FUNCTIONAL SERVICING REPORT

HAMLET OF WELCOME SUBDIVISION

4646 COUNTY ROAD 2 MUNICIPALITY OF PORT HOPE

April 14, 2025

PROJECT NO. W23089



GTA WEST OFFICE 9358 GOREWAY DRIVE BRAMPTON, ONTARIO L6P 0M7 T: (905) 794-0600 F: (905) 794-0611 PROVIDING CONSULTING SERVICES IN: MUNICIPAL ENGINEERING TRANSPORTATION PLANNING TRAFFIC & PARKING STUDIES ROADS & BRIDGES STRUCTURAL ENGINEERING

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FIGURES

FIGURE 1 Location Plan

DRAWINGS

DRAWING PL-1	Draft Plan of Subdivision (CANDEVCON GROUP INC., Feb. 24, 2025)
DRAWING PS-1	Preliminary Servicing and Grading Plan
DRAWING ST-1	Pre-Development Storm Drainage Area Plan
DRAWING ST-2	Post-Development Storm Drainage Area Plan

APPENDICES

APPENDIX "A"	Stormwater Management Design Calculations
APPENDIX "B"	Storm Sewer Design Sheets
APPENDIX "C"	Preliminary Geotechnical Investigation Report
APPENDIX "D"	Preliminary Hydrogeological Investigation Report
APPENDIX "E"	Nitrate Loading Impact Assessment



1. INTRODUCTION

This Study has been prepared as a technical document in support of the Draft Plan application for the subject subdivision and addresses sanitary, storm and water servicing and stormwater management.

The proposed subdivision is located at 4646 County Road 2, to the south and east of County Road 2 and Dale Road, in the Municipality of Port Hope, as shown on figure 1. It is bounded by existing agricultural lands to the east, existing residential lands to the north and west and existing agricultural lands to the south.

The subdivision, as illustrated on the Draft Plan of Subdivision by Candevcon Group Inc. (copy attached) comprises an area of 3.94 ha and includes:

- 12 single detached units;
- 1 existing detached unit;
- Stormwater management Block 1;
- 2 Open Space Blocks 2, 2A;
- Right-if-way including Street 'A'

This report describes the existing site conditions, and the proposed sanitary, storm and water systems, as well as the stormwater management infrastructure. This report includes preliminary grading information and outlines the required Erosion and Sediment Control Measures.





Figure 1 – Site Location Plan



2. BACKGROUND AND SITE SPECIFIC TECHNICAL STUDIES

2.1 Background Documents

The following Technical Documents are relevant to the stormwater management criteria for the subject lands:

- Ganaraska Region Conservation Authority Technical and Engineering Guidelines for Stormwater Management Submissions, (December 2014)
- Ministry of the Environment Stormwater Management Planning and Design Manual (2003)
- CVC/TRCA Low Impact Development Stormwater Management Planning and Design Guide, Version 1.0 (2010)

2.2 Site Specific Studies

The following Studies were completed in support of the subject application:

- A Geotechnical Investigation for Proposed Residential Subdivision prepared by Soil Engineers Ltd., Revised July 2024, Reference No. 2402-S021.
- A Hydrogeological Assessment for Proposed Residential Subdivision prepared by Soil Engineers Ltd., dated July 23, 2024, Reference No. 2402-W021.
- Watermain Hydraulic Analysis (DRAFT) prepared by CIMA+, dated January 27, 2025, Reference No. Z0022445
- Nitrate Loading Impact Assessment prepared by Soil Engineers Ltd., dated February 28, 2024, Reference No. 2402-W021.



3. EXISTING CONDITIONS

3.1 Land Use

The subject subdivision property currently comprises Agricultural lands with an existing residential building. The existing residential building on the subject lands will be incorporated into the proposed subdivision.

3.2 Topography, Drainage and Natural Features

The site is relatively flat with approximately 2.91 ha of the land draining west to County Road 2 at approx. 1.0% gradient. The remainder of the site, 1.03 ha, drains to the existing adjacent agricultural lands.

Existing elevations range from approx. 136.25m to 141.25m. The site ultimately drains to the Ganaraska River; however the site is not within the regulated Ganaraska Conservation Authority area therefore a permit is not anticipated to be required.

For details of the existing drainage patterns refer to drawing ST-2 - Pre-development Drainage Area Plan. A summary of the pre-development catchment areas is provided in the table below.

Catchment ID	Outlet Location	Area
Drainage Area No. 1	County Road 2	2.91 ha
Drainage Area No. 2	Adjacent Agricultural	1.03 ha
	Total	3.94 ha

TABLE 1.1 PRE-DEVELOPMENT DRAINAGE AREAS

3.3 Physiography and Geotechnical Conditions

The Geotechnical Investigation (copy of report included in **Appendix "C"**) indicated that the surficial soils beneath the topsoil layer is comprised of silty sand till. The geotechnical investigation indicated groundwater levels were at depths of 137.1m to 140.4m or approximately 0.2 to 1.0m below ground surface.

Single Well Response Tests were conducted to determine soil hydraulic conductivity K values of the soils. Based on the testing, K values were calculated to be 1.92 mm/hr to 17.7mm/hr. A copy of the hydrogeological report is included in **Appendix "D**".



4. SANITARY AND WATER SERVICING

4.1 Sanitary

4.1.1 Existing Sanitary Sewers

There are no existing sanitary sewers in the vicinity of the site to serve as an outlet for the subject lands. The sanitary demands for the proposed subdivision will need to be met by individual septic systems. The septic system will need to be engineered.

4.1.2 Proposed Sanitary Sewer System

The proposed sanitary sewer system consists of a septic tank system for each individual lot. The proposed septic systems will need to be designed to meet the requirements of the Ontario Building Code and local Municipal requirements.

A nitrate loading impact assessment was prepared by Soil Engineers Ltd. to review the capability of the site to support septic systems for the individual lots. The assessment concluded that with tertiary treatment limiting nitrate loading concentrations to 15 mg/l, the site can support the proposed residential use. A copy of the report is included in **Appendix "E"** for reference.



4.2 Water

4.2.1 Existing Watermains

The existing watermain system in the vicinity of the subject subdivision is shown on Drawing PS-1 and consists of the following;

• 150mm diameter watermain on County Road 2;

4.2.2 Proposed Watermain System

The proposed water distribution system is shown on **Drawing PS-1** and consists of a 150mm watermain to be constructed on Street 'A' that will connect to the existing 150mm watermain on County Road 2 to the west. The cul-de-sac will be looped with a 50mm diameter watermain. **Note:** Fire water demands for the site cannot be met with the existing watermain infrastructure and are therefore not included in the calculations.

A hydraulic analysis of the existing water supply system in Welcome Hamlet was prepared by CIMA+. The analysis concluded that there is sufficient supply and pressure for domestic use for the proposed development, however the system cannot provide for fire flow.

The estimated water demand for the proposed subdivision is summarized in the following table:

Unit Type	# of Units Area (ha)	Persons/Unit Persons/ha	Population
Proposed Single Detached (units)	12	4.2	50.4
Existing Single Detached (units)	1	4.2	4.2
	Total po	opulation	55
Wate	r Demand (L/s	5)	
Average day (L/s) ^A		0.18	
Max day (L/s) ^B		0.36	
Peak Hour Consumption (L/s) ^c		0.55	
Max Day plus fire (L/s)		N/A	

TABLE 4.5WATER DEMAND BASED ON UNIT TYPE AREA

^ABased on 280 L/cap/day average consumption rate

^B Based on Max Day Factor of 2.0

^C Based on Peak Hour Factor of 3.0



5. STORM DRAINAGE AND STORMWATER MANAGEMENT

5.1 General

In the absence of a specific subwatershed study for the site that establishes required stormwater management controls, the stormwater management design will adhere to the following criteria;

Stormwater quantity: Post-development peak discharge rates shall be controlled to predevelopment levels for the 2-year through 100-year storm events.

Stormwater quality: Enhanced level of control (80% total suspended solids removal)

Erosion control: Retention of the first 25mm rainfall over 24 hours.

5.2 Storm Drainage Design and Requirements

The Stormwater management criteria for the proposed development has been established in accordance with the standards and requirements of the Municipality of Port Hope, Ganaraska Region Conservation Authority (GRCA) and the Ministry of the Environment Conservation and Parks (MECP) and are summarized below:

- Storm sewer systems shall be designed to accommodate a 5-year storm.
- Storm sewers shall have a minimum frost cover of 1.5m.
- The major system should be designed to accommodate runoff exceeding the capacity of the minor system for flows up to and including the 100-year storm or regional storm event, whichever is greater. The major system should be contained within the ROW and designated easements.
- Roof leaders must not be connected directly to the storm sewer system, and the following conditions must be complied with:
 - Roof leaders must discharge onto concrete splash pads which direct the water into side yard swales, these swales must discharge to the front of the lot, no roof leaders shall drain to the rear of the lot. Roof leaders are not permitted to discharge onto driveways or walkways.
 - Houses located on corner lots have roof leaders located at the corner(s) of the house, closest to the street lines.
 - Roof leader down spout locations is to be indicated on site grading plans.



• Inverts of service connections at the property line shall be surcharge free and be above the 100-year hydraulic grade line of the municipal storm sewer system.

Water quality, erosion, and quantity control for the subject lands will be addressed by the proposed SWM Tank located at Block 1 at the north of the property. The SWM Tank will drain to the County Road 2 storm sewer (Tributary to the Ganaraska River).

The general design criteria for the SWM facility are summarized as follows:

- The stormwater management facility is designed as an off-line storage facility with permanent storage for water quality control in accordance with the "enhanced" protection level (80% TSS Removal) for the receiving watercourse as defined in the March 2003 MOE guidelines.
- Erosion control criterion is based on the 24-hour detention of runoff from a 25mm storm event.
- The SWM facility is designed to provide water quantity control for the 2-Year to 100-Year and Regional Storm events.
- Water Quantity Control release targets are established by matching postdevelopment peak flow rates to pre-development peak flow rates for 2, 5, 10, 25, 50 and 100-year return period rainfall events.

5.3 Storm Sewer (Minor) System

A. Sewers to Proposed SWM Tank

The proposed storm sewer system is shown on **Drawing PS-1**. The sewer system will be designed in accordance with the Municipality of Port Hope Standards to accommodate a **5-year storm** event and will outlet to the proposed stormwater management facility.

The storm drainage areas are shown on **Drawing ST-2** and the related Storm Sewer Design Sheets are included in **Appendix "B"**. Overland flow will be conveyed within the road right of way (maximum ponding depth of 0.3m) to the proposed stormwater management facility.



5.4 Stormwater Management Facility Design

5.4.1 Water Quality Control

Proposed SWM Facility shall provide an Enhanced Level of Protection (80% TSS removal) for runoff from total drainage area of 3.93 ha at an imperviousness of 50%.

Based on the Table 6.3 (Annual Sediment Loadings) in the 2003 MOE Stormwater Management Planning and Design Manual and an overall imperviousness of 50%, sediment loading equates to 1.56m³/ha, therefore sediment storage volume of 49.0 m³ is required to provide a "Enhanced Level of Protection" or 80% TSS removal.

5.4.2 Erosion Control

Extended detention of the 25 mm design storm event for a period of 24-hours is required.

3.93 Ha	Drainage Area (Ha) =
14.97 mm	25mm Chicago Storm Runoff Volume (mm) =
588.3 m ³	Volume Required =
589.0m ³	Volume Provided =
24 Hr	Drawdown Time =
75 mm	Orifice Plate Size =
135.77 m	Elevation in Underground Storage Tank =

Refer to **Appendix** "A" for Underground Stormwater Management Storage Tank Design Calculations.



5.4.3 Water Quantity Control

5.4.3.1 SWM Tank Outflow Rates

As mentioned in section 5.2, the SWM tank will provide quantity control of postdevelopment peak flows to allowable target release rates for the 2-year through 100year storm events.

The required peak flow release rates were calculated using the rational method. These equations were applied to the total drainage area to SWM Tank. Table I below shows the corresponding Target Release Rates.

TABLE ITARGET RELEASE RATES (L/s)

Drainage Area (Ha)*	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
3.93	130	191	218	253	279	304

*Total Development Drainage Area Breakdown for 3.93 ha. Single Detached Residential Subdivision Area = 3.70 ha Stormwater Management Block Area = 0.23 ha

5.4.3.2 SWM Storage Tank Volume Design

Based on the drainage area and release rates identified in Table I, the modified rational method was used to determine required storage volumes for the 2-year to 100-year storm events.

Table II below provides an overview of the results for the underground storage tank operation during 2 to 100-year storm events. A copy of the related calculations is included in **Appendix "A"**.



Description	Design Storm						
Description	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	
Unit Flow Targets (m ³ /s)	0.130	0.191	0.218	0.253	0.279	0.304	
Peak Flows (m ³ /s)	0.047						
SWM Tank W.L (m)	-	-	-	-	-	136.64	
Storage Required (m ³)	-	-	-	-	-	646.3	
Storage Provided (m ³)	-	-	-	-	-	686.0	

TABLE II STORMWATER MANAGEMENT TANK (DESIGN STORAGE VOLUME REQUIRED/PROVIDED)

A two stage outlet with a 75mm orifice plate and 300mm outlet pipe will be used to control the peak outflows for the 2-year up to the 100-year storm events.

The following summarizes the outlet controls:

- 25mm Erosion control: 75mm diameter orifice plate
- 2 to 100 Year Storm Release: 300mm diameter outlet pipe
- A 18.0m wide right of way is sized to safely convey the 100-Year uncontrolled peak flow (0.304m³/s). The crest elevation of the right of way is set at an elevation of 138.05m.

The event storage conditions of the underground storage tank, supporting stage storage and discharge calculations are included in **Appendix "A"**.

5.4.4 Sediment Loading

The estimated annual sediment loading, based on 50% catchment imperviousness, is 1.56 m³/ha. With the SWM tank drainage area covering 3.93 hectares, the annual sediment generation amounts to 6.13 m³. Over a ten-year interval, assuming the sediment is removed from the SWM tank, the total sediment generated will be 61.3 m³.



7 EROSION AND SEDIMENT CONTROL

Erosion and sedimentation are naturally occurring processes that involve particle detachment, sediment transport and deposition of soil particles. Construction activities commonly alter the landscapes where they are located, exacerbating these natural processes. One of the most significant alterations encountered during construction is the removal of the vegetation that stabilizes the subsoil. In the absence of the vegetation, the underlying soils are fully or partially exposed to various natural forces such as rain, flowing water, wind, and gravity¹

The discharge of high sediment loads to natural watercourses has significant impacts on receiving waters and aquatic habitat. Some specific examples include:

- Degradation of water quality;
- Damage or destruction of fish habitat;
- · Increased flooding.

In consideration of the above, it is necessary as part of the Final Design and implementation of infrastructure and development servicing to incorporate a comprehensive Erosion and Sediment Control Plan. The objectives are:

- (i) Minimize wherever possible the extent of vegetation removal;
- Provide appropriate sediment control measures to minimize the off-site transport of sediment;
- (iii) Minimize the extent of time that sites are devoid of stabilizing vegetation;
- (iv) Provide interim erosion control measures where permanent restoration is not feasible.
- (v) Provide permanent restoration to eliminate future erosion.

The Erosion and Sediment Control Plan should consider the specific characteristics of the development site and address the requirements relating to the following typical construction stages:



¹ Erosion and Sediment Control Guidelines for Urban Construction, December 2006, Greater Horseshoe Conservation Authorities.

- · Topsoil Stripping and Site Pre-Grading
- · Infrastructure Servicing
 - **Building Construction**

A "treatment train" approach is recommended in the development of an appropriate Erosion and Sediment Control Plan in compliance with the *Erosion and Sediment Control Guidelines for Urban Construction*. Typical sediment control measures include:

- Installation of silt fencing along the boundary of work areas;
- Construction of vegetated cut off swales including sediment traps and rock check dams;
- Stabilization of temporary sediment traps;
- Provision of catch basin sediment controls.

Inherent in the Erosion and Sediment Control Plan is a monitoring program with an Action Plan to implement remedial measures in a timely manner where required.

As part of the final engineering design, the Sediment and Erosion Control Plan will be prepared including sizing of temporary sedimentation ponds and sediment traps.



8 CONCLUSIONS

8.1 Summary

This Functional Servicing Report was prepared as a technical document in support of the Draft Plan of Subdivision. The report addresses sanitary, water and storm drainage servicing and stormwater management.

The report outlines a proposed servicing strategy for the proposed subdivision development and provides preliminary engineering design for sanitary, water, storm drainage and stormwater management in accordance with the technical requirements of Northumberland County, Municipality of Port Hope, Ganaraska River Conservation Authority and MECP guidelines.

8.2 Conclusion

Based on the findings of this report, the conclusions and recommendations are as follows:

- (i) Sanitary demands will need to be met using individual septic tanks,
- Water supply can be achieved by connecting to the existing 150mm diameter watermain on County Road 2, Fire demand cannot be supplied by the system,
- (iii) Storm water quality, quantity and erosion control requirements will be provided by an Underground Stormwater Storage Tank Facility to be located within the limits of Block 1,
- (iv) Erosion and sediment control measures be installed as recommended.



Scott Lang P. Eng.



Scott Ahonen P. Eng.



APPENDIX "A"

Stormwater Management Design Calculations



-

Project Name: Project No. Date. File:	Welcome Hamlet W23089 2025-03-24		
Catchment / Subarea >	County Road 2		
Description >	To Underground SWM Tank		
100 Year Storm Intensity	i =38.9 * T ^(-0.712)	T=time of concentration	(hrs)
Drainage Area (hectares)= Runoff Coefficient, C =	3.93 0.5		
Allowable Discharge (L/s)=	40	Max Storage	646.3 m3

Rainfall	Rainfall	Peak Rate	Runoff	Outflow	Storage
Duration	Intensity	of Runoff, Q	Volume	Volume	Volume
(min)	(mm/hr)	(L/s)	(cu.m)	(cu.m)	(cu.m)
()	, ,		, ,		, ,
100	27.0	147.6	885.6	240.0	645.6
101	26.8	146.6	888.1	242.4	645.7
102	26.7	145.5	890.7	244.8	645.9
103	26.5	144.5	893.2	247.2	646.0
104	26.3	143.5	895.7	249.6	646.1
105	26.1	142.6	898.1	252.0	646.1
106	25.9	141.6	900.6	254.4	646.2
107	25.8	140.7	903.0	256.8	646.2
108	25.6	139.7	905.5	259.2	646.3
109	25.4	138.8	907.9	261.6	646.3
110	25.3	137.9	910.2	264.0	646.2
111	25.1	137.0	912.6	266.4	646.2
112	24.9	136.2	915.0	268.8	646.2
113	24.8	135.3	917.3	271.2	646.1
114	24.6	134.5	919.7	273.6	646.1
115	24.5	133.6	922.0	276.0	646.0
116	24.3	132.8	924.3	278.4	645.9
117	24.2	132.0	926.6	280.8	645.8
118	24.0	131.2	928.8	283.2	645.6
119	23.9	130.4	931.1	285.6	645.5
120	23.7	129.6	933.3	288.0	645.3
121	23.6	128.9	935.6	290.4	645.2
122	23.5	128.1	937.8	292.8	645.0
123	23.3	127.4	940.0	295.2	644.8
124	23.2	126.6	942.2	297.6	644.6
125	23.1	125.9	944.4	300.0	644.4
126	22.9	125.2	946.6	302.4	644.2
127	22.8	124.5	948.7	304.8	643.9
128	22.7	123.8	950.9	307.2	643.7
129	22.6	123.1	953.0	309.6	643.4

Pre-development

Drainage to County Road 2

				Runoff					
Surface Type	<u>Area (ha)</u>	<u>C-value</u>	Area	Co-efficient Intens	ity (@ Tc=10min) mm/h Pred	levelopment Site Disc	<u>charge Rate (m3/s)</u>	А	38
Ex. Building & Gravel	0.0898	0.90	2yr		59.68	0.130	130	В	-0.7
Grassed area	2.8202	0.25	5yr		87.63	0.191	191		
			10yr		99.92	0.218	218		
			25yr		115.83	0.253	253		
Total	2.9100	0.27	50yr		127.62	0.279	279		
			100yr 2.9100	0.27	139.31	0.304	304		

Post-development

Drainage to County Road 2

				Runoff			
Surface Type	<u>Area (ha)</u>	<u>C-value</u>	<u>Area</u>	Co-efficient Intensity (@	<u>Tc=10min) mm/h Uncor</u>	ntrolled Site Discharg	<u>ge Rate (m3/s)</u>
Residential	3.7000	0.50	2yr		59.68	0.326	326
SWM Pond Block	0.2300	0.50	5yr		87.63	0.478	478
			10yr		99.92	0.545	545
Total	3.9300	0.50	25yr		115.83	0.632	632
					127.62	0.697	697
			100yr 3.9300	0.50	139.31	0.760	760

Port Hope

).7

		ID	F		
100	50	25	10	5	2
38.9	35.7	32.4	28.0	24.6	19.3
).712	-0.711	-0.711	-0.710	-0.709	-0.630

SWM POND CONTROL STRUCTURE DESIGN

	Project Number : W23089 Project Name : Welcome Hamlet Date : April 14, 2025	Prepared I Checked I	By: SA By:
Orifice No. 1 (To Control 25mm)		Orifice No.2 (To Control 2 - 100-Year)	
Orifice Plate Diameter =	0.075 m 75 mm	Orifice Plate Diameter =	0.300 m 300 mm
Area =	0.0044 m ²	Area =	0.0707 m ²
Orifice Coeff. (C)=	0.63	Orifice Coeff. (C)=	0.63
Invert =	136.10 m	Invert =	136.45 m
Orifice Plate Centroid =	136.14 m	Orifice Plate Centroid =	136.60 m
Eq. Tank Area	1277 m ²	Tank Area	1395 m ²
Submerged Orifice Equation =	Qo = 0.63 x A x [2 x g x H] ^{1/2}	Submerged Orifice Equation =	$Qo = 0.63 \times A \times [2 \times g \times H]^{1/2}$
Where,		Where,	
Q = Flow rate (m ³ /s)		Q = Flow rate (m ³ /s)	
C = Constant		C = Constant	
A = Area of opening (m2)		A = Area of opening ((m ²)
H = Net head above the	orifice (m)	H = Net head above t	the orifice (m)
g = Acceleration due to	gravity (m/s)= 2g = 19.62 m/s	g = Acceleration due	to gravity (m/s)= 2g = 19.62 m/s

	Stage (m):	0.05						
		ORIFICE CONTRO	DL-1 (ORIFICE PLATE)		ORIFICE CONTROL	2 (OUTLET PIPE)		
Storage	Elevation	Depth above orifice	Orifice No.1 Flow	Depth above orifice	Orifice No.2 Flow	Depth Above	Weir No.2 Flow	Total Flow
(m ³)		Centroid (m)	(m ³ /s)	Centroid (m)	(m³/s)	Weir (m)	(m³/s)	(m³/s)
0 112 176 239 303 367 431 495 559 589 623 686 750 766	136.14 136.19 136.24 136.29 136.34 136.39 136.44 136.49 136.54 136.56 136.59 136.64 136.69 136.74	0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.42 0.45 0.55 0.60	0.000 0.003 0.004 0.005 0.006 0.007 0.007 0.008 0.008 0.008 0.008 0.009 0.009 0.010	0.04 0.09 0.14	0.038 0.058 0.073			0.000 0.003 0.004 0.005 0.006 0.007 0.007 0.007 0.008 0.008 0.008 0.008 0.008 0.008





Permanent Pool

25mm Erosion 100-Year Top of Tank

APPENDIX "B"

Storm Sewer Design Sheets





Subdivision:

File No.: Consultant: Drainage Area Plan: Region: Municipality:

W23089

Candevcon Group Inc ST-2 Northumberland County Port Hope

Welcome Hamlet

STORM DRAINAGE Design Sheet DATE PREPARED BY Run-off Coefficients

0.25

0.40

0.70

0.90

<u>Guidelines</u>	
Vmax	4.00 m/s
Vmin	0.75 m/s
Min. Dia	300mm
Capacity	90% max

March 26, 2025

SAA

Core System	Area No.	Up- stream	Down- stream	Contri	buting Ar	ea (ha)	Bre	eakdow	n of Are	as	Are	ea x Sto	orm Co	-eff	С	Total	Cummulative	Time	e (min)	I ₂	I ₅	FLOW Q= 2.78ACI/ 1000				PIPE			
		Node	Node	In Area	Control	Cumul. Total	0.25	0.50	0.70	0.90	0.25	0.50	0.70	0.90		AxC	AxC	Tc (min)	Total			Q _{design}	Length (m)	Size (mm)	Grade (%)	Capacity (m³/sec)	Velocity (m/s)	Time (min)	% Full
POND P1																													
	1	MH12	MH11	1.07	0.00	1.07		1.07			0.00	0.54	0.00	0.00	0.50	0.54	0.54	10.0	10.8		87.6	0.130	45.2	450	0.30	0.156	0.98	0.77	83%
	2	MH11	MH10	2.02	1.07	3.09		2.02			0.00	1.01	0.00	0.00	0.50	1.01	1.55	10.8	11.6		83.2	0.357	98.9	525	1.00	0.430	1.99	0.83	83%
	-	MH10	MH9	0.00	3.09	3.09					0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.55	11.6	11.7		78.9	0.339	12.9	525	1.00	0.430	1.99	0.11	79%
	3	MH9	MH6	0.12	3.09	3.21		0.12			0.00	0.06	0.00	0.00	0.50	0.06	1.61	11.7	12.1		78.4	0.350	50.0	525	1.00	0.430	1.99	0.42	81%
	4	MH8	MH7	0.40	0.00	0.40		0.40			0.00	0.20	0.00	0.00	0.50	0.20	0.20	10.0	10.7		87.6	0.049	41.2	300	0.50	0.068	0.97	0.71	71%
	5	MH7	MH6	0.09	0.40	0.49		0.09			0.00	0.05	0.00	0.00	0.50	0.05	0.25	10.7	11.6		83.5	0.057	49.0	300	0.50	0.068	0.97	0.84	83%
	-	MH6	MH5	0.00	3.70	3.70					0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.85	12.1	12.4		76.4	0.393	27.4	600	0.50	0.434	1.54	0.30	91%
	-	MH4	MH3	0.00	0.00	0.00																0.040	19.9	300	0.30	0.053	0.75	0.44	76%
	-	MH3	MH2	0.00	0.00	0.00											Orifice Control on Storm Tank 0.040 41.6 300 0.30 0.053 0.75 0.040 22.5 300 0.30 0.053 0.75					0.93	76%						
	-	MH2	MH1	0.00	0.00	0.00																0.50	76%						
	-	MH1	EX.CB	0.00	0.00	0.00																0.040	22.3	300	0.30	0.053	0.75	0.50	76%
																													1

1.85

TOTALS

3.70 3.70

0.00 3.70 0.00 0.00 0.00 1.85 0.00 0.00 **0.500**

Park Single family

Roads

Condo/Towns

1.85

*Min time of concentration = 10 mins							
For 100-yr storm I ₁₀₀	=	38.9*T^(-0.712)					
For 5-yr storm I_5	=	24.6*T^(-0.709)					
For 2-yr storm I_2	=	19.3*T^(-0.630)					

APPENDIX "C"

Preliminary Geotechnical Investigation Report

A Geotechnical Investigation for Proposed Residential Subdivision, prepared by Soil Engineers Ltd., dated July 2024, Reference No. 2402-S021



APPENDIX "D"

Preliminary Hydrogeological Investigation Report

A Hydrogeological Assessment for Proposed Residential Subdivision, prepared by Soil Engineers Ltd., dated July 23, 2024, Reference No. 2402-W021



APPENDIX "E"

Nitrate Loading Impact Assessment

Nitrate Loading Impact Assessment, prepared by Soil Engineers Ltd., dated February 28, 2024, Reference No. 2402-W021



DRAWINGS

DRAWING PL-1 Draft Plan of Subdivision 4646 County Road 2, Municipality of Port Hope (Candevcon Group Inc., Project No. W23089)

DRAWING PS-1 Preliminary Servicing and Grading Plan 4646 County Road 2, Municipality of Port Hope (Candevcon Group Inc., Project No. W23089)

DRAWING ST-1 Pre Development Storm Drainage Plan

4646 County Road 2, Municipality of Port Hope (Candevcon Group Inc., Project No. W23089)

DRAWING ST-2 Post Development Storm Drainage Plan

4646 County Road 2, Municipality of Port Hope (Candevcon Group Inc., Project No. W23089)





LOT/BLOCK AREA SCHEDULE									
LAND USE	LOT / BLOCK	MINIMUM FRONTAGE	MINIMUM DEPTH	AREA					
RESIDENTIAL	LOT 1	18.8m	81.5m	0.228 h					
RESIDENTIAL	LOT 2	29.0m	75.4m	0.228 h					
RESIDENTIAL	LOT 3	31.6m	68.8m	0.228 h					
RESIDENTIAL	LOT 4	61.4m	35.0m	0.228 h					
RESIDENTIAL	LOT 5	32.5m	45.8m	0.228 h					
RESIDENTIAL	LOT 6	38.8m	38.0m	0.228 h					
RESIDENTIAL	LOT 7	30.3m	44.2m	0.228 h					
RESIDENTIAL	LOT 8	35.2m	59.9m	0.228 h					
RESIDENTIAL	LOT 9	35.8m	67.3m	0.228 h					
RESIDENTIAL	LOT 10	32.2m	73.9m	0.228 h					
RESIDENTIAL	LOT 11	29.6m	80.0m	0.228 h					
RESIDENTIAL	LOT 12	34.4m	80.0m	0.228 h					
RESIDENTIAL	LOT 13 (EXISTING)	60.3m	33.7m	0.228 h					
STORMWATER MANAGEMENT POND	BLOCK 1			0.23 h					
OPEN SPACE	BLOCKS 2-2A	-	-	0.07 h					
ROADS	STREET 'A'	-	-	0.67 h					
TOTAL				3.93 h					





