

## **Functional Servicing and Stormwater Management Design Report – Northern Lands (6581 Highway 6)**

Township of Centre Wellington (Fergus), Ontario

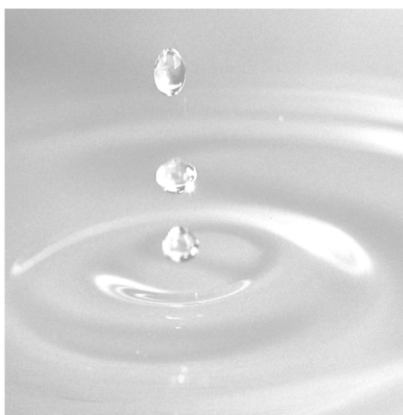
**Submitted to:**

Polocorp Inc.  
379 Queen Street South  
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**Submitted by:**

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March 12, 2025  
Project No. 2401807



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- Appendix A Geotechnical Investigation (Chung and Vander Doelen Engineering Ltd., dated February 28, 2025) and Preliminary Hydrogeological Investigation (Chung and Vander Doelen Engineering Ltd., dated February 28, 2025)
- Appendix B Sewer Design Sheets
- Appendix C Stormwater Management Analysis
  - C.1. Existing Conditions Modelling
  - C.2. Post-Development Conditions Modelling
- Appendix D Water Balance Analysis

PG/PW

# Certification

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**PREPARED BY:**

GEI Consultants Canada Ltd.



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Project Engineer



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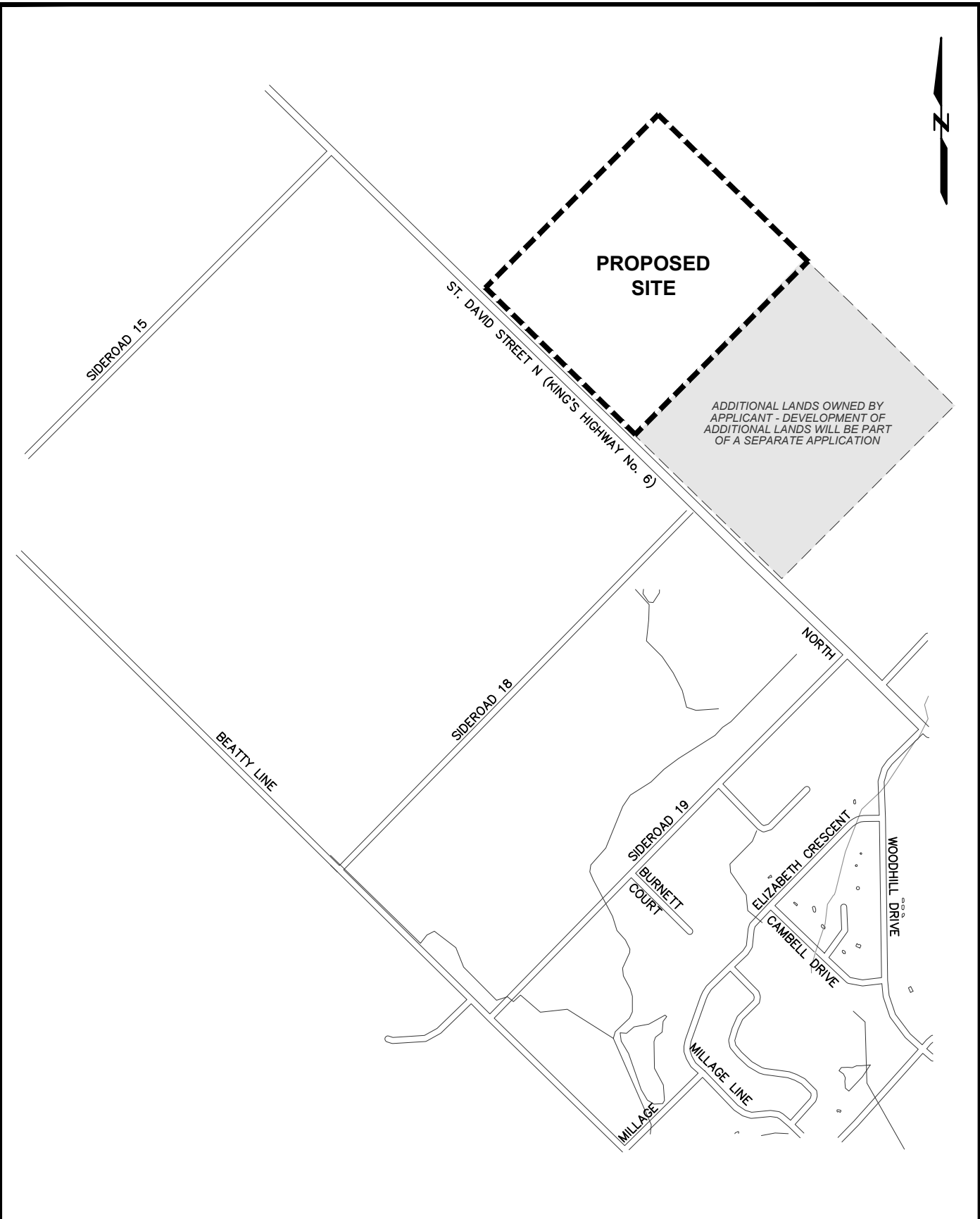
Patrick Grier, P.Eng.  
Senior Project Engineer

# 1. Introduction

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GEI Consultants Canada Ltd. have prepared this Functional Servicing Report to address the site servicing and stormwater management requirements for the proposed development in support of the Draft Plan approval. The Draft Plan of Subdivision has been prepared by Polocorp Inc. (dated December 10, 2024).

The proposed 20.03 ha development (site) is located north of St. David Street N (Highway No. 6), east and south of existing agricultural lands in Fergus. There are external lands east of the proposed development that are also owned by the applicant and are currently used for agriculture. The adjacent additional lands owned by the applicant will be part of a separate application for development. Figure 1 shows the location of the proposed development and the surrounding area. The wetland area in the northeast limits of the site is regulated by the Grand River Conservation Authority (GRCA).



FERGUS SUBDIVISION - NORTH LANDS  
TOWNSHIP OF CENTRE WELLINGTON (FERGUS)



LOCATION PLAN

POLOCORP

Project 2401807

FEBRUARY 2025

Figure No. 1

## **2. Existing Conditions**

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### **2.1. Land Use**

The site is currently a vacant agricultural field. One (1) existing dwelling is located along the southwest limits of the site. This dwelling is to remain under post-development conditions.

### **2.2. Topography**

The majority of the site drains by sheetflow in an easterly direction towards the adjacent property owned by the applicant, ultimately contributing to a wetland northeast of the site. A portion of the site along the south limits sheetflows south to the roadside ditch along the Highway 6 right-of-way. The roadside ditch along Highway 6 ultimately discharges to a regulated watercourse downstream of the northeast wetland. A portion of the site along the west limits sheetflows north and west, ultimately contributing to a second wetland off-site.

### **2.3. Soils**

A Geotechnical Investigation has been completed by Chung & Vander Doelen Engineering Ltd. in 2025. The preliminary geotechnical investigation consisted of three (3) boreholes across the site to depths ranging from 5.2 m to 8.25 m below the ground surface (bgs) and five (5) additional boreholes on the adjacent property owned by the applicant. Based on the geotechnical investigation, the site soils generally consist of approximately 180 mm to 300 mm thick topsoil followed by clayey sand silt and sandy silt.

A copy of the Geotechnical Investigation is included in Appendix A.

### **2.4. Groundwater**

A Preliminary Hydrogeological Investigation has been completed by Chung & Vander Doelen Engineering Ltd. in 2025. As part of the hydrogeological study, three (3) monitoring wells were installed between December 2023 and March 2024, as well as five (5) additional monitoring wells and four (4) shallow piezometers on the adjacent property owned by the applicant.

Groundwater monitoring results indicate that the seasonal high groundwater levels on site vary from 0.25 m below ground surface at the northeast limits of the site (BH/MW 8) to approximately 3.61 m below ground surface towards the southwest limits of the site (BH / MW 4). A copy of the Preliminary Hydrogeological Investigation is included in Appendix A.

## **3. Proposed Development**

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The proposed 20.03 ha residential development generally consists of 87-129 single-detached units, 179-266 on-street townhouse units, 93-125 medium density residential units, 8-14 mixed use residential units, a park block, and internal roadways. Figure 2 illustrates the proposed Draft Plan of Subdivision prepared by Polocorp Inc.. Connection to the site will be via the Street B connection to St. David Street N (Highway No. 6) and Streets A, D, E, and F to the adjacent property owned by the same applicant. A future connection is included to the north of the property via Street J.

### **3.1. Site Grading**

The site grading for the proposed residential lots, internal roads and stormwater management facility is shown on the Grading Plans. The site has been graded to match the Street B entrance elevations at Highway 6, and the property boundaries along the north, south, east and west portions of the site.

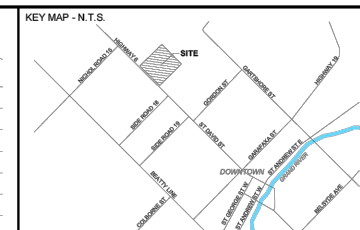
Internal roadways are graded with slopes ranging from 0.6% to 1.5%, while lots are generally graded with slopes ranging from 2% to 4%. The proposed lot grading patterns generally consists of split-drainage lots and back to front draining lots. 3:1 transition slopes are proposed in rear yard areas of select lots to accommodate the grade relief across the site.

### **3.2. Streets**

The internal local roadways will be constructed as 18-23 m wide urban cross sections complete with concrete curb and gutter per Township of Centre Wellington Standards. The Street G right-of-way connection at St. David Street N (Highway No. 6) will be 20 m in width.

### **3.3. Water Supply**

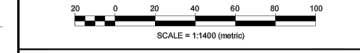
The proposed development will be serviced by extending a watermain along St. David Street N (Highway No. 7) in the westerly direction to the site entrance followed by which a local watermain will be extended throughout the site via the internal road network. The proposed watermain sizing will be completed as part of the detail design of the site once Draft Plan approval has been received.



**DRAFT PLAN OF SUBDIVISION**

PT OF LOT 18, CONCESSION 16  
IN THE FORMER GEOGRAPHIC TWP OF NICHOL  
CENTRE WELLINGTON

POLOCORP INC.



**LAND USE SCHEDULE**

DESCRIPTION	LOTS/BLOCKS	UNITS	AREA (ha.)
Single Detached	31-43	87-129	4.863
Street Townhouses	44-61	179-208	5.512
Medium Density	62-63	93-125	2.966
Mixed Use	64	8-14	0.338
Existing Houses	65	0-1	0.172
Stormwater Management Facility	-	-	-
Trail	-	-	-
Playland	66	-	0.802 (4.8%)
Pedestrian Walkway	67-69	-	0.115
Environmental Feature & Buffer	-	-	-
MTO Allowance	70, 71	-	0.534
Roads	-	-	5.279
<b>TOTAL</b>		<b>367-535</b>	<b>20.027</b>

SALEABLE FRONTAGE	LENGTH	UNIT SMALL	UNIT LARGE
Single Detached	1,466.3m	30' (9.1m)	50' (15.2m)
Street Townhouses	1,773.2m	18' (5.5m)	27' (8.2m)
<b>TOTAL</b>	<b>3,239.5m</b>		

**DENSITY**

Gross Area (ha)	20.027 ha (49.49 ac)
Developable Area (ha)	19.457 ha (48.08 ac)
Net Density (units/ha)	18.9 / 27.5 units/ha
Net People-Jobs (3.05 per unit)	57.7 - 83.9 PU/ha

**INFORMATION REQUIRED**  
UNDER SECTION 51 (17) OF THE PLANNING ACT, R.S.O. 1990, c.P.13 AS AMENDED  
INFORMATION REQUIRED BY CLAUSES a,b,c,d,e,f,g,j AND I ARE AS SHOWN ON THE DRAFT PLAN.  
(h) Municipal Water Supply  
(i) Sandy Loan  
(k) Municipal Sanitary and Storm Sewers

**SURVEYOR'S CERTIFICATE**  
I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

O.L.S. \_\_\_\_\_ DATE XX XX, 2024  
Surveying Inc.

**OWNER'S CERTIFICATE**  
I HEREBY CONSENT TO THE FILING OF THIS PLAN BY POLOCORP INC., IN DRAFT FORM

MIKE RUPOLO \_\_\_\_\_ DATE \_\_\_\_\_  
Polocorp Inc.

**APPROVALS**  
REGIONAL MUNICIPALITY OF WATERLOO APPROVAL BLOCK

**DRAFT FOR DISCUSSION PURPOSES ONLY**

DATE	BY	REVISIONS	DESCRIPTION

**POLOCORP**

379 Queen Street South, Kitchener | N2T 1W6 | 519-745-3246 | polocorpinc.com

DATE: December 10, 2024      SCALE 1:4000 (metric)

PROJECT: 1012 (Fergus)      DRAWN BY: GFE

**LEGEND**

FERGUS SUBDIVISION - NORTH LANDS  
TOWNSHIP OF CENTRE WELLINGTON (FERGUS)

POLOCORP



DRAFT PLAN OF SUBDIVISION

Project 2401807      FEBRUARY 2025      FIGURE No. 2

Domestic water demands for the proposed development are calculated in Table 1 below.

**Table No. 1: Domestic Water Demand Requirements**

Unit Type	Population	Average Day (350 L/p/d)	Min Hour (Factor = 0.40)	Max Day (Factor = 2.75)	Max Hour (Factor = 4.13)
129 Single Family Lots (at 2.8 persons/lot)	361	1.46 L/s	0.58 L/s	4.02 L/s	6.03 L/s
266 On-Street Townhome Units (at 2.5 persons per lot)	665	2.69 L/s	1.08 L/s	7.40 L/s	11.11 L/s
139 Mixed Use / Medium Density Units – (at 2.5 persons per unit)	348	1.41 L/s	0.56 L/s	3.87 L/s	5.81 L/s
1 Existing Single Family Lot (at 2.8 persons/lot)	3	0.01 L/s	0.004 L/s	0.03 L/s	0.04 L/s
Total On-site Domestic Demands	1,377	5.57 L/s	2.22 L/s	15.32 L/s	22.99 L/s

*Note: Population has been rounded to the nearest whole number.*

A 25mm diameter water service lateral will be provided for each dwelling. Fire hydrants will be installed at a minimum radius of 150m in accordance with Township of Centre Wellington Development Manual.

Watermain servicing is proposed to be connected to the adjacent property owned by the same applicant. The proposed watermain network layout is shown on the Servicing Plans.

Through discussions with the Township of Centre Wellington and Triton Engineering Services Limited, the existing 300mm diameter watermain has sufficient capacity to service these lands. The Township of Centre Wellington also confirmed that they are currently undertaking a Municipal Class Environmental Assessment (EA) to identify potential supply well location(s), to ensure that sufficient water supply is available to accommodate the additional demand resulting from the lands to be included within the Township’s municipal boundary as part of the MCR (Municipal Comprehensive Review) process. Therefore, from a water supply and watermain servicing perspective, there are minimal works required to support the development of this property lands.

### 3.4. Sanitary Sewer

Each dwelling will be serviced via a proposed 100 mm diameter sanitary service lateral per Township of Centre Wellington Development Manual. Sanitary sewer design calculations have been attached as Appendix B. Sanitary servicing is proposed to be connected to the adjacent property owned by the same applicant. The sanitary sewer layout is shown on the Servicing Plans.

Per our correspondence with the Township of Centre Wellington and Triton Engineering Services Limited, there is sufficient capacity in the existing downstream sanitary sewer system and the downstream wastewater treatment plan (WWTP) to service these lands. This is based on our understanding that the planned upgrades to the WWTP, which are scheduled to occur in 2029, will ensure that sufficient treatment capacity exists for the lands to be included within the Township’s municipal boundary as part

of the MCR (Municipal Comprehensive Review) process. Therefore, from a sanitary sewer servicing perspective, there are minimal works required to support the development of this property lands and the lands can be efficiently and cost effectively serviced via a gravity connection to an existing sanitary sewer.

### **3.5. Storm Sewer**

The storm sewer system on the internal roads will be sized to convey the 5-year design storm to the existing stormwater management facility (designed as part of the 968 St. David Street North Subdivision application) per the Township of Centre Wellington Development Manual. Major storm events will be conveyed overland through the municipal rights-of-way to the adjacent property owned by the same applicant, ultimately draining to the stormwater management facility. Storm sewer design calculations have been attached as Appendix B. The stormwater management facility will outlet to the wetland along the northeast limits of the site to maintain existing drainage patterns.

Each lot will have a proposed 100 mm diameter storm service lateral connected to the proposed storm sewer system in the municipal right-of-way. Foundation drainage will be provided via sump pump discharge to the storm service lateral.

## 4. Stormwater Management Criteria

The studies, policies and guidelines used to develop the stormwater management plan are as follows:

- 1) The Stormwater Management Practices Planning and Design Manual, 1994
- 2) Stormwater Management Planning and Design Manual, 2003
- 3) The Interim Stormwater Quality Control Guidelines, 1991
- 4) The Stormwater Quality Best Management Practices Manual, 1991
- 5) The MTO Drainage Management Technical Guidelines, 1989
- 6) The Ontario Urban Drainage Design Guidelines, 1987
- 7) Low Impact Development Stormwater Management Planning and Design Guide, 2010

The stormwater management criteria are as follows:

- 1) Post-development flow rates for the site must be controlled to pre-development conditions rates for the 2 to 100 year design storm events.
- 2) Provide Enhanced level of quality control (80% Total Suspended Solids (TSS) removal) from all runoff discharging from the site.
- 3) Volume control performance should be evaluated for the 25mm storm event or through continuous modelling.
- 4) All efforts should be made to maximize infiltration wherever soil conditions allow.
- 5) Provide extended detention storage for the 25mm storm event.

The method used to evaluate and design the stormwater management plan is as follows:

The Fergus Shand Dam rainfall parameters presented in the Stormwater Management Master Plan for Centre Wellington (Elora, Salem and Fergus) (wsp Group, dated April 9, 2024) were used to generate the mass rainfall data for a 4-hour duration rainfall event for the full range of design storms (2 to 100-year). The 25mm storm for a 2-hour duration is also included within the table below. The Chicago storm parameters and the total depth of rainfall for each storm are as follows:

**Table No. 2: Fergus Shand Dam - Chicago Storm Parameters**

Parameter	25mm	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
a =	367.000	414.876	544.711	627.308	746.059	820.361	901.088
b =	5.000	0.0268	0.0206	0.0136	0.0851	0.0100	0.0426
c =	0.700	0.682	0.686	0.687	0.692	0.691	0.692
r =	0.394	0.375	0.375	0.375	0.375	0.375	0.375
td =	120.00	240.00	240.00	240.00	240.00	240.00	240.00
Rainfall depth (mm)	24.995	39.504	50.743	58.119	67.239	74.358	81.221

The Regional Storm (Hurricane Hazel) was also modelled.

The Horton infiltration method was used in the runoff calculations.

**Table No. 3: MIDUSS – Horton Infiltration Parameters**

<b>Parameter</b>	<b>Impervious Areas</b>	<b>Pervious Areas</b>
Maximum Infiltration (mm/hr)	0.0	30.0
Minimum Infiltration (mm/hr)	0.0	5.0
Lag Constant (hr)	0.0	0.25
Depression Storage (mm)	1.5	5.0

The hydrologic model MIDUSS was used to create the runoff hydrographs and to route the flows through the storage structures.

## 5. Stormwater Management Plan

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The stormwater management design for the proposed development has been included in the adjacent lands owned by the applicant in order to size the stormwater management facility for buildout of both properties. Pre-development conditions refers to both lands as agricultural before development. Existing conditions refers to the full buildout of the adjacent lands, analyzed as part of the Functional Servicing and Stormwater Management Report – Southern Lands, 968 St. David Street North (GEI Consultants Canada Ltd., March 2025), with the built stormwater management facility, and Post-Development Conditions will refer to the proposed development of the Northern Lands (6581 Highway 6).

### 5.1. Existing Conditions

For analysis of existing conditions, the site was modelled as eight (8) drainage catchments. The existing condition drainage catchments are shown on Figure 3 and described below. The existing conditions MIDUSS computer modelling is attached in Appendix C.

**Catchment 100 (13.09 hectares, 80% impervious)** represents the majority of the adjacent lands owned by the same applicant. Runoff generated from Catchment 100 is captured and conveyed to the proposed stormwater management facility via on-site storm sewers.

**Catchment 200 (2.02 hectares, 15% impervious)** represents the stormwater management facility on the adjacent lands owned by the same applicant. The stormwater management facility is designed to provide the required Enhanced level of protection prior to discharging to the wetland along the northeast limits of the site.

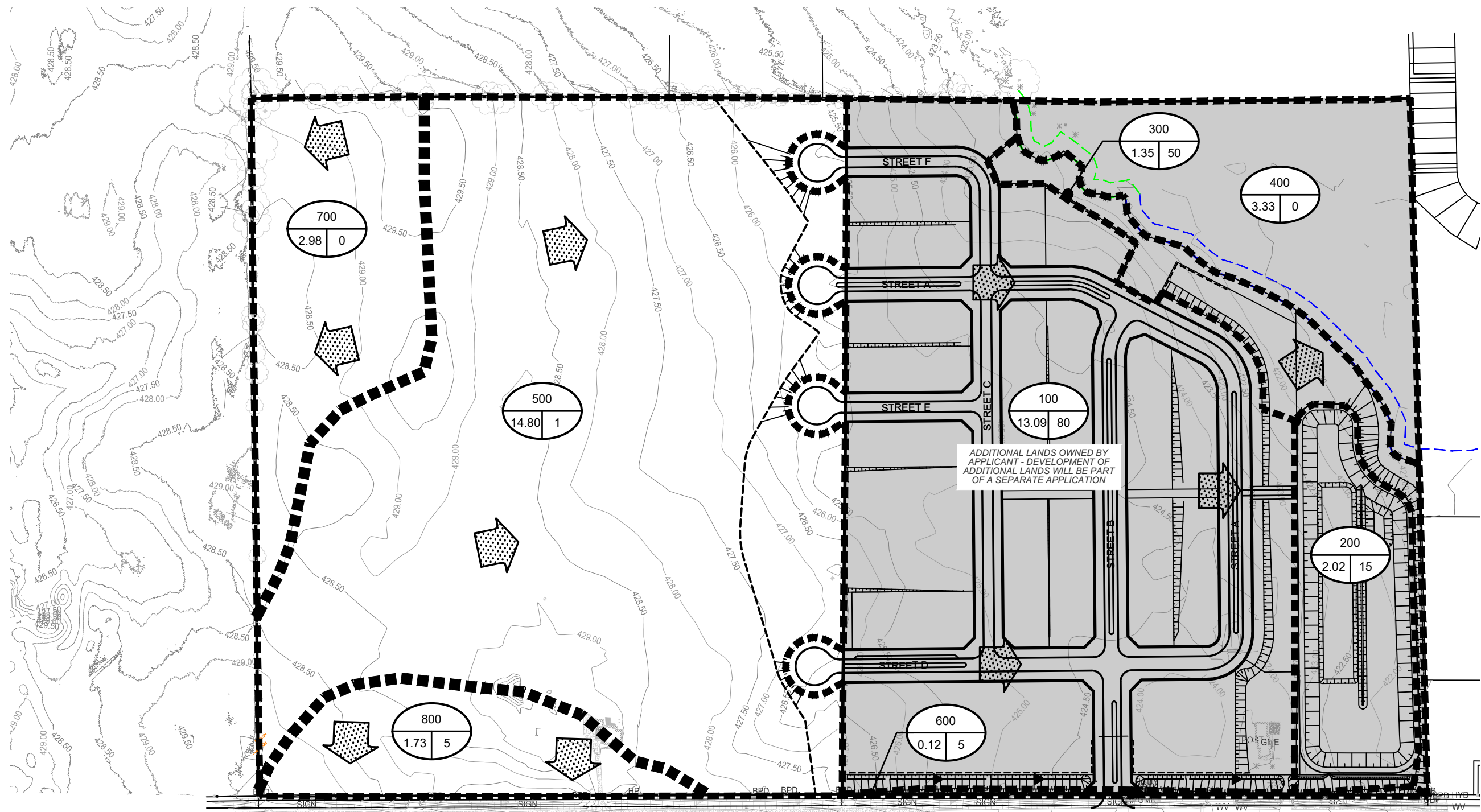
**Catchment 300 (1.35 hectares, 50% impervious)** represents a portion of the adjacent lands owned by the same applicant near the northeast wetland. Runoff generated from Catchment 300 will sheetflow overland, uncontrolled, to the northeast wetland.

**Catchment 400 (3.33 hectares, 0% impervious)** represents the northeast portion of the adjacent lands owned by the same applicant consisting of an existing wetland. Runoff generated from Catchment 400 contributes to the wetland extending north and east past the limits of the site.

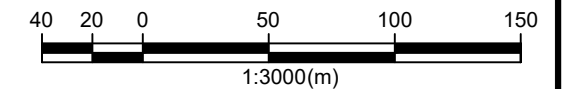
**Catchment 500 (14.80, 1% impervious)** represents the majority of the proposed development. Runoff generated from Catchment 500 will sheetflow overland east to the adjacent property owned by the same applicant, ultimately discharging to the stormwater management facility.

**Catchment 600 (0.12 hectares, 5% impervious)** represents a portion of the adjacent lands owned by the same applicant, adjacent to the Highway 6 right-of-way. Runoff generated from Catchment 600 will sheetflow overland to the roadside ditch on Highway 6 right-of-way, ultimately discharging to a regulated watercourse.

**Catchment 700 (2.98, 0% impervious)** represents a westerly portion of the site. Runoff generated from Catchment 700 sheetflows overland in the westerly direction to the adjacent farm field and an offsite wetland.

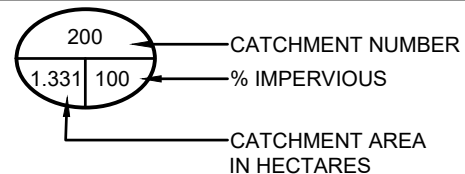


NOTE:  
 EXISTING EXTERNAL CONTOUR INFORMATION  
 RETRIEVED FROM THE ONTARIO GEOHUB DIGITAL  
 TERRAIN MODEL (LIDAR-DERIVED) ON 2024-08-19



**LEGEND**

--- CATCHMENT BOUNDARY  
 MAJOR OVERLAND FLOW



FERGUS SUBDIVISION - NORTH LANDS  
 TOWNSHIP OF CENTRE WELLINGTON (FERGUS)

POLOCORP



EXISTING CONDITIONS  
 DRAINAGE AREAS

Project 2401807

FEBRUARY 2025 FIGURE No. 3

**Catchment 800 (1.73, 5% impervious)** represents a southwesterly portion of the site. Runoff generated from Catchment 800 sheetflows overland to the roadside ditch in the Highway 6 right-of-way which then continues to sheetflow to and offsite regulated watercourse.

### 5.1.1. Routing – Existing Conditions

Table No. 4 compares the routing results through the stormwater management facility with the available stage/storage/ discharge capacities.

**Table No. 4: Stormwater Management Facility – Stage/Storage/Discharge Comparison**

	Available Capacity			Actual Capacity Used		
	Peak Flow m <sup>3</sup> /s	Storage Volume m <sup>3</sup>	Storage Elevation m	Peak Flow m <sup>3</sup> /s	Storage Volume m <sup>3</sup>	Storage Elevation m
Invert of Outlet Structure No. 2	0.000	0	421.50	--	--	--
25 mm Storm	--	--	--	0.019	3,398	421.81
T/G DICB.1	0.026	5,717	422.00	--	--	--
2 Year Storm	--	--	--	0.046	6,286	422.05
5 Year Storm	--	--	--	0.197	8,304	422.20
10 Year Storm	--	--	--	0.323	9,355	422.28
T/G DICB.2	0.352	9,602	422.30	--	--	--
25 Year Storm	--	--	--	0.398	10,987	422.40
50 Year Storm	--	--	--	0.501	12,188	422.49
100 Year Storm	--	--	--	0.681	13,175	422.56
Weir	0.958	15,198	422.70	--	--	--
Regional Storm	--	--	--	2.741	18,043	422.89
Top of Bank	8.746	22,853	423.20	--	--	--

**Table No. 5: Existing Condition Controlled Flow Rates**

	<b>25 mm (m<sup>3</sup>/s)</b>	<b>2-Year (m<sup>3</sup>/s)</b>	<b>5-Year (m<sup>3</sup>/s)</b>	<b>10-Year (m<sup>3</sup>/s)</b>	<b>25-Year (m<sup>3</sup>/s)</b>	<b>50-Year (m<sup>3</sup>/s)</b>	<b>100-Year (m<sup>3</sup>/s)</b>	<b>Regional Storm (m<sup>3</sup>/s)</b>
Catchment 600 (uncontrolled)	0.007	0.022	0.035	0.043	0.052	0.058	0.063	0.014
Catchment 800 (uncontrolled)	0.050	0.163	0.287	0.378	0.496	0.580	0.664	0.182
<i>To Highway 6 Roadside Ditch</i>	<i>0.052</i>	<i>0.167</i>	<i>0.305</i>	<i>0.398</i>	<i>0.519</i>	<i>0.604</i>	<i>0.691</i>	<i>0.196</i>
Catchment 100, 200 and 500 (controlled)	0.019	0.046	0.197	0.323	0.398	0.501	0.681	2.741
Catchment 300 (uncontrolled)	0.121	0.228	0.347	0.424	0.525	0.597	0.665	0.165
Catchment 400 (uncontrolled)	0.056	0.193	0.356	0.455	0.607	0.720	0.835	0.366
<i>To Northeast Wetland</i>	<i>0.127</i>	<i>0.266</i>	<i>0.442</i>	<i>0.560</i>	<i>0.756</i>	<i>0.893</i>	<i>1.033</i>	<i>3.222</i>
Catchment 700 (uncontrolled)	0.044	0.152	0.271	0.386	0.500	0.575	0.652	0.327
<i>To West Farm Field</i>	<i>0.044</i>	<i>0.152</i>	<i>0.271</i>	<i>0.386</i>	<i>0.500</i>	<i>0.575</i>	<i>0.652</i>	<i>0.327</i>
<b>Total Flow Rate</b>	<b>0.169</b>	<b>0.518</b>	<b>0.892</b>	<b>1.160</b>	<b>1.575</b>	<b>1.860</b>	<b>2.153</b>	<b>3.726</b>

## 5.2. Stormwater Management Overview

In line with current practices and guidelines, the stormwater management approach for the North Lands Subdivision is designed as a “treatment train” to remove sediments and any absorbed contaminants prior to the discharge of runoff from the development to the receiving outlets. The “treatment train” approach will include a combination of lot level, conveyance and end-of-pipe best management practices and is proposed to filter and remove sediments from stormwater runoff prior to discharging off-site.

### Lot Level Controls

Stormwater management practices recommended for providing lot level controls on this site are as follows:

#### a) Rooftop Infiltration

Each lot will have a rear yard infiltration gallery designed to infiltrate the 25 mm storm runoff from the proposed rooftop. The gallery connection to the roof downspout will include a splash pad and overflow for storm events greater than the 25 mm storm to discharge to ground surface followed by which the roof runoff will be directed to the grassed areas of the lot. The runoff for any event large enough to generate flow to the sewer system will be adequately filtered by the grass.

Design considerations that will be implemented in the infiltration galleries’ designs include:

- Located beneath frost penetration depth and minimum of 4 metres away from building foundations
- A 100-150mm diameter perforated vertical standpipe for inspection and flushing
- Leaf screens on downspouts
- 50mm clear stone with 30 to 40% void space
- Geotextile installed around the reservoir which considers their percent open area, load bearing ratio, and the texture and permeability of native soils

#### **b) Rear Yard Swales**

The grading of the lots will be to current Township of Centre Wellington Design Standards. Where practical, the length of the rear lot swales between catchbasins will be increased to extend the contact time with the grassed surfaces.

To promote more infiltration on the lots and in the swales, it is recommended that the average depth of graded topsoil be 300 mm.

#### **c) Foundation Drainage**

Foundation drainage will be provided for each lot via sump pumps discharging to storm service laterals.

### **Conveyance Controls**

Conveyance controls will be achieved through municipal maintenance of the storm sewer system. The regular cleanout of the manholes and catchbasin sumps will remove the heavier sediments deposited from the runoff during storm events.

### **End of Pipe Facilities**

The end-of-pipe component for Catchments 1000 and 2000 consists of the proposed stormwater management facility located near the south-easterly edge of the adjacent property, adjacent to the existing wetland and Highway 6 (St. David Street N).

### **Water Quality**

The stormwater management facility proposed on the adjacent property has been designed to function as a wetland. From Table 3.2, Stormwater Management Planning and Design Manual, 2003, in order to provide Enhanced water quality treatment, a wetland facility requires 128 m<sup>3</sup>/ha of storage volume for a contributing drainage area that is 76% impervious. 40 m<sup>3</sup>/ha of the required storage volume is extended detention volume, while the remaining 88 m<sup>3</sup>/ha is permanent pool.

Based on a contributing site area of 33.57 hectares (Catchments 1000 and 2000 in ultimate post-development conditions) and a requirement for 88 m<sup>3</sup>/ha of permanent pool storage volume to achieve Enhanced treatment, the required permanent pool storage is 2,954 m<sup>3</sup>.

The stormwater management facility has been designed with a 0.3-metre-deep permanent pool, which provides 3,003 m<sup>3</sup> of permanent pool volume. An additional permanent pool volume of 875 m<sup>3</sup> will be provided in the sediment forebay.

Further details of the stormwater management facility can be found in the Functional Servicing and Stormwater Management Report for the South Lands Subdivision (GEI Consultants Canada Ltd., dated February 2025).

### 5.3. Allowable Release Rates

The pre-development conditions for this site and the adjacent property were analyzed as part of the South Lands Subdivision Functional Servicing and Stormwater Management Design Report (dated February 2025). The allowable release rate has been established based on the pre-development flow rates to each outlet from the two properties. These are as follows:

**Table No. 6: Allowable Release Rates**

	25 mm (m <sup>3</sup> /s)	2-Year (m <sup>3</sup> /s)	5-Year (m <sup>3</sup> /s)	10-Year (m <sup>3</sup> /s)	25-Year (m <sup>3</sup> /s)	50-Year (m <sup>3</sup> /s)	100-Year (m <sup>3</sup> /s)	Regional Storm (m <sup>3</sup> /s)
To Northeast Wetland	0.489	1.700	2.963	3.974	5.416	6.448	7.319	3.762
To Farm Field West of Site	0.049	0.169	0.317	0.405	0.532	0.633	0.734	0.327
To Highway 6	0.058	0.188	0.332	0.437	0.574	0.670	0.768	0.211
<b>Total Flow Rate</b>	<b>0.561</b>	<b>1.947</b>	<b>3.346</b>	<b>4.608</b>	<b>6.178</b>	<b>7.296</b>	<b>8.263</b>	<b>4.283</b>

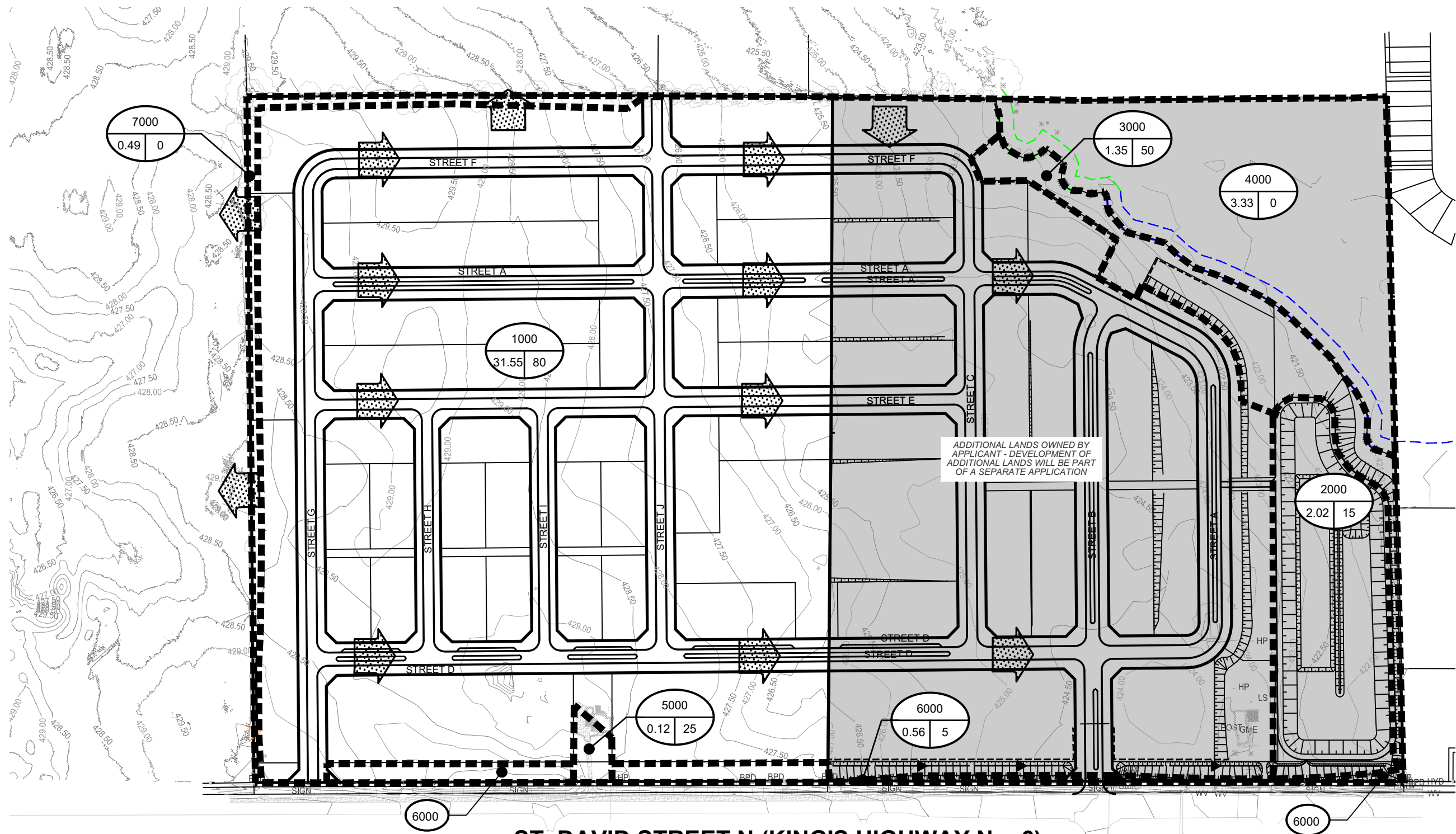
### 5.4. Post-Development Conditions

For post-development analysis purposes, the site was modelled as seven (7) drainage catchments. The post-development drainage catchments are shown on Figure 4 and described below. The post-development MIDUSS computer modelling is attached in Appendix C.

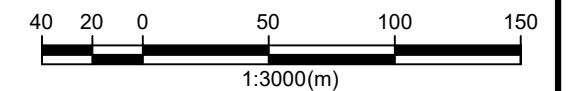
**Catchment 1000 (31.55 hectares, 80% impervious)** represents the majority of the development. Runoff generated from Catchment 1000 will be captured and conveyed to the proposed stormwater management facility via on-site storm sewers.

**Catchment 2000 (2.02 hectares, 15% impervious)** represents the proposed stormwater management facility. The proposed stormwater management facility is designed to provide the required Enhanced level of protection prior to discharging to the wetland along the northeast limits of the site.

**Catchment 3000 (1.35 hectares, 50% impervious)** represents a portion of the proposed development adjacent to the northeast wetland. Runoff generated from Catchment 3000 will sheetflow overland, uncontrolled, to the northeast wetland.



NOTE:  
EXISTING EXTERNAL CONTOUR INFORMATION  
RETRIEVED FROM THE ONTARIO GEOHUB DIGITAL  
TERRAIN MODEL (LIDAR-DERIVED) ON 2024-08-19

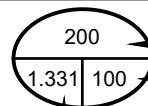


**LEGEND**



CATCHMENT BOUNDARY

MAJOR OVERLAND FLOW



CATCHMENT NUMBER

% IMPERVIOUS

CATCHMENT AREA  
IN HECTARES

FERGUS SUBDIVISION - NORTH LANDS  
TOWNSHIP OF CENTRE WELLINGTON (FERGUS)

POLOCORP



Project 2401807

POST-DEVELOPMENT  
DRAINAGE AREAS

FEBRUARY 2025 FIGURE No. 4

**Catchment 4000 (3.33 hectares, 0% impervious)** represents the northeast portion of the site consisting of an existing wetland. Runoff generated from Catchment 4000 contributes to the wetland extending north and east past the limits of the site.

**Catchment 5000 (0.12 hectares, 25% impervious)** represents the front yard of the existing houses on site. Runoff generated from Catchment 5000 will sheetflow overland to the roadside ditch on Highway 6 right-of-way, ultimately discharging to a regulated watercourse.

**Catchment 6000 (0.56 hectares, 5% impervious)** represents a portion of the proposed development adjacent to the Highway 6 right-of-way. Runoff generated from Catchment 6000 will sheetflow overland to the roadside ditch on Highway 6 right-of-way, ultimately discharging to a regulated watercourse.

**Catchment 7000 (0.49 hectares, 0% impervious)** represents a northwest portion of the proposed development consisting of rooftops and rear yards. Runoff generated from Catchment 7000 will sheetflow overland west to the adjacent farm field, ultimately discharging to an offsite wetland.

#### **5.4.1. Routing – Post-Development Conditions**

Table No. 7 lists the post-development uncontrolled flow rates for each catchment under the 2 to 100-year design storms and Regional Storm.

**Table No. 7: Post-Development Uncontrolled Flow Rates**

	<b>25 mm (m<sup>3</sup>/s)</b>	<b>2-Year (m<sup>3</sup>/s)</b>	<b>5-Year (m<sup>3</sup>/s)</b>	<b>10-Year (m<sup>3</sup>/s)</b>	<b>25-Year (m<sup>3</sup>/s)</b>	<b>50-Year (m<sup>3</sup>/s)</b>	<b>100-Year (m<sup>3</sup>/s)</b>	<b>Regional Storm (m<sup>3</sup>/s)</b>
Catchment 1000	3.692	6.428	8.626	10.093	12.028	13.467	14.844	3.800
Catchment 2000	0.056	0.170	0.279	0.383	0.509	0.595	0.686	0.210
Catchment 3000	0.121	0.228	0.347	0.424	0.525	0.597	0.665	0.165
Catchment 4000	0.056	0.193	0.356	0.455	0.607	0.720	0.835	0.366
Catchment 5000	0.005	0.009	0.016	0.022	0.029	0.034	0.039	0.013
Catchment 6000	0.032	0.105	0.163	0.198	0.242	0.272	0.296	0.065
Catchment 7000	0.025	0.082	0.136	0.169	0.210	0.239	0.261	0.056
<b>Total Flow Rate</b>	<b>3.901</b>	<b>6.995</b>	<b>9.548</b>	<b>11.267</b>	<b>13.566</b>	<b>15.259</b>	<b>16.873</b>	<b>4.594</b>

Table No. 8 compares the routing results through the stormwater management facility with the available stage/storage/ discharge capacities.

**Table No. 8: Stormwater Management Facility – Stage/Storage/Discharge Comparison**

	Available Capacity			Actual Capacity Used		
	Peak Flow m <sup>3</sup> /s	Storage Volume m <sup>3</sup>	Storage Elevation m	Peak Flow m <sup>3</sup> /s	Storage Volume m <sup>3</sup>	Storage Elevation m
Invert of Outlet Structure No. 2	0.000	0	421.50	--	--	--
T/G DICB.1	0.026	5,717	422.00	--	--	--
25 mm Storm	--	--	--	0.043	6,205	422.04
2 Year Storm	--	--	--	0.260	8,828	422.24
T/G DICB.2	0.352	9,602	422.3	--	--	--
5 Year Storm	--	--	--	0.407	11,095	422.41
10 Year Storm	--	--	--	0.562	12,581	422.52
25 Year Storm	--	--	--	0.835	14,092	422.62
Weir	0.958	15,198	422.70	--	--	--
50 Year Storm	--	--	--	1.045	15,395	422.71
100 Year Storm	--	--	--	1.445	16,290	422.77
Regional Storm	--	--	--	3.326	18,929	422.95
Top of Bank	8.746	22,853	423.20	--	--	--

**Table No. 9: Post-Development Controlled Flow Rates**

	<b>25 mm (m<sup>3</sup>/s)</b>	<b>2-Year (m<sup>3</sup>/s)</b>	<b>5-Year (m<sup>3</sup>/s)</b>	<b>10-Year (m<sup>3</sup>/s)</b>	<b>25-Year (m<sup>3</sup>/s)</b>	<b>50-Year (m<sup>3</sup>/s)</b>	<b>100-Year (m<sup>3</sup>/s)</b>	<b>Regional Storm (m<sup>3</sup>/s)</b>
Catchment 5000 (uncontrolled)	0.005	0.009	0.016	0.022	0.029	0.034	0.039	0.013
Catchment 6000 (uncontrolled)	0.032	0.105	0.163	0.198	0.242	0.272	0.296	0.065
<i>To Highway 6 Roadside Ditch</i>	<i>0.037</i>	<i>0.114</i>	<i>0.177</i>	<i>0.216</i>	<i>0.265</i>	<i>0.300</i>	<i>0.328</i>	<i>0.078</i>
Catchment 1000 and 2000 (controlled)	0.043	0.260	0.407	0.562	0.835	1.045	1.445	3.326
Catchment 4000 (uncontrolled)	0.056	0.193	0.356	0.455	0.607	0.720	0.835	0.366
Catchment 3000 (uncontrolled)	0.121	0.228	0.347	0.424	0.525	0.597	0.665	0.165
<i>To Northeast Wetland</i>	<i>0.132</i>	<i>0.296</i>	<i>0.687</i>	<i>0.907</i>	<i>1.185</i>	<i>1.561</i>	<i>1.866</i>	<i>3.807</i>
Catchment 7000 (uncontrolled)	0.025	0.082	0.136	0.169	0.210	0.239	0.261	0.056
<i>To West Farm Field</i>	<i>0.025</i>	<i>0.082</i>	<i>0.136</i>	<i>0.169</i>	<i>0.210</i>	<i>0.239</i>	<i>0.261</i>	<i>0.056</i>
<b>Total Flow Rate</b>	<b>0.173</b>	<b>0.473</b>	<b>0.755</b>	<b>0.975</b>	<b>1.292</b>	<b>1.643</b>	<b>1.932</b>	<b>3.902</b>

**Comparison to Existing Conditions Flows**

Tables No. 10-13 below compares the existing and post-development flow rates from the site to Highway 6 (St. David Street N) and to the wetland northeast of the site.

**Table No. 10: Comparison of Existing and Post-Development Flows - to Highway 6 (St. David Street N)**

<b>Design Storm</b>	<b>Allowable Release Rate</b>		<b>Existing Conditions</b>		<b>Controlled Post-Development Conditions</b>	
	<b>Flow Rate (m<sup>3</sup>/s)</b>	<b>Volume (m<sup>3</sup>)</b>	<b>Flow Rate (m<sup>3</sup>/s)</b>	<b>Volume (m<sup>3</sup>)</b>	<b>Flow Rate (m<sup>3</sup>/s)</b>	<b>Volume (m<sup>3</sup>)</b>
25 mm	0.058	138.6	0.052	127.9	0.037	49.6
2-Year	0.188	305.6	0.167	282.3	0.114	107.5
5-Year	0.332	496.7	0.305	458.8	0.177	171.9
10-Year	0.437	625.8	0.398	578.3	0.216	216.4
25-Year	0.574	799.5	0.519	738.5	0.265	273.5
50-Year	0.670	935.7	0.604	864.2	0.300	318.3
100-Year	0.768	1,066.8	0.691	985.1	0.328	361.6
Regional	0.211	3,007.4	0.196	2,761.3	0.078	951.2

**Table No. 11: Comparison of Existing and Post-Development Flows - to Northeast Wetland**

Design Storm	Allowable Release Rate	Existing Conditions	Controlled Post-Development Conditions
	Flow Rate (m <sup>3</sup> /s)	Flow Rate (m <sup>3</sup> /s)	Flow Rate (m <sup>3</sup> /s)
25 mm	0.489	0.127	0.132
2-Year	1.700	0.266	0.296
5-Year	2.963	0.442	0.687
10-Year	3.974	0.560	0.907
25-Year	5.416	0.756	1.185
50-Year	6.448	0.893	1.561
100-Year	7.319	1.083	1.866
Regional	3.762	3.222	3.807

**Table No. 12: Comparison of Existing and Post-Development Flows - to West Farm Field**

Design Storm	Allowable Release Rate	Existing Conditions	Controlled Post-Development Conditions
	Flow Rate (m <sup>3</sup> /s)	Flow Rate (m <sup>3</sup> /s)	Flow Rate (m <sup>3</sup> /s)
25 mm	0.049	0.044	0.025
2-Year	0.169	0.152	0.082
5-Year	0.317	0.271	0.136
10-Year	0.405	0.386	0.169
25-Year	0.532	0.500	0.210
50-Year	0.633	0.575	0.239
100-Year	0.734	0.652	0.261
Regional	0.327	0.327	0.056

**Table No. 13: Comparison of Existing and Post-Development Flows - Totals from the Site**

Design Storm	Allowable Release Rate	Existing Conditions	Controlled Post-Development Conditions
	Flow Rate (m <sup>3</sup> /s)	Flow Rate (m <sup>3</sup> /s)	Flow Rate (m <sup>3</sup> /s)
25 mm	0.561	0.169	0.173
2-Year	1.947	0.518	0.473
5-Year	3.346	0.892	0.755
10-Year	4.608	1.160	0.975
25-Year	6.178	1.575	1.292
50-Year	7.296	1.860	1.643
100-Year	8.263	2.153	1.932
Regional	4.283	3.726	3.902

Therefore, the post-development flow rates discharging from the site during the 2 to 100-year design storm events are less than the existing conditions flow rates from the site. The flow rate during the Regional Storm has increased under post development conditions. The Regional Storm will be conveyed overland through the site at each of the outlet locations summarized in the table above.

### **Major Flow Conveyance**

The anticipated major flows on the right-of-way are the 100-year minus the runoff that will be captured and conveyed by on-site storm sewers, which have been designed for the 5-year design storm event. The major overland flows are then approximately 3.370 m<sup>3</sup>/s (55% of Catchment 1000 flows 14.628 m<sup>3</sup>/s – 8.500 m<sup>3</sup>/s) and split evenly into four rights-of-way (0.843 m<sup>3</sup>/s) through the subdivision to the adjacent property owned by the same applicant. The proposed 20m right-of-way, with standard barrier curb and gutter and 2% crossfall has a conveyance capacity of approximately 0.944 m<sup>3</sup>/s at a longitudinal grade of 0.6%. Therefore, the proposed right-of-way has sufficient capacity to convey major flows to the proposed stormwater management facility. The major flow conveyance modelling has been included in Appendix C.

## 6. Infiltration Assessment

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As described in the Preliminary Hydrogeological Investigation (Chung and Vander Doelen Engineering, dated February 28, 2025), the existing conditions recharge rate for the area of proposed development is approximately 57,583 m<sup>3</sup>/yr (see Table No. 17). An enhanced infiltration system is proposed on site to mitigate the difference between existing and post-development condition infiltration volumes. The enhanced infiltration system will consist of rear lot infiltration galleries designed to infiltrate the 25mm storm event from the proposed building rooftops. The enhanced infiltration calculations in Table Nos. 14 to 20 assume that only the back half of the roof area from a townhome unit can be captured and infiltrated while for a single detached lot, the entire roof area is captured and infiltrated. For the medium density blocks, it has been assumed that 25% of the block area is available for infiltration. Therefore, the analysis calculates the roof area and the size of each infiltration gallery based on the different lot widths proposed for the subdivision. With the enhanced infiltration system, the proposed development will meet 81% of the recharge rate from existing conditions.

Infiltration gallery drawdown time has been calculated based on an average infiltration rate of 15 mm/hr as noted in the Geotechnical Investigation prepared by Chung and Vander Doelen Engineering (dated February 28, 2025). The average drawdown time of the infiltration galleries is estimated at 22 hours. The contributing runoff was then compared to the number of times the infiltration galleries could be filled with runoff (i.e. runoff available and available capacity to infiltrate) and a safety factor of 0.85 was applied to the resulting runoff depth each month.

As part of the detail design stage, once Draft Plan approval has been granted, we will conduct the required Guelph Permeameter Testing to confirm the in-situ infiltration rates as required by the Stormwater Management Planning and Design Guide.

## **7. Sediment and Erosion Control Plan**

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Primary sediment control will be achieved with the installation of heavy duty sediment fencing around the property boundary. The silt fence will eliminate the opportunity for water borne sediments to be transported from the site.

Temporary rock check dams will be installed in rear and side yard swales after the initial grading has been completed to slow the flow rates and promote the settlement of waterborne sediments before they reach the silt fences and the stormwater management facility.

Upon completion of the grading, any area not subject to active construction within 30 days will be topsoiled and seeded as per OPSS 572.

Once catch basins have been installed, the grates will be wrapped in filter cloth. This will be maintained until all building and landscaping has been completed.

Inspection and maintenance of all silt fencing and the stormwater management facility will start after installation is complete. These features will be inspected on a weekly basis or after a rainfall event of 13 mm or greater. Maintenance will be carried out, within 48 hours, on any part of the facility found to need repair.

Once construction has been substantially completed, the silt fence will be removed, any accumulated sediment will be removed and the landscaping and planting of the stormwater management facility will be restored as needed.

After construction of the complete development, erosion will not occur and sediment transport will be minimal. The stormwater management facility will provide all sediment removal.

## 8. Maintenance Plan

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To ensure that the stormwater management system continues to function as designed and constructed, we recommend that the following inspections and maintenance activities be completed on an annual basis:

1. Is there any indication of a spill (i.e. frothy water, oily sheen on the water)? If yes, investigate, inform the appropriate agencies and complete the necessary clean-up and restoration.
2. Inspect the outlet structures from the stormwater management facility. Remove and dispose of any accumulated sediment, trash/litter, debris (i.e. sediment, garbage, leaves, etc.).
3. Inspect all catch basins and manholes. Remove and dispose of any accumulated sediment, trash/litter, debris (i.e. sediment, garbage, leaves, etc.).
4. Inspect all swales and overflow locations. Remove and dispose of any accumulated sediment, trash/litter, debris (i.e. sediment, garbage, leaves, etc.).

Please note that any structures identified during the annual inspection to be worn, missing or damaged are to be repaired or replaced within 48 hours.

## 9. Conclusions

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In summary, the features of the design for the proposed development are as follows:

- 1) Sanitary service for the site will be provided by connecting to the service stubs proposed on the adjacent property owned by the same applicant. Internal sanitary sewers will then be extended throughout the site via the municipal rights-of-way to provide sanitary servicing for the proposed development.
- 2) Water servicing for the site will be provided by connecting to the service stubs proposed on the adjacent property owned by the same applicant. An internal watermain will then be extended throughout the site via the municipal rights-of-way to provide water service for the proposed development. Watermain sizing is to be confirmed at the detail design stage.
- 3) Storm sewers will be sized at the detailed design stage to convey the 5-year design storm event to the stormwater management facility on the adjacent property owned by the same applicant. Major overland flows will be directed towards the municipal rights-of-way to the stormwater management facility on the adjacent property owned by the same applicant.
- 4) The post-development flow rates discharging from the site during the 2 to 100-year design storm events are less than the pre-development conditions flow rates from the site. The Regional Storm is conveyed overland through the site.
- 5) Infiltration galleries sized to infiltrate the 25 mm design storm event from building rooftops will be implemented in rear yard areas of the proposed lots to meet the infiltration requirements for the site.
- 6) The stormwater management systems meet the current Provincial and Municipal guidelines.
- 7) The principles of “Stormwater Management Practices”, the Ministry of Environment Stormwater Management Planning and Design Manual 2003 have been used in the design of the stormwater management system.

# **Appendix A Geotechnical Investigation (Chung and Vander Doelen Engineering Ltd., dated February 28, 2025) and Preliminary Hydrogeological Investigation (Chung and Vander Doelen Engineering Ltd., dated February 28, 2025)**

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**CHUNG & VANDER DOELEN**  
ENGINEERING LTD.

**GEOTECHNICAL INVESTIGATION  
PROPOSED RESIDENTIAL SUBDIVISION**

**6581 Highway 6  
Fergus, Ontario**

**SUBMITTED TO:**

PoloCorp Inc.  
379 Queen Street South  
Kitchener, Ontario  
N2G 1W6

**ATTENTION:**

Mr. Mike Puopolo



**CHUNG & VANDER DOELEN**  
**ENGINEERING LTD.**

311 VICTORIA STREET NORTH  
KITCHENER / ONTARIO / N2H 5E1  
519-742-8979

February 28, 2025  
**File No.: 1495**

PoloCorp Inc.  
379 Queen Street South  
Kitchener, Ontario  
N2G 1W6

Attention: Mr. Mike Puopolo

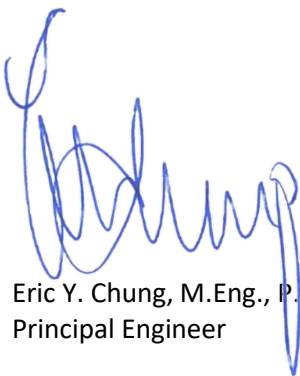
**RE: Geotechnical Investigation**  
**Proposed Residential Subdivision**  
**6581 Highway 6, Fergus, Ontario**

We take pleasure in enclosing one (1) copy of our Geotechnical Investigation Report prepared for the above-referenced site.

If you have any questions or clarifications are required, please contact the undersigned at your convenience.

We thank you for giving us this opportunity to be of service to you.

Yours truly,  
**CHUNG & VANDER DOELEN ENGINEERING LTD.**



Eric Y. Chung, M.Eng., P.Eng.  
Principal Engineer

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Appendix A	Limitations of Report
Appendix B	Draft Plan of Subdivision (Polocorp, December 10, 2024) Drawing No. 1 – CVD Borehole Location Plan
Appendix C	Single Well Response Test Analysis Charts
Appendix D	Table 1 – Summary of Groundwater Levels and Elevations Figure 5 – Water Table Contours Interpretation (September 18, 2024)
Enclosure A	Soil Abbreviation and Terms Used on Record of Borehole Log Sheets
Enclosures 1 to 5 & 9 to 13	Borehole Log Sheets
Enclosures 22 & 23	Grain Size Distribution Charts



## 1.0 INTRODUCTION

CHUNG & VANDER DOELEN ENGINEERING LTD. has been retained by PoloCorp Inc. to conduct a geotechnical investigation for a proposed residential subdivision to be located at 6581 Highway 6 in Fergus, Ontario.

It is understood that the 20.03± ha site, currently being used for agricultural purposes, will be developed into a residential subdivision comprised of a combination of residential single units, stacked townhouses, mixed-use units, roadways, and a park. The proposed residential subdivision will be fully serviced with municipal water and sanitary sewer services.

According to the Draft Plan of Subdivision (Polocorp Inc., December 10, 2024), as provided in Appendix B, the development will include a roadway network throughout the subdivision connected to Highway 6 as well as a 0.89± ha sized park (Block 66). The existing residential dwelling located at 6581 Highway 6 will be incorporated into the proposed residential subdivision (Block 65). It is also planned that the subdivision will be connected to a 2.41± ha sized stormwater management (SWM) facility located south of the property which will be constructed as part of a separate development.

As of the writing of this report, no site grading plan has been provided. CVD will be pleased to review the final design and site grading plan once they are made available.

The purpose of this investigation was to determine the subsurface soil and groundwater conditions at the site and, based on the findings, to make geotechnical recommendations for:

- Site grading operations and engineered fill construction;
- Excavation conditions;
- Groundwater control during construction;
- Foundation bearing pressures;
- Foundation soil classification for seismic design per OBC 2024;
- Site servicing;
- Pavement design and construction; and
- Estimates of infiltration rates of encountered soil deposits.

This geotechnical report should be read in conjunction with CVD's Preliminary Hydrogeological Investigation, Proposed Residential Subdivision Report (February 2025). CVD also performed a geotechnical investigation (January 2025) for the land parcel directly south of the site, and as such, the findings in that investigation is also used in this report.

## 2.0 FIELD AND LABORATORY WORK

Five (5) boreholes were advanced to depths of between 6.70 and 8.25 m below existing grade, and monitoring wells were installed at each borehole location (labelled Boreholes 1 to 5), on January 16 and 17, 2024. A supplemental investigation was completed on September 11 and 12, 2024, during which five (5) additional boreholes/monitoring wells (labelled Boreholes 101 to 105) were drilled and installed to depths between 8.10 and 9.60 m below grade. The borehole/monitoring well locations are illustrated



on the Borehole Location Plan, Drawing No. 1, which is included in Appendix B.

The field investigation program was conducted under the supervision of a member of our engineering team who logged the subsurface conditions encountered at the boreholes, effected the subsurface sampling and testing, and monitored the groundwater conditions. The boreholes were advanced using a track-mounted drilling rig, supplied, and operated by a specialized contractor. The drill rig was equipped with continuous flight augers and standard soil sampling equipment. Underground utilities were located prior to commencing the field work program.

The investigation was completed using a track-mounted CME-55 drill rig, equipped with standard 83 mm inner diameter hollow stem augers (HSA) operated by Davis Drilling Ltd. of Milton, Ontario. Standard penetration tests (SPTs) in accordance with ASTM Specification D1586, were carried out at frequent intervals of depth, and the results are shown on the Borehole Logs as Penetration Resistance or “N”-values. The undrained shear strength of the cohesive soil deposits was determined on the slightly disturbed SPT samples using a field pocket penetrometer. The compactness condition or consistency of the soil strata has been inferred from the test results.

Soil samples collected during the borehole investigation program were examined in the field and subsequently brought to CVD’s laboratory for tactile examination to confirm field classification. Moisture content determination on all retrieved soil samples was performed.

The borehole location, temporary benchmark, and associated ground surface elevations were surveyed by CVD for the purpose of this report using a Network RTK Global Navigation Satellite System (GNSS) Receiver. The survey data was collected using The UTM Zone 17N Projection, NAD83(CSRS)v7-2010 datum and Canada Geoid Model HT2\_2010v70 (CGVD28).

The referenced temporary benchmark (TBM) is described below:

TBM: Top of fire hydrant nut, south of northern driveway entrance to 968 St. David Street North, as shown on Drawing No. 1

Elevation: 425.17 m (Geodetic)

### **3.0 EXISTING SITE CONDITIONS**

The property is situated on the northwestern end of Fergus and is bound by Highway 6 to the west and predominantly by agricultural lands to the north, east, and south of the subject lands.

The majority of the site is comprised of a cultivated agricultural field. A residential dwelling with its related structures fronts Highway 6 at the west side of the proposed development. An existing residential subdivision is situated southwest of the southwestern corner of the Site on the opposite side of Highway 6, and another residential subdivision is found approximately 400± m southeast of the property.

Generally, there is gentle decrease in grade across the site in a southeasterly direction in which ground



elevations range from 430± to 425± m. No major undulations or notable topographical features exist. Ground surface elevations at the borehole locations ranged between 425.61 m to 429.41 m.

#### **4.0 SUBSURFACE CONDITIONS**

The detailed subsurface conditions encountered at the ten (10) boreholes are presented on the Borehole Log Sheets, Enclosures 1 to 5 & 9 to 13. The following notes are intended to amplify and comment on the subsurface data obtained. The borehole and monitoring well locations are indicated on the Borehole Location Plan, Drawing No. 1, included in Appendix B.

Enclosure A provides explanations of the various soil abbreviations and terms used on the borehole log sheets. The stratigraphic boundaries shown on the borehole logs are inferred from non-continuous sampling conducted during advancement of the borehole drilling procedures and, therefore, represent transitions between soil types rather than exact planes of geologic change. The subsurface conditions will vary between and beyond the borehole locations.

#### **4.1 Topsoil**

Topsoil was encountered at the ground surface of eight (8) boreholes (Boreholes 1 to 5, 101, 102, and 104) with measured thicknesses between 180 and 300 mm. The thickness of topsoil could vary between and beyond the borehole locations.

#### **4.2 Fill**

Dark brown to brown fill materials, typically comprised of sand and silt, were encountered beneath the topsoil or at the ground surface of Boreholes 103 to 105 and extend to depths between 0.80± and 2.15± m below existing grades. Trace amounts of gravel, clay, and topsoil as well as occasional clayey seams are found within the deposit.

The SPT “N”-values measured within the fill ranged from 3 to 8 blows per 300 mm of penetration, indicating a variable very loose to loose compactness condition. Natural moisture contents were measured between 5 and 19%, exhibiting typically a moist moisture condition. Elevated moisture contents are likely due to the presence of topsoil/organics.

#### **4.3 Fine Granular Deposits**

The topsoil/fill is underlain by a series of fine granular deposits varying between silt, sandy silt, and fine to medium sand, but predominantly composed of both laterally and vertically extensive fine to medium sand. These deposits extend to depths up to 9.60± m (below elevation 417.36 m at Borehole 5). Trace amounts of gravel and occasional clayey silt seams/layers (Boreholes 3, 4, and 101) were encountered within the deposit. Minor seams/layers of grey silt were encountered near the bottom of Boreholes 4,



5, 101, 104, and 105, which likely indicate the transition zone to the clayey silt till which underlies the area. All ten (10) boreholes were terminated within the fine granular deposits.

The results of two (2) grain size distribution analyses from the fine to medium sand in Boreholes 101 and 105 are shown graphically on Enclosures 22 and 23.

The SPT “N”-values measured within the fine granular deposits ranged from 3 to 31 blows per 300 mm of penetration, indicating a variable very loose to dense compactness condition, but typically exhibiting a loose to compact compactness condition. Natural moisture contents were measured between 2 and 27%, indicating damp to saturated moisture conditions.

#### 4.4 Groundwater

Throughout the field investigation, groundwater conditions were monitored during advancement of boreholes, and water level readings were measured on multiple occasions following the completion of fieldwork in all of the accessible ten (10) installed monitoring wells

Groundwater levels were measured at depths ranging between 1.99 (Borehole 5) and 5.39 mbgs (Borehole 1), corresponding to elevations ranging between 425.02 and 423.56 m. The groundwater measurements for each monitoring well collected thus far for the investigation (February to October 2024) are summarized in Table 1 (Appendix D).

It is noted that the observed groundwater table will fluctuate seasonally, such as during the spring following the period of peak snow melt, and in response to major weather events. It is possible that peak water levels could be up to 0.5 m higher than those measured in this investigation.

Figure 5, also included in Appendix D, presents an interpretation of the water table configuration and shallow groundwater flow directions across the property using the groundwater elevation measurements gathered on September 18, 2024. The water table mimics the topography of the site with shallow groundwater flowing towards the south/southeastern portion of the property in the direction of a nearby wetland.

Well response tests (slug/bail tests) were completed at two (2) of the monitoring well locations (Boreholes 1 and 5) on March 11, 2024, to provide a more accurate estimate of the hydraulic conductivity (K) (or permeability) of the saturated aquifer soil strata. These tests resulted in hydraulic conductivity values ranging from  $9 \times 10^{-5}$  to  $1 \times 10^{-4}$  m/s. These results are graphically presented in Appendix C, and a summary of the data is also included in Table 1 (Appendix D).

These values are consistent with the hydraulic conductivity ranges typically associated with similar soils (Freeze & Cherry, 1979). Hydraulic conductivities calculated using the Hazen Formula from the soil grain size analyses (Enclosures 22 and 23) were similar in magnitude to those of the single well response tests.



## 5.0 DISCUSSION AND RECOMMENDATIONS

It is understood that the 20.03± ha site, currently being used for agricultural purposes, will be developed into a residential subdivision comprised of a combination of residential single units, stacked townhouses, mixed-use units, roadways, and a park. The proposed residential subdivision will be fully serviced with municipal water and sanitary sewer services.

According to the Draft Plan of Subdivision (Polocorp Inc., December 10, 2024), as provided in Appendix B, the development will include a roadway network throughout the subdivision connected to Highway 6 as well as a 0.89± ha sized park (Block 66). The existing residential dwelling located at 6581 Highway 6 will be incorporated into the proposed residential subdivision (Block 65). It is also planned that the subdivision will be connected to a 2.41± ha sized stormwater management (SWM) facility located south of the property which will be constructed as part of a separate development.

In general, the surficial topsoil and fill were underlain by a series of loose to compact fine granular deposits, predominantly comprised of fine to medium sand. These deposits extend to depths up to at least 9.60± mbgs (below elevation 417.36 m at Borehole 5) and are expected to extend to even deeper depths near the northern portion of the property. Based on data collected by CVD as part of an independent development for the lot directly south of the Site, it is known that the sand deposit is underlain by a clayey silt stratum which is found at progressively shallower depths towards the south.

Very loose to loose fill materials, extending to between 0.80± and 2.15± m were encountered at or near ground surface of Boreholes 103 to 105, and more extensive native loose soil conditions were occasionally encountered within the near surface soils of some boreholes (e.g. Boreholes 2, 4, 5, and 104). In their current condition, these soils not suitable to support future house foundations. Removal of such loose zones and replacement with engineered fill (where necessary) is considered to be a suitable and practical remedy to repair such areas.

Shallow groundwater conditions were encountered at all ten (10) borehole locations with the water table measured across all site visits at depths between 1.99 (Borehole 5) and 5.39 mbgs (Borehole 1), corresponding to elevations ranging between 425.02 and 423.56 m. Shallow groundwater flows towards the south/southeastern portion of the property in the direction of a nearby wetland. Based on both the single well response tests and grain size analyses, the hydraulic conductivity values for the fine to medium sand deposit were calculated at approximately  $1 \times 10^{-4}$  m/s.

Within the southern portion of the proposed development where groundwater is found at a shallower depth, it is recommended that a permanent groundwater management system (GWMS) be implemented for the development of the subdivision lands to control future groundwater levels and prevent future wet basement problems. Alternatively, the site can be raised to establish basement floor levels at least 0.6 m above high groundwater levels which will be determined through on-going monitoring as part of the CVD hydrogeological study.

Furthermore, it is recommended that any existing below-grade drains, drainage tiles or drainage tile networks in the agricultural fields be fully understood/investigated to establish how their presence (or removal) would impact the shallow groundwater system and the proposed development.



As of the writing of this report, no site grading plan has been provided. CVD will be pleased to review the final design and site grading plan once they are made available.

### 5.1 Site Grading and Engineered Fill Construction

As of the writing of this report, no site grading plans have been provided; however, it is anticipated that partial regrading of the site will be conducted using “cut-fill” procedures, and that more extensive “fill” operations will occur. It is recommended to construct engineered fill in areas to be raised in order to suitably support the proposed residential building structures, future roadways, and infrastructure servicing.

Inorganic on-site native soil deposits from “cut” areas may potentially be reused to construct engineered fill capable of supporting future house foundations, roadways, and municipal infrastructure servicing. The natural moisture content of the “cut” soils to be used as engineered fill should be within 3% below their optimum moisture contents in order to achieve the specified degree of compaction.

Topsoil was encountered at the ground surface of eight (8) of the borehole locations with measured thicknesses ranging between 180± and 300± mm. It should be noted that the thickness of the organic soil layer could vary drastically across the site from those reported at the borehole locations.

Very loose to loose fill materials, extending to between 0.80± and 2.15± m were encountered at or near ground surface of Boreholes 103 to 105, and more extensive native loose soil conditions were occasionally encountered within the near surface soils of some boreholes (e.g. Boreholes 2, 4, 5, and 104). It is likely that the site has been regraded to achieve the present condition for farming, and therefore, filling of local depressions may result in fill pockets not detected by the boreholes. Test pits should be dug prior to or during site grading operations to further establish the extent of poor soil.

Topsoil stripping operations should be conducted when the ground is not wet and will support large scale construction equipment. Over-stripping can result when the ground conditions are wet and unstable.

Fill and/or loose soil conditions were encountered at all borehole locations and extended up to depths of up to 3± m below existing grade. The following table provides the depth and elevation at each borehole location where non-suitable soil conditions were encountered:

Borehole No.	Topsoil Thickness (mm)	Existing Ground Elevation (m)	Thickness of Non-Suitable Soils (m)	Elevation of Suitable Soils (m)
1	250	429.4±	0.8±	428.6±
2	300	429.1±	3.1±	426.0±
3	230	428.9±	0.8±	428.1±
4	300	426.9±	0.8±	426.1±



Borehole No.	Topsoil Thickness (mm)	Existing Ground Elevation (m)	Thickness of Non-Suitable Soils (m)	Elevation of Suitable Soils (m)
5	180	425.6±	3.0±	422.6±
101	180	428.7±	0.8±	427.9±
102	200	429.4±	1.8±	427.6±
103	-	428.3±	1.5±	426.8±
104	250	427.4±	2.4±	425.0±
105	-	428.2±	1.5±	426.7±

It should be noted that the elevations of suitable soils shown in the above table may differ from the founding elevations provided for specific bearing capacities in section 5.3. The elevations provided in the above table are located below loose and/or organic/deleterious soils but may not necessarily be located at an elevation sufficient for higher bearing capacities

Approved on-site sand and imported coarse sand and gravel are recommended to be used to construct the engineered fill beneath the footings and floor slabs under controlled and supervised conditions. Reuse of siltier soils (e.g., sandy silt or silt) should be limited to beneath pavement and landscaped areas.

Any shortfall of fill material required for engineered fill operations may be made with similarly graded imported soils. It is recommended that any proposed borrow source materials be tested prior to importing in order to ensure that the environmental quality of the imported fill meets all environmental approval criteria and to ensure that the natural moisture content of the fill is suitable for compaction. Should similarly graded soils not be able to meet the requirements for use as engineered fill, imported Granular B may be considered for such purposes.

**Due to the shallow depth of the water table in the southern portion of the site (2.0± mbgs during the spring), it is recommended that engineered fill construction be conducted during the summer and early fall months when drier warmer weather conditions typically exist as the onsite soils are sensitive to moisture and will become difficult to handle and compact to the specified degree of compaction when wet.**

The on-site finer grained deposits are considered to be frost-susceptible. Constructing engineered fill, backfilling footings, foundation walls and service trenches using finer-grained soils during the winter months is not advisable, unless suitable weather conditions prevail, the soils are at suitable moisture content, and strict procedures are followed and monitored on a full-time basis by the geotechnical engineer.

The on-site soils are generally susceptible to softening and deformation when exposed to excessive moisture and construction traffic. As a result, it is imperative that the grading/filling operations are planned and maintained to direct surface water run-off to low points and then be positively drained by



suitable means. During periods of wet weather, construction traffic should be directed along the designated construction routes so as not to disturb and rut the exposed subgrade soil. Temporary construction roads consisting of clear crushed material (such as crushed stone or recycled concrete) may be required during poor weather conditions such as wet spring or fall.

The following procedures are recommended for the construction of engineered fill to support future building foundations, roadways, and municipal infrastructure servicing:

1. All topsoil, fill materials, deleterious materials and very loose to loose inorganic native soil should be stripped from building envelope and roadway areas. The inorganic native soil may be carefully segregated and salvaged for potential reuse purposes to construct engineered fill;
2. The exposed subgrade surface should be thoroughly recompacted using large heavy compaction equipment (smooth drum for granular based materials) if it can support such equipment and remaining stable. Careful review and guidance by the geotechnical engineer are recommended should the subgrade become unstable. All prepared subgrade areas are to be inspected by qualified geotechnical personnel prior to placement of fill. Any soft spots encountered during the recompaction process should be excavated to the level of competent soil;
3. The required grades can then be achieved by placing approved inorganic on-site soil or imported fill in maximum 200 to 300 mm thick loose lifts which are to be thoroughly compacted to at least 100% Standard Proctor maximum dry density (SPMDD). The moisture content of the fill materials should be within 3% below their optimum moisture contents in order to achieve the specified degree of compaction;
4. The engineered fill used to support the future building, infrastructure servicing and roadway pavements must be placed such that the fill pad extends horizontally outwards at least a distance equal to the depth of fill to be placed;
5. Inorganic onsite soils may be considered as suitable engineered fill material provided the natural moisture content of the soil is within 3% below the optimum moisture content in order to achieve the specified degree of compaction. Overly wet and organic materials may be placed in non-structural areas and beyond stormwater management areas where 90% SPMDD is considered adequate. Overly wet inorganic soil may potentially be mixed with drier soils to produce a suitable moisture content to allow appropriate compaction to occur;
6. Adequate earth cover must be provided to protect engineered fill from freezing if left over the winter months; and
7. All fill placement and compaction operations must be supervised on a full-time basis by qualified geotechnical personnel to approve fill material and ensure the specified degrees of compaction have been achieved.

Vibration could be generated from various construction equipment during construction, such as compactors and rollers which could be harmful to surrounding structures and buildings. Peak particle velocity (PPV) of ground motion is widely accepted as the best descriptor of potential for vibration



damage to structures. The safe vibration limit can be set to 8 to 25 mm/s PPV, depending on frequency of vibrations and the sensitivity of surrounding structures to vibration.

Due to the relatively isolated location of the site, it is unlikely that any critical or susceptible infrastructure will be affected by the site grading operations. However, if deemed necessary, vibration monitoring can be performed. Vibration monitoring can be carried out to measure the PPV of ground motion from vibration generated from typical compaction equipment at the beginning of the project in potentially critical areas. This will set criteria and establish the type of equipment to be used for this project. It is also recommended that a pre-construction condition survey be conducted to document the condition of the existing structures within the possible zone of influence.

## 5.2 Site Servicing

The subdivision will be municipally serviced with watermain and sewers. According to the Centre Wellington Development Manual (June 2024), it is anticipated that municipal servicing will generally lie  $1.2\pm$  to  $2.4\pm$  m below finished grades. The sanitary sewer obvert should be located a minimum of 2.4 m below final road grade, the storm sewer obvert should be located 1.2 m below final road grade and adequately compacted, and the top of the watermain pipe should be located 2.0 m below finished grade.

### 5.2.1 Groundwater Control and Open Cut Excavation

Excavations are expected to be in the order of  $1\pm$  to  $3.5\pm$  m deep for foundations and site servicing. The excavations will penetrate topsoil, very loose to loose fill, and native loose to compact fine granular deposits. Provided the groundwater is controlled/lowered below the excavation depths, these materials are considered to be Type 3 Soils in accordance with the latest Occupational Health and Safety Act.

Above the groundwater table, uncontrollable groundwater is not expected within the anticipated depths of excavation, and excavations in the Type 3 Soils are expected to remain stable during the construction period provided that side slopes are cut to 1H : 1V from the bottom of the excavation. Where seepage or perched groundwater is encountered, side slopes should be cut to more stable angles of 3H : 1V. The side slopes should be suitably protected from erosion processes. Surface run-off which inadvertently enters the excavation can be controlled by using conventional filtered sump pumping techniques, as and where required.

Even though a site grading plan has not yet been provided, it is expected that groundwater control will be required for at least some of the footing excavations, particularly in the southern portion of the site, since excavations might be carried out below the groundwater table within the higher conductive fine granular soils (hydraulic conductivity in the range of  $1 \times 10^{-4}$  m/s), and the fine granular soils will become “quick” and lose their integrity to support loads. The groundwater level must be lowered and controlled to at least 600 mm below the excavation level to facilitate excavation and construction of footings and floor slabs.

It is recommended that CVD be retained to review the design grades and evaluate the need for



dewatering. Depending on the depth of sewer and footing excavation below the groundwater table, well-point dewatering could be required to pre-drain the fine granular soil prior to excavation.

In wet to saturated subgrade conditions, it will be necessary to excavate below founding level and pour a 50 to 75 mm thick mud slab of lean concrete to protect the founding soil from disturbance during the installation of reinforcing steel bars and form work.

### 5.2.2 Pipe Bedding

Any loose, unstable and/or organic soils encountered at the pipe invert should be sub-excavated and replaced with well compacted Granular "A" which should be placed in 150 mm thick layers and compacted to at least 95% Standard Proctor Maximum Dry Density (SPMDD). The support of pipes in these areas can also be achieved with non-shrinkable fill if poor soil is encountered at the subgrade level and fully removed.

The bedding requirements for the services should be in accordance with both the Ontario Provincial Standard Drawings OPSD - 802 for flexible and rigid pipes. The bedding shall be a Class "B" and consist of at least 150 mm thick Granular "A" compacted to at least 95% SPMDD. Granular "A" should be used to backfill around the pipe to at least 150 mm above the top of the pipe.

Particular attention should be given to ensure material placed beneath the haunches of the pipe is adequately compacted. Recycled asphalt will not be allowed to be used in Granular "A" bedding material.

### 5.2.3 Trench Backfill

Excavated inorganic materials are considered suitable for reuse as trench backfill. If necessary, potential mixing of drier and wetter excavated soils in proper ratios can be done to produce a suitable mixture near the material's optimum moisture content in order to achieve the required compaction specification. Conversely, judicious addition of water may be required if the soils are significantly drier than their optimum moisture content in order to facilitate suitable compaction.

The backfill should be placed in thin layers, 200 to 300 mm thick or less dependant on the demonstrated success of compaction based on in-situ density test results. Other types of materials such as organic soils, overly wet soils, boulders, and frozen materials (if work is carried out in the winter months) should not be used for backfilling. All backfill should be compacted to at least 95% SPMDD.

Backfilling operations should follow closely after excavation so that only a minimal length of trench slope is exposed at any one time so as to minimize potential problems. This will potentially minimize over-wetting of the subgrade material. Particular attention should be given to make sure frozen material is not used as backfill should construction extend into the winter season.

Frequent inspection by experienced geotechnical personnel should be carried out to examine and approve backfill material, to carefully inspect placement, and to verify that the specified degree of



compaction has been obtained by in situ density testing.

### 5.3 Footing Foundations

Conventional strip and spread footing foundations can be used to support the proposed buildings of the proposed residential subdivision; it should be noted that this current geotechnical investigation is insufficient and not intended for detailed building design purposes.

Depending on the final design and size of the proposed medium density blocks (Block 62 and 63) and other larger structures, it will be necessary to conduct a geotechnical investigation at those lots in order to provide a detailed, site and project specific report for the design and construction of the proposed development.

Based on the ten (10) widely spaced boreholes, footings cast on native competent fine granular deposits can be designed using net Geotechnical Reactions at SLS and Factored Geotechnical Resistances at ULS as provided in the following table which summarizes the highest founding level and elevation for the footing at the relevant borehole locations:

Borehole No.	Existing Ground Elevation (m)	Highest Founding Depth (m)	Highest Founding Elevation (m)
<b>SLS = 100 kPa; ULS = 150 kPa</b>			
1	429.41	0.81	428.60±
4	426.94	0.94	426.00±
5	425.61	3.01	422.60±
102	429.37	1.77	427.60±
<b>SLS = 150 kPa; ULS = 250 kPa</b>			
2	429.10	3.10	426.00±
3	428.87	0.77	428.10±
101	428.68	1.58	427.10±
103	428.31	1.51	426.80±
104	427.36	2.46	424.90±
105	428.15	1.55	426.60±

Higher soil bearing capacities may be available for footings founded at elevations lower than those cited above, through a site and project specific geotechnical evaluation.



Footings founded on approved engineered fill can be designed to a net Geotechnical Reaction of 150 kPa at SLS and Factored Geotechnical Resistance of 250 kPa at ULS.

These soil bearing pressures can be achieved provided that the founding subgrade is undisturbed during construction. The majority of the settlements will take place during construction and the first loading cycle of the building. In addition, the footings should be founded below any topsoil, fill, or other deleterious materials on competent undisturbed soils. Spacing between adjacent footing steps should not be steeper than 10H to 7V.

It should be noted that along the southern boundary of the property where relatively higher groundwater table elevations can be found (elevations 420.20± to 423.60± m), unless engineered fill (see Section 5.1) is used to raise the grade, the footing excavations may contact wet to saturated fine granular soils. To this end, it is recommended that a 50 to 75 mm thick protective concrete slab should be poured and allowed to set on the prepared subgrade to further protect it from disturbance by construction traffic and the elements. Basements should be suitably founded at least 0.6 m above the high groundwater table. A permanent groundwater management system (GWMS) could be utilized to control future groundwater levels and prevent future wet basement problems.

Exterior footings and footings in unheated portions of the building should be provided with a soil cover of not less than 1.2 m or equivalent synthetic thermal insulation for adequate frost protection. The founding subgrade soils must be protected from frost penetration during winter construction.

The footing excavations should be inspected by the geotechnical engineer to ensure adequate soil bearing and proper subgrade preparation.

#### 5.4 Lateral Earth Pressure

House basement walls and other soil retaining structures should be designed to resist the lateral earth pressure acting against these walls. The following formula may be used for these calculations. The following formula may be used to calculate the unfactored earth pressure distribution. The factored resistance can be calculated by using a factor of 0.8.

$$P = K (\gamma H + q)$$

where:

P =	Lateral earth pressure	kPa
K =	earth pressure coefficient, 0.5 for non-yielding foundation wall earth pressure coefficient, 0.3 for yielding retaining wall	
$\gamma$ =	unit weight of granular backfill, compacted to 95% SPMDD	21 kN/m <sup>3</sup>
H =	unbalanced height of wall	m
q =	surcharge load at ground surface	kPa



The backfill for the foundation walls and retaining walls should be free-draining granular materials which should have less than 8% silt particles (OPSS Granular "B" Type I). The backfill should be placed in thin layers and compacted to 95% SPMDD. Over-compaction adjacent to the foundation/retaining walls should be avoided. Compaction should be carried out with hand operated equipment within 1 m of the foundation wall or retaining wall. Weeping tiles leading to a frost-free outlet or weep holes should be installed to effect drainage behind the retaining wall.

The sliding resistance of the retaining wall footings should be checked. The unfactored horizontal resistance against sliding between cast-in-place concrete and the various soils can be calculated using the following unit weight and friction coefficient:

Soil	Unit Weight (kN/m <sup>3</sup> )	Friction Coefficient
Well-Compacted Granular Backfill	21	0.45
Fine to Medium Sand	20	0.35
Silt	19	0.30

It should be noted that the soils encountered during the investigation generally comprised of free-draining fine to medium grained sand; however, seams of non free-draining materials, such as clayey silt, can occasionally be found. A drainage core layer should be installed against basement walls in accordance with OBC requirements. The basement walls should be damp-proofed.

Depending upon the final grading plan, a perimeter drainage system might be required for areas of the development located where the water table is shallower (2± m depth), such as along the southern portion of the property, to ensure hydrostatic pressure does not build up in the backfill against the foundation walls. The perimeter weeping tile system is to be installed at the base of the footing to direct the collected waters to sump pump installations or the storm sewer.

## 5.5 Earthquake Considerations

In accordance with The Ontario Building Code 2024 (OBC), the proposed structure should be designed to resist earthquake load and effects as per OBC Subsection 4.1.8.

Based on the condition of the underlying soil encountered at the boreholes, and the fact that any loose/soft soils will be removed, and our experience with the local soil conditions up to a depth of 30 m, the site can be overall be classified as **Site Class D** as per OBC Table 4.1.8.4B.



## 5.6 Pavement Design

The earth subgrade soil is generally expected to primarily consist of fine granular deposits (sand, sandy silt). Cognizant of the traffic volume and the subgrade soils, the following pavement component thicknesses (per Centre Wellington Development Manual, June 2024) are considered suitable for the subdivision roads:

Pavement Component	Local Road	Collector Road
	Component Thickness (mm)	Component Thickness (mm)
HL3 Surface Asphaltic Concrete	40	50
HL4 Binder Asphaltic Concrete	50	60
Granular "A" Base Course	150	150
Granular "B" Type II Sub-base Course	450	600
<b>Granular Base Equivalency (GBE)</b>	<b>630</b>	<b>770</b>

**Note:** GBE denotes Granular Base Equivalency which is calculated using factors of 2 for asphaltic concrete, 1 for Granular "A" base and 0.67 for Granular "B" sub-base

The pavement design considers that road construction will be carried out during the drier time of the year and that the subgrade is stable, not heaving under construction equipment traffic. If the subgrade is wet or unstable, additional granular sub-base may be required.

The subgrade should be prepared in accordance with the recommendations provided in Sections 5.1 and 5.2 prior to placement of the granular base layers.

The base and sub-base materials should be produced in accordance with the current OPSS specifications and placed and uniformly compacted to at least 100% SPMDD. The asphaltic concrete should be placed and compacted in accordance with OPSS Form 310 and to a minimum of 92% of the Marshall Density (MRD). Frequent in-situ density testing by this office should be carried out to verify that the specified degree of compaction is being achieved and maintained.

SS-1 or SS-1HH tack coat should be applied to all binder course surfaces and vertical surfaces (i.e., curbs, pavement joints, etc.) prior to placement of asphalt. Refer to OPSS 310 and OPSS 1101 for additional details.

It should be noted that even well compacted trench backfill could settle for a period of time after construction. In this regard, the surface course of the asphaltic concrete should be placed at least one (1) year after trench backfill is completed so as to allow any minor settlements to occur within the trench backfill. The incomplete pavement structure may not be capable of supporting construction traffic. Consequently, minor repairs of the sub-base, base and asphaltic concrete may be required prior to paving with the base course and/or the surface course asphaltic concrete.



Near the southern portion of the site, where water level depths are shallower (i.e., 2± m around Borehole 5), longitudinal sub-drains with positive drainage outlets are recommended to be installed at the subgrade level along the edges of the roadway construction to enhance the performance of the pavement.

Positive drainage outlets should be provided at all low points of the prepared earth subgrade, such as stub drains extended from the catch-basins. Systematic drainage of the granular base materials will promote the longevity of the pavement structure. The prepared earth subgrade and final pavement surfaces should be graded to direct water runoff away from buildings, sidewalks, and other similar pertinent structures. The roadway subgrade should be free of depressions and should have a 2% slope from the crown to the edge of the pavement.

### 5.7 Infiltration Rates of On-Site Soils

It is understood that the proposed subdivision will be connected to a stormwater management (SWM) facility which is planned to be constructed south of the site as part of a separate development. Nonetheless, it is expected that some infiltration features will be designed on-site.

If an infiltration feature is to be included in the development of the property, it should be located below the footing drain/weeper and at least 5 m away from the proposed building footprints. Additionally, the infiltration features should have the base located at least 1.0 m above the groundwater table, and a minimum infiltration rate of 15 mm/hr is required.

Based on the results of grain size analyses and our experience, the hydraulic conductivity and infiltration rate of the native inorganic soil types encountered at the boreholes are estimated and provided in the following table and may be used for storm water management purposes:

Material	Hydraulic Conductivity (K) (cm/sec)	Infiltration Rate (mm/hr)
Fine to Medium Sand (Enclosures 22 and 23)	$1 \times 10^{-2}$	75 to 150
Sandy Silt to Sand and Silt	$3 \times 10^{-5}$ to $1 \times 10^{-4}$	10 to 20
Silt	$1 \times 10^{-5}$	3 to 5

Considering the laterally and vertically extensive sand deposits, and generally deeper depths of the water table in the area (depths of 2.0± to 5.5± mbgs, corresponding to elevations between 423.5± and 425.0± m across all seasons), the construction of on-site infiltration features is likely feasible.



## **5.8 Handling of Excess Soils**

Excess soil may be generated and removed off-site during the construction activities associated with the proposed site works. The management of excess soil is now governed by O.Reg. 406/19, MECP document entitled “On-Site and Excess Soil Management Regulation”. In accordance with the regulation, the Project Leader is responsible for the handling, storage, reuse, transportation, and removal of all soil. To support off-site removal of excess soil, the following is required:

- Planning Documentation
  - Assessment of Past Use
  - Sampling and Analysis Plan
  - Excess Soil Characterization Report
  - Excess Soil Destination Report
- Tracking
- Registry
- Record Keeping

No testing was conducted during this geotechnical investigation; however, soil sampling and analysis may be required as per the above-noted MECP document and/or as per the requirement of the receiving site owner(s), depending on the volume of excess soil generated during construction. The analytical results and environmental assessment findings must be disclosed to the receiving site owner(s) and approval by the receiving site owner(s) be obtained prior to exporting/transferring the materials.

If any impacted soils are discovered during construction, CVD should be contacted for sampling and testing to determine the limit of the impacted soils.



## 6.0 CLOSURE

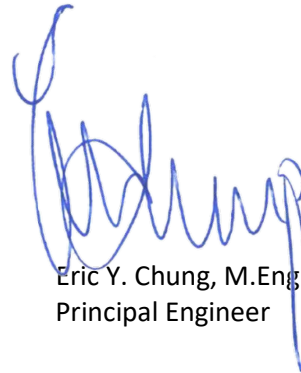
The Limitations of Report, as quoted in Appendix A, is an integral part of this report.

We trust that the information presented in this report is complete within our terms of reference. If there are any further questions concerning this report, please do not hesitate to contact our office.

Yours truly,  
**CHUNG & VANDER DOELEN ENGINEERING LTD.**



Yaroslav Chudin, E.I.T.  
Geotechnical Engineering Intern



Eric Y. Chung, M.Eng., P.Eng.  
Principal Engineer



## APPENDIX A

### LIMITATIONS OF REPORT



# APPENDIX “A”

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## LIMITATIONS OF REPORT

The conclusions and recommendations given in this report are based on information determined at the testhole locations. Subsurface and groundwater conditions between and beyond the testholes may differ from those encountered at the testhole locations, and conditions may become apparent during construction which could not be detected or anticipated at the time of the site investigation. It is recommended practice that the Soils Engineer be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in the testholes.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of testholes and their respective depths may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusion as to how the subsurface conditions may affect their work.

The benchmark and elevations mentioned in this report were obtained strictly for use in the geotechnical design of the project and by this office only, and should not be used by any other parties for any other purposes.

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

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final design stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.

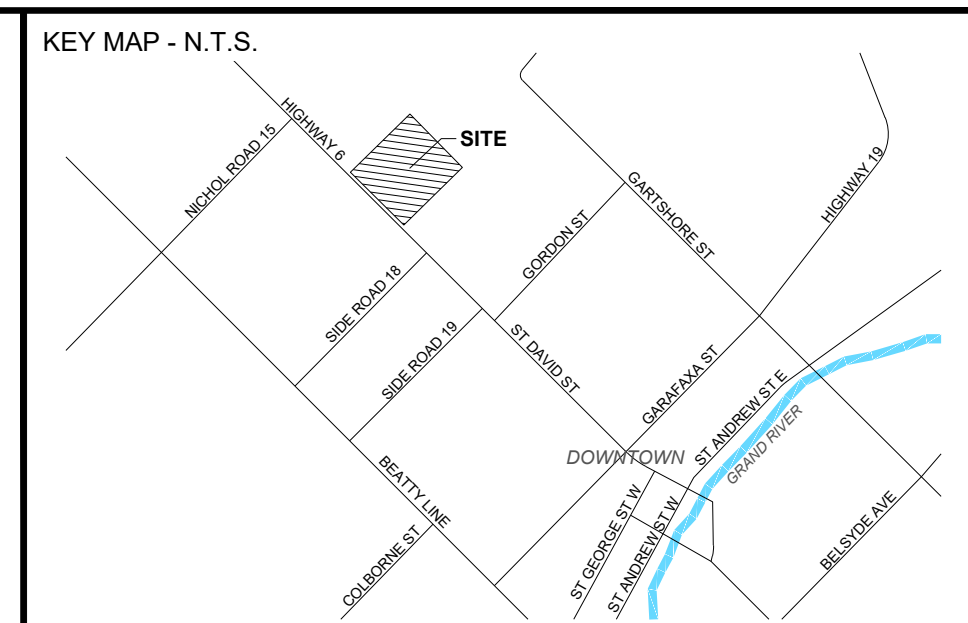
This report does not reflect the environmental issues or concerns unless otherwise stated in the report.



## APPENDIX B

### **Draft Plan of Subdivision (Polocorp, December 10, 2024) & Drawing No. 1 – CVD Borehole Location Plan**





# DRAFT PLAN OF SUBDIVISION

PT OF LOT 18, CONCESSION 16  
IN THE FORMER GEOGRAPHIC TWP OF NICHOL  
CENTRE WELLINGTON

POLOCORP INC.

SCALE = 1:1400 (metric)

**LAND USE SCHEDULE**

DESCRIPTION	LOTS/BLKS.	UNITS	AREA (ha.)
Single Detached	31-43	87-129	4.863
Street Townhouses	44-61	179-266	5.512
Medium Density	62, 63	93-125	2.065
Mixed Use	64	8-14	0.338
Existing House	65	0-1	0.172
Stormwater Management Facility	-	-	-
Trail	-	-	-
Parkland	66	-	0.892 (4.6%)
Pedestrian Walkway	67-69	-	0.115
Environmental Feature & Buffer	-	-	-
MTO Allowance	70, 71	-	0.534
Roads	-	-	5.279
<b>TOTAL</b>		<b>367-535</b>	<b>20.027</b>

**SALEABLE FRONTAGE**

DESCRIPTION	LENGTH	UNIT SMALL	UNIT LARGE
Single Detached	1,496.3m	36' (11.0m)	50' (15.2m)
Street Townhouses	1,773.2m	18' (5.5m)	27' (8.3m)
<b>TOTAL</b>	<b>3,239.5m</b>		

**DENSITY**

Gross Area (ha)	20.027 ha (49.49 ac)
Developable Area (ha)	19.457 ha (48.08 ac)
Net Density (uph)	18.9 - 27.5 upha
Net People-Jobs (3.05 per unit)	57.7 - 83.9 P/J ph

**INFORMATION REQUIRED**  
UNDER SECTION 51 (17) OF THE PLANNING ACT, R.S.O. 1990, c.P.13 AS AMENDED  
INFORMATION REQUIRED BY CLAUSES a,b,c,d,f,g,j AND I ARE AS SHOWN ON THE DRAFT PLAN.  
(i) Municipal Water Supply  
(h) Municipal Sanitary and Storm Sewers

**SURVEYOR'S CERTIFICATE**  
I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

O.L.S. Surveying Inc. DATE: XX XX, 2024

**OWNER'S CERTIFICATE**  
I HEREBY CONSENT TO THE FILING OF THIS PLAN BY POLOCORP INC., IN DRAFT FORM

MIKE PUOPOLO Polocorp Inc. DATE:

APPROVED: \_\_\_\_\_ DATE: \_\_\_\_\_

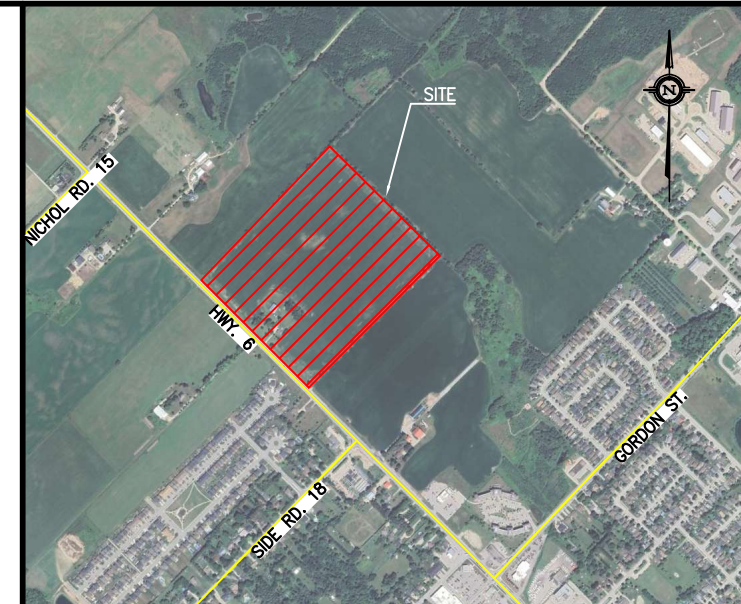
REVISIONS

DATE	BY	DESCRIPTION

**POLOCORP**  
379 Queen Street South, Kitchener | N2T 1W6 | 519-745-3249 | polocorpinc.com

DATE: December 10, 2024 SCALE: 1:4000 (metric)

PROJECT: 1012 (Fergus) DRAWN BY: GFE



**LEGEND**

- TBM: Top of fire hydrant nut, south of northern driveway entrance to 968 St. David Street North. Elev.: 425.17 m (Geodetic)
- Borehole and Monitoring Well Location (January 2024)
- Borehole and Monitoring Well Location (September 2024)
- Site Boundary

Image Ref.: Google Earth; Retrieved: May 1, 2024

Elev. Ref.: The borehole locations and associated ground surface elevations were surveyed using a Network RTK Global Navigation Satellite System (GNSS) Receiver. The survey data was collected using UTM Zone 17N Projection, NAD83(CSRS) v7-2010 datum and Canada Geoid Model HT2\_2010v70 (CGVD28).

**BOREHOLE LOCATION PLAN**

Proposed Residential Subdivision

6581 Highway 6  
Fergus, Ontario

**CHUNG & VANDER DOELEN**  
ENGINEERING LTD.

311 VICTORIA STREET NORTH  
KITCHENER / ONTARIO / N2H 5E1 / 519-742-8979

Drawn By: YC	Date: February 2025	File No.: 1495
Checked By: EYC	Scale: 1:4000	Drawing No.: 1

## APPENDIX C

### Single Well Response Test Analysis Charts





**CHUNG & VANDER DOELEN**  
ENGINEERING LTD.

311 Victoria Street North  
Kitchener / Ontario / N2H 5E1  
519-742-8979

**Response Test - Water Level Data and Analysis**

Project: Polocorp Fergus Subdivision

Number: 1495

Client: Polocorp Inc.

Location: 968 St. David Street North & 6581 Highway 6, Fergus, ON | Response Test: BH 1

Test Conducted by: Y.C.

Test Date: 2024-03-11

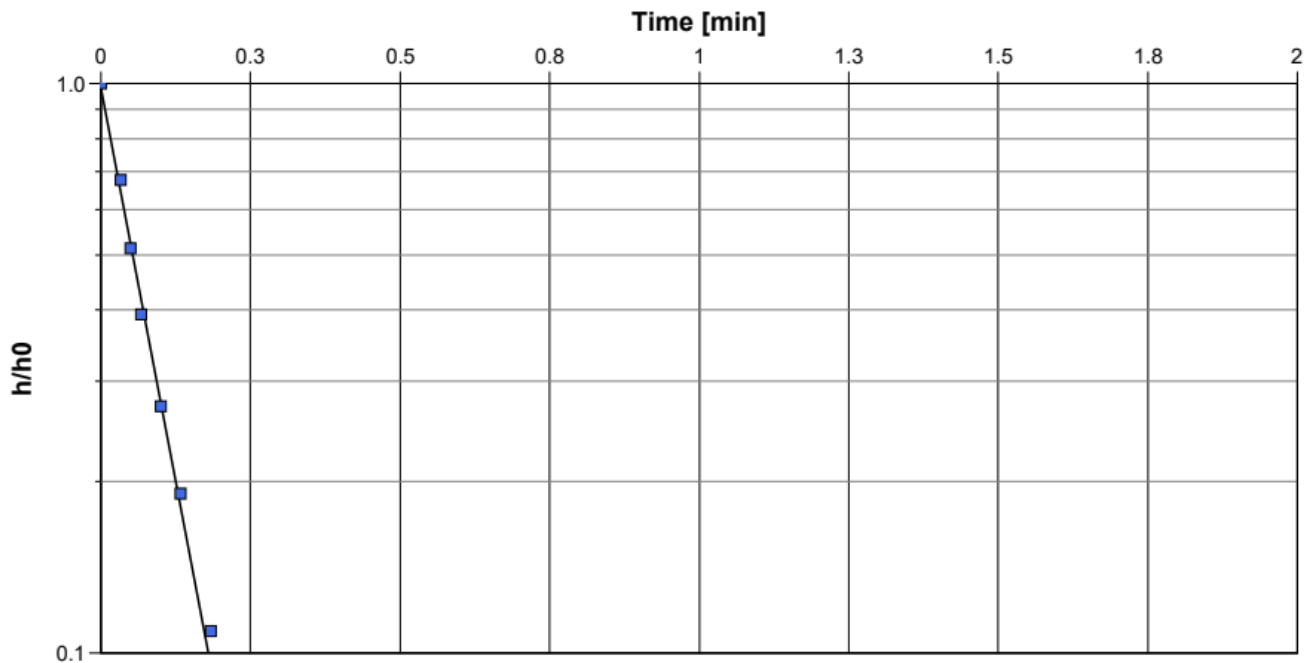
Aquifer Thickness: 2.90 m

Water level at t=0 [m]: 5.46

Static Water Level [m]: 5.22

Water level change at t=0 [m]: 0.25

	Time [min]	Water Level [m]	WL Change [m]
1	0	5.462	0.247
2	0.0333	5.382	0.167
3	0.05	5.342	0.127
4	0.0667	5.312	0.097
5	0.1	5.282	0.067
6	0.1333	5.262	0.047
7	0.1833	5.242	0.027
8	0.2333	5.232	0.017
9	0.45	5.225	0.01
10	0.6	5.222	0.007
11	0.9833	5.22	0.005
12	1.2667	5.217	0.002



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]
BH 1	$1.06 \times 10^{-4}$



**CHUNG & VANDER DOELEN**  
ENGINEERING LTD.

311 Victoria Street North  
Kitchener / Ontario / N2H 5E1  
519-742-8979

Response Test - Water Level Data and Analysis

Project: Polocorp Fergus Subdivision

Number: 1495

Client: Polocorp Inc.

Location: 968 St. David Street North & 6581 Highway 6, Fergus, ON | Response Test: BH 5

Test Conducted by: Y.C.

Test Date: 2024-03-11

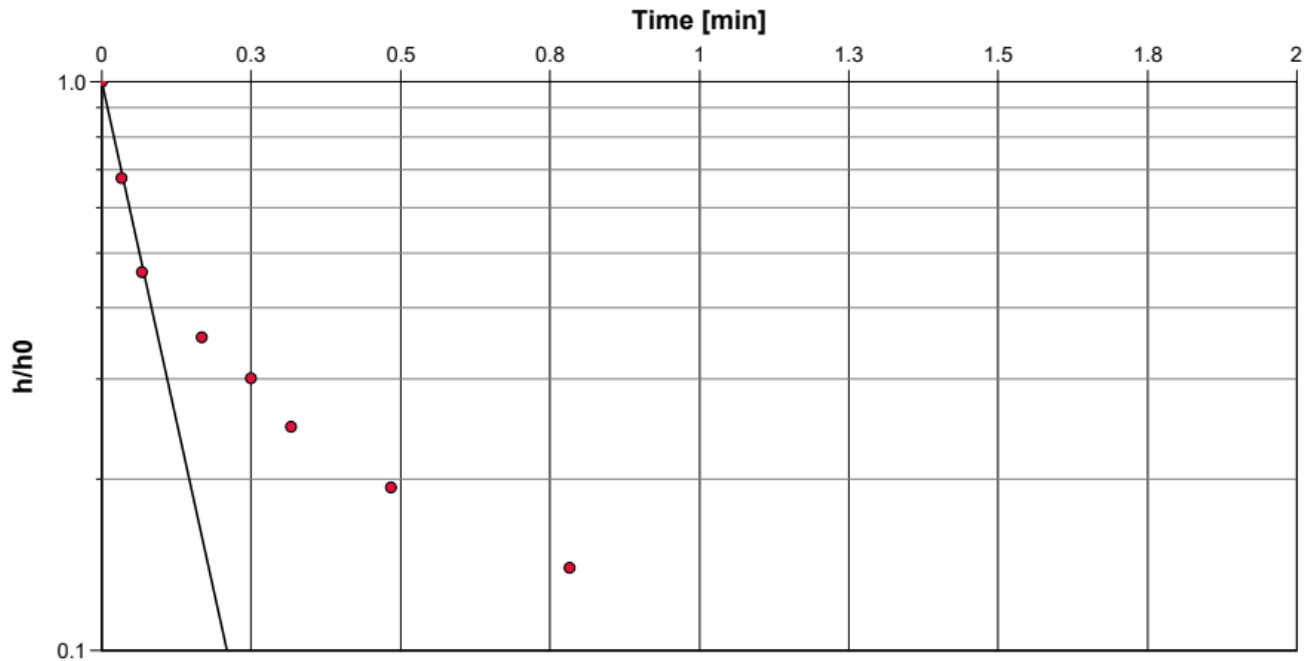
Aquifer Thickness: 6.20 m

Water level at t=0 [m]: 2.09

Static Water Level [m]: 1.99

Water level change at t=0 [m]: 0.09

	Time [min]	Water Level [m]	WL Change [m]
1	0	2.087	0.093
2	0.0333	2.057	0.063
3	0.0667	2.037	0.043
4	0.1667	2.027	0.033
5	0.25	2.022	0.028
6	0.3167	2.017	0.023
7	0.4833	2.012	0.018
8	0.7833	2.007	0.013
9	1.1167	2.002	0.008
10	1.55	2.00	0.006



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]
BH 5	$8.69 \times 10^{-5}$

## APPENDIX D

**Table 1 – Summary of Groundwater Levels and Elevations &  
Figure 5 – Water Table Contours Interpretation  
(September 18, 2024)**



Table 1 - Summary of Water Levels, Elevations & Fluctuations

Well	Ground Elevation (mASL)	Top Pipe Elevation (mASL)	Pipe Length (m)	Hydraulic Conductivity (m/s)	Water Level (m Below Ground)								Water Elevation (m Above Sea Level)								Fluctuation Relative to February 6, 2024 (m)			
					10-Nov-23	12-Dec-23	06-Feb-24	11-Mar-24	22-Jul-24	12-Sep-24	18-Sep-24	10-Nov-23	12-Dec-23	06-Feb-24	11-Mar-24	22-Jul-24	12-Sep-24	18-Sep-24	11-Mar-24	22-Jul-24	12-Sep-24	18-Sep-24		
BH 1	429.41	430.55	1.14	$1 \times 10^{-4}$			5.39	5.22	4.83		4.94			424.02	424.19	<b>424.58</b>		424.46	0.17	0.56		0.44		
BH 2	429.10	430.28	1.18	-			4.44	4.20	4.08		4.21			424.66	424.90	<b>425.02</b>		424.89	0.24	0.36		0.23		
BH 3	428.87	429.89	1.02	-			5.12	4.89	4.55		4.64			423.75	423.98	<b>424.32</b>		424.23	0.23	0.57		0.49		
BH 4	426.94	428.13	1.18	-			3.61	3.48	3.39		3.56			423.34	423.46	<b>423.56</b>		423.39	0.13	0.22		0.05		
BH 5	425.61	426.87	1.26	$9 \times 10^{-5}$			2.10	1.99	2.02		2.27			423.51	<b>423.62</b>	423.59		423.34	0.11	0.09		-0.17		
BH 101	428.68	429.79	1.10	-							3.80	3.82						<b>424.88</b>	424.87					
BH 102	429.37	430.36	0.99	-							4.64	4.65						<b>424.73</b>	424.72					
BH 103	428.31	429.27	0.96	-							3.76	3.77						<b>424.55</b>	424.53					
BH 104	427.36	428.60	1.25	-							2.97	3.00						<b>424.39</b>	424.36					
BH 105	428.15	429.20	1.05	-							4.44	4.45						<b>423.71</b>	423.70					

- Notes:
- 1) All Elevations Referenced to Geodetic Survey by CVD.
  - 2) **Bolded** elevations represent the maximum water table aquifer elevation measured at each monitoring well throughout all seasons.
  - 3) Negative water level indicates that water level is above ground.
  - 4) : Monitoring well/piezometer dry
  - 5) Negative fluctuation indicates drop in water level relative to baseline.

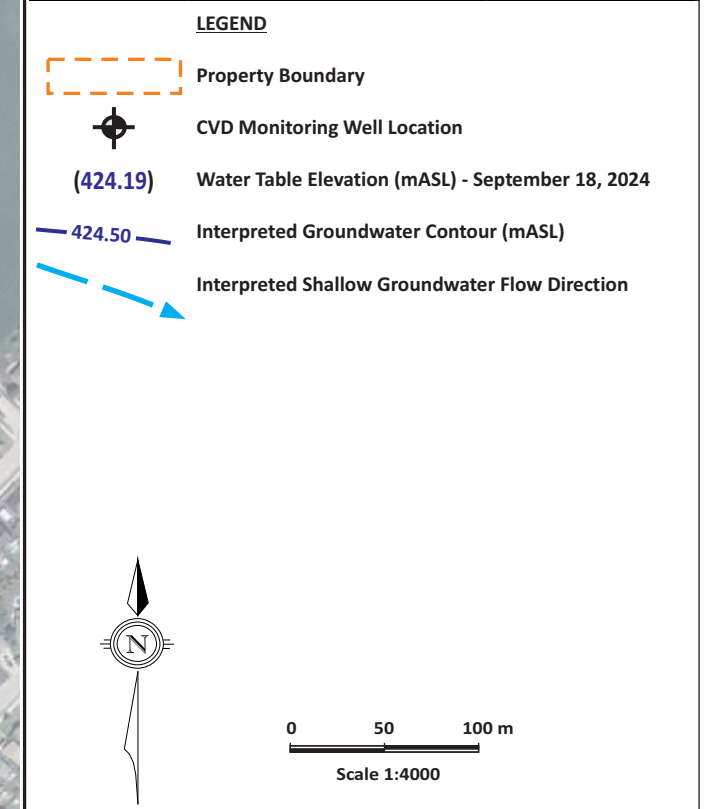


Image Reference: Google Earth; Retrieved: May 1, 2024

**Figure 5:**  
**Water Table Interpretation (September 18, 2024)**

Hydrogeological Assessment  
 Proposed Residential Subdivision

6581 Highway 6  
 Fergus, ON

**CHUNG & VANDER DOELEN**  
 ENGINEERING LTD.

311 VICTORIA STREET NORTH  
 KITCHENER / ONTARIO / N2H 2E1 / 519-742-8979

**ENCLOSURES**



# Soil Abbreviations and Terms Used on Record of Borehole Sheets

## TERMINOLOGY DESCRIBING COMMON SOIL TYPES:

<b>Topsoil</b>	-	mixture of soil and humus capable of supporting vegetation
<b>Peat</b>	-	mixture of visible and invisible fragments of decayed organic matter
<b>Till</b>	-	unstratified glacial deposit which may range from clay to boulders
<b>Fill</b>	-	soil materials identified as being placed anthropologically

## CLASSIFICATION (UNIFIED SYSTEM)

Clay	<0.002mm
Silt	0.002 to .075mm
Sand	0.075 to 4.75mm
	Fine 0.075 to 0.425 mm
	Medium 0.425 to 2.0 mm
	Coarse 2.0 to 4.75 mm
Gravel	4.75 to 75mm
	Fine 4.75 to 19 mm
	Coarse 19 to 75 mm
Cobbles	75 to 300mm
Boulders	>300mm

## TERMINOLOGY

Soil Composition	% by Weight
"traces"	<10%
"some"(eg. some silt)	10-20%
Adjective (eg. sandy)	20-35%
"and"(eg. sand and gravel)	35-50%

**Standard Penetration Resistance (SPT):** Standard Penetration Resistance ('N' Values) refers to the number of blows required to advance a standard (ASTM D1586) 51 mm Ø (2 inch) split-spoon sampler by the use of a free falling, 63.5 Kg (140lbs) hammer. The number of blows from the drop weight is recorded for every 15 cm (6 inches). The hammer is dropped from a distance of 0.76m (30 inches) providing 474.5 Joules per blow. When the sampler is driven a total of 45 cm (18 inches) into the soil, the standard penetration index ('N' Value) is the total number of blows for the last 30 cm (12 inches).

**Dynamic Cone Penetration Resistance (DCPT):** Dynamic Cone Penetration Resistance is similar to a SPT with the 474.5 Joule/blow impulse provided by the free falling hammer where the split-spoon sampler is replaced by a 51 mm Ø, 60° conical point and the number of blows is recorded continuously for every 30 cm (12 inches).

## COHESIVE SOILS CONSISTENCY

	(kPa)	(P.S.F.)	Nominal 'N' Value
Very Soft	<12	<250	0-2
Soft	12-25	250-500	2-4
Firm	25-50	500-1000	4-8
Stiff	50-100	1000-2000	8-15
Very Stiff	100-200	2000-4000	15-30
Hard	>200	>4000	>30

## RELATIVE DENSITY OF COHESIONLESS SOIL

	'N' Value
Very Loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	>50

## MOISTURE CONDITIONS:

Cohesive Soil
DTPL- Drier than plastic limit
APL- About plastic limit
WTPL- Wetter than plastic limit
MWTPL- Much wetter than plastic limit

Cohesionless Soil
Damp
Moist
Wet
Saturated

## SAMPLE TYPES AND ADDITIONAL FIELD TESTS

<b>SS</b> Split Spoon Sample (obtained from SPT)	<b>GS</b> Grab Sample	<b>PP</b> Pocket Penetrometer
<b>AS</b> Auger Sample	<b>BS</b> Bulk Sample	<b>VANE</b> Peak & Remolded shear
	<b>TW</b> Thin Wall Sample or Shelby Tube	<b>DMT</b> Flat Plate Dilatometer

## LABORATORY TESTS

<b>SG</b> Specific Gravity	<b>S</b> Sieve Analysis	<b>W</b> Water Content
<b>H</b> Hydrometer	<b>P</b> Field Permeability	<b>K</b> Lab Permeability
<b>W<sub>p</sub></b> Plastic Limit	<b>W<sub>l</sub></b> Liquid Limit	<b>I<sub>p</sub></b> Plasticity Index
<b>GSA</b> Grain Size Analysis	<b>C</b> Consolidation	<b>UNC</b> Unconfined compression

**FILE No: 1495**

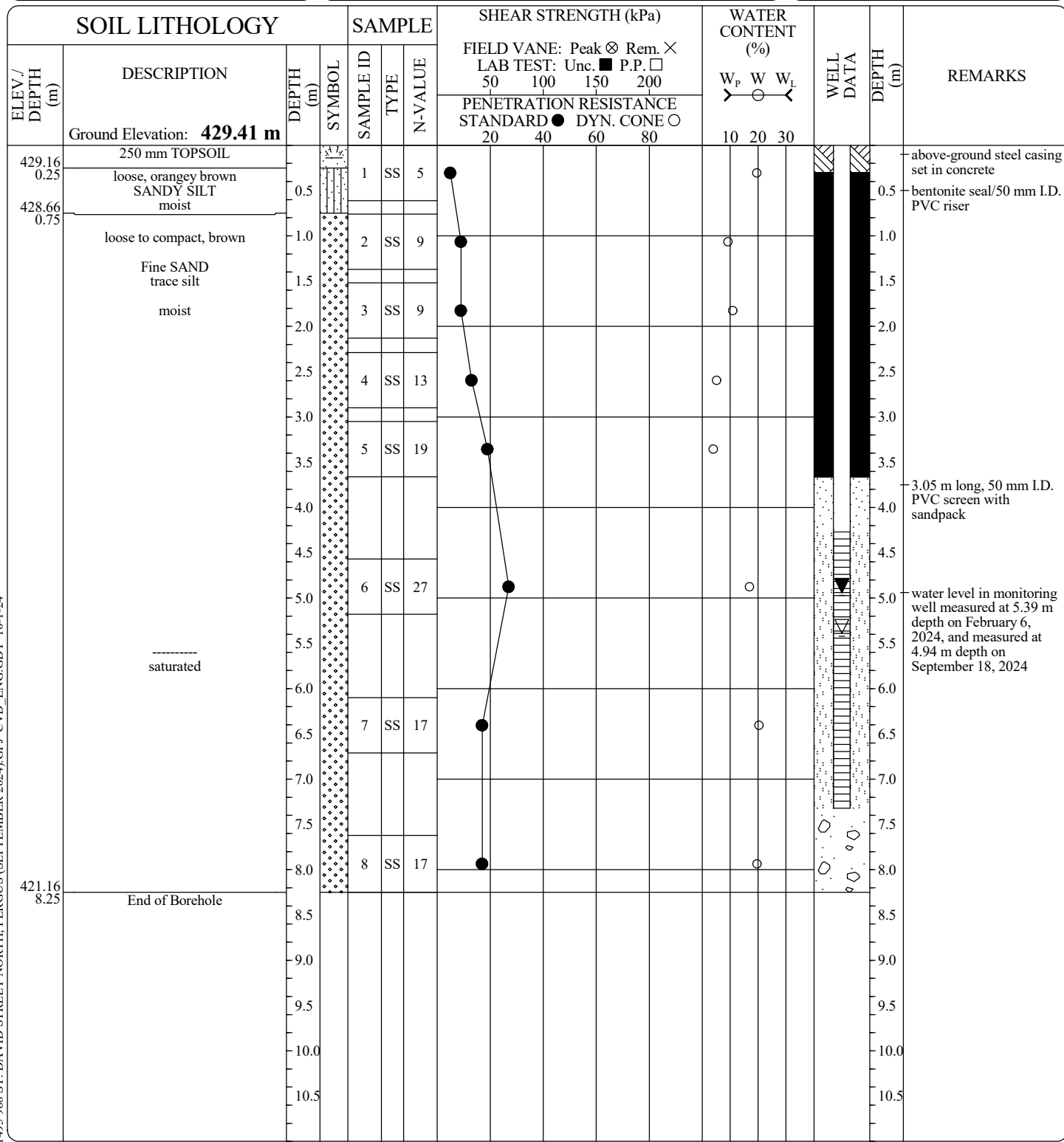
**BOREHOLE No. 1**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**

Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Jan 17 - 24 TO Jan 17 - 24**



CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT\_10-1-24

**PROJECT MANAGER: EYC**

**CHUNG & VANDER DOELEN ENGINEERING LTD.**  
311 Victoria Street North  
Kitchener, Ontario N2H 5E1  
ph. (519) 742-8979, fx. (519) 742-7739

**FILE No: 1495**

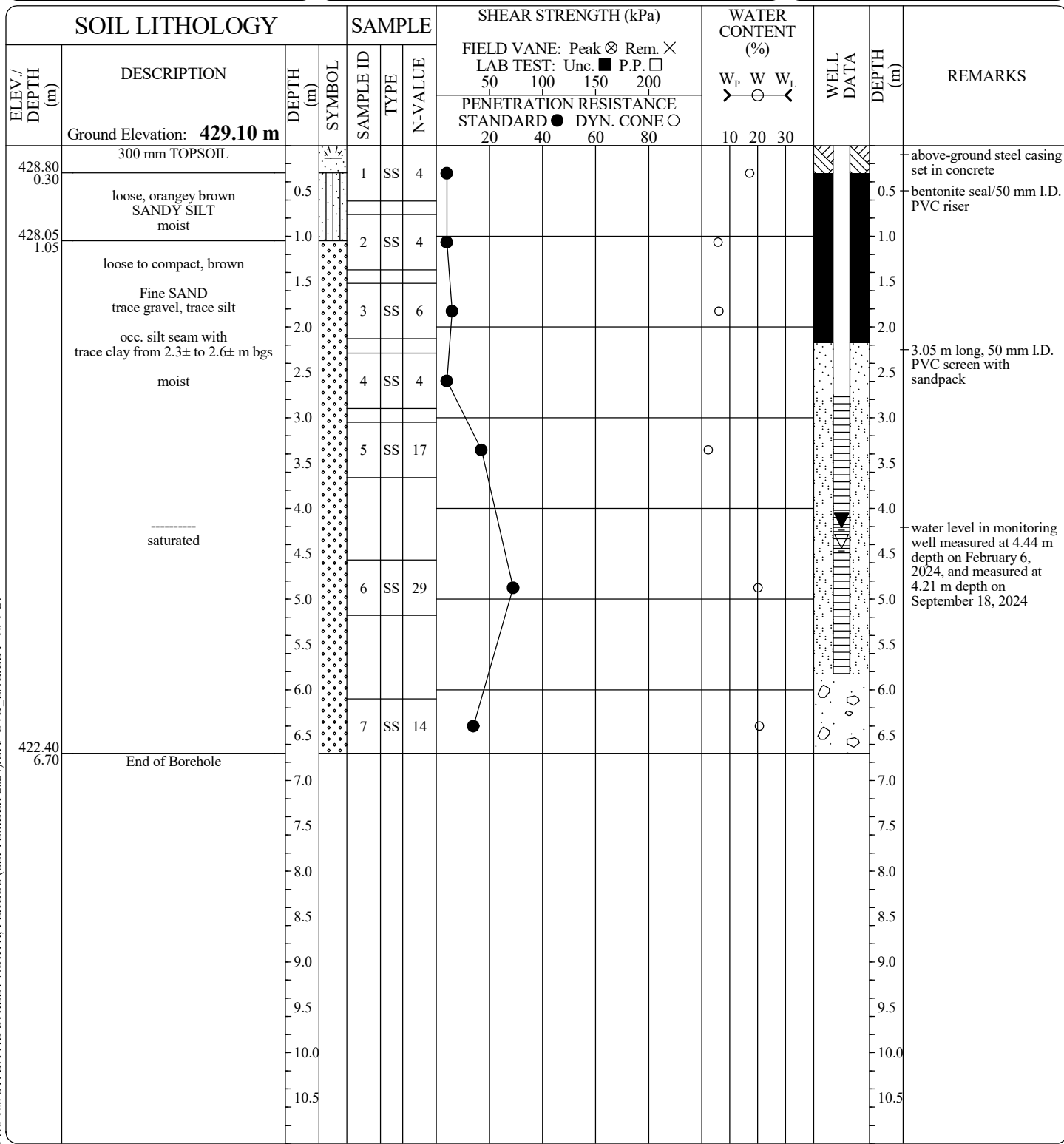
**BOREHOLE No. 2**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**

Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Jan 17 - 24 TO Jan 17 - 24**



CVD BOREHOLE (2017), 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024), GPJ\_CVD\_ENG.GDT\_10-1-24

**PROJECT MANAGER: EYC**  
**CHUNG & VANDER DOELEN ENGINEERING LTD.**  
 311 Victoria Street North  
 Kitchener, Ontario N2H 5E1  
 ph. (519) 742-8979, fx. (519) 742-7739

**FILE No: 1495**

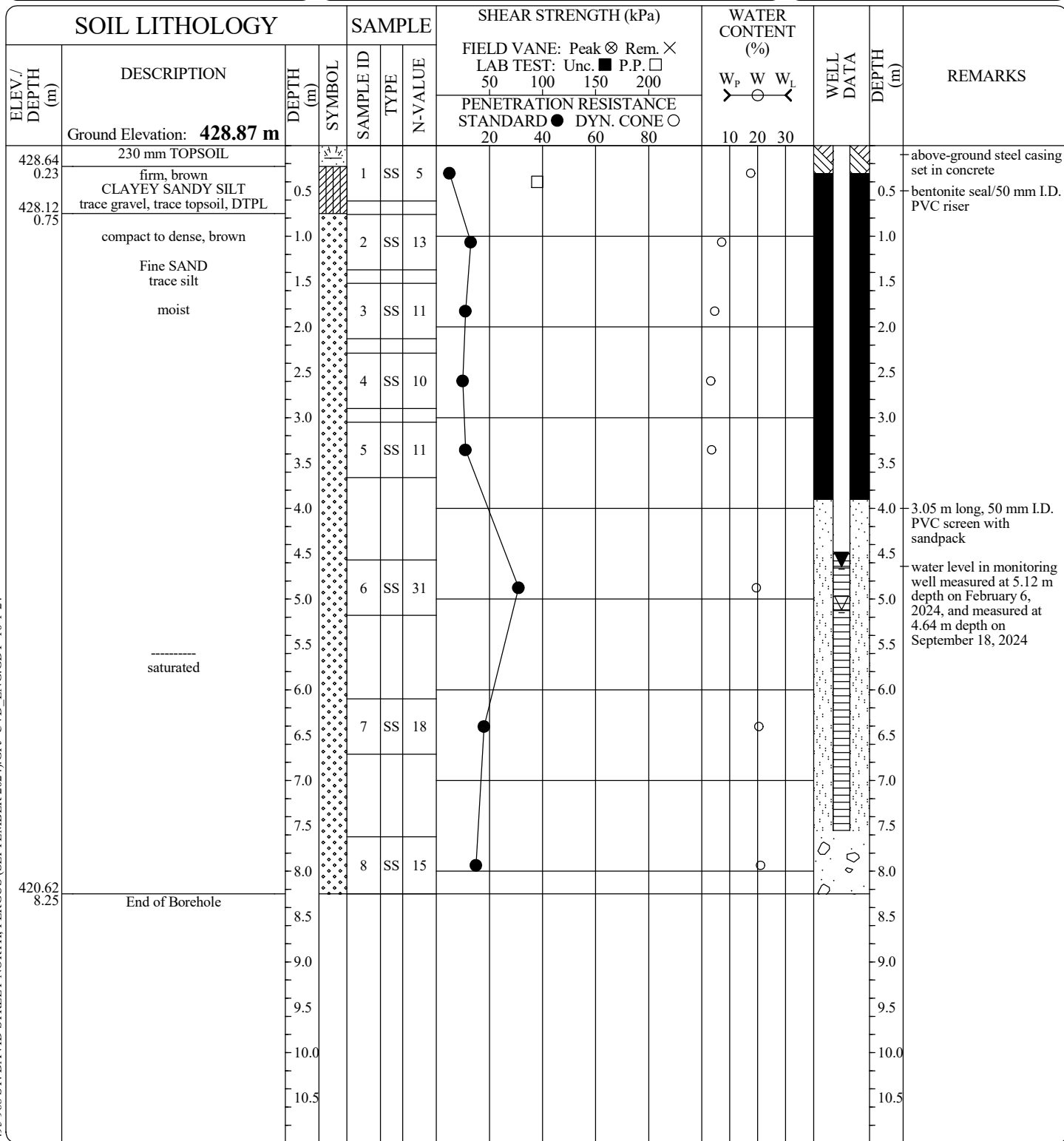
**BOREHOLE No. 3**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**

Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Jan 16 - 24 TO Jan 16 - 24**



CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT 10-1-24

**PROJECT MANAGER: EYC**

**CHUNG & VANDER DOELEN  
ENGINEERING LTD.**

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Kitchener, Ontario N2H 5E1  
ph. (519) 742-8979, fx. (519) 742-7739

**FILE No: 1495**

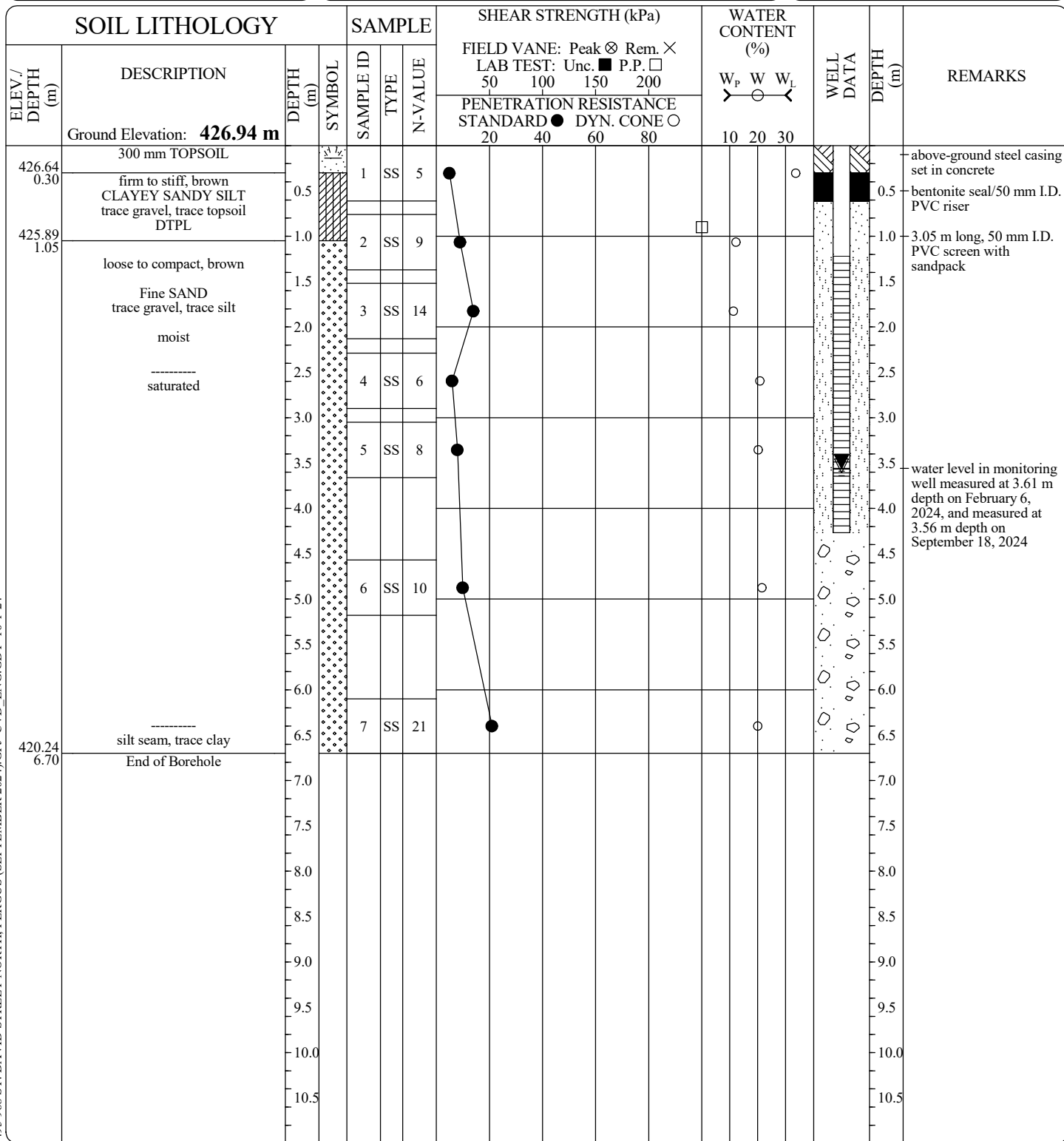
**BOREHOLE No. 4**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**

Machine: **CME-55 Track**  
Method: **Solid Stem Auger**  
Size: **152 mm O.D.**  
Date: **Jan 16 - 24 TO Jan 16 - 24**



CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT\_10-1-24

**CHUNG & VANDER DOELEN ENGINEERING LTD.**  
311 Victoria Street North  
Kitchener, Ontario N2H 5E1  
ph. (519) 742-8979, fx. (519) 742-7739

PROJECT MANAGER: **EYC**

**FILE No: 1495**

**BOREHOLE No. 5**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**

Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Jan 16 - 24 TO Jan 16 - 24**

SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS	
ELEV./DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80					W <sub>p</sub>
425.43 0.18	180 mm TOPSOIL	0.5		1	SS	5										
	loose, orangey brown	0.5														
	SANDY SILT trace topsoil	1.0		2	SS	4										
	moist to wet	1.0														
423.76 1.85	loose to compact, brown	2.0		3	SS	5										
	Fine SAND trace silt	2.5		4	SS	7										
	wet to saturated	3.0														
		3.5		5	SS	9										
		4.0														
		4.5														
		5.0		6	SS	9										
		5.5														
		6.0														
		6.5		7	SS	12										
		7.0														
		7.5														
		8.0		8	SS	13										
417.36 8.25	silt seam, trace clay	8.0														
	End of Borehole	8.25														

CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT\_10-1-24

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ENGINEERING LTD.**

311 Victoria Street North  
Kitchener, Ontario N2H 5E1  
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PROJECT MANAGER: **EYC**

**FILE No: 1495**

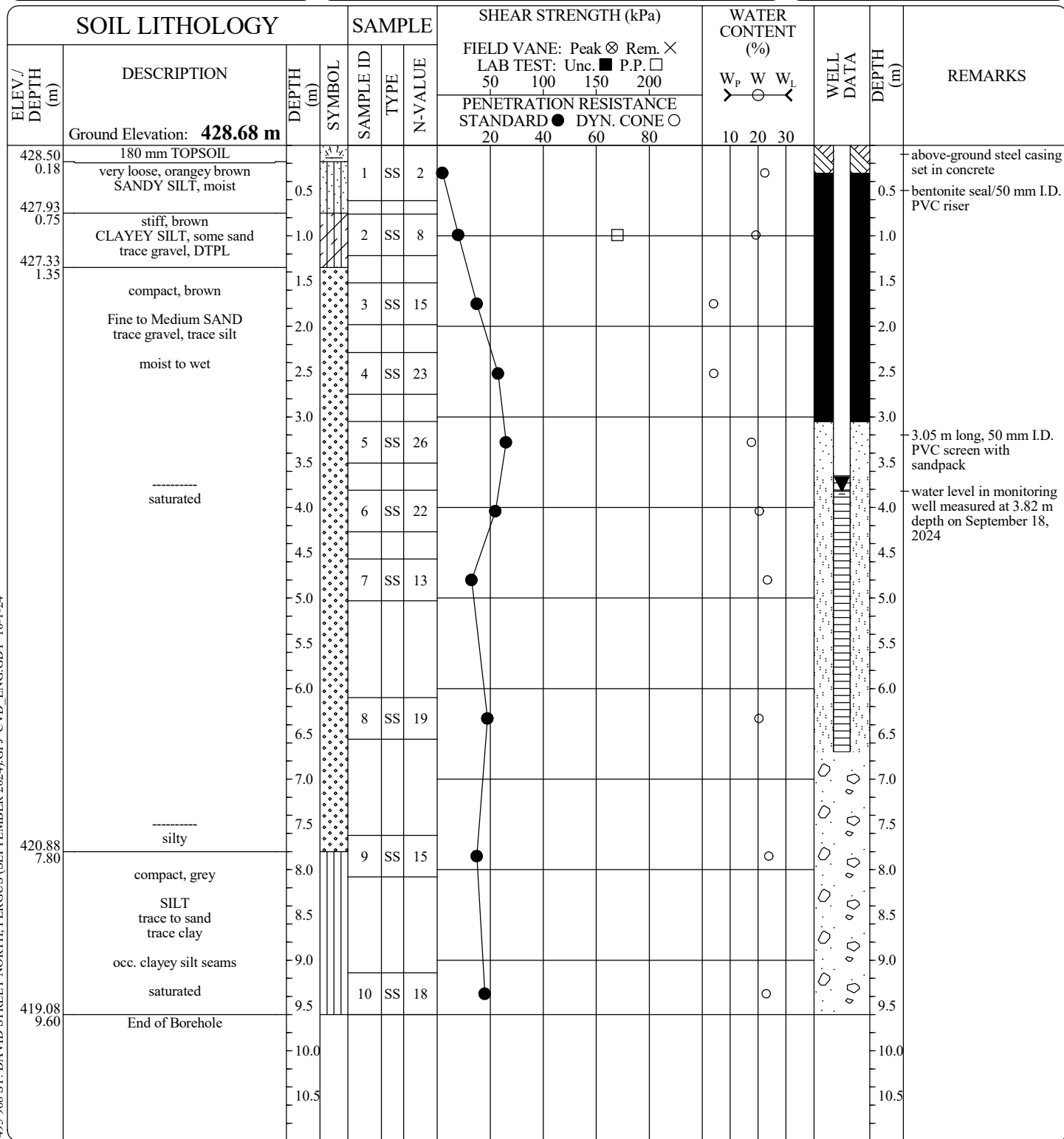
**BOREHOLE No. 101**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**

Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Sep 11 - 24 TO Sep 11 - 24**



CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT\_10-1-24

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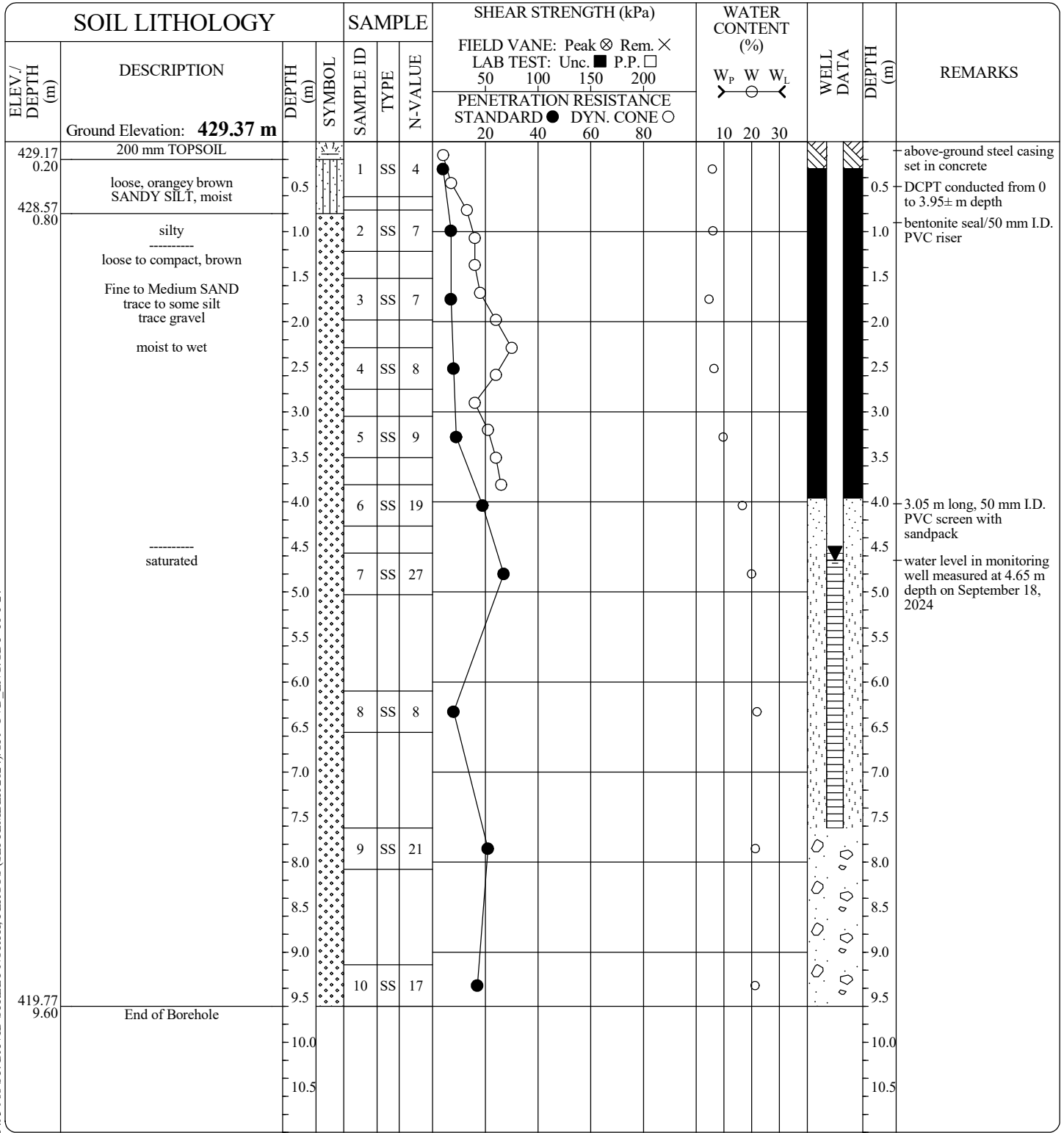
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Kitchener, Ontario N2H 5E1  
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PROJECT MANAGER: **EYC**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

EQUIPMENT DATA  
Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Sep 12 - 24 TO Sep 12 - 24**



CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT 10-1-24

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PROJECT MANAGER: **EYC**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**  
Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Sep 11 - 24 TO Sep 11 - 24**

SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS	
ELEV./DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80					W <sub>p</sub>
427.51	very loose, dark brown FILL, sand and silt trace gravel, trace clay trace topsoil, moist	0.5	[Symbol]	1	SS	3	●									above-ground steel casing set in concrete
426.96	loose, brown SANDY SILT, trace gravel trace clay, moist	1.0	[Symbol]	2	SS	5	●									bentonite seal/50 mm I.D. PVC riser
	compact, brown Fine to Medium SAND trace silt	2.0	[Symbol]	3	SS	21	●									
	moist	2.5	[Symbol]	4	SS	13	●									
		3.5	[Symbol]	5	SS	12	●									
	----- saturated	4.0	[Symbol]	6	SS	12	●									3.05 m long, 50 mm I.D. PVC screen with sandpack
		4.5	[Symbol]													water level in monitoring well measured at 3.77 m depth on September 18, 2024
		5.0	[Symbol]	7	SS	14	●									
		6.5	[Symbol]	8	SS	24	●									
420.21	End of Borehole	8.0	[Symbol]	9	SS	14	●									

CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT\_10-1-24

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**ENGINEERING LTD.**  
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 Kitchener, Ontario N2H 5E1  
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PROJECT MANAGER: **EYC**

**FILE No: 1495**

**BOREHOLE No. 104**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**

Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Sep 11 - 24 TO Sep 11 - 24**

SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS		
ELEV./DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80					W <sub>p</sub>	W
427.11 0.25	250 mm TOPSOIL	0.5		1	SS	6											above-ground steel casing set in concrete
	loose, orangey brown to brown FILL, sand and silt trace gravel, trace clay occ. clayey silt seams moist	1.0		2	SS	7											bentonite seal/50 mm I.D. PVC riser
		1.5		3	SS	5											
425.21 2.15	moist loose to compact, brown Fine to Medium SAND trace to some silt occ. silty sand seams saturated	2.5		4	SS	10											3.05 m long, 50 mm I.D. PVC screen with sandpack
		3.0		5	SS	15											water level in monitoring well measured at 3.0 m depth on September 18, 2024
		3.5		6	SS	9											
		4.0		7	SS	10											
		4.5															
		5.0															
		5.5															
		6.0															
421.06 6.30	brown compact, grey SILT trace sand, trace clay saturated	6.5		8	SS	15											
		7.0															
		7.5															
		8.0		9	SS	12											
419.26 8.10	End of Borehole	8.0															

CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT\_10-1-24

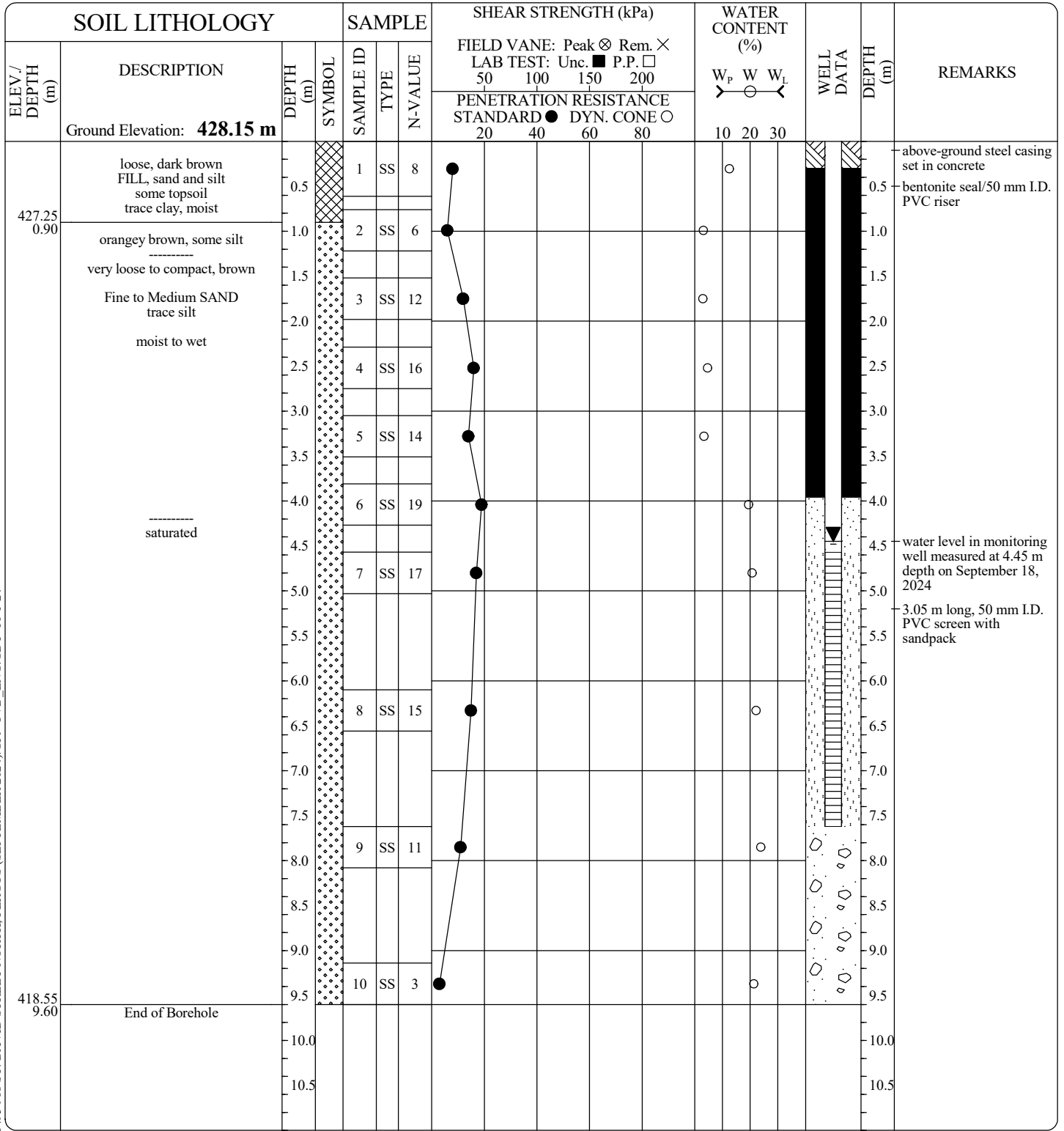
**CHUNG & VANDER DOELEN ENGINEERING LTD.**  
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Kitchener, Ontario N2H 5E1  
ph. (519) 742-8979, fx. (519) 742-7739

PROJECT MANAGER: **EYC**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**  
Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Sep 12 - 24 TO Sep 12 - 24**

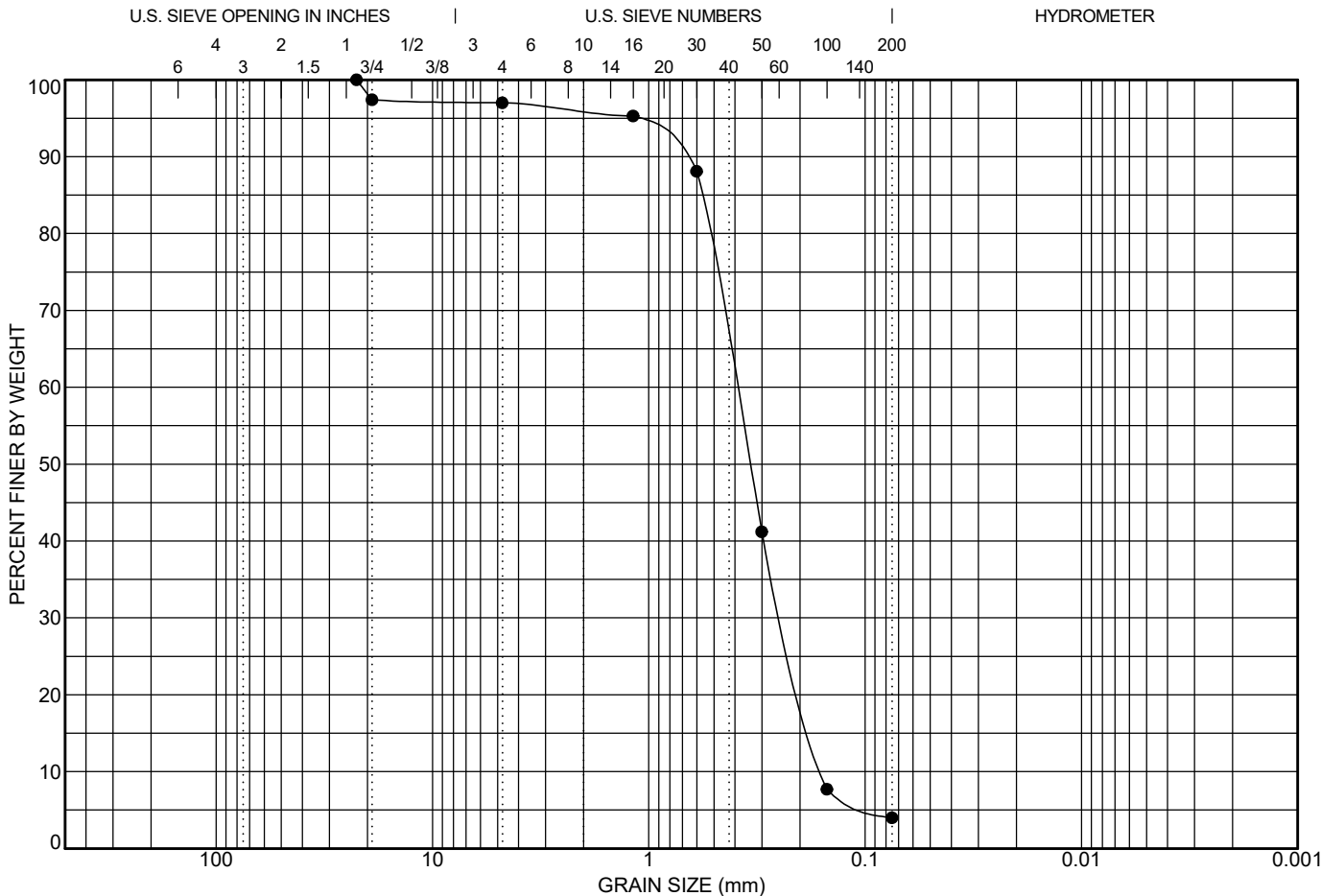


CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT 10-1-24

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Kitchener, Ontario N2H 5E1  
ph. (519) 742-8979, fx. (519) 742-7739

PROJECT MANAGER: **EYC**

DM - NO SPECIFICATIONS 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024), GPJ LAW LNDN.GDT 10-1-24



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

LL	PL	PI	Cc	Cu	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
			0.91	2.52	22.4	0.396	0.238	0.157	3.0	93.0	4.0	

**Date:** Sep. 25 - 2024  
**Client:** PoloCorp Inc.  
**Contractor:**  
**Source:**  
**Sampled From:** BH 101 - SA 4, 2.30 to 2.75 m depth  
**Sample No.:** 101-4  
**Date Sampled:** Sep. 11 - 2024  
**Sampled By:** RS  
**Lab No.:** 1033  
**Date Tested:** Sep. 25 - 2024  
**Type of Material:** Fine to Medium Sand, trace gravel, trace silt

Sieve Size (mm)	Percent Passing	No Specifications

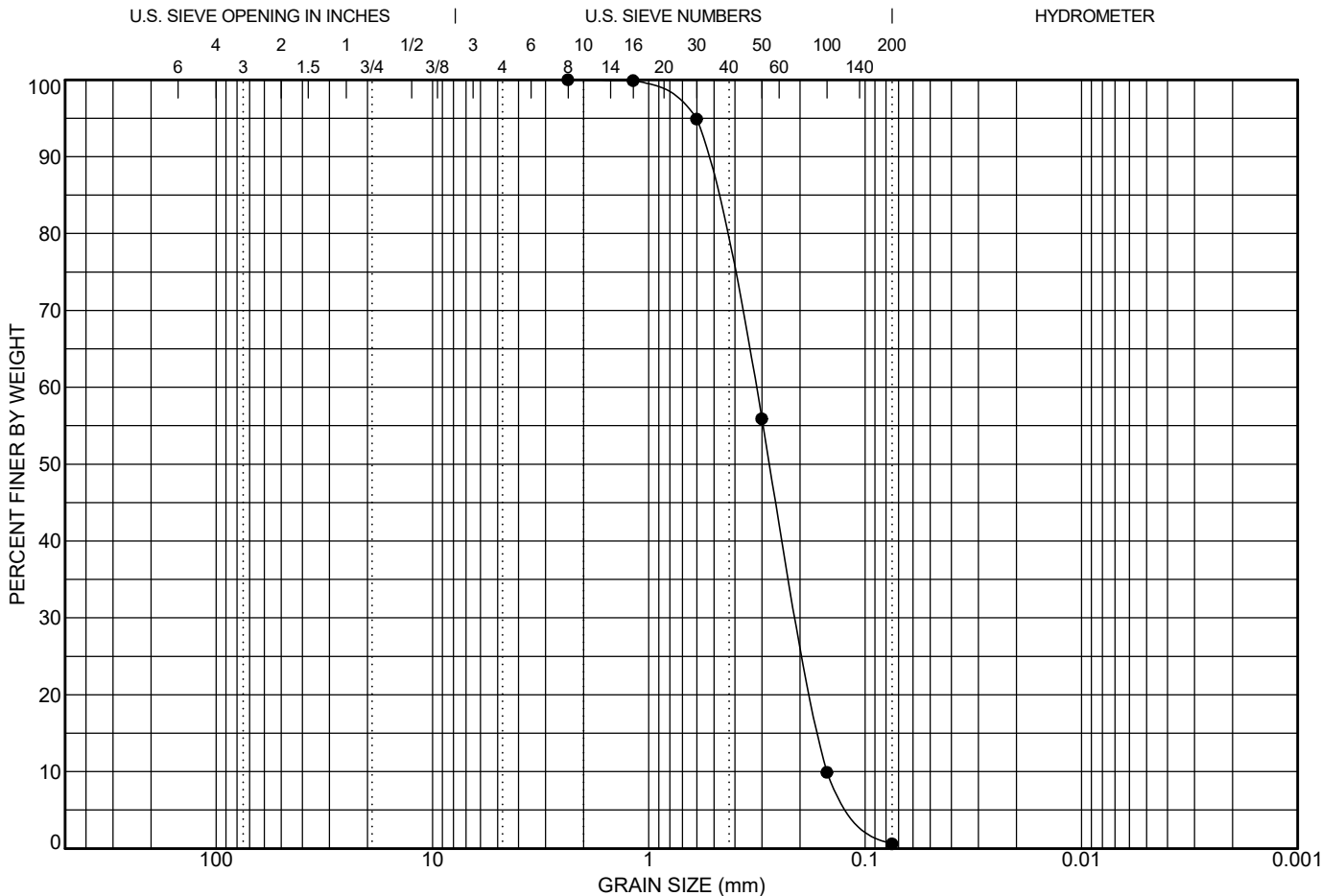


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 ENGINEERING LTD.**  
 311 Victoria Street North  
 Kitchener, Ontario N2H 5E1  
 Telephone: 519-742-8979  
 Fax: 519-742-7739  
 e-mail: info@cvdengineering.com

**GRAIN SIZE DISTRIBUTION**

**Project:** Proposed Residential Subdivision  
**Location:** 968 St. David Street North, Fergus, Ontario  
**File No.:** 1495  
**Enclosure No.:** 22

DM - NO SPECIFICATIONS 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024), GPJ LAW LNDN.GDT 10-1-24



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

LL	PL	PI	Cc	Cu	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
			0.85	2.15	2.36	0.323	0.203	0.15	0.0	99.4		0.6

**Date:** Sep. 25 - 2024  
**Client:** PoloCorp Inc.  
**Contractor:**  
**Source:**  
**Sampled From:** BH 105 - SA 4, 2.30 to 2.75 m depth  
**Sample No.:** 105-4  
**Date Sampled:** Sep. 12 - 2024  
**Sampled By:** RS  
**Lab No.:** 1034  
**Date Tested:** Sep. 25 - 2024  
**Type of Material:** Fine to Medium Sand, trace silt

Sieve Size (mm)	Percent Passing	No Specifications



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 Kitchener, Ontario N2H 5E1  
 Telephone: 519-742-8979  
 Fax: 519-742-7739  
 e-mail: info@cvdengineering.com

**GRAIN SIZE DISTRIBUTION**

**Project:** Proposed Residential Subdivision  
**Location:** 968 St. David Street North, Fergus, Ontario  
**File No.:** 1495  
**Enclosure No.:** 23



**CHUNG & VANDER DOELEN**  
ENGINEERING LTD.

**PRELIMINARY HYDROGEOLOGICAL INVESTIGATION  
PROPOSED RESIDENTIAL DEVELOPMENT**

**6581 Highway 6  
Fergus, Ontario**

**SUBMITTED TO:**  
Mr. Mike Puopolo  
Polocorp Inc.  
379 Queen Street South  
Kitchener, ON  
N2G 1W6

**FILE NO:** 1495 / February 28, 2025



February 28, 2025  
**FILE NO.:** 1495

Polocorp Inc.  
379 Queen Street South  
Kitchener, ON  
N2G 1W6

Attention: Mike Puopolo

**RE: Preliminary Hydrogeological Investigation**  
**Proposed Residential Development**  
**6581 Highway 6, Fergus, Ontario**

This report summarizes the preliminary results of a hydrogeological investigation completed in support of a proposed residential development containing a combination of residential single units, stacked townhouses, mixed-use units, roadways, and parkland, located at 6581 Highway 6 in Fergus, Ontario.

If you have any questions or concerns regarding the report, please contact the undersigned.

Yours truly,  
**CHUNG & VANDER DOELEN ENGINEERING LTD.**

Peter Dao, M.Sc., P.Geol.  
Manager, Environmental & Hydrogeology

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<b>Appendix B</b>	FIGURES Figure 1 – Site Location Figure 2 – Quaternary Geology Figure 3 – Watershed Mapping (GRCA) Figure 4 – Monitoring Well and Piezometer Locations Figure 5 – Water Table Contours Interpretation (September 18, 2024)
<b>Appendix C</b>	Well Response Test Analysis Charts
<b>Appendix D</b>	Table 1 – Summary of Groundwater Levels and Elevations & Hydrograph
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<b>Appendix F</b>	Water Chemistry Results (AGAT Laboratories of Mississauga, Ontario)
<b>Appendix G</b>	MECP Well Records
<b>Appendix H</b>	Limitations of Report
<b>Enclosure A</b>	Soil Abbreviations and Terms Used on Record of Borehole Log Sheets
<b>Enclosures 1 to 5 &amp; 9 to 13</b>	Borehole Log Sheets
<b>Enclosures 22 and 23</b>	Grain Size Distribution Charts



## 1.0 INTRODUCTION

CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD) has been retained by the 'Client', Polocorp Inc., to complete a scoped hydrogeological investigation for the property located at 6581 Highway 6 in Fergus, Ontario ("Site") to support a proposed residential subdivision. The proposed development area comprises part of Lot 17, Concession 16 of the Subject Lands.

The purpose of the investigation is to evaluate existing hydrogeological conditions at the Site in support of a proposal for a residential subdivision and subsequent development, comprised of a combination of residential single units, stacked townhouses, mixed-use units, roadways, and park.

This report presents the preliminary findings of the ongoing hydrogeological investigation, conducted between February and September 2024 for the proposed subdivision. At the time of the writing of this report, only a Draft Plan of Subdivision (Polocorp Inc., December 10, 2024), as provided in Appendix A, was available for our review.

The 20.03±-hectare (ha) Site is currently comprised of a cultivated agricultural field and a residential dwelling with its related structures fronting Highway 6. The Site is bound by Highway 6 to the west and predominantly by agricultural lands to the north, east, and south. An existing residential subdivision is situated southwest of the Site on the opposite side of Highway 6, and another residential subdivision is found approximately 400± m southeast of the property. Figure 1 shows the location of the subject Site in the Town of Fergus.

It is understood that the Site is proposed to be fully municipally serviced with the water and wastewater services. Although no current plans for on-Site stormwater management (SWM) facilities are available, it is expected that the property will be connected to a 2.41± ha sized SWM facility which is proposed to be constructed in the lot directly south of the Site (968 St. David Street North). A roadway network, connected to Highway 6, is planned throughout the subdivision. This investigation characterizes the hydrogeological setting and assesses potential impacts from future servicing. Other characteristics of the future development are to include a 0.89± ha sized parkland (Block 66).

The overall objectives of the hydrogeological investigation are as follows:

1. To characterize the hydrogeologic setting, using data from the current and previous investigations, with primary emphasis on the near surface hydrogeologic setting.
2. To assess the roles (or functions) that groundwater and surface water have with respect to nearby environmental features at or adjacent to the property.
3. To identify and evaluate potential impacts and opportunities to enhance groundwater and surface water contribution to receptors from the proposed development, and to make recommendations to safeguard these features from the potential impacts associated with the development.

As this is a preliminary report, early in the investigation process, the objectives above cannot be fully addressed at this time. An updated report will be provided after the completion of the investigative scope of work.



## **2.0 INVESTIGATION SCOPE**

### **2.1 BACKGROUND DATA REVIEW**

The following background information (Section 8.0 lists the specific information), which has been considered and reviewed as part of this investigation:

- CVD Engineering Ltd.; Preliminary Geotechnical Investigation (May 28, 2024)
- Golder; Hydrogeological Investigation, 8243 and 8282 Wellington Road 19, Ontario (February 2022)
- Grounded Engineering; Hydrogeological Assessment, 350 Wellington Road 7, Elora, Ontario (October 2022)
- Government of Canada Environment and Natural Resources; Historical Data; Fergus Shand Dam Weather Station; 2024 Daily Data Reports
- Grand River Conservation Authority; ESRI; ArcGIS; Map Your Property Tool (2024)
- Karrow, P.F.; Pleistocene Geology of the Guelph Area, Southern Ontario; Geological Report 61; Map 22153, scale 1:63,360 (1968) (Figure 2)
- Matrix Solutions Inc.; Centre Wellington Scoped Tier Three Water Budget Assessment (December 2017)
- Polocorp; Draft Plan of Subdivision (December 10, 2024) (Appendix A)
- MECP Water Well Records near Site (Appendix G)
- Toporama Topographical Map (Ministry of Natural Resources, Retrieved June 11, 2024) (Figure 1)
- WSP Canada Inc.; Hydrogeological Investigation - Updated, 8243 and 8282 Wellington Road 19, Ontario (April 2023)

### **2.2 BOREHOLE DRILLING & MONITORING WELL INSTALLATION**

As part of both the initial hydrogeological and preliminary geotechnical investigations completed between January 16 and 17, 2024, five (5) boreholes were advanced to depths of between 6.70 and 8.25 m below existing grade, and monitoring wells were installed at each borehole location (labelled BH 1 to 5). A supplemental investigation was completed, between September 11 and 12, 2024, in which eight (8) additional boreholes/monitoring wells (labelled BH 101 to 105) were drilled and installed to depths between 8.10 and 9.60 m below grade. These boreholes/wells were drilled/installed to investigate the shallow subsoil and shallow groundwater table conditions at the property.

The investigation was completed using a track-mounted CME-55 drill rig, equipped with standard 83 mm inner diameter hollow stem augers (HSA) operated by Davis Drilling Ltd. of Milton, Ontario. Soil samples collected during the borehole investigation program were examined in the field and subsequently brought to CVD's laboratory for tactile and textural examination. Moisture content determinations were performed on all retrieved soil samples from the drilling program.

The ground surface elevation of the boreholes, monitoring wells, and geomorphological features of the site were surveyed by CVD for the purpose of this report using a Network RTK Global Navigation Satellite



System (GNSS) Receiver. The survey data was collected using the UTM Zone 17N Projection, NAD83(CSRS)v7-2010 datum and Canada Geoid Model HT2\_2010v70 (CGVD28).

### **2.3 WELL DEVELOPMENT, WATER LEVEL MONITORING, & RESPONSE TESTS**

Each monitoring well was developed using Waterra™ polyethylene tubing and foot-valve hand pumps. As of the writing of this report, groundwater level monitoring was performed on five (5) occasions: on February 6, March 11, July 22, September 12, and September 18, 2024. Groundwater levels were obtained at all of the monitoring wells and piezometer locations during each occasion. Table 1 provides a summary of the groundwater levels and calculated elevations for the five monitoring events.

Well response tests (slug/bail tests) were completed at two (2) of the monitoring well locations (Boreholes 1 and 5) on March 11, 2024, to provide a more accurate estimate of the hydraulic conductivity (K) (or permeability) of the saturated aquifer subsoil strata, to assist in providing more accurate infiltration rates. The hydraulic conductivities were calculated through the Aquifer Test software utilizing the Bouwer and Rice method. The results of the tests are graphically presented in Appendix C, and a summary of the data is also included in Table 1.

Furthermore, two (2) grain size distribution analyses were carried out on representative subsoil samples to help identify and assist in providing estimates of hydraulic conductivities for the encountered groundwater-bearing subsoil deposits. The results of these tests are presented in Enclosures 22 and 23.

Additionally, to provide a more comprehensive summary of groundwater conditions at the Site, three (3) Van Essen DI801 10 m TD-Diver automated data loggers and one (1) Baro-Diver were installed in wells BH 1, 5, and 101. The automated monitoring of water level fluctuations at these wells using the data loggers is currently ongoing.

## **3.0 SITE CHARACTERIZATION**

### **3.1 TOPOGRAPHY, DRAINAGE & WETLAND FEATURES**

The Site is located within the Upper Grand River watershed and is split between the West Montrose – Grand River Sub watershed and the Irvine Creek Sub watershed. Locally, the groundwater table and any surface water runoff traverses across the Site in a generally north to south orientation, towards the southern portion of the property and towards a wetland, located southeast of the Site.

According to the Grand River Conservation Authority (GRCA), this wetland southeast of the property is GRCA-regulated and is split into two categories: marsh and swamp. Roughly the northern third of the wetland and a small section of the southeastern side of the area are designated as a swamp wetland, while the remainder of the wetland is designated as a marsh. The wetland includes multiple ponds connected by perennial streams. Occasional intermittent streams can be observed travelling along the north-south axis across the wetland, towards the southern streams/ponds. Various trees, frequent



cattails, and other marsh-related vegetation are present throughout most of the wetland. The GRCA mapping for the regulated lands abreast of the wetlands and water courses are shown on Figure 3.

Regionally, the surface topography decreases significantly towards Guelph and Kitchener/Waterloo, and generally increases north, towards The Grand Valley and Arthur. Elevations also decrease westward, towards Listowel, and significantly decrease eastward, towards Brampton. Currently, the topography in the area is formed from the most recent glacial activity (Wisconsin). The area around Fergus is full of kames associated with the Orangeville Moraine (Karrow, 1968). Figure 1 shows the topographic contours across the Site.

Local Site topography is considered 'rolling land', with ground elevations from north to south across the Site ranging from 430± to 425± mASL. There is also generally a slight increase in surface elevation from east to west, across the Site. The current terrain on-Site is relatively even, with no major undulations, or topographical features. In general, runoff will mimic topography flowing to low elevations where watercourses and wetlands are present. As a result, surface runoff from the farm fields is anticipated to be primarily controlled by topography and to drain towards the relatively lower lying south/wetland southeast of the Site.

Most of the Site consists of a farm field with occasional minor residential/grassy areas fronting Highway 6. Occasional medium to large sized trees can be found along the boundaries of the property.

### **3.2 GEOLOGIC SETTING**

Surface geological mapping for the area (by Karrow P.F., 1968) is presented in the Quaternary Geology map of Figure 2. According to Karrow (1968), the Site is primarily underlain by lacustrine, kame deposits, comprising mainly outwash sands, with an underlying Wentworth till unit. Both deposits were laid down during the late Wisconsinan stage of the Pleistocene period. The local topography of the area has been largely influenced by the presence of The Wentworth Till. The entire area is underlain by dolostone bedrock of the Guelph Formation. This is confirmed through the MECP well record data for drinking water wells in the area surrounding the property, as included in Appendix G. According to the records, bedrock was encountered at depths between 24± and 32± m below existing grade (mbeg). Bedrock outcrops can be found in certain areas around Fergus and are notably present towards the southwest within the Elora Gorge.

The monitoring well recorded data and borehole log data (Enclosures 1 to 5 and 9 to 13) collected during the Site investigation are generally consistent with Quaternary geological mapping. Based on the drilled boreholes, the soils encountered generally consist of 180 to 300 mm of topsoil predominantly underlain by a major deposit of fine to medium sand with trace to some silt which extends to between at least 8.10 and 9.60 mbeg. Occasional silt and/or clayey silt seams were observed within the sand deposit. Minor seams/layers of grey silt were encountered near the bottom of Boreholes 4, 5, 101, 104, and 105, which likely indicate the transition zone to the clayey silt till underlying the area. This clayey silt geological unit is presumed to be the Wentworth Till deposit, referred to in Karrow (1968). It should be



noted that the deposit was not directly encountered during borehole investigation at the Site; however, it is expected that it is present, just at deeper depths.

### **3.3 HYDROGEOLOGIC SETTING**

#### **3.3.1 Water Table Depth and Configuration**

The water table exists predominantly within the shallow fine granular deposits (fine to medium sand, silt subsoils) encountered beneath the entire Site. The encountered depth of the groundwater table greatly reduces from north to south across the property. Table 1 summarizes the groundwater level measurements collected thus far during this investigation from the period extending from February 2024 to September 2024 at all of monitoring well locations.

Figure 5 presents an interpretation of the water table configuration and shallow groundwater flow directions across the property using the groundwater elevation measurements gathered on September 18, 2024. As expected, the water table mimics the topography with shallow groundwater flowing southerly towards the south/southeastern portion of the Site in the direction of the nearby wetland.

During the monitoring period, according to the gathered data, groundwater levels were encountered at depths ranging between 4.83 (BH 1) and 2.02 mbeg (BH 5), corresponding to elevations ranging between 425.02 and 423.56 masl according to the July 22, 2024, water levels measurements. It should be noted that these high-water levels documented during the summer season are likely caused by the abnormally high amount of precipitation experienced throughout the first half of 2024. Furthermore, groundwater level monitoring is required to understand the seasonal and yearly variability in groundwater elevations across the Site. Ongoing groundwater monitoring is being conducted on a seasonal basis to provide an evaluation of the seasonal variability of the groundwater table and its fluctuations.

Appendix D includes a summary table of measured groundwater levels (Table 1) and interpreted hydrographs collected during the monitoring period. The hydrographs were plotted against monthly precipitation data sourced from the Government of Canada Environment and Natural Resources Daily Data Reports for the Fergus Shand Dam weather station, the nearest active weather station to the Site.

#### **3.3.2 Groundwater Infiltration and Recharge**

Groundwater infiltration rates are expected to be generally high across the Site due to the predominance of the sand deposit and the relatively deep depth of the water table. Infiltration and recharge areas are also heavily influenced by the topographical features of the land, which in this case promotes shallow groundwater to flow towards the south.

Based on the single well response tests and physical examination of the soil deposits, the correlating estimated infiltration rates for the various surficial soils at the property range as follows:



- Fine to Medium Sand: 75 to 150 mm/hr
- Silty Sand: 15 to 30 mm/hr
- Sandy Silt to Sand and Silt: 10 to 20 mm/hr
- Silt: 3 to 5 mm/hr
- Clayey Silt Till: <1 mm/hr

According to data layers provided from the GRCA-Web GIS application, the property has a recharge rate of 140± to 320± mm/year. Recharge/infiltration should be generally high due to the ubiquitous presence of the fine sand deposit and its overall 'dry' condition, since the water table during the peak groundwater elevation period (February to March 2024) was encountered at depths of between 2± to 5± mbeq.

### **3.4 SOURCE WATER PROTECTION AND GROUNDWATER USE**

The entire Site is located within the Fergus Wellhead Protection Area (WHPA). Fergus currently has six (6) municipal supply wells (wells F1, F2, F4, F5, F6, F7), with the Site located in between three of these wells (F4, F6, F7). According to data provided on the GRCA-Web GIS application, most of the property is classified as WHPA-C, denoting an area in which travel time is between 2 to 5 years, and with a vulnerability score of 6. The entire eastern boundary of the Site falls with WHPA-B for the municipal well, F6, denoting an area in which the groundwater travel time to the well is 2 years or less, and having a vulnerability score of 8. Both sections are considered to have a medium vulnerability. It should also be noted that the Belwood Reservoir, where the lake levels are controlled by the Fergus Shand Dam, is located along the Grand River, upstream of Fergus.

All six (6) of the existing municipal supply wells pump groundwater from the dolostone bedrock aquifers of the Guelph, Gasport, and Goat Island Formations. They are both primarily cased and open in the Guelph Formation dolostone. One of these six wells (F2), which is now inactive, is a well with groundwater under the direct influence of surface water (GUDI). Transmissivity values of the Fergus wells range between 52 to 395 m<sup>2</sup>/day (Matrix Solutions Inc., 2017). The wells were drilled to depths of between 76.5 mbeq (F2) and 138.7 mbeq (F7).

Regarding the water quality at the Site, two (2) groundwater samples were submitted from monitoring wells BH 1 and 5 for analysis of general chemistry, nutrients, and metals. These samples were submitted to the AGAT Laboratories of Mississauga for testing/analysis, with results being provided in Appendix F. No major concerns were identified. Elevated levels of iron were present which exceed the aesthetic drinking water objectives; however, this is naturally occurring within the shallow groundwater of the area. Minor amounts of cadmium, cobalt, copper, vanadium, and zinc were also detected. Slightly elevated amounts of sulphate were also detected in monitoring well BH 5. No chemical threats to groundwater at the Site were detected.



## 4.0 WATER BUDGET ASSESSMENT

### Pre-Development Water Balance

Precipitation ultimately becomes split into three 'water budget' components: evapotranspiration, runoff, and recharge, with the latter two often referred to together as 'the water balance' (i.e., the remainder after evapotranspiration is removed). Groundwater recharge rates will vary at a given site based on the permeability of the surficial deposits but will also depend on topography and type of vegetative cover. Most of the subject property has been historically agricultural and has had different types of crops depending on the year, with no crop planted at all during certain portions of the year.

A pre-development water balance for the property has been estimated using the Water Balance Method (WBM) of Thornthwaite and Mather (1957), a method cited in the MECP document "Stormwater Management Planning and Design Manual" (March 2003) to estimate evapotranspiration. The calculations utilize the 1981-2010 'Climate Normals' from the closest weather station located at the Fergus Shand Dam (gives an annual precipitation rate of 946 mm/yr) and considers a combination of cultivated land use with moderately deep-rooted crops (e.g. wheat), pasture & lawns, and impervious surfaces. Using these conditions, the subject Site has an average evapotranspiration rate of about 56.5% (or 536 mm/yr) and remaining 'water balance' of about 43.5% (410 mm/yr) is estimated. The 2003 MECP document also provides a methodology for estimating the proportions of the water balance that ultimately become runoff vs. recharge, based on applicable infiltration factors for soil, vegetative cover, and topography.

The overall water balance and water budget calculations are included in Appendix E. In summary, the pre-development average annual water budget for the 20.03± ha property is as follows:

A) Pervious Cultivated Land of 18.86 ha

Precipitation	946 mm/yr	178,349 m <sup>3</sup> /yr
Evapotranspiration	536 mm/yr	101,010 m <sup>3</sup> /yr
Water Balance	410 mm/yr	77,339 m <sup>3</sup> /yr
<b>Recharge</b>	<b>287 mm/yr</b>	<b>54,137 m<sup>3</sup>/yr</b>
Runoff	123 mm/yr	23,202 m <sup>3</sup> /yr

B) Pervious Pasture & Lawns of 1.00 ha

Precipitation	946 mm/yr	9,459 m <sup>3</sup> /yr
Evapotranspiration	536 mm/yr	5,357 m <sup>3</sup> /yr
Water Balance	410 mm/yr	4,102 m <sup>3</sup> /yr
<b>Recharge</b>	<b>308 mm/yr</b>	<b>3,076 m<sup>3</sup>/yr</b>
Runoff	103 mm/yr	1,025 m <sup>3</sup> /yr



C) Impervious Rooftops to Pervious Areas of 0.17 ha

Precipitation	946 mm/yr	1,627 m <sup>3</sup> /yr
Evapotranspiration	95 mm/yr	163 m <sup>3</sup> /yr
Water Balance	851 mm/yr	1,464 m <sup>3</sup> /yr
<b>Recharge</b>	<b>213 mm/yr</b>	<b>366 m<sup>3</sup>/yr</b>
Runoff	638 mm/yr	1,098 m <sup>3</sup> /yr

The target recharge quantity for matching in post-development is 57,580 m<sup>3</sup>/yr. Recharge can likely be met through a stormwater management design utilizing enhanced infiltration facilities as Low Impact Development (LID) infrastructure for the developed Site.

## 5.0 SITE SERVICING REQUIREMENTS & IMPACT ASSESSMENT

### 5.1 WASTEWATER SYSTEMS & POTENTIAL IMPACT OF EFFLUENT

The proposed subdivision will be connected to municipal sanitary sewers. No private wastewater treatment system requirements are anticipated for the proposed subdivision.

### 5.2 WATER SUPPLY & POTENTIAL IMPACT OF WATER TAKING

The proposed subdivision will be serviced by municipal water services. No private water supply service requirements are anticipated.

### 5.3 STORMWATER MANAGEMENT & POTENTIAL IMPACT TO GROUNDWATER RECHARGE

The proposed subdivision will be serviced by municipal stormwater management works; however, at the time of the writing of this report, no specific design drawings/plans were available. It is understood there are plans to connect the proposed development at the Site to the 2.41± ha SWM facility that is proposed for a separate subdivision development on the adjacent lot south of the Site. The general shallow groundwater gradient travels towards the proposed location of the SWM facility. As the realization of the project proceeds, addendums addressing stormwater management and any theoretical impacts to groundwater recharge including proposed LID infrastructure at the Site may be provided during the detailed design stage.

It is recommended that water balance and quality of water are maintained throughout the property, and any potential effects associated with erosion and sedimentation control to the topographical/environmental features are properly designed and controlled.

The Stormwater Management Planning and Design Manual (March 2003) provided by the Ministry of Environment may be used as a reference to the planning of the stormwater systems. Additionally, the



Township of Centre Wellington Sewer Use By-Law No. 2022-66 should be consulted.

Further groundwater monitoring is being performed to better understand the water table and its seasonal variations to support development design.

Due to the abundance of 'dry' and highly permeable sands throughout much of the Site, infiltration galleries, open ditches and/or swales, and or soak away pits can be constructed into the sandy soils to maintain pre-development recharge rates. Further recommendations may be provided once a more detailed plan is available.

## **6.0 CONCLUSIONS & RECOMMENDATIONS**

Based on the results of the hydrogeological investigation described in this report, the following conclusions and recommendations are provided:

1. The subject property is predominantly underlain by fine to medium grained sand deposits of the late Wisconsin stage of the Pleistocene period, which likely reduce in thickness from north to south across the property. A clayey silt till deposit, likely the Wentworth Till, is believed to underly the fine granular deposits. During the spring to early summer 2024 period, the groundwater table depths ranged between 5.39 (BH 1) and 1.99 mbeg (BH 5) across the property, corresponding to elevations between 425.02 and 423.56 masl.
2. Topography decreases in elevation from north to south with ground surface elevations approximately ranging from between 430± to 425± mASL. Shallow groundwater generally mimics the topography of the Site and flows towards the southern portion of the property and towards the nearby wetland located southeast of the Site.
3. Due to the predominance of the underlying fine sand deposits with a high infiltration rate (100± mm/hr), and the relatively deeper lying groundwater table of the Site (2± to 5± mbeg, March 2024), infiltration/recharge opportunities throughout the Site should be abundant. Based on the calculated pre-development water balance, the Site has an average evapotranspiration rate of about 56.5% (or 536 mm/yr) and a remaining 'water balance' of about 43.5% (410 mm/yr) is estimated. The target recharge quantity for matching in post-development is 57,580 m<sup>3</sup>/yr.
4. The property falls within the Fergus Wellhead Protection Area (WHPA) and is currently classified as WHPA-C and WHPA-B with an overall medium vulnerability rating between 6 and 8. The property is located between three (3) of the six (6) Fergus municipal supply wells. No chemical threats or concerns were identified within the property bounds.
5. Site servicing (wastewater, water supply, stormwater management) for the development is to be fully municipally supplied. At the time of the writing of this report, no specific design drawings / plans were available. It is also recommended that as design plans are updated and information becomes available, addendums be added to address the specific site servicing issues.



6. Seasonal groundwater monitoring is incomplete and is ongoing at the Site to better characterize the hydrogeological setting and groundwater/surface water interactions.
7. It is recommended that once finished floor elevations and a site grading plan are available, that CVD be retained to review the final design and provide updates to the recommendations and conclusions provided in this report. Based on the final design, additional boreholes/monitoring wells might be required to delineate the extent of the water table and provide additional information.

## 7.0 CLOSING

This hydrogeological investigation report has been prepared for the exclusive use of the Client and their assigns for specific application to this project property.

The assessment was conducted in accordance with the verbal and written requests from the Client, and generally accepted assessment practices. Performance of this assessment is intended to reduce, but not eliminate, uncertainty regarding the hydrogeological conditions encountered at the project site, given reasonable limits of time and cost. No other warranty, expressed or implied, is made.

We trust this report is sufficient for your immediate requirements. If you have any questions, please do not hesitate to contact the undersigned.

Respectfully submitted,  
**CHUNG & VANDER DOELEN ENGINEERING LTD.**



Yaroslav Chudin, EIT  
Geotechnical Engineering Intern



Gavin R. O'Brien M.Sc., P.Geo.  
Senior Hydrogeologist



Peter Dao, M.Sc., P.Geo.  
Manager, Environmental & Hydrogeology



## 8.0 REFERENCES

The following documents, maps, or other publications have been used in the preparation of this report.

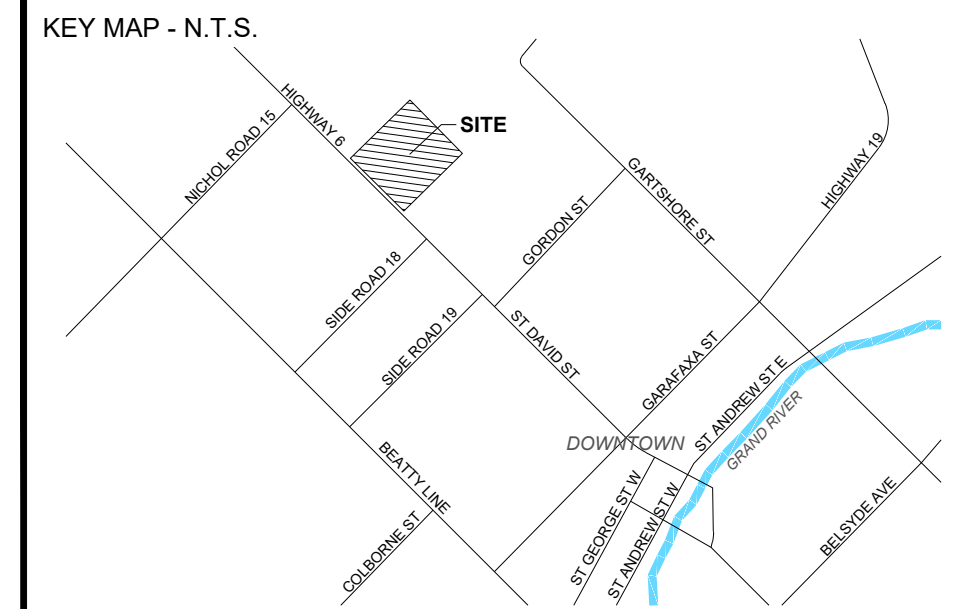
- “Centre Wellington Scoped Tier Three Water Budget Assessment”, Matrix Solutions Inc. (December 2017).
- “Draft Plan of Subdivision”, Polocorp (December 10, 2024).
- “Historical Data; Fergus Shand Dam Weather Station; 2024 Daily Data Reports” Government of Canada Environment and Natural Resources; Retrieved October 1, 202
- “Preliminary Geotechnical Investigation: Proposed Residential Subdivision”, Project No.: 1495, CVD Engineering Ltd. (May 28, 2024)
- “Hydrogeological Assessment, 350 Wellington Road 7, Elora, Ontario”, Grounded Engineering (October 2022)
- “Hydrogeological Investigation, 8243 and 8282 Wellington Road 19, Ontario”, Golder (February 2022)
- “Hydrogeological Investigation - Updated, 8243 and 8282 Wellington Road 19, Ontario”, WSP Canada Inc. (April 2023)
- “Map Your Property Tool”, Grand River Conservation Authority; ESRI; ArcGIS (2024)
- “Pleistocene Geology of the Guelph Area, Southern Ontario; Geological Report 61”, Map 22153, scale 1:63,360, Karrow, P. F. (1968).
- Toporama Topographical Map, Ministry of Natural Resources (Retrieved June 11, 2024)



## **APPENDIX A**

### **Conceptual Subdivision Plan (Polocorp, December 10, 2024)**

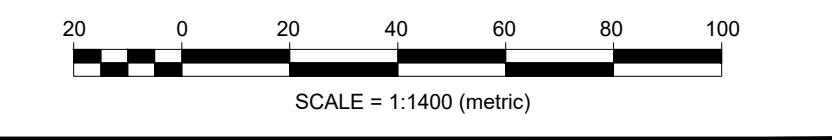




# DRAFT PLAN OF SUBDIVISION

PT OF LOT 18, CONCESSION 16  
IN THE FORMER GEOGRAPHIC TWP OF NICHOL  
CENTRE WELLINGTON

POLOCORP INC.



**LAND USE SCHEDULE**

DESCRIPTION	LOTS/BKLS.	UNITS	AREA (ha.)
Single Detached	31-43	87-129	4.863
Street Townhouses	44-61	179-266	5.512
Medium Density	62, 63	93-125	2.065
Mixed Use	64	8-14	0.338
Existing House	85	0-1	0.172
Stormwater Management Facility	-	-	-
Trail	-	-	-
Parkland	66	-	0.892 (4.6%)
Pedestrian Walkway	67-69	-	0.115
Environmental Feature & Buffer	-	-	-
MTO Allowance	70, 71	-	0.534
Roads	-	-	5.279
<b>TOTAL</b>		<b>367-535</b>	<b>20.027</b>

**SALEABLE FRONTAGE**

DESCRIPTION	LENGTH	UNIT SMALL	UNIT LARGE
Single Detached	1,496.3m	36' (11.0m)	50' (15.2m)
Street Townhouses	1,773.2m	18' (5.5m)	27' (8.3m)
<b>TOTAL</b>	<b>3,239.5m</b>		

**DENSITY**

Gross Area (ha)	20.027 ha (49.49 ac)
Developable Area (ha)	19.457 ha (48.08 ac)
Net Density (uph)	18.9 - 27.5 upha
Net People-Jobs (3.05 per unit)	57.7 - 83.9 P/J ph

**INFORMATION REQUIRED**  
UNDER SECTION 51 (17) OF THE PLANNING ACT, R.S.O. 1990, c.P.13 AS AMENDED  
INFORMATION REQUIRED BY CLAUSES a,b,c,d,f,g,j AND I ARE AS SHOWN ON THE DRAFT PLAN.  
(i) Municipal Water Supply  
(h) Sandy Loam  
(k) Municipal Sanitary and Storm Sewers

**SURVEYOR'S CERTIFICATE**  
I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

O.L.S. Surveying Inc. DATE: XX XX, 2024

**OWNER'S CERTIFICATE**  
I HEREBY CONSENT TO THE FILING OF THIS PLAN BY POLOCORP INC., IN DRAFT FORM  
MIKE PUOPOLO Polocorp Inc. DATE:

**APPROVALS**  
REGIONAL MUNICIPALITY OF WATERLOO APPROVAL BLOCK

# DRAFT FOR DISCUSSION PURPOSES ONLY

APPROVED: DATE:

DATE	BY	REVISIONS DESCRIPTION

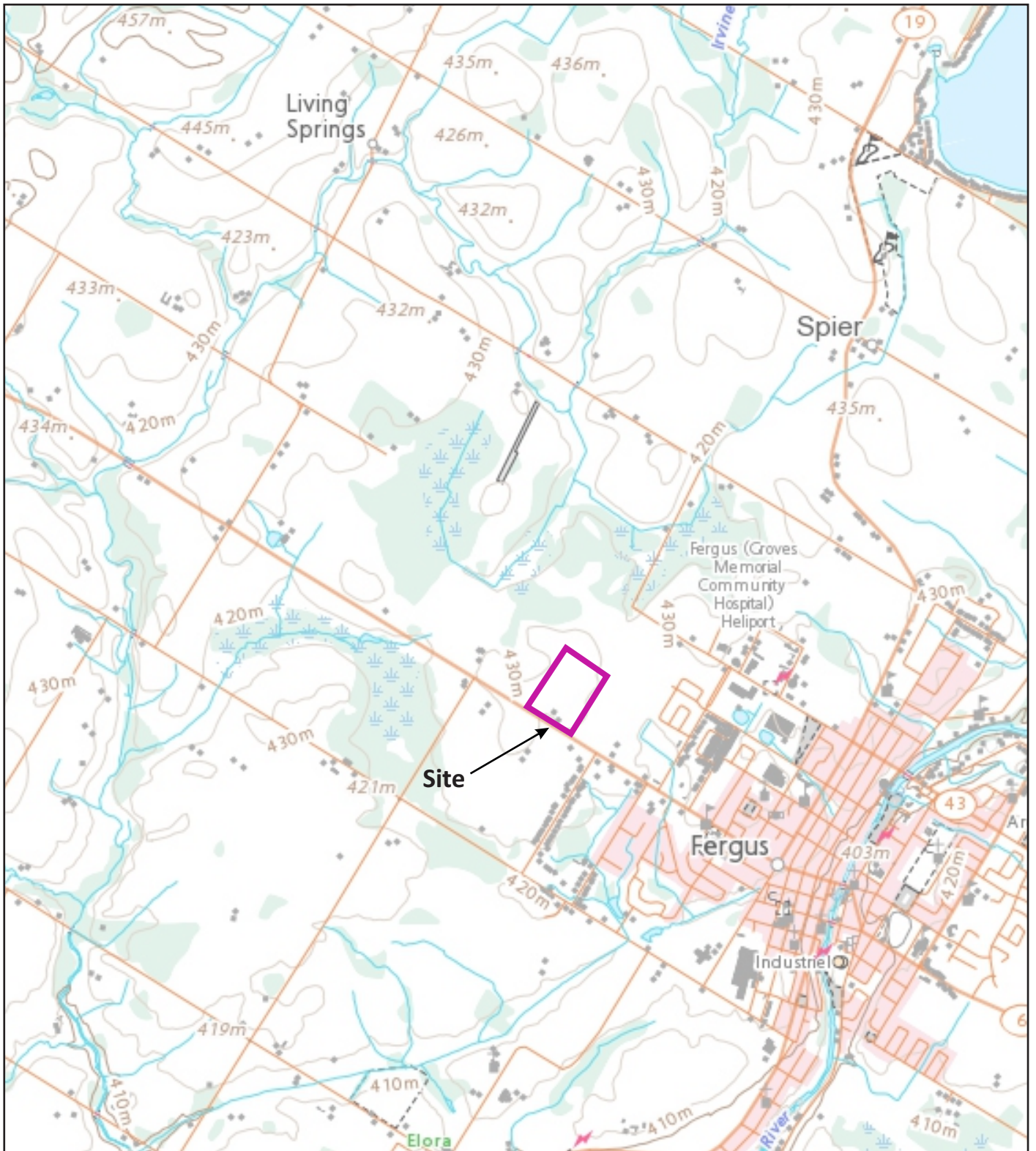
**POLOCORP**  
379 Queen Street South, Kitchener | N2T 1W6 | 519-745-3249 | polocorpinc.com

DATE: December 10, 2024 SCALE: 1:4000 (metric)  
PROJECT: 1012 (Fergus) DRAWN BY: GFE

## **APPENDIX B**

**Figures 1 to 5**





**LEGEND**



Subject Development Property



0 m 500 1000



Scale 1:40,000

Map Ref.: Toporama; Natural Resources Canada; GeoGratis; Retrieved June 6, 2024

**Figure 1 - Site Location**

Hydrogeological Assessment

6581 Highway 6  
Fergus, ON

Drawn By: YC

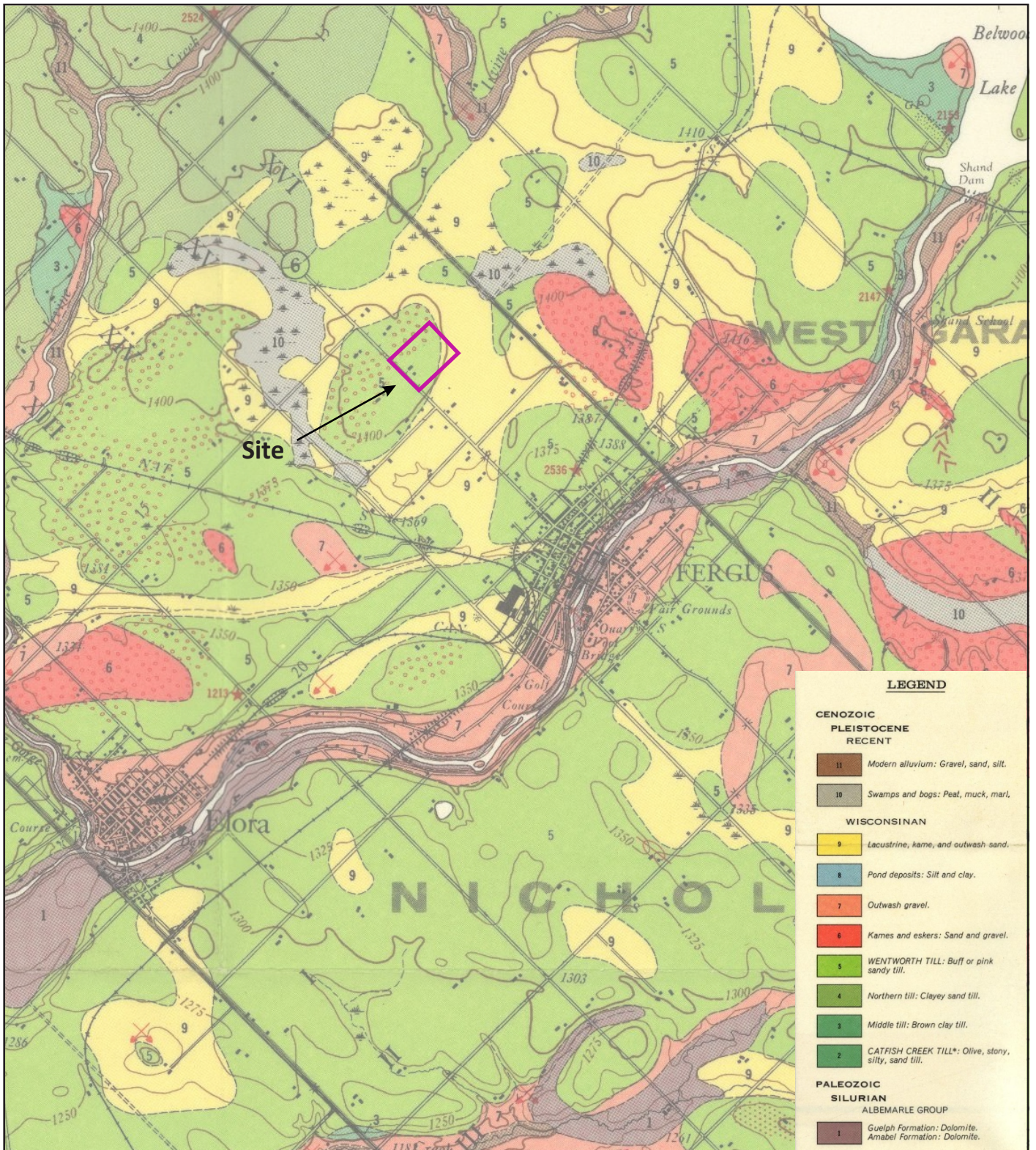
Date: Feb. 24/25

File No. 1495



**CHUNG & VANDER DOELEN**  
ENGINEERING LTD.

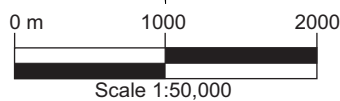
311 VICTORIA STREET NORTH  
KITCHENER / ONTARIO / N2H 2E1 / 519-742-8979



**LEGEND**



Subject Development Property



Map Ref.: Karrow, P.F.; Pleistocene Geology of the Guelph Area, Southern Ontario (Map 2153); 1968.

**Figure 2 - Quaternary Geology**

Hydrogeological Assessment

6581 Highway 6  
Fergus, ON

Drawn By: YC

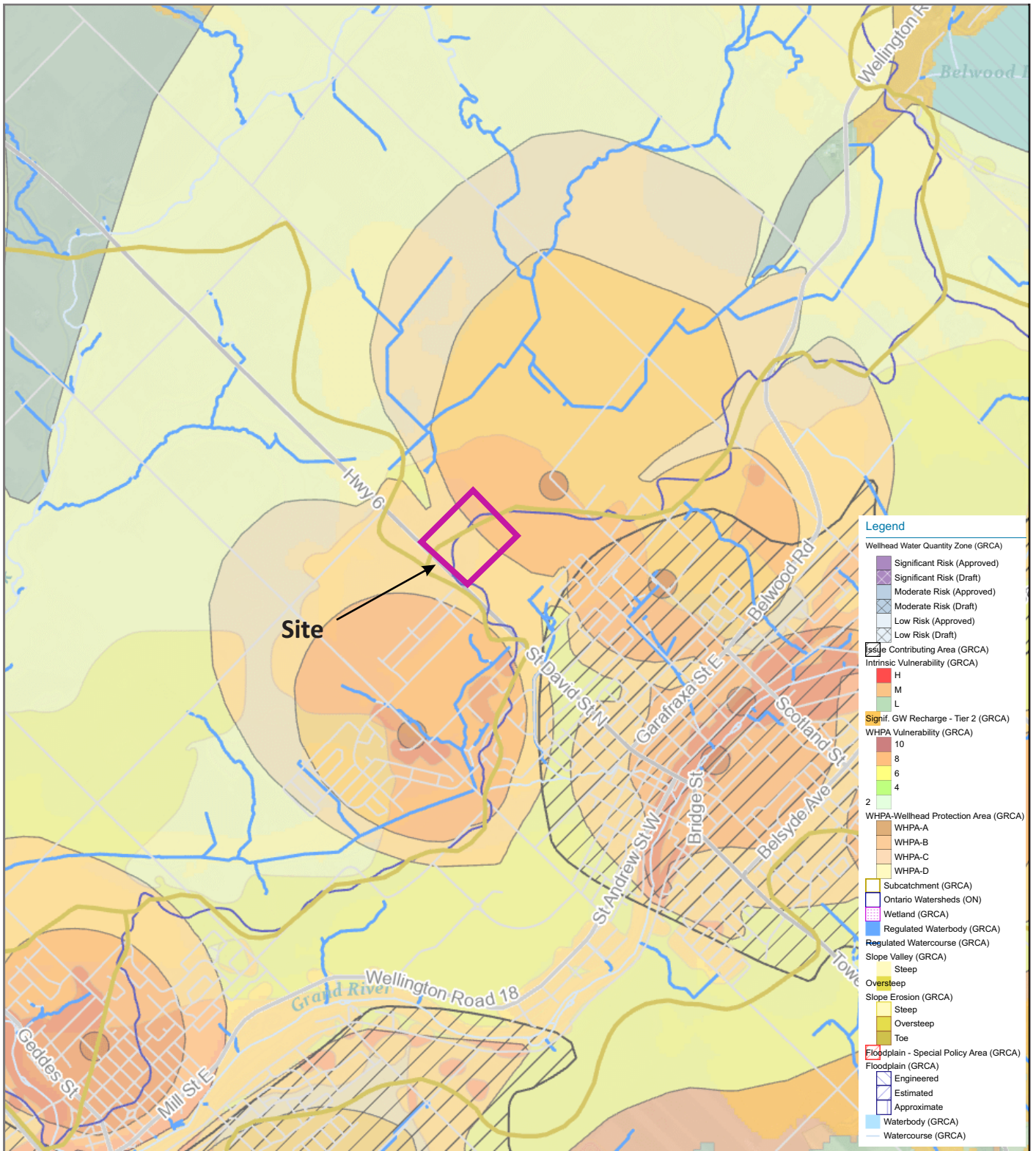
Date: Feb. 24/25

File No. 1495



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KITCHENER / ONTARIO / N2H 2E1 / 519-742-8979




**Legend**

- Wellhead Water Quantity Zone (GRCA)
  - Significant Risk (Approved)
  - Significant Risk (Draft)
  - Moderate Risk (Approved)
  - Moderate Risk (Draft)
  - Low Risk (Approved)
  - Low Risk (Draft)
- Constituting Area (GRCA)
- Intrinsic Vulnerability (GRCA)
  - H
  - M
  - L
- Signif. GW Recharge - Tier 2 (GRCA)
- WHPA Vulnerability (GRCA)
  - 10
  - 8
  - 6
  - 4
  - 2
- WHPA-Wellhead Protection Area (GRCA)
  - WHPA-A
  - WHPA-B
  - WHPA-C
  - WHPA-D
- Subcatchment (GRCA)
- Ontario Watersheds (ON)
- Wetland (GRCA)
- Regulated Waterbody (GRCA)
- Regulated Watercourse (GRCA)
- Slope Valley (GRCA)
  - Steep
  - Oversteep
- Slope Erosion (GRCA)
  - Steep
  - Oversteep
  - Toe
- Floodplain - Special Policy Area (GRCA)
  - Engineered
  - Estimated
  - Approximate
- Waterbody (GRCA)
- Watercourse (GRCA)

**LEGEND**

 Subject Development Property



0 m      500      1000  
  
 Scale 1:40,000

Map Ref.: Grand River Conservation Authority; GRCA Web-GIS; Retrieved September 30, 2024

**Figure 3 - Watershed Mapping**

Hydrogeological Assessment

6581 Highway 6  
 Fergus, ON

Drawn By: YC

Date: February 24/25

File No. 1495






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 KITCHENER / ONTARIO / N2H 2E1 / 519-742-8979



**LEGEND**

-  Property Boundary
-  CVD Monitoring Well Location
- (422.93, 423.89) Ground Surface, Top of Well Pipe Elevation (m)




  
Scale 1:4000

Image Reference: Google Earth; Retrieved: May 1, 2024

**Figure 4:**  
**Monitoring Well and Piezometer Locations**

Hydrogeological Assessment  
 Proposed Residential Subdivision

6581 Highway 6  
 Fergus, ON



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 KITCHENER / ONTARIO / N2H 2E1 / 519-742-8979

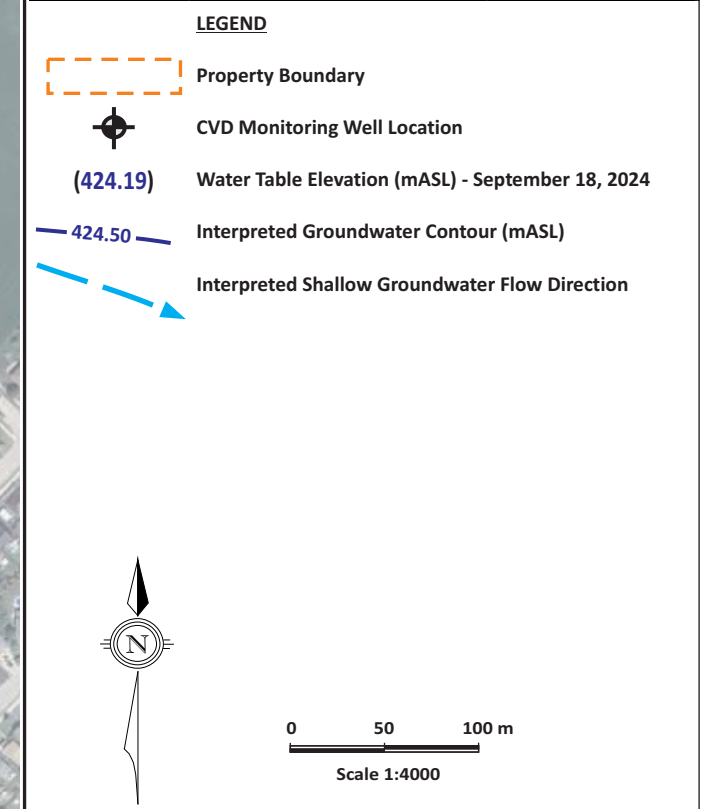
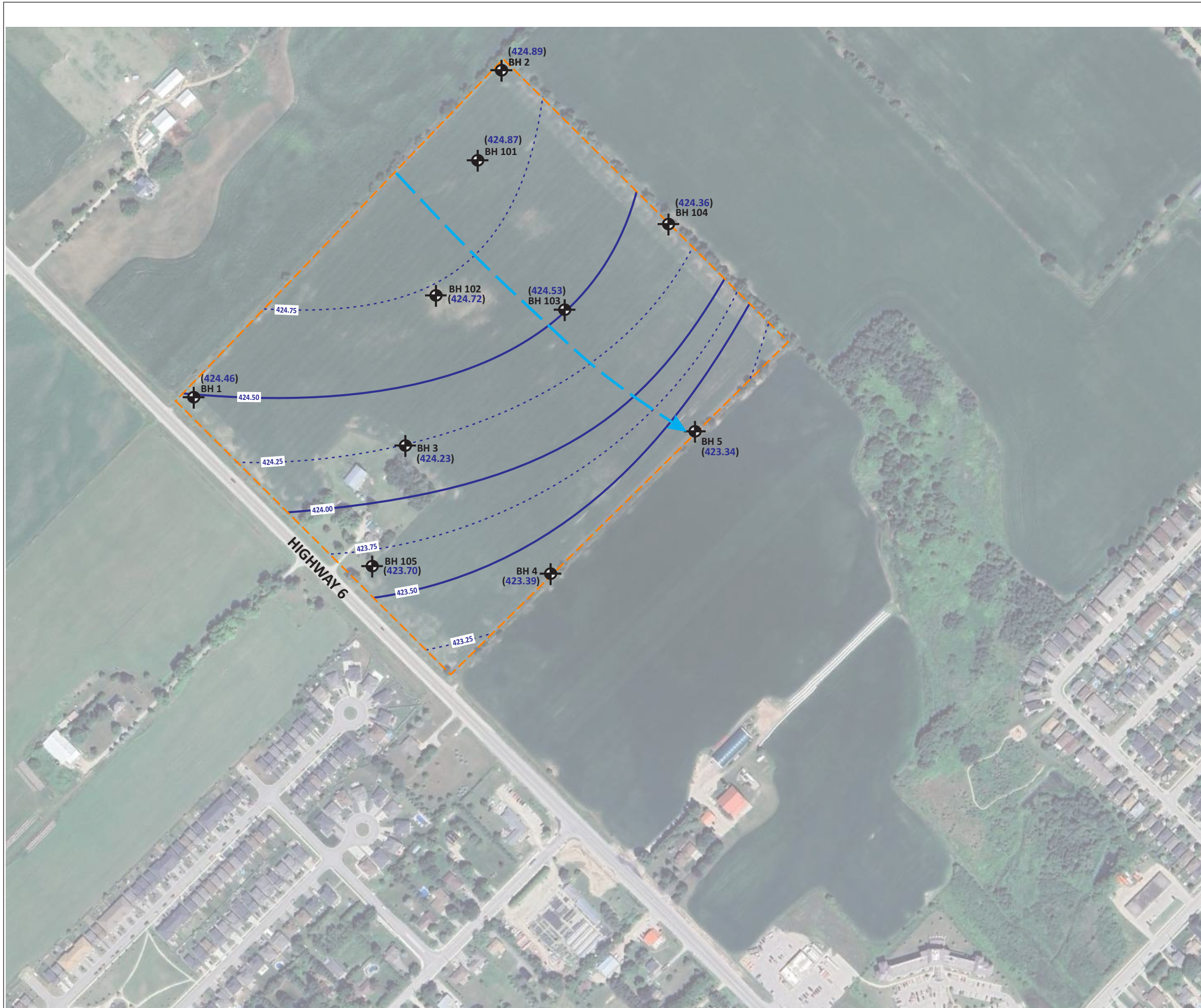


Image Reference: Google Earth; Retrieved: May 1, 2024

**Figure 5:**  
**Water Table Interpretation (September 18, 2024)**

Hydrogeological Assessment  
 Proposed Residential Subdivision

6581 Highway 6  
 Fergus, ON

**CHUNG & VANDER DOELEN**  
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311 VICTORIA STREET NORTH  
 KITCHENER / ONTARIO / N2H 2E1 / 519-742-8979

## **APPENDIX C**

### **Well Response Test Analysis Charts**





**CHUNG & VANDER DOELEN**  
ENGINEERING LTD.

311 Victoria Street North  
Kitchener / Ontario / N2H 5E1  
519-742-8979

**Response Test - Water Level Data and Analysis**

Project: Polocorp Fergus Subdivision

Number: 1495

Client: Polocorp Inc.

Location: 968 St. David Street North & 6581 Highway 6, Fergus, ON | Response Test: BH 1

Test Conducted by: Y.C.

Test Date: 2024-03-11

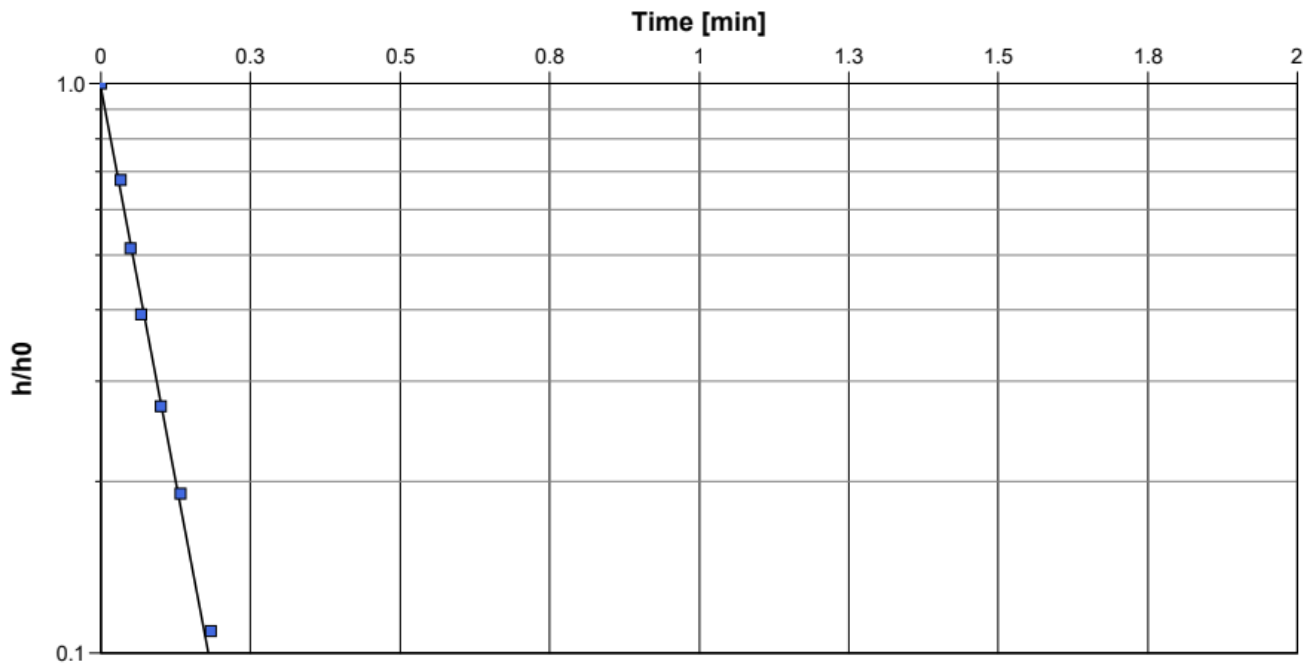
Aquifer Thickness: 2.90 m

Water level at t=0 [m]: 5.46

Static Water Level [m]: 5.22

Water level change at t=0 [m]: 0.25

	Time [min]	Water Level [m]	WL Change [m]
1	0	5.462	0.247
2	0.0333	5.382	0.167
3	0.05	5.342	0.127
4	0.0667	5.312	0.097
5	0.1	5.282	0.067
6	0.1333	5.262	0.047
7	0.1833	5.242	0.027
8	0.2333	5.232	0.017
9	0.45	5.225	0.01
10	0.6	5.222	0.007
11	0.9833	5.22	0.005
12	1.2667	5.217	0.002



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]
BH 1	$1.06 \times 10^{-4}$



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ENGINEERING LTD.

311 Victoria Street North  
Kitchener / Ontario / N2H 5E1  
519-742-8979

**Response Test - Water Level Data and Analysis**

Project: Polocorp Fergus Subdivision

Number: 1495

Client: Polocorp Inc.

Location: 968 St. David Street North & 6581 Highway 6, Fergus, ON | Response Test: BH 5

Test Conducted by: Y.C.

Test Date: 2024-03-11

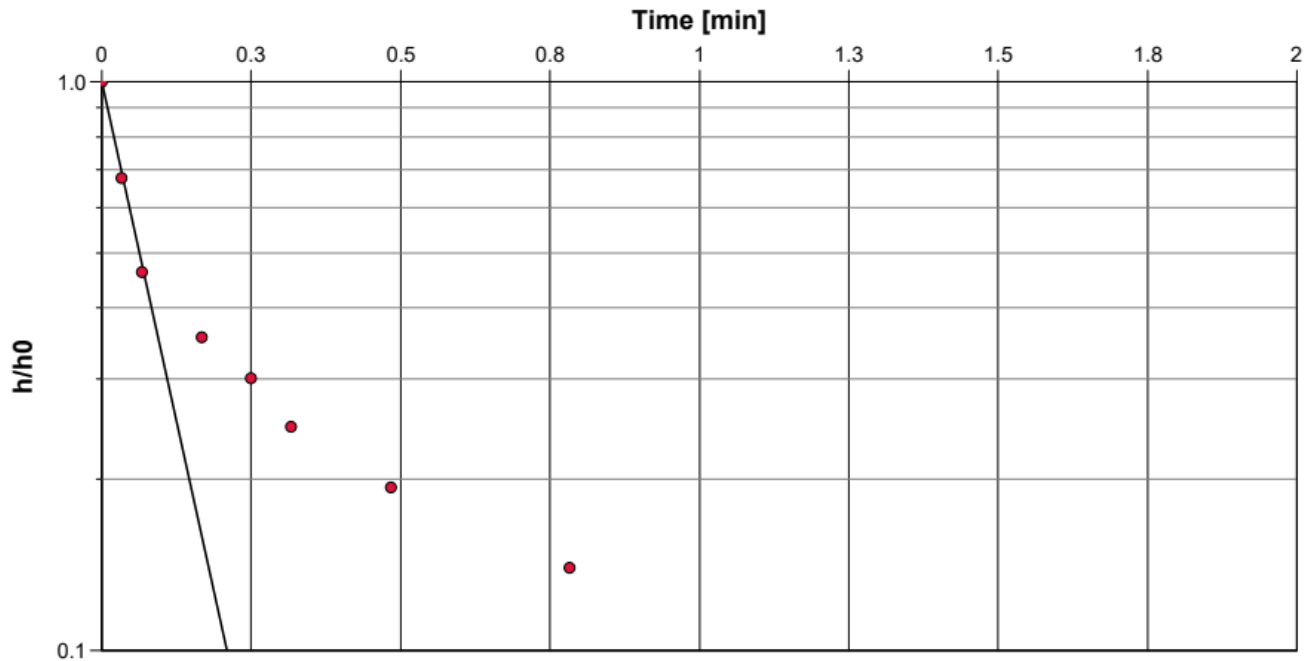
Aquifer Thickness: 6.20 m

Water level at t=0 [m]: 2.09

Static Water Level [m]: 1.99

Water level change at t=0 [m]: 0.09

	Time [min]	Water Level [m]	WL Change [m]
1	0	2.087	0.093
2	0.0333	2.057	0.063
3	0.0667	2.037	0.043
4	0.1667	2.027	0.033
5	0.25	2.022	0.028
6	0.3167	2.017	0.023
7	0.4833	2.012	0.018
8	0.7833	2.007	0.013
9	1.1167	2.002	0.008
10	1.55	2.00	0.006



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]
BH 5	$8.69 \times 10^{-5}$

## **APPENDIX D**

### **Table 1 – Water Level Measurements & Hydrograph (February 2024 to September 2024)**

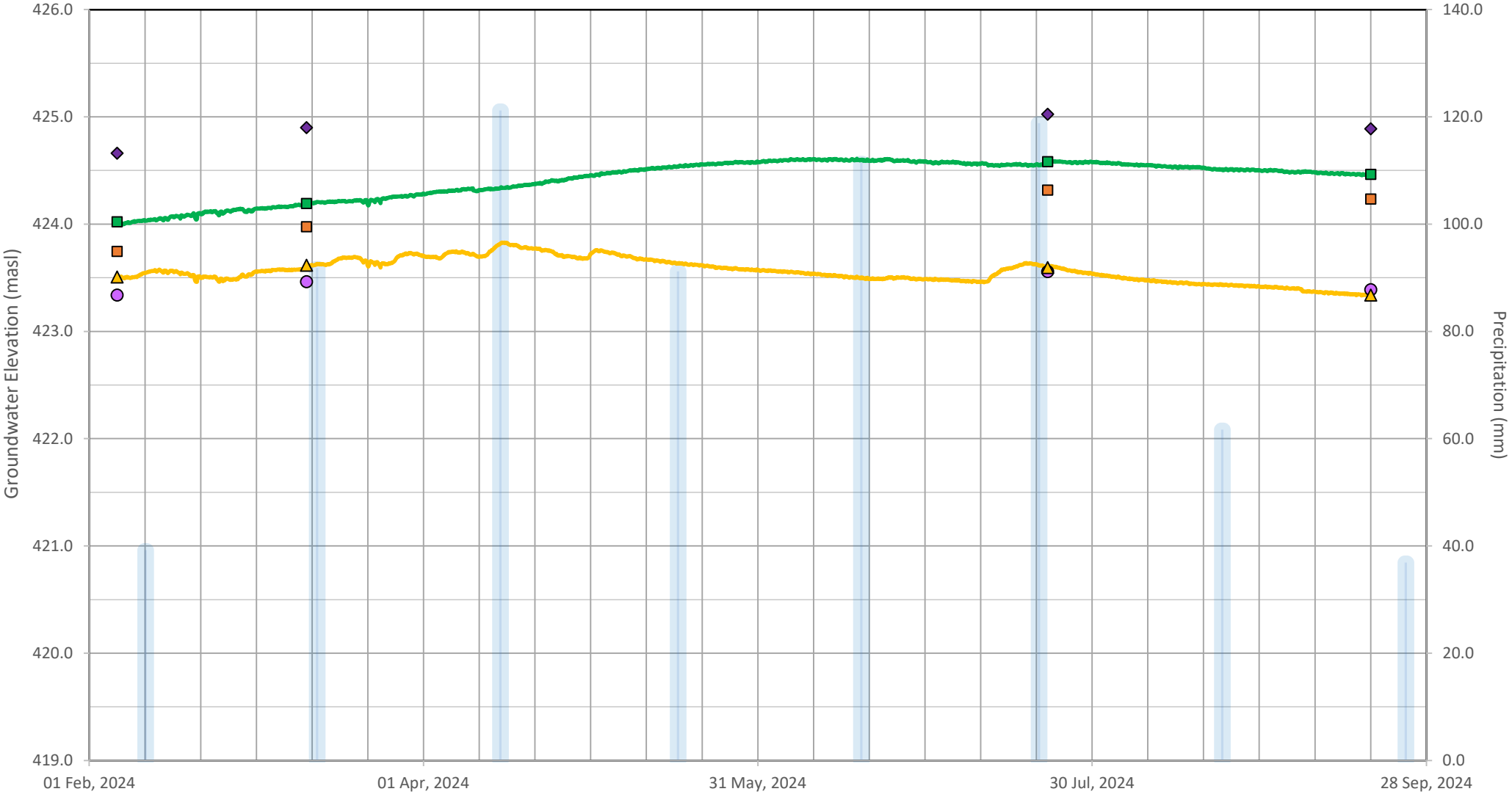


Table 1 - Summary of Water Levels, Elevations & Fluctuations

Well	Ground Elevation (mASL)	Top Pipe Elevation (mASL)	Pipe Length (m)	Hydraulic Conductivity (m/s)	Water Level (m Below Ground)								Water Elevation (m Above Sea Level)								Fluctuation Relative to February 6, 2024 (m)			
					10-Nov-23	12-Dec-23	06-Feb-24	11-Mar-24	22-Jul-24	12-Sep-24	18-Sep-24	10-Nov-23	12-Dec-23	06-Feb-24	11-Mar-24	22-Jul-24	12-Sep-24	18-Sep-24	11-Mar-24	22-Jul-24	12-Sep-24	18-Sep-24		
BH 1	429.41	430.55	1.14	$1 \times 10^{-4}$			5.39	5.22	4.83		4.94			424.02	424.19	<b>424.58</b>		424.46	0.17	0.56		0.44		
BH 2	429.10	430.28	1.18	-			4.44	4.20	4.08		4.21			424.66	424.90	<b>425.02</b>		424.89	0.24	0.36		0.23		
BH 3	428.87	429.89	1.02	-			5.12	4.89	4.55		4.64			423.75	423.98	<b>424.32</b>		424.23	0.23	0.57		0.49		
BH 4	426.94	428.13	1.18	-			3.61	3.48	3.39		3.56			423.34	423.46	<b>423.56</b>		423.39	0.13	0.22		0.05		
BH 5	425.61	426.87	1.26	$9 \times 10^{-5}$			2.10	1.99	2.02		2.27			423.51	<b>423.62</b>	423.59		423.34	0.11	0.09		-0.17		
BH 101	428.68	429.79	1.10	-							3.80	3.82						<b>424.88</b>	424.87					
BH 102	429.37	430.36	0.99	-							4.64	4.65						<b>424.73</b>	424.72					
BH 103	428.31	429.27	0.96	-							3.76	3.77						<b>424.55</b>	424.53					
BH 104	427.36	428.60	1.25	-							2.97	3.00						<b>424.39</b>	424.36					
BH 105	428.15	429.20	1.05	-							4.44	4.45						<b>423.71</b>	423.70					

- Notes:
- 1) All Elevations Referenced to Geodetic Survey by CVD.
  - 2) **Bolded** elevations represent the maximum water table aquifer elevation measured at each monitoring well throughout all seasons.
  - 3) Negative water level indicates that water level is above ground.
  - 4)   : Monitoring well/piezometer dry
  - 5) Negative fluctuation indicates drop in water level relative to baseline.

1495 Hydrograph - 6581 Highway 6, Fergus (February 2024 to September 2024)



Precipitation BH 1 BH 2 BH 3 BH 4 BH 5 BH 1 (Logger) BH 5 (Logger)

## **APPENDIX E**

### **Water Balance Calculation**



**Pre-Development Water Budget Calculations - 6581 Highway 6, Fergus**  
**Pervious Areas (Cultivated Land and Grassed Pasture, with Trees and Shubs)**

Feb-25

<b>Determination of Evapotranspiration and Water Balance Components - by Water Balance Method (Thornthwaite &amp; Mather, 1957)</b>															
Precipitation: Fergus Shand Dam (1981-2010), Vegetation: Moderately-Deep Crops, Mature Grasses with Trees/Shubs, Soil: Fine Sand and Clay															
	Units	Annual	% Total	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Temperature	deg C	<b>6.68</b>		-7.4	-6.3	-1.9	5.7	12.2	17.5	20.0	19.0	14.9	8.3	2.1	-3.9
Heat Index (i)	-	<b>35.09</b>		0.00	0.00	0.00	1.22	3.86	6.66	8.16	7.55	5.22	2.15	0.27	0.00
Unadjusted PET (UPET)	mm/day	<b>1.038</b>		0.00	0.00	0.00	0.87	1.91	2.78	3.20	3.03	2.35	1.28	0.31	0.00
latitude correction (r)	-			24.3	24.5	30.6	33.6	37.9	38.5	38.8	36	31.2	28.5	24.2	23
Potential Evapotranspiration (PET)	mm	<b>559.3</b>		0.0	0.0	0.0	29.2	72.5	107.1	124.0	109.1	73.5	36.5	7.4	0.0
Precipitation (P)	mm	<b>945.9</b>	<b>100.0</b>	67.9	55.9	59.6	74.1	86.9	83.8	89.2	96.6	93.1	77.2	93	68.6
P - PET	mm			67.9	55.9	59.6	44.9	14.4	-23.3	-34.8	-12.5	19.6	40.7	85.6	68.6
Accum. Water Loss	mm							0.0	-23.3	-58.1	-70.6				
Soil Moisture Retention (Storage - ST)	mm			75.0	75.0	75.0	75.0	75.0	54.0	34.0	28.0	47.6	75.0	75.0	75.0
Storage Change (ΔST)	mm			75.0	0.0	0.0	0.0	0.0	-21.0	-20.0	-6.0	19.6	27.4	0.0	0.0
<b>Actual Evapotranspiration (AE)</b>	mm	<b>535.7</b>	<b>56.6</b>	0.0	0.0	0.0	29.2	72.5	104.8	109.2	102.6	73.5	36.5	7.4	0.0
<b>Water Balance as Surplus/Deficit</b>	mm	<b>410.2</b>	<b>43.4</b>	67.9	55.9	59.6	44.9	14.4	-21.0	-20.0	-6.0	19.6	40.7	85.6	68.6
<b>Determination of Water Balance as 'Combined-Runoff' (Recharge + Direct Runoff) - (using WBM Assumptions)</b>															
Soil Moisture Surplus (SMS)	mm	<b>158.2</b>		0.0	0.0	0.0	44.9	14.4	0.0	0.0	0.0	13.3	85.6	0.0	0.0
Water Balance from SMS (Assumption 1)	mm	<b>144.8</b>		10.8	5.4	2.7	23.8	19.1	9.6	4.8	2.4	1.2	0.6	43.1	21.5
				0.03	0.01	0.00	0.00	7.20	3.60	1.80	0.90	0.45	0.22	0.11	0.06
				0.04	0.02	0.01	22.47	11.23	5.62	2.81	1.40	0.70	0.35	0.18	0.09
				10.69	5.35	2.67	1.34	0.67	0.33	0.17	0.08	0.04	0.02	42.78	21.39
Accumulated Snow (Assumption 2)	mm	<b>252.0</b>		0.0	0.0	0.0	252.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water Balance from Snow (Assumption 3)	mm	<b>252.0</b>		0.5	0.3	0.1	25.2	113.4	56.7	28.4	14.2	7.1	3.5	1.8	0.9
<b>Water Balance as 'Combined-Runoff'</b>	mm	<b>396.8</b>	<b>42.0</b>	11.3	5.7	2.8	49.0	132.5	66.3	33.1	16.6	8.3	4.1	44.8	22.4

Assumptions for Monthly 'Combined-Runoff' Estimations (from WBM):

- 1 - Combined 'Runoff' from the Soil Moisture Surplus is assumed to be 50% in the first month and then 50% of the remaining soil surplus each following month.
- 2 - All Snow is Accumulated and Stored throughout Winter Sub-Zero Months (i.e. No melt until first above-zero month)
- 3 - Combined 'Runoff' from Snowmelt is assumed to be 10% of the Accumulated Snow in the first month and then 50% of the remaining snowmelt in each following month.

<b>Determination of Recharge + Direct Runoff Components - using MOE Infiltration Factor Method (MOE 1995, 2003)</b>															
Catchment Area (m <sup>2</sup> )	MOE Infiltration Factors (0 to 1.00)						Annual Rates				Annual Rates				
	Topography	Soil	Cover	Sum	EvapoT	Balance	Recharge	Runoff	EvapoT	Balance	Recharge	Runoff			
					(mm)	(mm)	(mm)	(mm)	(m <sup>3</sup> /yr)	(m <sup>3</sup> /yr)	(m <sup>3</sup> /yr)	(m <sup>3</sup> /yr)			
Pervious, Cultivated Land 188,550 m <sup>2</sup>	Rolling	0.2	Sand	0.4	Cultivated	0.1	0.7	535.7	410.2	287.1	123.1	101,010	77,339	54,137	23,202
								56.6%	43.4%	30.4%	13.0%	56.6%	43.4%	30.4%	13.0%
Pervious, Pasture & Lawns 10,000 m <sup>2</sup>	Rolling	0.2	Sand	0.4	Pasture & Lawns	0.15	0.75	535.7	410.2	307.6	102.5	5,357	4,102	3,076	1,025
								56.6%	43.4%	32.5%	10.8%	56.6%	43.4%	32.5%	10.8%
Pervious, Woodland/Wetland 0 m <sup>2</sup>	Rolling	0.2	Sand	0.4	Woodland & Wetland	0.2	0.8	535.7	410.2	328.1	82.0	0	0	0	0
								56.6%	43.4%	34.7%	8.7%	0.0%	0.0%	0.0%	0.0%
Impervious Rooftops to Pervious Areas 1,720 m <sup>2</sup>							0.25	94.6	851.3	212.8	638.5	163	1,464	366	1,098
								10.0%	90.0%	22.5%	67.5%	10.0%	90.0%	22.5%	67.5%
Total Site 200,270 m <sup>2</sup>												106,530	82,905	57,580	25,325
												56.2%	43.8%	30.4%	13.4%

Assumptions for Evapotranspiration/Recharge/Runoff Proportioning

- 1 - Pervious Areas - by MOE Infiltration Factor Method (MOE 1995, 2003)
- 2 - Impervious Areas Shed to Pervious Areas - Assume 10% Lost to Evapotranspiration and Balance Split 25/75% to Recharge/Runoff

## **APPENDIX F**

### **Water Chemistry Results (AGAT Laboratories of Mississauga, Ontario)**



**CLIENT NAME: CHUNG AND VANDER DOELEN**  
**311 VICTORIA STREET NORTH**  
**KITCHENER, ON N2H5E1**  
**(519) 742-8979**

**ATTENTION TO: Yaroslav Chudin**

**PROJECT: 1495**

**AGAT WORK ORDER: 24T129206**

**WATER ANALYSIS REVIEWED BY: Yris Verastegui, Inorganic Team Lead**

**DATE REPORTED: Mar 22, 2024**

**PAGES (INCLUDING COVER): 10**

**VERSION\*: 1**

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

\*Notes

**Disclaimer:**

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
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- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.
- For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.



## Certificate of Analysis

AGAT WORK ORDER: 24T129206

PROJECT: 1495

5835 COOPERS AVENUE  
MISSISSAUGA, ONTARIO  
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<http://www.agatlabs.com>

CLIENT NAME: CHUNG AND VANDER DOELEN  
SAMPLING SITE: 968 ST. DAVID ST. N. FERGUS

ATTENTION TO: Yaroslav Chudin  
SAMPLED BY: Y.C.

### Water Quality Assessment - PWQO (mg/L)

DATE RECEIVED: 2024-03-13

DATE REPORTED: 2024-03-22

Parameter	Unit	SAMPLE DESCRIPTION:		BH1	BH5	BH6	BH7	
		G / S	RDL	Water	Water	Water	Water	
				2024-03-11 11:30	2024-03-11 11:30	2024-03-11 11:30	2024-03-11 11:30	
				5722603	5722663	5722665	RDL	5722666
Electrical Conductivity	µS/cm		2	480	497	596	2	1620
pH	pH Units	6.5-8.5	NA	7.43	7.64	7.62	NA	7.41
Saturation pH (Calculated)				6.53	6.62	6.72		6.36
Langelier Index (Calculated)				0.896	1.02	0.896		1.05
Hardness (as CaCO3) (Calculated)	mg/L		0.5	679	688	664	0.5	1260
Total Dissolved Solids	mg/L		10	224	338	412	10	706
Alkalinity (as CaCO3)	mg/L		5	291	255	206	5	271
Bicarbonate (as CaCO3)	mg/L		5	291	255	206	5	271
Carbonate (as CaCO3)	mg/L		5	<5	<5	<5	5	<5
Hydroxide (as CaCO3)	mg/L		5	<5	<5	<5	5	<5
Fluoride	mg/L		0.05	<0.05	<0.05	<0.05	0.05	<0.05
Chloride	mg/L		0.10	9.18	2.04	27.3	0.12	269
Nitrate as N	mg/L		0.05	1.48	12.8	24.9	0.05	<0.05
Nitrite as N	mg/L		0.05	<0.05	<0.05	<0.05	0.05	<0.05
Bromide	mg/L		0.05	<0.05	<0.05	<0.05	0.05	<0.05
Sulphate	mg/L		0.10	1.62	30.1	6.71	0.10	31.5
Ortho Phosphate as P	mg/L		0.10	<0.10	<0.10	<0.10	0.10	<0.10
Ammonia as N	mg/L		0.02	0.05	0.06	<0.02	0.02	0.03
Ammonia-Un-ionized (Calculated)	mg/L	0.02	0.000002	0.000774	0.00151	<0.000002	0.000002	0.000453
Total Phosphorus	mg/L	*	0.02	0.73	0.74	1.22	0.06	2.03
Total Organic Carbon	mg/L		0.5	7.6	9.2	8.4	0.5	14.4
True Colour	TCU		2.50	<2.50	<2.50	<2.50	2.50	4.55
Turbidity	NTU		0.5	92.5	192	60.3	0.5	97.6
Total Calcium	mg/L		0.20	204	209	192	0.20	394
Total Magnesium	mg/L		0.10	41.1	40.4	44.9	0.10	65.9
Total Potassium	mg/L		0.50	3.04	3.57	3.32	0.50	6.64
Total Sodium	mg/L		0.10	3.94	4.32	3.03	0.10	98.5
Aluminum-dissolved	mg/L	*	0.004	0.004	0.008	<0.004	0.004	<0.004
Total Antimony	mg/L	0.020	0.003	<0.003	<0.003	<0.003	0.003	<0.003

Certified By:

*Yris Veraestegui*



## Certificate of Analysis

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CLIENT NAME: CHUNG AND VANDER DOELEN  
SAMPLING SITE: 968 ST. DAVID ST. N. FERGUS

ATTENTION TO: Yaroslav Chudin  
SAMPLED BY: Y.C.

### Water Quality Assessment - PWQO (mg/L)

DATE RECEIVED: 2024-03-13

DATE REPORTED: 2024-03-22

Parameter	Unit	SAMPLE DESCRIPTION:		BH1	BH5	BH6	BH7	
		G / S	RDL	Water	Water	Water	Water	Water
DATE SAMPLED:		2024-03-11		2024-03-11	2024-03-11	2024-03-11	2024-03-11	
		11:30		11:30	11:30	11:30	11:30	
		5722603		5722663	5722665	RDL	5722666	
Total Arsenic	mg/L	0.1	0.003	0.006	0.008	0.007	0.003	0.007
Total Barium	mg/L		0.002	0.043	0.059	0.050	0.002	0.203
Total Beryllium	mg/L	*	0.001	<0.001	<0.001	<0.001	0.001	<0.001
Total Boron	mg/L	0.2	0.010	0.026	0.031	0.017	0.010	0.031
Total Cadmium	mg/L	0.0002	0.0001	<b>0.0003</b>	<b>0.0003</b>	<b>0.0003</b>	0.0001	<b>0.0004</b>
Total Chromium	mg/L		0.003	0.011	0.018	0.011	0.003	0.042
Total Cobalt	mg/L	0.0009	0.0005	<b>0.0066</b>	<b>0.0096</b>	<b>0.0084</b>	0.0005	<b>0.0137</b>
Total Copper	mg/L	0.005	0.002	<b>0.021</b>	<b>0.029</b>	<b>0.030</b>	0.002	<b>0.037</b>
Total Iron	mg/L	0.3	0.050	<b>12.2</b>	<b>18.0</b>	<b>15.2</b>	0.050	<b>31.5</b>
Total Lead	mg/L	*	0.0005	0.0224	0.0322	0.0318	0.0005	0.0249
Total Manganese	mg/L		0.002	0.651	0.860	0.991	0.002	1.03
Total Mercury	mg/L		0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001
Total Molybdenum	mg/L	0.040	0.002	<0.002	<0.002	<0.002	0.002	<0.002
Total Nickel	mg/L	0.025	0.003	0.012	0.019	0.018	0.003	<b>0.032</b>
Total Selenium	mg/L	0.1	0.002	<0.002	0.004	<0.002	0.002	0.004
Total Silver	mg/L	0.0001	0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001
Total Strontium	mg/L		0.005	0.298	0.281	0.304	0.005	0.670
Total Thallium	mg/L	0.0003	0.0003	<0.0003	<0.0003	<0.0003	0.0003	<0.0003
Total Tin	mg/L		0.002	0.002	0.002	0.002	0.002	<0.002
Total Titanium	mg/L		0.010	0.199	0.325	0.302	0.010	0.832
Total Tungsten	mg/L	0.030	0.010	<0.010	<0.010	<0.010	0.010	<0.010
Total Uranium	mg/L	0.005	0.0005	<0.0005	0.0006	<0.0005	0.0005	0.0023
Total Vanadium	mg/L	0.006	0.002	<b>0.017</b>	<b>0.022</b>	<b>0.017</b>	0.002	<b>0.052</b>
Total Zinc	mg/L	0.030	0.020	<b>0.153</b>	<b>0.185</b>	<b>0.136</b>	0.020	<b>0.498</b>
Total Zirconium	mg/L	0.004	0.004	<0.004	<0.004	<0.004	0.004	0.004
Lab Filtration Aluminum Dissolved				Y	Y	Y		Y

Certified By:

*Yris Veraestegui*



**AGAT** Laboratories

# Certificate of Analysis

AGAT WORK ORDER: 24T129206

PROJECT: 1495

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CLIENT NAME: CHUNG AND VANDER DOELEN  
SAMPLING SITE: 968 ST. DAVID ST. N. FERGUS

ATTENTION TO: Yaroslav Chudin  
SAMPLED BY: Y.C.

## Water Quality Assessment - PWQO (mg/L)

DATE RECEIVED: 2024-03-13

DATE REPORTED: 2024-03-22

**Comments:** RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO \* Variable - refer to guideline reference document  
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.  
**5722603-5722666** Dilution required, RDL has been increased accordingly.  
Un-ionized Ammonia detection limit is a calculated RDL. The calculation of Un-ionized Ammonia is based on lab measured parameters (ammonia as N, pH and temperature). Values are reported as calculated.

Analysis performed at AGAT Toronto (unless marked by \*)

Certified By:



## Exceedance Summary

AGAT WORK ORDER: 24T129206

PROJECT: 1495

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CLIENT NAME: CHUNG AND VANDER DOELEN

ATTENTION TO: Yaroslav Chudin

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
5722603	BH1	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Cadmium	mg/L	0.0002	0.0003
5722603	BH1	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Cobalt	mg/L	0.0009	0.0066
5722603	BH1	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Copper	mg/L	0.005	0.021
5722603	BH1	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Iron	mg/L	0.3	12.2
5722603	BH1	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Vanadium	mg/L	0.006	0.017
5722603	BH1	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Zinc	mg/L	0.030	0.153
5722663	BH5	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Cadmium	mg/L	0.0002	0.0003
5722663	BH5	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Cobalt	mg/L	0.0009	0.0096
5722663	BH5	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Copper	mg/L	0.005	0.029
5722663	BH5	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Iron	mg/L	0.3	18.0
5722663	BH5	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Vanadium	mg/L	0.006	0.022
5722663	BH5	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Zinc	mg/L	0.030	0.185
5722665	BH6	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Cadmium	mg/L	0.0002	0.0003
5722665	BH6	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Cobalt	mg/L	0.0009	0.0084
5722665	BH6	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Copper	mg/L	0.005	0.030
5722665	BH6	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Iron	mg/L	0.3	15.2
5722665	BH6	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Vanadium	mg/L	0.006	0.017
5722665	BH6	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Zinc	mg/L	0.030	0.136
5722666	BH7	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Cadmium	mg/L	0.0002	0.0004
5722666	BH7	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Cobalt	mg/L	0.0009	0.0137
5722666	BH7	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Copper	mg/L	0.005	0.037
5722666	BH7	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Iron	mg/L	0.3	31.5
5722666	BH7	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Nickel	mg/L	0.025	0.032
5722666	BH7	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Vanadium	mg/L	0.006	0.052
5722666	BH7	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Zinc	mg/L	0.030	0.498

## Quality Assurance

**CLIENT NAME: CHUNG AND VANDER DOELEN**  
**PROJECT: 1495**  
**SAMPLING SITE: 968 ST. DAVID ST. N. FERGUS**

**AGAT WORK ORDER: 24T129206**  
**ATTENTION TO: Yaroslav Chudin**  
**SAMPLED BY: Y.C.**

Water Analysis																
RPT Date: Mar 22, 2024			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits		
								Lower	Upper		Lower	Upper		Lower	Upper	

Water Quality Assessment - PWQO (mg/L)															
Electrical Conductivity	5722603	5722603	480	477	0.6%	< 2	104%	90%	110%						
pH	5722603	5722603	7.43	7.55	1.6%	NA	99%	90%	110%						
Total Dissolved Solids	5720157		190	168	12.3%	< 10	92%	80%	120%						
Alkalinity (as CaCO3)	5722603	5722603	291	306	5.0%	< 5	95%	80%	120%						
Bicarbonate (as CaCO3)	5722603	5722603	291	306	5.0%	< 5	NA								
Carbonate (as CaCO3)	5722603	5722603	<5	<5	NA	< 5	NA								
Hydroxide (as CaCO3)	5722603	5722603	<5	<5	NA	< 5	NA								
Fluoride	5718363		<0.05	<0.05	NA	< 0.05	105%	70%	130%	91%	80%	120%	98%	70%	130%
Chloride	5718363		153	152	0.7%	< 0.10	96%	70%	130%	91%	80%	120%	NA	70%	130%
Nitrate as N	5718363		<0.05	<0.05	NA	< 0.05	100%	70%	130%	98%	80%	120%	100%	70%	130%
Nitrite as N	5718363		<0.05	<0.05	NA	< 0.05	101%	70%	130%	101%	80%	120%	109%	70%	130%
Bromide	5718363		<0.05	<0.05	NA	< 0.05	105%	70%	130%	96%	80%	120%	95%	70%	130%
Sulphate	5718363		<0.10	<0.10	NA	< 0.10	94%	70%	130%	94%	80%	120%	94%	70%	130%
Ortho Phosphate as P	5718363		<0.10	<0.10	NA	< 0.10	101%	70%	130%	104%	80%	120%	105%	70%	130%
Ammonia as N	5724966		<0.02	<0.02	NA	< 0.02	108%	70%	130%	105%	80%	120%	103%	70%	130%
Total Phosphorus	5737950		0.05	0.05	NA	< 0.02	99%	70%	130%	99%	80%	120%	105%	70%	130%
Total Organic Carbon	5720157		1.8	1.7	NA	< 0.5	98%	90%	110%	98%	90%	110%	99%	80%	120%
True Colour	5720157		<2.50	<2.50	NA	< 2.5	100%	90%	110%						
Turbidity	5722603	5722603	92.5	144	43.6%	< 0.5	90%	80%	120%						
Total Calcium	5724836		80.1	80.4	0.4%	< 0.20	113%	70%	130%	107%	80%	120%	108%	70%	130%
Total Magnesium	5724836		6.75	6.85	1.5%	< 0.10	118%	70%	130%	111%	80%	120%	94%	70%	130%
Total Potassium	5724836		5.43	5.50	1.3%	< 0.50	113%	70%	130%	106%	80%	120%	97%	70%	130%
Total Sodium	5724836		858	817	4.9%	< 0.10	114%	70%	130%	108%	80%	120%	NA	70%	130%
Aluminum-dissolved	5722603	5722603	0.004	0.005	NA	< 0.004	104%	70%	130%	110%	80%	120%	104%	70%	130%
Total Antimony	5724836		<0.003	<0.003	NA	< 0.003	105%	70%	130%	105%	80%	120%	100%	70%	130%
Total Arsenic	5724836		<0.003	<0.003	NA	< 0.003	99%	70%	130%	105%	80%	120%	102%	70%	130%
Total Barium	5724836		0.009	0.010	NA	< 0.002	100%	70%	130%	105%	80%	120%	97%	70%	130%
Total Beryllium	5724836		<0.001	<0.001	NA	< 0.001	104%	70%	130%	115%	80%	120%	94%	70%	130%
Total Boron	5724836		0.072	0.076	5.4%	< 0.010	101%	70%	130%	112%	80%	120%	93%	70%	130%
Total Cadmium	5724836		0.0002	0.0002	NA	< 0.0001	102%	70%	130%	106%	80%	120%	98%	70%	130%
Total Chromium	5724836		0.005	0.005	NA	< 0.003	100%	70%	130%	106%	80%	120%	105%	70%	130%
Total Cobalt	5724836		0.0013	0.0015	NA	< 0.0005	101%	70%	130%	104%	80%	120%	103%	70%	130%
Total Copper	5724836		0.026	0.026	0.0%	< 0.002	99%	70%	130%	106%	80%	120%	98%	70%	130%
Total Iron	5724836		1.68	1.67	0.6%	< 0.050	102%	70%	130%	112%	80%	120%	108%	70%	130%
Total Lead	5724836		0.0079	0.0081	2.5%	< 0.0005	101%	70%	130%	98%	80%	120%	89%	70%	130%
Total Manganese	5724836		0.383	0.389	1.6%	< 0.002	103%	70%	130%	109%	80%	120%	105%	70%	130%
Total Mercury	5722014		<0.0001	<0.0001	NA	< 0.0001	100%	70%	130%	97%	80%	120%	98%	70%	130%
Total Molybdenum	5724836		0.009	0.010	NA	< 0.002	106%	70%	130%	91%	80%	120%	116%	70%	130%
Total Nickel	5724836		0.030	0.028	6.9%	< 0.003	102%	70%	130%	105%	80%	120%	101%	70%	130%

## Quality Assurance

**CLIENT NAME:** CHUNG AND VANDER DOELEN  
**PROJECT:** 1495  
**SAMPLING SITE:** 968 ST. DAVID ST. N. FERGUS

**AGAT WORK ORDER:** 24T129206  
**ATTENTION TO:** Yaroslav Chudin  
**SAMPLED BY:** Y.C.

### Water Analysis (Continued)

RPT Date: Mar 22, 2024			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits		
								Lower	Upper		Lower	Upper		Lower	Upper	
Total Selenium	5724836		0.004	0.006	NA	< 0.002	101%	70%	130%	108%	80%	120%	101%	70%	130%	
Total Silver	5724836		0.0001	<0.0001	NA	< 0.0001	103%	70%	130%	110%	80%	120%	96%	70%	130%	
Total Strontium	5724836		1.15	1.14	0.9%	< 0.005	104%	70%	130%	109%	80%	120%	99%	70%	130%	
Total Thallium	5724836		<0.0003	<0.0003	NA	< 0.0003	92%	70%	130%	105%	80%	120%	94%	70%	130%	
Total Tin	5724836		<0.002	<0.002	NA	< 0.002	100%	70%	130%	109%	80%	120%	105%	70%	130%	
Total Titanium	5724836		<0.010	<0.010	NA	< 0.010	102%	70%	130%	110%	80%	120%	106%	70%	130%	
Total Tungsten	5724836		<0.010	<0.010	NA	< 0.010	94%	70%	130%	100%	80%	120%	97%	70%	130%	
Total Uranium	5724836		<0.0005	<0.0005	NA	< 0.0005	92%	70%	130%	109%	80%	120%	106%	70%	130%	
Total Vanadium	5724836		0.003	0.002	NA	< 0.002	103%	70%	130%	110%	80%	120%	111%	70%	130%	
Total Zinc	5724836		0.119	0.125	4.9%	< 0.020	100%	70%	130%	105%	80%	120%	93%	70%	130%	
Total Zirconium	5724836		<0.004	<0.004	NA	< 0.004	101%	70%	130%	106%	80%	120%	109%	70%	130%	

Comments: NA signifies Not Applicable.  
 Duplicate NA: results are under 5X the RDL and will not be calculated.  
 Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.

Certified By: \_\_\_\_\_

*Yris Veraestegui*

## Method Summary

**CLIENT NAME:** CHUNG AND VANDER DOELEN  
**PROJECT:** 1495  
**SAMPLING SITE:** 968 ST. DAVID ST. N. FERGUS

**AGAT WORK ORDER:** 24T129206  
**ATTENTION TO:** Yaroslav Chudin  
**SAMPLED BY:** Y.C.

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
<b>Water Analysis</b>			
Electrical Conductivity	INOR-93-6000	modified from SM 2510 B	PC TITRATE
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Saturation pH (Calculated)		SM 2320 B	CALCULATION
Langelier Index (Calculated)		SM 2330B	CALCULATION
Hardness (as CaCO <sub>3</sub> ) (Calculated)	MET-93-6105	modified from EPA SW-846 6010C & 200.7 & SM 2340 B	CALCULATION
Total Dissolved Solids	INOR-93-6028	modified from EPA 1684, ON MOECC E3139, SM 2540C, D	BALANCE
Alkalinity (as CaCO <sub>3</sub> )	INOR-93-6000	Modified from SM 2320 B	PC TITRATE
Bicarbonate (as CaCO <sub>3</sub> )	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Carbonate (as CaCO <sub>3</sub> )	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Hydroxide (as CaCO <sub>3</sub> )	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Fluoride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Bromide	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ortho Phosphate as P	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	modified from SM 4500-NH <sub>3</sub> H	LACHAT FIA
Ammonia-Un-ionized (Calculated)		MOE REFERENCE, PWQOs Tab 2	CALCULATION
Total Phosphorus	INOR-93-6022	modified from SM 4500-P B and SM 4500-P E	SPECTROPHOTOMETER
Total Organic Carbon	INOR-93-6049	modified from SM 5310 B	SHIMADZU CARBON ANALYZER
True Colour	INOR-93-6074	modified from SM 2120 B	LACHAT FIA
Turbidity	INOR-93-6000	modified from SM 2130 B	PC TITRATE
Total Calcium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Magnesium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Potassium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Sodium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Aluminum-dissolved	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Total Antimony	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Arsenic	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Barium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Beryllium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Boron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cadmium	MET -93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Chromium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cobalt	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS

## Method Summary

**CLIENT NAME: CHUNG AND VANDER DOELEN**
**AGAT WORK ORDER: 24T129206**
**PROJECT: 1495**
**ATTENTION TO: Yaroslav Chudin**
**SAMPLING SITE: 968 ST. DAVID ST. N. FERGUS**
**SAMPLED BY: Y.C.**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Copper	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Iron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Lead	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Manganese	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	CVAAS
Total Molybdenum	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Nickel	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Selenium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Silver	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Strontium	INOR-93-6003	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Thallium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Tin	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Titanium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Tungsten	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Uranium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Vanadium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zinc	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zirconium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Lab Filtration Aluminum Dissolved	SR-78-9001		FILTRATION

Have feedback?  
Scan here for a quick survey!



5835 Coopers Avenue  
Mississauga, Ontario L4Z 1Y2  
Ph: 905.712.5100 Fax: 905.712.5122  
web@earth.agatlabs.com

### Laboratory Use Only

Work Order #: 24T129206

Cooler Quantity: 1 med.

Arrival Temperatures: 3.7 | 3.9 | 4.3

Depot Temperatures: \_\_\_\_\_

Custody Seal Intact:  Yes  No  N/A

Notes: Loss seal

## Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

### Report Information:

Company: CVD Engineering Ltd.

Contact: Yaroslav Chudlin

Address: 311 Victoria St. W., Etobicoke, ONT M9H 5E1

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Reports to be sent to:

1. Email: yaroslav.chudlin@cvdengineering.com

2. Email: \_\_\_\_\_

### Regulatory Requirements:

(Please check all applicable boxes)

Regulation 153/04  Regulation 406  Sewer Use  
 Sanitary  Storm

Table Indicate One  Ind/Com  Res/Park  Agriculture

Soil Texture (Check One)  Coarse  Fine  Regulation 558  CCME

Prov. Water Quality Objectives (PWQO)

Other

Indicate One

---

Is this submission for a Record of Site Condition (RSC)?  Yes  No

Report Guideline on Certificate of Analysis  Yes  No

### Project Information:

Project: 1495

Site Location: 968 St. David St. N., Ferris

Sampled By: P.C.

AGAT Quote #: \_\_\_\_\_ PO: \_\_\_\_\_

*Please note: If quotation number is not provided, client will be billed full price for analysis.*

### Turnaround Time (TAT) Required:

Regular TAT  5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

3 Business Days  2 Business Days  Next Business Day

OR Date Required (Rush Surcharges May Apply): \_\_\_\_\_

Please provide prior notification for rush TAT  
\*TAT is exclusive of weekends and statutory holidays

For 'Same Day' analysis, please contact your AGAT CSR

### Invoice Information:

Bill To Same: Yes  No

Company: \_\_\_\_\_

Contact: \_\_\_\_\_

Address: \_\_\_\_\_

Email: ap@cvdengineering.com

### Legal Sample

### Sample Matrix Legend

**GW** Ground Water **SD** Sediment  
**O** Oil **SW** Surface Water  
**P** Paint **R** Rock/Shale  
**S** Soil

Sample #	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/Special Instructions	Y/N	O. Reg 153		O. Reg 406		O. Reg 558		Potentially Hazardous or High Concentration (Y/N)
							Metals & Inorganics	Metals - CrVI, Hg, HWSB	Regulation 406 Characterization Package	Regulation 406 SPLP Rainwater Leach	Landfill Disposal Characterization TCLP	Corrosivity	
1.	<u>Mar 11/24</u>	<u>11:30 AM</u>	<u>8</u>	<u>GW</u>		<u>Z</u>							
2.	<u>"</u>	<u>12:30 AM</u>	<u>8</u>	<u>"</u>		<u>Z</u>							
3.	<u>"</u>	<u>1:45 AM</u>	<u>8</u>	<u>"</u>		<u>Z</u>							
4.	<u>"</u>	<u>3:45 AM</u>	<u>8</u>	<u>"</u>		<u>Z</u>							
5.													
6.													
7.													
8.													
9.													
10.													
11.													

"Positive Water Analysis"  
Package

Samples Relinquished By (Print Name and Sign): <u>Yaroslav Chudlin</u>	Date: <u>Mar 13/24</u>	Time: <u>12:00 pm</u>	Samples Received By (Print Name and Sign): <u>T. Khan</u>	Date: <u>Mar 13</u>	Time: <u>1:46 pm</u>
Samples Relinquished By (Print Name and Sign): _____	Date: _____	Time: _____	Samples Received By (Print Name and Sign): _____	Date: _____	Time: _____
Samples Relinquished By (Print Name and Sign): _____	Date: _____	Time: _____	Samples Received By (Print Name and Sign): _____	Date: _____	Time: _____

Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT

**APPENDIX G**  
**MECP Well Records**





# WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED  
2. CHECK  CORRECT BOX WHERE APPLICABLE

11

6709834

MUNICIPALITY 67009

CON. CON.

16

COUNTY OR DISTRICT <b>Wellington</b>	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE <b>Nichol</b>	CON. BLOCK TRACT, SURVEY ETC <b>XVI</b>	LOT <b>17</b>
OWNER (SURNAME FIRST) <b>Fergus PUC</b>	ADDRESS <b>P.O. Box 10, Fergus, Ont. N1M 2U7</b>	DATE COMPLETED DAY <b>15</b> MO <b>5</b> YR <b>89</b>	

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
Brown	Clay	Fill, Gravel Silt		0	18
Brown	Clay	Gravel		18	24
Grey	Clay	Gravel		24	84
Grey	Limestone			84	165
Brown	Limestone			165	213
Grey	Limestone			213	225
Brown	Limestone			225	232
Lt. Grey	Limestone			232	315
Brown	Limestone			315	378
Grey	Limestone			378	400
White	Limestone			400	402

31

32

**41 WATER RECORD**

WATER FOUND AT - FEET	KIND OF WATER		
128' - 402'	1 <input checked="" type="checkbox"/> FRESH 2 <input checked="" type="checkbox"/> SALTY	3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS	

**51 CASING & OPEN HOLE RECORD**

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
12	1 STEEL 2 GALVANIZED 3 CONCRETE 4 OPEN HOLE 5 PLASTIC	.375	109.5	109.5
11	1 STEEL 2 GALVANIZED 3 CONCRETE 4 OPEN HOLE 5 PLASTIC	109.5	109.5	402

**SCREEN**

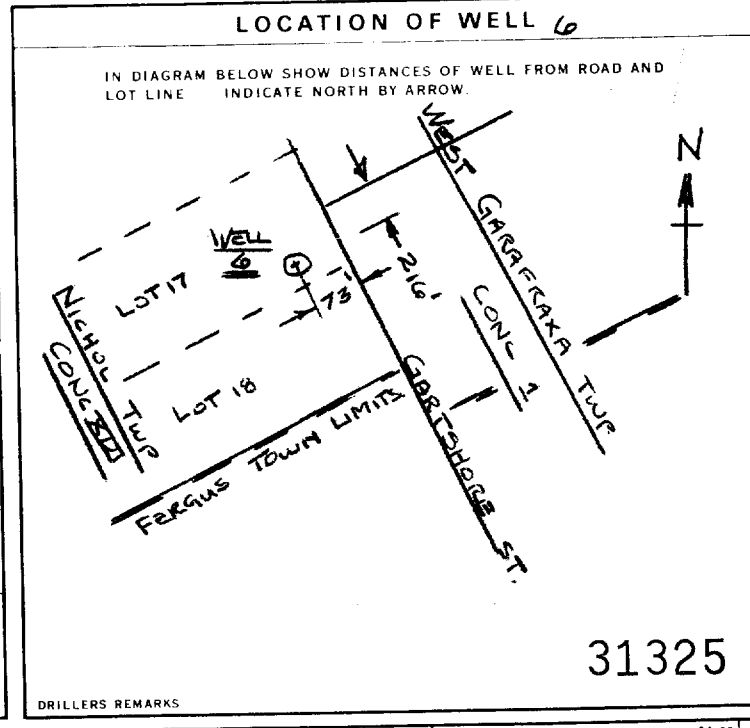
SIZE OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

**61 PLUGGING & SEALING RECORD**

DEPTH SET AT - FEET	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER ETC.)
0 - 109.5	12" casing cemented in 18" dia. open hole

**71 PUMPING TEST**

PUMPING TEST METHOD 1 <input checked="" type="checkbox"/> PUMP 2 <input type="checkbox"/> BAILER	PUMPING RATE GPM <b>350</b>	DURATION OF PUMPING 15-16 HOURS 17-18 MINS
STATIC LEVEL 19-21 <b>57.51</b> FEET	WATER LEVEL END OF PUMPING 22-24 <b>153.29</b> FEET	WATER LEVELS DURING 1 <input type="checkbox"/> PUMPING 2 <input type="checkbox"/> RECOVERY
IF FLOWING, GIVE RATE	PUMP INTAKE SET AT GPM	WATER AT END OF TEST 42



**FINAL STATUS OF WELL**

1  WATER SUPPLY  
2  OBSERVATION WELL  
3  TEST HOLE  
4  RECHARGE WELL

**WATER USE**

1  DOMESTIC  
2  STOCK  
3  IRRIGATION  
4  INDUSTRIAL  
5  COMMERCIAL  
6  MUNICIPAL  
7  PUBLIC SUPPLY  
8  COOLING OR AIR CONDITIONING  
9  NOT USED

**METHOD OF CONSTRUCTION**

1  CABLE TOOL  
2  ROTARY (CONVENTIONAL)  
3  ROTARY (REVERSE)  
4  ROTARY (AIR)  
5  AIR PERCUSSION  
6  BORING  
7  DIAMOND  
8  JETTING  
9  DRIVING  
10  DIGGING  
11  OTHER

**CONTRACTOR**

NAME OF WELL CONTRACTOR  
**International Water Supply, Ltd.**

WELL CONTRACTOR'S LICENCE NUMBER  
**2801**

ADDRESS  
**342 Bayview Dr., Barrie, Ont. L4M 4T5**

NAME OF WELL TECHNICIAN  
**R.C. Magee**

WELL TECHNICIAN'S LICENCE NUMBER  
**T0117**

SIGNATURE OF TECHNICIAN/CONTRACTOR  
*R.C. Magee*

SUBMISSION DATE  
DAY **14** MO **07** YR **89**

**OFFICE USE ONLY**

DATA SOURCE  
**2801**

DATE RECEIVED  
**JUL 20 1989**

DATE OF INSPECTION

INSPECTOR

REMARKS

CSS.ES

# WATER WELL RECORD

6710068

MUNICIPALITY 67009

CON. 15

1. PRINT ONLY IN SPACES PROVIDED  
2. CHECK  CORRECT BOX WHERE APPLICABLE

11

COUNTY OR DISTRICT: Wellington TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Nichol CON. BLOCK, TRACT, SURVEY, ETC: XV LOT: 20

OWNER (SURNAME FIRST): W. Dixon & Sons Ltd. ADDRESS: 745 St. David St. N., FERGUS, ONT. N1M 2L1 DATE COMPLETED: DAY 29 MO 03 YR 89

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## LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
	Gravel	Fill		0	3
Br.	Clay	Stones		3	20
Gr.	Clay			20	30
Gr.	Clay	Stones		30	77
Br./Gr.	Limestone			77	96
Gr.	Limestone			96	125
Br.	Limestone			125	265

**41 WATER RECORD**

WATER FOUND AT - FEET	KIND OF WATER
23.5	1 <input checked="" type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
15-18	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
20-23	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
25-28	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
30-33	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS

**51 CASING & OPEN HOLE RECORD**

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
6 1/4	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC	.188	0	85
6 1/8	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC		85	265

**SCREEN**

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE: \_\_\_\_\_ DEPTH TO TOP OF SCREEN: \_\_\_\_\_

**61 PLUGGING & SEALING RECORD**

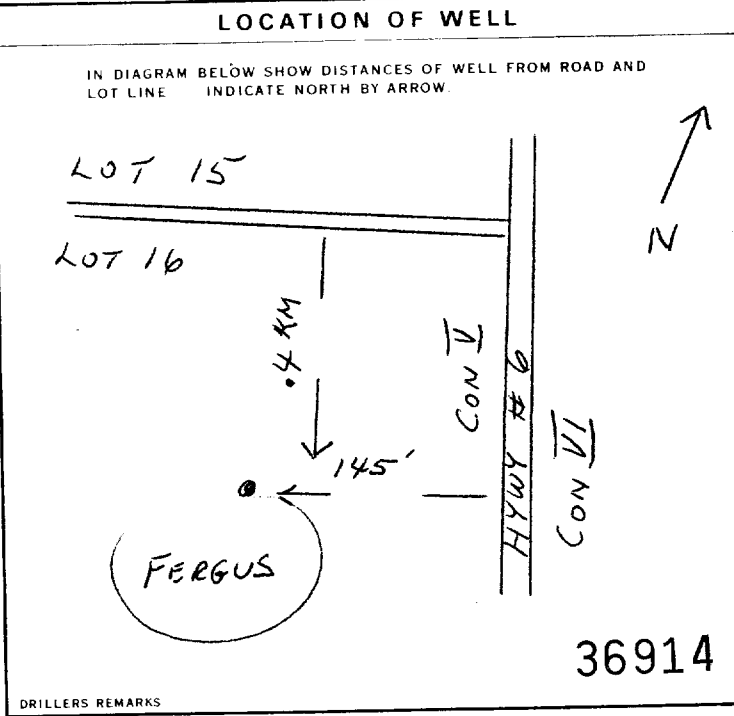
DEPTH SET AT - FEET	MATERIAL AND TYPE	(CEMENT GROUT LEAD PACKER, ETC.)
10-13		
18-21		
28-29		

**71 PUMPING TEST**

PUMPING TEST METHOD: AIR PUMPING RATE: 20 GPM DURATION OF PUMPING: 1 HOURS 15 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING	1. <input checked="" type="checkbox"/> PUMPING	2. <input type="checkbox"/> RECOVERY
97	140	15 MINUTES: 140 30 MINUTES: 140 45 MINUTES: 140 60 MINUTES: 140		

RECOMMENDED PUMP TYPE:  SHALLOW  DEEP  
RECOMMENDED PUMP SETTING: 160 FEET  
RECOMMENDED PUMPING RATE: 18 GPM



**FINAL STATUS OF WELL**

1  WATER SUPPLY 5  ABANDONED, INSUFFICIENT SUPPLY  
2  OBSERVATION WELL 6  ABANDONED POOR QUALITY  
3  TEST HOLE 7  UNFINISHED  
4  RECHARGE WELL 9  DEWATERING

**WATER USE**

1  DOMESTIC 5  COMMERCIAL  
2  STOCK 6  MUNICIPAL  
3  IRRIGATION 7  PUBLIC SUPPLY  
4  INDUSTRIAL 8  COOLING OR AIR CONDITIONING  
 OTHER 9  NOT USED

**METHOD OF CONSTRUCTION**

1  CABLE TOOL 5  BORING  
2  ROTARY (CONVENTIONAL) 7  DIAMOND  
3  ROTARY (REVERSE) 8  JETTING  
4  ROTARY (AIR) 9  DRIVING  
5  AIR PERCUSSION  DIGGING  OTHER

**CONTRACTOR**

NAME OF WELL CONTRACTOR: Lang & Sons Ltd. WELL CONTRACTOR'S LICENCE NUMBER: 3317

ADDRESS: R.R. 1 Hillsburgh Ont.

NAME OF WELL TECHNICIAN: ROY LANG WELL TECHNICIAN'S LICENCE NUMBER: T-0158

SIGNATURE OF TECHNICIAN/CONTRACTOR: R. Lang SUBMISSION DATE: DAY 31 MO 10 YR 89

**OFFICE USE ONLY**

DATA SOURCE: 3317 DATE RECEIVED: NOV 15 1989

DATE OF INSPECTION: \_\_\_\_\_ INSPECTOR: \_\_\_\_\_

REMARKS: \_\_\_\_\_

CSS.ES

Print only in spaces provided.  
Mark correct box with a checkmark, where applicable.

11

6712246

Municipality 67009 Con. CON 15

25-97

County or District: [Redacted] Township/Borough/City/Town/Village: NICHOL TWP  
 Con block tract survey, etc.: 15 Lot: 18  
 Address: P.O. BOX FERGUS, ONT N1M-2W7 Date completed: 21 05 97

21 2 10 12 17 18 24 25 26 30 31 47

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)					
General colour	Most common material	Other materials	General description	Depth - feet	
				From	To
BROWN	SAND			0	30
GREY	CLAY	SAND		30	50
GREY	CLAY	GRAVEL		50	94
BROWN	ROCK			94	115
GREY	ROCK			115	140
TOTAL DEPTH				140'	
6" DRIVE SHOE.					

31 32

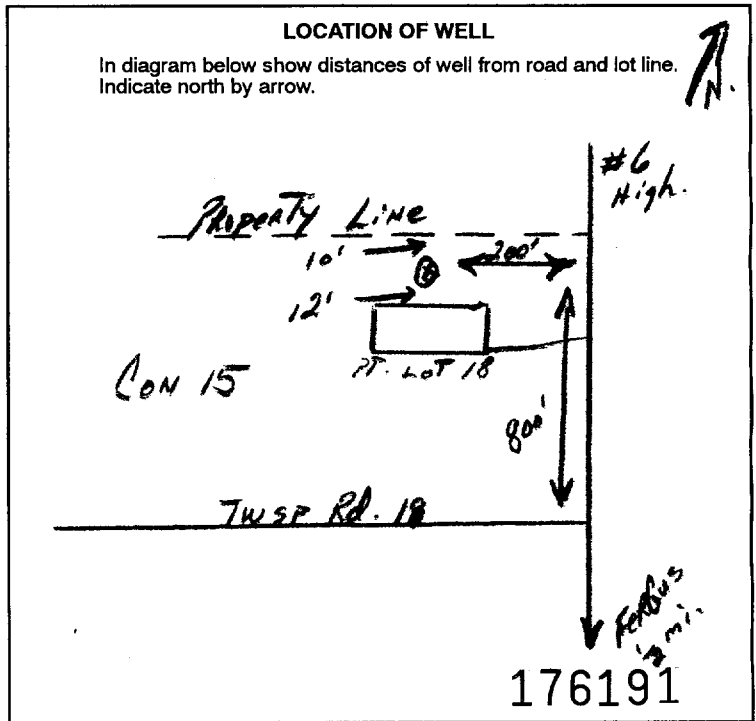
WATER RECORD			
Water found at - feet	Kind of water		
10-13	<input type="checkbox"/> Fresh <input type="checkbox"/> Salty	<input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals <input type="checkbox"/> Gas	14
15-18	<input type="checkbox"/> Fresh <input type="checkbox"/> Salty	<input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals <input type="checkbox"/> Gas	19
20-23	<input type="checkbox"/> Fresh <input type="checkbox"/> Salty	<input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals <input type="checkbox"/> Gas	24
25-28	<input type="checkbox"/> Fresh <input type="checkbox"/> Salty	<input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals <input type="checkbox"/> Gas	29
30-33	<input type="checkbox"/> Fresh <input type="checkbox"/> Salty	<input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals <input type="checkbox"/> Gas	34

CASING & OPEN HOLE RECORD				
Inside diam inches	Material	Wall thickness inches	Depth - feet	
			From	To
6"	<input checked="" type="checkbox"/> Steel <input type="checkbox"/> Galvanized <input type="checkbox"/> Concrete <input type="checkbox"/> Open hole <input type="checkbox"/> Plastic	.188	+1	95
6"	<input type="checkbox"/> Steel <input type="checkbox"/> Galvanized <input type="checkbox"/> Concrete <input checked="" type="checkbox"/> Open hole <input type="checkbox"/> Plastic		95	140
24-25	<input type="checkbox"/> Steel <input type="checkbox"/> Galvanized <input type="checkbox"/> Concrete <input type="checkbox"/> Open hole <input type="checkbox"/> Plastic			27-30

SCREEN	Sizes of opening (Slot No.)	Diameter	Length
	Material and type	Inches	feet

PLUGGING & SEALING RECORD			
Annular space		Abandonment	
Depth set at - feet	Material and type (Cement grout, bentonite, etc.)	From	To
0-25	BENTONITE	0	25

PUMPING TEST	Pumping test method		Pumping rate	Duration of pumping
	<input checked="" type="checkbox"/> Pump	<input type="checkbox"/> Bailer	3 GPM	1 Hours 0 Mins
	Static level	Water level end of pumping	Water levels during	<input checked="" type="checkbox"/> Pumping <input type="checkbox"/> Recovery
	44 feet	125 feet	15 minutes: 105 feet 30 minutes: 125 feet 45 minutes: 125 feet 60 minutes: 125 feet	
If flowing give rate	Pump intake set at	Water at end of test		
		* Clear <input type="checkbox"/> Cloudy		
Recommended pump type	Recommended pump setting	Recommended pump rate		
<input type="checkbox"/> Shallow <input checked="" type="checkbox"/> Deep	135 feet	3 GPM		



FINAL STATUS OF WELL

Water supply  Abandoned, insufficient supply  Unfinished  
 Observation well  Abandoned, poor quality  Replacement well  
 Test hole  Abandoned (Other)  
 Recharge well  Dewatering

WATER USE

Domestic  Commercial  Not used  
 Stock  Municipal  Other  
 Irrigation  Public supply  
 Industrial  Cooling & air conditioning

METHOD OF CONSTRUCTION

Cable tool  Air percussion  Driving  
 Rotary (conventional)  Boring  Digging  
 Rotary (reverse)  Diamond  Other  
 Rotary (air)  Jetting

Name of Well Contractor: GRAHAM WELL DRILLING LTD Well Contractor's Licence No.: 2336  
 Address: RR#5 ROCKWOOD, ONT. N0B-2K0  
 Name of Well Technician: Jim Wilson Well Technician's Licence No.: T-1924  
 Signature of Technician/Contractor: Robert W. Graham Submission date: 030 05 97

MINISTRY USE ONLY

Data source: 2336 Date received: JUN 27 1997  
 Date of inspection: Inspector:  
 Remarks: CSS. S

Print only in spaces provided.  
Mark correct box with a checkmark, where applicable.

11

6713078

Municipality  
67009

Con.  
CON 16

64-99

County or District <b>WELLINGTON</b>		Township/Borough/City/Town/Village <b>NICHOL TWP</b>		Con block tract survey, etc. <b>16</b>	Lot <b>16</b>
Owner's surname <b>1188521 ONTARIO LTD</b>	First name	Address <b>142 South River Rd. ELORA, ONT.</b>		Date completed <b>26 08 99</b>	

Zone	Easting	Northing	RC	Elevation	RC	Basin Code	ii	iii	iv
------	---------	----------	----	-----------	----	------------	----	-----	----

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet	
				From	To
BROWN	SAND			0	25
GREY	CLAY	STONES		25	70
GREY	CLAY	GRAVEL		70	83
BROWN	ROCK			83	115
GREY-BROWN	ROCK			115	190
<b>TOTAL DEPTH</b>				<b>190'</b>	
<b>6" DRIVE SHOE</b>					

31	32
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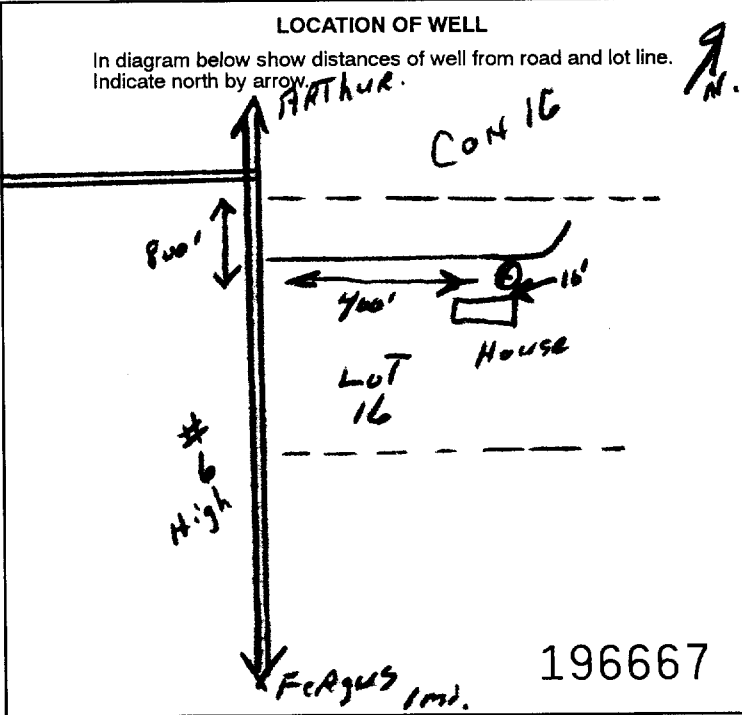
WATER RECORD	
Water found at - feet	Kind of water
190	<input checked="" type="checkbox"/> Fresh <input type="checkbox"/> Salty <input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals <input type="checkbox"/> Gas

CASING & OPEN HOLE RECORD			
Inside diam inches	Material	Wall thickness inches	Depth - feet
6"	Steel	.188	71 84
6"	Steel		84 190

SCREEN		
Sizes of opening (Slot No.)	Diameter inches	Length feet

PLUGGING & SEALING RECORD	
Annular space	Abandonment
Depth set at - feet	Material and type (Cement grout, bentonite, etc.)
0 25	BENTONITE

PUMPING TEST	
Pumping test method	Pumping rate
1 Pump	7 GPM
Static level	Water level end of pumping
80 feet	120 feet
Water levels during	
15 minutes: 93 feet	30 minutes: 104 feet
45 minutes: 115 feet	60 minutes: 120 feet
Recommended pump type	Recommended pump setting
Deep	130 feet



FINAL STATUS OF WELL		
<input checked="" type="checkbox"/> Water supply	<input type="checkbox"/> Abandoned, insufficient supply	<input type="checkbox"/> Unfinished
<input type="checkbox"/> Observation well	<input type="checkbox"/> Abandoned, poor quality	<input type="checkbox"/> Replacement well
<input type="checkbox"/> Test hole	<input type="checkbox"/> Abandoned (Other)	
<input type="checkbox"/> Recharge well	<input type="checkbox"/> Dewatering	

WATER USE		
<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Commercial	<input type="checkbox"/> Not used
<input type="checkbox"/> Stock	<input type="checkbox"/> Municipal	<input type="checkbox"/> Other
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Public supply	
<input type="checkbox"/> Industrial	<input type="checkbox"/> Cooling & air conditioning	

METHOD OF CONSTRUCTION		
<input type="checkbox"/> Cable tool	<input type="checkbox"/> Air percussion	<input type="checkbox"/> Driving
<input type="checkbox"/> Rotary (conventional)	<input type="checkbox"/> Boring	<input type="checkbox"/> Digging
<input type="checkbox"/> Rotary (reverse)	<input type="checkbox"/> Diamond	<input type="checkbox"/> Other
<input checked="" type="checkbox"/> Rotary (air)	<input type="checkbox"/> Jetting	

Name of Well Contractor <b>GRAHAM WELL DRILLING LTD</b>	Well Contractor's Licence No. <b>2336</b>
Address <b>RRA 5 ROCKWOOD, ONT. N0B-2K0</b>	
Name of Well Technician <b>Jim Wilson</b>	Well Technician's Licence No. <b>T-1924</b>
Signature of Technician/Contractor	Submission date <b>231 08 99</b>

MINISTRY USE ONLY	
Data source	Contractor
	<b>2336</b>
Date of inspection	Inspector
Remarks	

Measurements recorded in:  Metric  Imperial

Address of Well Location (Street Number/Name): **6581 Hwy 6 N**  
 Township: **West Garafraxa** Lot: **12** Concession: **1**  
 County/District/Municipality: **Wellington** City/Town/Village: **Fergus** Province: **Ontario** Postal Code: **N1M2W3**  
 UTM Coordinates: Zone **18** Easting **8317548508** Northing **4840921** Municipal Plan and Sublot Number: \_\_\_\_\_ Other: \_\_\_\_\_

**Overburden and Bedrock Materials/Abandonment Sealing Record** (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft)	
				From	To
Brown	Sand			0	10.66
Grey	Clay & stones			10.66	29.87
Grey	Clay			29.87	32.30
Brown	limestone			32.30	54.25

**Annular Space**

Depth Set at (m/ft)	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
From: 0 To: 10 m	Bentonite Grout	0.25

**Results of Well Yield Testing**

Time (min)	Water Level (m/ft)	Draw Down		Recovery	
		Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
Static Level	30.08				33.38
1	31.05	1			32.56
2	31.22	2			32.03
3	31.50	3			31.72
4	31.72	4			31.55
5	31.86	5			31.36
10	32.33	10			31.08
15	32.60	15			30.95
20	32.76	20			30.85
25	32.87	25			30.78
30	32.97	30			30.72
40	33.14	40			30.62
50	33.28	50			30.54
60	33.38	60			30.47

After test of well yield, water was:  
 Clear and sand free  
 Other, specify \_\_\_\_\_  
 If pumping discontinued, give reason: \_\_\_\_\_  
 Pump intake set at (m/ft): **175**  
 Pumping rate (l/min / GPM): **5 IGPM**  
 Duration of pumping: **1 hrs + 0 min**  
 Final water level end of pumping (m/ft): **33.28**  
 If flowing give rate (l/min / GPM): **175**  
 Recommended pump depth (m/ft): **175**  
 Recommended pump rate (l/min / GPM): **5 IGPM**  
 Well production (l/min / GPM): \_\_\_\_\_  
 Disinfected?  Yes  No

**Method of Construction**

Cable Tool  Diamond  
 Rotary (Conventional)  Jetting  
 Rotary (Reverse)  Driving  
 Boring  Digging  
 Air percussion  
 Other, specify \_\_\_\_\_

**Well Use**

Public  Commercial  Not used  
 Domestic  Municipal  Dewatering  
 Livestock  Test Hole  Monitoring  
 Irrigation  Cooling & Air Conditioning  
 Industrial  
 Other, specify \_\_\_\_\_

**Construction Record - Casing**

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft)		Status of Well
			From	To	
15.9	steel	188	1.50	33.2	<input checked="" type="checkbox"/> Water Supply <input type="checkbox"/> Replacement Well <input type="checkbox"/> Test Hole <input type="checkbox"/> Recharge Well <input type="checkbox"/> Dewatering Well <input type="checkbox"/> Observation and/or Monitoring Hole <input type="checkbox"/> Alteration (Construction) <input type="checkbox"/> Abandoned, Insufficient Supply <input type="checkbox"/> Abandoned, Poor Water Quality <input type="checkbox"/> Abandoned, other, specify _____ <input type="checkbox"/> Other, specify _____

**Construction Record - Screen**

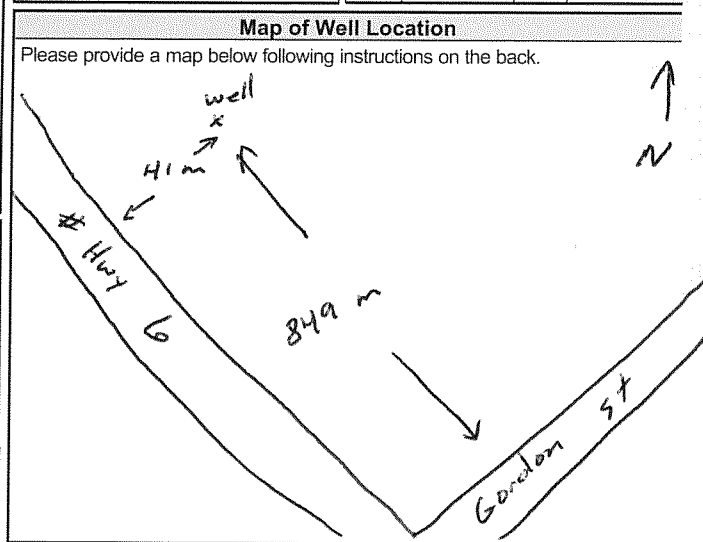
Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft)		Status of Well
			From	To	
					<input type="checkbox"/> Other, specify _____

**Water Details**

Water found at Depth (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested	Hole Diameter	
		Depth (m/ft)	Diameter (cm/in)
54.15 (m/ft)	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	From: 0 To: 33.2	22.8
		33.2 To: 54.25	15.6

**Well Contractor and Well Technician Information**

Business Name of Well Contractor: **Well Initiatives** Well Contractor's Licence No.: **72221**  
 Business Address (Street Number/Name): **15 Town line** Municipality: **Owen Sound**  
 Province: **ON** Postal Code: **L9W3R4** Business E-mail Address: \_\_\_\_\_



Business Name of Well Contractor: **Well Initiatives** Well Contractor's Licence No.: **72221**  
 Business Address (Street Number/Name): **15 Town line** Municipality: **Owen Sound**  
 Province: **ON** Postal Code: **L9W3R4** Business E-mail Address: \_\_\_\_\_  
 Bus. Telephone No. (inc. area code): **5198468289** Name of Well Technician (Last Name, First Name): **Loesch Kim**  
 Well Technician's Licence No.: **T927** Signature of Technician and/or Contractor: **Kim Loesch** Date Submitted: **20130630**

Well owner's information package delivered:  Yes  No  
 Date Package Delivered: **20130613** Date Work Completed: **20130613**

**Ministry Use Only**  
 Audit No.: **Z159276**  
 Received: **JUL 09 2013**

**APPENDIX H**  
**Limitations of Report**



# STATEMENT OF LIMITATIONS

1. The work performed in this report was carried out in accordance with the Standard Terms of Conditions made part of our contract. The conclusions presented herein are based solely upon the scope of services and time and budgetary limitations described in our contract.
2. The report has been prepared in accordance with generally accepted hydrogeological study and/or engineering practices. No other warranties, either expressed or implied, are made as to the professional services provided under the terms of our contract and included in this report.
3. The services performed and outlined in this report were based, in part, upon visual observations of the site and attendant structures. Our opinion cannot be extended to portions of the site which were unavailable for direct observation, reasonably beyond the control of CHUNG & VANDER DOELEN ENGINEERING LTD.
4. The objective of this report was to assess hydrogeological conditions at the site, within the context of our contract and hydrogeological assessment guidelines within the applicable jurisdiction. Evaluating compliance of past or future owners with applicable local, provincial and federal government laws and regulations was not included in our contract for services.
5. CHUNG & VANDER DOELEN ENGINEERING LTD. has relied in good faith on information and services provided by others while conducting the record search. We accept no responsibility for any deficiency, misstatements or inaccuracies contained in this report as a result of omission, misinterpretation or fraudulent acts of the services used.
6. It should be noted that the observations and recommendations presented in this report are limited to the actual locations explored. The information presented in terms of the thickness and types of the subsoils encountered, groundwater levels, and chemical testing results, etc., are only applicable to the actual locations explored. Variations may be present between these locations. Should significant variation become apparent during later investigations, it may be necessary to reevaluate the findings of this report.
7. The conclusions of this report are based in part, on the information provided by others. The possibility remains that unexpected environmental conditions may be encountered at the site in locations not specifically investigated. Should such an event occur, CHUNG & VANDER DOELEN ENGINEERING LTD. must be notified in order that we may determine if modifications to our conclusions are necessary.



**ENCLOSURES**



# Soil Abbreviations and Terms Used on Record of Borehole Sheets

## TERMINOLOGY DESCRIBING COMMON SOIL TYPES:

<b>Topsoil</b>	-	mixture of soil and humus capable of supporting vegetation
<b>Peat</b>	-	mixture of visible and invisible fragments of decayed organic matter
<b>Till</b>	-	unstratified glacial deposit which may range from clay to boulders
<b>Fill</b>	-	soil materials identified as being placed anthropologically

## CLASSIFICATION (UNIFIED SYSTEM)

Clay	<0.002mm
Silt	0.002 to .075mm
Sand	0.075 to 4.75mm
	Fine     0.075 to 0.425 mm
	Medium  0.425 to 2.0 mm
	Coarse  2.0 to 4.75 mm
Gravel	4.75 to 75mm
	Fine     4.75 to 19 mm
	Coarse  19 to 75 mm
Cobbles	75 to 300mm
Boulders	>300mm

## TERMINOLOGY

Soil Composition	% by Weight
"traces"	<10%
"some"(eg. some silt)	10-20%
Adjective (eg. sandy)	20-35%
"and"(eg. sand and gravel)	35-50%

**Standard Penetration Resistance (SPT):** Standard Penetration Resistance ('N' Values) refers to the number of blows required to advance a standard (ASTM D1586) 51 mm Ø (2 inch) split-spoon sampler by the use of a free falling, 63.5 Kg (140lbs) hammer. The number of blows from the drop weight is recorded for every 15 cm (6 inches). The hammer is dropped from a distance of 0.76m (30 inches) providing 474.5 Joules per blow. When the sampler is driven a total of 45 cm (18 inches) into the soil, the standard penetration index ('N' Value) is the total number of blows for the last 30 cm (12 inches).

**Dynamic Cone Penetration Resistance (DCPT):** Dynamic Cone Penetration Resistance is similar to a SPT with the 474.5 Joule/blow impulse provided by the free falling hammer where the split-spoon sampler is replaced by a 51 mm Ø, 60° conical point and the number of blows is recorded continuously for every 30 cm (12 inches).

## COHESIVE SOILS CONSISTENCY

	(kPa)	(P.S.F.)	Nominal 'N' Value
Very Soft	<12	<250	0-2
Soft	12-25	250-500	2-4
Firm	25-50	500-1000	4-8
Stiff	50-100	1000-2000	8-15
Very Stiff	100-200	2000-4000	15-30
Hard	>200	>4000	>30

## RELATIVE DENSITY OF COHESIONLESS SOIL

	'N' Value
Very Loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	>50

## MOISTURE CONDITIONS:

Cohesive Soil
DTPL- Drier than plastic limit
APL- About plastic limit
WTPL- Wetter than plastic limit
MWTPL- Much wetter than plastic limit

Cohesionless Soil
Damp
Moist
Wet
Saturated

## SAMPLE TYPES AND ADDITIONAL FIELD TESTS

<b>SS</b> Split Spoon Sample (obtained from SPT)	<b>GS</b> Grab Sample	<b>PP</b> Pocket Penetrometer
<b>AS</b> Auger Sample	<b>BS</b> Bulk Sample	<b>VANE</b> Peak & Remolded shear
	<b>TW</b> Thin Wall Sample or Shelby Tube	<b>DMT</b> Flat Plate Dilatometer

## LABORATORY TESTS

<b>SG</b> Specific Gravity	<b>S</b> Sieve Analysis	<b>W</b> Water Content
<b>H</b> Hydrometer	<b>P</b> Field Permeability	<b>K</b> Lab Permeability
<b>W<sub>p</sub></b> Plastic Limit	<b>W<sub>l</sub></b> Liquid Limit	<b>I<sub>p</sub></b> Plasticity Index
<b>GSA</b> Grain Size Analysis	<b>C</b> Consolidation	<b>UNC</b> Unconfined compression

**FILE No: 1495**

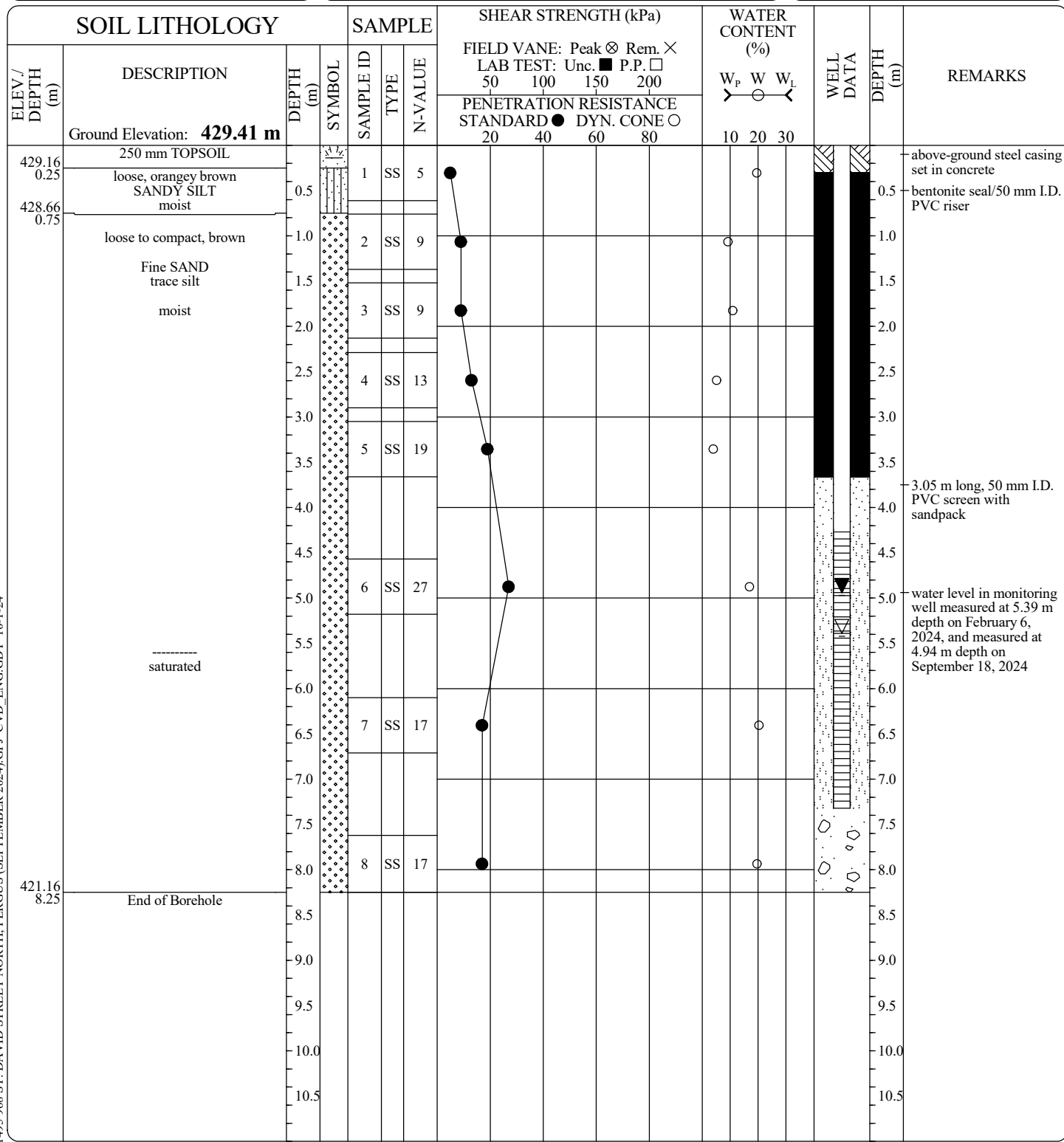
**BOREHOLE No. 1**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**

Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Jan 17 - 24 TO Jan 17 - 24**



CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT\_10-1-24

**PROJECT MANAGER: EYC**

**CHUNG & VANDER DOELEN ENGINEERING LTD.**  
311 Victoria Street North  
Kitchener, Ontario N2H 5E1  
ph. (519) 742-8979, fx. (519) 742-7739

**FILE No: 1495**

**BOREHOLE No. 2**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**

Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Jan 17 - 24 TO Jan 17 - 24**

SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS		
ELEV./DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80					W <sub>p</sub>	W
428.80 0.30	300 mm TOPSOIL	0.5		1	SS	4	●										above-ground steel casing set in concrete
428.05 1.05	loose, orangey brown SANDY SILT moist	1.0		2	SS	4	●										bentonite seal/50 mm I.D. PVC riser
	loose to compact, brown Fine SAND trace gravel, trace silt	1.5		3	SS	6	●										
	occ. silt seam with trace clay from 2.3± to 2.6± m bgs	2.0		4	SS	4	●										
	moist	2.5		5	SS	17	●										3.05 m long, 50 mm I.D. PVC screen with sandpack
	----- saturated	3.0		6	SS	29	●										
		3.5		7	SS	14	●										water level in monitoring well measured at 4.44 m depth on February 6, 2024, and measured at 4.21 m depth on September 18, 2024
422.40 6.70	End of Borehole	6.5															

CVD BOREHOLE (2017), 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024), GPJ\_CVD\_ENG.GDT\_10-1-24

**PROJECT MANAGER: EYC**  
**CHUNG & VANDER DOELEN ENGINEERING LTD.**  
 311 Victoria Street North  
 Kitchener, Ontario N2H 5E1  
 ph. (519) 742-8979, fx. (519) 742-7739

**FILE No: 1495**

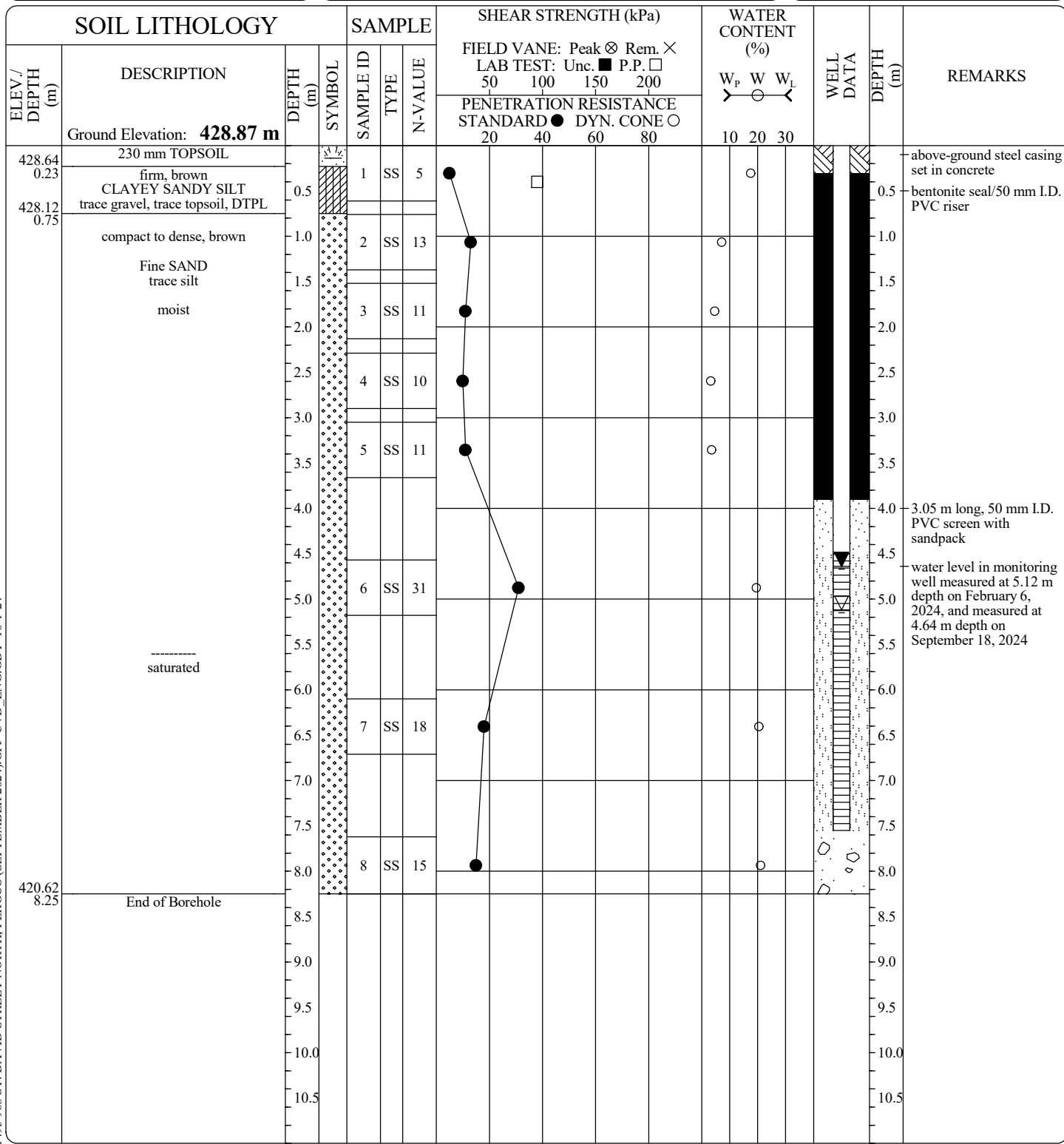
**BOREHOLE No. 3**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**

Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Jan 16 - 24 TO Jan 16 - 24**



CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT 10-1-24

**CHUNG & VANDER DOELEN  
ENGINEERING LTD.**

311 Victoria Street North  
Kitchener, Ontario N2H 5E1  
ph. (519) 742-8979, fx. (519) 742-7739

PROJECT MANAGER: **EYC**

FILE No: 1495

BOREHOLE No. 4



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

EQUIPMENT DATA

Machine: **CME-55 Track**  
Method: **Solid Stem Auger**  
Size: **152 mm O.D.**  
Date: **Jan 16 - 24 TO Jan 16 - 24**

SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS		
ELEV./DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. ×	LAB TEST: Unc. ■ P.P. □	50	100	150	200				W <sub>p</sub>	W
Ground Elevation: <b>426.94 m</b>							PENETRATION RESISTANCE				STANDARD ● DYN. CONE ○						
							20	40	60	80	10	20	30				
426.64 0.30	300 mm TOPSOIL	0.30		1	SS	5	●										above-ground steel casing set in concrete
	firm to stiff, brown CLAYEY SANDY SILT trace gravel, trace topsoil DTPL	0.5															bentonite seal/50 mm I.D. PVC riser
425.89 1.05	loose to compact, brown Fine SAND trace gravel, trace silt moist	1.05		2	SS	9	●										3.05 m long, 50 mm I.D. PVC screen with sandpack
	moist	1.5		3	SS	14	●										
	saturated	2.0		4	SS	6	●										
		2.5		5	SS	8	●										
		3.0															
		3.5		6	SS	10	●										
		4.0															
		4.5															
		5.0															
		5.5															
		6.0															
		6.5		7	SS	21	●										water level in monitoring well measured at 3.61 m depth on February 6, 2024, and measured at 3.56 m depth on September 18, 2024
420.24 6.70	silt seam, trace clay	6.70															
	End of Borehole																

CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT\_10-1-24

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PROJECT MANAGER: **EYC**

**FILE No: 1495**

**BOREHOLE No. 5**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**

Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Jan 16 - 24 TO Jan 16 - 24**

SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS	
ELEV./DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80					W <sub>p</sub>
425.43 0.18	180 mm TOPSOIL	0.5		1	SS	5										above-ground steel casing set in concrete
	loose, orangey brown SANDY SILT trace topsoil moist to wet	1.0		2	SS	4										bentonite seal/50 mm I.D. PVC riser
		1.5														
423.76 1.85	loose to compact, brown Fine SAND trace silt wet to saturated	2.0		3	SS	5										3.05 m long, 50 mm I.D. PVC screen with sandpack
		2.5		4	SS	7										
		3.0														
		3.5		5	SS	9										
		4.0														
		4.5														
		5.0		6	SS	9										
		5.5														
		6.0														
		6.5		7	SS	12										
		7.0														
		7.5														
		8.0		8	SS	13										water level in monitoring well measured at 2.10 m depth on February 6, 2024, and measured at 2.27 m depth on September 18, 2024
417.36 8.25	silt seam, trace clay	8.5														
	End of Borehole	9.0														
		9.5														
		10.0														
		10.5														

CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT\_10-1-24

**PROJECT MANAGER: EYC**

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**FILE No: 1495**

**BOREHOLE No. 101**



Client: **PoloCorp Inc.**

Project: **Proposed Residential Subdivision**

Location: **968 St. David Street North, Fergus, Ontario**

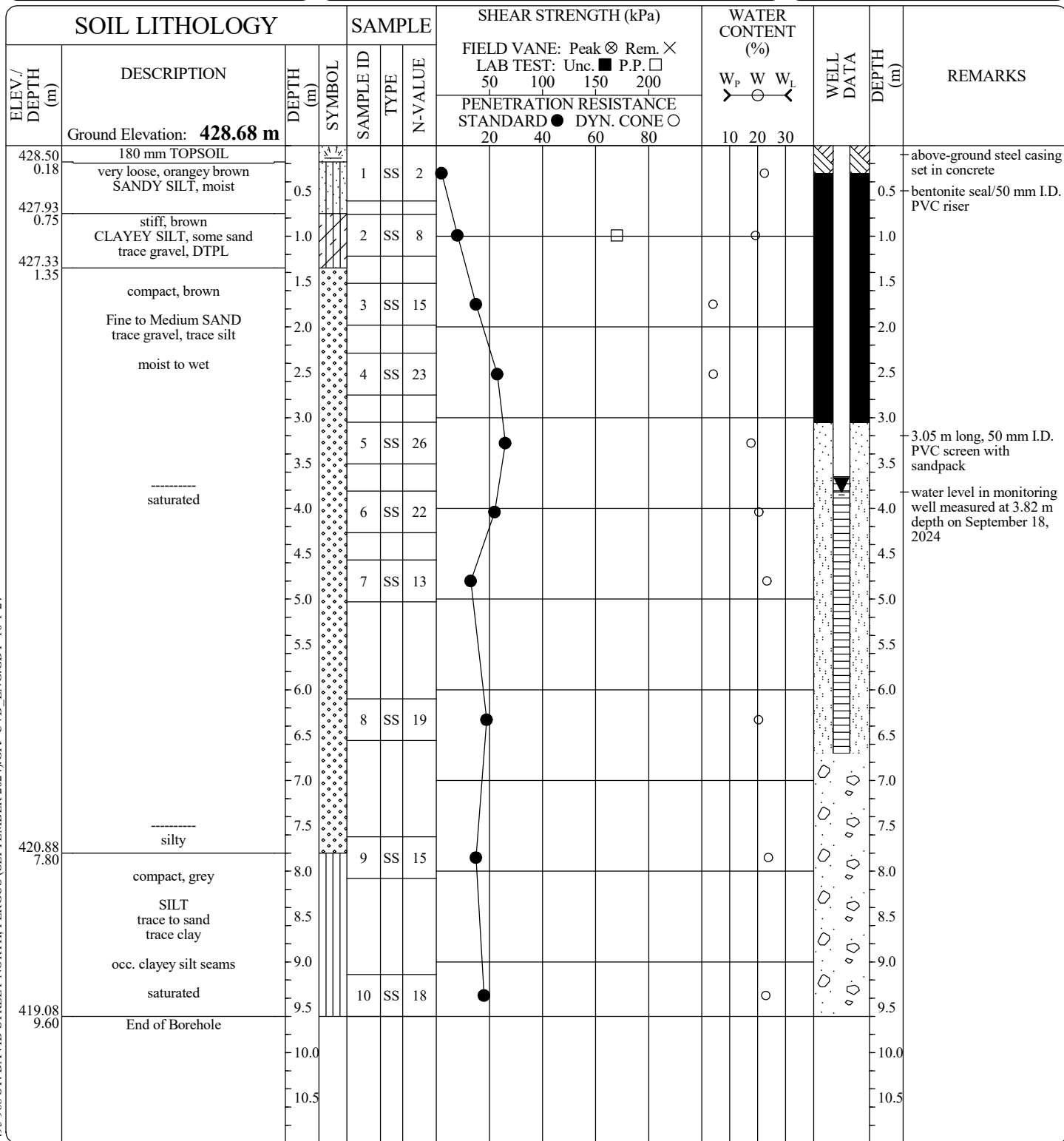
**EQUIPMENT DATA**

Machine: **CME-55 Track**

Method: **Hollow Stem Auger**

Size: **83 mm I.D.**

Date: **Sep 11 - 24 TO Sep 11 - 24**



CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT\_10-1-24

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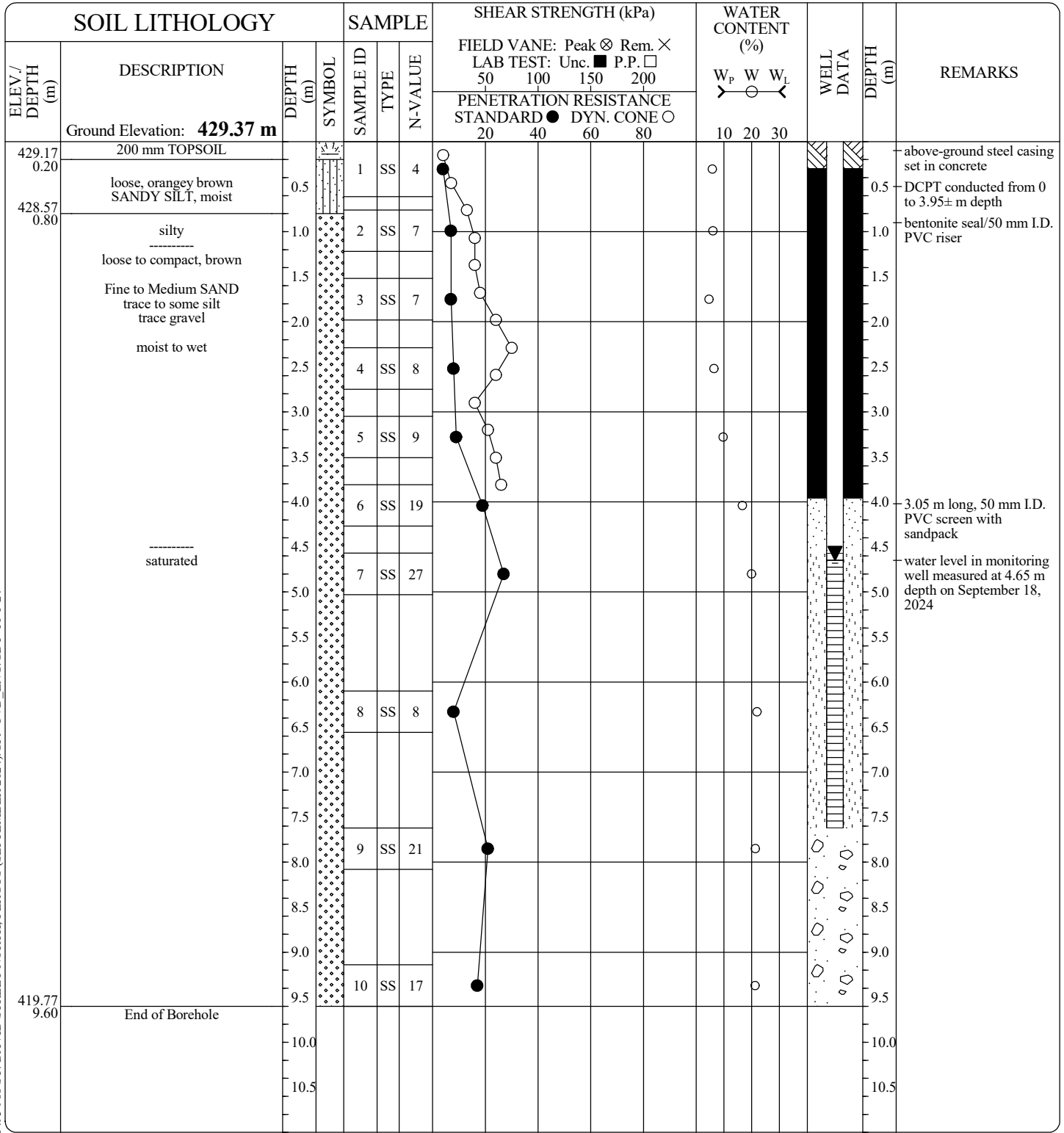
ph. (519) 742-8979, fx. (519) 742-7739

PROJECT MANAGER: **EYC**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

EQUIPMENT DATA  
Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Sep 12 - 24 TO Sep 12 - 24**



CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT 10-1-24

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PROJECT MANAGER: **EYC**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**  
Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Sep 11 - 24 TO Sep 11 - 24**

SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS	
ELEV./DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80					W <sub>p</sub>
427.51	very loose, dark brown FILL, sand and silt trace gravel, trace clay trace topsoil, moist	0.5	[Symbol]	1	SS	3	●									above-ground steel casing set in concrete
0.80																
426.96	loose, brown SANDY SILT, trace gravel trace clay, moist	1.0	[Symbol]	2	SS	5	●									bentonite seal/50 mm I.D. PVC riser
1.35																
	compact, brown Fine to Medium SAND trace silt	1.5	[Symbol]	3	SS	21	●									
		2.0														
	moist	2.5	[Symbol]	4	SS	13	●									
		3.0														
		3.5	[Symbol]	5	SS	12	●									
		4.0														
	----- saturated	4.0	[Symbol]	6	SS	12	●									3.05 m long, 50 mm I.D. PVC screen with sandpack
		4.5														
		5.0	[Symbol]	7	SS	14	●									
		5.5														
		6.0														
		6.5	[Symbol]	8	SS	24	●									
		7.0														
		7.5														
420.21	End of Borehole	8.0	[Symbol]	9	SS	14	●									water level in monitoring well measured at 3.77 m depth on September 18, 2024
8.10																

CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT\_10-1-24

**PROJECT MANAGER: EYC**  
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 Kitchener, Ontario N2H 5E1  
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Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

EQUIPMENT DATA  
Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Sep 11 - 24 TO Sep 11 - 24**

SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA		REMARKS	
ELEV./DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				WATER CONTENT (%) W <sub>p</sub> W W <sub>L</sub>			WELL DATA		DEPTH (m)
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10	20	30			
427.11 0.25	250 mm TOPSOIL	0.5		1	SS	6	●					○			above-ground steel casing set in concrete	
	loose, orangey brown to brown FILL, sand and silt trace gravel, trace clay occ. clayey silt seams moist	1.0		2	SS	7	●					○			bentonite seal/50 mm I.D. PVC riser	
		1.5		3	SS	5	●					○				
425.21 2.15	moist loose to compact, brown Fine to Medium SAND trace to some silt occ. silty sand seams saturated	2.5		4	SS	10	●					○			3.05 m long, 50 mm I.D. PVC screen with sandpack	
		3.0		5	SS	15	●					○			water level in monitoring well measured at 3.0 m depth on September 18, 2024	
		3.5		6	SS	9	●					○				
		4.0		7	SS	10	●					○				
		4.5														
		5.0														
		5.5														
		6.0														
421.06 6.30	brown compact, grey SILT trace sand, trace clay saturated	6.5		8	SS	15	●					○				
		7.0														
		7.5														
		8.0		9	SS	12	●					○				
419.26 8.10	End of Borehole	8.0														
		8.5														
		9.0														
		9.5														
		10.0														
		10.5														

CVD BOREHOLE (2017) 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024).GPJ\_CVD\_ENG.GDT\_10-1-24

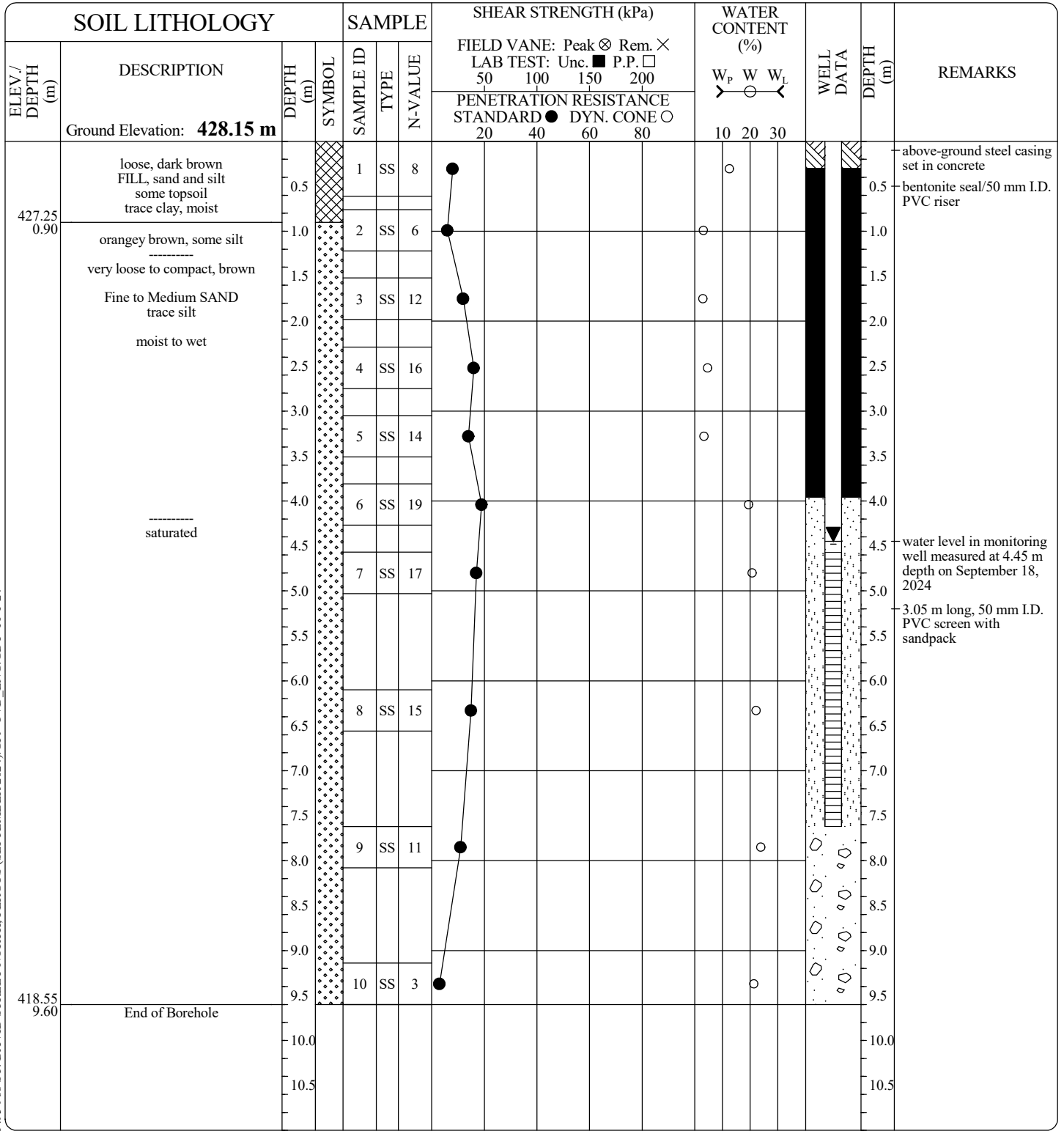
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Kitchener, Ontario N2H 5E1  
ph. (519) 742-8979, fx. (519) 742-7739

PROJECT MANAGER: **EYC**



Client: **PoloCorp Inc.**  
Project: **Proposed Residential Subdivision**  
Location: **968 St. David Street North, Fergus, Ontario**

**EQUIPMENT DATA**  
Machine: **CME-55 Track**  
Method: **Hollow Stem Auger**  
Size: **83 mm I.D.**  
Date: **Sep 12 - 24 TO Sep 12 - 24**

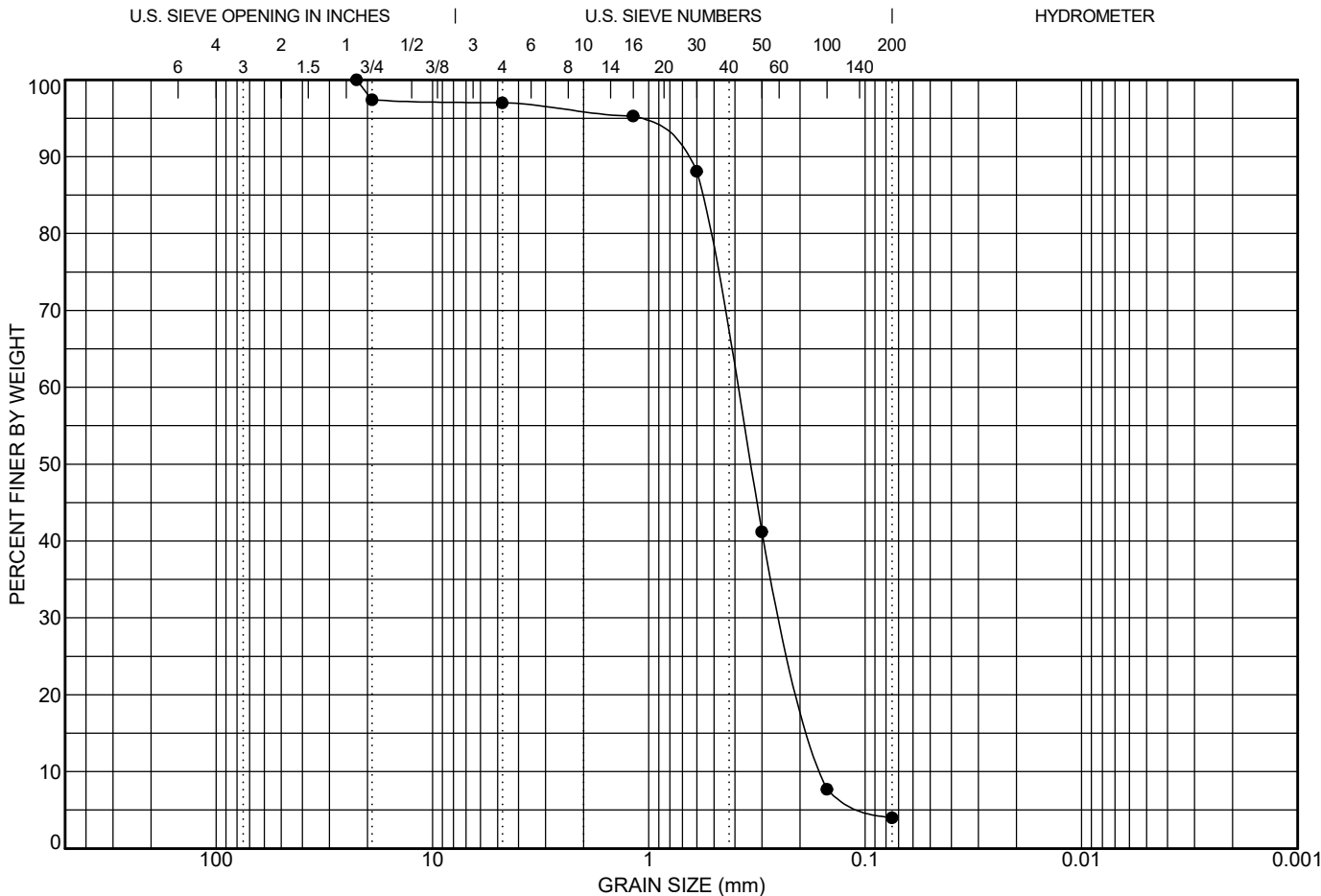


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PROJECT MANAGER: **EYC**

DM - NO SPECIFICATIONS 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024), GPJ LAW LNDN.GDT 10-1-24



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

LL	PL	PI	Cc	Cu	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
			0.91	2.52	22.4	0.396	0.238	0.157	3.0	93.0	4.0	

**Date:** Sep. 25 - 2024  
**Client:** PoloCorp Inc.  
**Contractor:**  
**Source:**  
**Sampled From:** BH 101 - SA 4, 2.30 to 2.75 m depth  
**Sample No.:** 101-4  
**Date Sampled:** Sep. 11 - 2024  
**Sampled By:** RS  
**Lab No.:** 1033  
**Date Tested:** Sep. 25 - 2024  
**Type of Material:** Fine to Medium Sand, trace gravel, trace silt

Sieve Size (mm)	Percent Passing	No Specifications

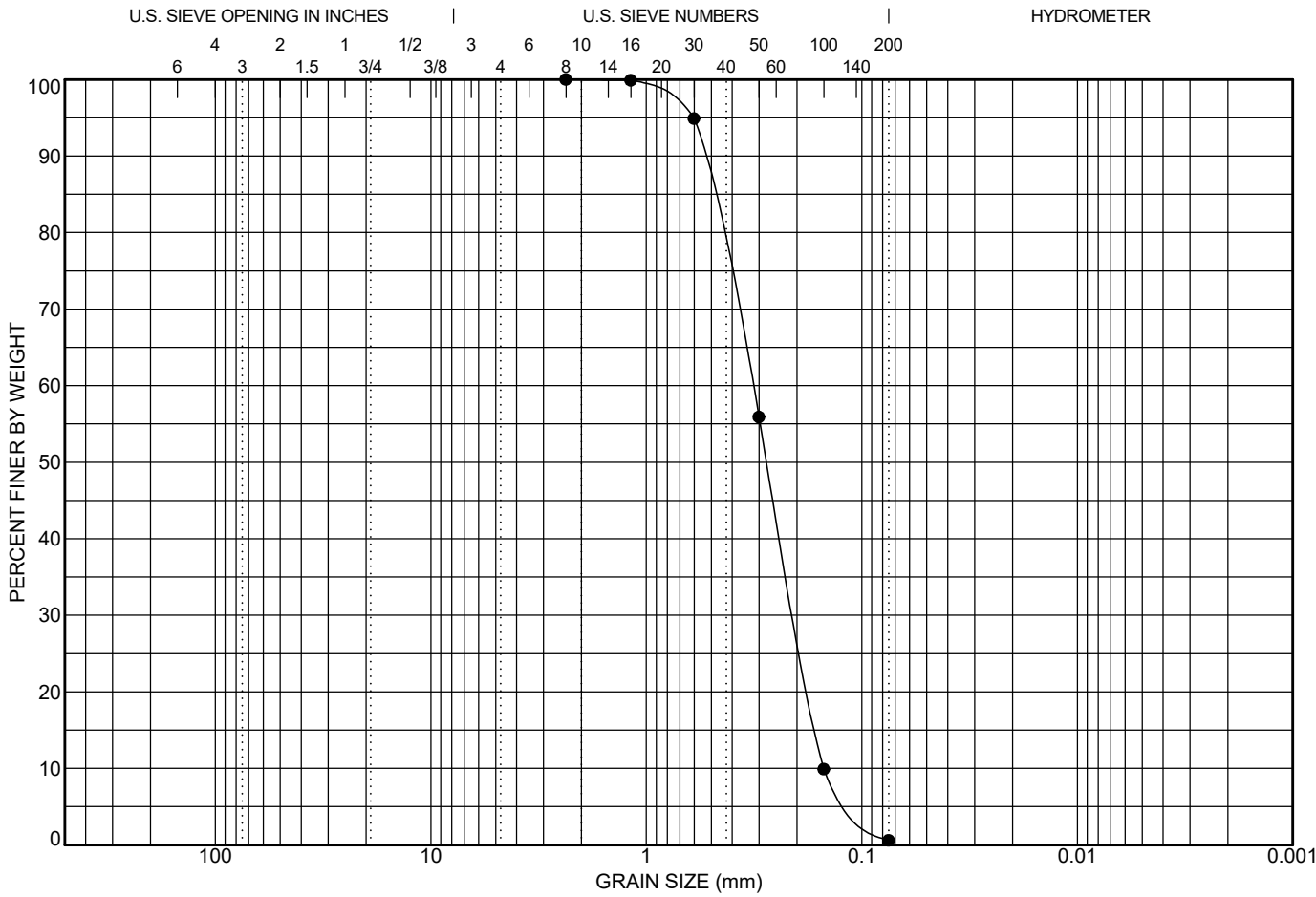


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 311 Victoria Street North  
 Kitchener, Ontario N2H 5E1  
 Telephone: 519-742-8979  
 Fax: 519-742-7739  
 e-mail: info@cvdengineering.com

**GRAIN SIZE DISTRIBUTION**

**Project:** Proposed Residential Subdivision  
**Location:** 968 St. David Street North, Fergus, Ontario  
**File No.:** 1495  
**Enclosure No.:** 22

DM - NO SPECIFICATIONS 1495 968 ST. DAVID STREET NORTH, FERGUS (SEPTEMBER 2024), GPJ LAW LNDN.GDT 10-1-24



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

LL	PL	PI	Cc	Cu	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
			0.85	2.15	2.36	0.323	0.203	0.15	0.0	99.4		0.6

<b>Date:</b> Sep. 25 - 2024 <b>Client:</b> PoloCorp Inc. <b>Contractor:</b> <b>Source:</b> <b>Sampled From:</b> BH 105 - SA 4, 2.30 to 2.75 m depth <b>Sample No.:</b> 105-4 <b>Date Sampled:</b> Sep. 12 - 2024 <b>Sampled By:</b> RS <b>Lab No.:</b> 1034 <b>Date Tested:</b> Sep. 25 - 2024 <b>Type of Material:</b> Fine to Medium Sand, trace silt	<b>Sieve Size (mm)</b>  	<b>Percent Passing</b>  	<b>No Specifications</b>  
---	--------------------------------	--------------------------------	----------------------------------



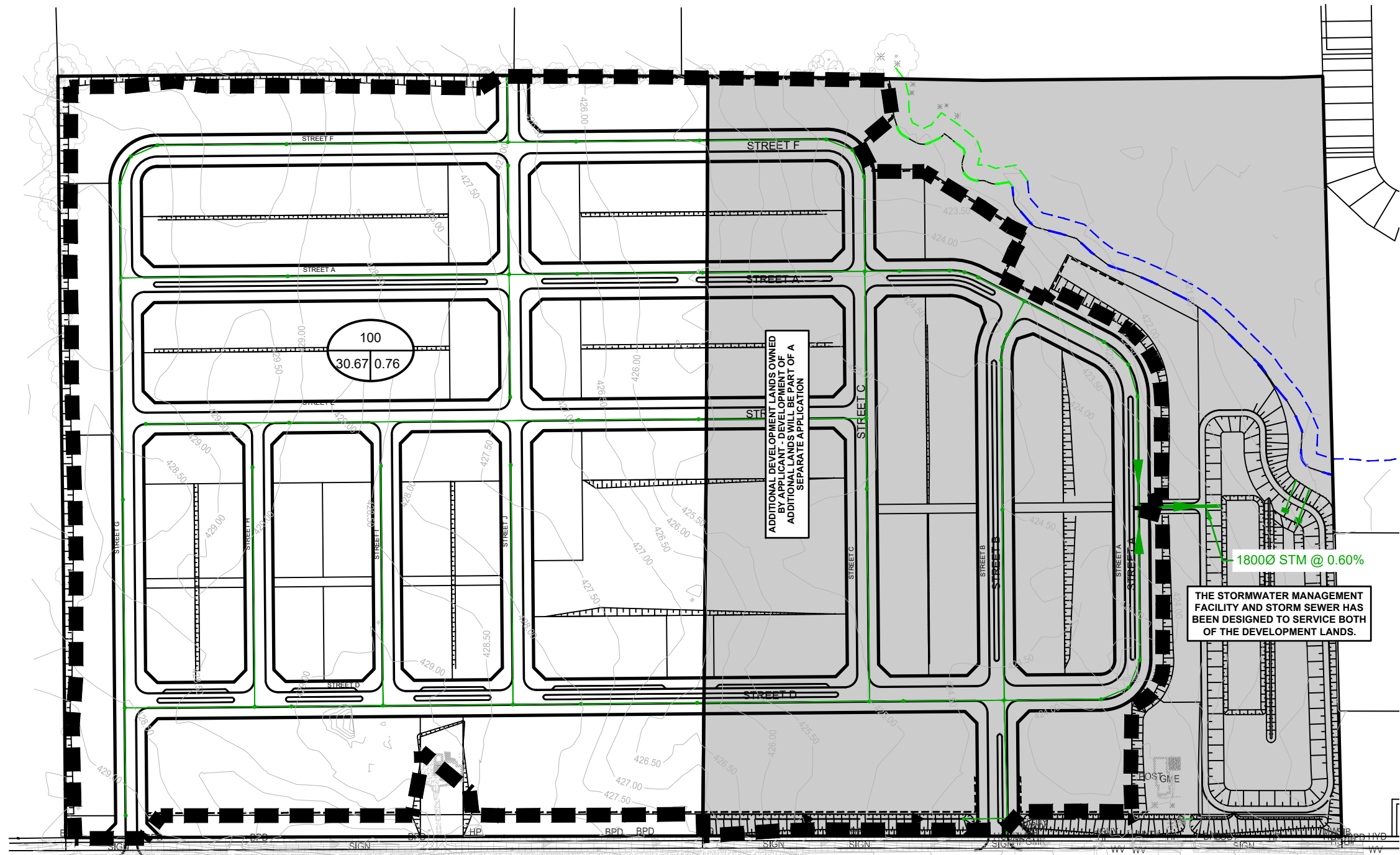
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 Kitchener, Ontario N2H 5E1  
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 Fax: 519-742-7739  
 e-mail: info@cvdengineering.com

### GRAIN SIZE DISTRIBUTION

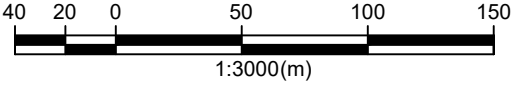
**Project:** Proposed Residential Subdivision  
**Location:** 968 St. David Street North, Fergus, Ontario  
**File No.:** 1495  
**Enclosure No.:** 23

## **Appendix B Sewer Design Sheets**

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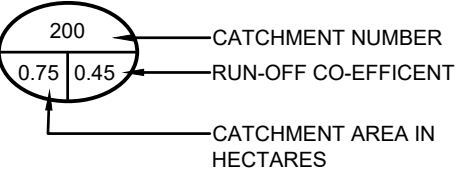


HIGHWAY 6



**LEGEND**

■ ■ ■ ■ CATCHMENT BOUNDARY



FERGUS SUBDIVISION - NORTH LANDS  
TOWNSHIP OF CENTRE WELLINGTON (FERGUS)



CONCEPTUAL STORM  
SEWER CATCHMENT AREAS

POLOCORP

Project 2401807

FEBRUARY 2025

# PRELIMINARY STORM SEWER DESIGN

5 Year Design

## TOWNSHIP OF CENTRE WELLINGTON (FERGUS)

North Lands Subdivision

Fergus Shand Dam IDF Curves

A = 544.711

B = 0.0206

C = 0.686

Intensity =  $A / (t + B)^C$

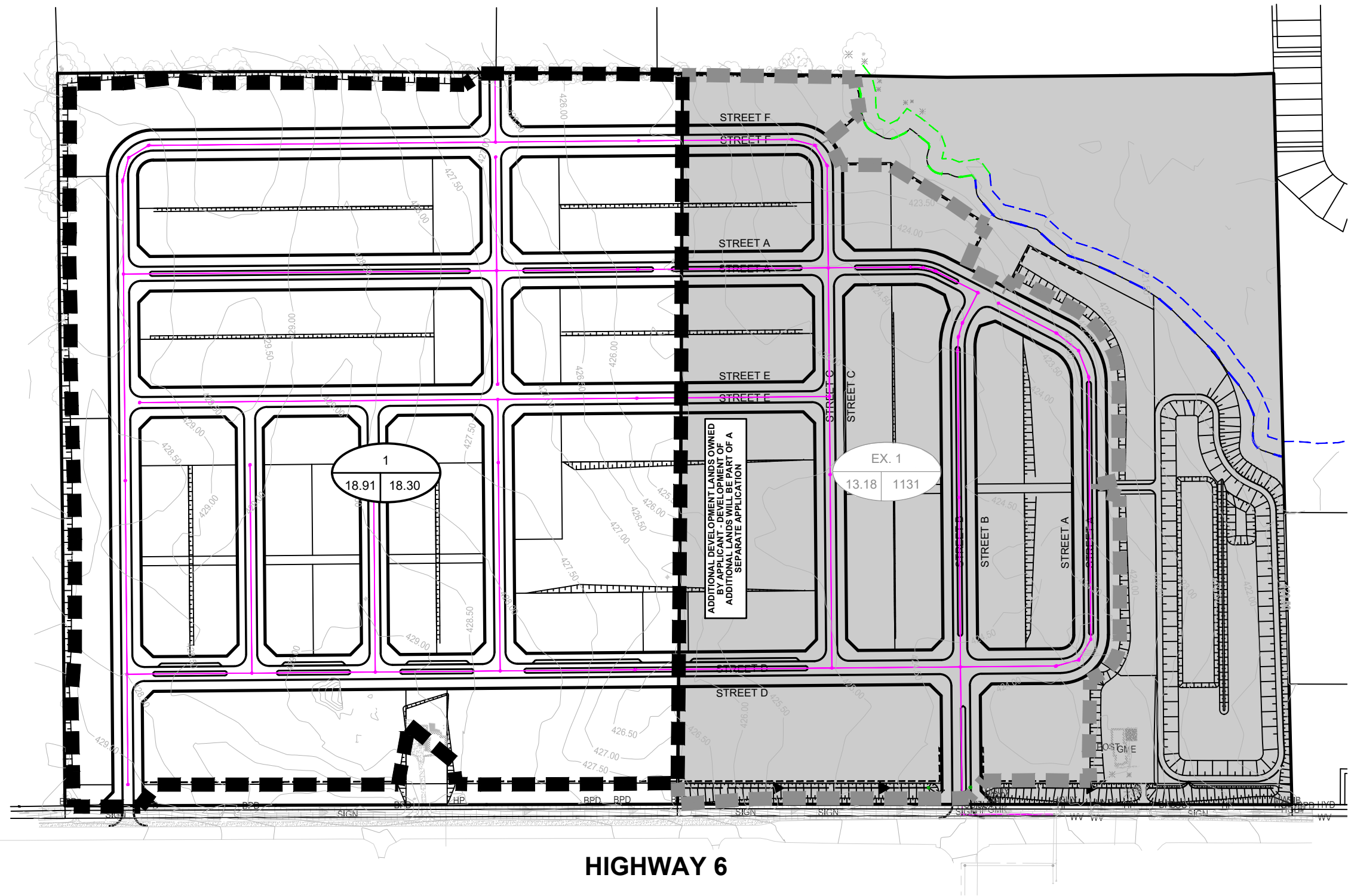
$Q = CiA$  (m<sup>3</sup>/s)

February 4, 2025

Designed By: BL

Checked By: PW

Location	Area (ha)	Runoff Coefficient	A x C	Cumulative A x C	Time of Conc. (min.)	Intensity (mm/hr)	Flow (m <sup>3</sup> /s)	Proposed Sewer						
Catchment Area								Length (m)	Pipe Size (mm)	Type of Pipe	Grade %	Capacity (m <sup>3</sup> /s)	Full Flow Velocity (m/s)	Time of Flow (min.)
100 Inlet to SWM Pond	30.67	0.76	23.31	23.31	10.00	112.09	7.257	53.0	1800	0.013	0.60	8.90	3.50	0.25



**LEGEND**

■ ■ ■ ■ CATCHMENT BOUNDARY

○ 200 — CATCHMENT NUMBER  
 0.75 0.45 — RUN-OFF CO-EFFICIENT  
 — CATCHMENT AREA IN HECTARES

FERGUS SUBDIVISION - NORTH LANDS  
TOWNSHIP OF CENTRE WELLINGTON (FERGUS)

POLOCORP



CONCEPTUAL SANITARY  
SEWER CATCHMENT AREAS

Project 2401807

FEBRUARY 2025

q = average daily per capita flow (350 L/cap.d)  
 I = unit of peak extraneous flow (0.15 L/ha/s)  
 A = Tributary area in gross hectares  
 M = Peaking factor  
 Q(p) = peak population flow (L/s)  
 Q(i) = peak extraneous flow (L/s)  
 Q(d) = peak design flow

# PRELIMINARY SANITARY SEWER DESIGN

$M = 1 + \frac{14}{4 + (P)^{1/2}}$  where P is population in 1000's  
 $Q(p) = \frac{PqM}{86.4}$  (L/s)  
 $Q(i) = IA$   
 $Q(d) = Q(p) + Q(i)$  (L/s)

## TOWNSHIP OF CENTRE WELLINGTON (FERGUS)

North Lands Subdivision

February 28, 2025

Designed By: BL

Checked By:

Location		Individual Population	Cumulative Population	Individual Area (ha)	Cumulative Area	Peaking Factor (M)	Pop. Flow Q(p) (L/s)	Peak Extraneous Flow Q(i) (L/s)	Peak Design Flow Q(d) (m3/s)	Pipe Size (mm)	Type of Pipe	Grade %	Capacity (m³/s)	Full Flow Velocity (m/s)	Actual velocity at Q(d)
From	To														
Proposed Catchment 1	Highway 6 Ex. Sanitary	1873	1873	13.81	13.81	3.608	27.37	2.072	0.0294	300	0.013	0.60	0.075	1.060	0.987
Existing Catchment 1	Highway 6 Ex. Sanitary	1131	3003	18.30	18.30	3.442	41.87	2.745	0.0446	300	0.013	0.60	0.075	1.060	1.097

## **Appendix C Stormwater Management Analysis**

---

### **C.1. Existing Conditions Modelling**

### **C.2. Post-Development Conditions Modelling**

## **C.1. Existing Conditions Modelling**

**NORTH LANDS SUBDIVISION  
TOWNSHIP OF CENTRE WELLINGTON (FERGUS)  
Our File: 422079  
March 4, 2025**

**Proposed Forebay**

Forebay Length =	140.0 m	(Dist)
Forebay Top Width =	27.0 m	
Active Forebay Depth =	1.0 m	(d)
Active Forebay Bottom Width =	21.0 m	
Approximate Permanent Forebay Pool Volume =	224.9 m <sup>3</sup>	
Length Width Ratio =	5.2 :1	(r)
25 mm Storm Pond Outlet Flowrate =	0.043 m <sup>3</sup> /s	(Q25mm)
5 Year Storm Inflow Rate =	8.626 m <sup>3</sup> /s	(Q5)
Desired Forebay Velocity =	0.500 m/s	(Vf)
Desired Settling Velocity (recommended) =	0.0003 m/s	(Vs)

**Settling Length**

$$\text{Dist} = ((r \times Q25\text{mm})/V_s)^{.5} = 27.3 \text{ m} \quad 25\text{mm}$$

Forebay length (140 m) exceeds the settling length (27.3 m).

**Dispersion Length**

$$\text{Dist} = (8 \times Q5)/(d \times V_f) = 138.0 \text{ m} \quad 5 \text{ Year}$$

Forebay length (140 m) exceeds the dispersion length (138.0 m).

**Flow Velocity in Forebay**

Cross-sectional Area (Forebay Only) =	24 m <sup>2</sup>	
Cross-sectional Area (With Permanent Pool) =	41.85 m <sup>2</sup>	
Cross-sectional Area (With Outlet Pool) =	57.85 m <sup>2</sup>	(A)
Q5 =	8.626 m <sup>3</sup> /s	
Velocity = Q5/A =	0.149 m/s	5 Year

The average flow velocity through the forebay is equal to the allowable velocity of 0.15 m/s.

**NORTH LANDS SUBDIVISION**  
**TOWNSHIP OF CENTRE WELLINGTON (FERGUS)**  
 Our File: 422079  
 March 4, 2025

**SWM Facility - Stage/Storage Volume Calculations**

**Forebay/Permanent Pool Storage Volume Calculations**

Elevation (m)	Depth (m)	Forebay Surface Area (m <sup>2</sup> )	Forebay Incremental Storage Volume (m <sup>3</sup> )	Perm. Pool Surface Area (m <sup>2</sup> )	Perm. Pool Incremental Storage Volume (m <sup>3</sup> )	Accumulative Volume (m <sup>3</sup> )	
420.20	0.00	0.0	0.0			0.0	Bottom of Forebay
420.40	0.20	817.9	81.79			81.8	
420.60	0.40	902.4	172.03			253.8	
420.80	0.60	989.3	189.17			443.0	
421.00	0.80	1,078.6	206.79			649.8	Bottom of Permanent Pool
421.20	1.00	1,170.2	224.88	9,630.00	0.00	874.7	
421.30	1.10			9,798.00	971.40	1,846.1	
421.40	1.20			10,157.40	997.77	2,843.8	
421.50	1.30			10,518.80	1,033.81	3,877.6	
							Top of Permanent Pool

**Active Storage Volume Calculations**

Elevation (m)	Depth (m)	Active Surface Area (m <sup>2</sup> )	Active Incremental Volume (m <sup>3</sup> )	Accumulative Active Volume (m <sup>3</sup> )	
421.50	0.00	10,518.8	0.00	0.00	Bottom of Active Storage
421.60	0.10	10,882.4	1,070.06	1,070.06	
421.70	0.20	11,248.2	1,106.53	2,176.59	
421.80	0.30	11,616.3	1,143.23	3,319.82	
421.90	0.40	11,986.6	1,180.15	4,499.96	T/G DICB.1
422.00	0.50	12,359.0	1,217.28	5,717.24	
422.10	0.60	12,841.0	1,260.00	6,977.24	T/G DICB.2
422.20	0.70	13,125.1	1,298.31	8,275.55	
422.30	0.80	13,410.9	1,326.80	9,602.35	
422.40	0.90	13,698.3	1,355.46	10,957.81	Weir
422.50	1.00	13,987.2	1,384.27	12,342.08	
422.60	1.10	14,277.9	1,413.26	13,755.34	
422.70	1.20	14,570.1	1,442.40	15,197.74	
422.80	1.30	14,864.0	1,471.71	16,669.44	
422.90	1.40	15,159.4	1,501.17	18,170.61	
423.00	1.50	15,456.5	1,530.80	19,701.41	
423.10	1.60	15,755.3	1,560.59	21,262.00	Top of Pond
423.20	1.70	16,055.6	1,590.55	22,852.54	

**1800 x1800 Structure Controls**

**Orifice Outlet (Extended Detention)**

modelled with 50% blockage

INV = 421.50 m  
 Q = 0.044 m<sup>3</sup>/s  
 Cd = 0.600  
 H = 1.100 m  
 2g = 19.620  
 A = 0.031 m<sup>2</sup>  
 D = 0.200 m

**Overflow Weir**

d1 = 1.500 m  
 h = 1.200  
 H = 0.300 m  
 2g = 19.620  
 L = 15.0 m  
 Q = 3.524 m<sup>3</sup>/s

$$\text{Orifice Flow} = Cd A \sqrt{2gH}$$

Cd = Discharge Coefficient  
 A = Area of Orifice  
 2g = 19.62  
 H = Depth of Water above orifice - half of orifice diameter

**Major Control - Flow Over Grate**

modelled with 50% blockage

d1 = 0.80 m  
 h = 0.50  
 H = 0.30 m  
 2g = 19.62  
 L = 3.66 m  
 Q = 0.453 m<sup>3</sup>/s

**Length of Weir**

Head over Grate (m)	Length (m)
0	1.200
0.1	1.832
0.2	2.464
0.3	3.66

**Pipe Outflow - Outlet 1**

INV. = 421.34 m  
 Diameter = 525 mm  
 Gradient = 0.50%  
 Pipe Capacity = 0.317 m<sup>3</sup>/s  
 Length = 21.30 m

**Pipe Outflow - Outlet 2**

INV. = 421.5 m  
 Diameter = 600 mm  
 Gradient = 1%  
 Pipe Capacity = 0.641 m<sup>3</sup>/s  
 Length = 20.30 m

$$\text{Weir Flow} = 0.433 \sqrt{2g \left(\frac{d}{d+h}\right)} LH^{3/2}$$

L = Length of Weir  
 2g = 19.62  
 d = total depth of water  
 h = depth of water below weir  
 H = depth of water above weir

Stage-Storage-Discharge Table										
Elevation (m)	Stage (m)	Storage (m <sup>3</sup> )	OUTLET STRUCTURE 1		OUTLET STRUCTURE 2			Weir Overflow (m <sup>3</sup> /s)	Actual Discharge (m <sup>3</sup> /s)	
			Major Control Grate (m <sup>3</sup> /s)	Major Control Pipe Outlet (m <sup>3</sup> /s)	200mm dia. Minor Outlet (m <sup>3</sup> /s)	Major Control Grate (m <sup>3</sup> /s)	Major Control Pipe Outlet (m <sup>3</sup> /s)			
421.50	0.00	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Bottom of Active Storage
421.60	0.10	1,070.1	0.000	0.152	0.007	0.000	0.039	0.000	0.007	
421.70	0.20	2,176.6	0.000	0.250	0.013	0.000	0.144	0.000	0.013	
421.80	0.30	3,319.8	0.000	0.317	0.019	0.000	0.307	0.000	0.019	
421.90	0.40	4,500.0	0.000	0.317	0.023	0.000	0.485	0.000	0.023	
422.00	0.50	5,717.2	0.000	0.317	0.026	0.000	0.621	0.000	0.026	T/G DICB.1
422.10	0.60	6,977.2	0.041	0.317	0.030	0.000	0.641	0.000	0.071	
422.20	0.70	8,275.5	0.161	0.317	0.032	0.000	0.641	0.000	0.194	
422.30	0.80	9,602.3	0.453	0.317	0.035	0.000	0.641	0.000	0.352	T/G DICB.2
422.40	0.90	10,957.8		0.317	0.037	0.040	0.641	0.000	0.395	
422.50	1.00	12,342.1		0.317	0.040	0.158	0.641	0.000	0.514	
422.60	1.10	13,755.3		0.317	0.042	0.439	0.641	0.000	0.798	
422.70	1.20	15,197.7		0.317	0.044	0.689	0.641	0.000	0.958	Weir
422.80	1.30	16,669.4		0.317			0.641	0.656	1.614	
422.90	1.40	18,170.6		0.317			0.641	1.888	2.846	
423.00	1.50	19,701.4		0.317			0.641	3.524	4.482	
423.10	1.60	21,262.0		0.317			0.641	5.502	6.460	
423.20	1.70	22,852.5		0.317			0.641	7.788	8.746	Top of Pond

**Notes:**

Major Controls - the minimum of flow over grate and pipe discharge flow rate is used in the actual discharge calculation

Knockout Controls - the knockout is assumed to contribute to discharge flow rates until the pipe discharge rate is the controlling release rate.

Major Control Pipe Flow - based on Pipe Capacity

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                      Ex__25mm.out"
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"          Company
"          Date & Time last used:                2/1/2025 at 9:55:06 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          367.000  Coefficient A"
"          5.000  Constant B"
"          0.700  Exponent C"
"          0.394  Fraction R"
"          120.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                      72.993  mm/hr"
"          Total depth                          24.995  mm"
"          7  0025hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 10"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          10  Catchment 10"
"          2.000  % Impervious"
"          31.110  Total Area"
"          200.000  Flow length"
"          3.750  Overland Slope"
"          30.488  Pervious Area"
"          200.000  Pervious length"
"          3.750  Pervious slope"
"          0.622  Impervious Area"
"          200.000  Impervious length"
"          3.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.436	0.000	0.000	0.000	c.m/sec"
"		Catchment 10	Pervious	Impervious	Total Area	"
"		Surface Area	30.488	0.622	31.110	hectare"
"		Time of concentration	53.937	6.504	50.503	minutes"
"		Time to Centroid	118.211	68.506	114.611	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	7620.53	155.52	7776.05	c.m"
"		Rainfall losses	18.911	1.722	18.568	mm"
"		Runoff depth	6.084	23.273	6.428	mm"
"		Runoff volume	1854.87	144.81	1999.67	c.m"
"		Runoff coefficient	0.243	0.931	0.257	"
"		Maximum flow	0.423	0.099	0.436	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.436	0.436	0.000	0.000"	
" 33		CATCHMENT 40"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	40	Catchment 40"				
"	0.000	% Impervious"				
"	3.330	Total Area"				
"	120.000	Flow length"				
"	3.000	Overland Slope"				
"	3.330	Pervious Area"				
"	120.000	Pervious length"				
"	3.000	Pervious slope"				
"	0.000	Impervious Area"				
"	120.000	Impervious length"				
"	3.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.056	0.436	0.000	0.000	c.m/sec"
"		Catchment 40	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	42.448	5.118	42.448	minutes"
"		Time to Centroid	105.920	66.672	105.919	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	832.34	0.00	832.34	c.m"
"		Rainfall losses	18.910	1.665	18.910	mm"
"		Runoff depth	6.085	23.330	6.085	mm"

"	Runoff volume	202.64	0.00	202.64	c.m"
"	Runoff coefficient	0.243	0.000	0.243	"
"	Maximum flow	0.056	0.000	0.056	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.056	0.489	0.000	0.000"	
" 33	CATCHMENT 30"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	30 Catchment 30"				
"	5.000 % Impervious"				
"	2.000 Total Area"				
"	40.000 Flow length"				
"	3.750 Overland Slope"				
"	1.900 Pervious Area"				
"	40.000 Pervious length"				
"	3.750 Pervious slope"				
"	0.100 Impervious Area"				
"	40.000 Impervious length"				
"	3.750 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.058	0.489	0.000	0.000 c.m/sec"	
"	Catchment 30	Pervious	Impervious	Total Area	"
"	Surface Area	1.900	0.100	2.000	hectare"
"	Time of concentration	20.536	2.476	17.532	minutes"
"	Time to Centroid	82.465	63.135	79.250	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	474.91	25.00	499.91	c.m"
"	Rainfall losses	18.914	1.941	18.065	mm"
"	Runoff depth	6.082	23.054	6.930	mm"
"	Runoff volume	115.55	23.05	138.61	c.m"
"	Runoff coefficient	0.243	0.922	0.277	"
"	Maximum flow	0.055	0.016	0.058	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.058	0.514	0.000	0.000"	
" 33	CATCHMENT 20"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

```

"      20  Catchment 20"
"      0.000  % Impervious"
"      2.980  Total Area"
"     80.000  Flow length"
"      1.250  Overland Slope"
"      2.980  Pervious Area"
"     80.000  Pervious length"
"      1.250  Pervious slope"
"      0.000  Impervious Area"
"     80.000  Impervious length"
"      1.250  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.049    0.514    0.000    0.000 c.m/sec"
"      Catchment 20      Pervious  Impervious Total Area "
"      Surface Area      2.980    0.000    2.980    hectare"
"      Time of concentration 43.278    5.218    43.277    minutes"
"      Time to Centroid    106.800    66.808    106.800    minutes"
"      Rainfall depth      24.995    24.995    24.995    mm"
"      Rainfall volume     744.86    0.00    744.86    c.m"
"      Rainfall losses     18.910    1.642    18.910    mm"
"      Runoff depth        6.085    23.353    6.085    mm"
"      Runoff volume       181.33    0.00    181.33    c.m"
"      Runoff coefficient   0.243    0.000    0.243    "
"      Maximum flow        0.049    0.000    0.049    c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"          0.049    0.561    0.000    0.000"
" 38  START/RE-START TOTALS 20"
"      3  Runoff Totals on EXIT"
"      Total Catchment area      39.420    hectare"
"      Total Impervious area     0.722    hectare"
"      Total % impervious      1.832"
" 19  EXIT"

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"          MIDUSS Output ----->"
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"          MIDUSS created                      Sunday, February 7, 2010"
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"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                      Ex__2yr.out"
"          Licensee name:
"          Company
"          Date & Time last used:                2/1/2025 at 9:57:32 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          414.876  Coefficient A"
"          0.027  Constant B"
"          0.682  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          100.235  mm/hr"
"          Total depth                39.504  mm"
"          6  002hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 10"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          10  Catchment 10"
"          2.000  % Impervious"
"          31.110  Total Area"
"          200.000  Flow length"
"          3.750  Overland Slope"
"          30.488  Pervious Area"
"          200.000  Pervious length"
"          3.750  Pervious slope"
"          0.622  Impervious Area"
"          200.000  Impervious length"
"          3.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		1.519	0.000	0.000	0.000	c.m/sec"
"		Catchment 10	Pervious	Impervious	Total Area	"
"		Surface Area	30.488	0.622	31.110	hectare"
"		Time of concentration	31.890	5.729	30.537	minutes"
"		Time to Centroid	144.180	120.327	142.946	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	1.2044	0.0246	1.2290	ha-m"
"		Rainfall losses	25.393	1.789	24.921	mm"
"		Runoff depth	14.111	37.715	14.583	mm"
"		Runoff volume	4302.12	234.66	4536.78	c.m"
"		Runoff coefficient	0.357	0.955	0.369	"
"		Maximum flow	1.495	0.138	1.519	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		1.519	1.519	0.000	0.000"	
" 33		CATCHMENT 40"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	40	Catchment 40"				
"	0.000	% Impervious"				
"	3.330	Total Area"				
"	120.000	Flow length"				
"	3.000	Overland Slope"				
"	3.330	Pervious Area"				
"	120.000	Pervious length"				
"	3.000	Pervious slope"				
"	0.000	Impervious Area"				
"	120.000	Impervious length"				
"	3.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.193	1.519	0.000	0.000	c.m/sec"
"		Catchment 40	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	25.097	4.509	25.096	minutes"
"		Time to Centroid	135.157	118.349	135.157	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	1315.48	0.00	1315.48	c.m"
"		Rainfall losses	25.393	1.692	25.393	mm"
"		Runoff depth	14.111	37.813	14.111	mm"

"	Runoff volume	469.88	0.00	469.89	c.m"
"	Runoff coefficient	0.357	0.000	0.357	"
"	Maximum flow	0.193	0.000	0.193	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.193 1.700 0.000 0.000"				
" 33	CATCHMENT 30"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	30 Catchment 30"				
"	5.000 % Impervious"				
"	2.000 Total Area"				
"	40.000 Flow length"				
"	3.750 Overland Slope"				
"	1.900 Pervious Area"				
"	40.000 Pervious length"				
"	3.750 Pervious slope"				
"	0.100 Impervious Area"				
"	40.000 Impervious length"				
"	3.750 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.188 1.700 0.000 0.000 c.m/sec"				
"	Catchment 30 Pervious Impervious Total Area "				
"	Surface Area 1.900 0.100 2.000 hectare"				
"	Time of concentration 12.141 2.181 10.914 minutes"				
"	Time to Centroid 117.971 114.662 117.563 minutes"				
"	Rainfall depth 39.504 39.504 39.504 mm"				
"	Rainfall volume 750.58 39.50 790.08 c.m"				
"	Rainfall losses 25.401 1.860 24.224 mm"				
"	Runoff depth 14.103 37.644 15.280 mm"				
"	Runoff volume 267.95 37.64 305.59 c.m"				
"	Runoff coefficient 0.357 0.953 0.387 "				
"	Maximum flow 0.183 0.026 0.188 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.188 1.787 0.000 0.000"				
" 33	CATCHMENT 20"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

```

"      20  Catchment 20"
"      0.000  % Impervious"
"      2.980  Total Area"
"     80.000  Flow length"
"      1.250  Overland Slope"
"      2.980  Pervious Area"
"     80.000  Pervious length"
"      1.250  Pervious slope"
"      0.000  Impervious Area"
"     80.000  Impervious length"
"      1.250  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.169      1.787      0.000      0.000 c.m/sec"
"      Catchment 20      Pervious      Impervious      Total Area  "
"      Surface Area      2.980      0.000      2.980      hectare"
"      Time of concentration  25.587      4.597      25.587      minutes"
"      Time to Centroid      135.809      118.488      135.809      minutes"
"      Rainfall depth      39.504      39.504      39.504      mm"
"      Rainfall volume      1177.22      0.00      1177.22      c.m"
"      Rainfall losses      25.405      1.665      25.405      mm"
"      Runoff depth      14.099      37.839      14.099      mm"
"      Runoff volume      420.16      0.00      420.16      c.m"
"      Runoff coefficient      0.357      0.000      0.357      "
"      Maximum flow      0.169      0.000      0.169      c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"          0.169      1.947      0.000      0.000"
" 38  START/RE-START TOTALS 20"
"      3  Runoff Totals on EXIT"
"      Total Catchment area      39.420      hectare"
"      Total Impervious area      0.722      hectare"
"      Total % impervious      1.832"
" 19  EXIT"

```

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                      Ex__5yr.out"
"          Licensee name:
"          Company
"          Date & Time last used:                2/1/2025 at 10:00:00 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          544.711  Coefficient A"
"          0.021  Constant B"
"          0.686  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          130.581  mm/hr"
"          Total depth          50.743  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 10"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          10  Catchment 10"
"          2.000  % Impervious"
"          31.110  Total Area"
"          200.000  Flow length"
"          3.750  Overland Slope"
"          30.488  Pervious Area"
"          200.000  Pervious length"
"          3.750  Pervious slope"
"          0.622  Impervious Area"
"          200.000  Impervious length"
"          3.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		2.658	0.000	0.000	0.000	c.m/sec"
"		Catchment 10	Pervious	Impervious	Total Area	"
"		Surface Area	30.488	0.622	31.110	hectare"
"		Time of concentration	28.411	5.154	27.464	minutes"
"		Time to Centroid	142.235	118.538	141.271	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	1.5470	0.0316	1.5786	ha-m"
"		Rainfall losses	27.148	1.682	26.639	mm"
"		Runoff depth	23.595	49.061	24.104	mm"
"		Runoff volume	7193.54	305.26	7498.80	c.m"
"		Runoff coefficient	0.465	0.967	0.475	"
"		Maximum flow	2.627	0.173	2.658	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		2.658	2.658	0.000	0.000"	
" 33		CATCHMENT 40"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	40	Catchment 40"				
"	0.000	% Impervious"				
"	3.330	Total Area"				
"	120.000	Flow length"				
"	3.000	Overland Slope"				
"	3.330	Pervious Area"				
"	120.000	Pervious length"				
"	3.000	Pervious slope"				
"	0.000	Impervious Area"				
"	120.000	Impervious length"				
"	3.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.356	2.658	0.000	0.000	c.m/sec"
"		Catchment 40	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	22.359	4.056	22.359	minutes"
"		Time to Centroid	134.036	116.866	134.036	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	1689.74	0.00	1689.74	c.m"
"		Rainfall losses	27.188	2.068	27.188	mm"
"		Runoff depth	23.555	48.675	23.555	mm"

"	Runoff volume	784.37	0.00	784.38	c.m"
"	Runoff coefficient	0.464	0.000	0.464	"
"	Maximum flow	0.356	0.000	0.356	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.356 2.963 0.000 0.000"				
" 33	CATCHMENT 30"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	30 Catchment 30"				
"	5.000 % Impervious"				
"	2.000 Total Area"				
"	40.000 Flow length"				
"	3.750 Overland Slope"				
"	1.900 Pervious Area"				
"	40.000 Pervious length"				
"	3.750 Pervious slope"				
"	0.100 Impervious Area"				
"	40.000 Impervious length"				
"	3.750 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.332 2.963 0.000 0.000 c.m/sec"				
"	Catchment 30 Pervious Impervious Total Area "				
"	Surface Area 1.900 0.100 2.000 hectare"				
"	Time of concentration 10.817 1.962 9.949 minutes"				
"	Time to Centroid 118.405 113.377 117.912 minutes"				
"	Rainfall depth 50.743 50.743 50.743 mm"				
"	Rainfall volume 964.12 50.74 1014.86 c.m"				
"	Rainfall losses 27.163 2.058 25.908 mm"				
"	Runoff depth 23.580 48.685 24.835 mm"				
"	Runoff volume 448.02 48.69 496.71 c.m"				
"	Runoff coefficient 0.465 0.959 0.489 "				
"	Maximum flow 0.314 0.033 0.332 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.332 3.061 0.000 0.000"				
" 33	CATCHMENT 20"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

```

"      20  Catchment 20"
"      0.000  % Impervious"
"      2.980  Total Area"
"     80.000  Flow length"
"      1.250  Overland Slope"
"      2.980  Pervious Area"
"     80.000  Pervious length"
"      1.250  Pervious slope"
"      0.000  Impervious Area"
"     80.000  Impervious length"
"      1.250  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.317      3.061      0.000      0.000 c.m/sec"
"      Catchment 20      Pervious      Impervious      Total Area  "
"      Surface Area      2.980      0.000      2.980      hectare"
"      Time of concentration  22.796      4.135      22.796      minutes"
"      Time to Centroid      134.645      116.951      134.645      minutes"
"      Rainfall depth      50.743      50.743      50.743      mm"
"      Rainfall volume      1512.14      0.00      1512.14      c.m"
"      Rainfall losses      27.154      1.996      27.154      mm"
"      Runoff depth      23.589      48.747      23.589      mm"
"      Runoff volume      702.95      0.00      702.95      c.m"
"      Runoff coefficient      0.465      0.000      0.465      "
"      Maximum flow      0.317      0.000      0.317      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"      4      Add Runoff  "
"          0.317      3.346      0.000      0.000"
" 38      START/RE-START TOTALS 20"
"      3      Runoff Totals on EXIT"
"      Total Catchment area      39.420      hectare"
"      Total Impervious area      0.722      hectare"
"      Total % impervious      1.832"
" 19      EXIT"

```

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                      Ex__10yr.out"
"          Licensee name:
"          Company
"          Date & Time last used:                2/1/2025 at 10:01:14 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          627.308  Coefficient A"
"          0.014  Constant B"
"          0.687  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          150.159  mm/hr"
"          Total depth                58.119  mm"
"          6  010hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 10"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          10  Catchment 10"
"          2.000  % Impervious"
"          31.110  Total Area"
"          200.000  Flow length"
"          3.750  Overland Slope"
"          30.488  Pervious Area"
"          200.000  Pervious length"
"          3.750  Pervious slope"
"          0.622  Impervious Area"
"          200.000  Impervious length"
"          3.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		3.519	0.000	0.000	0.000	c.m/sec"
"		Catchment 10	Pervious	Impervious	Total Area	"
"		Surface Area	30.488	0.622	31.110	hectare"
"		Time of concentration	26.776	4.874	25.973	minutes"
"		Time to Centroid	142.154	117.737	141.259	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	1.7719	0.0362	1.8081	ha-m"
"		Rainfall losses	27.874	1.726	27.351	mm"
"		Runoff depth	30.245	56.393	30.768	mm"
"		Runoff volume	9221.02	350.88	9571.89	c.m"
"		Runoff coefficient	0.520	0.970	0.529	"
"		Maximum flow	3.479	0.202	3.519	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		3.519	3.519	0.000	0.000"	
" 33		CATCHMENT 40"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	40	Catchment 40"				
"	0.000	% Impervious"				
"	3.330	Total Area"				
"	120.000	Flow length"				
"	3.000	Overland Slope"				
"	3.330	Pervious Area"				
"	120.000	Pervious length"				
"	3.000	Pervious slope"				
"	0.000	Impervious Area"				
"	120.000	Impervious length"				
"	3.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.455	3.519	0.000	0.000	c.m/sec"
"		Catchment 40	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	21.072	3.835	21.072	minutes"
"		Time to Centroid	134.304	116.233	134.304	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	1935.36	0.00	1935.37	c.m"
"		Rainfall losses	27.871	2.469	27.871	mm"
"		Runoff depth	30.248	55.650	30.248	mm"

"	Runoff volume	1007.27	0.00	1007.27	c.m"
"	Runoff coefficient	0.520	0.000	0.520	"
"	Maximum flow	0.455	0.000	0.455	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.455	3.974	0.000	0.000"	
" 33	CATCHMENT 30"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	30 Catchment 30"				
"	5.000 % Impervious"				
"	2.000 Total Area"				
"	40.000 Flow length"				
"	3.750 Overland Slope"				
"	1.900 Pervious Area"				
"	40.000 Pervious length"				
"	3.750 Pervious slope"				
"	0.100 Impervious Area"				
"	40.000 Impervious length"				
"	3.750 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.437	3.974	0.000	0.000 c.m/sec"	
"	Catchment 30	Pervious	Impervious	Total Area	"
"	Surface Area	1.900	0.100	2.000	hectare"
"	Time of concentration	10.194	1.856	9.450	minutes"
"	Time to Centroid	119.342	112.794	118.757	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	1104.26	58.12	1162.38	c.m"
"	Rainfall losses	28.125	2.227	26.830	mm"
"	Runoff depth	29.994	55.893	31.289	mm"
"	Runoff volume	569.88	55.89	625.77	c.m"
"	Runoff coefficient	0.516	0.962	0.538	"
"	Maximum flow	0.417	0.038	0.437	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.437	4.203	0.000	0.000"	
" 33	CATCHMENT 20"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

```

"      20  Catchment 20"
"      0.000  % Impervious"
"      2.980  Total Area"
"     80.000  Flow length"
"      1.250  Overland Slope"
"      2.980  Pervious Area"
"     80.000  Pervious length"
"      1.250  Pervious slope"
"      0.000  Impervious Area"
"     80.000  Impervious length"
"      1.250  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.405      4.203      0.000      0.000 c.m/sec"
"      Catchment 20      Pervious      Impervious      Total Area  "
"      Surface Area      2.980      0.000      2.980      hectare"
"      Time of concentration  21.484      3.910      21.484      minutes"
"      Time to Centroid      134.868      116.328      134.868      minutes"
"      Rainfall depth      58.119      58.119      58.119      mm"
"      Rainfall volume      1731.95      0.00      1731.95      c.m"
"      Rainfall losses      27.884      2.347      27.884      mm"
"      Runoff depth      30.235      55.772      30.235      mm"
"      Runoff volume      901.02      0.00      901.02      c.m"
"      Runoff coefficient      0.520      0.000      0.520      "
"      Maximum flow      0.405      0.000      0.405      c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"          0.405      4.608      0.000      0.000"
" 38  START/RE-START TOTALS 20"
"      3  Runoff Totals on EXIT"
"      Total Catchment area      39.420      hectare"
"      Total Impervious area      0.722      hectare"
"      Total % impervious      1.832"
" 19  EXIT"

```

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                      Ex__25yr.out"
"          Licensee name:
"          Company
"          Date & Time last used:                2/1/2025 at 10:02:34 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          746.059  Coefficient A"
"          0.085  Constant B"
"          0.692  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          175.653  mm/hr"
"          Total depth          67.239  mm"
"          6  025hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 10"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          10  Catchment 10"
"          2.000  % Impervious"
"          31.110  Total Area"
"          200.000  Flow length"
"          3.750  Overland Slope"
"          30.488  Pervious Area"
"          200.000  Pervious length"
"          3.750  Pervious slope"
"          0.622  Impervious Area"
"          200.000  Impervious length"
"          3.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		4.835	0.000	0.000	0.000	c.m/sec"
"		Catchment 10	Pervious	Impervious	Total Area	"
"		Surface Area	30.488	0.622	31.110	hectare"
"		Time of concentration	25.077	4.577	24.395	minutes"
"		Time to Centroid	142.054	116.842	141.215	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	2.0500	0.0418	2.0918	ha-m"
"		Rainfall losses	28.420	1.790	27.888	mm"
"		Runoff depth	38.818	65.448	39.351	mm"
"		Runoff volume	1.1835	0.0407	1.2242	ha-m"
"		Runoff coefficient	0.577	0.973	0.585	"
"		Maximum flow	4.789	0.242	4.835	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		4.835	4.835	0.000	0.000"	
" 33		CATCHMENT 40"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	40	Catchment 40"				
"	0.000	% Impervious"				
"	3.330	Total Area"				
"	120.000	Flow length"				
"	3.000	Overland Slope"				
"	3.330	Pervious Area"				
"	120.000	Pervious length"				
"	3.000	Pervious slope"				
"	0.000	Impervious Area"				
"	120.000	Impervious length"				
"	3.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.607	4.835	0.000	0.000	c.m/sec"
"		Catchment 40	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	19.735	3.602	19.735	minutes"
"		Time to Centroid	134.608	115.439	134.608	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	2239.05	0.00	2239.05	c.m"
"		Rainfall losses	28.441	2.959	28.441	mm"
"		Runoff depth	38.798	64.280	38.798	mm"

"	Runoff volume	1291.96	0.00	1291.97	c.m"
"	Runoff coefficient	0.577	0.000	0.577	"
"	Maximum flow	0.607	0.000	0.607	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.607	5.416	0.000	0.000"	
" 33	CATCHMENT 30"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	30 Catchment 30"				
"	5.000 % Impervious"				
"	2.000 Total Area"				
"	40.000 Flow length"				
"	3.750 Overland Slope"				
"	1.900 Pervious Area"				
"	40.000 Pervious length"				
"	3.750 Pervious slope"				
"	0.100 Impervious Area"				
"	40.000 Impervious length"				
"	3.750 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.574	5.416	0.000	0.000 c.m/sec"	
"	Catchment 30	Pervious	Impervious	Total Area	"
"	Surface Area	1.900	0.100	2.000	hectare"
"	Time of concentration	9.548	1.743	8.915	minutes"
"	Time to Centroid	120.388	112.106	119.717	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	1277.54	67.24	1344.78	c.m"
"	Rainfall losses	28.570	2.417	27.262	mm"
"	Runoff depth	38.669	64.822	39.977	mm"
"	Runoff volume	734.71	64.82	799.53	c.m"
"	Runoff coefficient	0.575	0.964	0.595	"
"	Maximum flow	0.551	0.045	0.574	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.574	5.660	0.000	0.000"	
" 33	CATCHMENT 20"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

```

"      20  Catchment 20"
"      0.000  % Impervious"
"      2.980  Total Area"
"     80.000  Flow length"
"      1.250  Overland Slope"
"      2.980  Pervious Area"
"     80.000  Pervious length"
"      1.250  Pervious slope"
"      0.000  Impervious Area"
"     80.000  Impervious length"
"      1.250  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.532      5.660      0.000      0.000 c.m/sec"
"      Catchment 20      Pervious      Impervious      Total Area  "
"      Surface Area      2.980      0.000      2.980      hectare"
"      Time of concentration  20.121      3.673      20.121      minutes"
"      Time to Centroid      135.142      115.553      135.142      minutes"
"      Rainfall depth      67.239      67.239      67.239      mm"
"      Rainfall volume      2003.72      0.00      2003.72      c.m"
"      Rainfall losses      28.405      2.912      28.405      mm"
"      Runoff depth      38.834      64.327      38.834      mm"
"      Runoff volume      1157.25      0.00      1157.26      c.m"
"      Runoff coefficient      0.578      0.000      0.578      "
"      Maximum flow      0.532      0.000      0.532      c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"          0.532      6.178      0.000      0.000"
" 38  START/RE-START TOTALS 20"
"      3  Runoff Totals on EXIT"
"      Total Catchment area      39.420      hectare"
"      Total Impervious area      0.722      hectare"
"      Total % impervious      1.832"
" 19  EXIT"

```

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                      Ex__50yr.out"
"          Licensee name:
"          Company
"          Date & Time last used:                2/1/2025 at 10:03:46 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          820.361  Coefficient A"
"          0.010  Constant B"
"          0.691  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          194.803  mm/hr"
"          Total depth                74.358  mm"
"          6  050hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 10"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          10  Catchment 10"
"          2.000  % Impervious"
"          31.110  Total Area"
"          200.000  Flow length"
"          3.750  Overland Slope"
"          30.488  Pervious Area"
"          200.000  Pervious length"
"          3.750  Pervious slope"
"          0.622  Impervious Area"
"          200.000  Impervious length"
"          3.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		5.783	0.000	0.000	0.000	c.m/sec"
"		Catchment 10	Pervious	Impervious	Total Area	"
"		Surface Area	30.488	0.622	31.110	hectare"
"		Time of concentration	24.024	4.392	23.408	minutes"
"		Time to Centroid	142.713	116.390	141.888	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	2.2670	0.0463	2.3133	ha-m"
"		Rainfall losses	28.718	1.950	28.183	mm"
"		Runoff depth	45.640	72.408	46.175	mm"
"		Runoff volume	1.3915	0.0451	1.4365	ha-m"
"		Runoff coefficient	0.614	0.974	0.621	"
"		Maximum flow	5.731	0.272	5.783	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		5.783	5.783	0.000	0.000"	
" 33		CATCHMENT 40"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	40	Catchment 40"				
"	0.000	% Impervious"				
"	3.330	Total Area"				
"	120.000	Flow length"				
"	3.000	Overland Slope"				
"	3.330	Pervious Area"				
"	120.000	Pervious length"				
"	3.000	Pervious slope"				
"	0.000	Impervious Area"				
"	120.000	Impervious length"				
"	3.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.720	5.783	0.000	0.000	c.m/sec"
"		Catchment 40	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	18.906	3.456	18.906	minutes"
"		Time to Centroid	135.377	115.016	135.377	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	2476.11	0.00	2476.11	c.m"
"		Rainfall losses	28.813	3.112	28.813	mm"
"		Runoff depth	45.544	71.246	45.544	mm"

"	Runoff volume	1516.63	0.00	1516.63	c.m"
"	Runoff coefficient	0.613	0.000	0.613	"
"	Maximum flow	0.720	0.000	0.720	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.720	6.448	0.000	0.000"	
" 33	CATCHMENT 30"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	30 Catchment 30"				
"	5.000 % Impervious"				
"	2.000 Total Area"				
"	40.000 Flow length"				
"	3.750 Overland Slope"				
"	1.900 Pervious Area"				
"	40.000 Pervious length"				
"	3.750 Pervious slope"				
"	0.100 Impervious Area"				
"	40.000 Impervious length"				
"	3.750 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.670	6.448	0.000	0.000 c.m/sec"	
"	Catchment 30	Pervious	Impervious	Total Area	"
"	Surface Area	1.900	0.100	2.000	hectare"
"	Time of concentration	9.147	1.672	8.573	minutes"
"	Time to Centroid	121.402	111.843	120.668	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	1412.80	74.36	1487.16	c.m"
"	Rainfall losses	28.890	2.541	27.572	mm"
"	Runoff depth	45.468	71.816	46.785	mm"
"	Runoff volume	863.89	71.82	935.71	c.m"
"	Runoff coefficient	0.611	0.966	0.629	"
"	Maximum flow	0.645	0.050	0.670	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.670	6.702	0.000	0.000"	
" 33	CATCHMENT 20"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

```

"      20  Catchment 20"
"      0.000  % Impervious"
"      2.980  Total Area"
"     80.000  Flow length"
"      1.250  Overland Slope"
"      2.980  Pervious Area"
"     80.000  Pervious length"
"      1.250  Pervious slope"
"      0.000  Impervious Area"
"     80.000  Impervious length"
"      1.250  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.633      6.702      0.000      0.000 c.m/sec"
"      Catchment 20      Pervious      Impervious      Total Area  "
"      Surface Area      2.980      0.000      2.980      hectare"
"      Time of concentration  19.276      3.524      19.276      minutes"
"      Time to Centroid      135.920      115.139      135.920      minutes"
"      Rainfall depth      74.358      74.358      74.358      mm"
"      Rainfall volume      2215.86      0.00      2215.86      c.m"
"      Rainfall losses      28.877      3.109      28.877      mm"
"      Runoff depth      45.481      71.249      45.481      mm"
"      Runoff volume      1355.32      0.00      1355.32      c.m"
"      Runoff coefficient      0.612      0.000      0.612      "
"      Maximum flow      0.633      0.000      0.633      c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"          0.633      7.296      0.000      0.000"
" 38  START/RE-START TOTALS 20"
"      3  Runoff Totals on EXIT"
"      Total Catchment area      39.420      hectare"
"      Total Impervious area      0.722      hectare"
"      Total % impervious      1.832"
" 19  EXIT"

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```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                      Ex__100yr.out"
"          Licensee name:
"          Company
"          Date & Time last used:                2/1/2025 at 10:05:05 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          901.088  Coefficient A"
"          0.043  Constant B"
"          0.692  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                212.928  mm/hr"
"          Total depth                      81.221  mm"
"          6  100hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 10"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          10  Catchment 10"
"          2.000  % Impervious"
"          31.110  Total Area"
"          200.000  Flow length"
"          3.750  Overland Slope"
"          30.488  Pervious Area"
"          200.000  Pervious length"
"          3.750  Pervious slope"
"          0.622  Impervious Area"
"          200.000  Impervious length"
"          3.750  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

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"	1.500	Impervious Depression storage"				
"		6.563	0.000	0.000	0.000	c.m/sec"
"		Catchment 10	Pervious	Impervious	Total Area	"
"		Surface Area	30.488	0.622	31.110	hectare"
"		Time of concentration	23.158	4.238	22.591	minutes"
"		Time to Centroid	142.372	115.974	141.581	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	2.4762	0.0505	2.5268	ha-m"
"		Rainfall losses	28.992	2.155	28.455	mm"
"		Runoff depth	52.229	79.066	52.765	mm"
"		Runoff volume	1.5923	0.0492	1.6415	ha-m"
"		Runoff coefficient	0.643	0.973	0.650	"
"		Maximum flow	6.506	0.301	6.563	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		6.563	6.563	0.000	0.000"	
" 33		CATCHMENT 40"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	40	Catchment 40"				
"	0.000	% Impervious"				
"	3.330	Total Area"				
"	120.000	Flow length"				
"	3.000	Overland Slope"				
"	3.330	Pervious Area"				
"	120.000	Pervious length"				
"	3.000	Pervious slope"				
"	0.000	Impervious Area"				
"	120.000	Impervious length"				
"	3.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.835	6.563	0.000	0.000	c.m/sec"
"		Catchment 40	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	18.225	3.335	18.225	minutes"
"		Time to Centroid	135.263	114.631	135.263	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	2704.65	0.00	2704.66	c.m"
"		Rainfall losses	28.982	3.311	28.982	mm"
"		Runoff depth	52.239	77.910	52.239	mm"

"	Runoff volume	1739.55	0.00	1739.55	c.m"
"	Runoff coefficient	0.643	0.000	0.643	"
"	Maximum flow	0.835	0.000	0.835	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.835	7.319	0.000	0.000"	
" 33	CATCHMENT 30"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	30 Catchment 30"				
"	5.000 % Impervious"				
"	2.000 Total Area"				
"	40.000 Flow length"				
"	3.750 Overland Slope"				
"	1.900 Pervious Area"				
"	40.000 Pervious length"				
"	3.750 Pervious slope"				
"	0.100 Impervious Area"				
"	40.000 Impervious length"				
"	3.750 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.768	7.319	0.000	0.000 c.m/sec"	
"	Catchment 30	Pervious	Impervious	Total Area	"
"	Surface Area	1.900	0.100	2.000	hectare"
"	Time of concentration	8.817	1.614	8.287	minutes"
"	Time to Centroid	121.743	111.617	120.997	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1543.20	81.22	1624.42	c.m"
"	Rainfall losses	29.209	2.686	27.883	mm"
"	Runoff depth	52.011	78.534	53.338	mm"
"	Runoff volume	988.22	78.53	1066.75	c.m"
"	Runoff coefficient	0.640	0.967	0.657	"
"	Maximum flow	0.742	0.054	0.768	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.768	7.588	0.000	0.000"	
" 33	CATCHMENT 20"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

```

"      20  Catchment 20"
"      0.000  % Impervious"
"      2.980  Total Area"
"     80.000  Flow length"
"      1.250  Overland Slope"
"      2.980  Pervious Area"
"     80.000  Pervious length"
"      1.250  Pervious slope"
"      0.000  Impervious Area"
"     80.000  Impervious length"
"      1.250  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.734      7.588      0.000      0.000 c.m/sec"
"      Catchment 20      Pervious      Impervious      Total Area  "
"      Surface Area      2.980      0.000      2.980      hectare"
"      Time of concentration 18.581      3.401      18.581      minutes"
"      Time to Centroid      135.779      114.745      135.779      minutes"
"      Rainfall depth      81.221      81.221      81.221      mm"
"      Rainfall volume      2420.38      0.00      2420.38      c.m"
"      Rainfall losses      29.021      3.280      29.021      mm"
"      Runoff depth      52.200      77.941      52.200      mm"
"      Runoff volume      1555.57      0.00      1555.57      c.m"
"      Runoff coefficient      0.643      0.000      0.643      "
"      Maximum flow      0.734      0.000      0.734      c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"          0.734      8.263      0.000      0.000"
" 38  START/RE-START TOTALS 20"
"      3  Runoff Totals on EXIT"
"      Total Catchment area      39.420      hectare"
"      Total Impervious area      0.722      hectare"
"      Total % impervious      1.832"
" 19  EXIT"

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25 rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10 Units used:                      ie METRIC"
"          Job folder:                        B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                    Ex__REG.out"
"          Licensee name:                     "
"          Company                            "
"          Date & Time last used:             2/1/2025 at 10:06:12 AM"
" 31          TIME PARAMETERS"
"          60.000 Time Step"
"          2880.000 Max. Storm length"
"          7500.000 Max. Hydrograph"
" 32          STORM Historic"
"          5 Historic"
"          2880.000 Duration"
"          48.000 Rainfall intensity values"
"              2.028    2.028    2.028    2.028    2.028"
"              2.028    2.028    2.028    2.028    2.028"
"              2.028    2.028    2.028    2.028    2.028"
"              2.028    2.028    2.028    2.028    2.028"
"              2.028    2.028    2.028    2.028    2.028"
"              2.028    2.026    2.026    2.026    2.028"
"              2.026    6.000    4.000    6.000    13.000"
"              17.000   13.000   23.000   13.000   13.000"
"              53.000   38.000   13.000"
"          Maximum intensity                    53.000 mm/hr"
"          Total depth                          285.000 mm"
"          6 000hyd Hydrograph extension used in this file"
" 33          CATCHMENT 10"
"          1 Triangular SCS"
"          1 Equal length"
"          2 Horton equation"
"          10 Catchment 10"
"          2.000 % Impervious"
"          31.110 Total Area"
"          200.000 Flow length"
"          3.750 Overland Slope"
"          30.488 Pervious Area"
"          200.000 Pervious length"
"          3.750 Pervious slope"
"          0.622 Impervious Area"
"          200.000 Impervious length"
"          3.750 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          30.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"

```

```

"      0.250 Pervious Lag constant (hours)"
"      5.000 Pervious Depression storage"
"      0.015 Impervious Manning 'n'"
"      0.000 Impervious Max.infiltration"
"      0.000 Impervious Min.infiltration"
"      0.010 Impervious Lag constant (hours)"
"      1.500 Impervious Depression storage"
"          3.396      0.000      0.000      0.000 c.m/sec"
"      Catchment 10      Pervious      Impervious      Total Area  "
"      Surface Area      30.488      0.622      31.110      hectare"
"      Time of concentration 41.600      7.392      40.367      minutes"
"      Time to Centroid      2745.601      2247.763      2727.666      minutes"
"      Rainfall depth      285.000      285.000      285.000      mm"
"      Rainfall volume      8.6890      0.1773      8.8664      ha-m"
"      Rainfall losses      141.365      21.980      138.978      mm"
"      Runoff depth      143.635      263.020      146.022      mm"
"      Runoff volume      4.3791      0.1637      4.5428      ha-m"
"      Runoff coefficient      0.504      0.923      0.512      "
"      Maximum flow      3.340      0.079      3.396      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          3.396      3.396      0.000      0.000"
" 33      CATCHMENT 40"
"      1      Triangular SCS"
"      1      Equal length"
"      2      Horton equation"
"      40      Catchment 40"
"      0.000 % Impervious"
"      3.330 Total Area"
"      120.000 Flow length"
"      3.000 Overland Slope"
"      3.330 Pervious Area"
"      120.000 Pervious length"
"      3.000 Pervious slope"
"      0.000 Impervious Area"
"      120.000 Impervious length"
"      3.000 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      30.000 Pervious Max.infiltration"
"      5.000 Pervious Min.infiltration"
"      0.250 Pervious Lag constant (hours)"
"      5.000 Pervious Depression storage"
"      0.015 Impervious Manning 'n'"
"      0.000 Impervious Max.infiltration"
"      0.000 Impervious Min.infiltration"
"      0.010 Impervious Lag constant (hours)"
"      1.500 Impervious Depression storage"
"          0.366      3.396      0.000      0.000 c.m/sec"
"      Catchment 40      Pervious      Impervious      Total Area  "
"      Surface Area      3.330      0.000      3.330      hectare"

```

"	Time of concentration	32.738	5.817	32.738	minutes"
"	Time to Centroid	2737.685	2233.111	2737.684	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	9490.49	0.01	9490.50	c.m"
"	Rainfall losses	139.700	29.327	139.699	mm"
"	Runoff depth	145.300	255.673	145.301	mm"
"	Runoff volume	4838.50	0.01	4838.51	c.m"
"	Runoff coefficient	0.510	0.000	0.510	"
"	Maximum flow	0.366	0.000	0.366	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.366	3.762	0.000	0.000"
" 33	CATCHMENT 30"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	30	Catchment 30"			
"	5.000	% Impervious"			
"	2.000	Total Area"			
"	40.000	Flow length"			
"	3.750	Overland Slope"			
"	1.900	Pervious Area"			
"	40.000	Pervious length"			
"	3.750	Pervious slope"			
"	0.100	Impervious Area"			
"	40.000	Impervious length"			
"	3.750	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	30.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.010	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.211	3.762	0.000	0.000 c.m/sec"
"	Catchment 30	Pervious	Impervious	Total Area	"
"	Surface Area	1.900	0.100	2.000	hectare"
"	Time of concentration	15.838	2.814	14.776	minutes"
"	Time to Centroid	2719.829	2252.474	2681.704	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	5415.00	285.00	5700.00	c.m"
"	Rainfall losses	139.630	39.672	134.632	mm"
"	Runoff depth	145.370	245.328	150.368	mm"
"	Runoff volume	2762.02	245.33	3007.35	c.m"
"	Runoff coefficient	0.510	0.861	0.528	"
"	Maximum flow	0.198	0.013	0.211	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				

```

"          4  Add Runoff "
"              0.211      3.956      0.000      0.000"
" 33      CATCHMENT 20"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          20  Catchment 20"
"          0.000  % Impervious"
"          2.980  Total Area"
"          80.000  Flow length"
"          1.250  Overland Slope"
"          2.980  Pervious Area"
"          80.000  Pervious length"
"          1.250  Pervious slope"
"          0.000  Impervious Area"
"          80.000  Impervious length"
"          1.250  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.010  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"              0.327      3.956      0.000      0.000 c.m/sec"
"          Catchment 20      Pervious      Impervious      Total Area "
"          Surface Area      2.980      0.000      2.980      hectare"
"          Time of concentration  33.378      5.931      33.378      minutes"
"          Time to Centroid      2738.064      2233.739      2738.063      minutes"
"          Rainfall depth      285.000      285.000      285.000      mm"
"          Rainfall volume      8492.99      0.01      8493.00      c.m"
"          Rainfall losses      139.842      28.841      139.842      mm"
"          Runoff depth      145.158      256.159      145.158      mm"
"          Runoff volume      4325.70      0.01      4325.71      c.m"
"          Runoff coefficient      0.509      0.000      0.509      "
"          Maximum flow      0.327      0.000      0.327      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              0.327      4.283      0.000      0.000"
" 38      START/RE-START TOTALS 20"
"          3  Runoff Totals on EXIT"
"          Total Catchment area      39.420      hectare"
"          Total Impervious area      0.722      hectare"
"          Total % impervious      1.832"
" 19      EXIT"

```

## **C.2. Post-Development Conditions Modelling**

**NORTH LANDS SUBDIVISION  
TOWNSHIP OF CENTRE WELLINGTON (FERGUS)  
Our File: 422079  
March 4, 2025**

**Proposed Forebay**

Forebay Length =	140.0 m	(Dist)
Forebay Top Width =	27.0 m	
Active Forebay Depth =	1.0 m	(d)
Active Forebay Bottom Width =	21.0 m	
Approximate Permanent Forebay Pool Volume =	224.9 m <sup>3</sup>	
Length Width Ratio =	5.2 :1	(r)
25 mm Storm Pond Outlet Flowrate =	0.043 m <sup>3</sup> /s	(Q25mm)
5 Year Storm Inflow Rate =	8.626 m <sup>3</sup> /s	(Q5)
Desired Forebay Velocity =	0.500 m/s	(Vf)
Desired Settling Velocity (recommended) =	0.0003 m/s	(Vs)

**Settling Length**

$$\text{Dist} = ((r \times Q25\text{mm})/V_s)^{.5} = 27.3 \text{ m} \quad 25\text{mm}$$

Forebay length (140 m) exceeds the settling length (27.3 m).

**Dispersion Length**

$$\text{Dist} = (8 \times Q5)/(d \times V_f) = 138.0 \text{ m} \quad 5 \text{ Year}$$

Forebay length (140 m) exceeds the dispersion length (138.0 m).

**Flow Velocity in Forebay**

Cross-sectional Area (Forebay Only) =	24 m <sup>2</sup>	
Cross-sectional Area (With Permanent Pool) =	41.85 m <sup>2</sup>	
Cross-sectional Area (With Outlet Pool) =	57.85 m <sup>2</sup>	(A)
Q5 =	8.626 m <sup>3</sup> /s	
Velocity = Q5/A =	0.149 m/s	5 Year

The average flow velocity through the forebay is equal to the allowable velocity of 0.15 m/s.

**NORTH LANDS SUBDIVISION**  
**TOWNSHIP OF CENTRE WELLINGTON (FERGUS)**  
 Our File: 422079  
 March 4, 2025

**SWM Facility - Stage/Storage Volume Calculations**

**Forebay/Permanent Pool Storage Volume Calculations**

Elevation (m)	Depth (m)	Forebay Surface Area (m <sup>2</sup> )	Forebay Incremental Storage Volume (m <sup>3</sup> )	Perm. Pool Surface Area (m <sup>2</sup> )	Perm. Pool Incremental Storage Volume (m <sup>3</sup> )	Accumulative Volume (m <sup>3</sup> )	
420.20	0.00	0.0	0.0			0.0	Bottom of Forebay
420.40	0.20	817.9	81.79			81.8	
420.60	0.40	902.4	172.03			253.8	
420.80	0.60	989.3	189.17			443.0	
421.00	0.80	1,078.6	206.79			649.8	Bottom of Permanent Pool
421.20	1.00	1,170.2	224.88	9,630.00	0.00	874.7	
421.30	1.10			9,798.00	971.40	1,846.1	
421.40	1.20			10,157.40	997.77	2,843.8	
421.50	1.30			10,518.80	1,033.81	3,877.6	
							Top of Permanent Pool

**Active Storage Volume Calculations**

Elevation (m)	Depth (m)	Active Surface Area (m <sup>2</sup> )	Active Incremental Volume (m <sup>3</sup> )	Accumulative Active Volume (m <sup>3</sup> )	
421.50	0.00	10,518.8	0.00	0.00	Bottom of Active Storage
421.60	0.10	10,882.4	1,070.06	1,070.06	
421.70	0.20	11,248.2	1,106.53	2,176.59	
421.80	0.30	11,616.3	1,143.23	3,319.82	
421.90	0.40	11,986.6	1,180.15	4,499.96	T/G DICB.1
422.00	0.50	12,359.0	1,217.28	5,717.24	
422.10	0.60	12,841.0	1,260.00	6,977.24	T/G DICB.2
422.20	0.70	13,125.1	1,298.31	8,275.55	
422.30	0.80	13,410.9	1,326.80	9,602.35	
422.40	0.90	13,698.3	1,355.46	10,957.81	Weir
422.50	1.00	13,987.2	1,384.27	12,342.08	
422.60	1.10	14,277.9	1,413.26	13,755.34	
422.70	1.20	14,570.1	1,442.40	15,197.74	
422.80	1.30	14,864.0	1,471.71	16,669.44	
422.90	1.40	15,159.4	1,501.17	18,170.61	
423.00	1.50	15,456.5	1,530.80	19,701.41	
423.10	1.60	15,755.3	1,560.59	21,262.00	Top of Pond
423.20	1.70	16,055.6	1,590.55	22,852.54	

**1800 x1800 Structure Controls**

**Orifice Outlet (Extended Detention)**

modelled with 50% blockage

INV = 421.50 m  
 Q = 0.044 m<sup>3</sup>/s  
 Cd = 0.600  
 H = 1.100 m  
 2g = 19.620  
 A = 0.031 m<sup>2</sup>  
 D = 0.200 m

**Overflow Weir**

d1 = 1.500 m  
 h = 1.200  
 H = 0.300 m  
 2g = 19.620  
 L = 15.0 m  
 Q = 3.524 m<sup>3</sup>/s

$$\text{Orifice Flow} = Cd A \sqrt{2gH}$$

Cd = Discharge Coefficient  
 A = Area of Orifice  
 2g = 19.62  
 H = Depth of Water above orifice - half of orifice diameter

**Major Control - Flow Over Grate**

modelled with 50% blockage

d1 = 0.80 m  
 h = 0.50  
 H = 0.30 m  
 2g = 19.62  
 L = 3.66 m  
 Q = 0.453 m<sup>3</sup>/s

**Length of Weir**

Head over Grate (m)	Length (m)
0	1.200
0.1	1.832
0.2	2.464
0.3	3.66

**Pipe Outflow - Outlet 1**

INV. = 421.34 m  
 Diameter = 525 mm  
 Gradient = 0.50%  
 Pipe Capacity = 0.317 m<sup>3</sup>/s  
 Length = 21.30 m

**Pipe Outflow - Outlet 2**

INV. = 421.5 m  
 Diameter = 600 mm  
 Gradient = 1%  
 Pipe Capacity = 0.641 m<sup>3</sup>/s  
 Length = 20.30 m

$$\text{Weir Flow} = 0.433 \sqrt{2g \left(\frac{d}{d+h}\right)} LH^{3/2}$$

L = Length of Weir  
 2g = 19.62  
 d = total depth of water  
 h = depth of water below weir  
 H = depth of water above weir

Stage-Storage-Discharge Table										
Elevation (m)	Stage (m)	Storage (m <sup>3</sup> )	OUTLET STRUCTURE 1		OUTLET STRUCTURE 2			Weir Overflow (m <sup>3</sup> /s)	Actual Discharge (m <sup>3</sup> /s)	
			Major Control Grate (m <sup>3</sup> /s)	Major Control Pipe Outlet (m <sup>3</sup> /s)	200mm dia. Minor Outlet (m <sup>3</sup> /s)	Major Control Grate (m <sup>3</sup> /s)	Major Control Pipe Outlet (m <sup>3</sup> /s)			
421.50	0.00	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Bottom of Active Storage
421.60	0.10	1,070.1	0.000	0.152	0.007	0.000	0.039	0.000	0.007	
421.70	0.20	2,176.6	0.000	0.250	0.013	0.000	0.144	0.000	0.013	
421.80	0.30	3,319.8	0.000	0.317	0.019	0.000	0.307	0.000	0.019	
421.90	0.40	4,500.0	0.000	0.317	0.023	0.000	0.485	0.000	0.023	
422.00	0.50	5,717.2	0.000	0.317	0.026	0.000	0.621	0.000	0.026	T/G DICB.1
422.10	0.60	6,977.2	0.041	0.317	0.030	0.000	0.641	0.000	0.071	
422.20	0.70	8,275.5	0.161	0.317	0.032	0.000	0.641	0.000	0.194	
422.30	0.80	9,602.3	0.453	0.317	0.035	0.000	0.641	0.000	0.352	T/G DICB.2
422.40	0.90	10,957.8		0.317	0.037	0.040	0.641	0.000	0.395	
422.50	1.00	12,342.1		0.317	0.040	0.158	0.641	0.000	0.514	
422.60	1.10	13,755.3		0.317	0.042	0.439	0.641	0.000	0.798	
422.70	1.20	15,197.7		0.317	0.044	0.689	0.641	0.000	0.958	Weir
422.80	1.30	16,669.4		0.317			0.641	0.656	1.614	
422.90	1.40	18,170.6		0.317			0.641	1.888	2.846	
423.00	1.50	19,701.4		0.317			0.641	3.524	4.482	
423.10	1.60	21,262.0		0.317			0.641	5.502	6.460	
423.20	1.70	22,852.5		0.317			0.641	7.788	8.746	Top of Pond

**Notes:**

Major Controls - the minimum of flow over grate and pipe discharge flow rate is used in the actual discharge calculation

Knockout Controls - the knockout is assumed to contribute to discharge flow rates until the pipe discharge rate is the controlling release rate.

Major Control Pipe Flow - based on Pipe Capacity

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                     Uncon-Interim__25mm.out"
"          Licensee name:                       "
"          Company                              "
"          Date & Time last used:              2/5/2025 at 2:20:21 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          367.000  Coefficient A"
"          5.000  Constant B"
"          0.700  Exponent C"
"          0.394  Fraction R"
"          120.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    72.993  mm/hr"
"          Total depth                          24.995  mm"
"          7  0025hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.007	0.000	0.000	0.000	c.m/sec"
"		Catchment 600	Pervious	Impervious	Total Area	"
"		Surface Area	0.114	0.006	0.120	hectare"
"		Time of concentration	3.071	0.370	2.655	minutes"
"		Time to Centroid	63.738	60.371	63.219	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	28.49	1.50	29.99	c.m"
"		Rainfall losses	19.084	4.536	18.356	mm"
"		Runoff depth	5.912	20.459	6.639	mm"
"		Runoff volume	6.74	1.23	7.97	c.m"
"		Runoff coefficient	0.237	0.819	0.266	"
"		Maximum flow	0.006	0.001	0.007	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.007	0.007	0.000	0.000"	
" 33		CATCHMENT 800"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	800	Catchment 800"				
"	5.000	% Impervious"				
"	1.730	Total Area"				
"	40.000	Flow length"				
"	3.750	Overland Slope"				
"	1.643	Pervious Area"				
"	40.000	Pervious length"				
"	3.750	Pervious slope"				
"	0.087	Impervious Area"				
"	40.000	Impervious length"				
"	3.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.050	0.007	0.000	0.000	c.m/sec"
"		Catchment 800	Pervious	Impervious	Total Area	"
"		Surface Area	1.643	0.087	1.730	hectare"
"		Time of concentration	20.536	2.476	17.532	minutes"
"		Time to Centroid	82.465	63.135	79.250	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	410.80	21.62	432.42	c.m"
"		Rainfall losses	18.914	1.941	18.065	mm"
"		Runoff depth	6.082	23.054	6.930	mm"

"	Runoff volume	99.95	19.94	119.90	c.m"
"	Runoff coefficient	0.243	0.922	0.277	"
"	Maximum flow	0.047	0.013	0.050	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.050	0.052	0.000	0.000"	
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.129	0.052	0.000	0.000 c.m/sec"	
"	Catchment 500	Pervious	Impervious	Total Area	"
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	90.569	10.921	87.585	minutes"
"	Time to Centroid	157.420	74.245	154.304	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	3662.32	36.99	3699.31	c.m"
"	Rainfall losses	18.910	1.543	18.736	mm"
"	Runoff depth	6.085	23.453	6.259	mm"
"	Runoff volume	891.61	34.71	926.32	c.m"
"	Runoff coefficient	0.243	0.938	0.250	"
"	Maximum flow	0.127	0.018	0.129	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.129	0.137	0.000	0.000"	
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

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"      100  Catchment 100"
"      80.000  % Impervious"
"      13.090  Total Area"
"      40.000  Flow length"
"      2.000  Overland Slope"
"      2.618  Pervious Area"
"      40.000  Pervious length"
"      2.000  Pervious slope"
"      10.472  Impervious Area"
"      40.000  Impervious length"
"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          1.552      0.137      0.000      0.000 c.m/sec"
"      Catchment 100      Pervious      Impervious      Total Area  "
"      Surface Area      2.618      10.472      13.090      hectare"
"      Time of concentration  24.798      2.990      4.336      minutes"
"      Time to Centroid      87.039      63.901      65.330      minutes"
"      Rainfall depth      24.995      24.995      24.995      mm"
"      Rainfall volume      654.38      2617.51      3271.89      c.m"
"      Rainfall losses      18.913      1.889      5.294      mm"
"      Runoff depth      6.082      23.106      19.701      mm"
"      Runoff volume      159.22      2419.69      2578.92      c.m"
"      Runoff coefficient      0.243      0.924      0.788      "
"      Maximum flow      0.069      1.550      1.552      c.m/sec"
" 40  HYDROGRAPH Add Runoff  "
"      4  Add Runoff  "
"          1.552      1.581      0.000      0.000"
" 33  CATCHMENT 200"
"      1  Triangular SCS"
"      1  Equal length"
"      2  Horton equation"
"      200  Catchment 200"
"      15.000  % Impervious"
"      2.020  Total Area"
"      40.000  Flow length"
"      2.000  Overland Slope"
"      1.717  Pervious Area"
"      40.000  Pervious length"
"      2.000  Pervious slope"
"      0.303  Impervious Area"
"      40.000  Impervious length"

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"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.056      1.581      0.000      0.000 c.m/sec"
"      Catchment 200      Pervious      Impervious Total Area "
"      Surface Area      1.717      0.303      2.020      hectare"
"      Time of concentration 24.798      2.990      16.045      minutes"
"      Time to Centroid      87.039      63.901      77.753      minutes"
"      Rainfall depth      24.995      24.995      24.995      mm"
"      Rainfall volume      429.17      75.74      504.91      c.m"
"      Rainfall losses      18.913      1.889      16.360      mm"
"      Runoff depth      6.082      23.106      8.636      mm"
"      Runoff volume      104.43      70.01      174.44      c.m"
"      Runoff coefficient      0.243      0.924      0.345      "
"      Maximum flow      0.045      0.045      0.056      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.056      1.628      0.000      0.000"
" 33      CATCHMENT 400"
"      1      Triangular SCS"
"      1      Equal length"
"      2      Horton equation"
"      400      Catchment 400"
"      0.000      % Impervious"
"      3.330      Total Area"
"    120.000      Flow length"
"      3.000      Overland Slope"
"      3.330      Pervious Area"
"    120.000      Pervious length"
"      3.000      Pervious slope"
"      0.000      Impervious Area"
"    120.000      Impervious length"
"      3.000      Impervious slope"
"      0.250      Pervious Manning 'n'"
"    30.000      Pervious Max.infiltration"
"      5.000      Pervious Min.infiltration"
"      0.250      Pervious Lag constant (hours)"
"      5.000      Pervious Depression storage"
"      0.015      Impervious Manning 'n'"
"      0.000      Impervious Max.infiltration"
"      0.000      Impervious Min.infiltration"
"      0.001      Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.056	1.628	0.000	0.000	c.m/sec"
"		Catchment 400	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	42.448	5.118	42.448	minutes"
"		Time to Centroid	105.920	66.672	105.919	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	832.34	0.00	832.34	c.m"
"		Rainfall losses	18.910	1.665	18.910	mm"
"		Runoff depth	6.085	23.330	6.085	mm"
"		Runoff volume	202.64	0.00	202.64	c.m"
"		Runoff coefficient	0.243	0.000	0.243	"
"		Maximum flow	0.056	0.000	0.056	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.056	1.629	0.000	0.000"	
" 33		CATCHMENT 300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	300	Catchment 300"				
"	50.000	% Impervious"				
"	1.350	Total Area"				
"	20.000	Flow length"				
"	15.000	Overland Slope"				
"	0.675	Pervious Area"				
"	20.000	Pervious length"				
"	15.000	Pervious slope"				
"	0.675	Impervious Area"				
"	20.000	Impervious length"				
"	15.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.121	1.629	0.000	0.000	c.m/sec"
"		Catchment 300	Pervious	Impervious	Total Area	"
"		Surface Area	0.675	0.675	1.350	hectare"
"		Time of concentration	8.939	1.078	2.724	minutes"
"		Time to Centroid	70.037	61.193	63.045	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	168.72	168.72	337.44	c.m"
"		Rainfall losses	18.924	2.080	10.502	mm"
"		Runoff depth	6.071	22.916	14.493	mm"

"	Runoff volume	40.98	154.68	195.66	c.m"
"	Runoff coefficient	0.243	0.917	0.580	"
"	Maximum flow	0.031	0.118	0.121	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.121	1.750	0.000	0.000"	
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.044	1.750	0.000	0.000 c.m/sec"	
"	Catchment 700	Pervious	Impervious	Total Area	"
"	Surface Area	2.980	0.000	2.980	hectare"
"	Time of concentration	49.662	5.988	49.662	minutes"
"	Time to Centroid	113.637	67.835	113.637	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	744.86	0.00	744.86	c.m"
"	Rainfall losses	18.911	1.624	18.911	mm"
"	Runoff depth	6.084	23.371	6.084	mm"
"	Runoff volume	181.30	0.00	181.31	c.m"
"	Runoff coefficient	0.243	0.000	0.243	"
"	Maximum flow	0.044	0.000	0.044	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.044	1.751	0.000	0.000"	
" 38	START/RE-START TOTALS 700"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			39.420	hectare"
"	Total Impervious area			11.691	hectare"

"	Total % impervious	29.656"
" 19	EXIT"	

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                     Uncon-Interim__2yr.out"
"          Licensee name:                      "
"          Company                              "
"          Date & Time last used:              2/5/2025 at 2:16:04 PM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          414.876  Coefficient A"
"          0.027  Constant B"
"          0.682  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    100.235  mm/hr"
"          Total depth                          39.504  mm"
"          6  002hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.022	0.000	0.000	0.000	c.m/sec"
"		Catchment 600	Pervious	Impervious	Total Area	"
"		Surface Area	0.114	0.006	0.120	hectare"
"		Time of concentration	1.816	0.326	1.648	minutes"
"		Time to Centroid	104.196	112.311	105.112	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	45.03	2.37	47.40	c.m"
"		Rainfall losses	25.568	5.814	24.580	mm"
"		Runoff depth	13.936	33.690	14.924	mm"
"		Runoff volume	15.89	2.02	17.91	c.m"
"		Runoff coefficient	0.353	0.853	0.378	"
"		Maximum flow	0.021	0.001	0.022	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.022	0.022	0.000	0.000"	
" 33		CATCHMENT 800"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	800	Catchment 800"				
"	5.000	% Impervious"				
"	1.730	Total Area"				
"	40.000	Flow length"				
"	3.750	Overland Slope"				
"	1.643	Pervious Area"				
"	40.000	Pervious length"				
"	3.750	Pervious slope"				
"	0.087	Impervious Area"				
"	40.000	Impervious length"				
"	3.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.163	0.022	0.000	0.000	c.m/sec"
"		Catchment 800	Pervious	Impervious	Total Area	"
"		Surface Area	1.643	0.087	1.730	hectare"
"		Time of concentration	12.141	2.181	10.914	minutes"
"		Time to Centroid	117.971	114.662	117.563	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	649.25	34.17	683.42	c.m"
"		Rainfall losses	25.401	1.860	24.224	mm"
"		Runoff depth	14.103	37.644	15.280	mm"

"	Runoff volume	231.78	32.56	264.34	c.m"
"	Runoff coefficient	0.357	0.953	0.387	"
"	Maximum flow	0.158	0.022	0.163	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.163	0.167	0.000	0.000"	
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.449	0.167	0.000	0.000 c.m/sec"	
"	Catchment 500	Pervious	Impervious	Total Area	"
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	53.548	9.620	52.390	minutes"
"	Time to Centroid	172.894	126.382	171.669	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	5788.13	58.47	5846.59	c.m"
"	Rainfall losses	25.381	1.671	25.143	mm"
"	Runoff depth	14.123	37.833	14.361	mm"
"	Runoff volume	2069.36	55.99	2125.36	c.m"
"	Runoff coefficient	0.358	0.958	0.364	"
"	Maximum flow	0.445	0.030	0.449	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.449	0.481	0.000	0.000"	
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

```

"      100  Catchment 100"
"      80.000  % Impervious"
"      13.090  Total Area"
"      40.000  Flow length"
"      2.000  Overland Slope"
"      2.618  Pervious Area"
"      40.000  Pervious length"
"      2.000  Pervious slope"
"      10.472  Impervious Area"
"      40.000  Impervious length"
"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          2.700      0.481      0.000      0.000 c.m/sec"
"      Catchment 100      Pervious      Impervious      Total Area  "
"      Surface Area      2.618      10.472      13.090      hectare"
"      Time of concentration  14.661      2.634      3.668      minutes"
"      Time to Centroid      121.346      115.356      115.871      minutes"
"      Rainfall depth      39.504      39.504      39.504      mm"
"      Rainfall volume      1034.22      4136.86      5171.08      c.m"
"      Rainfall losses      25.379      1.965      6.648      mm"
"      Runoff depth      14.125      37.539      32.856      mm"
"      Runoff volume      369.79      3931.05      4300.84      c.m"
"      Runoff coefficient      0.358      0.950      0.832      "
"      Maximum flow      0.236      2.644      2.700      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"      4      Add Runoff  "
"          2.700      2.845      0.000      0.000"
" 33      CATCHMENT 200"
"      1      Triangular SCS"
"      1      Equal length"
"      2      Horton equation"
"      200  Catchment 200"
"      15.000  % Impervious"
"      2.020  Total Area"
"      40.000  Flow length"
"      2.000  Overland Slope"
"      1.717  Pervious Area"
"      40.000  Pervious length"
"      2.000  Pervious slope"
"      0.303  Impervious Area"
"      40.000  Impervious length"

```

```

"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"     30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"              0.170      2.845      0.000      0.000 c.m/sec"
"      Catchment 200      Pervious      Impervious      Total Area  "
"      Surface Area      1.717      0.303      2.020      hectare"
"      Time of concentration  14.661      2.634      10.821      minutes"
"      Time to Centroid      121.346      115.356      119.434      minutes"
"      Rainfall depth      39.504      39.504      39.504      mm"
"      Rainfall volume      678.28      119.70      797.98      c.m"
"      Rainfall losses      25.379      1.965      21.867      mm"
"      Runoff depth      14.125      37.539      17.637      mm"
"      Runoff volume      242.53      113.74      356.27      c.m"
"      Runoff coefficient      0.358      0.950      0.446      "
"      Maximum flow      0.155      0.077      0.170      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.170      2.958      0.000      0.000"
" 33      CATCHMENT 400"
"      1      Triangular SCS"
"      1      Equal length"
"      2      Horton equation"
"      400      Catchment 400"
"      0.000      % Impervious"
"      3.330      Total Area"
"     120.000      Flow length"
"      3.000      Overland Slope"
"      3.330      Pervious Area"
"     120.000      Pervious length"
"      3.000      Pervious slope"
"      0.000      Impervious Area"
"     120.000      Impervious length"
"      3.000      Impervious slope"
"      0.250      Pervious Manning 'n'"
"     30.000      Pervious Max.infiltration"
"      5.000      Pervious Min.infiltration"
"      0.250      Pervious Lag constant (hours)"
"      5.000      Pervious Depression storage"
"      0.015      Impervious Manning 'n'"
"      0.000      Impervious Max.infiltration"
"      0.000      Impervious Min.infiltration"
"      0.001      Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.193	2.958	0.000	0.000	c.m/sec"
"		Catchment 400	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	25.097	4.509	25.096	minutes"
"		Time to Centroid	135.157	118.349	135.157	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	1315.48	0.00	1315.48	c.m"
"		Rainfall losses	25.393	1.692	25.393	mm"
"		Runoff depth	14.111	37.813	14.111	mm"
"		Runoff volume	469.88	0.00	469.89	c.m"
"		Runoff coefficient	0.357	0.000	0.357	"
"		Maximum flow	0.193	0.000	0.193	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.193	2.987	0.000	0.000"	
" 33		CATCHMENT 300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	300	Catchment 300"				
"	50.000	% Impervious"				
"	1.350	Total Area"				
"	20.000	Flow length"				
"	15.000	Overland Slope"				
"	0.675	Pervious Area"				
"	20.000	Pervious length"				
"	15.000	Pervious slope"				
"	0.675	Impervious Area"				
"	20.000	Impervious length"				
"	15.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.228	2.987	0.000	0.000	c.m/sec"
"		Catchment 300	Pervious	Impervious	Total Area	"
"		Surface Area	0.675	0.675	1.350	hectare"
"		Time of concentration	5.285	0.949	2.157	minutes"
"		Time to Centroid	108.893	112.435	111.449	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	266.65	266.65	533.30	c.m"
"		Rainfall losses	25.407	2.971	14.189	mm"
"		Runoff depth	14.097	36.533	25.315	mm"

"	Runoff volume	95.16	246.59	341.75	c.m"
"	Runoff coefficient	0.357	0.925	0.641	"
"	Maximum flow	0.106	0.170	0.228	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.228	3.215	0.000	0.000"	
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.152	3.215	0.000	0.000 c.m/sec"	
"	Catchment 700	Pervious	Impervious	Total Area	"
"	Surface Area	2.980	0.000	2.980	hectare"
"	Time of concentration	29.362	5.275	29.362	minutes"
"	Time to Centroid	140.817	119.556	140.816	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	1177.22	0.00	1177.22	c.m"
"	Rainfall losses	25.383	1.653	25.383	mm"
"	Runoff depth	14.121	37.851	14.121	mm"
"	Runoff volume	420.82	0.00	420.82	c.m"
"	Runoff coefficient	0.357	0.000	0.357	"
"	Maximum flow	0.152	0.000	0.152	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.152	3.235	0.000	0.000"	
" 38	START/RE-START TOTALS 700"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			39.420	hectare"
"	Total Impervious area			11.691	hectare"

"	Total % impervious	29.656"
" 19	EXIT"	

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"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
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"          Licensee name:                       "
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"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          544.711  Coefficient A"
"          0.021  Constant B"
"          0.686  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    130.581  mm/hr"
"          Total depth                          50.743  mm"
"          6 005hyd Hydrograph extension used in this file"
" 33          CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.035	0.000	0.000	0.000	c.m/sec"
"		Catchment 600	Pervious	Impervious	Total Area	"
"		Surface Area	0.114	0.006	0.120	hectare"
"		Time of concentration	1.618	0.293	1.500	minutes"
"		Time to Centroid	105.803	111.144	106.279	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	57.85	3.04	60.89	c.m"
"		Rainfall losses	27.440	7.450	26.440	mm"
"		Runoff depth	23.303	43.293	24.303	mm"
"		Runoff volume	26.57	2.60	29.16	c.m"
"		Runoff coefficient	0.459	0.853	0.479	"
"		Maximum flow	0.033	0.002	0.035	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.035	0.035	0.000	0.000"	
" 33		CATCHMENT 800"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	800	Catchment 800"				
"	5.000	% Impervious"				
"	1.730	Total Area"				
"	40.000	Flow length"				
"	3.750	Overland Slope"				
"	1.643	Pervious Area"				
"	40.000	Pervious length"				
"	3.750	Pervious slope"				
"	0.087	Impervious Area"				
"	40.000	Impervious length"				
"	3.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.287	0.035	0.000	0.000	c.m/sec"
"		Catchment 800	Pervious	Impervious	Total Area	"
"		Surface Area	1.643	0.087	1.730	hectare"
"		Time of concentration	10.817	1.962	9.949	minutes"
"		Time to Centroid	118.405	113.377	117.912	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	833.96	43.89	877.85	c.m"
"		Rainfall losses	27.163	2.058	25.907	mm"
"		Runoff depth	23.580	48.685	24.835	mm"

"	Runoff volume	387.54	42.11	429.65	c.m"
"	Runoff coefficient	0.465	0.959	0.489	"
"	Maximum flow	0.272	0.029	0.287	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.287	0.305	0.000	0.000"	
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.818	0.305	0.000	0.000 c.m/sec"	
"	Catchment 500	Pervious	Impervious	Total Area	"
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	47.706	8.654	46.903	minutes"
"	Time to Centroid	168.372	124.102	167.462	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	7434.86	75.10	7509.96	c.m"
"	Rainfall losses	27.127	1.696	26.873	mm"
"	Runoff depth	23.616	49.047	23.870	mm"
"	Runoff volume	3460.21	72.59	3532.80	c.m"
"	Runoff coefficient	0.465	0.967	0.470	"
"	Maximum flow	0.812	0.040	0.818	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.818	0.868	0.000	0.000"	
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

```

"      100  Catchment 100"
"      80.000  % Impervious"
"      13.090  Total Area"
"      40.000  Flow length"
"      2.000  Overland Slope"
"      2.618  Pervious Area"
"      40.000  Pervious length"
"      2.000  Pervious slope"
"      10.472  Impervious Area"
"      40.000  Impervious length"
"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          3.616      0.868      0.000      0.000 c.m/sec"
"      Catchment 100      Pervious      Impervious      Total Area  "
"      Surface Area      2.618      10.472      13.090      hectare"
"      Time of concentration  13.062      2.369      3.518      minutes"
"      Time to Centroid      121.452      114.097      114.887      minutes"
"      Rainfall depth      50.743      50.743      50.743      mm"
"      Rainfall volume      1328.45      5313.80      6642.25      c.m"
"      Rainfall losses      27.259      1.941      7.004      mm"
"      Runoff depth      23.484      48.802      43.739      mm"
"      Runoff volume      614.82      5110.59      5725.39      c.m"
"      Runoff coefficient      0.463      0.962      0.862      "
"      Maximum flow      0.395      3.479      3.616      c.m/sec"
" 40  HYDROGRAPH Add Runoff  "
"      4  Add Runoff  "
"          3.616      3.901      0.000      0.000"
" 33  CATCHMENT 200"
"      1  Triangular SCS"
"      1  Equal length"
"      2  Horton equation"
"      200  Catchment 200"
"      15.000  % Impervious"
"      2.020  Total Area"
"      40.000  Flow length"
"      2.000  Overland Slope"
"      1.717  Pervious Area"
"      40.000  Pervious length"
"      2.000  Pervious slope"
"      0.303  Impervious Area"
"      40.000  Impervious length"

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"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"     30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"              0.279      3.901      0.000      0.000 c.m/sec"
"      Catchment 200      Pervious      Impervious      Total Area  "
"      Surface Area      1.717      0.303      2.020      hectare"
"      Time of concentration  13.062      2.369      10.193      minutes"
"      Time to Centroid      121.452      114.097      119.479      minutes"
"      Rainfall depth      50.743      50.743      50.743      mm"
"      Rainfall volume      871.26      153.75      1025.01      c.m"
"      Rainfall losses      27.259      1.941      23.461      mm"
"      Runoff depth      23.484      48.802      27.282      mm"
"      Runoff volume      403.22      147.87      551.10      c.m"
"      Runoff coefficient      0.463      0.962      0.538      "
"      Maximum flow      0.259      0.101      0.279      c.m/sec"
" 40      HYDROGRAPH Add Runoff  "
"      4      Add Runoff  "
"              0.279      4.092      0.000      0.000"
" 33      CATCHMENT 400"
"      1      Triangular SCS"
"      1      Equal length"
"      2      Horton equation"
"      400      Catchment 400"
"      0.000      % Impervious"
"      3.330      Total Area"
"     120.000      Flow length"
"      3.000      Overland Slope"
"      3.330      Pervious Area"
"     120.000      Pervious length"
"      3.000      Pervious slope"
"      0.000      Impervious Area"
"     120.000      Impervious length"
"      3.000      Impervious slope"
"      0.250      Pervious Manning 'n'"
"     30.000      Pervious Max.infiltration"
"      5.000      Pervious Min.infiltration"
"      0.250      Pervious Lag constant (hours)"
"      5.000      Pervious Depression storage"
"      0.015      Impervious Manning 'n'"
"      0.000      Impervious Max.infiltration"
"      0.000      Impervious Min.infiltration"
"      0.001      Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.356	4.092	0.000	0.000	c.m/sec"
"		Catchment 400	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	22.359	4.056	22.359	minutes"
"		Time to Centroid	134.036	116.866	134.036	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	1689.74	0.00	1689.74	c.m"
"		Rainfall losses	27.188	2.068	27.188	mm"
"		Runoff depth	23.555	48.675	23.555	mm"
"		Runoff volume	784.37	0.00	784.38	c.m"
"		Runoff coefficient	0.464	0.000	0.464	"
"		Maximum flow	0.356	0.000	0.356	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.356	4.163	0.000	0.000"	
" 33		CATCHMENT 300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	300	Catchment 300"				
"	50.000	% Impervious"				
"	1.350	Total Area"				
"	20.000	Flow length"				
"	15.000	Overland Slope"				
"	0.675	Pervious Area"				
"	20.000	Pervious length"				
"	15.000	Pervious slope"				
"	0.675	Impervious Area"				
"	20.000	Impervious length"				
"	15.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.347	4.163	0.000	0.000	c.m/sec"
"		Catchment 300	Pervious	Impervious	Total Area	"
"		Surface Area	0.675	0.675	1.350	hectare"
"		Time of concentration	4.708	0.854	2.132	minutes"
"		Time to Centroid	110.182	111.691	111.191	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	342.51	342.51	685.03	c.m"
"		Rainfall losses	27.326	3.537	15.432	mm"
"		Runoff depth	23.417	47.206	35.311	mm"

"	Runoff volume	158.07	318.64	476.70	c.m"
"	Runoff coefficient	0.461	0.930	0.696	"
"	Maximum flow	0.157	0.219	0.347	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.347	4.510	0.000	0.000"	
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.271	4.510	0.000	0.000 c.m/sec"	
"	Catchment 700	Pervious	Impervious	Total Area	"
"	Surface Area	2.980	0.000	2.980	hectare"
"	Time of concentration	26.159	4.745	26.159	minutes"
"	Time to Centroid	139.192	117.881	139.192	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	1512.14	0.00	1512.14	c.m"
"	Rainfall losses	27.134	1.694	27.134	mm"
"	Runoff depth	23.609	49.049	23.609	mm"
"	Runoff volume	703.54	0.00	703.54	c.m"
"	Runoff coefficient	0.465	0.000	0.465	"
"	Maximum flow	0.271	0.000	0.271	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.271	4.559	0.000	0.000"	
" 38	START/RE-START TOTALS 700"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		39.420	hectare"	
"	Total Impervious area		11.691	hectare"	

"	Total % impervious	29.656"
" 19	EXIT"	

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"          MIDUSS Output ----->"
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"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
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"          Licensee name:                      "
"          Company                             "
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"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          627.308  Coefficient A"
"          0.014  Constant B"
"          0.687  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    150.154  mm/hr"
"          Total depth                          58.119  mm"
"          6  010hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.043	0.000	0.000	0.000	c.m/sec"
"		Catchment 600	Pervious	Impervious	Total Area	"
"		Surface Area	0.114	0.006	0.120	hectare"
"		Time of concentration	1.525	0.278	1.424	minutes"
"		Time to Centroid	107.285	110.607	107.552	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	66.26	3.49	69.74	c.m"
"		Rainfall losses	28.307	8.539	27.318	mm"
"		Runoff depth	29.812	49.580	30.801	mm"
"		Runoff volume	33.99	2.97	36.96	c.m"
"		Runoff coefficient	0.513	0.853	0.530	"
"		Maximum flow	0.040	0.002	0.043	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.043	0.043	0.000	0.000"	
" 33		CATCHMENT 800"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	800	Catchment 800"				
"	5.000	% Impervious"				
"	1.730	Total Area"				
"	40.000	Flow length"				
"	3.750	Overland Slope"				
"	1.643	Pervious Area"				
"	40.000	Pervious length"				
"	3.750	Pervious slope"				
"	0.087	Impervious Area"				
"	40.000	Impervious length"				
"	3.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.378	0.043	0.000	0.000	c.m/sec"
"		Catchment 800	Pervious	Impervious	Total Area	"
"		Surface Area	1.643	0.087	1.730	hectare"
"		Time of concentration	10.195	1.856	9.450	minutes"
"		Time to Centroid	119.343	112.794	118.758	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	955.19	50.27	1005.46	c.m"
"		Rainfall losses	28.125	2.227	26.830	mm"
"		Runoff depth	29.994	55.892	31.289	mm"

"	Runoff volume	492.95	48.35	541.29	c.m"
"	Runoff coefficient	0.516	0.962	0.538	"
"	Maximum flow	0.361	0.033	0.378	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.378	0.398	0.000	0.000"	
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	1.110	0.398	0.000	0.000 c.m/sec"	
"	Catchment 500	Pervious	Impervious	Total Area	"
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	44.961	8.184	44.281	minutes"
"	Time to Centroid	167.191	123.105	166.375	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	8515.60	86.02	8601.62	c.m"
"	Rainfall losses	27.876	1.659	27.613	mm"
"	Runoff depth	30.243	56.460	30.506	mm"
"	Runoff volume	4431.28	83.56	4514.84	c.m"
"	Runoff coefficient	0.520	0.971	0.525	"
"	Maximum flow	1.104	0.051	1.110	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	1.110	1.172	0.000	0.000"	
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

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"      100  Catchment 100"
"      80.000  % Impervious"
"      13.090  Total Area"
"      40.000  Flow length"
"      2.000  Overland Slope"
"      2.618  Pervious Area"
"      40.000  Pervious length"
"      2.000  Pervious slope"
"      10.472  Impervious Area"
"      40.000  Impervious length"
"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          4.219      1.172      0.000      0.000 c.m/sec"
"      Catchment 100      Pervious      Impervious      Total Area  "
"      Surface Area      2.618      10.472      13.090      hectare"
"      Time of concentration  12.310      2.241      3.433      minutes"
"      Time to Centroid      122.261      113.547      114.579      minutes"
"      Rainfall depth      58.119      58.119      58.119      mm"
"      Rainfall volume      1521.56      6086.22      7607.78      c.m"
"      Rainfall losses      27.960      1.991      7.185      mm"
"      Runoff depth      30.159      56.128      50.934      mm"
"      Runoff volume      789.57      5877.72      6667.29      c.m"
"      Runoff coefficient      0.519      0.966      0.876      "
"      Maximum flow      0.493      4.013      4.219      c.m/sec"
" 40  HYDROGRAPH Add Runoff  "
"      4  Add Runoff  "
"          4.219      4.634      0.000      0.000"
" 33  CATCHMENT 200"
"      1  Triangular SCS"
"      1  Equal length"
"      2  Horton equation"
"      200  Catchment 200"
"      15.000  % Impervious"
"      2.020  Total Area"
"      40.000  Flow length"
"      2.000  Overland Slope"
"      1.717  Pervious Area"
"      40.000  Pervious length"
"      2.000  Pervious slope"
"      0.303  Impervious Area"
"      40.000  Impervious length"

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"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"    30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.383      4.634      0.000      0.000 c.m/sec"
"      Catchment 200      Pervious      Impervious      Total Area  "
"      Surface Area      1.717      0.303      2.020      hectare"
"      Time of concentration  12.310      2.241      9.821      minutes"
"      Time to Centroid      122.261      113.547      120.106      minutes"
"      Rainfall depth      58.119      58.119      58.119      mm"
"      Rainfall volume      997.90      176.10      1174.00      c.m"
"      Rainfall losses      27.960      1.991      24.065      mm"
"      Runoff depth      30.159      56.128      34.054      mm"
"      Runoff volume      517.83      170.07      687.90      c.m"
"      Runoff coefficient      0.519      0.966      0.586      "
"      Maximum flow      0.323      0.116      0.383      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.383      4.885      0.000      0.000"
" 33      CATCHMENT 400"
"      1      Triangular SCS"
"      1      Equal length"
"      2      Horton equation"
"      400      Catchment 400"
"      0.000      % Impervious"
"      3.330      Total Area"
"    120.000      Flow length"
"      3.000      Overland Slope"
"      3.330      Pervious Area"
"    120.000      Pervious length"
"      3.000      Pervious slope"
"      0.000      Impervious Area"
"    120.000      Impervious length"
"      3.000      Impervious slope"
"      0.250      Pervious Manning 'n'"
"    30.000      Pervious Max.infiltration"
"      5.000      Pervious Min.infiltration"
"      0.250      Pervious Lag constant (hours)"
"      5.000      Pervious Depression storage"
"      0.015      Impervious Manning 'n'"
"      0.000      Impervious Max.infiltration"
"      0.000      Impervious Min.infiltration"
"      0.001      Impervious Lag constant (hours)"

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"	1.500	Impervious Depression storage"				
"		0.455	4.885	0.000	0.000	c.m/sec"
"		Catchment 400	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	21.072	3.836	21.072	minutes"
"		Time to Centroid	134.305	116.233	134.305	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	1935.36	0.00	1935.36	c.m"
"		Rainfall losses	27.871	2.469	27.871	mm"
"		Runoff depth	30.248	55.650	30.248	mm"
"		Runoff volume	1007.27	0.00	1007.27	c.m"
"		Runoff coefficient	0.520	0.000	0.520	"
"		Maximum flow	0.455	0.000	0.455	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.455	4.999	0.000	0.000"	
" 33		CATCHMENT 300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	300	Catchment 300"				
"	50.000	% Impervious"				
"	1.350	Total Area"				
"	20.000	Flow length"				
"	15.000	Overland Slope"				
"	0.675	Pervious Area"				
"	20.000	Pervious length"				
"	15.000	Pervious slope"				
"	0.675	Impervious Area"				
"	20.000	Impervious length"				
"	15.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.424	4.999	0.000	0.000	c.m/sec"
"		Catchment 300	Pervious	Impervious	Total Area	"
"		Surface Area	0.675	0.675	1.350	hectare"
"		Time of concentration	4.437	0.808	2.102	minutes"
"		Time to Centroid	111.465	111.382	111.412	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	392.30	392.30	784.61	c.m"
"		Rainfall losses	28.094	3.950	16.022	mm"
"		Runoff depth	30.025	54.169	42.097	mm"

"	Runoff volume	202.67	365.64	568.30	c.m"
"	Runoff coefficient	0.517	0.932	0.724	"
"	Maximum flow	0.180	0.250	0.424	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.424	5.423	0.000	0.000"	
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.386	5.423	0.000	0.000	c.m/sec"
"	Catchment 700	Pervious	Impervious	Total Area	"
"	Surface Area	2.980	0.000	2.980	hectare"
"	Time of concentration	24.654	4.487	24.654	minutes"
"	Time to Centroid	139.257	117.159	139.257	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	1731.95	0.00	1731.95	c.m"
"	Rainfall losses	27.890	1.793	27.890	mm"
"	Runoff depth	30.229	56.326	30.229	mm"
"	Runoff volume	900.82	0.00	900.82	c.m"
"	Runoff coefficient	0.520	0.000	0.520	"
"	Maximum flow	0.386	0.000	0.386	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.386	5.501	0.000	0.000"	
" 38	START/RE-START TOTALS 700"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			39.420	hectare"
"	Total Impervious area			11.691	hectare"

"	Total % impervious	29.656"
" 19	EXIT"	

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                     Uncon-Interim__25yr.out"
"          Licensee name:                       "
"          Company                              "
"          Date & Time last used:               2/5/2025 at 2:03:30 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          746.059  Coefficient A"
"          0.085  Constant B"
"          0.692  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    175.654  mm/hr"
"          Total depth                          67.239  mm"
"          6  025hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.052	0.000	0.000	0.000	c.m/sec"
"		Catchment 600	Pervious	Impervious	Total Area	"
"		Surface Area	0.114	0.006	0.120	hectare"
"		Time of concentration	1.428	0.261	1.342	minutes"
"		Time to Centroid	108.971	109.975	109.045	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	76.65	4.03	80.69	c.m"
"		Rainfall losses	29.074	9.934	28.117	mm"
"		Runoff depth	38.165	57.305	39.122	mm"
"		Runoff volume	43.51	3.44	46.95	c.m"
"		Runoff coefficient	0.568	0.852	0.582	"
"		Maximum flow	0.049	0.003	0.052	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.052	0.052	0.000	0.000"	
" 33		CATCHMENT 800"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	800	Catchment 800"				
"	5.000	% Impervious"				
"	1.730	Total Area"				
"	40.000	Flow length"				
"	3.750	Overland Slope"				
"	1.643	Pervious Area"				
"	40.000	Pervious length"				
"	3.750	Pervious slope"				
"	0.087	Impervious Area"				
"	40.000	Impervious length"				
"	3.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.496	0.052	0.000	0.000	c.m/sec"
"		Catchment 800	Pervious	Impervious	Total Area	"
"		Surface Area	1.643	0.087	1.730	hectare"
"		Time of concentration	9.548	1.743	8.915	minutes"
"		Time to Centroid	120.388	112.106	119.717	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	1105.07	58.16	1163.23	c.m"
"		Rainfall losses	28.570	2.417	27.262	mm"
"		Runoff depth	38.669	64.822	39.977	mm"

"	Runoff volume	635.52	56.07	691.59	c.m"
"	Runoff coefficient	0.575	0.964	0.595	"
"	Maximum flow	0.477	0.039	0.496	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.496 0.519 0.000 0.000"				
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	1.530 0.519 0.000 0.000 c.m/sec"				
"	Catchment 500 Pervious Impervious Total Area "				
"	Surface Area 14.652 0.148 14.800 hectare"				
"	Time of concentration 42.108 7.686 41.531 minutes"				
"	Time to Centroid 165.819 121.852 165.082 minutes"				
"	Rainfall depth 67.239 67.239 67.239 mm"				
"	Rainfall volume 9851.84 99.51 9951.36 c.m"				
"	Rainfall losses 28.384 1.687 28.117 mm"				
"	Runoff depth 38.855 65.552 39.122 mm"				
"	Runoff volume 5692.98 97.02 5789.99 c.m"				
"	Runoff coefficient 0.578 0.975 0.582 "				
"	Maximum flow 1.521 0.060 1.530 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	1.530 1.611 0.000 0.000"				
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

```

"      100  Catchment 100"
"      80.000  % Impervious"
"      13.090  Total Area"
"      40.000  Flow length"
"      2.000  Overland Slope"
"      2.618  Pervious Area"
"      40.000  Pervious length"
"      2.000  Pervious slope"
"      10.472  Impervious Area"
"      40.000  Impervious length"
"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          5.040      1.611      0.000      0.000 c.m/sec"
"      Catchment 100      Pervious      Impervious      Total Area  "
"      Surface Area      2.618      10.472      13.090      hectare"
"      Time of concentration  11.529      2.104      3.326      minutes"
"      Time to Centroid      123.146      112.845      114.181      minutes"
"      Rainfall depth      67.239      67.239      67.239      mm"
"      Rainfall volume      1760.31      7041.26      8801.57      c.m"
"      Rainfall losses      28.447      2.145      7.405      mm"
"      Runoff depth      38.792      65.094      59.834      mm"
"      Runoff volume      1015.58      6816.63      7832.21      c.m"
"      Runoff coefficient      0.577      0.968      0.890      "
"      Maximum flow      0.662      4.705      5.040      c.m/sec"
" 40  HYDROGRAPH Add Runoff  "
"      4  Add Runoff  "
"          5.040      5.657      0.000      0.000"
" 33  CATCHMENT 200"
"      1  Triangular SCS"
"      1  Equal length"
"      2  Horton equation"
"      200  Catchment 200"
"      15.000  % Impervious"
"      2.020  Total Area"
"      40.000  Flow length"
"      2.000  Overland Slope"
"      1.717  Pervious Area"
"      40.000  Pervious length"
"      2.000  Pervious slope"
"      0.303  Impervious Area"
"      40.000  Impervious length"

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"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"     30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.509      5.657      0.000      0.000 c.m/sec"
"      Catchment 200      Pervious      Impervious      Total Area  "
"      Surface Area      1.717      0.303      2.020      hectare"
"      Time of concentration  11.529      2.104      9.376      minutes"
"      Time to Centroid      123.146      112.845      120.792      minutes"
"      Rainfall depth      67.239      67.239      67.239      mm"
"      Rainfall volume      1154.49      203.73      1358.23      c.m"
"      Rainfall losses      28.447      2.145      24.501      mm"
"      Runoff depth      38.792      65.094      42.738      mm"
"      Runoff volume      666.07      197.23      863.30      c.m"
"      Runoff coefficient      0.577      0.968      0.636      "
"      Maximum flow      0.434      0.136      0.509      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.509      6.013      0.000      0.000"
" 33      CATCHMENT 400"
"      1      Triangular SCS"
"      1      Equal length"
"      2      Horton equation"
"      400      Catchment 400"
"      0.000      % Impervious"
"      3.330      Total Area"
"     120.000      Flow length"
"      3.000      Overland Slope"
"      3.330      Pervious Area"
"     120.000      Pervious length"
"      3.000      Pervious slope"
"      0.000      Impervious Area"
"     120.000      Impervious length"
"      3.000      Impervious slope"
"      0.250      Pervious Manning 'n'"
"     30.000      Pervious Max.infiltration"
"      5.000      Pervious Min.infiltration"
"      0.250      Pervious Lag constant (hours)"
"      5.000      Pervious Depression storage"
"      0.015      Impervious Manning 'n'"
"      0.000      Impervious Max.infiltration"
"      0.000      Impervious Min.infiltration"
"      0.001      Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.607	6.013	0.000	0.000	c.m/sec"
"		Catchment 400	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	19.735	3.602	19.735	minutes"
"		Time to Centroid	134.608	115.438	134.608	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	2239.05	0.00	2239.06	c.m"
"		Rainfall losses	28.441	2.959	28.441	mm"
"		Runoff depth	38.798	64.280	38.798	mm"
"		Runoff volume	1291.97	0.00	1291.97	c.m"
"		Runoff coefficient	0.577	0.000	0.577	"
"		Maximum flow	0.607	0.000	0.607	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.607	6.195	0.000	0.000"	
" 33		CATCHMENT 300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	300	Catchment 300"				
"	50.000	% Impervious"				
"	1.350	Total Area"				
"	20.000	Flow length"				
"	15.000	Overland Slope"				
"	0.675	Pervious Area"				
"	20.000	Pervious length"				
"	15.000	Pervious slope"				
"	0.675	Impervious Area"				
"	20.000	Impervious length"				
"	15.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.525	6.195	0.000	0.000	c.m/sec"
"		Catchment 300	Pervious	Impervious	Total Area	"
"		Surface Area	0.675	0.675	1.350	hectare"
"		Time of concentration	4.156	0.759	2.050	minutes"
"		Time to Centroid	112.936	110.977	111.722	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	453.86	453.86	907.73	c.m"
"		Rainfall losses	28.833	4.588	16.711	mm"
"		Runoff depth	38.406	62.651	50.528	mm"

"	Runoff volume	259.24	422.89	682.13	c.m"
"	Runoff coefficient	0.571	0.932	0.751	"
"	Maximum flow	0.234	0.291	0.525	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.525	6.720	0.000	0.000"	
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.500	6.720	0.000	0.000 c.m/sec"	
"	Catchment 700	Pervious	Impervious	Total Area	"
"	Surface Area	2.980	0.000	2.980	hectare"
"	Time of concentration	23.089	4.215	23.089	minutes"
"	Time to Centroid	139.283	116.269	139.283	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	2003.72	0.00	2003.72	c.m"
"	Rainfall losses	28.407	2.068	28.407	mm"
"	Runoff depth	38.832	65.171	38.832	mm"
"	Runoff volume	1157.20	0.00	1157.21	c.m"
"	Runoff coefficient	0.578	0.000	0.578	"
"	Maximum flow	0.500	0.000	0.500	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.500	6.845	0.000	0.000"	
" 38	START/RE-START TOTALS 700"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			39.420	hectare"
"	Total Impervious area			11.691	hectare"

"	Total % impervious	29.656"
" 19	EXIT"	

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                    Uncon-Interim__50yr.out"
"          Licensee name:                      "
"          Company                             "
"          Date & Time last used:              2/5/2025 at 2:00:47 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          820.361  Coefficient A"
"          0.010  Constant B"
"          0.691  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    194.803  mm/hr"
"          Total depth                          74.358  mm"
"          6  050hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

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"	1.500	Impervious Depression storage"				
"		0.058	0.000	0.000	0.000	c.m/sec"
"		Catchment 600	Pervious	Impervious	Total Area	"
"		Surface Area	0.114	0.006	0.120	hectare"
"		Time of concentration	1.368	0.250	1.290	minutes"
"		Time to Centroid	110.205	109.690	110.169	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	84.77	4.46	89.23	c.m"
"		Rainfall losses	29.637	11.032	28.707	mm"
"		Runoff depth	44.721	63.326	45.651	mm"
"		Runoff volume	50.98	3.80	54.78	c.m"
"		Runoff coefficient	0.601	0.852	0.614	"
"		Maximum flow	0.055	0.003	0.058	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.058	0.058	0.000	0.000"	
" 33		CATCHMENT 800"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	800	Catchment 800"				
"	5.000	% Impervious"				
"	1.730	Total Area"				
"	40.000	Flow length"				
"	3.750	Overland Slope"				
"	1.643	Pervious Area"				
"	40.000	Pervious length"				
"	3.750	Pervious slope"				
"	0.087	Impervious Area"				
"	40.000	Impervious length"				
"	3.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.580	0.058	0.000	0.000	c.m/sec"
"		Catchment 800	Pervious	Impervious	Total Area	"
"		Surface Area	1.643	0.087	1.730	hectare"
"		Time of concentration	9.147	1.672	8.573	minutes"
"		Time to Centroid	121.402	111.843	120.668	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	1222.07	64.32	1286.39	c.m"
"		Rainfall losses	28.890	2.541	27.572	mm"
"		Runoff depth	45.468	71.816	46.785	mm"

"	Runoff volume	747.27	62.12	809.39	c.m"
"	Runoff coefficient	0.611	0.966	0.629	"
"	Maximum flow	0.558	0.043	0.580	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.580	0.604	0.000	0.000"	
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	1.817	0.604	0.000	0.000 c.m/sec"	
"	Catchment 500	Pervious	Impervious	Total Area	"
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	40.339	7.374	39.818	minutes"
"	Time to Centroid	166.075	121.211	165.366	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	1.0895	0.0110	1.1005	ha-m"
"	Rainfall losses	28.716	1.802	28.447	mm"
"	Runoff depth	45.642	72.556	45.911	mm"
"	Runoff volume	6687.42	107.38	6794.80	c.m"
"	Runoff coefficient	0.614	0.976	0.617	"
"	Maximum flow	1.807	0.066	1.817	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	1.817	1.914	0.000	0.000"	
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

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"      100  Catchment 100"
"      80.000  % Impervious"
"      13.090  Total Area"
"      40.000  Flow length"
"      2.000  Overland Slope"
"      2.618  Pervious Area"
"      40.000  Pervious length"
"      2.000  Pervious slope"
"      10.472  Impervious Area"
"      40.000  Impervious length"
"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          5.638      1.914      0.000      0.000 c.m/sec"
"      Catchment 100      Pervious      Impervious      Total Area  "
"      Surface Area      2.618      10.472      13.090      hectare"
"      Time of concentration  11.045      2.019      3.250      minutes"
"      Time to Centroid      124.131      112.509      114.093      minutes"
"      Rainfall depth      74.358      74.358      74.358      mm"
"      Rainfall volume      1946.69      7786.75      9733.44      c.m"
"      Rainfall losses      28.840      2.269      7.583      mm"
"      Runoff depth      45.518      72.088      66.774      mm"
"      Runoff volume      1191.65      7549.11      8740.76      c.m"
"      Runoff coefficient      0.612      0.969      0.898      "
"      Maximum flow      0.783      5.218      5.638      c.m/sec"
" 40  HYDROGRAPH Add Runoff  "
"      4  Add Runoff  "
"          5.638      6.392      0.000      0.000"
" 33  CATCHMENT 200"
"      1  Triangular SCS"
"      1  Equal length"
"      2  Horton equation"
"      200  Catchment 200"
"      15.000  % Impervious"
"      2.020  Total Area"
"      40.000  Flow length"
"      2.000  Overland Slope"
"      1.717  Pervious Area"
"      40.000  Pervious length"
"      2.000  Pervious slope"
"      0.303  Impervious Area"
"      40.000  Impervious length"

```

```

"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"     30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"              0.595      6.392      0.000      0.000 c.m/sec"
"      Catchment 200      Pervious      Impervious      Total Area  "
"      Surface Area      1.717      0.303      2.020      hectare"
"      Time of concentration  11.045      2.019      9.073      minutes"
"      Time to Centroid      124.131      112.509      121.592      minutes"
"      Rainfall depth      74.358      74.358      74.358      mm"
"      Rainfall volume      1276.72      225.30      1502.03      c.m"
"      Rainfall losses      28.840      2.269      24.855      mm"
"      Runoff depth      45.518      72.088      49.503      mm"
"      Runoff volume      781.54      218.43      999.97      c.m"
"      Runoff coefficient      0.612      0.969      0.666      "
"      Maximum flow      0.514      0.151      0.595      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.595      6.819      0.000      0.000"
" 33      CATCHMENT 400"
"      1      Triangular SCS"
"      1      Equal length"
"      2      Horton equation"
"      400      Catchment 400"
"      0.000      % Impervious"
"      3.330      Total Area"
"     120.000      Flow length"
"      3.000      Overland Slope"
"      3.330      Pervious Area"
"     120.000      Pervious length"
"      3.000      Pervious slope"
"      0.000      Impervious Area"
"     120.000      Impervious length"
"      3.000      Impervious slope"
"      0.250      Pervious Manning 'n'"
"     30.000      Pervious Max.infiltration"
"      5.000      Pervious Min.infiltration"
"      0.250      Pervious Lag constant (hours)"
"      5.000      Pervious Depression storage"
"      0.015      Impervious Manning 'n'"
"      0.000      Impervious Max.infiltration"
"      0.000      Impervious Min.infiltration"
"      0.001      Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.720	6.819	0.000	0.000	c.m/sec"
"		Catchment 400	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	18.906	3.456	18.906	minutes"
"		Time to Centroid	135.377	115.016	135.377	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	2476.11	0.00	2476.11	c.m"
"		Rainfall losses	28.813	3.112	28.813	mm"
"		Runoff depth	45.544	71.246	45.544	mm"
"		Runoff volume	1516.63	0.00	1516.63	c.m"
"		Runoff coefficient	0.613	0.000	0.613	"
"		Maximum flow	0.720	0.000	0.720	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.720	7.048	0.000	0.000"	
" 33		CATCHMENT 300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	300	Catchment 300"				
"	50.000	% Impervious"				
"	1.350	Total Area"				
"	20.000	Flow length"				
"	15.000	Overland Slope"				
"	0.675	Pervious Area"				
"	20.000	Pervious length"				
"	15.000	Pervious slope"				
"	0.675	Impervious Area"				
"	20.000	Impervious length"				
"	15.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.597	7.048	0.000	0.000	c.m/sec"
"		Catchment 300	Pervious	Impervious	Total Area	"
"		Surface Area	0.675	0.675	1.350	hectare"
"		Time of concentration	3.981	0.728	2.007	minutes"
"		Time to Centroid	114.123	110.827	112.123	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	501.92	501.92	1003.83	c.m"
"		Rainfall losses	29.474	5.085	17.279	mm"
"		Runoff depth	44.884	69.273	57.079	mm"

"	Runoff volume	302.97	467.59	770.56	c.m"
"	Runoff coefficient	0.604	0.932	0.768	"
"	Maximum flow	0.276	0.321	0.597	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.597	7.645	0.000	0.000"	
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.575	7.645	0.000	0.000 c.m/sec"	
"	Catchment 700	Pervious	Impervious	Total Area	"
"	Surface Area	2.980	0.000	2.980	hectare"
"	Time of concentration	22.119	4.044	22.119	minutes"
"	Time to Centroid	139.988	115.872	139.988	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	2215.86	0.00	2215.86	c.m"
"	Rainfall losses	28.813	2.354	28.812	mm"
"	Runoff depth	45.545	72.004	45.545	mm"
"	Runoff volume	1357.25	0.00	1357.25	c.m"
"	Runoff coefficient	0.613	0.000	0.613	"
"	Maximum flow	0.575	0.000	0.575	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.575	7.802	0.000	0.000"	
" 38	START/RE-START TOTALS 700"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			39.420	hectare"
"	Total Impervious area			11.691	hectare"

"	Total % impervious	29.656"
" 19	EXIT"	

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25 rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10 Units used:                      ie METRIC"
"          Job folder:                        B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                   Uncon-Interim__100yr.out"
"          Licensee name:                     "
"          Company                           "
"          Date & Time last used:            2/5/2025 at 1:58:41 PM"
" 31          TIME PARAMETERS"
"          5.000 Time Step"
"          240.000 Max. Storm length"
"          2000.000 Max. Hydrograph"
" 32          STORM Chicago storm"
"          1 Chicago storm"
"          901.088 Coefficient A"
"          0.043 Constant B"
"          0.692 Exponent C"
"          0.375 Fraction R"
"          240.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity                   212.921 mm/hr"
"          Total depth                         81.221 mm"
"          6 100hyd Hydrograph extension used in this file"
" 33          CATCHMENT 600"
"          1 Triangular SCS"
"          1 Equal length"
"          2 Horton equation"
"          600 Catchment 600"
"          5.000 % Impervious"
"          0.120 Total Area"
"          5.000 Flow length"
"          33.000 Overland Slope"
"          0.114 Pervious Area"
"          5.000 Pervious length"
"          33.000 Pervious slope"
"          0.006 Impervious Area"
"          5.000 Impervious length"
"          33.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          30.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.001 Impervious Lag constant (hours)"

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"	1.500	Impervious Depression storage"				
"		0.063	0.000	0.000	0.000	c.m/sec"
"		Catchment 600	Pervious	Impervious	Total Area	"
"		Surface Area	0.114	0.006	0.120	hectare"
"		Time of concentration	1.319	0.241	1.247	minutes"
"		Time to Centroid	110.908	109.390	110.807	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	92.59	4.87	97.46	c.m"
"		Rainfall losses	30.156	12.072	29.251	mm"
"		Runoff depth	51.065	69.148	51.969	mm"
"		Runoff volume	58.21	4.15	62.36	c.m"
"		Runoff coefficient	0.629	0.851	0.640	"
"		Maximum flow	0.060	0.003	0.063	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.063	0.063	0.000	0.000"	
" 33		CATCHMENT 800"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	800	Catchment 800"				
"	5.000	% Impervious"				
"	1.730	Total Area"				
"	40.000	Flow length"				
"	3.750	Overland Slope"				
"	1.643	Pervious Area"				
"	40.000	Pervious length"				
"	3.750	Pervious slope"				
"	0.087	Impervious Area"				
"	40.000	Impervious length"				
"	3.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.664	0.063	0.000	0.000	c.m/sec"
"		Catchment 800	Pervious	Impervious	Total Area	"
"		Surface Area	1.643	0.087	1.730	hectare"
"		Time of concentration	8.817	1.614	8.287	minutes"
"		Time to Centroid	121.743	111.617	120.997	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	1334.86	70.26	1405.12	c.m"
"		Rainfall losses	29.209	2.686	27.883	mm"
"		Runoff depth	52.011	78.534	53.337	mm"

"	Runoff volume	854.81	67.93	922.74	c.m"
"	Runoff coefficient	0.640	0.967	0.657	"
"	Maximum flow	0.641	0.047	0.664	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.664	0.691	0.000	0.000"	
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	2.059	0.691	0.000	0.000 c.m/sec"	
"	Catchment 500	Pervious	Impervious	Total Area	"
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	38.886	7.117	38.407	minutes"
"	Time to Centroid	165.000	120.685	164.331	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	1.1900	0.0120	1.2021	ha-m"
"	Rainfall losses	28.976	1.949	28.706	mm"
"	Runoff depth	52.245	79.272	52.515	mm"
"	Runoff volume	7654.90	117.32	7772.23	c.m"
"	Runoff coefficient	0.643	0.976	0.647	"
"	Maximum flow	2.048	0.072	2.059	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	2.059	2.166	0.000	0.000"	
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				

```

"      100  Catchment 100"
"      80.000  % Impervious"
"      13.090  Total Area"
"      40.000  Flow length"
"      2.000  Overland Slope"
"      2.618  Pervious Area"
"      40.000  Pervious length"
"      2.000  Pervious slope"
"      10.472  Impervious Area"
"      40.000  Impervious length"
"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          6.208      2.166      0.000      0.000 c.m/sec"
"      Catchment 100      Pervious      Impervious      Total Area  "
"      Surface Area      2.618      10.472      13.090      hectare"
"      Time of concentration  10.647      1.949      3.182      minutes"
"      Time to Centroid      124.365      112.180      113.907      minutes"
"      Rainfall depth      81.221      81.221      81.221      mm"
"      Rainfall volume      0.2126      0.8505      1.0632      ha-m"
"      Rainfall losses      29.139      2.392      7.742      mm"
"      Runoff depth      52.082      78.828      73.479      mm"
"      Runoff volume      1363.51      8254.90      9618.41      c.m"
"      Runoff coefficient      0.641      0.971      0.905      "
"      Maximum flow      0.912      5.702      6.208      c.m/sec"
" 40  HYDROGRAPH Add Runoff  "
"      4  Add Runoff  "
"          6.208      7.107      0.000      0.000"
" 33  CATCHMENT 200"
"      1  Triangular SCS"
"      1  Equal length"
"      2  Horton equation"
"      200  Catchment 200"
"      15.000  % Impervious"
"      2.020  Total Area"
"      40.000  Flow length"
"      2.000  Overland Slope"
"      1.717  Pervious Area"
"      40.000  Pervious length"
"      2.000  Pervious slope"
"      0.303  Impervious Area"
"      40.000  Impervious length"

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"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"     30.000  Pervious Max.infiltration"
"      5.000  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.001  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"              0.686      7.107      0.000      0.000 c.m/sec"
"      Catchment 200      Pervious      Impervious      Total Area  "
"      Surface Area      1.717      0.303      2.020      hectare"
"      Time of concentration 10.647      1.949      8.813      minutes"
"      Time to Centroid      124.365      112.180      121.796      minutes"
"      Rainfall depth      81.221      81.221      81.221      mm"
"      Rainfall volume      1394.56      246.10      1640.66      c.m"
"      Rainfall losses      29.139      2.392      25.127      mm"
"      Runoff depth      52.082      78.828      56.094      mm"
"      Runoff volume      894.25      238.85      1133.10      c.m"
"      Runoff coefficient      0.641      0.971      0.691      "
"      Maximum flow      0.598      0.165      0.686      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.686      7.604      0.000      0.000"
" 33      CATCHMENT 400"
"      1      Triangular SCS"
"      1      Equal length"
"      2      Horton equation"
"      400      Catchment 400"
"      0.000      % Impervious"
"      3.330      Total Area"
"     120.000      Flow length"
"      3.000      Overland Slope"
"      3.330      Pervious Area"
"     120.000      Pervious length"
"      3.000      Pervious slope"
"      0.000      Impervious Area"
"     120.000      Impervious length"
"      3.000      Impervious slope"
"      0.250      Pervious Manning 'n'"
"     30.000      Pervious Max.infiltration"
"      5.000      Pervious Min.infiltration"
"      0.250      Pervious Lag constant (hours)"
"      5.000      Pervious Depression storage"
"      0.015      Impervious Manning 'n'"
"      0.000      Impervious Max.infiltration"
"      0.000      Impervious Min.infiltration"
"      0.001      Impervious Lag constant (hours)"

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"	1.500	Impervious Depression storage"				
"		0.835	7.604	0.000	0.000	c.m/sec"
"		Catchment 400	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	18.225	3.335	18.225	minutes"
"		Time to Centroid	135.263	114.631	135.263	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	2704.65	0.00	2704.65	c.m"
"		Rainfall losses	28.982	3.311	28.982	mm"
"		Runoff depth	52.239	77.910	52.239	mm"
"		Runoff volume	1739.55	0.00	1739.55	c.m"
"		Runoff coefficient	0.643	0.000	0.643	"
"		Maximum flow	0.835	0.000	0.835	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.835	7.881	0.000	0.000"	
" 33		CATCHMENT 300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	300	Catchment 300"				
"	50.000	% Impervious"				
"	1.350	Total Area"				
"	20.000	Flow length"				
"	15.000	Overland Slope"				
"	0.675	Pervious Area"				
"	20.000	Pervious length"				
"	15.000	Pervious slope"				
"	0.675	Impervious Area"				
"	20.000	Impervious length"				
"	15.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.665	7.881	0.000	0.000	c.m/sec"
"		Catchment 300	Pervious	Impervious	Total Area	"
"		Surface Area	0.675	0.675	1.350	hectare"
"		Time of concentration	3.838	0.702	1.967	minutes"
"		Time to Centroid	114.744	110.663	112.310	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	548.24	548.24	1096.48	c.m"
"		Rainfall losses	30.089	5.611	17.850	mm"
"		Runoff depth	51.132	75.610	63.371	mm"

"	Runoff volume	345.14	510.37	855.51	c.m"
"	Runoff coefficient	0.630	0.931	0.780	"
"	Maximum flow	0.315	0.350	0.665	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.665	8.546	0.000	0.000"	
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.652	8.546	0.000	0.000 c.m/sec"	
"	Catchment 700	Pervious	Impervious	Total Area	"
"	Surface Area	2.980	0.000	2.980	hectare"
"	Time of concentration	21.323	3.902	21.323	minutes"
"	Time to Centroid	139.735	115.505	139.735	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	2420.38	0.00	2420.38	c.m"
"	Rainfall losses	28.988	2.703	28.988	mm"
"	Runoff depth	52.233	78.518	52.233	mm"
"	Runoff volume	1556.54	0.00	1556.55	c.m"
"	Runoff coefficient	0.643	0.000	0.643	"
"	Maximum flow	0.652	0.000	0.652	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.652	8.737	0.000	0.000"	
" 38	START/RE-START TOTALS 700"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			39.420	hectare"
"	Total Impervious area			11.691	hectare"

"	Total % impervious	29.656"
" 19	EXIT"	

```

"          MIDUSS Output ----->"
"          MIDUSS version                Version 2.25  rev. 473"
"          MIDUSS created                 Sunday, February 7, 2010"
"          10  Units used:                ie METRIC"
"          Job folder:                   B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:              Uuncon-Interim__REG.out"
"          Licensee name:                "
"          Company                       "
"          Date & Time last used:        2/5/2025 at 1:53:57 PM"
" 31          TIME PARAMETERS"
"          60.000  Time Step"
"          2880.000  Max. Storm length"
"          7500.000  Max. Hydrograph"
" 32          STORM Historic"
"          5  Historic"
"          2880.000  Duration"
"          48.000  Rainfall intensity values"
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"                  2.028    2.028    2.028    2.028    2.028"
"                  2.028    2.028    2.028    2.028    2.028"
"                  2.028    2.028    2.028    2.028    2.028"
"                  2.028    2.028    2.028    2.028    2.028"
"                  2.028    2.026    2.026    2.026    2.028"
"                  2.026    6.000    4.000    6.000    13.000"
"                  17.000    13.000    23.000    13.000    13.000"
"                  53.000    38.000    13.000"
"          Maximum intensity              53.000  mm/hr"
"          Total depth                    285.000  mm"
"          6  000hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"

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"      0.250 Pervious Lag constant (hours)"
"      5.000 Pervious Depression storage"
"      0.015 Impervious Manning 'n'"
"      0.000 Impervious Max.infiltration"
"      0.000 Impervious Min.infiltration"
"      0.010 Impervious Lag constant (hours)"
"      1.500 Impervious Depression storage"
"          0.014      0.000      0.000      0.000 c.m/sec"
"      Catchment 600      Pervious      Impervious Total Area "
"      Surface Area      0.114      0.006      0.120      hectare"
"      Time of concentration 2.369      0.421      2.184      minutes"
"      Time to Centroid 2699.991 2271.478 2659.445 minutes"
"      Rainfall depth 285.000 285.000 285.000 mm"
"      Rainfall volume 324.90 17.10 342.00 c.m"
"      Rainfall losses 157.980 32.780 151.720 mm"
"      Runoff depth 127.020 252.220 133.280 mm"
"      Runoff volume 144.80 15.13 159.94 c.m"
"      Runoff coefficient 0.446 0.885 0.468 "
"      Maximum flow 0.013 0.001 0.014 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
"      4 Add Runoff "
"          0.014      0.014      0.000      0.000"
" 33 CATCHMENT 800"
"      1 Triangular SCS"
"      1 Equal length"
"      2 Horton equation"
"      800 Catchment 800"
"      5.000 % Impervious"
"      1.730 Total Area"
"      40.000 Flow length"
"      3.750 Overland Slope"
"      1.643 Pervious Area"
"      40.000 Pervious length"
"      3.750 Pervious slope"
"      0.087 Impervious Area"
"      40.000 Impervious length"
"      3.750 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      30.000 Pervious Max.infiltration"
"      5.000 Pervious Min.infiltration"
"      0.250 Pervious Lag constant (hours)"
"      5.000 Pervious Depression storage"
"      0.015 Impervious Manning 'n'"
"      0.000 Impervious Max.infiltration"
"      0.000 Impervious Min.infiltration"
"      0.010 Impervious Lag constant (hours)"
"      1.500 Impervious Depression storage"
"          0.182      0.014      0.000      0.000 c.m/sec"
"      Catchment 800      Pervious      Impervious Total Area "
"      Surface Area      1.643      0.087      1.730      hectare"

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"	Time of concentration	15.838	2.814	14.776	minutes"
"	Time to Centroid	2719.829	2252.474	2681.705	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	4683.98	246.53	4930.50	c.m"
"	Rainfall losses	139.630	39.672	134.632	mm"
"	Runoff depth	145.370	245.328	150.368	mm"
"	Runoff volume	2389.15	212.21	2601.36	c.m"
"	Runoff coefficient	0.510	0.861	0.528	"
"	Maximum flow	0.171	0.011	0.182	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.182	0.196	0.000	0.000"
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.010 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		1.470	0.196	0.000	0.000 c.m/sec"
"	Catchment 500	Pervious	Impervious	Total Area	"
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	69.853	12.412	68.788	minutes"
"	Time to Centroid	2777.725	2293.749	2768.751	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	4.1758	0.0422	4.2180	ha-m"
"	Rainfall losses	138.578	11.153	137.304	mm"
"	Runoff depth	146.422	273.847	147.696	mm"
"	Runoff volume	2.1454	0.0405	2.1859	ha-m"
"	Runoff coefficient	0.514	0.961	0.518	"
"	Maximum flow	1.454	0.018	1.470	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				

```

"          4  Add Runoff "
"              1.470      1.647      0.000      0.000"
" 33      CATCHMENT 100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"      100  Catchment 100"
"      80.000 % Impervious"
"      13.090 Total Area"
"      40.000 Flow length"
"          2.000 Overland Slope"
"          2.618 Pervious Area"
"      40.000 Pervious length"
"          2.000 Pervious slope"
"      10.472 Impervious Area"
"      40.000 Impervious length"
"          2.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"      30.000 Pervious Max.infiltration"
"          5.000 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.010 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"
"              1.584      1.647      0.000      0.000 c.m/sec"
"          Catchment 100      Pervious      Impervious      Total Area "
"          Surface Area      2.618      10.472      13.090      hectare"
"          Time of concentration  19.125      3.398      5.426      minutes"
"          Time to Centroid      2724.073      2240.650      2302.975      minutes"
"          Rainfall depth      285.000      285.000      285.000      mm"
"          Rainfall volume      0.7461      2.9845      3.7307      ha-m"
"          Rainfall losses      139.363      39.000      59.073      mm"
"          Runoff depth      145.637      246.000      225.927      mm"
"          Runoff volume      0.3813      2.5761      2.9574      ha-m"
"          Runoff coefficient      0.511      0.863      0.793      "
"          Maximum flow      0.264      1.323      1.584      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"              1.584      2.853      0.000      0.000"
" 33      CATCHMENT 200"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"      200  Catchment 200"
"      15.000 % Impervious"
"          2.020 Total Area"
"      40.000 Flow length"

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"	2.000	Overland Slope"				
"	1.717	Pervious Area"				
"	40.000	Pervious length"				
"	2.000	Pervious slope"				
"	0.303	Impervious Area"				
"	40.000	Impervious length"				
"	2.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.010	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.210	2.853	0.000	0.000	c.m/sec"
"		Catchment 200	Pervious	Impervious	Total Area	"
"		Surface Area	1.717	0.303	2.020	hectare"
"		Time of concentration	19.125	3.398	15.514	minutes"
"		Time to Centroid	2724.073	2240.650	2613.063	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	4893.45	863.55	5757.00	c.m"
"		Rainfall losses	139.363	39.000	124.309	mm"
"		Runoff depth	145.637	246.000	160.691	mm"
"		Runoff volume	2500.58	745.38	3245.96	c.m"
"		Runoff coefficient	0.511	0.863	0.564	"
"		Maximum flow	0.173	0.038	0.210	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.210	3.053	0.000	0.000"	
" 33		CATCHMENT 400"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	400	Catchment 400"				
"	0.000	% Impervious"				
"	3.330	Total Area"				
"	120.000	Flow length"				
"	3.000	Overland Slope"				
"	3.330	Pervious Area"				
"	120.000	Pervious length"				
"	3.000	Pervious slope"				
"	0.000	Impervious Area"				
"	120.000	Impervious length"				
"	3.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				

"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.010	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.366	3.053	0.000	0.000 c.m/sec"
"		Catchment 400	Pervious	Impervious	Total Area "
"		Surface Area	3.330	0.000	3.330 hectare"
"		Time of concentration	32.738	5.817	32.738 minutes"
"		Time to Centroid	2737.685	2233.111	2737.684 minutes"
"		Rainfall depth	285.000	285.000	285.000 mm"
"		Rainfall volume	9490.49	0.01	9490.50 c.m"
"		Rainfall losses	139.700	29.327	139.699 mm"
"		Runoff depth	145.300	255.673	145.301 mm"
"		Runoff volume	4838.50	0.01	4838.51 c.m"
"		Runoff coefficient	0.510	0.000	0.510 "
"		Maximum flow	0.366	0.000	0.366 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.366	3.419	0.000	0.000"
" 33		CATCHMENT 300"			
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	300	Catchment 300"			
"	50.000	% Impervious"			
"	1.350	Total Area"			
"	20.000	Flow length"			
"	15.000	Overland Slope"			
"	0.675	Pervious Area"			
"	20.000	Pervious length"			
"	15.000	Pervious slope"			
"	0.675	Impervious Area"			
"	20.000	Impervious length"			
"	15.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	30.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.010	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			
"		0.165	3.419	0.000	0.000 c.m/sec"
"		Catchment 300	Pervious	Impervious	Total Area "
"		Surface Area	0.675	0.675	1.350 hectare"

"	Time of concentration	6.894	1.225	3.197	minutes"
"	Time to Centroid	2702.037	2279.380	2426.416	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	1923.75	1923.75	3847.50	c.m"
"	Rainfall losses	153.479	38.462	95.970	mm"
"	Runoff depth	131.521	246.538	189.030	mm"
"	Runoff volume	887.77	1664.13	2551.90	c.m"
"	Runoff coefficient	0.461	0.865	0.663	"
"	Maximum flow	0.077	0.088	0.165	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.165 3.533 0.000 0.000"				
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.010 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.327 3.533 0.000 0.000 c.m/sec"				
"	Catchment 700 Pervious Impervious Total Area "				
"	Surface Area 2.980 0.000 2.980 hectare"				
"	Time of concentration 38.303 6.806 38.303 minutes"				
"	Time to Centroid 2741.219 2241.541 2741.218 minutes"				
"	Rainfall depth 285.000 285.000 285.000 mm"				
"	Rainfall volume 8492.99 0.01 8493.00 c.m"				
"	Rainfall losses 141.568 24.635 141.568 mm"				
"	Runoff depth 143.432 260.365 143.432 mm"				
"	Runoff volume 4274.27 0.01 4274.27 c.m"				
"	Runoff coefficient 0.503 0.000 0.503 "				
"	Maximum flow 0.327 0.000 0.327 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				

"	4	Add Runoff "				
"			0.327	3.860	0.000	0.000"
" 38		START/RE-START TOTALS 700"				
"	3	Runoff Totals on EXIT"				
"		Total Catchment area			39.420	hectare"
"		Total Impervious area			11.691	hectare"
"		Total % impervious			29.656"	
" 19		EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                      Interim__25mm.out"
"          Licensee name:
"          Company
"          Date & Time last used:                2/5/2025 at 11:29:30 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          367.000  Coefficient A"
"          5.000  Constant B"
"          0.700  Exponent C"
"          0.394  Fraction R"
"          120.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                      72.993  mm/hr"
"          Total depth                          24.995  mm"
"          7  0025hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.007	0.000	0.000	0.000	c.m/sec"
"		Catchment 600	Pervious	Impervious	Total Area	"
"		Surface Area	0.114	0.006	0.120	hectare"
"		Time of concentration	3.071	0.370	2.655	minutes"
"		Time to Centroid	63.738	60.371	63.219	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	28.49	1.50	29.99	c.m"
"		Rainfall losses	19.084	4.536	18.356	mm"
"		Runoff depth	5.912	20.459	6.639	mm"
"		Runoff volume	6.74	1.23	7.97	c.m"
"		Runoff coefficient	0.237	0.819	0.266	"
"		Maximum flow	0.006	0.001	0.007	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.007	0.007	0.000	0.000"	
" 33		CATCHMENT 800"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	800	Catchment 800"				
"	5.000	% Impervious"				
"	1.730	Total Area"				
"	40.000	Flow length"				
"	3.750	Overland Slope"				
"	1.643	Pervious Area"				
"	40.000	Pervious length"				
"	3.750	Pervious slope"				
"	0.087	Impervious Area"				
"	40.000	Impervious length"				
"	3.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.050	0.007	0.000	0.000	c.m/sec"
"		Catchment 800	Pervious	Impervious	Total Area	"
"		Surface Area	1.643	0.087	1.730	hectare"
"		Time of concentration	20.536	2.476	17.532	minutes"
"		Time to Centroid	82.465	63.135	79.250	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	410.80	21.62	432.42	c.m"
"		Rainfall losses	18.914	1.941	18.065	mm"
"		Runoff depth	6.082	23.054	6.930	mm"

"	Runoff volume	99.95	19.94	119.90	c.m"
"	Runoff coefficient	0.243	0.922	0.277	"
"	Maximum flow	0.047	0.013	0.050	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.050 0.052 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.050 0.052 0.052 0.000"				
" 40	HYDROGRAPH Combine 100"				
"	6 Combine "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow	0.052			c.m/sec"
"	Hydrograph volume	127.862			c.m"
"	0.050 0.052 0.052 0.052"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.050 0.000 0.052 0.052"				
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.129 0.000 0.052 0.052 c.m/sec"				
"	Catchment 500 Pervious Impervious Total Area "				
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	90.569	10.921	87.585	minutes"
"	Time to Centroid	157.420	74.245	154.304	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"

"		Rainfall volume	3662.32	36.99	3699.31	c.m"
"		Rainfall losses	18.910	1.543	18.736	mm"
"		Runoff depth	6.085	23.453	6.259	mm"
"		Runoff volume	891.61	34.71	926.32	c.m"
"		Runoff coefficient	0.243	0.938	0.250	"
"		Maximum flow	0.127	0.018	0.129	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"			0.129	0.129	0.052	0.052"
" 33		CATCHMENT 100"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	100	Catchment 100"				
"	80.000	% Impervious"				
"	13.090	Total Area"				
"	40.000	Flow length"				
"	2.000	Overland Slope"				
"	2.618	Pervious Area"				
"	40.000	Pervious length"				
"	2.000	Pervious slope"				
"	10.472	Impervious Area"				
"	40.000	Impervious length"				
"	2.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"			1.552	0.129	0.052	0.052 c.m/sec"
"		Catchment 100	Pervious	Impervious	Total Area	"
"		Surface Area	2.618	10.472	13.090	hectare"
"		Time of concentration	24.798	2.990	4.336	minutes"
"		Time to Centroid	87.039	63.901	65.330	minutes"
"		Rainfall depth	24.995	24.995	24.995	mm"
"		Rainfall volume	654.38	2617.51	3271.89	c.m"
"		Rainfall losses	18.913	1.889	5.294	mm"
"		Runoff depth	6.082	23.106	19.701	mm"
"		Runoff volume	159.22	2419.69	2578.92	c.m"
"		Runoff coefficient	0.243	0.924	0.788	"
"		Maximum flow	0.069	1.550	1.552	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"			1.552	1.562	0.052	0.052"
" 33		CATCHMENT 200"				

```

"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"         200   Catchment 200"
"       15.000   % Impervious"
"         2.020   Total Area"
"       40.000   Flow length"
"         2.000   Overland Slope"
"         1.717   Pervious Area"
"       40.000   Pervious length"
"         2.000   Pervious slope"
"         0.303   Impervious Area"
"       40.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"       30.000   Pervious Max.infiltration"
"         5.000   Pervious Min.infiltration"
"         0.250   Pervious Lag constant (hours)"
"         5.000   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.001   Impervious Lag constant (hours)"
"         1.500   Impervious Depression storage"
"
"           0.056       1.562       0.052       0.052 c.m/sec"
"       Catchment 200       Pervious   Impervious Total Area "
"       Surface Area           1.717       0.303       2.020       hectare"
"       Time of concentration  24.798       2.990       16.045       minutes"
"       Time to Centroid      87.039       63.901       77.753       minutes"
"       Rainfall depth        24.995       24.995       24.995       mm"
"       Rainfall volume       429.17       75.74       504.91       c.m"
"       Rainfall losses       18.913       1.889       16.360       mm"
"       Runoff depth          6.082       23.106       8.636       mm"
"       Runoff volume         104.43       70.01       174.44       c.m"
"       Runoff coefficient     0.243       0.924       0.345       "
"       Maximum flow          0.045       0.045       0.056       c.m/sec"
" 40       HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"           0.056       1.609       0.052       0.052"
" 54       POND DESIGN"
"         1.609   Current peak flow   c.m/sec"
"         3.341   Target outflow     c.m/sec"
"       3679.7   Hydrograph volume   c.m"
"         18.    Number of stages"
"       421.500   Minimum water level   metre"
"       423.200   Maximum water level   metre"
"       421.500   Starting water level  metre"
"         0     Keep Design Data: 1 = True; 0 = False"
"           Level Discharge   Volume"
"       421.500       0.000       0.000"

```

"	421.600	0.00700	1070.100"		
"	421.700	0.01300	2176.600"		
"	421.800	0.01900	3319.800"		
"	421.900	0.02300	4500.000"		
"	422.000	0.02600	5717.200"		
"	422.100	0.07100	6977.200"		
"	422.200	0.1940	8275.500"		
"	422.300	0.3520	9602.300"		
"	422.400	0.3950	10957.80"		
"	422.500	0.5140	12342.10"		
"	422.600	0.7980	13755.30"		
"	422.700	0.9580	15197.70"		
"	422.800	1.614	16669.40"		
"	422.900	2.846	18170.60"		
"	423.000	4.482	19701.40"		
"	423.100	6.460	21262.00"		
"	423.200	8.746	22852.50"		
"	Peak outflow		0.019	c.m/sec"	
"	Maximum level		421.807	metre"	
"	Maximum storage		3397.904	c.m"	
"	Centroidal lag		40.318	hours"	
"	0.056	1.609	0.019	0.052	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5 Next link "				
"	0.056	0.019	0.019	0.052"	
" 33	CATCHMENT 400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	400 Catchment 400"				
"	0.000 % Impervious"				
"	3.330 Total Area"				
"	120.000 Flow length"				
"	3.000 Overland Slope"				
"	3.330 Pervious Area"				
"	120.000 Pervious length"				
"	3.000 Pervious slope"				
"	0.000 Impervious Area"				
"	120.000 Impervious length"				
"	3.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				

	0.056	0.019	0.019	0.052	c.m/sec"
"	Catchment 400	Pervious	Impervious	Total Area	"
"	Surface Area	3.330	0.000	3.330	hectare"
"	Time of concentration	42.448	5.118	42.448	minutes"
"	Time to Centroid	105.920	66.672	105.919	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	832.34	0.00	832.34	c.m"
"	Rainfall losses	18.910	1.665	18.910	mm"
"	Runoff depth	6.085	23.330	6.085	mm"
"	Runoff volume	202.64	0.00	202.64	c.m"
"	Runoff coefficient	0.243	0.000	0.243	"
"	Maximum flow	0.056	0.000	0.056	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

	0.056	0.069	0.019	0.052"
"	4	Add Runoff	"	

" 33 CATCHMENT 300"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	300	Catchment 300"
"	50.000	% Impervious"
"	1.350	Total Area"
"	20.000	Flow length"
"	15.000	Overland Slope"
"	0.675	Pervious Area"
"	20.000	Pervious length"
"	15.000	Pervious slope"
"	0.675	Impervious Area"
"	20.000	Impervious length"
"	15.000	Impervious slope"
"	0.250	Pervious Manning 'n'"
"	30.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n'"
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.001	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

	0.121	0.069	0.019	0.052	c.m/sec"
"	Catchment 300	Pervious	Impervious	Total Area	"
"	Surface Area	0.675	0.675	1.350	hectare"
"	Time of concentration	8.939	1.078	2.724	minutes"
"	Time to Centroid	70.037	61.193	63.045	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	168.72	168.72	337.44	c.m"
"	Rainfall losses	18.924	2.080	10.502	mm"
"	Runoff depth	6.071	22.916	14.493	mm"
"	Runoff volume	40.98	154.68	195.66	c.m"

"	Runoff coefficient	0.243	0.917	0.580	"
"	Maximum flow	0.031	0.118	0.121	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.121	0.127	0.019	0.052"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.121	0.127	0.127	0.052"	
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow		0.127	c.m/sec"	
"	Hydrograph volume		2200.568	c.m"	
"	0.121	0.127	0.127	0.127"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.121	0.000	0.127	0.127"	
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.044	0.000	0.127	0.127 c.m/sec"	
"	Catchment 700	Pervious	Impervious	Total Area	"
"	Surface Area	2.980	0.000	2.980	hectare"
"	Time of concentration	49.662	5.988	49.662	minutes"
"	Time to Centroid	113.637	67.835	113.637	minutes"
"	Rainfall depth	24.995	24.995	24.995	mm"
"	Rainfall volume	744.86	0.00	744.86	c.m"

"	Rainfall losses	18.911	1.624	18.911	mm"
"	Runoff depth	6.084	23.371	6.084	mm"
"	Runoff volume	181.30	0.00	181.31	c.m"
"	Runoff coefficient	0.243	0.000	0.243	"
"	Maximum flow	0.044	0.000	0.044	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.044 0.044	0.127	0.127"		
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.044 0.044	0.044	0.127"		
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow	0.044	c.m/sec"		
"	Hydrograph volume	181.305	c.m"		
"	0.044 0.044	0.044	0.044"		
" 40	HYDROGRAPH Confluence 100"				
"	7 Confluence "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow	0.052	c.m/sec"		
"	Hydrograph volume	127.863	c.m"		
"	0.044 0.052	0.044	0.000"		
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.044 0.052	0.052	0.000"		
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow	0.145	c.m/sec"		
"	Hydrograph volume	2328.431	c.m"		
"	0.044 0.052	0.052	0.145"		
" 40	HYDROGRAPH Confluence 200"				
"	7 Confluence "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow	0.145	c.m/sec"		
"	Hydrograph volume	2328.431	c.m"		
"	0.044 0.145	0.052	0.000"		
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.044 0.145	0.145	0.000"		
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow	0.169	c.m/sec"		

"	Hydrograph volume	2509.736	c.m"
"	0.044 0.145	0.145	0.169"
" 38	START/RE-START TOTALS 200"		
"	3 Runoff Totals on EXIT"		
"	Total Catchment area	39.420	hectare"
"	Total Impervious area	11.691	hectare"
"	Total % impervious	29.656"	
" 19	EXIT"		

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                      Interim__2yr.out"
"          Licensee name:
"          Company
"          Date & Time last used:                2/5/2025 at 11:39:23 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          414.876  Coefficient A"
"          0.027  Constant B"
"          0.682  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          100.235  mm/hr"
"          Total depth          39.504  mm"
"          6  002hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.022	0.000	0.000	0.000	c.m/sec"
"		Catchment 600	Pervious	Impervious	Total Area	"
"		Surface Area	0.114	0.006	0.120	hectare"
"		Time of concentration	1.816	0.326	1.648	minutes"
"		Time to Centroid	104.196	112.311	105.112	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	45.03	2.37	47.40	c.m"
"		Rainfall losses	25.568	5.814	24.580	mm"
"		Runoff depth	13.936	33.690	14.924	mm"
"		Runoff volume	15.89	2.02	17.91	c.m"
"		Runoff coefficient	0.353	0.853	0.378	"
"		Maximum flow	0.021	0.001	0.022	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.022	0.022	0.000	0.000"	
" 33		CATCHMENT 800"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	800	Catchment 800"				
"	5.000	% Impervious"				
"	1.730	Total Area"				
"	40.000	Flow length"				
"	3.750	Overland Slope"				
"	1.643	Pervious Area"				
"	40.000	Pervious length"				
"	3.750	Pervious slope"				
"	0.087	Impervious Area"				
"	40.000	Impervious length"				
"	3.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.163	0.022	0.000	0.000	c.m/sec"
"		Catchment 800	Pervious	Impervious	Total Area	"
"		Surface Area	1.643	0.087	1.730	hectare"
"		Time of concentration	12.141	2.181	10.914	minutes"
"		Time to Centroid	117.971	114.662	117.563	minutes"
"		Rainfall depth	39.504	39.504	39.504	mm"
"		Rainfall volume	649.25	34.17	683.42	c.m"
"		Rainfall losses	25.401	1.860	24.224	mm"
"		Runoff depth	14.103	37.644	15.280	mm"

"	Runoff volume	231.78	32.56	264.34	c.m"
"	Runoff coefficient	0.357	0.953	0.387	"
"	Maximum flow	0.158	0.022	0.163	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.163 0.167 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.163 0.167 0.167 0.000"				
" 40	HYDROGRAPH Combine 100"				
"	6 Combine "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow	0.167			c.m/sec"
"	Hydrograph volume	282.246			c.m"
"	0.163 0.167 0.167 0.167"				0.167"
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.163 0.000 0.167 0.167"				
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.449 0.000 0.167 0.167 c.m/sec"				
"	Catchment 500 Pervious Impervious Total Area "				
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	53.548	9.620	52.390	minutes"
"	Time to Centroid	172.894	126.382	171.669	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"

"	Rainfall volume	5788.13	58.47	5846.59	c.m"
"	Rainfall losses	25.381	1.671	25.143	mm"
"	Runoff depth	14.123	37.833	14.361	mm"
"	Runoff volume	2069.36	55.99	2125.36	c.m"
"	Runoff coefficient	0.358	0.958	0.364	"
"	Maximum flow	0.445	0.030	0.449	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.449	0.449	0.167	0.167"
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	100 Catchment 100"				
"	80.000 % Impervious"				
"	13.090 Total Area"				
"	40.000 Flow length"				
"	2.000 Overland Slope"				
"	2.618 Pervious Area"				
"	40.000 Pervious length"				
"	2.000 Pervious slope"				
"	10.472 Impervious Area"				
"	40.000 Impervious length"				
"	2.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		2.700	0.449	0.167	0.167 c.m/sec"
"	Catchment 100	Pervious	Impervious	Total Area	"
"	Surface Area	2.618	10.472	13.090	hectare"
"	Time of concentration	14.661	2.634	3.668	minutes"
"	Time to Centroid	121.346	115.356	115.871	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	1034.22	4136.86	5171.08	c.m"
"	Rainfall losses	25.379	1.965	6.648	mm"
"	Runoff depth	14.125	37.539	32.856	mm"
"	Runoff volume	369.79	3931.05	4300.84	c.m"
"	Runoff coefficient	0.358	0.950	0.832	"
"	Maximum flow	0.236	2.644	2.700	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		2.700	2.753	0.167	0.167"
" 33	CATCHMENT 200"				

```

"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"         200   Catchment 200"
"       15.000   % Impervious"
"         2.020   Total Area"
"       40.000   Flow length"
"         2.000   Overland Slope"
"         1.717   Pervious Area"
"       40.000   Pervious length"
"         2.000   Pervious slope"
"         0.303   Impervious Area"
"       40.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"       30.000   Pervious Max.infiltration"
"         5.000   Pervious Min.infiltration"
"         0.250   Pervious Lag constant (hours)"
"         5.000   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.001   Impervious Lag constant (hours)"
"         1.500   Impervious Depression storage"
"
"           0.170      2.753      0.167      0.167 c.m/sec"
"       Catchment 200      Pervious      Impervious Total Area "
"       Surface Area      1.717      0.303      2.020      hectare"
"       Time of concentration 14.661      2.634      10.821      minutes"
"       Time to Centroid 121.346      115.356      119.434      minutes"
"       Rainfall depth      39.504      39.504      39.504      mm"
"       Rainfall volume      678.28      119.70      797.98      c.m"
"       Rainfall losses      25.379      1.965      21.867      mm"
"       Runoff depth      14.125      37.539      17.637      mm"
"       Runoff volume      242.53      113.74      356.27      c.m"
"       Runoff coefficient      0.358      0.950      0.446      "
"       Maximum flow      0.155      0.077      0.170      c.m/sec"
" 40       HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"           0.170      2.866      0.167      0.167"
" 54       POND DESIGN"
"         2.866   Current peak flow      c.m/sec"
"         3.341   Target outflow      c.m/sec"
"       6782.5   Hydrograph volume      c.m"
"         18.     Number of stages"
"       421.500   Minimum water level      metre"
"       423.200   Maximum water level      metre"
"       421.500   Starting water level      metre"
"         0     Keep Design Data: 1 = True; 0 = False"
"           Level Discharge      Volume"
"       421.500      0.000      0.000"

```

"	421.600	0.00700	1070.100"		
"	421.700	0.01300	2176.600"		
"	421.800	0.01900	3319.800"		
"	421.900	0.02300	4500.000"		
"	422.000	0.02600	5717.200"		
"	422.100	0.07100	6977.200"		
"	422.200	0.1940	8275.500"		
"	422.300	0.3520	9602.300"		
"	422.400	0.3950	10957.80"		
"	422.500	0.5140	12342.10"		
"	422.600	0.7980	13755.30"		
"	422.700	0.9580	15197.70"		
"	422.800	1.614	16669.40"		
"	422.900	2.846	18170.60"		
"	423.000	4.482	19701.40"		
"	423.100	6.460	21262.00"		
"	423.200	8.746	22852.50"		
"	Peak outflow		0.046	c.m/sec"	
"	Maximum level		422.045	metre"	
"	Maximum storage		6285.971	c.m"	
"	Centroidal lag		44.437	hours"	
"	0.170	2.866	0.046	0.167	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5 Next link "				
"	0.170	0.046	0.046	0.167"	
" 33	CATCHMENT 400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	400 Catchment 400"				
"	0.000 % Impervious"				
"	3.330 Total Area"				
"	120.000 Flow length"				
"	3.000 Overland Slope"				
"	3.330 Pervious Area"				
"	120.000 Pervious length"				
"	3.000 Pervious slope"				
"	0.000 Impervious Area"				
"	120.000 Impervious length"				
"	3.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				

	0.193	0.046	0.046	0.167	c.m/sec"
"	Catchment 400	Pervious	Impervious	Total Area	"
"	Surface Area	3.330	0.000	3.330	hectare"
"	Time of concentration	25.097	4.509	25.096	minutes"
"	Time to Centroid	135.157	118.349	135.157	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	1315.48	0.00	1315.48	c.m"
"	Rainfall losses	25.393	1.692	25.393	mm"
"	Runoff depth	14.111	37.813	14.111	mm"
"	Runoff volume	469.88	0.00	469.89	c.m"
"	Runoff coefficient	0.357	0.000	0.357	"
"	Maximum flow	0.193	0.000	0.193	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.193	0.211	0.046	0.167"

" 33 CATCHMENT 300"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	300	Catchment 300"
"	50.000	% Impervious"
"	1.350	Total Area"
"	20.000	Flow length"
"	15.000	Overland Slope"
"	0.675	Pervious Area"
"	20.000	Pervious length"
"	15.000	Pervious slope"
"	0.675	Impervious Area"
"	20.000	Impervious length"
"	15.000	Impervious slope"
"	0.250	Pervious Manning 'n'"
"	30.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n'"
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.001	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

"		0.228	0.211	0.046	0.167	c.m/sec"
"	Catchment 300	Pervious	Impervious	Total Area	"	
"	Surface Area	0.675	0.675	1.350	hectare"	
"	Time of concentration	5.285	0.949	2.157	minutes"	
"	Time to Centroid	108.893	112.435	111.449	minutes"	
"	Rainfall depth	39.504	39.504	39.504	mm"	
"	Rainfall volume	266.65	266.65	533.30	c.m"	
"	Rainfall losses	25.407	2.971	14.189	mm"	
"	Runoff depth	14.097	36.533	25.315	mm"	
"	Runoff volume	95.16	246.59	341.75	c.m"	

"	Runoff coefficient	0.357	0.925	0.641	"
"	Maximum flow	0.106	0.170	0.228	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.228	0.266	0.046	0.167"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.228	0.266	0.266	0.167"	
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow		0.266	c.m/sec"	
"	Hydrograph volume		3828.538	c.m"	
"	0.228	0.266	0.266	0.266"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.228	0.000	0.266	0.266"	
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.152	0.000	0.266	0.266 c.m/sec"	
"	Catchment 700	Pervious	Impervious	Total Area	"
"	Surface Area	2.980	0.000	2.980	hectare"
"	Time of concentration	29.362	5.275	29.362	minutes"
"	Time to Centroid	140.817	119.556	140.816	minutes"
"	Rainfall depth	39.504	39.504	39.504	mm"
"	Rainfall volume	1177.22	0.00	1177.22	c.m"

"	Rainfall losses	25.383	1.653	25.383	mm"
"	Runoff depth	14.121	37.851	14.121	mm"
"	Runoff volume	420.82	0.00	420.82	c.m"
"	Runoff coefficient	0.357	0.000	0.357	"
"	Maximum flow	0.152	0.000	0.152	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.152	0.152	0.266	0.266"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.152	0.152	0.152	0.266"
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow		0.152		c.m/sec"
"	Hydrograph volume		420.819		c.m"
"		0.152	0.152	0.152	0.152"
" 40	HYDROGRAPH Confluence 100"				
"	7 Confluence "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow		0.167		c.m/sec"
"	Hydrograph volume		282.246		c.m"
"		0.152	0.167	0.152	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.152	0.167	0.167	0.000"
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow		0.429		c.m/sec"
"	Hydrograph volume		4110.784		c.m"
"		0.152	0.167	0.167	0.429"
" 40	HYDROGRAPH Confluence 200"				
"	7 Confluence "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow		0.429		c.m/sec"
"	Hydrograph volume		4110.784		c.m"
"		0.152	0.429	0.167	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.152	0.429	0.429	0.000"
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow		0.518		c.m/sec"

"	Hydrograph volume	4531.603	c.m"
"	0.152 0.429	0.429	0.518"
" 38	START/RE-START TOTALS 200"		
"	3 Runoff Totals on EXIT"		
"	Total Catchment area	39.420	hectare"
"	Total Impervious area	11.691	hectare"
"	Total % impervious	29.656"	
" 19	EXIT"		

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                      Interim__5yr.out"
"          Licensee name:
"          Company
"          Date & Time last used:                2/5/2025 at 11:42:37 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          544.711  Coefficient A"
"          0.021  Constant B"
"          0.686  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          130.581  mm/hr"
"          Total depth          50.743  mm"
"          6 005hyd Hydrograph extension used in this file"
" 33          CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.035	0.000	0.000	0.000	c.m/sec"
"		Catchment 600	Pervious	Impervious	Total Area	"
"		Surface Area	0.114	0.006	0.120	hectare"
"		Time of concentration	1.618	0.293	1.500	minutes"
"		Time to Centroid	105.803	111.144	106.279	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	57.85	3.04	60.89	c.m"
"		Rainfall losses	27.440	7.450	26.440	mm"
"		Runoff depth	23.303	43.293	24.303	mm"
"		Runoff volume	26.57	2.60	29.16	c.m"
"		Runoff coefficient	0.459	0.853	0.479	"
"		Maximum flow	0.033	0.002	0.035	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.035	0.035	0.000	0.000"	
" 33		CATCHMENT 800"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	800	Catchment 800"				
"	5.000	% Impervious"				
"	1.730	Total Area"				
"	40.000	Flow length"				
"	3.750	Overland Slope"				
"	1.643	Pervious Area"				
"	40.000	Pervious length"				
"	3.750	Pervious slope"				
"	0.087	Impervious Area"				
"	40.000	Impervious length"				
"	3.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.287	0.035	0.000	0.000	c.m/sec"
"		Catchment 800	Pervious	Impervious	Total Area	"
"		Surface Area	1.643	0.087	1.730	hectare"
"		Time of concentration	10.817	1.962	9.949	minutes"
"		Time to Centroid	118.405	113.377	117.912	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	833.96	43.89	877.85	c.m"
"		Rainfall losses	27.163	2.058	25.907	mm"
"		Runoff depth	23.580	48.685	24.835	mm"

"	Runoff volume	387.54	42.11	429.65	c.m"
"	Runoff coefficient	0.465	0.959	0.489	"
"	Maximum flow	0.272	0.029	0.287	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.287 0.305 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.287 0.305 0.305 0.000"				
" 40	HYDROGRAPH Combine 100"				
"	6 Combine "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow	0.305			c.m/sec"
"	Hydrograph volume	458.817			c.m"
"	0.287 0.305 0.305 0.305"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.287 0.000 0.305 0.305"				
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.818 0.000 0.305 0.305 c.m/sec"				
"	Catchment 500 Pervious Impervious Total Area "				
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	47.706	8.654	46.903	minutes"
"	Time to Centroid	168.372	124.102	167.462	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"

"		Rainfall volume	7434.86	75.10	7509.96	c.m"
"		Rainfall losses	27.127	1.696	26.873	mm"
"		Runoff depth	23.616	49.047	23.870	mm"
"		Runoff volume	3460.21	72.59	3532.80	c.m"
"		Runoff coefficient	0.465	0.967	0.470	"
"		Maximum flow	0.812	0.040	0.818	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"			0.818	0.818	0.305	0.305"
" 33		CATCHMENT 100"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	100	Catchment 100"				
"	80.000	% Impervious"				
"	13.090	Total Area"				
"	40.000	Flow length"				
"	2.000	Overland Slope"				
"	2.618	Pervious Area"				
"	40.000	Pervious length"				
"	2.000	Pervious slope"				
"	10.472	Impervious Area"				
"	40.000	Impervious length"				
"	2.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"			3.616	0.818	0.305	0.305 c.m/sec"
"		Catchment 100	Pervious	Impervious	Total Area	"
"		Surface Area	2.618	10.472	13.090	hectare"
"		Time of concentration	13.062	2.369	3.518	minutes"
"		Time to Centroid	121.452	114.097	114.887	minutes"
"		Rainfall depth	50.743	50.743	50.743	mm"
"		Rainfall volume	1328.45	5313.80	6642.25	c.m"
"		Rainfall losses	27.259	1.941	7.004	mm"
"		Runoff depth	23.484	48.802	43.739	mm"
"		Runoff volume	614.82	5110.59	5725.39	c.m"
"		Runoff coefficient	0.463	0.962	0.862	"
"		Maximum flow	0.395	3.479	3.616	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"			3.616	3.726	0.305	0.305"
" 33		CATCHMENT 200"				

```

"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"         200   Catchment 200"
"       15.000   % Impervious"
"         2.020   Total Area"
"       40.000   Flow length"
"         2.000   Overland Slope"
"         1.717   Pervious Area"
"       40.000   Pervious length"
"         2.000   Pervious slope"
"         0.303   Impervious Area"
"       40.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"       30.000   Pervious Max.infiltration"
"         5.000   Pervious Min.infiltration"
"         0.250   Pervious Lag constant (hours)"
"         5.000   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.001   Impervious Lag constant (hours)"
"         1.500   Impervious Depression storage"
"
"           0.279      3.726      0.305      0.305 c.m/sec"
"       Catchment 200      Pervious      Impervious Total Area "
"       Surface Area      1.717      0.303      2.020      hectare"
"       Time of concentration 13.062      2.369      10.193      minutes"
"       Time to Centroid      121.452      114.097      119.479      minutes"
"       Rainfall depth      50.743      50.743      50.743      mm"
"       Rainfall volume      871.26      153.75      1025.01      c.m"
"       Rainfall losses      27.259      1.941      23.461      mm"
"       Runoff depth      23.484      48.802      27.282      mm"
"       Runoff volume      403.22      147.87      551.10      c.m"
"       Runoff coefficient      0.463      0.962      0.538      "
"       Maximum flow      0.259      0.101      0.279      c.m/sec"
" 40       HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"           0.279      3.916      0.305      0.305"
" 54       POND DESIGN"
"         3.916   Current peak flow      c.m/sec"
"         3.341   Target outflow      c.m/sec"
"       9809.3   Hydrograph volume      c.m"
"         18.   Number of stages"
"       421.500   Minimum water level      metre"
"       423.200   Maximum water level      metre"
"       421.500   Starting water level      metre"
"         0   Keep Design Data: 1 = True; 0 = False"
"           Level Discharge      Volume"
"       421.500      0.000      0.000"

```

"	421.600	0.00700	1070.100"		
"	421.700	0.01300	2176.600"		
"	421.800	0.01900	3319.800"		
"	421.900	0.02300	4500.000"		
"	422.000	0.02600	5717.200"		
"	422.100	0.07100	6977.200"		
"	422.200	0.1940	8275.500"		
"	422.300	0.3520	9602.300"		
"	422.400	0.3950	10957.80"		
"	422.500	0.5140	12342.10"		
"	422.600	0.7980	13755.30"		
"	422.700	0.9580	15197.70"		
"	422.800	1.614	16669.40"		
"	422.900	2.846	18170.60"		
"	423.000	4.482	19701.40"		
"	423.100	6.460	21262.00"		
"	423.200	8.746	22852.50"		
"	Peak outflow		0.197	c.m/sec"	
"	Maximum level		422.202	metre"	
"	Maximum storage		8304.400	c.m"	
"	Centroidal lag		35.961	hours"	
"	0.279	3.916	0.197	0.305	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5 Next link "				
"	0.279	0.197	0.197	0.305"	
" 33	CATCHMENT 400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	400 Catchment 400"				
"	0.000 % Impervious"				
"	3.330 Total Area"				
"	120.000 Flow length"				
"	3.000 Overland Slope"				
"	3.330 Pervious Area"				
"	120.000 Pervious length"				
"	3.000 Pervious slope"				
"	0.000 Impervious Area"				
"	120.000 Impervious length"				
"	3.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				

	0.356	0.197	0.197	0.305	c.m/sec"
"	Catchment 400	Pervious	Impervious	Total Area	"
"	Surface Area	3.330	0.000	3.330	hectare"
"	Time of concentration	22.359	4.056	22.359	minutes"
"	Time to Centroid	134.036	116.866	134.036	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	1689.74	0.00	1689.74	c.m"
"	Rainfall losses	27.188	2.068	27.188	mm"
"	Runoff depth	23.555	48.675	23.555	mm"
"	Runoff volume	784.37	0.00	784.38	c.m"
"	Runoff coefficient	0.464	0.000	0.464	"
"	Maximum flow	0.356	0.000	0.356	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.356	0.379	0.197	0.305"

" 33	CATCHMENT 300"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	300	Catchment 300"			
"	50.000	% Impervious"			
"	1.350	Total Area"			
"	20.000	Flow length"			
"	15.000	Overland Slope"			
"	0.675	Pervious Area"			
"	20.000	Pervious length"			
"	15.000	Pervious slope"			
"	0.675	Impervious Area"			
"	20.000	Impervious length"			
"	15.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	30.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.001	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			

	0.347	0.379	0.197	0.305	c.m/sec"
"	Catchment 300	Pervious	Impervious	Total Area	"
"	Surface Area	0.675	0.675	1.350	hectare"
"	Time of concentration	4.708	0.854	2.132	minutes"
"	Time to Centroid	110.182	111.691	111.191	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	342.51	342.51	685.03	c.m"
"	Rainfall losses	27.326	3.537	15.432	mm"
"	Runoff depth	23.417	47.206	35.311	mm"
"	Runoff volume	158.07	318.64	476.70	c.m"

"	Runoff coefficient	0.461	0.930	0.696	"
"	Maximum flow	0.157	0.219	0.347	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.347	0.442	0.197	0.305"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.347	0.442	0.442	0.305"	
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow		0.442	c.m/sec"	
"	Hydrograph volume		6876.024	c.m"	
"	0.347	0.442	0.442	0.442"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.347	0.000	0.442	0.442"	
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.271	0.000	0.442	0.442 c.m/sec"	
"	Catchment 700	Pervious	Impervious	Total Area	"
"	Surface Area	2.980	0.000	2.980	hectare"
"	Time of concentration	26.159	4.745	26.159	minutes"
"	Time to Centroid	139.192	117.881	139.192	minutes"
"	Rainfall depth	50.743	50.743	50.743	mm"
"	Rainfall volume	1512.14	0.00	1512.14	c.m"

"	Rainfall losses	27.134	1.694	27.134	mm"
"	Runoff depth	23.609	49.049	23.609	mm"
"	Runoff volume	703.54	0.00	703.54	c.m"
"	Runoff coefficient	0.465	0.000	0.465	"
"	Maximum flow	0.271	0.000	0.271	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.271 0.271 0.442 0.442"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.271 0.271 0.271 0.442"				
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow	0.271		c.m/sec"	
"	Hydrograph volume	703.538		c.m"	
"	0.271 0.271 0.271 0.271"				
" 40	HYDROGRAPH Confluence 100"				
"	7 Confluence "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow	0.305		c.m/sec"	
"	Hydrograph volume	458.817		c.m"	
"	0.271 0.305 0.271 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.271 0.305 0.305 0.000"				
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow	0.732		c.m/sec"	
"	Hydrograph volume	7334.836		c.m"	
"	0.271 0.305 0.305 0.732"				
" 40	HYDROGRAPH Confluence 200"				
"	7 Confluence "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow	0.732		c.m/sec"	
"	Hydrograph volume	7334.837		c.m"	
"	0.271 0.732 0.305 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.271 0.732 0.732 0.000"				
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow	0.892		c.m/sec"	

"	Hydrograph volume	8038.375	c.m"
"	0.271 0.732	0.732	0.892"
" 38	START/RE-START TOTALS 200"		
"	3 Runoff Totals on EXIT"		
"	Total Catchment area	39.420	hectare"
"	Total Impervious area	11.691	hectare"
"	Total % impervious	29.656"	
" 19	EXIT"		

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                      Interim_10yr.out"
"          Licensee name:
"          Company
"          Date & Time last used:                2/5/2025 at 11:44:41 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          627.308  Coefficient A"
"          0.014  Constant B"
"          0.687  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          150.159  mm/hr"
"          Total depth          58.119  mm"
"          6  010hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.043	0.000	0.000	0.000	c.m/sec"
"		Catchment 600	Pervious	Impervious	Total Area	"
"		Surface Area	0.114	0.006	0.120	hectare"
"		Time of concentration	1.525	0.278	1.424	minutes"
"		Time to Centroid	107.285	110.607	107.552	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	66.26	3.49	69.74	c.m"
"		Rainfall losses	28.307	8.539	27.318	mm"
"		Runoff depth	29.812	49.580	30.801	mm"
"		Runoff volume	33.99	2.97	36.96	c.m"
"		Runoff coefficient	0.513	0.853	0.530	"
"		Maximum flow	0.040	0.002	0.043	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.043	0.043	0.000	0.000"	
" 33		CATCHMENT 800"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	800	Catchment 800"				
"	5.000	% Impervious"				
"	1.730	Total Area"				
"	40.000	Flow length"				
"	3.750	Overland Slope"				
"	1.643	Pervious Area"				
"	40.000	Pervious length"				
"	3.750	Pervious slope"				
"	0.087	Impervious Area"				
"	40.000	Impervious length"				
"	3.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.378	0.043	0.000	0.000	c.m/sec"
"		Catchment 800	Pervious	Impervious	Total Area	"
"		Surface Area	1.643	0.087	1.730	hectare"
"		Time of concentration	10.194	1.856	9.450	minutes"
"		Time to Centroid	119.342	112.794	118.757	minutes"
"		Rainfall depth	58.119	58.119	58.119	mm"
"		Rainfall volume	955.19	50.27	1005.46	c.m"
"		Rainfall losses	28.125	2.227	26.830	mm"
"		Runoff depth	29.994	55.893	31.289	mm"

"	Runoff volume	492.95	48.35	541.29	c.m"
"	Runoff coefficient	0.516	0.962	0.538	"
"	Maximum flow	0.361	0.033	0.378	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.378 0.398 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.378 0.398 0.398 0.000"				
" 40	HYDROGRAPH Combine 100"				
"	6 Combine "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow	0.398			c.m/sec"
"	Hydrograph volume	578.255			c.m"
"	0.378 0.398 0.398 0.398"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.378 0.000 0.398 0.398"				
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	1.110 0.000 0.398 0.398 c.m/sec"				
"	Catchment 500 Pervious Impervious Total Area "				
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	44.961	8.184	44.280	minutes"
"	Time to Centroid	167.190	123.105	166.374	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"

"	Rainfall volume	8515.61	86.02	8601.63	c.m"
"	Rainfall losses	27.876	1.659	27.613	mm"
"	Runoff depth	30.244	56.460	30.506	mm"
"	Runoff volume	4431.29	83.56	4514.85	c.m"
"	Runoff coefficient	0.520	0.971	0.525	"
"	Maximum flow	1.104	0.051	1.110	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	1.110 1.110 0.398 0.398"				
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	100 Catchment 100"				
"	80.000 % Impervious"				
"	13.090 Total Area"				
"	40.000 Flow length"				
"	2.000 Overland Slope"				
"	2.618 Pervious Area"				
"	40.000 Pervious length"				
"	2.000 Pervious slope"				
"	10.472 Impervious Area"				
"	40.000 Impervious length"				
"	2.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	4.219 1.110 0.398 0.398 c.m/sec"				
"	Catchment 100 Pervious Impervious Total Area "				
"	Surface Area 2.618 10.472 13.090 hectare"				
"	Time of concentration 12.310 2.241 3.433 minutes"				
"	Time to Centroid 122.260 113.547 114.579 minutes"				
"	Rainfall depth 58.119 58.119 58.119 mm"				
"	Rainfall volume 1521.56 6086.23 7607.79 c.m"				
"	Rainfall losses 27.960 1.991 7.185 mm"				
"	Runoff depth 30.159 56.128 50.934 mm"				
"	Runoff volume 789.57 5877.73 6667.30 c.m"				
"	Runoff coefficient 0.519 0.966 0.876 "				
"	Maximum flow 0.493 4.013 4.219 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	4.219 4.380 0.398 0.398"				
" 33	CATCHMENT 200"				

```

"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"         200   Catchment 200"
"       15.000   % Impervious"
"         2.020   Total Area"
"       40.000   Flow length"
"         2.000   Overland Slope"
"         1.717   Pervious Area"
"       40.000   Pervious length"
"         2.000   Pervious slope"
"         0.303   Impervious Area"
"       40.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"       30.000   Pervious Max.infiltration"
"         5.000   Pervious Min.infiltration"
"         0.250   Pervious Lag constant (hours)"
"         5.000   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.001   Impervious Lag constant (hours)"
"         1.500   Impervious Depression storage"
"           0.383   4.380   0.398   0.398 c.m/sec"
"       Catchment 200      Pervious   Impervious Total Area "
"       Surface Area      1.717      0.303      2.020      hectare"
"       Time of concentration 12.310      2.241      9.821      minutes"
"       Time to Centroid    122.260      113.547      120.106      minutes"
"       Rainfall depth      58.119      58.119      58.119      mm"
"       Rainfall volume     997.91      176.10      1174.01      c.m"
"       Rainfall losses     27.960      1.991      24.064      mm"
"       Runoff depth        30.159      56.128      34.055      mm"
"       Runoff volume       517.84      170.07      687.90      c.m"
"       Runoff coefficient   0.519      0.966      0.586      "
"       Maximum flow       0.323      0.116      0.383      c.m/sec"
" 40       HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"           0.383   4.631   0.398   0.398"
" 54       POND DESIGN"
"         4.631   Current peak flow   c.m/sec"
"         3.341   Target outflow   c.m/sec"
"       11870.1   Hydrograph volume   c.m"
"         18.     Number of stages"
"       421.500   Minimum water level   metre"
"       423.200   Maximum water level   metre"
"       421.500   Starting water level   metre"
"         0     Keep Design Data: 1 = True; 0 = False"
"           Level Discharge   Volume"
"       421.500   0.000   0.000"

```

"	421.600	0.00700	1070.100"		
"	421.700	0.01300	2176.600"		
"	421.800	0.01900	3319.800"		
"	421.900	0.02300	4500.000"		
"	422.000	0.02600	5717.200"		
"	422.100	0.07100	6977.200"		
"	422.200	0.1940	8275.500"		
"	422.300	0.3520	9602.300"		
"	422.400	0.3950	10957.80"		
"	422.500	0.5140	12342.10"		
"	422.600	0.7980	13755.30"		
"	422.700	0.9580	15197.70"		
"	422.800	1.614	16669.40"		
"	422.900	2.846	18170.60"		
"	423.000	4.482	19701.40"		
"	423.100	6.460	21262.00"		
"	423.200	8.746	22852.50"		
"	Peak outflow		0.323	c.m/sec"	
"	Maximum level		422.281	metre"	
"	Maximum storage		9354.942	c.m"	
"	Centroidal lag		31.136	hours"	
"	0.383	4.631	0.323	0.398	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5 Next link "				
"	0.383	0.323	0.323	0.398"	
" 33	CATCHMENT 400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	400 Catchment 400"				
"	0.000 % Impervious"				
"	3.330 Total Area"				
"	120.000 Flow length"				
"	3.000 Overland Slope"				
"	3.330 Pervious Area"				
"	120.000 Pervious length"				
"	3.000 Pervious slope"				
"	0.000 Impervious Area"				
"	120.000 Impervious length"				
"	3.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				

	0.455	0.323	0.323	0.398	c.m/sec"
"	Catchment 400	Pervious	Impervious	Total Area	"
"	Surface Area	3.330	0.000	3.330	hectare"
"	Time of concentration	21.072	3.835	21.072	minutes"
"	Time to Centroid	134.304	116.233	134.304	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	1935.36	0.00	1935.37	c.m"
"	Rainfall losses	27.871	2.469	27.871	mm"
"	Runoff depth	30.248	55.650	30.248	mm"
"	Runoff volume	1007.27	0.00	1007.27	c.m"
"	Runoff coefficient	0.520	0.000	0.520	"
"	Maximum flow	0.455	0.000	0.455	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.455	0.480	0.323	0.398"

" 33	CATCHMENT 300"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	300	Catchment 300"			
"	50.000	% Impervious"			
"	1.350	Total Area"			
"	20.000	Flow length"			
"	15.000	Overland Slope"			
"	0.675	Pervious Area"			
"	20.000	Pervious length"			
"	15.000	Pervious slope"			
"	0.675	Impervious Area"			
"	20.000	Impervious length"			
"	15.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	30.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.001	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			

	0.424	0.480	0.323	0.398	c.m/sec"
"	Catchment 300	Pervious	Impervious	Total Area	"
"	Surface Area	0.675	0.675	1.350	hectare"
"	Time of concentration	4.437	0.808	2.102	minutes"
"	Time to Centroid	111.465	111.382	111.412	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	392.30	392.30	784.61	c.m"
"	Rainfall losses	28.095	3.951	16.023	mm"
"	Runoff depth	30.025	54.169	42.097	mm"
"	Runoff volume	202.67	365.64	568.30	c.m"

"	Runoff coefficient	0.517	0.932	0.724	"
"	Maximum flow	0.180	0.250	0.424	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.424	0.560	0.323	0.398"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.424	0.560	0.560	0.398"	
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow		0.560	c.m/sec"	
"	Hydrograph volume		9168.893	c.m"	
"	0.424	0.560	0.560	0.560"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.424	0.000	0.560	0.560"	
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.386	0.000	0.560	0.560 c.m/sec"	
"	Catchment 700	Pervious	Impervious	Total Area	"
"	Surface Area	2.980	0.000	2.980	hectare"
"	Time of concentration	24.654	4.487	24.654	minutes"
"	Time to Centroid	139.257	117.159	139.257	minutes"
"	Rainfall depth	58.119	58.119	58.119	mm"
"	Rainfall volume	1731.95	0.00	1731.95	c.m"

"	Rainfall losses	27.890	1.793	27.890	mm"
"	Runoff depth	30.229	56.326	30.229	mm"
"	Runoff volume	900.82	0.00	900.82	c.m"
"	Runoff coefficient	0.520	0.000	0.520	"
"	Maximum flow	0.386	0.000	0.386	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.386 0.386 0.560 0.560"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.386 0.386 0.386 0.560"				
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow	0.386		c.m/sec"	
"	Hydrograph volume	900.821		c.m"	
"	0.386 0.386 0.386 0.386"				
" 40	HYDROGRAPH Confluence 100"				
"	7 Confluence "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow	0.398		c.m/sec"	
"	Hydrograph volume	578.255		c.m"	
"	0.386 0.398 0.386 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.386 0.398 0.398 0.000"				
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow	0.944		c.m/sec"	
"	Hydrograph volume	9747.152		c.m"	
"	0.386 0.398 0.398 0.944"				
" 40	HYDROGRAPH Confluence 200"				
"	7 Confluence "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow	0.944		c.m/sec"	
"	Hydrograph volume	9747.152		c.m"	
"	0.386 0.944 0.398 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.386 0.944 0.944 0.000"				
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow	1.160		c.m/sec"	

"	Hydrograph volume	10647.971	c.m"
"	0.386 0.944 0.944	1.160"	
" 38	START/RE-START TOTALS 200"		
"	3 Runoff Totals on EXIT"		
"	Total Catchment area	39.420	hectare"
"	Total Impervious area	11.691	hectare"
"	Total % impervious	29.656"	
" 19	EXIT"		

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                      Interim__25yr.out"
"          Licensee name:
"          Company
"          Date & Time last used:                2/5/2025 at 11:46:32 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          746.059  Coefficient A"
"          0.085  Constant B"
"          0.692  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          175.653  mm/hr"
"          Total depth          67.239  mm"
"          6  025hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.052	0.000	0.000	0.000	c.m/sec"
"		Catchment 600	Pervious	Impervious	Total Area	"
"		Surface Area	0.114	0.006	0.120	hectare"
"		Time of concentration	1.428	0.261	1.342	minutes"
"		Time to Centroid	108.971	109.975	109.045	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	76.65	4.03	80.69	c.m"
"		Rainfall losses	29.074	9.934	28.117	mm"
"		Runoff depth	38.165	57.305	39.122	mm"
"		Runoff volume	43.51	3.44	46.95	c.m"
"		Runoff coefficient	0.568	0.852	0.582	"
"		Maximum flow	0.049	0.003	0.052	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.052	0.052	0.000	0.000"	
" 33		CATCHMENT 800"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	800	Catchment 800"				
"	5.000	% Impervious"				
"	1.730	Total Area"				
"	40.000	Flow length"				
"	3.750	Overland Slope"				
"	1.643	Pervious Area"				
"	40.000	Pervious length"				
"	3.750	Pervious slope"				
"	0.087	Impervious Area"				
"	40.000	Impervious length"				
"	3.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.496	0.052	0.000	0.000	c.m/sec"
"		Catchment 800	Pervious	Impervious	Total Area	"
"		Surface Area	1.643	0.087	1.730	hectare"
"		Time of concentration	9.548	1.743	8.915	minutes"
"		Time to Centroid	120.388	112.106	119.717	minutes"
"		Rainfall depth	67.239	67.239	67.239	mm"
"		Rainfall volume	1105.07	58.16	1163.23	c.m"
"		Rainfall losses	28.570	2.417	27.262	mm"
"		Runoff depth	38.669	64.822	39.977	mm"

"	Runoff volume	635.52	56.07	691.59	c.m"
"	Runoff coefficient	0.575	0.964	0.595	"
"	Maximum flow	0.477	0.039	0.496	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.496 0.519 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.496 0.519 0.519 0.000"				
" 40	HYDROGRAPH Combine 100"				
"	6 Combine "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow	0.519			c.m/sec"
"	Hydrograph volume	738.540			c.m"
"	0.496 0.519 0.519 0.519"				0.519"
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.496 0.000 0.519 0.519"				
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	1.530 0.000 0.519 0.519 c.m/sec"				
"	Catchment 500 Pervious Impervious Total Area "				
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	42.108	7.686	41.532	minutes"
"	Time to Centroid	165.819	121.852	165.083	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"

"	Rainfall volume	9851.84	99.51	9951.36	c.m"
"	Rainfall losses	28.384	1.687	28.117	mm"
"	Runoff depth	38.855	65.552	39.122	mm"
"	Runoff volume	5692.97	97.02	5789.99	c.m"
"	Runoff coefficient	0.578	0.975	0.582	"
"	Maximum flow	1.521	0.060	1.530	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	1.530 1.530 0.519 0.519"				
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	100 Catchment 100"				
"	80.000 % Impervious"				
"	13.090 Total Area"				
"	40.000 Flow length"				
"	2.000 Overland Slope"				
"	2.618 Pervious Area"				
"	40.000 Pervious length"				
"	2.000 Pervious slope"				
"	10.472 Impervious Area"				
"	40.000 Impervious length"				
"	2.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	5.040 1.530 0.519 0.519 c.m/sec"				
"	Catchment 100 Pervious Impervious Total Area "				
"	Surface Area 2.618 10.472 13.090 hectare"				
"	Time of concentration 11.529 2.104 3.327 minutes"				
"	Time to Centroid 123.146 112.845 114.181 minutes"				
"	Rainfall depth 67.239 67.239 67.239 mm"				
"	Rainfall volume 1760.31 7041.26 8801.57 c.m"				
"	Rainfall losses 28.447 2.145 7.405 mm"				
"	Runoff depth 38.792 65.094 59.834 mm"				
"	Runoff volume 1015.58 6816.62 7832.21 c.m"				
"	Runoff coefficient 0.577 0.968 0.890 "				
"	Maximum flow 0.662 4.705 5.040 c.m/sec"				
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	5.040 5.289 0.519 0.519"				
" 33	CATCHMENT 200"				

```

"          1 Triangular SCS"
"          1 Equal length"
"          2 Horton equation"
"         200 Catchment 200"
"        15.000 % Impervious"
"         2.020 Total Area"
"        40.000 Flow length"
"         2.000 Overland Slope"
"         1.717 Pervious Area"
"        40.000 Pervious length"
"         2.000 Pervious slope"
"         0.303 Impervious Area"
"        40.000 Impervious length"
"         2.000 Impervious slope"
"         0.250 Pervious Manning 'n'"
"       30.000 Pervious Max.infiltration"
"         5.000 Pervious Min.infiltration"
"         0.250 Pervious Lag constant (hours)"
"         5.000 Pervious Depression storage"
"         0.015 Impervious Manning 'n'"
"         0.000 Impervious Max.infiltration"
"         0.000 Impervious Min.infiltration"
"         0.001 Impervious Lag constant (hours)"
"         1.500 Impervious Depression storage"
"           0.509      5.289      0.519      0.519 c.m/sec"
"         Catchment 200      Pervious      Impervious Total Area "
"         Surface Area      1.717      0.303      2.020      hectare"
"         Time of concentration 11.529      2.104      9.376      minutes"
"         Time to Centroid      123.146      112.845      120.792      minutes"
"         Rainfall depth      67.239      67.239      67.239      mm"
"         Rainfall volume      1154.49      203.73      1358.23      c.m"
"         Rainfall losses      28.447      2.145      24.501      mm"
"         Runoff depth      38.792      65.094      42.738      mm"
"         Runoff volume      666.06      197.23      863.30      c.m"
"         Runoff coefficient      0.577      0.968      0.636      "
"         Maximum flow      0.434      0.136      0.509      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"         4      Add Runoff "
"           0.509      5.646      0.519      0.519"
" 54      POND DESIGN"
"         5.646      Current peak flow      c.m/sec"
"         3.341      Target outflow      c.m/sec"
"       14485.5      Hydrograph volume      c.m"
"         18.      Number of stages"
"       421.500      Minimum water level      metre"
"       423.200      Maximum water level      metre"
"       421.500      Starting water level      metre"
"         0      Keep Design Data: 1 = True; 0 = False"
"           Level Discharge      Volume"
"       421.500      0.000      0.000"

```

"	421.600	0.00700	1070.100"		
"	421.700	0.01300	2176.600"		
"	421.800	0.01900	3319.800"		
"	421.900	0.02300	4500.000"		
"	422.000	0.02600	5717.200"		
"	422.100	0.07100	6977.200"		
"	422.200	0.1940	8275.500"		
"	422.300	0.3520	9602.300"		
"	422.400	0.3950	10957.80"		
"	422.500	0.5140	12342.10"		
"	422.600	0.7980	13755.30"		
"	422.700	0.9580	15197.70"		
"	422.800	1.614	16669.40"		
"	422.900	2.846	18170.60"		
"	423.000	4.482	19701.40"		
"	423.100	6.460	21262.00"		
"	423.200	8.746	22852.50"		
"	Peak outflow		0.398	c.m/sec"	
"	Maximum level		422.402	metre"	
"	Maximum storage		10987.398	c.m"	
"	Centroidal lag		27.034	hours"	
"	0.509	5.646	0.398	0.519	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5 Next link "				
"	0.509	0.398	0.398	0.519"	
" 33	CATCHMENT 400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	400 Catchment 400"				
"	0.000 % Impervious"				
"	3.330 Total Area"				
"	120.000 Flow length"				
"	3.000 Overland Slope"				
"	3.330 Pervious Area"				
"	120.000 Pervious length"				
"	3.000 Pervious slope"				
"	0.000 Impervious Area"				
"	120.000 Impervious length"				
"	3.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				

	0.607	0.398	0.398	0.519	c.m/sec"
"	Catchment 400	Pervious	Impervious	Total Area	"
"	Surface Area	3.330	0.000	3.330	hectare"
"	Time of concentration	19.735	3.602	19.735	minutes"
"	Time to Centroid	134.608	115.439	134.608	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	2239.05	0.00	2239.05	c.m"
"	Rainfall losses	28.441	2.959	28.441	mm"
"	Runoff depth	38.798	64.280	38.798	mm"
"	Runoff volume	1291.96	0.00	1291.97	c.m"
"	Runoff coefficient	0.577	0.000	0.577	"
"	Maximum flow	0.607	0.000	0.607	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

	0.607	0.632	0.398	0.519"
"	4	Add Runoff	"	

	0.607	0.632	0.398	0.519"
" 33	CATCHMENT 300"			
"	1	Triangular SCS"		
"	1	Equal length"		
"	2	Horton equation"		
"	300	Catchment 300"		
"	50.000	% Impervious"		
"	1.350	Total Area"		
"	20.000	Flow length"		
"	15.000	Overland Slope"		
"	0.675	Pervious Area"		
"	20.000	Pervious length"		
"	15.000	Pervious slope"		
"	0.675	Impervious Area"		
"	20.000	Impervious length"		
"	15.000	Impervious slope"		
"	0.250	Pervious Manning 'n'"		
"	30.000	Pervious Max.infiltration"		
"	5.000	Pervious Min.infiltration"		
"	0.250	Pervious Lag constant (hours)"		
"	5.000	Pervious Depression storage"		
"	0.015	Impervious Manning 'n'"		
"	0.000	Impervious Max.infiltration"		
"	0.000	Impervious Min.infiltration"		
"	0.001	Impervious Lag constant (hours)"		
"	1.500	Impervious Depression storage"		

	0.525	0.632	0.398	0.519	c.m/sec"
"	Catchment 300	Pervious	Impervious	Total Area	"
"	Surface Area	0.675	0.675	1.350	hectare"
"	Time of concentration	4.156	0.759	2.050	minutes"
"	Time to Centroid	112.936	110.977	111.722	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	453.86	453.86	907.72	c.m"
"	Rainfall losses	28.833	4.588	16.711	mm"
"	Runoff depth	38.406	62.651	50.528	mm"
"	Runoff volume	259.24	422.89	682.13	c.m"

"	Runoff coefficient	0.571	0.932	0.751	"
"	Maximum flow	0.234	0.291	0.525	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.525	0.756	0.398	0.519"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.525	0.756	0.756	0.519"	
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow		0.756	c.m/sec"	
"	Hydrograph volume		12088.804	c.m"	
"	0.525	0.756	0.756	0.756"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.525	0.000	0.756	0.756"	
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.500	0.000	0.756	0.756 c.m/sec"	
"	Catchment 700	Pervious	Impervious	Total Area	"
"	Surface Area	2.980	0.000	2.980	hectare"
"	Time of concentration	23.089	4.215	23.089	minutes"
"	Time to Centroid	139.283	116.269	139.283	minutes"
"	Rainfall depth	67.239	67.239	67.239	mm"
"	Rainfall volume	2003.72	0.00	2003.72	c.m"

"	Rainfall losses	28.407	2.068	28.407	mm"
"	Runoff depth	38.832	65.171	38.832	mm"
"	Runoff volume	1157.20	0.00	1157.20	c.m"
"	Runoff coefficient	0.578	0.000	0.578	"
"	Maximum flow	0.500	0.000	0.500	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.500 0.500 0.756 0.756"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.500 0.500 0.500 0.756"				
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow 0.500 c.m/sec"				
"	Hydrograph volume 1157.205 c.m"				
"	0.500 0.500 0.500 0.500"				
" 40	HYDROGRAPH Confluence 100"				
"	7 Confluence "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow 0.519 c.m/sec"				
"	Hydrograph volume 738.540 c.m"				
"	0.500 0.519 0.500 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.500 0.519 0.519 0.000"				
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow 1.239 c.m/sec"				
"	Hydrograph volume 12827.345 c.m"				
"	0.500 0.519 0.519 1.239"				
" 40	HYDROGRAPH Confluence 200"				
"	7 Confluence "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow 1.239 c.m/sec"				
"	Hydrograph volume 12827.345 c.m"				
"	0.500 1.239 0.519 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.500 1.239 1.239 0.000"				
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow 1.575 c.m/sec"				

"	Hydrograph volume	13984.553	c.m"
"	0.500	1.239	1.239
"	1.575"		
" 38	START/RE-START TOTALS 200"		
"	3 Runoff Totals on EXIT"		
"	Total Catchment area	39.420	hectare"
"	Total Impervious area	11.691	hectare"
"	Total % impervious	29.656"	
" 19	EXIT"		

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
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"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                      Interim__50yr.out"
"          Licensee name:
"          Company
"          Date & Time last used:                2/5/2025 at 11:49:00 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          820.361  Coefficient A"
"          0.010  Constant B"
"          0.691  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          194.803  mm/hr"
"          Total depth                74.358  mm"
"          6  050hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.058	0.000	0.000	0.000	c.m/sec"
"		Catchment 600	Pervious	Impervious	Total Area	"
"		Surface Area	0.114	0.006	0.120	hectare"
"		Time of concentration	1.368	0.250	1.290	minutes"
"		Time to Centroid	110.205	109.690	110.169	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	84.77	4.46	89.23	c.m"
"		Rainfall losses	29.637	11.032	28.707	mm"
"		Runoff depth	44.721	63.326	45.651	mm"
"		Runoff volume	50.98	3.80	54.78	c.m"
"		Runoff coefficient	0.601	0.852	0.614	"
"		Maximum flow	0.055	0.003	0.058	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.058	0.058	0.000	0.000"	
" 33		CATCHMENT 800"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	800	Catchment 800"				
"	5.000	% Impervious"				
"	1.730	Total Area"				
"	40.000	Flow length"				
"	3.750	Overland Slope"				
"	1.643	Pervious Area"				
"	40.000	Pervious length"				
"	3.750	Pervious slope"				
"	0.087	Impervious Area"				
"	40.000	Impervious length"				
"	3.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.580	0.058	0.000	0.000	c.m/sec"
"		Catchment 800	Pervious	Impervious	Total Area	"
"		Surface Area	1.643	0.087	1.730	hectare"
"		Time of concentration	9.147	1.672	8.573	minutes"
"		Time to Centroid	121.402	111.843	120.668	minutes"
"		Rainfall depth	74.358	74.358	74.358	mm"
"		Rainfall volume	1222.07	64.32	1286.39	c.m"
"		Rainfall losses	28.890	2.541	27.572	mm"
"		Runoff depth	45.468	71.816	46.785	mm"

"	Runoff volume	747.27	62.12	809.39	c.m"
"	Runoff coefficient	0.611	0.966	0.629	"
"	Maximum flow	0.558	0.043	0.580	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.580 0.604 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.580 0.604 0.604 0.000"				
" 40	HYDROGRAPH Combine 100"				
"	6 Combine "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow	0.604			c.m/sec"
"	Hydrograph volume	864.169			c.m"
"	0.580 0.604 0.604 0.604"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.580 0.000 0.604 0.604"				
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	1.817 0.000 0.604 0.604 c.m/sec"				
"	Catchment 500 Pervious Impervious Total Area "				
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	40.339	7.374	39.818	minutes"
"	Time to Centroid	166.075	121.211	165.366	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"

"	Rainfall volume	1.0895	0.0110	1.1005	ha-m"
"	Rainfall losses	28.716	1.802	28.447	mm"
"	Runoff depth	45.642	72.556	45.911	mm"
"	Runoff volume	6687.42	107.38	6794.80	c.m"
"	Runoff coefficient	0.614	0.976	0.617	"
"	Maximum flow	1.807	0.066	1.817	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		1.817	1.817	0.604	0.604"
" 33	CATCHMENT 100"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	100 Catchment 100"				
"	80.000 % Impervious"				
"	13.090 Total Area"				
"	40.000 Flow length"				
"	2.000 Overland Slope"				
"	2.618 Pervious Area"				
"	40.000 Pervious length"				
"	2.000 Pervious slope"				
"	10.472 Impervious Area"				
"	40.000 Impervious length"				
"	2.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"		5.638	1.817	0.604	0.604 c.m/sec"
"	Catchment 100	Pervious	Impervious	Total Area	"
"	Surface Area	2.618	10.472	13.090	hectare"
"	Time of concentration	11.045	2.019	3.250	minutes"
"	Time to Centroid	124.131	112.509	114.093	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	1946.69	7786.75	9733.44	c.m"
"	Rainfall losses	28.840	2.269	7.583	mm"
"	Runoff depth	45.518	72.088	66.774	mm"
"	Runoff volume	1191.65	7549.11	8740.76	c.m"
"	Runoff coefficient	0.612	0.969	0.898	"
"	Maximum flow	0.783	5.218	5.638	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		5.638	5.949	0.604	0.604"
" 33	CATCHMENT 200"				

```

"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"         200   Catchment 200"
"       15.000   % Impervious"
"         2.020   Total Area"
"       40.000   Flow length"
"         2.000   Overland Slope"
"         1.717   Pervious Area"
"       40.000   Pervious length"
"         2.000   Pervious slope"
"         0.303   Impervious Area"
"       40.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"       30.000   Pervious Max.infiltration"
"         5.000   Pervious Min.infiltration"
"         0.250   Pervious Lag constant (hours)"
"         5.000   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.001   Impervious Lag constant (hours)"
"         1.500   Impervious Depression storage"
"           0.595       5.949       0.604       0.604 c.m/sec"
"       Catchment 200       Pervious   Impervious Total Area "
"       Surface Area           1.717       0.303       2.020       hectare"
"       Time of concentration  11.045       2.019       9.073       minutes"
"       Time to Centroid      124.131      112.509      121.592      minutes"
"       Rainfall depth         74.358       74.358       74.358       mm"
"       Rainfall volume        1276.72      225.30       1502.03      c.m"
"       Rainfall losses        28.840       2.269       24.855       mm"
"       Runoff depth           45.518       72.088       49.503       mm"
"       Runoff volume          781.54       218.43       999.97       c.m"
"       Runoff coefficient      0.612       0.969       0.666       "
"       Maximum flow           0.514       0.151       0.595       c.m/sec"
" 40       HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"           0.595       6.376       0.604       0.604"
" 54       POND DESIGN"
"         6.376   Current peak flow   c.m/sec"
"         3.341   Target outflow     c.m/sec"
"       16535.5   Hydrograph volume   c.m"
"         18.     Number of stages"
"       421.500   Minimum water level   metre"
"       423.200   Maximum water level   metre"
"       421.500   Starting water level  metre"
"         0     Keep Design Data: 1 = True; 0 = False"
"           Level Discharge   Volume"
"       421.500       0.000       0.000"

```

"	421.600	0.00700	1070.100"		
"	421.700	0.01300	2176.600"		
"	421.800	0.01900	3319.800"		
"	421.900	0.02300	4500.000"		
"	422.000	0.02600	5717.200"		
"	422.100	0.07100	6977.200"		
"	422.200	0.1940	8275.500"		
"	422.300	0.3520	9602.300"		
"	422.400	0.3950	10957.80"		
"	422.500	0.5140	12342.10"		
"	422.600	0.7980	13755.30"		
"	422.700	0.9580	15197.70"		
"	422.800	1.614	16669.40"		
"	422.900	2.846	18170.60"		
"	423.000	4.482	19701.40"		
"	423.100	6.460	21262.00"		
"	423.200	8.746	22852.50"		
"	Peak outflow		0.501	c.m/sec"	
"	Maximum level		422.489	metre"	
"	Maximum storage		12187.462	c.m"	
"	Centroidal lag		24.653	hours"	
"	0.595	6.376	0.501	0.604	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5 Next link "				
"	0.595	0.501	0.501	0.604"	
" 33	CATCHMENT 400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	400 Catchment 400"				
"	0.000 % Impervious"				
"	3.330 Total Area"				
"	120.000 Flow length"				
"	3.000 Overland Slope"				
"	3.330 Pervious Area"				
"	120.000 Pervious length"				
"	3.000 Pervious slope"				
"	0.000 Impervious Area"				
"	120.000 Impervious length"				
"	3.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				

	0.720	0.501	0.501	0.604	c.m/sec"
"	Catchment 400		Pervious	Impervious	Total Area "
"	Surface Area	3.330	0.000	3.330	hectare"
"	Time of concentration	18.906	3.456	18.906	minutes"
"	Time to Centroid	135.377	115.016	135.377	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	2476.11	0.00	2476.11	c.m"
"	Rainfall losses	28.813	3.112	28.813	mm"
"	Runoff depth	45.544	71.246	45.544	mm"
"	Runoff volume	1516.63	0.00	1516.63	c.m"
"	Runoff coefficient	0.613	0.000	0.613	"
"	Maximum flow	0.720	0.000	0.720	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.720	0.762	0.501	0.604"

" 33 CATCHMENT 300"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	300	Catchment 300"
"	50.000	% Impervious"
"	1.350	Total Area"
"	20.000	Flow length"
"	15.000	Overland Slope"
"	0.675	Pervious Area"
"	20.000	Pervious length"
"	15.000	Pervious slope"
"	0.675	Impervious Area"
"	20.000	Impervious length"
"	15.000	Impervious slope"
"	0.250	Pervious Manning 'n'"
"	30.000	Pervious Max.infiltration"
"	5.000	Pervious Min.infiltration"
"	0.250	Pervious Lag constant (hours)"
"	5.000	Pervious Depression storage"
"	0.015	Impervious Manning 'n'"
"	0.000	Impervious Max.infiltration"
"	0.000	Impervious Min.infiltration"
"	0.001	Impervious Lag constant (hours)"
"	1.500	Impervious Depression storage"

	0.597	0.762	0.501	0.604	c.m/sec"
"	Catchment 300		Pervious	Impervious	Total Area "
"	Surface Area	0.675	0.675	1.350	hectare"
"	Time of concentration	3.981	0.728	2.007	minutes"
"	Time to Centroid	114.123	110.827	112.123	minutes"
"	Rainfall depth	74.358	74.358	74.358	mm"
"	Rainfall volume	501.92	501.92	1003.83	c.m"
"	Rainfall losses	29.474	5.085	17.279	mm"
"	Runoff depth	44.884	69.273	57.079	mm"
"	Runoff volume	302.97	467.59	770.56	c.m"

"	Runoff coefficient	0.604	0.932	0.768	"
"	Maximum flow	0.276	0.321	0.597	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.597 0.893 0.501 0.604"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.597 0.893 0.893 0.604"				
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow	0.893		c.m/sec"	
"	Hydrograph volume	14396.146		c.m"	
"	0.597 0.893 0.893 0.893"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.597 0.000 0.893 0.893"				
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.575 0.000 0.893 0.893 c.m/sec"				
"	Catchment 700 Pervious Impervious Total Area "				
"	Surface Area 2.980 0.000 2.980 hectare"				
"	Time of concentration 22.119 4.044 22.119 minutes"				
"	Time to Centroid 139.988 115.872 139.988 minutes"				
"	Rainfall depth 74.358 74.358 74.358 mm"				
"	Rainfall volume 2215.86 0.00 2215.86 c.m"				

"	Rainfall losses	28.813	2.354	28.812	mm"
"	Runoff depth	45.545	72.004	45.545	mm"
"	Runoff volume	1357.25	0.00	1357.25	c.m"
"	Runoff coefficient	0.613	0.000	0.613	"
"	Maximum flow	0.575	0.000	0.575	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.575 0.575 0.893 0.893"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.575 0.575 0.575 0.893"				
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow	0.575		c.m/sec"	
"	Hydrograph volume	1357.251		c.m"	
"	0.575 0.575 0.575 0.575"				
" 40	HYDROGRAPH Confluence 100"				
"	7 Confluence "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow	0.604		c.m/sec"	
"	Hydrograph volume	864.169		c.m"	
"	0.575 0.604 0.575 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.575 0.604 0.604 0.000"				
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow	1.453		c.m/sec"	
"	Hydrograph volume	15260.317		c.m"	
"	0.575 0.604 0.604 1.453"				
" 40	HYDROGRAPH Confluence 200"				
"	7 Confluence "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow	1.453		c.m/sec"	
"	Hydrograph volume	15260.318		c.m"	
"	0.575 1.453 0.604 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.575 1.453 1.453 0.000"				
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow	1.860		c.m/sec"	

"	Hydrograph volume	16617.568	c.m"
"	0.575 1.453 1.453	1.860"	
" 38	START/RE-START TOTALS 200"		
"	3 Runoff Totals on EXIT"		
"	Total Catchment area	39.420	hectare"
"	Total Impervious area	11.691	hectare"
"	Total % impervious	29.656"	
" 19	EXIT"		

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:                      Interim__100yr.out"
"          Licensee name:
"          Company
"          Date & Time last used:                2/5/2025 at 11:52:52 AM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          240.000  Max. Storm length"
"          2000.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          901.088  Coefficient A"
"          0.043  Constant B"
"          0.692  Exponent C"
"          0.375  Fraction R"
"          240.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                212.928  mm/hr"
"          Total depth                      81.221  mm"
"          6  100hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.001  Impervious Lag constant (hours)"

```

"	1.500	Impervious Depression storage"				
"		0.063	0.000	0.000	0.000	c.m/sec"
"		Catchment 600	Pervious	Impervious	Total Area	"
"		Surface Area	0.114	0.006	0.120	hectare"
"		Time of concentration	1.319	0.241	1.247	minutes"
"		Time to Centroid	110.907	109.390	110.806	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	92.59	4.87	97.47	c.m"
"		Rainfall losses	30.156	12.072	29.251	mm"
"		Runoff depth	51.065	69.149	51.969	mm"
"		Runoff volume	58.21	4.15	62.36	c.m"
"		Runoff coefficient	0.629	0.851	0.640	"
"		Maximum flow	0.060	0.003	0.063	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.063	0.063	0.000	0.000"	
" 33		CATCHMENT 800"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	800	Catchment 800"				
"	5.000	% Impervious"				
"	1.730	Total Area"				
"	40.000	Flow length"				
"	3.750	Overland Slope"				
"	1.643	Pervious Area"				
"	40.000	Pervious length"				
"	3.750	Pervious slope"				
"	0.087	Impervious Area"				
"	40.000	Impervious length"				
"	3.750	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.664	0.063	0.000	0.000	c.m/sec"
"		Catchment 800	Pervious	Impervious	Total Area	"
"		Surface Area	1.643	0.087	1.730	hectare"
"		Time of concentration	8.817	1.614	8.287	minutes"
"		Time to Centroid	121.743	111.617	120.997	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	1334.87	70.26	1405.12	c.m"
"		Rainfall losses	29.209	2.686	27.883	mm"
"		Runoff depth	52.011	78.534	53.338	mm"

"	Runoff volume	854.81	67.93	922.74	c.m"
"	Runoff coefficient	0.640	0.967	0.657	"
"	Maximum flow	0.641	0.047	0.664	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.664 0.691 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.664 0.691 0.691 0.000"				
" 40	HYDROGRAPH Combine 100"				
"	6 Combine "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow	0.691			c.m/sec"
"	Hydrograph volume	985.103			c.m"
"	0.664 0.691 0.691 0.691"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.664 0.000 0.691 0.691"				
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	2.059 0.000 0.691 0.691 c.m/sec"				
"	Catchment 500 Pervious Impervious Total Area "				
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	38.886	7.117	38.406	minutes"
"	Time to Centroid	164.999	120.685	164.330	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"

"		Rainfall volume	1.1900	0.0120	1.2021	ha-m"
"		Rainfall losses	28.976	1.949	28.706	mm"
"		Runoff depth	52.245	79.272	52.515	mm"
"		Runoff volume	7654.92	117.32	7772.24	c.m"
"		Runoff coefficient	0.643	0.976	0.647	"
"		Maximum flow	2.049	0.072	2.059	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"			2.059	2.059	0.691	0.691"
" 33		CATCHMENT 100"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	100	Catchment 100"				
"	80.000	% Impervious"				
"	13.090	Total Area"				
"	40.000	Flow length"				
"	2.000	Overland Slope"				
"	2.618	Pervious Area"				
"	40.000	Pervious length"				
"	2.000	Pervious slope"				
"	10.472	Impervious Area"				
"	40.000	Impervious length"				
"	2.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.001	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"			6.209	2.059	0.691	0.691 c.m/sec"
"		Catchment 100	Pervious	Impervious	Total Area	"
"		Surface Area	2.618	10.472	13.090	hectare"
"		Time of concentration	10.647	1.949	3.182	minutes"
"		Time to Centroid	124.364	112.180	113.907	minutes"
"		Rainfall depth	81.221	81.221	81.221	mm"
"		Rainfall volume	0.2126	0.8505	1.0632	ha-m"
"		Rainfall losses	29.139	2.392	7.742	mm"
"		Runoff depth	52.082	78.828	73.479	mm"
"		Runoff volume	1363.51	8254.91	9618.42	c.m"
"		Runoff coefficient	0.641	0.971	0.905	"
"		Maximum flow	0.913	5.702	6.209	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"			6.209	6.587	0.691	0.691"
" 33		CATCHMENT 200"				

```

"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"         200   Catchment 200"
"       15.000   % Impervious"
"         2.020   Total Area"
"       40.000   Flow length"
"         2.000   Overland Slope"
"         1.717   Pervious Area"
"       40.000   Pervious length"
"         2.000   Pervious slope"
"         0.303   Impervious Area"
"       40.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"       30.000   Pervious Max.infiltration"
"         5.000   Pervious Min.infiltration"
"         0.250   Pervious Lag constant (hours)"
"         5.000   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.001   Impervious Lag constant (hours)"
"         1.500   Impervious Depression storage"
"           0.686   6.587   0.691   0.691 c.m/sec"
"       Catchment 200       Pervious   Impervious Total Area "
"       Surface Area           1.717       0.303       2.020       hectare"
"       Time of concentration  10.647       1.949       8.813       minutes"
"       Time to Centroid      124.365      112.180      121.796      minutes"
"       Rainfall depth        81.221       81.221       81.221       mm"
"       Rainfall volume       1394.56      246.10       1640.66      c.m"
"       Rainfall losses       29.139       2.392       25.127       mm"
"       Runoff depth          52.082       78.828       56.094       mm"
"       Runoff volume         894.25      238.85      1133.10      c.m"
"       Runoff coefficient     0.641       0.971       0.691       "
"       Maximum flow          0.598       0.165       0.686       c.m/sec"
" 40       HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"           0.686   7.084   0.691   0.691"
" 54       POND DESIGN"
"         7.084   Current peak flow   c.m/sec"
"         3.341   Target outflow   c.m/sec"
"       18523.8   Hydrograph volume   c.m"
"         18.     Number of stages"
"       421.500   Minimum water level   metre"
"       423.200   Maximum water level   metre"
"       421.500   Starting water level   metre"
"         0     Keep Design Data: 1 = True; 0 = False"
"           Level Discharge   Volume"
"       421.500   0.000   0.000"

```

"	421.600	0.00700	1070.100"		
"	421.700	0.01300	2176.600"		
"	421.800	0.01900	3319.800"		
"	421.900	0.02300	4500.000"		
"	422.000	0.02600	5717.200"		
"	422.100	0.07100	6977.200"		
"	422.200	0.1940	8275.500"		
"	422.300	0.3520	9602.300"		
"	422.400	0.3950	10957.80"		
"	422.500	0.5140	12342.10"		
"	422.600	0.7980	13755.30"		
"	422.700	0.9580	15197.70"		
"	422.800	1.614	16669.40"		
"	422.900	2.846	18170.60"		
"	423.000	4.482	19701.40"		
"	423.100	6.460	21262.00"		
"	423.200	8.746	22852.50"		
"	Peak outflow		0.681	c.m/sec"	
"	Maximum level		422.559	metre"	
"	Maximum storage		13175.188	c.m"	
"	Centroidal lag		22.647	hours"	
"	0.686	7.084	0.681	0.691	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5 Next link "				
"	0.686	0.681	0.681	0.691"	
" 33	CATCHMENT 400"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	400 Catchment 400"				
"	0.000 % Impervious"				
"	3.330 Total Area"				
"	120.000 Flow length"				
"	3.000 Overland Slope"				
"	3.330 Pervious Area"				
"	120.000 Pervious length"				
"	3.000 Pervious slope"				
"	0.000 Impervious Area"				
"	120.000 Impervious length"				
"	3.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				

	0.835	0.681	0.681	0.691	c.m/sec"
"	Catchment 400		Pervious	Impervious	Total Area "
"	Surface Area	3.330	0.000	3.330	hectare"
"	Time of concentration	18.225	3.335	18.225	minutes"
"	Time to Centroid	135.263	114.631	135.263	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	2704.65	0.00	2704.66	c.m"
"	Rainfall losses	28.982	3.311	28.982	mm"
"	Runoff depth	52.239	77.910	52.239	mm"
"	Runoff volume	1739.55	0.00	1739.55	c.m"
"	Runoff coefficient	0.643	0.000	0.643	"
"	Maximum flow	0.835	0.000	0.835	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

	0.835	0.909	0.681	0.691"
"	4	Add Runoff "		

	0.835	0.909	0.681	0.691"
" 33	CATCHMENT 300"			
"	1	Triangular SCS"		
"	1	Equal length"		
"	2	Horton equation"		
"	300	Catchment 300"		
"	50.000	% Impervious"		
"	1.350	Total Area"		
"	20.000	Flow length"		
"	15.000	Overland Slope"		
"	0.675	Pervious Area"		
"	20.000	Pervious length"		
"	15.000	Pervious slope"		
"	0.675	Impervious Area"		
"	20.000	Impervious length"		
"	15.000	Impervious slope"		
"	0.250	Pervious Manning 'n'"		
"	30.000	Pervious Max.infiltration"		
"	5.000	Pervious Min.infiltration"		
"	0.250	Pervious Lag constant (hours)"		
"	5.000	Pervious Depression storage"		
"	0.015	Impervious Manning 'n'"		
"	0.000	Impervious Max.infiltration"		
"	0.000	Impervious Min.infiltration"		
"	0.001	Impervious Lag constant (hours)"		
"	1.500	Impervious Depression storage"		

	0.665	0.909	0.681	0.691	c.m/sec"
"	Catchment 300		Pervious	Impervious	Total Area "
"	Surface Area	0.675	0.675	1.350	hectare"
"	Time of concentration	3.838	0.702	1.967	minutes"
"	Time to Centroid	114.744	110.663	112.309	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	548.24	548.24	1096.48	c.m"
"	Rainfall losses	30.089	5.611	17.850	mm"
"	Runoff depth	51.132	75.610	63.371	mm"
"	Runoff volume	345.14	510.37	855.51	c.m"

"	Runoff coefficient	0.630	0.931	0.780	"
"	Maximum flow	0.315	0.350	0.665	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.665	1.033	0.681	0.691"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.665	1.033	1.033	0.691"	
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow		1.033	c.m/sec"	
"	Hydrograph volume		16661.775	c.m"	
"	0.665	1.033	1.033	1.033"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.665	0.000	1.033	1.033"	
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.001 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.652	0.000	1.033	1.033 c.m/sec"	
"	Catchment 700	Pervious	Impervious	Total Area	"
"	Surface Area	2.980	0.000	2.980	hectare"
"	Time of concentration	21.322	3.902	21.322	minutes"
"	Time to Centroid	139.734	115.505	139.734	minutes"
"	Rainfall depth	81.221	81.221	81.221	mm"
"	Rainfall volume	2420.38	0.00	2420.38	c.m"

"	Rainfall losses	28.988	2.703	28.988	mm"
"	Runoff depth	52.233	78.518	52.233	mm"
"	Runoff volume	1556.55	0.00	1556.55	c.m"
"	Runoff coefficient	0.643	0.000	0.643	"
"	Maximum flow	0.652	0.000	0.652	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.652 0.652 1.033 1.033"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.652 0.652 0.652 1.033"				
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow	0.652		c.m/sec"	
"	Hydrograph volume	1556.551		c.m"	
"	0.652 0.652 0.652 0.652"				
" 40	HYDROGRAPH Confluence 100"				
"	7 Confluence "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow	0.691		c.m/sec"	
"	Hydrograph volume	985.103		c.m"	
"	0.652 0.691 0.652 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.652 0.691 0.691 0.000"				
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow	1.665		c.m/sec"	
"	Hydrograph volume	17646.877		c.m"	
"	0.652 0.691 0.691 1.665"				
" 40	HYDROGRAPH Confluence 200"				
"	7 Confluence "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow	1.665		c.m/sec"	
"	Hydrograph volume	17646.877		c.m"	
"	0.652 1.665 0.691 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.652 1.665 1.665 0.000"				
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow	2.153		c.m/sec"	

"	Hydrograph volume	19203.426	c.m"
"	0.652 1.665 1.665	2.153"	
" 38	START/RE-START TOTALS 200"		
"	3 Runoff Totals on EXIT"		
"	Total Catchment area	39.420	hectare"
"	Total Impervious area	11.691	hectare"
"	Total % impervious	29.656"	
" 19	EXIT"		

```

"          MIDUSS Output ----->"
"          MIDUSS version                Version 2.25  rev. 473"
"          MIDUSS created                 Sunday, February 7, 2010"
"          10  Units used:                ie METRIC"
"          Job folder:                   B:\Working\POLOCORP INC\
"          2401807 - 422079 North Lands Hwy 6 Fergus\Design Phase\Design
Data\Modelling Files\Jan10_2025 - Copy"
"          Output filename:              Interim__REG.out"
"          Licensee name:                "
"          Company                       "
"          Date & Time last used:        2/5/2025 at 11:56:08 AM"
" 31          TIME PARAMETERS"
"          60.000  Time Step"
"          2880.000  Max. Storm length"
"          7500.000  Max. Hydrograph"
" 32          STORM Historic"
"          5  Historic"
"          2880.000  Duration"
"          48.000  Rainfall intensity values"
"                  2.028    2.028    2.028    2.028    2.028"
"                  2.028    2.028    2.028    2.028    2.028"
"                  2.028    2.028    2.028    2.028    2.028"
"                  2.028    2.028    2.028    2.028    2.028"
"                  2.028    2.028    2.028    2.028    2.028"
"                  2.028    2.026    2.026    2.026    2.028"
"                  2.026    6.000    4.000    6.000    13.000"
"                  17.000    13.000    23.000    13.000    13.000"
"                  53.000    38.000    13.000"
"          Maximum intensity              53.000  mm/hr"
"          Total depth                    285.000  mm"
"          6  000hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 600"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          600  Catchment 600"
"          5.000  % Impervious"
"          0.120  Total Area"
"          5.000  Flow length"
"          33.000  Overland Slope"
"          0.114  Pervious Area"
"          5.000  Pervious length"
"          33.000  Pervious slope"
"          0.006  Impervious Area"
"          5.000  Impervious length"
"          33.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          30.000  Pervious Max.infiltration"
"          5.000  Pervious Min.infiltration"

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"      0.250 Pervious Lag constant (hours)"
"      5.000 Pervious Depression storage"
"      0.015 Impervious Manning 'n'"
"      0.000 Impervious Max.infiltration"
"      0.000 Impervious Min.infiltration"
"      0.010 Impervious Lag constant (hours)"
"      1.500 Impervious Depression storage"
"          0.014      0.000      0.000      0.000 c.m/sec"
"      Catchment 600      Pervious      Impervious Total Area "
"      Surface Area      0.114      0.006      0.120      hectare"
"      Time of concentration 2.369      0.421      2.184      minutes"
"      Time to Centroid 2699.991 2271.477 2659.445 minutes"
"      Rainfall depth 285.000 285.000 285.000 mm"
"      Rainfall volume 324.90 17.10 342.00 c.m"
"      Rainfall losses 157.980 32.780 151.720 mm"
"      Runoff depth 127.020 252.220 133.280 mm"
"      Runoff volume 144.80 15.13 159.94 c.m"
"      Runoff coefficient 0.446 0.885 0.468 "
"      Maximum flow 0.013 0.001 0.014 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
"      4 Add Runoff "
"          0.014      0.014      0.000      0.000"
" 33 CATCHMENT 800"
"      1 Triangular SCS"
"      1 Equal length"
"      2 Horton equation"
"      800 Catchment 800"
"      5.000 % Impervious"
"      1.730 Total Area"
"      40.000 Flow length"
"      3.750 Overland Slope"
"      1.643 Pervious Area"
"      40.000 Pervious length"
"      3.750 Pervious slope"
"      0.087 Impervious Area"
"      40.000 Impervious length"
"      3.750 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      30.000 Pervious Max.infiltration"
"      5.000 Pervious Min.infiltration"
"      0.250 Pervious Lag constant (hours)"
"      5.000 Pervious Depression storage"
"      0.015 Impervious Manning 'n'"
"      0.000 Impervious Max.infiltration"
"      0.000 Impervious Min.infiltration"
"      0.010 Impervious Lag constant (hours)"
"      1.500 Impervious Depression storage"
"          0.182      0.014      0.000      0.000 c.m/sec"
"      Catchment 800      Pervious      Impervious Total Area "
"      Surface Area      1.643      0.087      1.730      hectare"

```

"	Time of concentration	15.838	2.814	14.776	minutes"
"	Time to Centroid	2719.829	2252.473	2681.704	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	4683.98	246.53	4930.50	c.m"
"	Rainfall losses	139.631	39.672	134.633	mm"
"	Runoff depth	145.370	245.328	150.368	mm"
"	Runoff volume	2389.15	212.21	2601.36	c.m"
"	Runoff coefficient	0.510	0.861	0.528	"
"	Maximum flow	0.171	0.011	0.182	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.182	0.196	0.000	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.182	0.196	0.196	0.000"
" 40	HYDROGRAPH Combine 100"				
"	6 Combine "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow		0.196		c.m/sec"
"	Hydrograph volume		2761.294		c.m"
"		0.182	0.196	0.196	0.196"
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"		0.182	0.000	0.196	0.196"
" 33	CATCHMENT 500"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	500 Catchment 500"				
"	1.000 % Impervious"				
"	14.800 Total Area"				
"	245.000 Flow length"				
"	1.000 Overland Slope"				
"	14.652 Pervious Area"				
"	245.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.148 Impervious Area"				
"	245.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.010 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				

	1.470	0.000	0.196	0.196	c.m/sec"
"	Catchment 500		Pervious	Impervious	Total Area "
"	Surface Area	14.652	0.148	14.800	hectare"
"	Time of concentration	69.853	12.412	68.788	minutes"
"	Time to Centroid	2777.725	2293.748	2768.751	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	4.1758	0.0422	4.2180	ha-m"
"	Rainfall losses	138.578	11.153	137.304	mm"
"	Runoff depth	146.422	273.848	147.696	mm"
"	Runoff volume	2.1454	0.0405	2.1859	ha-m"
"	Runoff coefficient	0.514	0.961	0.518	"
"	Maximum flow	1.454	0.018	1.470	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		1.470	1.470	0.196	0.196"

" 33	CATCHMENT 100"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	100	Catchment 100"			
"	80.000	% Impervious"			
"	13.090	Total Area"			
"	40.000	Flow length"			
"	2.000	Overland Slope"			
"	2.618	Pervious Area"			
"	40.000	Pervious length"			
"	2.000	Pervious slope"			
"	10.472	Impervious Area"			
"	40.000	Impervious length"			
"	2.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	30.000	Pervious Max.infiltration"			
"	5.000	Pervious Min.infiltration"			
"	0.250	Pervious Lag constant (hours)"			
"	5.000	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.010	Impervious Lag constant (hours)"			
"	1.500	Impervious Depression storage"			

"		1.584	1.470	0.196	0.196	c.m/sec"
"	Catchment 100		Pervious	Impervious	Total Area "	
"	Surface Area	2.618	10.472	13.090	hectare"	
"	Time of concentration	19.125	3.398	5.426	minutes"	
"	Time to Centroid	2724.073	2240.649	2302.974	minutes"	
"	Rainfall depth	285.000	285.000	285.000	mm"	
"	Rainfall volume	0.7461	2.9845	3.7307	ha-m"	
"	Rainfall losses	139.363	39.000	59.073	mm"	
"	Runoff depth	145.637	246.000	225.928	mm"	
"	Runoff volume	0.3813	2.5761	2.9574	ha-m"	

"	Runoff coefficient	0.511	0.863	0.793	"
"	Maximum flow	0.264	1.323	1.584	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	1.584	2.676	0.196	0.196"	
" 33	CATCHMENT 200"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	200 Catchment 200"				
"	15.000 % Impervious"				
"	2.020 Total Area"				
"	40.000 Flow length"				
"	2.000 Overland Slope"				
"	1.717 Pervious Area"				
"	40.000 Pervious length"				
"	2.000 Pervious slope"				
"	0.303 Impervious Area"				
"	40.000 Impervious length"				
"	2.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.010 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.210	2.676	0.196	0.196 c.m/sec"	
"	Catchment 200	Pervious	Impervious	Total Area	"
"	Surface Area	1.717	0.303	2.020	hectare"
"	Time of concentration	19.125	3.398	15.514	minutes"
"	Time to Centroid	2724.073	2240.649	2613.063	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	4893.45	863.55	5757.00	c.m"
"	Rainfall losses	139.363	39.000	124.309	mm"
"	Runoff depth	145.637	246.000	160.691	mm"
"	Runoff volume	2500.58	745.38	3245.96	c.m"
"	Runoff coefficient	0.511	0.863	0.564	"
"	Maximum flow	0.173	0.038	0.210	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.210	2.876	0.196	0.196"	
" 54	POND DESIGN"				
"	2.876 Current peak flow	c.m/sec"			
"	3.341 Target outflow	c.m/sec"			
"	54678.9 Hydrograph volume	c.m"			
"	18. Number of stages"				

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" 421.500 Minimum water level metre"
" 423.200 Maximum water level metre"
" 421.500 Starting water level metre"
" 0 Keep Design Data: 1 = True; 0 = False"
" Level Discharge Volume"
" 421.500 0.000 0.000"
" 421.600 0.00700 1070.100"
" 421.700 0.01300 2176.600"
" 421.800 0.01900 3319.800"
" 421.900 0.02300 4500.000"
" 422.000 0.02600 5717.200"
" 422.100 0.07100 6977.200"
" 422.200 0.1940 8275.500"
" 422.300 0.3520 9602.300"
" 422.400 0.3950 10957.80"
" 422.500 0.5140 12342.10"
" 422.600 0.7980 13755.30"
" 422.700 0.9580 15197.70"
" 422.800 1.614 16669.40"
" 422.900 2.846 18170.60"
" 423.000 4.482 19701.40"
" 423.100 6.460 21262.00"
" 423.200 8.746 22852.50"
" Peak outflow 2.741 c.m/sec"
" Maximum level 422.892 metre"
" Maximum storage 18043.141 c.m"
" Centroidal lag 53.312 hours"
" 0.210 2.876 2.741 0.196 c.m/sec"
" 40 HYDROGRAPH Next link "
" 5 Next link "
" 0.210 2.741 2.741 0.196"
" 33 CATCHMENT 400"
" 1 Triangular SCS"
" 1 Equal length"
" 2 Horton equation"
" 400 Catchment 400"
" 0.000 % Impervious"
" 3.330 Total Area"
" 120.000 Flow length"
" 3.000 Overland Slope"
" 3.330 Pervious Area"
" 120.000 Pervious length"
" 3.000 Pervious slope"
" 0.000 Impervious Area"
" 120.000 Impervious length"
" 3.000 Impervious slope"
" 0.250 Pervious Manning 'n'"
" 30.000 Pervious Max.infiltration"
" 5.000 Pervious Min.infiltration"
" 0.250 Pervious Lag constant (hours)"

```

"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.010	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.366	2.741	2.741	0.196 c.m/sec"	
"		Catchment 400	Pervious	Impervious	Total Area	"
"		Surface Area	3.330	0.000	3.330	hectare"
"		Time of concentration	32.738	5.817	32.738	minutes"
"		Time to Centroid	2737.685	2233.110	2737.684	minutes"
"		Rainfall depth	285.000	285.000	285.000	mm"
"		Rainfall volume	9490.50	0.01	9490.51	c.m"
"		Rainfall losses	139.700	29.327	139.700	mm"
"		Runoff depth	145.300	255.674	145.301	mm"
"		Runoff volume	4838.50	0.01	4838.51	c.m"
"		Runoff coefficient	0.510	0.000	0.510	"
"		Maximum flow	0.366	0.000	0.366	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.366	3.107	2.741	0.196"	
" 33		CATCHMENT 300"				
"	1	Triangular SCS"				
"	1	Equal length"				
"	2	Horton equation"				
"	300	Catchment 300"				
"	50.000	% Impervious"				
"	1.350	Total Area"				
"	20.000	Flow length"				
"	15.000	Overland Slope"				
"	0.675	Pervious Area"				
"	20.000	Pervious length"				
"	15.000	Pervious slope"				
"	0.675	Impervious Area"				
"	20.000	Impervious length"				
"	15.000	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	30.000	Pervious Max.infiltration"				
"	5.000	Pervious Min.infiltration"				
"	0.250	Pervious Lag constant (hours)"				
"	5.000	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.010	Impervious Lag constant (hours)"				
"	1.500	Impervious Depression storage"				
"		0.165	3.107	2.741	0.196 c.m/sec"	
"		Catchment 300	Pervious	Impervious	Total Area	"
"		Surface Area	0.675	0.675	1.350	hectare"
"		Time of concentration	6.894	1.225	3.197	minutes"

"	Time to Centroid	2702.037	2279.379	2426.416	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	1923.75	1923.75	3847.50	c.m"
"	Rainfall losses	153.479	38.462	95.971	mm"
"	Runoff depth	131.521	246.538	189.030	mm"
"	Runoff volume	887.77	1664.13	2551.90	c.m"
"	Runoff coefficient	0.461	0.865	0.663	"
"	Maximum flow	0.077	0.088	0.165	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.165	3.222	2.741	0.196"	
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.165	3.222	3.222	0.196"	
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow		3.222	c.m/sec"	
"	Hydrograph volume		60356.441	c.m"	
"	0.165	3.222	3.222	3.222"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.165	0.000	3.222	3.222"	
" 33	CATCHMENT 700"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	2 Horton equation"				
"	700 Catchment 700"				
"	0.000 % Impervious"				
"	2.980 Total Area"				
"	90.000 Flow length"				
"	1.000 Overland Slope"				
"	2.980 Pervious Area"				
"	90.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.000 Impervious Area"				
"	90.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	30.000 Pervious Max.infiltration"				
"	5.000 Pervious Min.infiltration"				
"	0.250 Pervious Lag constant (hours)"				
"	5.000 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.010 Impervious Lag constant (hours)"				
"	1.500 Impervious Depression storage"				
"	0.327	0.000	3.222	3.222 c.m/sec"	

	Catchment 700	Pervious	Impervious	Total Area	
"	Surface Area	2.980	0.000	2.980	hectare"
"	Time of concentration	38.303	6.806	38.303	minutes"
"	Time to Centroid	2741.219	2241.540	2741.218	minutes"
"	Rainfall depth	285.000	285.000	285.000	mm"
"	Rainfall volume	8493.00	0.01	8493.01	c.m"
"	Rainfall losses	141.568	24.635	141.568	mm"
"	Runoff depth	143.432	260.365	143.432	mm"
"	Runoff volume	4274.27	0.01	4274.27	c.m"
"	Runoff coefficient	0.503	0.000	0.503	"
"	Maximum flow	0.327	0.000	0.327	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.327	0.327	3.222	3.222"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.327	0.327	0.327	3.222"
" 40	HYDROGRAPH Combine 300"				
"	6 Combine "				
"	300 Node #"				
"	To West Farm Field"				
"	Maximum flow		0.327		c.m/sec"
"	Hydrograph volume		4274.274		c.m"
"		0.327	0.327	0.327	0.327"
" 40	HYDROGRAPH Confluence 100"				
"	7 Confluence "				
"	100 Node #"				
"	To Highway 6 Roadside Ditch"				
"	Maximum flow		0.196		c.m/sec"
"	Hydrograph volume		2761.294		c.m"
"		0.327	0.196	0.327	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.327	0.196	0.196	0.000"
" 40	HYDROGRAPH Combine 200"				
"	6 Combine "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow		3.399		c.m/sec"
"	Hydrograph volume		63117.754		c.m"
"		0.327	0.196	0.196	3.399"
" 40	HYDROGRAPH Confluence 200"				
"	7 Confluence "				
"	200 Node #"				
"	To Northeast Wetland"				
"	Maximum flow		3.399		c.m/sec"
"	Hydrograph volume		63117.754		c.m"
"		0.327	3.399	0.196	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				

"		0.327	3.399	3.399	0.000"	
" 40	HYDROGRAPH	Combine	300"			
"	6	Combine "				
"	300	Node #"				
"		To West Farm Field"				
"		Maximum flow		3.726	c.m/sec"	
"		Hydrograph volume		67392.039	c.m"	
"		0.327	3.399	3.399	3.726"	
" 38	START/RE-START	TOTALS	200"			
"	3	Runoff Totals on	EXIT"			
"		Total Catchment area		39.420	hectare"	
"		Total Impervious area		11.691	hectare"	
"		Total % impervious		29.656"		
" 19	EXIT"					

## **Appendix D Water Balance Analysis**

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**North Lands Subdivision**  
**Township of Centre Wellington (Fergus)**  
**Monthly Water Balance (Thorntwaite and Mather Method)**  
**Date: February 2025**

**Table No. 14: Pre-Development Recharge Volume Summary**

<b>Catchment</b>	<b>Area</b>	<b>Imperv. (%)</b>	<b>Recharge Depth (mm/yr)</b>	<b>Recharge Volume (m<sup>3</sup>/yr)</b>
800	1.73	5	308	5061.98
Catchment 500, 700	18.3	0	287	52521
				57,582.98

**North Lands Subdivision**  
**Township of Centre Wellington (Fergus)**  
**Monthly Water Balance (Thorntwaite and Mather Method)**  
**Date: February 2025**

**Table No. 15: Recharge Volume Summary**

<b>Catchment</b>	<b>Area</b>	<b>Imperv. (%)</b>	<b>Recharge Depth</b>	<b>Recharge Volume</b>
1000	18.98 ha	80	287 mm/yr	10,895 m <sup>3</sup> /yr
5000	0.12 ha	25	308 mm/yr	277 m <sup>3</sup> /yr
6000	0.44 ha	5	308 mm/yr	1,287 m <sup>3</sup> /yr
7000	0.49 ha	0	287 mm/yr	1,406 m <sup>3</sup> /yr
				13,865 m <sup>3</sup> /yr
			Enhanced Infiltration from Infiltration Galleries	<u>32,903 m<sup>3</sup>/yr</u>
				<b>46,768 m<sup>3</sup>/yr</b>

**81% of 57,583 m<sup>3</sup>/yr required as per**  
**Hydrogeological Investigation**

**North Lands Subdivision**  
**Township of Centre Wellington (Fergus)**  
**Monthly Water Balance (Thornthwaite and Mather Method)**  
**Date: February 2025**

**Table 16: Rooftop (100% Impervious)**

Contributing Catchments: Rooftops	Soil Type: Fine Sand	Impervious Area = 0.15 ha	Percent of Total Area 100%	Runoff Factor = 1.00
Contributing Area = 0.15 ha	Vegetation: Shallow-rooted crops	Pervious Area = 0.00 ha	0%	
Percent Impervious = 100%	Root Zone Depth = 0.50m	Total Area = 0.15 ha	100%	Evapotranspiration Factor for Impervious Surfaces = 0.34
	Soil Moisture Retention Capacity = 75mm			

Month	Daily Average Temperature (°C)	Monthly Heat Index	Unadjusted Daily Potential Evapotranspiration (mm)	Correction Factors	Adjusted Potential Evapotranspiration (mm)	Average Precipitation (mm)	P-PE (mm)	Accum. Pot. Water Loss (mm)	Storage (mm)	ΔS (mm)	Pervious ET (mm)	Actual Evapotranspiration (mm)	Pervious ET - Actual ET (mm)	Moisture Deficit (mm)	Moisture Surplus (mm)	Water Runoff (mm)	Snow Melt Runoff (mm)	Total Recharge & Runoff (mm)	Actual Runoff (mm)
Jan	-7.4	0.0	0.0	24.3	0.0	67.9	67.9		211.5	0.0	0.0	0.0	0.0	0.0	0.0	18.2	0.0	18.2	18.2
Feb	-6.3	0.0	0.0	24.5	0.0	55.9	55.9		267.4	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0.0	9.1	9.1
Mar	-1.9	0.0	0.0	30.6	0.0	59.6	59.6		327.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	4.5	4.5
Apr	5.7	1.2	0.9	33.6	29.2	74.1	44.9		75.0	0.0	29.2	9.8	19.4	19.4	64.3	34.4	25.2	59.6	59.6
May	12.2	3.9	1.9	37.9	72.4	86.9	14.5		75.0	0.0	72.4	24.4	48.0	48.0	62.5	48.5	113.4	161.9	161.9
Jun	17.5	6.7	2.8	38.5	107.0	83.8	-23.2	-23.2	54.0	-21.0	104.8	35.3	69.5	71.7	69.5	59.0	56.7	115.7	115.7
Jul	20.0	8.2	3.2	38.8	124.2	89.2	-35.0	-58.2	46.0	-8.0	97.2	32.7	64.5	91.4	64.5	61.7	28.4	90.1	90.1
Aug	19.0	7.6	3.0	36.0	109.1	96.6	-12.5	-70.7	28.0	-18.0	114.6	38.6	76.0	70.5	76.0	68.9	14.2	83.0	83.0
Sep	14.9	5.2	2.4	31.2	73.3	93.1	19.8		47.8	19.8	73.3	24.7	48.6	48.6	48.6	58.8	7.5	66.3	66.3
Oct	8.3	2.2	1.3	28.5	36.5	77.2	40.7		88.5	40.7	36.5	12.3	24.2	24.2	24.2	41.5	3.9	45.4	45.4
Nov	2.1	0.3	0.3	24.2	7.5	93.0	85.5		75.0	-13.5	7.5	2.5	5.0	5.0	104.0	72.7	2.0	74.7	74.7
Dec	-3.9	0.0	0.0	23.0	0.0	68.6	68.6		143.6	0.0	0.0	0.0	0.0	0.0	0.0	36.4	0.8	37.2	37.2
<b>Total</b>		<b>35.1</b>				<b>945.9</b>	<b>386.7</b>				<b>535.5</b>	<b>180.3</b>	<b>355.2</b>	<b>378.9</b>	<b>513.6</b>	<b>513.6</b>	<b>252.0</b>	<b>765.5</b>	<b>765.5</b>

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1981-2010 for the Orangeville Weather Station

Monthly water balance strategy as outlined in the document *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thornthwaite and Mather, 1957)*

Evaporation Factor for Impervious Surfaces = Average Annual Evapotranspiration for Impervious Surfaces (180.3mm/year) / Average Annual Evapotranspiration for Pervious Surfaces (535.5mm/year) = 0.34

Runoff Factor = [(Impervious Percentage of Site x Average Annual Runoff for Impervious Surfaces (765.6mm/year)) + (Pervious Percentage of Site x Average Annual Runoff for Pervious Surfaces (123 mm/year))] / Total Annual Recharge & Runoff

**North Lands Subdivision  
Township of Centre Wellington (Fergus)  
File No: 422079**

**Table 17: Infiltration Gallery Sizing Calculation**

Runoff Depth = 25 mm							Infiltration Gallery					
Type of Lot	Number of Units	Building Width (m)	Building Length (m)	Rooftop Area (m <sup>2</sup> )	Required Storage Volume Per Lot (m <sup>3</sup> )	Total Storage Volume Required (m <sup>3</sup> )	Length (m)	Width (m)	Depth (m)	Stone Volume (m <sup>3</sup> )	Storage Volume (m <sup>3</sup> )	Total Storage Volume Provided (m <sup>3</sup> )
Single Detached (11m - 15.2m lots)	129	9.20	17.00	156.40	3.91	504.39	7.50	1.6	1	12.00	4.00	516.00
Street Townhouse (5.5m - 7m units)	266	5.00	17.00	42.50	1.06	282.63	3.25	1	1	3.25	1.08	288.17
Mixed Use and Medium Density Blocks				1,275.00		31.88	125.00	1	1	125.00	41.67	41.67
<b>Total</b>	<b>395</b>			<b>1,473.90</b>		<b>818.89</b>						<b>845.83</b>

**Notes:**

- 1.0 Assumes the following lot setbacks:
- 2.0 Assumes stone void ratio of 1/3
- 3.0 Infiltration Galleries sized to infiltrate 25mm design storm event from building rooftops.
- 4.0 For townhome units, it is assumed that only half of the rooftop area can be infiltrated.
- 5.0 Assumes Multiple Residential Block rooftop area to be infiltrated is 25% of block area

**Table 18: Enhanced Recharge Calculation - Single Detached Houses**

Structure Length =	7.50	m	Gallery Footprint =	12.00	m <sup>2</sup>
Structure Width =	1.60	m			
Structure Depth =	1.00	m			
			Volume of Stone =	12.00	m <sup>3</sup>
			Stone Porosity =	0.33	
			<b>Storage Volume of Stone =</b>	<b>4.00</b>	<b>m<sup>3</sup></b>

Draindown time calculated using the BMP Sizing equation from the Low Impact Development Stormwater Management Planning and Design Guide

$$d_{rmax} = i * t_s / V_r$$

$d_{rmax}$  = depth of stone = 1000.00 mm  
 $i$  = infiltration rate for native soils = 15.00 mm/hr  
 $V_r$  = void space ratio for aggregate used = 0.33  
 $t_s$  = time to drain, solve for  $t_s$

$$t_s = d_{rmax} * V_r / i = 22.00 \text{ hours or } 0.92 \text{ day draindown period}$$

**Building Rooftops**

Number of Lots =	207	
Rooftop Area (per lot)=	156.40 m <sup>2</sup>	0.0156 ha
Total Rooftop Area	3.237 ha	Rooftop Area (ha) x Number of Lots
Recharge Time	22.00 hours	/ 0.92 days
Recharge Volume Potential =	4.00 m <sup>3</sup>	(per lot)
Total Recharge Volume Potential =	828.00 m <sup>3</sup>	(Recharge Volume Potential x Number of Lots)

Month	Total Runoff (mm)	No. of days	Max Potential Recharge (m <sup>3</sup> )	Total Available Recharge (m <sup>3</sup> )	Total Enhanced Recharge (m <sup>3</sup> )	Available Recharge per Lot (m <sup>3</sup> )	Enhanced Recharge per Lot (m <sup>3</sup> )
Jan	18.2	31	28,001	589	500	2.8	2.4
Feb	9.1	28	25,292	294	250	1.4	1.2
Mar	4.5	31	28,001	147	125	0.7	0.6
Apr	59.6	30	27,098	1,929	1,640	9.3	7.9
May	161.9	31	28,001	5,240	4,454	25.3	21.5
Jun	115.7	30	27,098	3,745	3,183	18.1	15.4
Jul	90.1	31	28,001	2,916	2,479	14.1	12.0
Aug	83.0	31	28,001	2,689	2,285	13.0	11.0
Sep	66.3	30	27,098	2,145	1,823	10.4	8.8
Oct	45.4	31	28,001	1,469	1,249	7.1	6.0
Nov	74.7	30	27,098	2,418	2,055	11.7	9.9
Dec	37.2	31	28,001	1,203	1,023	5.8	4.9
<b>Total</b>	<b>765.5</b>	<b>365</b>	<b>329,695</b>	<b>24,784</b>	<b>21,066</b>	<b>119.7</b>	<b>101.8</b>

Note: Infiltration Galleries are sized for the 25mm design storm event. It is assumed that 85% of storm events are 25mm or less. Enhanced recharge is taken as 85% of the available recharge to represent the 25mm storm infiltration.

**Table 19: Enhanced Recharge Calculation - Townhome Blocks**

Structure Length =	3.00	m	Gallery Footprint =	3.00	m <sup>2</sup>
Structure Width =	1.00	m			
Structure Depth =	1.00	m			
			Volume of Stone =	3.00	m <sup>3</sup>
			Stone Porosity =	0.33	
			<b>Storage Volume of Stone =</b>	<b>1.00</b>	<b>m<sup>3</sup></b>

Draindown time calculated using the BMP Sizing equation from the Low Impact Development Stormwater Management Planning and Design Guide

$d_{rmax} = i * t_s / V_r$		
$d_{rmax}$ = depth of stone =	1000.00	mm
$i$ = infiltration rate for native soils =	15.00	mm/hr
$V_r$ = void space ratio for aggregate used =	0.33	
$t_s$ = time to drain, solve for $t_s$		
$t_s = d_{rmax} * V_r / i =$	22.00 hours or	0.92 day draindown period

**Building Rooftops**

Number of Lots =	398	
Rooftop Area (per lot)=	42.50 m <sup>2</sup>	0.0043 ha
Total Rooftop Area	1.692 ha	Rooftop Area (ha) x Number of Lots
Recharge Time	22.00 hours	/ 0.92 days
Recharge Volume Potential =	1.00 m <sup>3</sup>	(per lot)
Total Recharge Volume Potential =	398.00 m <sup>3</sup>	(Recharge Volume Potential x Number of Lots)

Month	Total Runoff (mm)	No. of days	Max Potential Recharge (m <sup>3</sup> )	Available Recharge (m <sup>3</sup> )	Enhanced Recharge (m <sup>3</sup> )
Jan	18.2	31	13,460	308	261
Feb	9.1	28	12,157	154	131
Mar	4.5	31	13,460	77	65
Apr	59.6	30	13,025	1,008	857
May	161.9	31	13,460	2,738	2,327
Jun	115.7	30	13,025	1,957	1,663
Jul	90.1	31	13,460	1,524	1,295
Aug	83.0	31	13,460	1,405	1,194
Sep	66.3	30	13,025	1,121	953
Oct	45.4	31	13,460	768	652
Nov	74.7	30	13,025	1,263	1,074
Dec	37.2	31	13,460	629	534
<b>Total</b>	<b>765.5</b>	<b>365</b>	<b>158,476</b>	<b>12,949</b>	<b>11,007</b>

Notes:

- 1.0 Rooftop area for townhome units is taken as half of the building roof area (assumes only rear half of roof is infiltrated)
- 2.0 Note: Infiltration Galleries are sized for the 25mm design storm event. It is assumed that 85% of storm events are 25mm or less. Enhanced recharge is taken as 85% of the available recharge to represent the 25mm storm infiltration.

**Table 20: Enhanced Recharge Calculation - Medium Density/ Mixed Use Blocks**

Structure Length =	125.00	m	Gallery Footprint =	125.00	m <sup>2</sup>
Structure Width =	1.00	m			
Structure Depth =	1.00	m			
			Volume of Stone =	125.00	m <sup>3</sup>
			Stone Porosity =	0.33	
			<b>Storage Volume of Stone =</b>	<b>41.67</b>	<b>m<sup>3</sup></b>

Draindown time calculated using the BMP Sizing equation from the Low Impact Development Stormwater Management Planning and Design Guide

$$d_{rmax} = i * t_s / V_r$$

$d_{rmax}$  = depth of stone = 1000.00 mm  
 $i$  = infiltration rate for native soils = 15.00 mm/hr  
 $V_r$  = void space ratio for aggregate used = 0.33  
 $t_s$  = time to drain, solve for  $t_s$

$$t_s = d_{rmax} * V_r / i = 22.00 \text{ hours or } 0.92 \text{ day draindown period}$$

**Building Rooftops**

Total Rooftop Area	0.128 ha	Rooftop Area (ha) x Number of Lots
Recharge Time	22.00 hours /	0.92 days
Recharge Volume Potential =	41.67 m <sup>3</sup> (per lot)	

Month	Total Runoff (mm)	No. of days	Max Potential Recharge (m <sup>3</sup> )	Available Recharge (m <sup>3</sup> )	Enhanced Recharge (m <sup>3</sup> )
Jan	18.2	31	1,409	23	20
Feb	9.1	28	1,273	12	10
Mar	4.5	31	1,409	6	5
Apr	59.6	30	1,364	76	65
May	161.9	31	1,409	206	175
Jun	115.7	30	1,364	147	125
Jul	90.1	31	1,409	115	98
Aug	83.0	31	1,409	106	90
Sep	66.3	30	1,364	84	72
Oct	45.4	31	1,409	58	49
Nov	74.7	30	1,364	95	81
Dec	37.2	31	1,409	47	40
<b>Total</b>	<b>765.5</b>	<b>365</b>	<b>16,591</b>	<b>976</b>	<b>830</b>

Notes:

- 1.0 Assumes Multiple Residential Block rooftop area to be infiltrated is 25% of block area
- 2.0 Infiltration Galleries are sized for the 25mm design storm event. It is assumed that 85% of storm events are 25mm or less. Enhanced recharge is taken as 85% of the available recharge to represent the 25mm storm infiltration.