELOPMENT

February 3, 2023 473-23

Via Digital Upload

Attn: Honourable Steve Clark,
Minister of Municipal Affairs and Housing

c/o

Ms. Julianna Zhuo
Municipal Services Office – Central Ontario
777 Bay Street, 16th Floor
Toronto, ON M7A 2J3

RE: Request to Facilitate Inclusion of Lands into Thornton's Settlement Area Boundary
6958 Simcoe County Road 27, Thornton, Simcoe County, Ontario
ERO No. 019-6113

UrbanSolutions Planning & Land Development Consultants Inc. (UrbanSolutions) is the authorized planning consultant acting on behalf of AJGL Group Inc., the registered owner of the subject lands municipally known as 6958 Simcoe County Road 27, Thornton, in the County of Simcoe.

On December 5th, 2022, the Ministry of Municipal Affairs and Housing (MMAH) initiated an invitation for public consultation on the proposed amendments to the County of Simcoe Official Plan via Official Plan Amendment No. 7 – which sets out growth management policies to guide growth and development to the year 2051. The 60-day commenting period closes on February 3, 2023. The subject lands described below are well suited for future growth and intensification, as will be outlined throughout the remainder of this Letter. The purpose of this submission is to recommend specific changes to OPA No. 7 – namely, the inclusion of the subject lands within Thornton's Settlement Area boundary – so that it better aligns with the goals and objectives of the Province.

Site & Neighbourhood Context

The subject property has frontage on Simcoe County Road 27 and borders Thornton's Settlement Area boundary, as outlined on Schedule "A" – Land Use Designations of the Township of Essa Official Plan (Figure 1). The subject site is approximately 30.5 hectares (75.5 acres) in size and is predominantly comprised of vacant agricultural land with a single detached dwelling and accessory structure situated along the eastern boundary.

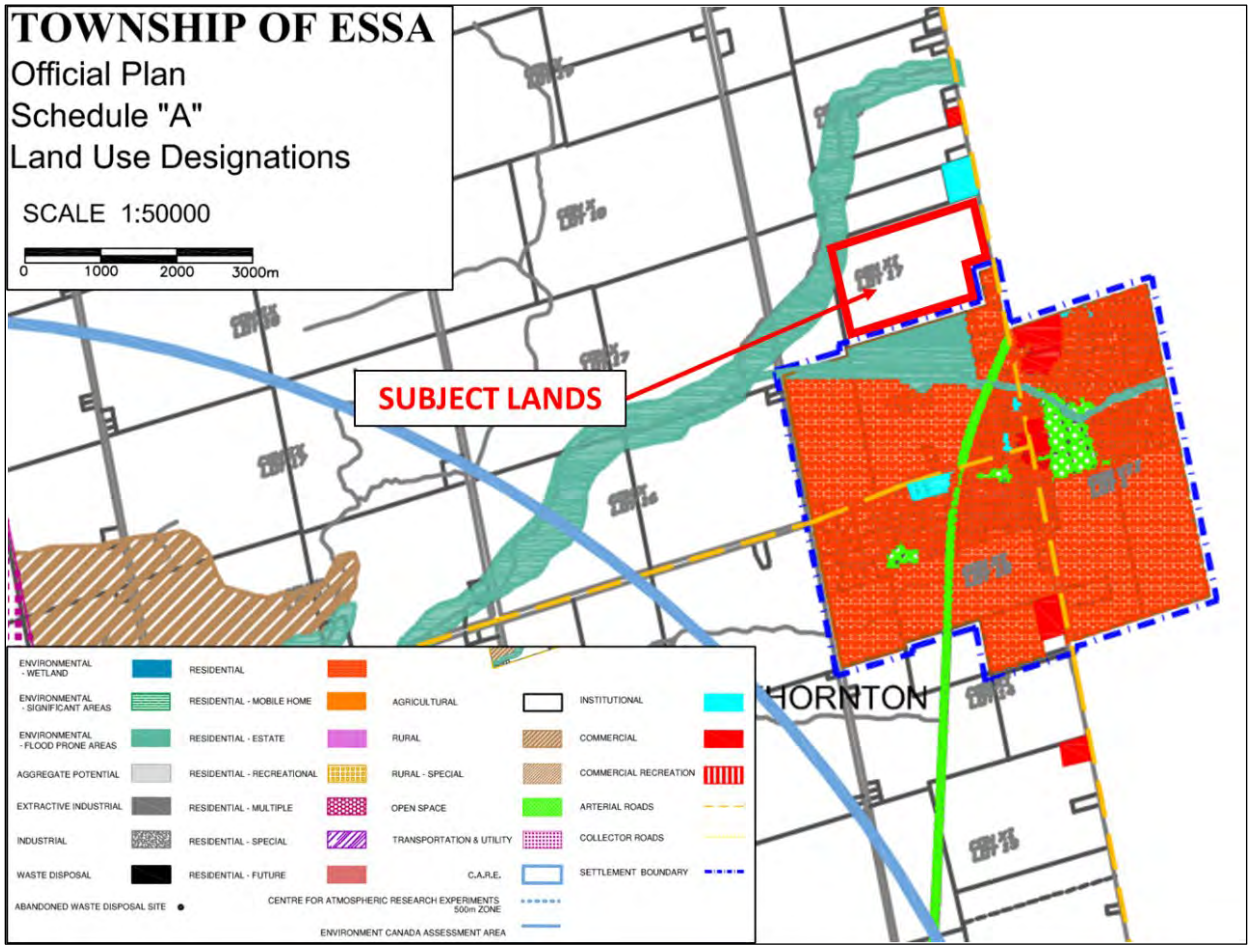


Figure 1: Subject Lands in Proximity to Thornton's Settlement Area Boundary

A variety of land uses surround the subject property. To the north and east are predominantly agricultural lands and to the south are a range of both residential and commercial uses including restaurants, medical offices, a community centre, a public library, and places of worship – all of which are located within Thornton's Settlement Area boundary. Directly to the west of the subject lands is a designated Greenlands area as identified on Schedule 5.1 of the County of Simcoe Official Plan.

Figure 2: Neighbourhood Context Map

Existing Planning Framework

Province of Ontario

To address current housing supply concerns, the Province of Ontario has established the Housing Supply Action Plan and the *More Homes Built Faster Act* has been given Royal Assent. This plan is part of a long-term strategy to help building more homes and make life more affordable for Ontario families.

Growth Plan for the Greater Golden Horseshoe

Being in Simcoe County, the subject lands are subject to the policies of the Growth Plan for the Greater Golden Horseshoe, wherein Schedule 3 of this Plan prescribes a residential population target of 555,000 for the County by 2051.

Simcoe County Official Plan

The subject lands are designated 'Agricultural' and 'Greenlands' on Schedule 5.1 – Land Use Designations of the County of Simcoe Official Plan.

Essa Official Plan

The subject lands are designated 'Agricultural' and 'Environmental – Floor Prone Areas' on Schedule A – Land Use Designations of the Township of Essa Official Plan.

Township of Essa Zoning By-law No. 2003-50

The subject lands are zoned Agricultural (A) in the Township of Essa Zoning By-law No. 2003-50.

Concept Plan

A preliminary Site Plan prepared by Jonathan Weizel Architect dated January 30, 2023 is contained in Appendix B of this Letter. The Plan demonstrates how the subject lands could be developed with 427 modular housing units ranging from approximately 670 to 1,070 square feet in size, a +/- 3.64 hectare sewage treatment plant, outdoor amenity space, and a stormwater management pond. As proposed, these 427 new residential units (which will comprise a mix of 2- and 3-bedroom units) will aid the County in achieving its growth target of 555,000 people by 2051, as established in Section 3.2.4 of OPA No. 7 and on Schedule 3 of the Growth Plan. The modular component of the concept will provide a very affordable housing option for the residents of Simcoe County. Such a proposal can be implemented promptly, as the subject lands are in proximity to a range of municipal infrastructure and services including schools, fire and police services, and other community uses within Thornton's existing Settlement Area boundary.

Further, OPA No. 7 proposes to increase the County-wide minimum Designated Greenfield Area density target from 39 residents and jobs per hectare to 51 residents and jobs per hectare. To achieve this, Table E prescribes a target density of 45 residents and jobs per hectare for Designated Greenfield Areas within Essa. Similarly, OPA No. 7 proposes to increase the County-wide minimum intensification target from 32% to 35%, and establishes an intensification target of 30% for Essa in Table D. As such, the proposed development of the subject lands – to be facilitated through an expansion to Thornton's Settlement Area boundary – would support the achievement of both Provincial and County-wide growth targets.

Background Studies

To inform the proposed concept, the owner retained Gunnell Engineering Limited to perform a Preliminary Onsite Sewage System Assessment, Terrastory Environmental Consulting Inc. to conduct a Preliminary Natural Heritage Constraints Analysis, and Greck & Associates Limited to prepare a Stormwater Management Brief.

Preliminary Onsite Sewage System Assessment – Gunnell Engineering Limited

Gunnel Engineering Limited was retained to complete a Preliminary Onsite Communal Sewage System Assessment (dated January 2023) in support of the above-noted development concept. This Assessment concludes that no major issues associated with the proposed +/- 3.64 hectare on-site communal sewage treatment system are anticipated, and indicates that a future hydrogeological study will determine the environmental conditions that will allow for the proposed development to be in compliance with the MECP Reasonable Use Policy (RUP). A copy of this Assessment is contained in Appendix C of this Letter.

Preliminary Natural Heritage Constraints Analysis – Terrastory Environmental Consulting Inc.

Terrastory Environmental Consulting Inc. was retained to complete a Preliminary Natural Heritage Constraints Analysis, dated January 30, 2023. This Analysis concluded that the majority of the subject property is comprised of tilled agricultural lands which lack natural heritage value and are therefore, unconstrained from a natural heritage perspective. Further, the Analysis confirms that an Environmental Impact Study (EIS) will be required prior to future development, which will characterize the biophysical features and conditions of the subject property and include standard technical recommendations and mitigation measures to minimize the potential for environmental impact, such as appropriate setbacks, a timing restriction on vegetation removal, and inclusion of appropriate stormwater management controls. A copy of this Analysis is contained in Appendix D of this Letter.

Stormwater Management Brief – Greck & Associates Limited

Greck & Associates Limited was retained to prepare a Stormwater Management Brief, dated February 3, 2023. This Brief concludes that the proposed stormwater management pond will meet the Nottawasaga Valley Conservation Authority (NVCA) and Township criteria for water quality, quantity, and erosion. The Brief also indicates that a water balance analysis will be completed in further design stages to determine the feasibility of water balance mitigation strategies. It should also be noted that Section 3.3.19 of the County of Simcoe Official Plan requires the submission of a Stormwater Management Report in support of a future *Planning Act* application, which will address the impacts of the proposed development on stormwater runoff volumes; water quality; erosion and sedimentation; and environmental features. A copy of this Brief is contained in Appendix E of this Letter.

Planning Merit

OPA No. 7 was presented in Simcoe County Staff Report No. CCW – 2022-235 and was adopted by County Council on August 9, 2022 via By-law No. 6977. The purpose and effect of this Amendment is to implement the Phase 1 Growth Management policies and updates to Schedule 5.1 – Land Use Designations as a part of the ongoing Municipal Comprehensive Review (MCR); in order to begin the process of bringing the County's Official Plan into full conformity with the Growth Plan. It should be noted that OPA No. 7 does not propose site-specific settlement area boundary expansions, as such are set to occur through a future MCR Phase 2 Growth Management Amendment.

As the Growth Plan requires the County to plan for 555,000 residents and 198,000 jobs by 2051, Hemson Consulting Ltd. was retained to conduct a Land Needs Analysis (LNA) as a part of the County's MCR, to determine how much additional Designated Greenfield Area land (Settlement Area land outside of the delineated built boundary) is required to achieve the provincial population targets outlined in Schedule 3 of the Growth Plan. As outlined in Table F of OPA No. 7, this analysis concluded that Essa requires an additional 134.8 hectares of Designated Greenfield Area land for community (residential) uses. Accordingly, the inclusion of the +/- 30.5 hectare site with Thornton's Settlement Area boundary would support the achievement of this objective and provide a balanced distribution of the required Settlement Area land throughout Essa and Simcoe County as a whole.

As previously noted, OPA No. 7 also proposes to increase the County-wide intensification target from 32% to 35% and establishes an intensification target of 30% for Essa to further focus growth within municipalities that have delineated built-up areas. As outlined in Staff Report CCW 2022-235 to Committee of the Whole dated August 9, 2022, this change is necessary to achieve the fundamental objectives of the Growth Plan which promote "complete communities" that are compact, pedestrian-oriented, and transit-supportive; as such are generally more efficient to service and rely less on the consumption of additional greenfield land to accommodate growth. The inclusion of the subject lands within Thornton's Settlement Area boundary would provide additional opportunity to accommodate growth associated with this target and prevent the consumption of land that is less suited for urbanization.

In keeping with the Provincial Housing Supply Action Plan, ERO No. 019-6113 presents an opportunity to further revise the County of Simcoe's Official Plan by expanding Thornton's Settlement Area boundary to include the subject lands. While the County has plans to proceed with the next phase of its ongoing MCR process once a decision is reached on OPA No. 7, such is anticipated to be a lengthy and prolonged process. Making this change now, through this ERO, will support the Province's goal of building 1.5 million homes over the next 10 years.

In considering settlement area boundaries, Section 3.2.28 of OPA No. 7 establishes development criteria for additional Designated Greenfield Areas created through Settlement Area expansions. These include:

i. The protection of natural heritage features and areas

Planning Comment: The Planning Act application process will secure the submission of an Environmental Impact Study to build upon the preliminary findings of the Preliminary Natural Heritage Constraints Analysis prepared by Terrastory Environmental Consulting Inc. to the site's developable limits in relation to any existing natural heritage features.

ii. The promotion of coordinated, efficient and cost-effective infrastructure

Planning Comment: As outlined in the Preliminary Onsite Communal Sewage System Assessment prepared by Gunnell Engineering Ltd., the proposed residential development will be serviced by a large on-site communal sewage system, as there are currently no municipal sanitary services available for sewage disposal. Further, the Assessment states that the Ministry of the Environment, Conservation and Parks (MECP) will require a Municipal Responsibility Agreement (MRA) to be executed for the proposed communal services to ensure such are constructed, operated, and maintained in accordance with applicable guidelines and regulations. Further, proposed development of the subject lands with 427 modular housing units will make better use of the surrounding road network.

iii. The promotion of fiscal responsibility

Planning Comment: Once developed, the subject lands will support the long-term economic prosperity of the Province by adding to the overall housing supply to contribute to a diverse workforce. Once

developed, the lands will contribute significantly more to the municipal tax base than the currently underutilized parcel.

iv. The development of compact, complete and healthy communities

Planning Comment: Thornton exhibits many elements of a complete community including convenient access to an appropriate mix of jobs, local services, a full range of housing, and community infrastructure including, schools, recreation and open space for their residents, convenient access to public transportation and options for safe, nonmotorized travel. As such, expanding the Community's Settlement Area boundary to include the subject lands would provide further opportunities to make Thornton a complete community.

Further, Section 3.2.7(d) of OPA No. 7 outlines the following criteria for new development within a Designated Greenfield Area:

i. The proposed development will generally serve as a logical extension to the existing delineated built-up area or already developed designated greenfield areas, is compact and has a mix of uses to allow for the efficient use of land, infrastructure and public service facilities;

Planning Comment: As the subject lands border Thornton's Settlement Area, their development would serve as a logical extension to the existing boundary. Such would also create a new firm Settlement Area boundary to further preserve rural lands within the County that are less suited for growth and intensification.

ii. The proposal will contribute to the availability of a range of housing choices (e.g. density, form, and price) in the designated greenfield area as a whole;

Planning Comment: The proposed development of the subject lands with a mix of 2- and 3-bedroom modular housing units will contribute to a range and mix of housing choices in the area.

iii. All of the other infrastructure and public service facilities required to service the development is available or to be provided, with such infrastructure and public service facilities being used as efficiently as possible; and

Planning Comment: The proposed development of the subject lands will make more efficient use of existing infrastructure and public service facilities than the currently underutilized parcel.

iv. Access is provided in a manner that supports the provision of essential emergency services, active transportation, efficient transportation patterns, and/or linkages with adjacent existing or planned development.

Planning Comment: The subject lands have frontage on County Road 27 which provides direct access to Highway 400 to the North and a number of destinations throughout the GTA to the south. As such, the

proposed development will make more efficient use of the existing road network and support more efficient transportation patterns.

Planning Merit Conclusion

The need for an additional 134.8 hectares of Designated Greenfield Area land for community (residential) uses to accommodate the population and employment targets established in Schedule 3 of the Growth Plan (as well as those established in Sections 3.2.4 and 3.2.5 of OPA No. 7) is confirmed by the results of the Land Needs Assessment conducted by Hemson Consulting Ltd. Given the existing surrounding uses and potential future uses, it is our (UrbanSolutions') opinion that the subject lands represent an ideal location for future growth and intensification through the requested Settlement Area boundary expansion.

In keeping with Provincial objectives, the proposed expansion:

- Will be accommodated by a large on-site communal sewage system;
- Will be developed with a mix of 2- and 3-bedroom dwelling units; and,
- Will accommodate 427 affordable modular housing units, as outlined in Appendix B.

Accordingly, the inclusion of the subject lands within Thornton's Settlement Area boundary as Designated Greenfield Area conforms to and implements both provincial and local objectives and represents good land use planning.

Recommended Changes to the OPA No. 7 and the County of Simcoe Official Plan

Based on the above, UrbanSolutions recommends the following change to the County of Simcoe Official Plan:

1. To amend Schedule 5.1 – Land Use Designations of the County of Simcoe Official Plan to include the subject lands within the 'Settlement Area' designation, as shown on Appendix A.

Thank you for the opportunity to provide these comments. Please feel free to contact the undersigned to discuss the matter further.

Kind Regards,
UrbanSolutions

Matt Johnston, MCIP, RPP
Principal

Matthew LeBlanc, M.PL, BA (Hons)
Planner

cc: AJGL Group Inc. (via email)

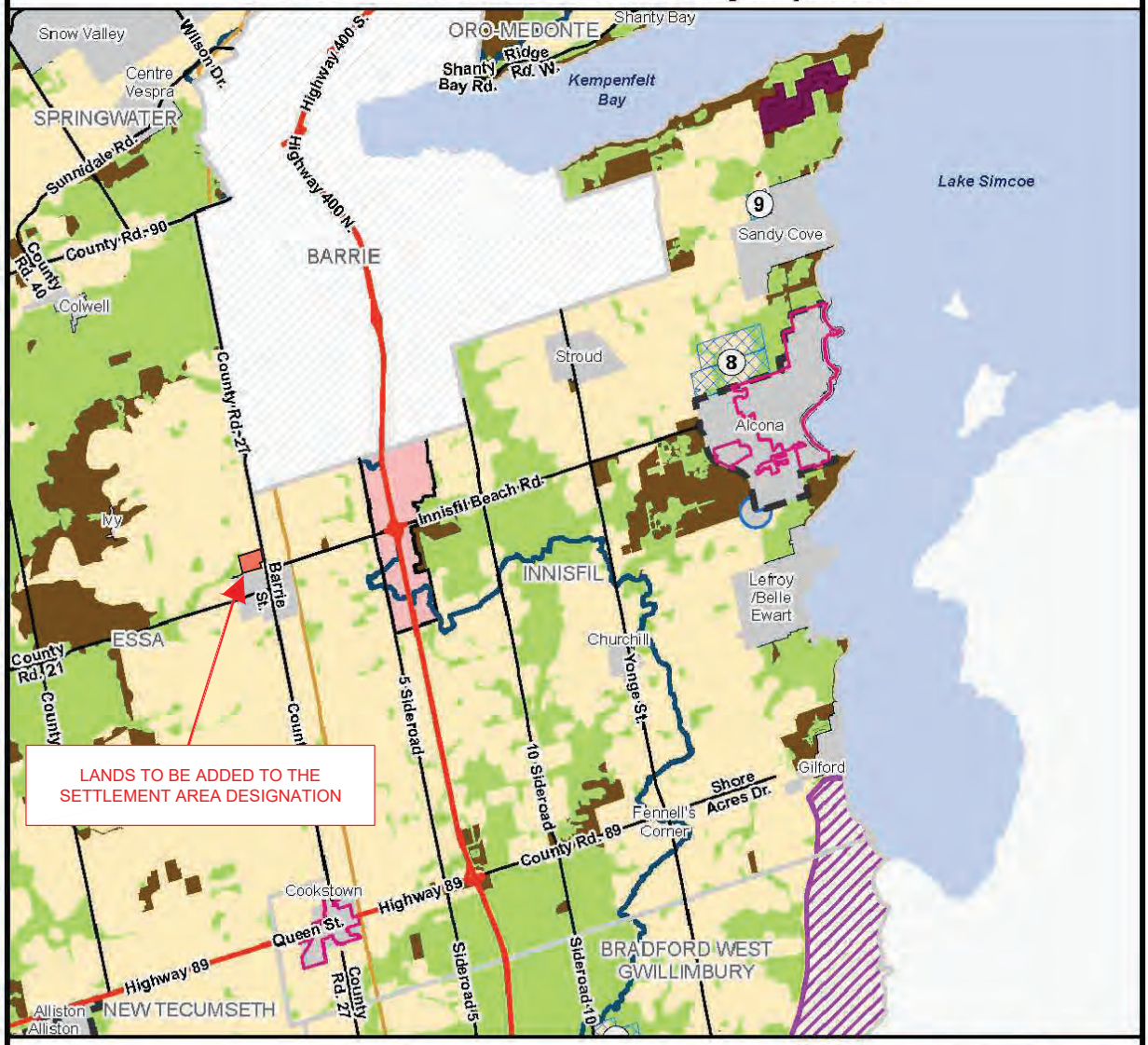
Appendix A – Schedule 5.1 of OPA No. 7

Proposed Changes to Schedule 5.1 – Land Use Designations

Schedule A By-Law No. 6977

Schedule 'A' to Official Plan Amendment No. 7 to the County of Simcoe Official Plan

SCHEDULE 5.1 LAND USE DESIGNATIONS
Alcona Settlement Area Boundary Expansion



Designations

- Under Appeal
- Settlement Boundary Under Appeal
- Agricultural
- Settlement Area
- Strategic Settlement Employment Areas and Economic Employment Districts
- Greenbelt Plan - Protected Countryside
- Greenlands
- Lands Not Subject To Plan
- Rural
- Special Development Area Big Bay Point
- (1) General Location of Site-Specific Appeals
- Settlement Area Boundary Expansion

Reference Data

- Delineated Built Boundary
- Provincial Highway
- County Road
- Trans Canada Pipeline
- Lake Simcoe Protection Plan - Watershed Boundary

0 3 6 Km

N

COUNTY OF SIMCOE
For the Greater Good

GIS
GEOGRAPHICAL INFORMATION SYSTEMS

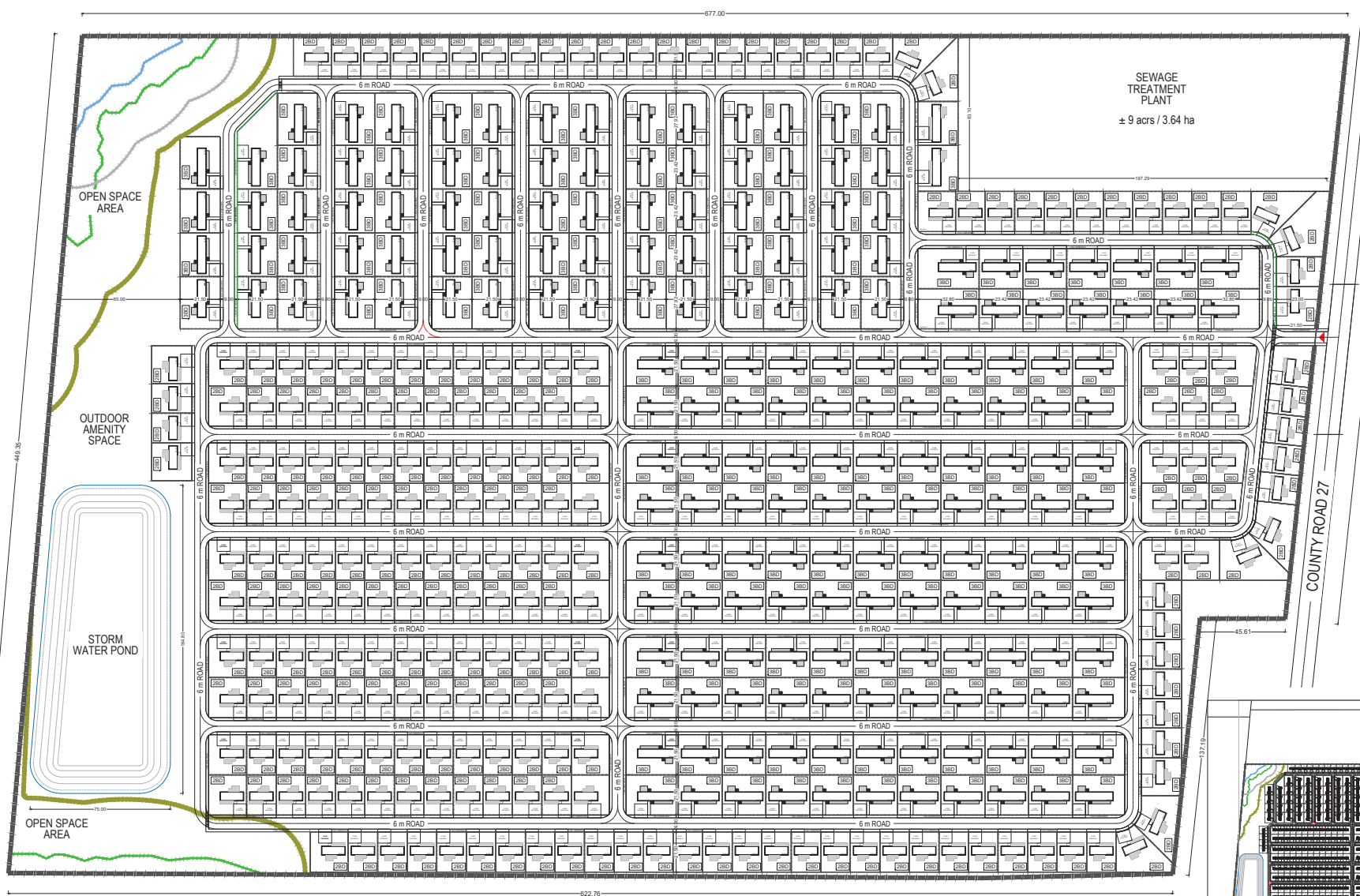
Appendix B – Site Plan

Prepared by Jonathan Weizel Architect

MODULAR HOME DEVELOPMENT

6958 COUNTY ROAD 27, THORNTON, ESSA COUNTY

427 TOTAL HOMES (228-2BD+199-3BD)



SITE STATISTICS		
SITE AREA:	±295 720,06 m²	100%
TOTAL BUILDING AREA:	34 052,40m²	11.53%
228-2BD HOMES (62,43 m²)	14 234,04 m²	4.81%
199-3BD HOMES (99,59 m²)	19 816,41 m²	6.72%
PORCH & STAIRS & DECKS	12 183,42m²	4.11%
228-2BD HORCH (25,65 m²)	5 700,70 m²	1.92%
199-3BD HOMES (22,58 m²)	6 483,42 m²	2.18%
PAVED AREA:	20 788,35 m²	7.03%
PATH AREA:	2854,35 m²	0.97%
DRIVEWAY AREA :	17 934,00 m²	6.06%
LANDSCAPE AREA:	139 040,10m²	47.02%
SOFT LANDSCAPE AREA:	126 964,64 m²	42.93%
HARD LANDSCAPE AREA [1]:	12 075,46 m²	4.09%
OPEN SPACE AREA:	± 14 912,48 m²	5.04%
OUTDOOR AMENITY SPACE :	± 22 014,31 m²	7.44%
SEWAGE TREATMENT PLANT:	± 36 400,00 m²	12.31%
NUMBER OF HOMES (2BD+3BD):	427 (228+199)	
NUMBER OF PARKING SPACES [2]:	427x2=854	

[1] - HARD LANDSCAPE AREA INCLUDES: SIDEWALKS, WALKWAYS & CURBS.
[2] - 2 PARKING SPACES FOR EACH HOMES: 2 DRIVEWAY

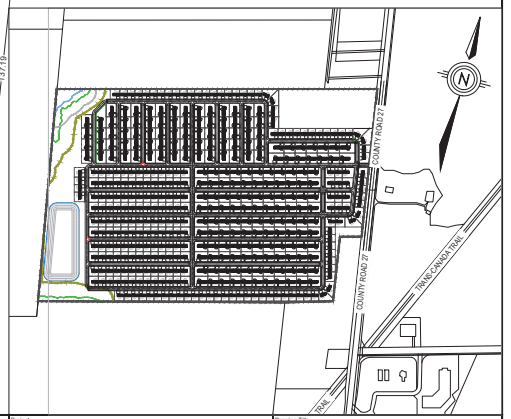
PARKING REQUIRED:
2 PARKING / HOME
1.4 X 427 = 598

THE TWO BEDROOM UNIT IS ON A LOT THAT IS 15.80 m WIDE x 21.50 m DEEP, EXCEPT END LOTS ARE 20.30 m WIDE (6.0 m EXTERIOR SIDE YARD REQUIRED)
THE THREE BEDROOM UNIT IS ON A LOT THAT IS 23.42 m WIDE x 21.50 m DEEP, EXCEPT END LOTS ARE 29.92 M WIDE (6.0 M EXTERIOR SIDE YARD REQUIRED)

STORM WATER POND AREA : 11 162,25 m2

ROAD RIGHT-OF-WAY AREA (WIDE-9m) : 50 542,10 m2

KEY PLAN



No.	Revisions	Date
1	Issued for Site Plan Approval	Feb. 02, 2023

Note

THE GENERAL CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ARCHITECT
DO NOT SCALE THE DRAWINGS
THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES UNTIL SIGNED BY THE ARCHITECT

SHEET PRINT SIZE 24" x 36"

36 JANESVILLE ROAD
Thornhill, Ontario L4J 6Z9
Telephone.....(905) 707-1996
Facsimile.....(905) 707-3474

AS ASSOCIATE OF ONTARIO ARCHITECTS
JONATHAN S. WEIZEL LICENCE 3237

JONATHAN WEIZEL ARCHITECT

Project: MODULAR HOME DEVELOPMENT
6958 COUNTY ROAD 27, THORNTON, ESSA COUNTY

Drawing Title: SITE PLAN

Drawn by:	GN	Date	Project Number	Drawing Number
Checked by:	JW	JAN 30, 2023	223/01	A-001
		Scale: 1:750		

AS 1189x841

Appendix C – Preliminary Onsite Communal Sewage System Assessment

Prepared by Gunnell Engineering Ltd.

PRELIMINARY ONSITE COMMUNAL SEWAGE SYSTEM ASSESSMENT

Proposed Residential Subdivision

6958 County Road 27
Essa Township, Simcoe County

January 2023

Prepared for: **AJGL Group Inc.**

Gunnell Engineering Ltd.
File:D3618

1 INTRODUCTION

Gunnell Engineering Ltd. has been retained by AJGL GROUP INC. to undertake a preliminary onsite communal sewage system assessment for a proposed residential subdivision to be located at 6958 County Road 27, Essa Township, Simcoe County.

This assessment and reporting is in support of your proposed ERO application, to enable the lands to be included for residential development with the Municipal Official Plan.

The proposed residential development will be required to be serviced by a large on-site communal sewage system designed to accommodate the daily design sewage flows based on proposed property usage, as there are currently no municipal sanitary services available for sewage disposal. When the daily design sewage flow is 10,000 L/day or less, the jurisdiction is with the Township of Essa building department. For daily design sewage flows greater than 10,000 L/day, which will be the case for this proposed development, the approval authority is the Ministry of the Environment, Conservation and Parks (MECP).

The current concept plan includes for a modular home development of approximately 350 residential units; with a mix of two and three bedroom units, ranging from 700 ft^2 to 1,000 ft^2 homes, to be serviced by a large communal sewage system. For MECP sewage system designs, with a daily design sewage flow greater than 10,000 L/day, the requirements of Chapter 22 – *Large Subsurface Sewage Disposal Systems*, of the MOE Design Guidelines for Sewage Works must be adhered to. This reporting will outline such requirements that will form part of a future site plan application, including a hydrogeological investigation and a MECP Reasonable Use assessment to determine nutrient treatment requirements for phosphorous and nitrate reduction.

The scope of this preliminary onsite communal sewage system assessment is to assess the overall property to accommodate a large communal sewage system and to undertake an evaluation of the daily design sewage flows and size of the dispersal beds that will be required to service the proposed residential subdivision. For the purpose of this exercise, an assumption has been made on the proportioning between two-bedroom and three-bedroom units. This assessment has been based on 200 two-bedroom and 150 three-bedroom residential units, for a total of 350 units.

A municipal drinking water supply is proposed to service this residential development.

2 SITE CHARACTERISTICS

The Site is located at 6958 County Road 27, Township of Essa, Simcoe County. The 31 hectare (75.5 acre) site borders the Thornton Urban Boundary to the south. The Site is designated as 'Agriculture' in the Essa Official Plan and the Simcoe County Official Plan. The Site is currently being utilized for agricultural purposes and is surrounded mainly by agricultural land uses. Refer to the attached aerial photo mapping of the property.

Drainage

Thornton Creek is situated on the adjacent property to the west. The Site is partially regulated by the Nottawasaga Valley Conservation Authority (NVCA), with a portion of the north-east corner of the property containing a Significant Groundwater Recharge Area. A permit from the Conservation Authority will be required prior to any construction at the Site. See the attached NVCA regulations mapping for the property for reference. The NVCA regulation mapping also identifies a Well Head Protection Zone, located south of the subject property.

The site topography gently slopes from east to west and it is anticipated that surface watercourse flows, both surface runoff and sub-surface water, flows in a general east to west direction. The direction of groundwater flow will ultimately be confirmed in a future hydrogeological investigation.

Native Soils

Based on our initial research, and our previous projects in the general area of Thornton, the soils are classified as 'Bondhead Sandy Loam' soils (Ontario Soil Mapping). Bondhead Sandy Loam is classified within hydrologic soil group 'AB'. Group A soils represent material which have low runoff potential and high infiltration rates even when thoroughly wet. They consist of deep, well to excessively drained sand or gravel and have a high rate of water transmission. The Group B soils represent material which has a moderate infiltration rate when thoroughly wet and consists of moderately deep to deep, fine to coarse textured soil.

The subject property is located within the Peterborough Drumlin Field physiographic region as described by Chapman and Putnam (1984). The drumlins that occur within this region display varying morphologies, ranging from very well-developed drumlins to drumlinoid hills. Drumlins range from a few metres to more than 60 m in height, and are composed primarily of Newmarket Till. The drumlins are composed of a stone-rich slightly silty to fine to medium-grained sand till.

Based on the above noted soils description for the area, we are currently assessing an anticipated soil percolation rate of T = 25 min/cm, for on-site sewage system design.

Site Inspection

A site visit to the property was undertaken on January 27, 2023, which confirmed the farming nature of the property, with woodlands along the westerly property boundary. There are several residences located adjacent to County Road 27. Well locations will require to be located, to ensure minimum OBC setback clearances are provided to the new communal sewage system.

3 PRELIMINARY SEWAGE SYSTEM DESIGN CONCEPT

3.1 Communal Sewage System with Tertiary Treatment

It is proposed that a large communal sewage system, permitted by the Ministry of the Environment, Conservation and Parks (MECP), will service this proposed residential development.

3.1.2 Sewage Treatment and Disposal

For the purpose of this evaluation, the proposed sewage system will consist of a tertiary treatment system (i.e. MBBR technology) with discharge to a series of in-ground or partially in-ground Type 'A' Dispersal Beds, designed with an estimated native soil percolation rate ('T' time) of 25 min/cm.

As noted earlier in this report, the high level total number of modular home residential units will be in the range of 350, each with living areas of 700 ft^2 to 1000 ft^2. These will include a mix of two-bedroom and three-bedroom units. At this time, we have assumed 200 two-bedroom units and 150 three-bedroom units. The design of the onsite sewage system can be adjusted in the future, should there be either a reduction or increase in the number of residential units.

The proposed size of the dispersal bed has been calculated based on the following MECP / Ontario Building Code (OBC) flow analysis:

- 350 Residential Modular Homes / Units
  - Assume 200 Units: 2-Bedrooms @ 1,100 L/day = 220,000 L/day
  - Assume 150 Units: 3-Bedrooms @ 1,600 L/day = 240,000 L/day

Total Daily Design Flow (Q) = 460,000 L/day

- Assessed Native Soil Percolation Rate: ('T' time) = 25 min/cm (based on Ontario Soil Mapping = 'Bondhead Sandy Loam')

- Assume Tertiary Treatment Sewage Plant

  Field Area = Q T / 400
  = 460,000 x 25 / 400
  = 28,750 m^2
  + 25% for layout / sewage treatment plant / tanks, etc.
  = 36,000 m^2 (approximately 9 Acres)

Given the smaller sized residential units, a reduction of flows may be possible, subject to a future review with the MECP. Initially, the MECP will most likely require a reserve land area allocated for the sewage system, based on the 460,000 L/day sewage flows.

At this time, it is assumed that OBC Type 'A' Dispersal Beds will be utilized to receive the treated effluent. Alternative types of septic fields are possible (i.e. Shallow Buried Trench fields), that would reduce the required land area. A detailed on-site septic test pit investigation will be required to determine and more accurately assess the soil percolation rate ('T' time) and groundwater conditions, prior to selecting the most appropriate type of septic field for this project.

Based on the above noted calculations, the land area required for the sewage treatment system would be in the range of 36,000 m^2 (approximately 9 acres). Based on the anticipated topography and sub-surface water flows (east to west), the proposed septic fields should generally be located at the higher ground elevation east-end portion of the property. In terms of the septic system layout, multiple septic field layouts are possible (i.e. 2, 4, or 8 septic bed configurations), that would be rectangular in shape. This would largely be determined once a proposed development site plan has been prepared.

Based on the attached regulations mapping from the Nottawasaga Valley Conservation Authority (NVCA), the proposed septic fields should be situated outside of the noted groundwater recharge area at the north-east corner of the development site and away from any surface water features and neighorouring wells.

4.0 SEWAGE IMPACT STUDY

A ground water assessment is typically evaluated within the scope of the MECP *Reasonable Use Policy* (RUP Procedure B-7-1), i.e. for individual home and septic systems. The RUP describes acceptable levels of parameters (i.e. nitrates and phosphorous) that are permitted to reach the downgradient property boundary in the ground water regime. As noted earlier, a hydrogeological assessment will be required to confirm groundwater flow direction, provide a RUP analysis to determine the proposed nutrient levels for nitrates and phosphorous, and will confirm that the proposed sewage system will not have any negative impacts on the wellhead protection zone, located south of the subject property and the Significant Groundwater Recharge area located on the north-east corner of the property.

5.0 MUNICIPAL RESPONSIBILITY AGREEMENT (MRA)

Given the nature of the proposed residential development, the MECP will require a Municipal Responsibility Agreement (MRA) to be executed for the proposed communal services.

Municipal Responsibility Agreements (MRA) are legal agreements between the municipality and developer, which stipulate the conditions under which communal sewage system services will be constructed, operated and maintained. Municipal Responsibility Agreements form the basis for a preventative mechanism by establishing responsibilities for proper construction, operation, maintenance and management practices, by providing up-front secured funds and on-going fund accumulation for both short term repairs / remedial measures and long term major upgrades / replacement that may be necessary in the event of default, to ensure the long-term viability of the sewage system services, and protection of the environment and public health.

6.0 SUMMARY

From a sewage system standpoint, we do not anticipate any major roadblocks for the lands to accommodate the proposed on-site communal sewage treatment system to service the proposed residential development.

The future hydrogeological study will determine the environmental conditions that will allow for the proposed residential development to be in compliance with the MECP Reasonable Use Policy

(RUP) and without adverse impacts to the local groundwater regime and adjacent surface watercourses, i.e. nitrate and phosphorous reduction.

Our assessment is based on a conservative native soil percolation rate and therefore conservatively sized dispersal bed. The exact location of the dispersal bed system and the percolation rate used in the final design for each bed is to be confirmed during the detailed design stage.

Should there be any questions regarding the above preliminary sewage system assessment, please feel free to contact our office.

Yours sincerely,
GUNNELL ENGINEERING LTD.

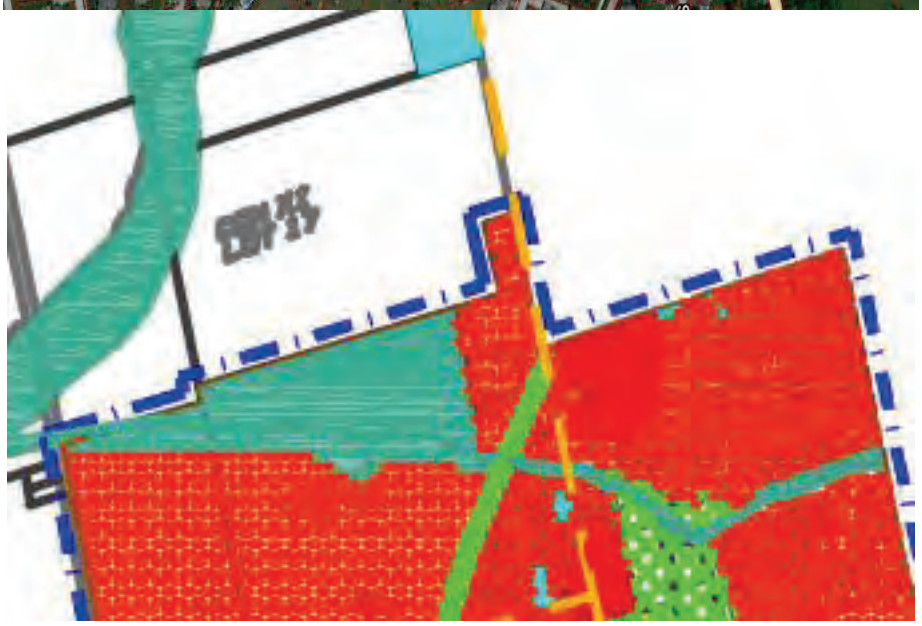
Eric Gunnell, P.Eng

Attachment:

- Aerial Photo Mapping of Subject Property
- Nottawasaga Valley Conservation Authority Regulation Mapping

6958 County Road 27, Essa

- 75.5 acre property bordering the Thornton Urban Boundary
- Designated Agriculture in the Essa Official Plan and the Simcoe County Official Plan
- Currently the property is being farmed



Nottawasaga Valley Conservation Authority

Property Screening Report

16-Jan-2023

Information Resources for Regulated Properties

Do I need a permit?

Submit a Property Inquiry

Google Driving Directions

Info Regarding Covid-19

Email the Regulations Department
permits@nvca.on.ca

NVCA Contact Information

(705) 424-1479

8195 8th Line,
Utopia, ON L0M 1T0

www.nvca.on.ca

Monday to Friday
8:30 a.m. to 4:30 p.m.
except between 12:00 p.m. - 1:00 p.m.

Appendix D – Preliminary Natural Heritage Constraints Analysis

Prepared by Terrastory Environmental Consulting Inc.

February 3, 2023
Project No.: 23003

AJGL Group Inc.
425 Alness Street
North York, ON M3J 2T8
jamie.erlick@gmail.com

SUBJECT: Preliminary Natural Heritage Constraints Analysis
6958 County Road 27
Community of Thornton, Township of Essa

Terrastory Environmental Consulting Inc. (hereinafter "Terrastory") was commissioned to undertake a preliminary assessment of natural heritage constraints and considerations at the above-captioned location (hereinafter "Subject Property") in Thornton (Township of Essa). Mapping which indicates the preliminary biophysical conditions of the Subject Property is provided in **Figure 1**.

EXISTING BIOPHYSICAL CONDITIONS

A Terrastory Ecologist (C. A. Wegenschimmel) visited the Subject Property on 18 January 2023 under winter conditions (i.e., snow present). The Subject Property was found to be comprised primarily of tilled agricultural lands (planted in corn and/or soybeans in 2022), which offers negligible natural heritage value. A stand of planted White Spruce (*Picea glauca*) along with Sugar Maple (*Acer saccharum*) and Eastern White Pine (*Pinus strobus*) encircles the existing residence near County Road 27. Naturalized lands within the Subject Property are generally contained within a broad, wooded riparian area associated with Thornton Creek to the west, which extends slightly into the northwest and southwest corners of the Subject Property (see **Figure 1**).

The northwest corner of the Subject Property is comprised of a mixed treed swamp (i.e., wetland) dominated by Balsam Fir (*Abies balsamea*), Eastern White Cedar (*Thuja occidentalis*), and White Birch (*Betula papyrifera*). Marsh Fern (*Thelypteris palustris*), Sensitive Fern (*Onoclea sensibilis*), Purple-stemmed Aster (*Symphyotrichum puniceum*), and a variety of sedges (*Carex* spp., not identifiable during winter conditions) were documented in this area. The wetland appears to extend near (but does not directly abut) the edge of the farm field (see **Figure 1**). Note that confirmation of wetland boundaries must be undertaken during the appropriate season (i.e., approximately June to September) and may require verification by agency staff. A narrow fringe of moist woodland comprised of Eastern White Cedar and Yellow Birch (*Betula alleghaniensis*) occurs in this area, the dripline of which was delineated by Terrastory.

A mature mixed forest extends very slightly into the southwest corner of the Subject Property. This forest contains Eastern Hemlock (*Tsuga canadensis*), American Beech (*Fagus grandifolia*), Sugar Maple (*Acer saccharum*), White Ash (*Fraxinus americana*), and Eastern White Pine. Evidence of foraging by Pileated Woodpecker (*Dryocopus pileatus*) was noted, along with large snags/cavity trees which could support roosting by bats or nesting by various bird species.

A narrow hedgerow containing Black Locust (*Robinia pseudoacacia*), Red Oak (*Quercus rubra*), and hawthorn (*Crataegus* spp.) barely extends into the Subject Property from the west. This narrow sliver of hedgerow was found to be distinct (i.e., separate) from the broader woodland to the west.

No surface water drainage features (e.g., watercourses, swales) were documented during the site assessment, suggesting that precipitation infiltrates into the surficial soils and/or runs off as sheet flow within the site. Surface water is primarily conveyed in a westward or southwestward direction towards the adjacent natural lands comprising the Thornton Creek riparian zone.

No Endangered Threatened species (e.g., Butternut) or Significant Wildlife Habitat (SWH) were confirmed during the site assessment.

SIGNIFICANT NATURAL FEATURES

Terrastory has confirmed the presence of a wetland (northwest corner of the Subject Property) and Significant Woodland (northwest and southwest corners of the Subject Property) through this preliminary study (see **Figure 1**). Two (2) watercourses (Thornton Creek and an "Unnamed Tributary") flow westward through Adjacent Lands only (see **Figure 1**).

A conceptual 30 m setback has been applied to both the wetland boundary and dripline of the Significant Woodland per **Figure 1**. The 30 m dripline setback extends beyond the 30 m wetland setback and forms the greatest natural heritage constraint limit in both the northwest and southeast corners of the Subject Property. These 30 m setbacks are consistent with draft policies proposed by Simcoe County (not yet approved by MMAH) and generally reflect the draft "Proposed Refined Natural Heritage System for the Growth Plan Overlay" recommended by the County through their Municipal Comprehensive Review (MCR) process. The 30 m wetland setback also reflects NVCA Policy 4.7.4.2.1(1) pursuant to their Planning and Regulation Guidelines (August 28, 2009). Note that setback refinements may be considered through a future development application.

In addition to the wetland and Significant Woodland noted above, other overlapping significant natural features may also be present within or adjacent to the Subject Property, particularly Species at Risk (SAR) habitat and/or Significant Wildlife Habitat (SWH). Should the existing residence on-site require demolition to support future development, an assessment of this building as habitat for Endangered bats (i.e., roosting) and/or Chimney Swift (i.e., roosting/nesting) would be recommended. Additional candidate habitats for SAR and/or SWH would likely be contained within the wetland and/or Significant Woodlands as described above and shown on **Figure 1**.

NATURAL HERITAGE POLICY CONTEXT

There is an overlapping municipal, provincial, and federal policy framework respecting the protection of natural heritage features and areas across southern Ontario. These requirements include objectives, policies, and directives which are principally contained in federal and provincial statutes, regulations, policy statements, Official Plans, and guidance documents.

The Subject Property is zoned "Agricultural" (A) pursuant to Schedule A of the Township's Zoning By-law 2003-50. There are no "Environmental Protection" (EP) zones mapped from within the Subject Property; however, a portion of the natural area to the west is zoned EP per Schedule C (Thornton) of Zoning By-law 2003-50. The Subject Property is primarily designated "Agricultural" per Schedule A of the Township's Official Plan (OP), while an "Environmental – Flood Prone

Area" is shown from the northwest corner of the Subject Property. The Subject Property is also primarily designated "Agricultural" per Schedule 5.1 of Simcoe County's OP and contains a "Greenlands" designation which is associated with the natural area flanking Thornton Creek. The Greenlands designation appears to be confluent with Terrastory's preliminary significant natural feature mapping extending into the northwest and southwest corners of the Subject Property (see **Figure 1**).

Portions of the Subject Property appear to overlap with the regulatory jurisdiction of the Nottawasaga Valley Conservation Authority (NVCA). Based on mapping provided by NVCA (see **Appendix 1**), the northwest corner of the Subject Property is subject to three separate hazards: 1) slope erosion, 2) floodplain, and 3) wetland interference. While sloped areas were documented in this area, these were generally less than 3H:1V; confirmation of the presence or absence of a slope hazard must be made by a qualified geotechnical professional. The flood hazard associated with Thornton Creek appears to reflect the 275.5 metre above sea level (masl) contour; confirmation of the floodplain limit may require additional review/modelling by a water resources engineer and may also require updated elevation data (e.g., collected through a topographic survey). NVCA regulates an area of 120 m (i.e., "area of interference") for all wetlands greater than 2 ha.

Additional floodplain hazards are mapped by NVCA in the south-central portion of the Subject Property. As described above, there are no watercourses (i.e., surface water drainage features with a discrete bed and banks) flowing through the Subject Property; absence of a watercourse would in turn indicate absence of a floodplain hazard. This suggests that NVCA's regulation mapping is either outdated (i.e., based on site conditions that are no longer applicable) or inaccurate. The floodplain hazard associated with the Unnamed Tributary does not extend onto the Subject Property (based on current mapping) and appears to be below the 278 masl contour. Further discussion with NVCA is recommended to clarify regulated area limits and future hazard study requirements (e.g., slope stability assessment, floodplain modelling). At a minimum, given that NVCA regulated areas extend 120 m from wetlands greater than 2 ha, permission from NVCA to construct any future subdivision within the Subject Property would be expected.

As noted above, portions of the Subject Property are proposed to be included in the new County Natural Heritage System (NHS) as defined through the MCR. The draft County NHS mapping (which builds on current Growth Plan NHS mapping) is available for public-review and comment. Terrastory notes that the County mapping appears to incorporate a 30 m setback from the hedgerow in the central-western portion of the Subject Property, which (based on currently available information) does not accurately reflect the limit of any significant natural feature. The significant natural features (plus 30 m setbacks) mapped by Terrastory in the northwest and southwest corners of the Subject Property through this study appear to generally align with the proposed new County NHS mapping.

CONCLUSIONS

The results of this preliminary natural heritage constraints analysis are summarized as follows:

- The majority of the Subject Property is comprised of tilled agricultural lands (planted in corn/soybeans in 2022) which lack natural heritage value and are therefore unconstrained from a natural heritage perspective.

- A wetland and Significant Woodland are present in the northwest corner of the Subject Property, while a Significant Woodland is present in the southeast corner of the Subject Property. Additional significant natural features (e.g., habitat for SAR and SWH) may also overlap with these features.
- Both the wetland and Significant Woodland have been afforded a conceptual 30 m setback in **Figure 1** which reflects County and NVCA policies; consideration for any setback refinements may occur through a future and comprehensive natural heritage study (e.g., Environmental Impact Study).
- Confirmation of wetland boundaries must be undertaken during the appropriate season (i.e., approximately June to September) and may require verification by agency staff.
- Should the existing residence on-site be demolished to support future development, an assessment of this building/structure as habitat for Endangered bats (i.e., roosting) and/or Chimney Swift (i.e., roosting/nesting) is recommended.
- NVCA has mapped a watercourse and floodplain through the south-central portion of the Subject Property (see **Appendix 1**); this feature/hazard appears absent (further discussion with NVCA is recommended).
- The northwestern portion of the Subject Property is subject to three partially overlapping hazard areas/allowances (slope, floodplain, wetland interference); as such, a future subdivision development within the Subject Property is expected to require permission from NVCA to proceed.

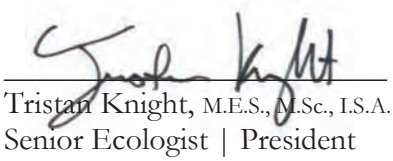
Should any future development activities for the lands be proposed, an Environmental Impact Study (EIS) will be required to comprehensively characterize the biophysical features and conditions of the Subject Property, particularly the wetland and Significant Woodlands. At a minimum, the EIS would include standard technical recommendations and mitigation measures to minimize the potential for environmental impact, such as (among others) appropriate setbacks, a timing restriction on vegetation removal (to protect nesting birds and roosting bats), and inclusion of appropriate stormwater management controls. Verification of the wetland boundaries during the appropriate season (i.e., approximately June 1 to September 30) should be expected.

This letter provides a preliminary summary of the natural heritage conditions and expected constraints within the Subject Property. Additional constraints (e.g., natural hazards, groundwater recharge areas) pertaining to other technical disciplines may also influence the amount of area available for future development.

Should you have any questions or require further clarification regarding the contents of this letter, I would be pleased to discuss them further and can be reached by phone (905.745.5398) or email (tristan@terrastoryenviro.com).

Regards,

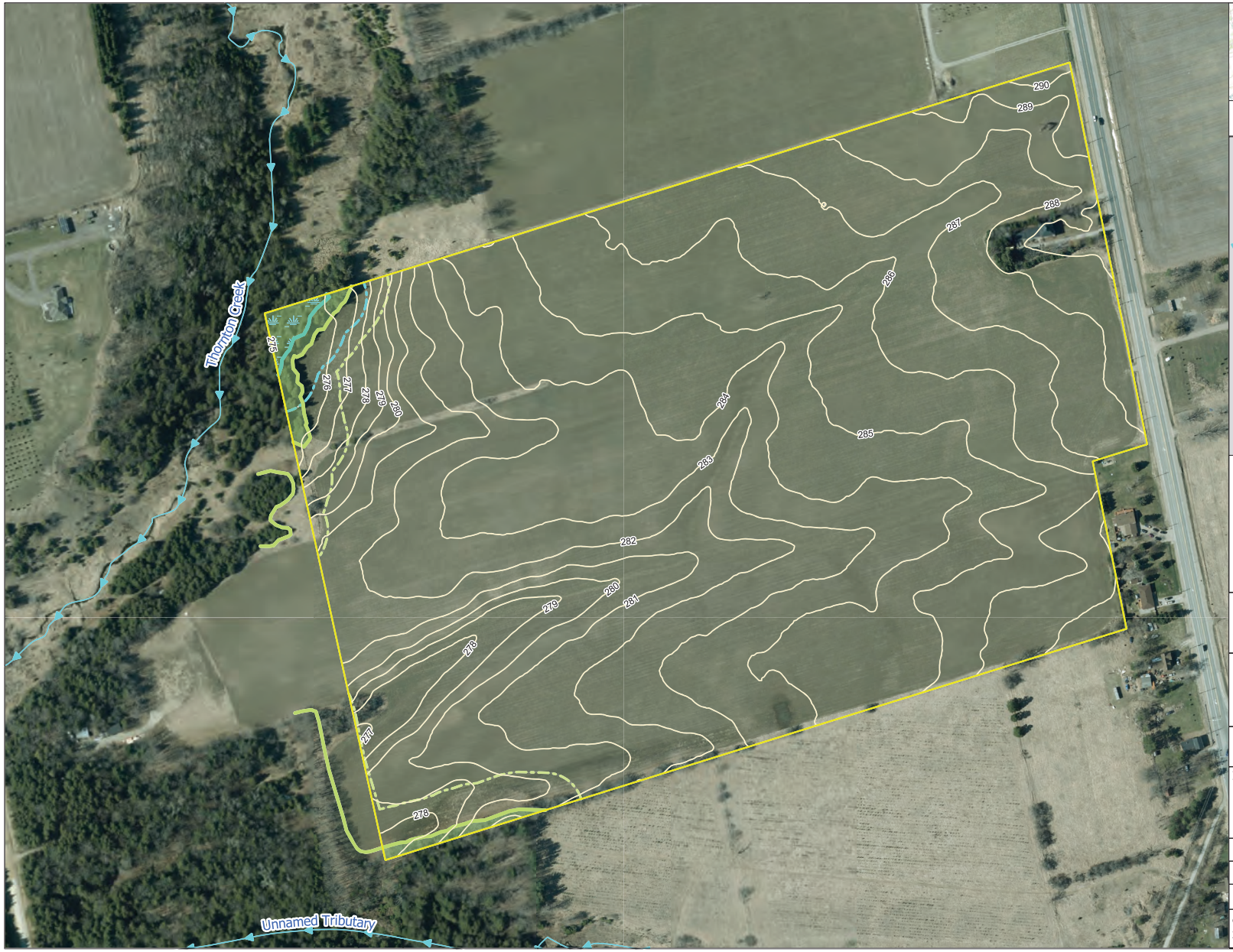
Terrastory Environmental Consulting Inc.



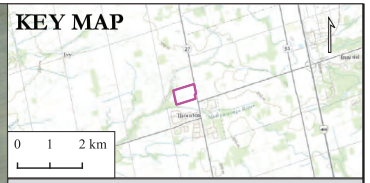
Tristan Knight, M.E.S., M.Sc., I.S.A.
Senior Ecologist | President

STATEMENT OF LIMITATIONS

This report has been prepared by Terrastory Environmental Consulting Inc. (hereinafter "Terrastory") for the client. All information, conclusions, and recommendations contained in this report are subject to the scope and limitations set out in the agreement between Terrastory and the client and qualifications contained in this report. This report shall not be relied upon by any third parties without the prior written consent of Terrastory. Terrastory is not responsible for any injury, loss, or damages arising from improper use of this report by third parties. Excerpts of this report or alterations to this report taken without the authorization of Terrastory invalidates the report and any conclusions therein.



KEY MAP



Legend

Area of Assessment
- Subject Property

Biophysical Features and Conditions
- Topographic Contours (1 m; DTM-derived)
- Surface Water Drainage Features

Significant Natural Features - Terrastory
- Woodland Dripline
- Wetland Boundary per OWES
- Wetland
- Significant Woodland

Natural Feature Setbacks Prescribed by Policy
- Wetland Boundary + 30 m
- Signficant Woodland Dripline + 30 m

SPECIFIC NOTES:
-All natural feature extents and boundaries depicted on this figure have been identified based on existing information and one (1) site visit conducted in January 2023. Updates to the information shown herein may be required based on the results of more detailed site level information (e.g., EIS) collected during the appropriate season.
-Additional natural features occur (or have the potential to occur) on the Subject Property apart from those shown on this figure; see report text for further details.

GENERAL NOTES:
-Features depicted herein should not be used in place of a professional survey.
-Numeric scale is for a 11x17 inch print.

TERRASTORY
environmental consulting inc.
info@terrastoryenviro.com 905.745.5398

N | 1:3,000 | 0 25 50 75 100 m

Location:
6958 County Road 27,
Thornton (Township of Essa)

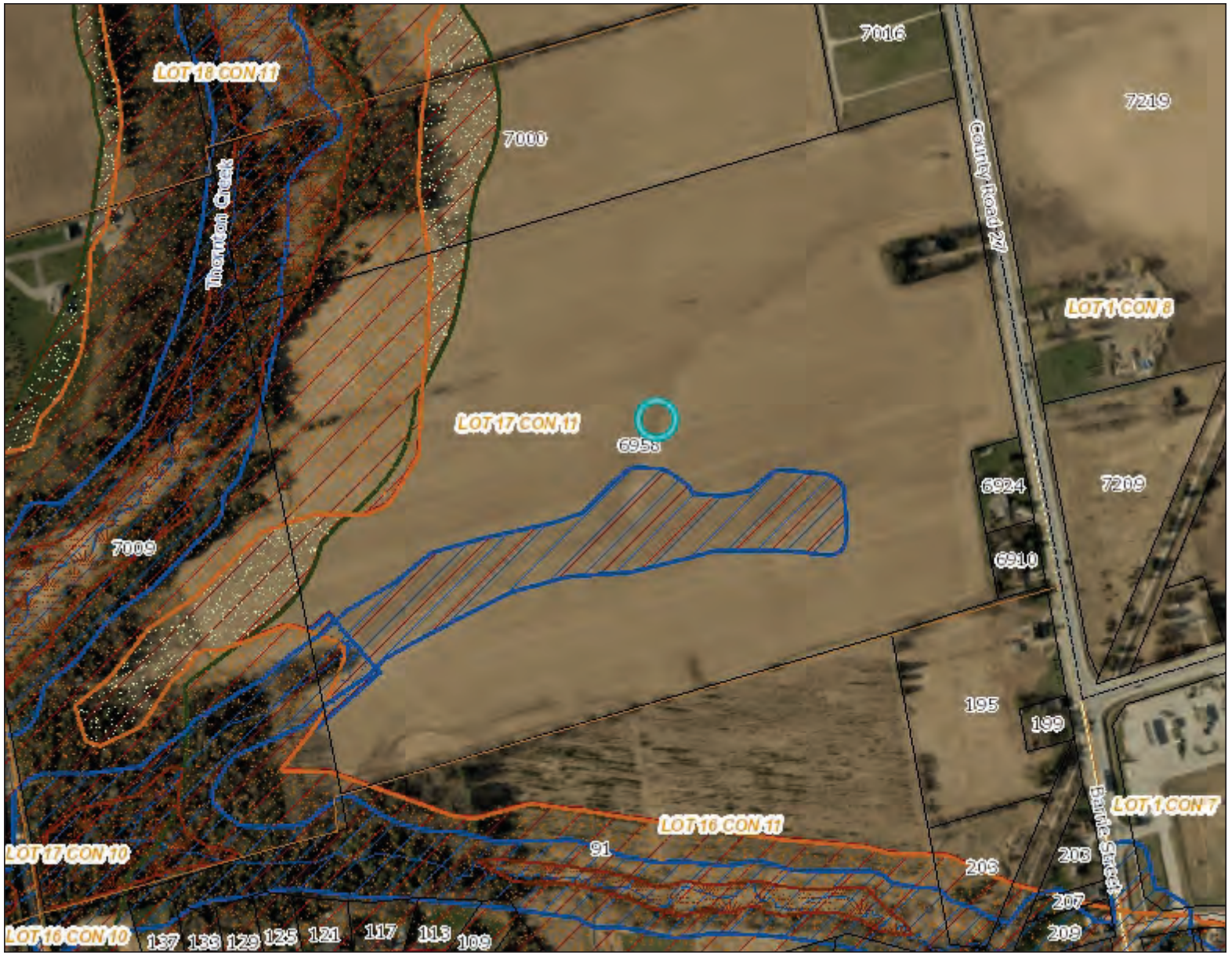
Project No.: 23003	**Figure 1:** Prelim. Significant Natural Feature Mapping
Date: 2023-01-30	
By: TK **Checked:** --	
Orthophotograph Date: 2018 (Simcoe Maps)	

C:\TS\Terrastory\Terrastory - Documents\2023\23003 - Erlick Constraints County Rd 27 Thornton\Graphics\QGIS\23003.qgz - Tristan Knight

Appendix 1. NVCA Regulation Mapping

NVCA Maps - 6958 County Road 27

24-Jan-2023



Legend

- Jurisdiction Boundary
- Municipalities
- NVCA Properties
- Lots and Concessions
- Parcel Boundaries
- Evaluated Wetlands (MNRF)
  - Evaluated - Other
  - Evaluated - Provincial
- Unevaluated Wetlands (NVCA)
- Flood Hazard
- Slope Erosion Hazard
- Meander Erosion Hazard
- Wetland Interference Hazard
- Regulated Extent
- NEP Planning Designation
  - Escarpment Natural Area
  - Escarpment Protection Area
  - Escarpment Recreation Area
  - Escarpment Rural Area
  - Mineral Resource Extraction Area
  - Urban Area (NEC)
- Local Roads
  - Streets and Small Roads
  - Unclassified
- Lakes
- River / Stream
- Neighbouring CAs

Nottawasaga Valley Conservation Authority
8195 8th Line
Utopia, ON L0M 1T0
www.nvca.on.ca

0 75 150 300 m

1 : 7500

Appendix E – Stormwater Management Brief

Prepared by Greck & Associated Limited

February 3, 2023 Reference: 22-936

Mr. Jamie Erlick
AJGL Group Inc.
Toronto, ON
M3J 2T8

Attention: Jamie Erlick
Reference: 6958 County Road 27 – Conceptual Stormwater Management Facility Sizing

Dear Mr. Jamie Erlick,

Greck and Associates (Greck) have been retained to provide specialized water resources engineering services for the potential development at 6958 County Road 27 in Thornton (Township of Essa), Ontario. The proposed development for this 29.6ha property is a 427 lot subdivision with single detached dwellings.

To support the potential development, stormwater management (SWM) is required to provide necessary water quality treatment, water quantity, water balance and erosion control requirements as outlined by the Nottawasaga Valley Conservation Authority (NVCA) and Township of Essa. A stormwater management wet pond has been conceptually proposed to meet the Conservation Authority's and the Township's criteria. The preliminary pond sizing and concept plan is to be submitted to the Township for their support to expand the Thornton settlement area and is anticipated to be utilized for future functional and detailed design of the subdivision.

SUBJECT PROPERTY LOCATION AND EXISTING CONDITIONS

The subject property is currently an undeveloped, 29.6ha agricultural field with a residential dwelling and accessory buildings, which is bounded by County Road 27 to the east, agricultural lands to the north and south, and valley lands to the west. A tributary of the Nottawasaga River is located west of the property, which is conveyed westerly towards the main branch of the Nottawasaga River; a portion of the property is regulated by the NVCA.

Based on the topographic information from the SCOOP 2013 DEM Package B made publicly available by Land Information Ontario, the overall subject property drains in the southwest direction with an approximate slope of 1.7%.

Please see **Figure 1** below for the site location.

Figure 1: Site Location

As per the proposed site plan, there are two (2) open spaced areas that will not be developed and remain unchanged in the proposed conditions. As such, the open spaced areas will not be included in the SWM, the effective development area considered is 28.0ha.

STORMWATER MANAGEMENT

The following stormwater management criteria is to be addressed in accordance with regulatory policy and requirements set in the NVCA's Stormwater Technical Guide (December 2013), Township of Essa's Engineering Design Standards & Specifications Manual (June 2022) and the MECP's Stormwater Management Planning and Design Manual (MECP SWMPDM, March 2003):

- **Water Quality** – Enhanced protection level, 80% long term total suspended solids (TSS) removal.
- **Water Quantity** – Post-development peak flows to be controlled to pre-development levels.
- **Water Balance** – To the extent possible, SWM measures should be used to maintain water balance in post-development conditions.
- **Erosion Control** – Extended detention of the 25mm storm

As discussed previously, the effective development area considered for SWM is 28.0ha. A wet pond is proposed to meet the water quality, quantity and erosion control requirements. Note that the design of the pond outlined in this memo is preliminary, the pond will be optimized when the project moves into the detailed design stage.

Due to the property's close proximity to the Nottawasaga River tributary, it is recommended that a flood study be done to determine the flood elevation. The design of all SWM facilities shall account for the flood elevation.

The site statistics in proposed site plan prepared by Jonathan Weizel Architect have been used to guide the design of the pond. For the purposes of modelling, the percent impervious of the proposed site has been conservatively estimated at 50% and the average overall slope of the site is 2%.

WATER QUALITY

To achieve an enhanced level water quality protection (80% TSS removal), an extended detention wet pond with a pre-treatment forebay is proposed. The permanent pool has been sized to exceed the 80% TSS removal rate as per Table 3.2 of the MECP SWMPD Manual.

The following table summarizes the required quality control volumes based on the proposed development.

Table 1: Permanent Pool Summary

Drainage Area (ha)	28.0
% Impervious	50%
TSS Removal Rate	80%
Unitary Volume (m^3/ha)	176.2
Required Permanent Pool Volume (m^3)	4,940
Provided Permanent Pool Volume (m^3)	6,368

The table demonstrates that the provided permanent pool volume exceeds the required permanent pool volume. Detailed water quality calculations can be found in the memo attachments.

WATER QUANTITY

The proposed SWM pond will provide detention and controlled release rates to attenuate post development peak flows from the site to pre-development rates. As per the Township of Essa's Engineering Design Manual, the Barrie WPCC station #6110557 intensity-duration-frequency (IDF) curves and runoff volumes were used in the water quantity analysis.

To determine the pre- and post-development peak flow rates and to aid with the design of the wet pond, a PCSWMM hydrologic model was developed to quantify flows for the 100-year design storm for the subject property. The SCS Type II 6-, 12- and 24-hour, and the 4-hour Chicago storm distributions were simulated to determine the critical storm distribution.

Each of the above storm events were simulated under pre- and post-development conditions, where required storage volumes were calculated from their respective distribution. It was noted

that the 4-hour Chicago storm duration resulted in the highest required storage volume and as such, will be utilized for quantity control purposes.

For the purposes of hydrologic modelling, the soils have been modelled as a sandy loam as per the Land Information Ontario Soil Survey Complex. The Green-Ampt infiltration method was selected as the site is considered a rural development. Parameters including hydraulic conductivity, initial deficit ratio and suction head were determined based on soil texture class as reported in the "Green-Ampt Infiltration Parameters from Soils Data" technical paper by Rawls et al. Please see the infiltration parameters assigned summarized in **Table 2** below.

Table 2: Infiltration Parameters

Soil Type	Sandy Loam
Suction Head (mm)	109.98
Conductivity (mm/h)	10.92
Initial Deficit (-)	0.368

Table 3 is a summary of the parameters used to model the existing and proposed catchments in the PCSWMM model.

Table 3: PCSWMM Modelling Parameters

	Existing	Proposed
Area ID	101	201
Area (ha)	28.03	28.03
Flow Length (m)	782	800
Slope (%)	1.66%	2.00%
Percent Impervious (%)	0.3%	50.0%
Impervious Manning's N	0.013	0.013
Pervious Manning's N	0.15	0.15

The following default values were applied for all catchments within the PCSWMM hydrologic model:

- Percent of impervious area with no depression storage (25%)
- Percent of runoff routed between subareas (100%)

Table 4 is a summary of the pre- and post-development peak flows and the corresponding required storage volumes.

Table 4: Pre- and Post-Development 100-year Storm Events

Storm Event	Existing Area 101 (m^3/s)	Proposed Area 202 (m^3/s)	Required Storage (m^3)
SCS 6-hour	0.831	5.886	8,972
SCS 12-hour	0.739	5.114	8,415
SCS 24-hour	0.967	5.267	8,225
Chicago 4-hour	0.603	6.425	9,374

As per the NVCA's Stormwater Technical Guide, an extra 20% of active storage volume will be provided to account an increase in precipitation due to anticipated climate change, as well as an added factor of safety when developing functional and detailed design plans. As such, the preliminary active storage volume for the wet pond is 11,248m^3. Detailed pond calculations and hydrologic modelling output can be found in the memo attachments.

An appropriately designed outlet structure and emergency spillway will be designed in further design stages of the development.

WATER BALANCE

To the extent possible, SWM measures should be implemented to maintain water balance in post-development conditions. Typically, a best practices approach will be applied to retain the 5mm storm event from all new impervious surfaces. The subject property is not located in a wellhead protection area, nor a significant groundwater recharge area however, it is within a highly vulnerable aquifer area. In the functional design stage, a desktop study, hydrogeological and/or geotechnical study will be done to determine the property's feasibility for water balance mitigations.

Factors to be investigated/considered but not limited to groundwater elevation, underlying soil properties, infiltration rates and adjacent natural features. Water balance initiatives are anticipated to be met by lot level controls (i.e., soakaway pits, infiltration trenches etc.) which are to be determined during functional and detailed design stages.

EROSION CONTROL

The SWM pond will be sized to ensure that the greater of 40m^3/ha (as per MECP SWMPD Manual) or the runoff volume from the 25mm 4-hour Chicago storm is detained for at least 24 hours. The 25mm 4-hour Chicago storm was modelled in PCSWMM software. A summary of the extended detention volumes is provided below in **Table 5**.

Table 5: Extended Detention Summary

Drainage Area (ha)	28.0
Unitary Extended Detention Volume (m^3/ha)	40
Extended Detention Volume (m^3)	1,121
25mm 4-hour Chicago Volume (m^3)	3,303
Drawdown Time (hours)	24

The provided extended detention volume will be greater than the 25mm 4-hour Chicago storm event volume. This will be released over a period of 24 hours, meeting the minimum requirements for erosion control. The extended detention outlet control details will be provided in detail design. Detailed calculations are provided in the memo attachments.

CONCEPT PLAN DEVELOPMENT

The permanent pool will have a depth of 1.0, active storage will have a depth of 1.2m and a 0.3m freeboard will be included. The conceptual pond layout has been incorporated on the Site Plan, prepared by Jonathan Weizel Architect, dated February 2, 2022; the proposed pond area has the capacity to service the site plan.

In further design stages, a 5.0m access road and detailed grading will be considered. The size and layout of the pond will be optimized during the functional and detailed design stages. A preliminary pond layout drawing has been included in the memo attachments.

EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION

Erosion and sediment controls (ESC) will be implemented for all construction activities, including topsoil striping, material stockpiling, and grading operations. The ESC plan will be prepared as the project progresses into the detailed design stage.

CONCLUSIONS

Greck and Associates is confident that this memo and the analyses completed are consistent with the latest municipal and provincial standards and guidelines with respect to scientific analysis and engineering principles. In summary:

- A wet pond is proposed to meet the water quality, quantity and erosion criteria.
- A water balance analysis will be done in further design stages to determine the feasibility of water balance mitigation strategies.

If you require additional information or have any questions, please feel free to contact me at (289) 657-9797 ext. 230.

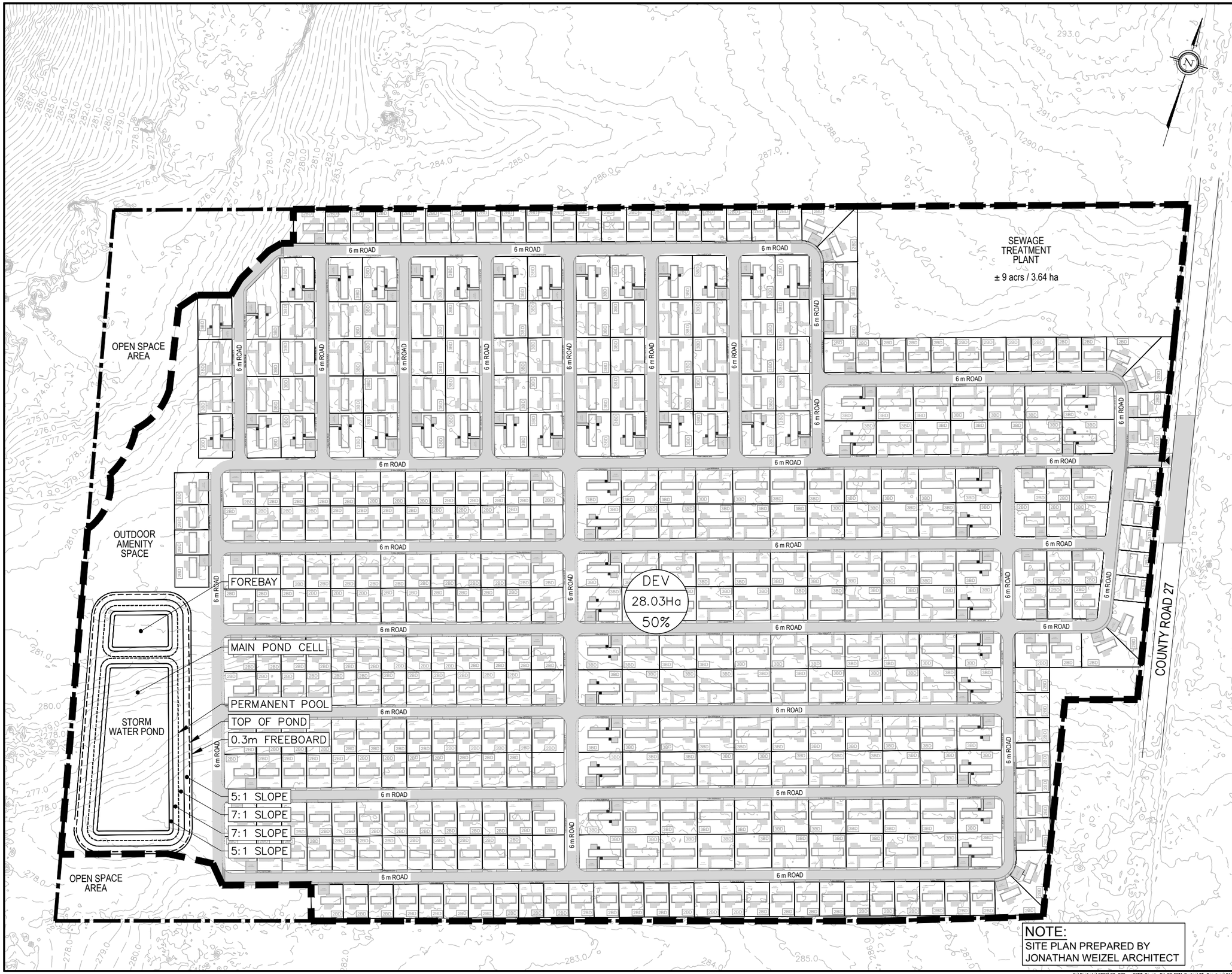
Respectfully submitted,

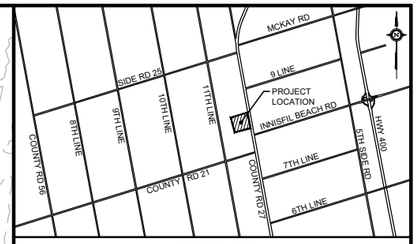
Jennifer Chan, P.Eng.
Water Resources Engineer

Reviewed by Scott Sexton, P.Eng.
Water Resources Engineer – Project Manager

ATTACHMENTS

- Preliminary Pond Layout
- Stormwater Management Calculations
- Hydrologic Modelling Outputs





KEY PLAN
N.T.S.

LEGEND

LIMIT OF SUBJECT PROPERTY
DEVELOPMENT AREA

DEV — AREA ID
27.38Ha — AREA IN HECTARES
50% — IMPERVIOUSNESS

BENCHMARK

NOTE:
SITE PLAN PREPARED BY
JONATHAN WEIZEL ARCHITECT

Greck
5770 Highway 7, Woodbridge, Ontario, L4L 1T8 www.greck.ca

CLIENT NAME:
AJGL GROUP INC.

PROJECT NAME:
6958 COUNTY RD 27 SWM DESIGN

CONCEPTUAL STORMWATER MANAGEMENT POND

DESIGNED BY:	J.C.	SCALES:		PROJECT No.	22-936
CHECKED BY:	S.S.	HORIZONTAL:	1:750	DRAWING No.	SWM
DRAWN BY:	J.N.	VERTICAL:	N/A	SHEET No.	
DATE:	FEB 03, 2023	SHEET SIZE:	11"x17"		

E:\Projects\2022\22-936 - 6958 County Rd 27 SWM Design\05_Drawings\CAD\BASE\22-936_CONCEPT.dwg

Date Plotted: Feb 3, 2023 - 3:00 PM

Stormwater Management Facility - Design Criteria

Site: 6958 County Road 27, Thornton (Township of Essa)
Date: February 3, 2023

Design Criteria

Site Location : Thornton (Township of Essa)
Region: Simcoe County
Conservation Authority: Nottawasaga Valley Conservation Authority

As per the NVCA Stormwater Tehcnical Guide (December 2013), the following are the stormwater management design criteria.

Water Quantity: Match post-development flows to pre-development flows
Design Storms: 4h Chicago and 24h SCS Type II
Water Quality: Enhanced 80% TSS Removal
Water Balance: To the extent possible, SWM measures should be used to maintain water balance
Erosion: Extended detention of the 25mm storm

IDF Curves

Source: Barrie WPCC Climate Station

Intensity Equation: $$I = \frac{A}{(T+B)^C}$$

I = Rainfall intensity (mm/hr)
T = Storm Duration, 6mins for SCS storms and 10mins for Chicago
A, B, C = IDF parameters

Storm Event	A	B	C
2	678.085	4.699	0.781
5	853.608	4.699	0.766
10	975.865	4.699	0.760
25	1146.275	4.922	0.757
50	1236.152	4.699	0.751
100	1426.408	5.273	0.759

Stormwater Management Facility - Site Conditions

Site: 6958 County Road 27, Thornton (Township of Essa)
Date: February 3, 2023

Site Conditions

		Existing		Proposed		
Land Cover	Impervious Ratio	Area 101 (m^2)	% Coverage	Area 201 (m^2)	Total	% Coverage
Road/Hardscape	1.00	401	0.1%	60,366	60,366	21.5%
Building Roof	1.00	300	0.1%	34,834	34,834	12.4%
Grassed	0.00	279,601	99.7%	165,103	165,103	58.9%
Pond	0.50	0	0.0%	20,000	20,000	7.1%
Total		280,302	100%	280,302	280,302	100%
Percent Impervious		0.3%		37.5%	37.5%	

PCSWMM Catchment Parameters

Parameter	Existing	Proposed
Area ID	101	201
Area (ha)	28.03	28.03
Flow Length (m)	782.28	800
Slope (%)	1.66%	2.00%
Percent Impervious (%)	0.3%	50.0%
Impervious Manning N	0.013	0.013
Pervious Manning N	0.15	0.15
Depression Storage Imperv	2	2
Depression Storage Perv	5	5
Zero Imperv (%)*	25%	25%
Subarea Routing*	OUTLET	OUTLET
Infiltration Method	GREEN AMPT	GREEN AMPT
Suction Head (mm)	109.98	109.98
Conductivity (mm/hour)	10.92	10.92
Initial Deficit Fraction (frac)	0.368	0.368

*Default values
**Proposed % impervious modelled as 50% as a conservative measure

Peak Runoff Assessment

Critical Storm Event (100-year only)

	Peak Runoff (m^3/s)		
Storm Event	Existing 101	Proposed 201	Required Storage (m^3)
SCS 6 hour*	0.831	5.886	8,972
SCS 12 hour*	0.739	5.114	8,415
SCS 24 hour*	0.967	5.267	8,225
Chicago 4 hour	0.603	6.425	9,374
Timmins	0.517	2.187	

*Runoff volumes were obtained from Environment Canada's Barrie WPCC weather station

Stormwater Management Facility -Design

Site: 6958 County Road 27, Thornton (Township of Essa)
Date: February 3, 2023

Quality Control

Controlled Area:	28.03	ha	
Percent Impervious:	50.0%		
TSS Removal Target:	80%		
Unitary Storage Volume:	176.2	m^3/ha	
Required Permanent Pool Volme:	4,940	m^3	

Extended Detention Volume

Area:	28.03	ha	
Unitary Storage Volume:	40	m^3/ha	
	1,121	m^3	
25mm Runoff Volume:	3,303	m^3	*(from PCSWMM Model)*
25mm Runoff Rate:	1,026	L/s	*(from PCSWMM Model)*
	1.026	m^3 /s	

Therefore, extended detention volume is the greater of the 25mm runoff volume, or unitary storage volume

Extended Detention Volume =	3303	m^3
Drawdown Time =	24.00	hours
Extended Detention Discharge =	0.038	m^3/s

PCSWMM OUTPUT – EXISTING CONDITIONS
SCS TYPE II 6-HOUR 100-YEAR

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
-------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 10
Number of subcatchments ... 1
Number of nodes ........... 1
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
------------------------------------------------------------------------
Chicago4h_100y       Chicago4h_100y              INTENSITY   10 min.
Chicago4h_10y        Chicago4h_10y               INTENSITY   10 min.
Chicago4h_25y        Chicago4h_25y               INTENSITY   10 min.
Chicago4h_2y         Chicago4h_2y                INTENSITY   10 min.
Chicago4h_50y        Chicago4h_50y               INTENSITY   10 min.
Chicago4h_5y         Chicago4h_5y                INTENSITY   10 min.
SCS_TypeII_12h_100y  SCS_TypeII_12h_100y         INTENSITY    6 min.
SCS_TypeII_24h_100y  SCS_TypeII_24h_100y         INTENSITY    6 min.
SCS_TypeII_6h_100y   SCS_TypeII_6h_100y          INTENSITY    6 min.
Timmins_Storm_(0-25) Timmins_Storm_(0-25)        INTENSITY   60 min.


*******************
Subcatchment Summary
*******************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------
101                        28.03    358.31      0.30    1.6600 SCS_TypeII_6h_100y   OF1


************
Node Summary
************
                                       Invert      Max.    Ponded    External
Name                 Type                Elev.     Depth      Area    Inflow
--------------------------------------------------------------------------------
OF1                  OUTFALL              0.00      0.00       0.0


*****************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*****************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Surcharge Method ......... EXTRAN
Starting Date ............ 01/26/2023 00:00:00
Ending Date .............. 01/27/2023 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
```

Total Precipitation	2.534	90.400
Evaporation Loss	0.000	0.000
Infiltration Loss	2.254	80.418
Surface Runoff	0.280	9.998
Final Storage	0.000	0.005
Continuity Error (%)	-0.022	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.281	2.808
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.281	2.808
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
101	90.40	0.00	0.00	80.42	0.27	9.73	10.00	2.80	0.84	0.111

Analysis begun on: Fri Feb 3 16:26:32 2023
Analysis ended on: Fri Feb 3 16:26:32 2023
Total elapsed time: < 1 sec

PCSWMM OUTPUT – EXISTING CONDITIONS
SCS TYPE II 12-HOUR 100-YEAR

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 10
Number of subcatchments ... 1
Number of nodes ........... 1
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


***************
Raingage Summary
***************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
----------------------------------------------------------------------
Chicago4h_100y       Chicago4h_100y              INTENSITY   10 min.
Chicago4h_10y        Chicago4h_10y               INTENSITY   10 min.
Chicago4h_25y        Chicago4h_25y               INTENSITY   10 min.
Chicago4h_2y         Chicago4h_2y                INTENSITY   10 min.
Chicago4h_50y        Chicago4h_50y               INTENSITY   10 min.
Chicago4h_5y         Chicago4h_5y                INTENSITY   10 min.
SCS_TypeII_12h_100y  SCS_TypeII_12h_100y         INTENSITY    6 min.
SCS_TypeII_24h_100y  SCS_TypeII_24h_100y         INTENSITY    6 min.
SCS_TypeII_6h_100y   SCS_TypeII_6h_100y          INTENSITY    6 min.
Timmins_Storm_(0-25) Timmins_Storm_(0-25)        INTENSITY   60 min.


*******************
Subcatchment Summary
*******************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-------------------------------------------------------------------------------------------------
101                        28.03    358.31      0.30    1.6600 SCS_TypeII_12h_100y  OF1


************
Node Summary
************
                                      Invert      Max.    Ponded    External
Name                 Type              Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------
OF1                  OUTFALL            0.00      0.00       0.0


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

***************
Analysis Options
***************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Surcharge Method ......... EXTRAN
Starting Date ............ 01/26/2023 00:00:00
Ending Date .............. 01/27/2023 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         2.663        95.000
Evaporation Loss .........         0.000         0.000
```

Infiltration Loss	2.368	84.463
Surface Runoff	0.296	10.551
Final Storage	0.000	0.005
Continuity Error (%)	-0.020	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.296	2.962
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.296	2.962
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
101	95.00	0.00	0.00	84.46	0.28	10.27	10.55	2.96	0.74	0.111

Analysis begun on: Fri Feb 3 16:23:39 2023
Analysis ended on: Fri Feb 3 16:23:39 2023
Total elapsed time: < 1 sec

PCSWMM OUTPUT – EXISTING CONDITIONS
SCS TYPE II 24-HOUR 100-YEAR

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
-------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 10
Number of subcatchments ... 1
Number of nodes ........... 1
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                  Data       Recording
Name                 Data Source                  Type       Interval
---------------------------------------------------------------------
Chicago4h_100y       Chicago4h_100y               INTENSITY   10 min.
Chicago4h_10y        Chicago4h_10y                INTENSITY   10 min.
Chicago4h_25y        Chicago4h_25y                INTENSITY   10 min.
Chicago4h_2y         Chicago4h_2y                 INTENSITY   10 min.
Chicago4h_50y        Chicago4h_50y                INTENSITY   10 min.
Chicago4h_5y         Chicago4h_5y                 INTENSITY   10 min.
SCS_TypeII_12h_100y  SCS_TypeII_12h_100y          INTENSITY    6 min.
SCS_TypeII_24h_100y  SCS_TypeII_24h_100y          INTENSITY    6 min.
SCS_TypeII_6h_100y   SCS_TypeII_6h_100y           INTENSITY    6 min.
Timmins_Storm_(0-25) Timmins_Storm_(0-25)         INTENSITY   60 min.


********************
Subcatchment Summary
********************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------------
101                        28.03    358.31      0.30    1.6600 SCS_TypeII_24h_100y  OF1


************
Node Summary
************
                                       Invert      Max.    Ponded    External
Name                 Type                Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
OF1                  OUTFALL              0.00      0.00       0.0


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

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Surcharge Method ......... EXTRAN
Starting Date ............ 01/26/2023 00:00:00
Ending Date .............. 01/27/2023 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         3.145       112.200
```

Evaporation Loss	0.000	0.000
Infiltration Loss	2.649	94.512
Surface Runoff	0.496	17.702
Final Storage	0.000	0.005
Continuity Error (%)	-0.017	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.497	4.966
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.497	4.966
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
101	112.20	0.00	0.00	94.51	0.33	17.37	17.70	4.96	0.97	0.158

Analysis begun on: Fri Feb 3 16:25:33 2023
Analysis ended on: Fri Feb 3 16:25:33 2023
Total elapsed time: < 1 sec

PCSWMM OUTPUT – EXISTING CONDITIONS CHICAGO 4-HOUR 100-YEAR

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
-------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 10
Number of subcatchments ... 1
Number of nodes ........... 1
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
----------------------------------------------------------------------
Chicago4h_100y       Chicago4h_100y              INTENSITY   10 min.
Chicago4h_10y        Chicago4h_10y               INTENSITY   10 min.
Chicago4h_25y        Chicago4h_25y               INTENSITY   10 min.
Chicago4h_2y         Chicago4h_2y                INTENSITY   10 min.
Chicago4h_50y        Chicago4h_50y               INTENSITY   10 min.
Chicago4h_5y         Chicago4h_5y                INTENSITY   10 min.
SCS_TypeII_12h_100y  SCS_TypeII_12h_100y         INTENSITY    6 min.
SCS_TypeII_24h_100y  SCS_TypeII_24h_100y         INTENSITY    6 min.
SCS_TypeII_6h_100y   SCS_TypeII_6h_100y          INTENSITY    6 min.
Timmins_Storm_(0-25) Timmins_Storm_(0-25)        INTENSITY   60 min.


********************
Subcatchment Summary
********************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------
101                        28.03    358.31      0.30    1.6600 Chicago4h_100y       OF1


************
Node Summary
************
                                       Invert      Max.    Ponded    External
Name                 Type                Elev.     Depth      Area    Inflow
------------------------------------------------------------------------------
OF1                  OUTFALL              0.00      0.00       0.0


*****************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*****************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Surcharge Method ......... EXTRAN
Starting Date ............ 01/26/2023 00:00:00
Ending Date .............. 01/27/2023 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         2.456        87.611
Evaporation Loss .........         0.000         0.000
```

Infiltration Loss	2.217	79.104
Surface Runoff	0.240	8.552
Final Storage	0.000	0.005
Continuity Error (%)	-0.056	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.240	2.397
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.240	2.397
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
101	87.61	0.00	0.00	79.10	0.26	8.29	8.55	2.40	0.60	0.098

Analysis begun on: Fri Feb 3 16:21:39 2023
Analysis ended on: Fri Feb 3 16:21:39 2023
Total elapsed time: < 1 sec

PCSWMM OUTPUT – EXISTING CONDITIONS
12 HOUR TIMMINS STORM

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
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 *************
 Element Count
 *************
 Number of rain gages ...... 10
 Number of subcatchments ... 1
 Number of nodes ........... 1
 Number of links ........... 0
 Number of pollutants ...... 0
 Number of land uses ....... 0


 ****************
 Raingage Summary
 ****************
                                                 Data       Recording
 Name                 Data Source                Type       Interval
 ------------------------------------------------------------------------
 Chicago4h_100y       Chicago4h_100y             INTENSITY   10 min.
 Chicago4h_10y        Chicago4h_10y              INTENSITY   10 min.
 Chicago4h_25y        Chicago4h_25y              INTENSITY   10 min.
 Chicago4h_2y         Chicago4h_2y               INTENSITY   10 min.
 Chicago4h_50y        Chicago4h_50y              INTENSITY   10 min.
 Chicago4h_5y         Chicago4h_5y               INTENSITY   10 min.
 SCS_TypeII_12h_100y  SCS_TypeII_12h_100y        INTENSITY    6 min.
 SCS_TypeII_24h_100y  SCS_TypeII_24h_100y        INTENSITY    6 min.
 SCS_TypeII_6h_100y   SCS_TypeII_6h_100y         INTENSITY    6 min.
 Timmins_Storm_(0-25) Timmins_Storm_(0-25)       INTENSITY   60 min.


 ********************
 Subcatchment Summary
 ********************
 Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
 ------------------------------------------------------------------------------------------------------------
 101                        28.03    358.31      0.30    1.6600 Timmins_Storm_(0-25) OF1


 ************
 Node Summary
 ************
                                       Invert      Max.    Ponded    External
 Name                 Type                Elev.     Depth      Area    Inflow
 ------------------------------------------------------------------------
 OF1                  OUTFALL              0.00      0.00       0.0


 ********************************************************
 NOTE: The summary statistics displayed in this report are
 based on results found at every computational time step,
 not just on results from each reporting time step.
 ********************************************************

 ****************
 Analysis Options
 ****************
 Flow Units ............... CMS
 Process Models:
   Rainfall/Runoff ........ YES
   RDII ................... NO
   Snowmelt ............... NO
   Groundwater ............ NO
   Flow Routing ........... NO
   Water Quality .......... NO
 Infiltration Method ...... HORTON
 Surcharge Method ......... EXTRAN
 Starting Date ............ 01/26/2023 00:00:00
 Ending Date .............. 01/27/2023 00:00:00
 Antecedent Dry Days ...... 0.0
 Report Time Step ......... 00:01:00
 Wet Time Step ............ 00:05:00
 Dry Time Step ............ 00:05:00


 *************************        Volume         Depth
 Runoff Quantity Continuity     hectare-m            mm
 *************************     ---------       -------
 Total Precipitation ......         5.410       193.000
 Evaporation Loss .........         0.000         0.000
```

Infiltration Loss	4.815	171.780
Surface Runoff	0.595	21.227
Final Storage	0.000	0.005
Continuity Error (%)	-0.006	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.595	5.950
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.595	5.950
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
101	193.00	0.00	0.00	171.78	0.58	20.65	21.23	5.95	0.52	0.110

Analysis begun on: Fri Feb 3 16:18:49 2023
Analysis ended on: Fri Feb 3 16:18:49 2023
Total elapsed time: < 1 sec

PCSWMM OUTPUT – PROPOSED CONDITIONS CHICAGO 4-HOUR 25mm

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 11
Number of subcatchments ... 1
Number of nodes ........... 1
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


***************
Raingage Summary
***************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
----------------------------------------------------------------------
Chicago_4h_25mm      Chicago_4h_25mm             INTENSITY   10 min.
Chicago4h_100y       Chicago4h_100y              INTENSITY   10 min.
Chicago4h_10y        Chicago4h_10y               INTENSITY   10 min.
Chicago4h_25y        Chicago4h_25y               INTENSITY   10 min.
Chicago4h_2y         Chicago4h_2y                INTENSITY   10 min.
Chicago4h_50y        Chicago4h_50y               INTENSITY   10 min.
Chicago4h_5y         Chicago4h_5y                INTENSITY   10 min.
SCS_TypeII_12h_100y  SCS_TypeII_12h_100y         INTENSITY    6 min.
SCS_TypeII_24h_100y  SCS_TypeII_24h_100y         INTENSITY    6 min.
SCS_TypeII_6h_100y   SCS_TypeII_6h_100y          INTENSITY    6 min.
Timmins_Storm_(0-25) Timmins_Storm_(0-25)        INTENSITY   60 min.


*******************
Subcatchment Summary
*******************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-------------------------------------------------------------------------------------------------------
201                        28.03    350.38     50.00    2.0000 Chicago_4h_25mm      OF1


************
Node Summary
************
                                      Invert      Max.    Ponded    External
Name                 Type              Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------
OF1                  OUTFALL            0.00      0.00       0.0


**********************************************************
NOTE: The summary statistics displayed in this report are
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not just on results from each reporting time step.
**********************************************************

***************
Analysis Options
***************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Surcharge Method ......... EXTRAN
Starting Date ............ 01/26/2023 00:00:00
Ending Date .............. 01/27/2023 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         0.701        25.023
```

Evaporation Loss	0.000	0.000
Infiltration Loss	0.351	12.512
Surface Runoff	0.330	11.781
Final Storage	0.021	0.760
Continuity Error (%)	-0.117	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.330	3.302
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.330	3.302
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
201	25.02	0.00	0.00	12.51	11.78	0.00	11.78	3.30	1.03	0.471

Analysis begun on: Fri Feb 3 16:34:27 2023
Analysis ended on: Fri Feb 3 16:34:27 2023
Total elapsed time: < 1 sec

PCSWMM OUTPUT – PROPOSED CONDITIONS
SCS TYPE II 6-HOUR 100-YEAR

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 11
Number of subcatchments ... 1
Number of nodes ........... 1
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


***************
Raingage Summary
***************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
----------------------------------------------------------------------
Chicago_4h_25mm      Chicago_4h_25mm             INTENSITY   10 min.
Chicago4h_100y       Chicago4h_100y              INTENSITY   10 min.
Chicago4h_10y        Chicago4h_10y               INTENSITY   10 min.
Chicago4h_25y        Chicago4h_25y               INTENSITY   10 min.
Chicago4h_2y         Chicago4h_2y                INTENSITY   10 min.
Chicago4h_50y        Chicago4h_50y               INTENSITY   10 min.
Chicago4h_5y         Chicago4h_5y                INTENSITY   10 min.
SCS_TypeII_12h_100y  SCS_TypeII_12h_100y         INTENSITY    6 min.
SCS_TypeII_24h_100y  SCS_TypeII_24h_100y         INTENSITY    6 min.
SCS_TypeII_6h_100y   SCS_TypeII_6h_100y          INTENSITY    6 min.
Timmins_Storm_(0-25) Timmins_Storm_(0-25)        INTENSITY   60 min.


*******************
Subcatchment Summary
*******************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-------------------------------------------------------------------------------------------------------
201                        28.03    350.38     50.00    2.0000 SCS_TypeII_6h_100y   OF1


************
Node Summary
************
                                      Invert      Max.    Ponded    External
Name                 Type              Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------
OF1                  OUTFALL            0.00      0.00       0.0


**********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
**********************************************************

***************
Analysis Options
***************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Surcharge Method ......... EXTRAN
Starting Date ............ 01/26/2023 00:00:00
Ending Date .............. 01/27/2023 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         2.534        90.400
```

Evaporation Loss	0.000	0.000
Infiltration Loss	1.064	37.959
Surface Runoff	1.452	51.818
Final Storage	0.021	0.762
Continuity Error (%)	-0.153	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.454	14.544
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.454	14.544
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
201	90.40	0.00	0.00	37.96	44.56	7.26	51.82	14.52	5.91	0.573

Analysis begun on: Fri Feb 3 16:33:31 2023
Analysis ended on: Fri Feb 3 16:33:31 2023
Total elapsed time: < 1 sec

PCSWMM OUTPUT – PROPOSED CONDITIONS
SCS TYPE II 12-HOUR 100-YEAR

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 11
Number of subcatchments ... 1
Number of nodes ........... 1
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


***************
Raingage Summary
***************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
---------------------------------------------------------------------
Chicago_4h_25mm      Chicago_4h_25mm             INTENSITY   10 min.
Chicago4h_100y       Chicago4h_100y              INTENSITY   10 min.
Chicago4h_10y        Chicago4h_10y               INTENSITY   10 min.
Chicago4h_25y        Chicago4h_25y               INTENSITY   10 min.
Chicago4h_2y         Chicago4h_2y                INTENSITY   10 min.
Chicago4h_50y        Chicago4h_50y               INTENSITY   10 min.
Chicago4h_5y         Chicago4h_5y                INTENSITY   10 min.
SCS_TypeII_12h_100y  SCS_TypeII_12h_100y         INTENSITY    6 min.
SCS_TypeII_24h_100y  SCS_TypeII_24h_100y         INTENSITY    6 min.
SCS_TypeII_6h_100y   SCS_TypeII_6h_100y          INTENSITY    6 min.
Timmins_Storm_(0-25) Timmins_Storm_(0-25)        INTENSITY   60 min.


*******************
Subcatchment Summary
*******************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-------------------------------------------------------------------------------------------------------
201                        28.03    350.38     50.00    2.0000 SCS_TypeII_12h_100y  OF1


************
Node Summary
************
                                      Invert      Max.    Ponded    External
Name                 Type              Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------
OF1                  OUTFALL            0.00      0.00       0.0


**********************************************************
NOTE: The summary statistics displayed in this report are
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not just on results from each reporting time step.
**********************************************************

***************
Analysis Options
***************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Surcharge Method ......... EXTRAN
Starting Date ............ 01/26/2023 00:00:00
Ending Date .............. 01/27/2023 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         2.663        95.000
```

Evaporation Loss	0.000	0.000
Infiltration Loss	1.123	40.057
Surface Runoff	1.522	54.294
Final Storage	0.022	0.770
Continuity Error (%)	-0.127	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.523	15.234
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.523	15.234
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
201	95.00	0.00	0.00	40.06	46.83	7.46	54.29	15.22	5.13	0.572

Analysis begun on: Fri Feb 3 16:30:21 2023
Analysis ended on: Fri Feb 3 16:30:21 2023
Total elapsed time: < 1 sec

PCSWMM OUTPUT – PROPOSED CONDITIONS
SCS TYPE II 24-HOUR 100-YEAR

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 11
Number of subcatchments ... 1
Number of nodes ........... 1
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


***************
Raingage Summary
***************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
----------------------------------------------------------------------
Chicago_4h_25mm      Chicago_4h_25mm             INTENSITY   10 min.
Chicago4h_100y       Chicago4h_100y              INTENSITY   10 min.
Chicago4h_10y        Chicago4h_10y               INTENSITY   10 min.
Chicago4h_25y        Chicago4h_25y               INTENSITY   10 min.
Chicago4h_2y         Chicago4h_2y                INTENSITY   10 min.
Chicago4h_50y        Chicago4h_50y               INTENSITY   10 min.
Chicago4h_5y         Chicago4h_5y                INTENSITY   10 min.
SCS_TypeII_12h_100y  SCS_TypeII_12h_100y         INTENSITY    6 min.
SCS_TypeII_24h_100y  SCS_TypeII_24h_100y         INTENSITY    6 min.
SCS_TypeII_6h_100y   SCS_TypeII_6h_100y          INTENSITY    6 min.
Timmins_Storm_(0-25) Timmins_Storm_(0-25)        INTENSITY   60 min.


*******************
Subcatchment Summary
*******************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------------
201                        28.03    350.38     50.00    2.0000 SCS_TypeII_24h_100y  OF1


************
Node Summary
************
                                      Invert      Max.    Ponded    External
Name                 Type              Elev.     Depth      Area    Inflow
----------------------------------------------------------------------------
OF1                  OUTFALL            0.00      0.00       0.0


**********************************************************
NOTE: The summary statistics displayed in this report are
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not just on results from each reporting time step.
**********************************************************

***************
Analysis Options
***************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Surcharge Method ......... EXTRAN
Starting Date ............ 01/26/2023 00:00:00
Ending Date .............. 01/27/2023 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         3.145       112.200
```

Evaporation Loss	0.000	0.000
Infiltration Loss	1.250	44.588
Surface Runoff	1.862	66.426
Final Storage	0.037	1.332
Continuity Error (%)	-0.130	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.863	18.627
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.863	18.627
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
201	112.20	0.00	0.00	44.59	54.90	11.53	66.43	18.62	5.27	0.592

Analysis begun on: Fri Feb 3 16:32:25 2023
Analysis ended on: Fri Feb 3 16:32:25 2023
Total elapsed time: < 1 sec

PCSWMM OUTPUT – PROPOSED CONDITIONS CHICAGO 4-HOUR 100-YEAR

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 11
Number of subcatchments ... 1
Number of nodes ........... 1
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


***************
Raingage Summary
***************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
----------------------------------------------------------------------
Chicago_4h_25mm      Chicago_4h_25mm             INTENSITY   10 min.
Chicago4h_100y       Chicago4h_100y              INTENSITY   10 min.
Chicago4h_10y        Chicago4h_10y               INTENSITY   10 min.
Chicago4h_25y        Chicago4h_25y               INTENSITY   10 min.
Chicago4h_2y         Chicago4h_2y                INTENSITY   10 min.
Chicago4h_50y        Chicago4h_50y               INTENSITY   10 min.
Chicago4h_5y         Chicago4h_5y                INTENSITY   10 min.
SCS_TypeII_12h_100y  SCS_TypeII_12h_100y         INTENSITY    6 min.
SCS_TypeII_24h_100y  SCS_TypeII_24h_100y         INTENSITY    6 min.
SCS_TypeII_6h_100y   SCS_TypeII_6h_100y          INTENSITY    6 min.
Timmins_Storm_(0-25) Timmins_Storm_(0-25)        INTENSITY   60 min.


*******************
Subcatchment Summary
*******************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-------------------------------------------------------------------------------------------------------
201                        28.03    350.38     50.00    2.0000 Chicago4h_100y       OF1


************
Node Summary
************
                                      Invert      Max.    Ponded    External
Name                 Type                Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
OF1                  OUTFALL             0.00      0.00       0.0


**********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
**********************************************************

***************
Analysis Options
***************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Surcharge Method ......... EXTRAN
Starting Date ............ 01/26/2023 00:00:00
Ending Date .............. 01/27/2023 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         2.456        87.611
```

Evaporation Loss	0.000	0.000
Infiltration Loss	1.052	37.540
Surface Runoff	1.390	49.581
Final Storage	0.021	0.760
Continuity Error (%)	-0.309	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.390	13.898
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.390	13.898
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
201	87.61	0.00	0.00	37.54	43.27	6.32	49.58	13.90	6.46	0.566

Analysis begun on: Fri Feb 3 16:29:14 2023
Analysis ended on: Fri Feb 3 16:29:14 2023
Total elapsed time: < 1 sec

PCSWMM OUTPUT – PROPOSED CONDITIONS
12 HOUR TIMMINS STORM

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 11
Number of subcatchments ... 1
Number of nodes ........... 1
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


***************
Raingage Summary
***************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
----------------------------------------------------------------------
Chicago_4h_25mm      Chicago_4h_25mm             INTENSITY   10 min.
Chicago4h_100y       Chicago4h_100y              INTENSITY   10 min.
Chicago4h_10y        Chicago4h_10y               INTENSITY   10 min.
Chicago4h_25y        Chicago4h_25y               INTENSITY   10 min.
Chicago4h_2y         Chicago4h_2y                INTENSITY   10 min.
Chicago4h_50y        Chicago4h_50y               INTENSITY   10 min.
Chicago4h_5y         Chicago4h_5y                INTENSITY   10 min.
SCS_TypeII_12h_100y  SCS_TypeII_12h_100y         INTENSITY    6 min.
SCS_TypeII_24h_100y  SCS_TypeII_24h_100y         INTENSITY    6 min.
SCS_TypeII_6h_100y   SCS_TypeII_6h_100y          INTENSITY    6 min.
Timmins_Storm_(0-25) Timmins_Storm_(0-25)        INTENSITY   60 min.


*******************
Subcatchment Summary
*******************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-------------------------------------------------------------------------------------------------------
201                        28.03    350.38     50.00    2.0000 Timmins_Storm_(0-25) OF1


************
Node Summary
************
                                      Invert      Max.    Ponded    External
Name                 Type              Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------
OF1                  OUTFALL            0.00      0.00       0.0


**********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
**********************************************************

***************
Analysis Options
***************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Surcharge Method ......... EXTRAN
Starting Date ............ 01/26/2023 00:00:00
Ending Date .............. 01/27/2023 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         5.410       193.000
```

Evaporation Loss	0.000	0.000
Infiltration Loss	2.343	83.595
Surface Runoff	3.047	108.688
Final Storage	0.022	0.771
Continuity Error (%)	-0.028	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	3.047	30.466
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	3.047	30.466
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
201	193.00	0.00	0.00	83.59	95.77	12.91	108.69	30.47	2.19	0.563

Analysis begun on: Fri Feb 3 16:28:12 2023
Analysis ended on: Fri Feb 3 16:28:12 2023
Total elapsed time: < 1 sec