

Burwash Road Development – Preliminary Stormwater Management Report

Baltimore, Township of Hamilton

Project Number: 23121

Engage Engineering Ltd.

September 2026

Revision Summary

Revision No.	Revision Title	Date	Revision Summary
1	Draft Plan Sub.	2026-09-17	Final

Land Acknowledgement

Engage Engineering would like to acknowledge that our concern is in the traditional territory of the Michi Saagiig Anishinaabe and is part of the land and people encompassed within Treaty #20 and the Williams Treaty. We believe it is important to acknowledge these treaties, as our projects and designs often have a lasting impact on the lands, waters, wildlife, and people of this territory. We thank our local First Nations and communities for their ongoing stewardship of these lands and waters and strive to centre their voices in our work and honor our treaty obligations. May we dedicate ourselves as treaty people to moving forward in the spirit of reconciliation and enduring collaboration.

Accessibility for Ontarians With Disabilities (AODA)

This proposal was prepared and formatted to comply with AODA guidelines. Engage is committed to taking all reasonable steps to ensure that anyone who accesses our services will be able to do so in a way that respects their needs. As such, if you require any assistance with the access or interpretation of this proposal, please do not hesitate to reach out and we will be pleased to accommodate you.

Rights and Distribution

This report was prepared by Engage Engineering Ltd. (Engage) for Stalwood Homes Inc. and intended for their sole use only. This report is considered our professional work product and remains the property of Engage. Any unauthorized reuse, redistribution of, or reliance upon the report, shall be at the users risk, without liability to Engage.

Table of Contents

1.0 Introduction 1

1.1 Site Description 1

2.0 Hydrologic Analysis 1

2.1 Hydrologic Model 1
2.2 Existing Conditions 3
2.3 Proposed Conditions 3
2.4 Existing and Proposed Peak Flows 4

3.0 Stormwater Management 5

3.1 Quantity Control 5
3.2 Water Quality 9
3.3 Stormwater Conveyance 11

4.0 Summary 11

List of Tables

Table 1 - Existing Catchment Area Characteristics 3
Table 2 - Proposed Catchment Area Characteristics 4
Table 3 – Existing Uncontrolled Peak Flows 5
Table 4: Proposed Uncontrolled Peak Flows 5
Table 5: North Pond Stage Storage Discharge 7
Table 6: South Pond Stage Storage Discharge 8
Table 7: Allowable vs. Proposed Release Rates (North Direction) 9
Table 8: Allowable vs. Proposed Release Rates (South Direction) 9
Table 9: Swale Capacity 11

List of Figures

Figure 1: Location Plan
Figure 2: Existing Drainage Area Plan
Figure 3: Proposed Drainage Area Plan
Figure 4: Courtyard Drainage Area
Figure 5: Topographic Survey

Appendix Items

Appendix A: Hydrologic Model Inputs
Appendix B: VO Outputs
Appendix C: Stage Storage
Appendix D: Stormwater Conveyance
Appendix E: Water Quality
Appendix F: Geotechnical Information
Appendix G: Preliminary Design Drawings

1.0 Introduction

Engage Engineering Limited (Engage) has been retained to prepare a Preliminary Stormwater Management (SWM) Report in support of the Draft Plan of Subdivision application for a proposed subdivision on Burwash Road north east of Baltimore in the Township of Hamilton. The development will include the construction of single and semi-detached family homes, roadways, landscaping and supporting infrastructure. The purpose of this report is to quantify the impact that the proposed development will have on stormwater runoff rates and to recommend stormwater management measures required to maintain post-development to pre-development flows and reduce water quality impact on downstream receivers.

Recommendations made in this report are in accordance with Ganaraska Region Conservation Authority and Township and County requirements, in addition to current stormwater management best practices.

1.1 Site Description

The subject site is located on the north side of Burwash Road in the Township of Hamilton. The site is currently a mixture of cropland and woodland. The site is in proximity to the middle reach of Cobourg Creek and the surrounding area is characterized by agriculture and woodlands. The location of the subject site is identified on the Location Plan included as **Figure 1**.

2.0 Hydrologic Analysis

2.1 Hydrologic Model

As part of this study, a hydrologic model for the site under both existing and proposed conditions was developed using Visual OTTHYMO (VO) software. The model was used to simulate peak flows from the site under both pre-development and post-development conditions for a variety of storm distributions and durations, as well as to verify stormwater management storage requirements and performance.

Storm distributions used in the hydrologic model were developed from A, B parameters available in the Ministry of Transportation (MTO) IDF lookup tool. A Preliminary Hydrogeological and Geotechnical Report was completed by GHD (September 2026), and is included in **Appendix F**. According to the GHD report, the underlying soils are generally characterized as silty sand and sandy gravel. This type of soil is classified as Hydrologic Soils Group A for the purposes of this report.

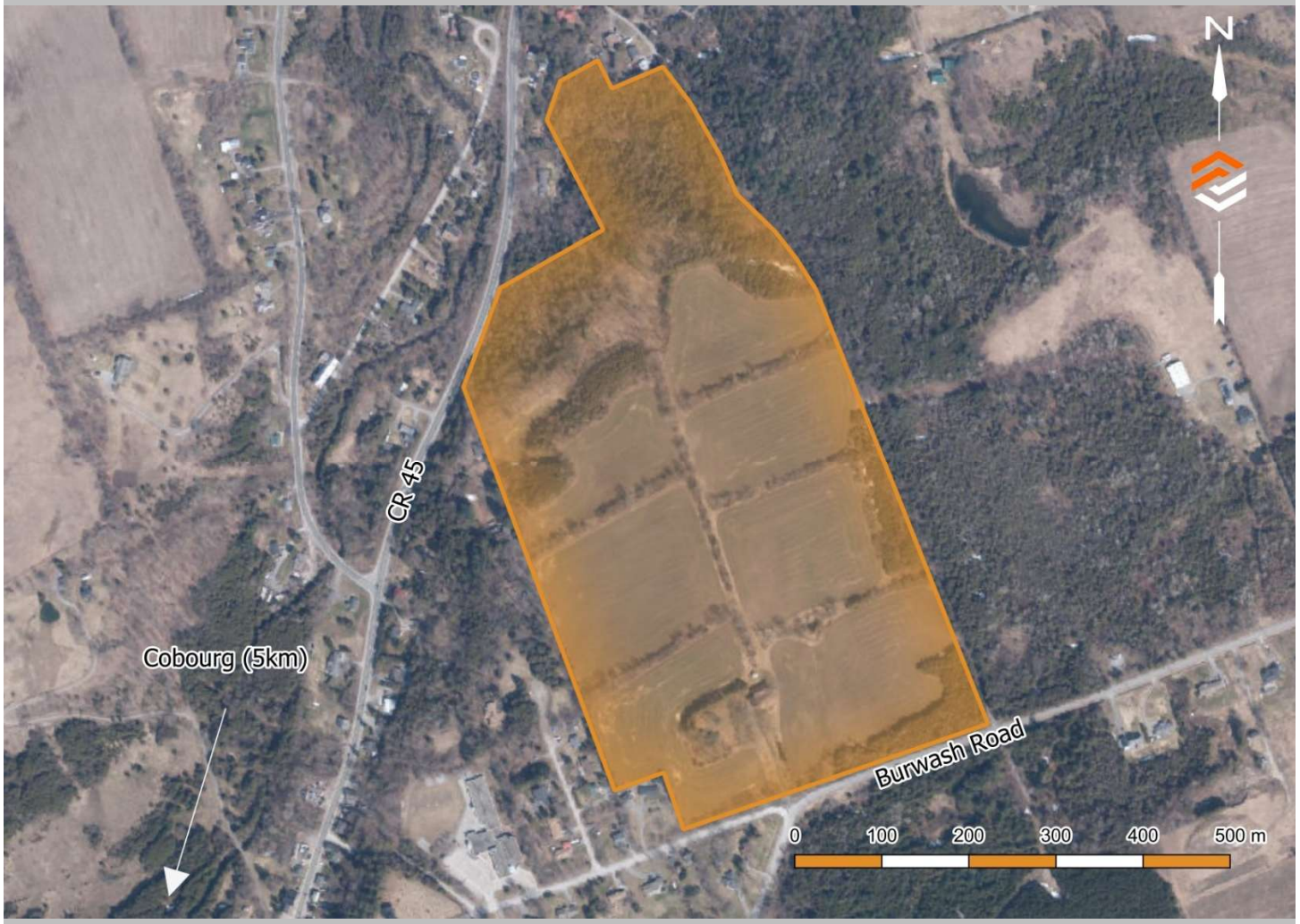


Figure 1: Location Plan

2.2 Existing Conditions

The existing site measures approximately 30ha. The proposed development area of the site measures approximately 23ha, with the remaining 7ha area remaining undisturbed. The topography and legal limits are shown on the Topographic Survey Plan prepared by IBW Surveyors, which is included as **Figure 4: Topographic Survey**. The topographic survey was utilized to determine existing elevations, locations of existing features on the site, and to establish a grading design for the proposed development of the site. There is a high point in the middle of the site, with drainage from the northern area of the site being directed north, and drainage from the southern area of the site being directed south.

The site has a mixture of ground cover consisting of fallow cropland and woodland area. The existing catchment areas have been identified as shown on the Pre-Development Drainage Area Plan included as **Figure 2: Existing Drainage Area Plan**.

- **EX1:** Existing catchment area EX1 consists of 18.47ha of woodland and cropland land. Flows in this catchment area drain from south to north uncontrolled off of the subject site, with runoff being directed towards County Road 45, or an existing drainage feature in the northern undisturbed area of the site.

- **EX2:** Existing catchment area EX2 consists of 11.42ha of fallow cropland. Flows from this catchment area flow from north to south towards the drainage swale along Burwash Road and Community Centre Road to the south.

There do not appear to be any external catchment areas directed to the developed areas of the site. The characteristics of the existing catchment areas are summarized in **Table 1**. A complete list of the VO input parameters are included in **Appendix A**.

Table 1 - Existing Catchment Area Characteristics

Catchment	Area (ha)	TIMP	XIMP	CN*	VO Command
EX1	18.47	-	-	55	NASHYD
EX2	11.42	-	-	60	NASHYD

2.3 Proposed Conditions

Under the proposed conditions, the topography will change to accommodate the grading required for the proposed buildings, roadways and additional landscaped areas. There are four proposed catchment areas identified in **Figure 3: Proposed Drainage Area Plan**, which have the following properties:

- **PR1**: Proposed catchment area PR1 is 6.32ha in area and consists of lower density housing around the north and west perimeter of the subject site. Flows from this catchment drain into the stormwater management facility at the northwest edge of the subject site.

- **PR2**: Proposed catchment PR2 is 11.13ha in area and consists of the higher density townhome portion of the proposed development. Flows from this catchment will be conveyed along drainage swales towards the stormwater management facility at the south edge of the property within PR2.

- **PR3:** Proposed catchment PR3 is 2.70ha in area and consists of the marginal southern and eastern portion of the proposed development. The flows from this catchment are uncontrolled due to grading constraints along the slope and road allowance.

- **PR4**: Proposed catchment area PR4 is 9.73ha in area and consists of the north portion of the subject site. The majority of this catchment will remain undisturbed, and the remainder is largely the rear yard areas of low density lots. The flows from this catchment are uncontrolled due to grading constraints along the slope and road allowance.

The characteristics of the proposed catchment areas are summarized in **Table 2** below. A complete list of the VO input data is included in **Appendix A**.

Table 2 - Proposed Catchment Area Characteristics

Catchment	Area (ha)	TIMP	XIMP	CN*	VO Command
PR1	6.32	0.46	0.23	62	STANDHYD
PR2	11.12	0.48	0.24	57	STANDHYD
PR3	2.70	-	-	58	NASHYD
PR4	9.73	-	-	59	NASHYD

The directly connected impervious areas for Catchment Areas PR1 and PR2 were conservatively assumed to be 50% for the purposes of this analysis.

2.4 Existing and Proposed Peak Flows

6 Hour SCS Type II storm distributions have been utilized for the design of the stormwater management facility. The hydrologic model was used to simulate existing and proposed peak flows for the 2 through 100-year storm events. Spreadsheets with the VO model inputs are included in **Appendix A**. The VO

output is included in **Appendix B** and uncontrolled peak flow results are summarized in **Table 3** and **4**.

Table 3 – Existing Uncontrolled Peak Flows

Catchment ID	Peak Flows (m^3/s) – 6hr SCS Storm Distribution					
	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
EX1 (North)	0.223	0. 403	0.541	0.740	0.899	1.068
EX2 (South)	0.134	0.238	0.319	0.434	0.525	0.622
Total	**0.349**	**0.626**	**0.840**	**1.148**	**1.395**	**1.657**

Table 4: Proposed Uncontrolled Peak Flows

Catchment ID	Peak Flows (m^3/s) - 6hr SCS Storm Distribution					
	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
PR1	0.362	0.596	0.743	0.943	1.098	1.257
PR2	0.605	0.892	1.098	1.522	1.771	2.028
PR3	0.067	0.118	0.157	0.213	0.257	0.303
PR4	0.183	0.325	0.433	0.586	0.709	0.837
Total	**1.217**	**1.931**	**2.431**	**3.264**	**3.835**	**3.425**

The results indicate that in the absence of any quantity controls, the peak flows will increase under the proposed conditions when compared with existing conditions. Therefore, some form of quantity control is required.

3.0 Stormwater Management

3.1 Quantity Control

To address quantity control for the site development, two stormwater ponds are proposed. The ponds will be in the northwest corner of the site and the south side of the subject site.

North Pond

Runoff for minor and major storm events from drainage area PR1 will be collected in drainage swale and directed to the north pond. The proposed dry pond is designed with a multi-stage outlet that will control the peak flows. The first stage consists of an 80 mm orifice tube, while the second stage consists of a 200 mm orifice tube. An overflow weir will be incorporated within the detailed pond design to direct emergency overland flows towards the site outlet.

The stormwater management facility was modeled to determine the capacity and functionality of the proposed pond and to confirm if it has the capacity to accommodate the flows from the site. A proposed pond was developed in AutoCAD Civil 3D. This surface was analyzed, and it was determined that the constructed pond has a total capacity of 1,879 m^3. The surface was then used to develop a stage storage relationship in 0.05m increments.

The preliminary pond layout is illustrated on the Preliminary Grading Plan, which is included in **Appendix G**. Detailed design of the pond, including pond outlet details and cross sections, will be developed at the detailed design stage. Runoff from the north pond will be directed through a proposed drainage swale to the roadside ditch along County Road 45. Drainage will then be directed north to the existing watercourse crossing. The drainage swale from the north pond to County Road 45 will be designed at the detailed design stage.

An abbreviated stage storage discharge (SSD) relationship for the pond is shown in **Table 7** below. The complete SSD table and calculations are included in **Appendix C**.

Table 5: North Pond Stage Storage Discharge

Description	Stage (m)	Discharge (m^3/s)	Active Storage Required (from VO) (m^3)
Bottom of Pond	181.16	0.000	-
2 – Year Elevation	182.10	0.043	672
5 – Year Elevation	182.31	0.103	887
10 – Year Elevation	182.49	0.131	1068
25 – Year Elevation	182.71	0.160	1330
50 - Year Elevation	182.88	0.179	1539
100 - Year Elevation	183.04	0.196	1759
Top of Pond	183.16	0.206	-

As illustrated in **Table 5**, there is 0.12m of freeboard between the top of the pond and the 100-year ponding elevation. The pond design and outlet configuration will be refined at the detailed design stage to try to optimize the amount of freeboard.

South Pond

Runoff for minor and major storm events from drainage area PR2 will be collected in drainage swale and directed to the south pond. The proposed wet pond is designed with a multi-stage outlet that will control the peak flows. The first stage consists of a 100 mm orifice tube, while the second stage consists of a 200 mm orifice tube. An overflow weir will be incorporated within the detailed pond design to direct emergency overland flows towards the site outlet.

The stormwater management facility was modeled to determine the capacity and functionality of the proposed pond and to confirm if it has the capacity to accommodate the flows from the site. A proposed pond was developed in AutoCAD Civil 3D. This surface was analyzed, and it was determined that the constructed pond has a total capacity of 7502 m^3. The surface was then used to develop a stage storage relationship in 0.05m increments.

The preliminary pond layout is illustrated on the Preliminary Grading Plan, which is included in **Appendix G**. Detailed design of the pond, including pond outlet details and cross sections, will be developed at the detailed design stage. Runoff from the south

pond will be directed to the drainage ditch on the north side of Community Centre Road. The outlet location and design will be reviewed further at the detailed design stage.

An abbreviated stage storage discharge (SSD) relationship for the pond is shown in **Table 6**. The complete SSD table and calculations are included in **Appendix C**.

Table 6: South Pond Stage Storage Discharge

Description	Stage (m)	Discharge (m^3/s)	Active Storage Required (from VO) (m^3)
Bottom of Pond	183.50	0.000	-
2 – Year Elevation	184.17	0.051	1228
5 – Year Elevation	184.41	0.088	1724
10 – Year Elevation	184.60	0.106	2105
25 – Year Elevation	184.82	0.126	2645
50 - Year Elevation	185.00	0.139	3065
100 - Year Elevation	185.17	0.150	3505
Top of Pond	186.50	0.220	-

The actual storage volume provided by the south pond is significantly greater than the required storage volume. The pond sizing will be refined during the detailed design phase.

Table 7 and **8** demonstrate that the proposed discharge rates from the SWM facilities and the uncontrolled flows from the remainder of drainage areas for both north and south drainage directions from the site are at or below pre-development release rates. Detailed VO model results are included in **Appendix B:** VO Outputs

Table 7: Allowable vs. Proposed Release Rates (North Direction)

Design Storm	Allowable Discharge Rate (m^3/s) (EX1)	Proposed Discharge Rate (m^3/s) (PR1 Controlled + PR4 Uncontrolled)
2 Year	0.223	0.198
5 Year	0.403	0.393
10 Year	0.541	0.538
25 Year	0.740	0.724
50 Year	0.899	0.865
100 Year	1.068	1.010

Table 8: Allowable vs. Proposed Release Rates (South Direction)

Design Storm	Allowable Discharge Rate (m^3/s) (EX2)	Proposed Discharge Rate (m^3/s) (PR2 Controlled + PR3 Uncontrolled)
2 Year	0.134	0.083
5 Year	0.238	0.147
10 Year	0.319	0.207
25 Year	0.434	0.293
50 Year	0.525	0.351
100 Year	0.622	0.408

3.2 Water Quality

Quality control is required for this site as the stormwater runoff from impervious surfaces will contain suspended solids and contaminants that can impact the receiving water course if released uncontrolled.

Runoff generated from catchment area PR2 will be directed to various roadside grassed swales prior to entering the stormwater wet pond (south pond) on the south side of the site. The entire 11.13 ha catchment area PR2 will be directed to the proposed wet pond,

with an overall imperviousness of 48% to provide water quality control. Based on the design criteria presented in Table 3.2 of the Stormwater Management Planning and Design Manual (2003), a water quality storage volume of 166 m³/ha is required for a contributing area with 48% impervious cover. The total water quality storage requirement therefore equals 1,847 m³. This volume includes two components: the permanent pool and the extended detention volume. The extended detention volume is defined as the greater of 40 m³/ha, while the remaining 126 m³/ha is provided as the permanent pool below the outlet invert. The storage volume provided for the wet pond exceeds the required storage volume. Therefore, it is expected that the proposed south pond will provide Enhanced Level (80%) TSS removal for the catchment area PR2. Calculations demonstrating the water quality volume requirements have been included in **Appendix E: Water Quality**. Further design details, including review of the extended detention volume and pond drawdown times will be reviewed further at the detailed design stage, however, given the extra volume available within the pond, it is expected that the pond block size is sufficiently sized.

Runoff from the catchment area PR1 will be directed to various roadside grassed swales prior to entering the stormwater dry pond (north pond). The dry pond is expected to be able to provide Basic (60%) TSS removal for runoff from catchment area PR1. Based on the design criteria presented in Table 3.2 of the Stormwater Management Planning and Design Manual (2003), a water quality storage volume of 123 m³/ha is required for a contributing area with 46% impervious cover. The total water quality storage requirement therefore equals 777 m³, which is exceeded by the volume available within the pond (1879m^3). The drawdown calculations for the pond will be reviewed further at the detailed design stage, however, the proposed orifice diameter (80mm) is close to the minimum recommended orifice size. In addition to the dry pond, the roadside swales are expected to provide additional water quality treatment for runoff from catchment area PR1. The water quality velocities within the swales will be reviewed further at the detailed design stage. Permanent rock check dams can be incorporated within the swales, if required, to reduce the velocity within the swales to promote additional sedimentation.

Due to grading constraints, runoff from catchment areas PR3 and PR4 cannot be captured by the stormwater facilities and will therefore leave the site untreated. Given that both areas consist primarily of grass cover and rear yard areas, the runoff generated is expected to be relatively clean; therefore, no additional water quality control measures are proposed.

A water balance assessment was completed by GHD within their Preliminary Hydrogeological and Geotechnical Investigation, which is included in **Appendix F**. The water balance assessment recommends that rooftop drainage should be directed to sodded / naturalized areas for infiltration to achieve the required water balance controls.

3.3 Stormwater Conveyance

Runoff from the site will be conveyed to the SWM facility via grassed roadside swales. The swales have been reviewed at this stage to ensure they can convey the anticipated 100-year design peak flows. Calculations demonstrating the sizing and capacity of the swales are included in **Appendix D** and summarized in **Table 9.**

Further details regarding conveyance will be provided during the detailed design phase.

Table 9: Swale Capacity

Channel Name	Contributing Catchment Area	Cross Sectional Area (m^2)	Design Flow (m^3/s)	Percent Capacity	Velocity (m/s)
Conveyance Swale 1- PR1	PR1	1.64	1.218	32.8%	1.77
Conveyance Swale 2- PR2	PR2	1.64	2.116	52.9%	2.00

4.0 Summary

The proposed development includes the construction of single and semi-detached family homes and landscaping, laneway and two stormwater ponds that will increase the site imperviousness and increase post development runoff rates. To mitigate these effects, a stormwater management strategy is proposed that incorporates two stormwater management ponds to provide quantity and quality controls.

Sufficient storage is provided in the ponds to allow attenuation of the peak flows for up to the 100-year storm event. Quality control is proposed to be provided via a treatment train approach with roadside swales ahead of runoff reaching the proposed pond facilitates. These systems are designed to provide an Enhanced Level of quality control. Further details regarding the proposed stormwater management features will be provided at the detailed design stage.

Prepared by:

Luke Parsons, P.Eng.
Water Resources Manager



Figure 2: Existing Drainage Area Plan



LEGEND

OVERLAND FLOW ROUTE

CATCHMENT BOUNDARY

EXTERNAL CATCHMENT BOUNDARY

PR1 — CATCHMENT NAME
RUNOFF COEFFICIENT — 0.26 | 0.45 — AREA (ha)

ENGAGE ENGINEERING

www.engageeng.ca • 171 King Street, Suite 120, Peterborough, ON • Phone: (705) 755-0427

FIGURE 2 - PRE-DEVELOPMENT DRAINAGE AREA PLAN

9380 BURWASH ROAD

DRAWN:	APPROVED:	SCALE:	DATE:	PROJECT No.:
D. RADCLIFFE	L. PARSONS	1:2000	2026-05-07	23121

Figure 3: Proposed Drainage Area Plan

PR4
0.24 | 9.73

PR1
0.50 | 6.32

PR2
0.51 | 11.13

PR3
0.26 | 2.70

19.2%

6.1%

12.4%

N

LEGEND

OVERLAND FLOW ROUTE

CATCHMENT BOUNDARY

EXTERNAL CATCHMENT BOUNDARY

PR1 — CATCHMENT NAME
RUNOFF COEFFICIENT: 0.26
AREA (ha): 0.45

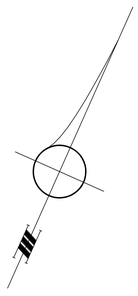
ENGAGE ENGINEERING
www.engageeng.ca • 171 King Street, Suite 120, Peterborough, ON • Phone: (705) 755-0427

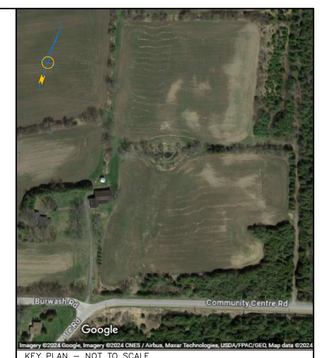
FIGURE 3 - POST-DEVELOPMENT DRAINAGE AREA PLAN

9380 BURWASH ROAD

DRAWN:	APPROVED:	SCALE:	DATE:	PROJECT No.:
D. RADCLIFFE	L. PARSONS	1:2000	2026-05-07	23121

Figure 4: Topographic Survey





KEY PLAN – NOT TO SCALE

IMAGERY

AERIAL IMAGERY SHOWN IS FOR ILLUSTRATIVE PURPOSES ONLY AND MAY NOT DEPICT CURRENT FEATURES.

COPYRIGHT © IBW SURVEYORS LTD. 2024

TOPOGRAPHIC BASE PLAN OF

PART OF 9380 BURWASH ROAD
TOWNSHIP OF HAMILTON

SCALE 1 : 1000 METRES

0 5 10 15 20 40 80

COORDINATES

COORDINATE VALUES AND DIGITAL FILE ARE IN GRID SYSTEM, UTM ZONE 17 (81° WEST LONGITUDE), NAD83(CSRS)(2010). COMBINED SCALE FACTOR = 1.000223.

CONTOURS

CONTOURS SHOWN HEREON ARE DRAWN AT 0.50 METRE INTERVALS.

ELEVATIONS

ELEVATIONS ARE GEODETIC AND REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD28) BY DIRECT MEASUREMENT TO A REAL TIME NETWORK SUPPLEMENTED WITH LIDAR DATA DERIVED FROM THE MNRF MAPPING UNIT FROM 2016–2018.

DRAFT

CAUTION

THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED EXCEPT FOR THE PURPOSE INDICATED IN THE TITLE BLOCK. THE WORK AND DRAWINGS HEREIN WERE COMPLETED FOR THE EXCLUSIVE USE OF OUR CLIENT AND NO LIABILITY IS ASSUMED TO ANY THIRD PARTIES OR SUBSEQUENT OWNERS.

LEGEND

Ø	DENOTES ROUND
AN	DENOTES ANCHOR POINT
CB	DENOTES CATCH BASIN
CPP	DENOTES CORRUGATED PLASTIC PIPE
CSP	DENOTES CORRUGATED STEEL PIPE
CTP	DENOTES CONCRETE PAD
DIC	DENOTES DITCH INLET ELEVATION AT CENTRE
DSE	DENOTES DOOR SILL ELEVATION
FH	DENOTES FIRE HYDRANT
INV	DENOTES INVERT
MH	DENOTES MAINTENANCE HOLE
POA	DENOTES ANCHOR POLE
POU	DENOTES UTILITY POLE
POULS	DENOTES UTILITY/LIGHT STANDARD POLE
RWT	DENOTES RETAINING WALL ELEVATION AT TOP
	DENOTES SIGN
SRW	DENOTES STONE RETAINING WALL
TB	DENOTES TERMINAL BOX
WC	DENOTES WELL CAP
–OH–	DENOTES OVERHEAD UTILITY WIRES
0.10M	DENOTES CONIFEROUS TREE W/TRUNK DIAMETER
0.10M	DENOTES DECIDUOUS TREE W/TRUNK DIAMETER
WV	DENOTES WATER VALVE

IBW SURVEYORS

IBWSURVEYORS.COM | 1.800.667.0696

PARTY CHIEF:DS | DRAWN:JC | CHECKED:DC | PLOT DATE:FEB. 5, 2024

FILE: A-045314-TOPO_NODTM

A-045314

Appendix A: Hydrologic Model Inputs

Hydrologic Model and Catchment Summary

Project Name: Burwash Road **Designed By:** LP
Project No: 23121 **Date:** 2026-07-01

Catchment Name		Land Use and Areas (ha)								Hydrologic Calculations										
Name	Description	Wetland CN = 77	Grass CN = 39	Gravel CN = 76	Crop & Other Unimproved Land CN = 66	Pasture & Other Unimproved Land CN = 58	Woodlands and Forests CN = 50	Impervious CN = 98	Total	CN Weighted	CN Weighted | Pervious Areas	Percent Impervious	Directly Connected Impervious	Soils Group	Total Length (m)	Average Slope: Overall (%)	Time of Concentration (Minimum 10 Minutes)	Time to Peak (Hours)	Recession Period (k)	Composite Runoff Coefficient
EX1	North	0.000	0.000	0.000	0.000	9.923	8.543	0.000	18.47	54	54	0%	0%	A	400	11.6%	26.1	0.29	1.09	0.20
EX2	South	0.000	0.000	0.000	0.000	11.417	0.000	0.000	11.42	58	58	0%	0%	A	400	5.8%	34.7	0.39	1.74	0.15
PR1	North	0.000	3.391	0.000	0.000	0.000	0.000	2.933	6.32	66	63	46%	23%	A	150	6.0%	10.0	0.11	1.47	0.50
PR2	South	0.000	5.825	0.000	0.000	0.000	0.000	5.300	11.13	67	59	48%	24%	A	300	5.0%	10.0	0.11	1.96	0.51
PR3	Front Uncontrolled	0.000	2.461	0.000	0.000	0.000	0.000	0.240	2.70	44	60	9%	0%	A	40	12.0%	10.0	0.11	0.67	0.26
PR4	Rear Uncontrolled	0.000	2.609	0.000	0.000	0.000	6.336	0.780	9.73	51	61	8%	0%	A	200	15.0%	16.2	0.18	0.75	0.24

Visual OTTHYMO Input Parameters

Project Name: Burwash Road **Designed By:** LP
Project No: 23121 **Date:** 2026-07-01

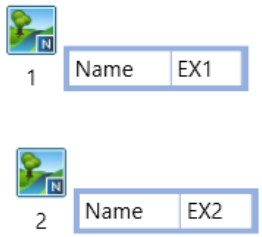
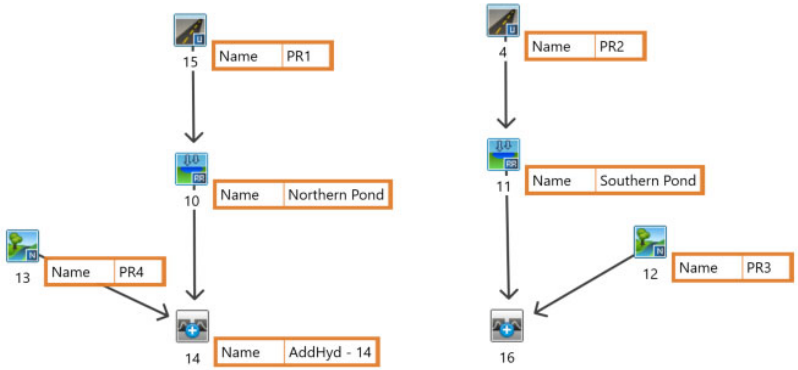
Parameter	Description	EX1	EX2	PR1	PR2	PR3	PR4
COMMAND	STANDHYD or NASHYD	NASHYD	NASHYD	STANDHYD	STANDHYD	NASHYD	NASHYD
AREA	Catchment Area (ha)	18.466	11.417	6.324	11.125	2.701	9.725
DT	Time Step Increment (min)	5	5	5	5	5	5
TIMP	Total Impervious Area (%)	0.0%	0.0%	46.4%	47.6%	8.9%	8.0%
XIMP	Directly Connected Impervious Area (%)	-	-	23.0%	24.0%	0.0%	0.0%
DWF	Dry Weather Flow (m^3/s)	0	0	0	0	0	0
CN	Pervious Weighted Curve Number	54	58	63	59	60	61
LOSS[1]	Modified CN*	55	55	62	57	58	59
IA	Initial Abstraction (Pervious)	5.0	5.0	5.0	5.0	5.0	5.0
TP	Unit Hydrograph Time to Peak (Hr)	0.29	0.39	0.11	0.11	0.11	0.18
K	Williams Recession Period (Hr)	1.09	1.74	1.47	1.96	0.67	0.75
SLPP	Average Slope Pervious Area (%)	-	-	5.0%	5.0%	-	-
LGP	Overland Flow Length Pervious Area (m)	-	-	30	50	-	-
MNP	Manning's Roughness Coefficient (Pervious)	-	-	0.25	0.25	-	-
SCP	Storage Coefficient Pervious Area	-	-	0	0	-	-
DPSI	Depression Storage Impervious Area (mm/hr)	-	-	1	1	-	-
SLPI	Average Slope Impervious Area (%)	-	-	5.0%	5.0%	-	-
LGI	Impervious Overland Flow Length √(A/1.5) x 100 (m)	-	-	205.33	272.34	-	-
MNI	Manning's Roughness Coefficient (Impervious)	-	-	0.013	0.013	-	-
SCI	Storage Coefficient Impervious Area	-	-	0	0	-	-
RAIN	Optional Rainfall Intensity (mm/hr)	-	-	0	0	-	-

Notes:

1. CN values based on Design Chart 1.09 in MTO Drainage Manual
2. Modified CN derived from IA and CN using functionality in Visual OTTHYMO v6
3. Initial abstraction values derived from UNESCO Manual on Drainage in Urban Areas, 1987.
4. TC calculated using Airport Equation for C<0.4 and Bransby Williams for C>0.4.
5. Time to Peak estimated at 0.67Tc.

Visual OTTHYMO Model

Project Name: Burwash Road
Project No: 23121
Designed By: KT
Date: 2026-06-17

PRE-DEVELOPMENT MODEL	POST-DEVELOPMENT MODEL
	

Appendix B: VO Outputs

Pre-Development VO Outputs

```
*******************************************
** SIMULATION:00 2yr 6hr 10min SCS Type II **
*******************************************

--------------------
|    READ STORM    |    Filename: C:\Users\lparsons\AppD
|                  |              ata\Local\Temp\
|                  |              1c7a4083-4b82-41cd-98e3-f8f070a6fcdd\ec0238c9
| Ptotal= 39.43 mm |    Comments: 2yr 6hr 10min SCS Type II
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	3.94	3.33	8.67	5.00	2.37
0.17	1.58	1.83	3.94	3.50	8.67	5.17	1.58
0.33	1.58	2.00	3.94	3.67	3.94	5.33	1.58
0.50	1.58	2.17	4.73	3.83	3.94	5.50	1.58
0.67	2.37	2.33	4.73	4.00	3.94	5.67	1.58
0.83	2.37	2.50	4.73	4.17	3.15	5.83	1.58
1.00	2.37	2.67	23.66	4.33	3.15	6.00	1.58
1.17	2.37	2.83	42.58	4.50	3.15		
1.33	2.37	3.00	61.51	4.67	2.37		
1.50	2.37	3.17	8.67	4.83	2.37		

```
--------------------------------------------------------------------------------

--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  18.47   Curve Number   (CN)= 55.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.29

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	2.37	3.250	8.68	4.83	2.37
0.167	0.00	1.750	3.94	3.333	8.67	4.92	2.37
0.250	1.58	1.833	3.94	3.417	8.67	5.00	2.37
0.333	1.58	1.917	3.94	3.500	8.67	5.08	2.37
0.417	1.58	2.000	3.94	3.583	8.67	5.17	2.37
0.500	1.58	2.083	3.94	3.667	8.67	5.25	1.58
0.583	1.58	2.167	3.94	3.750	3.94	5.33	1.58
0.667	1.58	2.250	4.73	3.833	3.94	5.42	1.58
0.750	2.37	2.333	4.73	3.917	3.94	5.50	1.58
0.833	2.37	2.417	4.73	4.000	3.94	5.58	1.58
0.917	2.37	2.500	4.73	4.083	3.94	5.67	1.58
1.000	2.37	2.583	4.73	4.167	3.94	5.75	1.58
1.083	2.37	2.667	4.73	4.250	3.15	5.83	1.58
1.167	2.37	2.750	23.66	4.333	3.15	5.92	1.58
1.250	2.37	2.833	23.66	4.417	3.15	6.00	1.58
1.333	2.37	2.917	42.58	4.500	3.15	6.08	1.58
1.417	2.37	3.000	42.58	4.583	3.15	6.17	1.58
1.500	2.37	3.083	61.51	4.667	3.15		
1.583	2.37	3.167	61.51	4.750	2.37		

```
    Unit Hyd Qpeak  (cms)=   2.433

    PEAK FLOW       (cms)=   0.223 (i)
    TIME TO PEAK    (hrs)=   3.333
    RUNOFF VOLUME    (mm)=   4.891
    TOTAL RAINFALL   (mm)=  39.430
    RUNOFF COEFFICIENT   =   0.124

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=  11.42   Curve Number   (CN)= 60.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	2.37	3.250	8.68	4.83	2.37
0.167	0.00	1.750	3.94	3.333	8.67	4.92	2.37
0.250	1.58	1.833	3.94	3.417	8.67	5.00	2.37
0.333	1.58	1.917	3.94	3.500	8.67	5.08	2.37
0.417	1.58	2.000	3.94	3.583	8.67	5.17	2.37
0.500	1.58	2.083	3.94	3.667	8.67	5.25	1.58
0.583	1.58	2.167	3.94	3.750	3.94	5.33	1.58
0.667	1.58	2.250	4.73	3.833	3.94	5.42	1.58
0.750	2.37	2.333	4.73	3.917	3.94	5.50	1.58
0.833	2.37	2.417	4.73	4.000	3.94	5.58	1.58
0.917	2.37	2.500	4.73	4.083	3.94	5.67	1.58
1.000	2.37	2.583	4.73	4.167	3.94	5.75	1.58
1.083	2.37	2.667	4.73	4.250	3.15	5.83	1.58
1.167	2.37	2.750	23.66	4.333	3.15	5.92	1.58
1.250	2.37	2.833	23.66	4.417	3.15	6.00	1.58
1.333	2.37	2.917	42.58	4.500	3.15	6.08	1.58
1.417	2.37	3.000	42.58	4.583	3.15	6.17	1.58
1.500	2.37	3.083	61.51	4.667	3.15		
1.583	2.37	3.167	61.51	4.750	2.37		

```
    Unit Hyd Qpeak  (cms)=   1.118

    PEAK FLOW       (cms)=   0.134 (i)
    TIME TO PEAK    (hrs)=   3.500
    RUNOFF VOLUME    (mm)=   5.817
    TOTAL RAINFALL   (mm)=  39.430
```

RUNOFF COEFFICIENT = 0.148

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0001):	18.47	0.223	3.33	4.89
	+ ID2= 2 (0002):	11.42	0.134	3.50	5.82
	ID = 3 (0016):	29.89	0.349	3.42	5.24

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:01 5yr 6hr 10min SCS Type II **
****

READ STORM	Filename: C:\Users\lparsons\AppData\Local\Temp\1c7a4083-4b82-41cd-98e3-f8f070a6fcdd\adb10d6b
Ptotal= 52.04 mm	Comments: 5yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	5.20	3.33	11.45	5.00	3.12
0.17	2.08	1.83	5.20	3.50	11.45	5.17	2.08
0.33	2.08	2.00	5.20	3.67	5.20	5.33	2.08
0.50	2.08	2.17	6.24	3.83	5.20	5.50	2.08
0.67	3.12	2.33	6.24	4.00	5.20	5.67	2.08
0.83	3.12	2.50	6.24	4.17	4.16	5.83	2.08
1.00	3.12	2.67	31.22	4.33	4.16	6.00	2.08
1.17	3.12	2.83	56.20	4.50	4.16		
1.33	3.12	3.00	81.18	4.67	3.12		
1.50	3.12	3.17	11.45	4.83	3.12		

CALIB					
NASHYD (0001)	Area (ha)=	18.47	Curve Number (CN)=	55.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.29			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.12	3.250	11.45	4.83	3.12
0.167	0.00	1.750	5.20	3.333	11.45	4.92	3.12
0.250	2.08	1.833	5.20	3.417	11.45	5.00	3.12
0.333	2.08	1.917	5.20	3.500	11.45	5.08	3.12
0.417	2.08	2.000	5.20	3.583	11.45	5.17	3.12
0.500	2.08	2.083	5.20	3.667	11.45	5.25	2.08
0.583	2.08	2.167	5.20	3.750	5.20	5.33	2.08
0.667	2.08	2.250	6.24	3.833	5.20	5.42	2.08
0.750	3.12	2.333	6.24	3.917	5.20	5.50	2.08
0.833	3.12	2.417	6.24	4.000	5.20	5.58	2.08
0.917	3.12	2.500	6.24	4.083	5.20	5.67	2.08
1.000	3.12	2.583	6.24	4.167	5.20	5.75	2.08
1.083	3.12	2.667	6.24	4.250	4.16	5.83	2.08
1.167	3.12	2.750	31.22	4.333	4.16	5.92	2.08
1.250	3.12	2.833	31.22	4.417	4.16	6.00	2.08
1.333	3.12	2.917	56.20	4.500	4.16	6.08	2.08
1.417	3.12	3.000	56.20	4.583	4.16	6.17	2.08
1.500	3.12	3.083	81.18	4.667	4.16		
1.583	3.12	3.167	81.18	4.750	3.12		

Unit Hyd Qpeak (cms)= 2.433

PEAK FLOW (cms)= 0.403 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 8.678
TOTAL RAINFALL (mm)= 52.040
RUNOFF COEFFICIENT = 0.167

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0002)	Area (ha)=	11.42	Curve Number (CN)=	60.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.39			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.12	3.250	11.45	4.83	3.12
0.167	0.00	1.750	5.20	3.333	11.45	4.92	3.12
0.250	2.08	1.833	5.20	3.417	11.45	5.00	3.12
0.333	2.08	1.917	5.20	3.500	11.45	5.08	3.12
0.417	2.08	2.000	5.20	3.583	11.45	5.17	3.12
0.500	2.08	2.083	5.20	3.667	11.45	5.25	2.08
0.583	2.08	2.167	5.20	3.750	5.20	5.33	2.08
0.667	2.08	2.250	6.24	3.833	5.20	5.42	2.08
0.750	3.12	2.333	6.24	3.917	5.20	5.50	2.08

0.833	3.12	2.417	6.24	4.000	5.20	5.58	2.08
0.917	3.12	2.500	6.24	4.083	5.20	5.67	2.08
1.000	3.12	2.583	6.24	4.167	5.20	5.75	2.08
1.083	3.12	2.667	6.24	4.250	4.16	5.83	2.08
1.167	3.12	2.750	31.22	4.333	4.16	5.92	2.08
1.250	3.12	2.833	31.22	4.417	4.16	6.00	2.08
1.333	3.12	2.917	56.20	4.500	4.16	6.08	2.08
1.417	3.12	3.000	56.20	4.583	4.16	6.17	2.08
1.500	3.12	3.083	81.18	4.667	4.16		
1.583	3.12	3.167	81.18	4.750	3.12		

Unit Hyd Qpeak (cms)= 1.118

PEAK FLOW (cms)= 0.238 (i)
TIME TO PEAK (hrs)= 3.500
RUNOFF VOLUME (mm)= 10.225
TOTAL RAINFALL (mm)= 52.040
RUNOFF COEFFICIENT = 0.196

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0001):	18.47	0.403	3.33	8.68
	+ ID2= 2 (0002):	11.42	0.238	3.50	10.23
	ID = 3 (0016):	29.89	0.626	3.42	9.27

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:02 10yr 6hr 10min SCS Type II **
****

READ STORM	Filename: C:\Users\lparsons\AppData\Local\Temp\1c7a4083-4b82-41cd-98e3-f8f070a6fcdd\064c0b53
Ptotal= 60.19 mm	Comments: 10yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	6.02	3.33	13.24	5.00	3.61
0.17	2.41	1.83	6.02	3.50	13.24	5.17	2.41
0.33	2.41	2.00	6.02	3.67	6.02	5.33	2.41
0.50	2.41	2.17	7.22	3.83	6.02	5.50	2.41
0.67	3.61	2.33	7.22	4.00	6.02	5.67	2.41
0.83	3.61	2.50	7.22	4.17	4.82	5.83	2.41
1.00	3.61	2.67	36.11	4.33	4.82	6.00	2.41
1.17	3.61	2.83	65.01	4.50	4.82		
1.33	3.61	3.00	93.90	4.67	3.61		
1.50	3.61	3.17	13.24	4.83	3.61		

CALIB NASHYD (0001) ID= 1 DT= 5.0 min					
	Area	(ha)=	18.47	Curve Number (CN)=	55.0
	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		0.29		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.61	3.250	13.24	4.83	3.61
0.167	0.00	1.750	6.02	3.333	13.24	4.92	3.61
0.250	2.41	1.833	6.02	3.417	13.24	5.00	3.61
0.333	2.41	1.917	6.02	3.500	13.24	5.08	3.61
0.417	2.41	2.000	6.02	3.583	13.24	5.17	3.61
0.500	2.41	2.083	6.02	3.667	13.24	5.25	2.41
0.583	2.41	2.167	6.02	3.750	6.02	5.33	2.41
0.667	2.41	2.250	7.22	3.833	6.02	5.42	2.41
0.750	3.61	2.333	7.22	3.917	6.02	5.50	2.41
0.833	3.61	2.417	7.22	4.000	6.02	5.58	2.41
0.917	3.61	2.500	7.22	4.083	6.02	5.67	2.41
1.000	3.61	2.583	7.22	4.167	6.02	5.75	2.41
1.083	3.61	2.667	7.22	4.250	4.82	5.83	2.41
1.167	3.61	2.750	36.11	4.333	4.82	5.92	2.41
1.250	3.61	2.833	36.11	4.417	4.82	6.00	2.41
1.333	3.61	2.917	65.00	4.500	4.82	6.08	2.41
1.417	3.61	3.000	65.01	4.583	4.82	6.17	2.41
1.500	3.61	3.083	93.90	4.667	4.82		
1.583	3.61	3.167	93.90	4.750	3.61		

Unit Hyd Qpeak (cms)= 2.433

PEAK FLOW (cms)= 0.541 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 11.576
TOTAL RAINFALL (mm)= 60.190
RUNOFF COEFFICIENT = 0.192

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (0002) ID= 1 DT= 5.0 min					
	Area	(ha)=	11.42	Curve Number (CN)=	60.0
	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00

---------- U.H. Tp(hrs)= 0.39

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.61	3.250	13.24	4.83	3.61
0.167	0.00	1.750	6.02	3.333	13.24	4.92	3.61
0.250	2.41	1.833	6.02	3.417	13.24	5.00	3.61
0.333	2.41	1.917	6.02	3.500	13.24	5.08	3.61
0.417	2.41	2.000	6.02	3.583	13.24	5.17	3.61
0.500	2.41	2.083	6.02	3.667	13.24	5.25	2.41
0.583	2.41	2.167	6.02	3.750	6.02	5.33	2.41
0.667	2.41	2.250	7.22	3.833	6.02	5.42	2.41
0.750	3.61	2.333	7.22	3.917	6.02	5.50	2.41
0.833	3.61	2.417	7.22	4.000	6.02	5.58	2.41
0.917	3.61	2.500	7.22	4.083	6.02	5.67	2.41
1.000	3.61	2.583	7.22	4.167	6.02	5.75	2.41
1.083	3.61	2.667	7.22	4.250	4.82	5.83	2.41
1.167	3.61	2.750	36.11	4.333	4.82	5.92	2.41
1.250	3.61	2.833	36.11	4.417	4.82	6.00	2.41
1.333	3.61	2.917	65.00	4.500	4.82	6.08	2.41
1.417	3.61	3.000	65.01	4.583	4.82	6.17	2.41
1.500	3.61	3.083	93.90	4.667	4.82		
1.583	3.61	3.167	93.90	4.750	3.61		

Unit Hyd Qpeak (cms)= 1.118

PEAK FLOW (cms)= 0.319 (i)
TIME TO PEAK (hrs)= 3.417
RUNOFF VOLUME (mm)= 13.564
TOTAL RAINFALL (mm)= 60.190
RUNOFF COEFFICIENT = 0.225

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0001):	18.47	0.541	3.33	11.58
	+ ID2= 2 (0002):	11.42	0.319	3.42	13.56
	ID = 3 (0016):	29.89	0.840	3.33	12.34

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:03 25yr 6hr 10min SCS Type II **
****

READ STORM	Filename: C:\Users\lparsons\AppData\Local\Temp\1c7a4083-4b82-41cd-98e3-f8f070a6fcdd\a9720736
Ptotal= 70.55 mm	Comments: 25yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	7.06	3.33	15.52	5.00	4.23
0.17	2.82	1.83	7.06	3.50	15.52	5.17	2.82
0.33	2.82	2.00	7.06	3.67	7.06	5.33	2.82
0.50	2.82	2.17	8.47	3.83	7.06	5.50	2.82
0.67	4.23	2.33	8.47	4.00	7.06	5.67	2.82
0.83	4.23	2.50	8.47	4.17	5.64	5.83	2.82
1.00	4.23	2.67	42.33	4.33	5.64	6.00	2.82
1.17	4.23	2.83	76.19	4.50	5.64		
1.33	4.23	3.00	110.06	4.67	4.23		
1.50	4.23	3.17	15.52	4.83	4.23		

CALIB		
NASHYD (0001)	Area (ha)= 18.47	Curve Number (CN)= 55.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.29	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.23	3.250	15.52	4.83	4.23
0.167	0.00	1.750	7.06	3.333	15.52	4.92	4.23
0.250	2.82	1.833	7.06	3.417	15.52	5.00	4.23
0.333	2.82	1.917	7.06	3.500	15.52	5.08	4.23
0.417	2.82	2.000	7.06	3.583	15.52	5.17	4.23
0.500	2.82	2.083	7.06	3.667	15.52	5.25	2.82
0.583	2.82	2.167	7.06	3.750	7.06	5.33	2.82
0.667	2.82	2.250	8.47	3.833	7.06	5.42	2.82
0.750	4.23	2.333	8.47	3.917	7.05	5.50	2.82
0.833	4.23	2.417	8.47	4.000	7.06	5.58	2.82
0.917	4.23	2.500	8.47	4.083	7.05	5.67	2.82
1.000	4.23	2.583	8.47	4.167	7.06	5.75	2.82
1.083	4.23	2.667	8.47	4.250	5.64	5.83	2.82
1.167	4.23	2.750	42.33	4.333	5.64	5.92	2.82
1.250	4.23	2.833	42.33	4.417	5.64	6.00	2.82
1.333	4.23	2.917	76.19	4.500	5.64	6.08	2.82
1.417	4.23	3.000	76.19	4.583	5.64	6.17	2.82
1.500	4.23	3.083	110.06	4.667	5.64		

1.583	4.23	3.167	110.06	4.750	4.23

Unit Hyd Qpeak (cms)= 2.433

PEAK FLOW (cms)= 0.740 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 15.711
TOTAL RAINFALL (mm)= 70.550
RUNOFF COEFFICIENT = 0.223

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (0002) ID= 1 DT= 5.0 min	Area (ha)= 11.42	Curve Number (CN)= 60.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.39	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.23	3.250	15.52	4.83	4.23
0.167	0.00	1.750	7.06	3.333	15.52	4.92	4.23
0.250	2.82	1.833	7.06	3.417	15.52	5.00	4.23
0.333	2.82	1.917	7.06	3.500	15.52	5.08	4.23
0.417	2.82	2.000	7.06	3.583	15.52	5.17	4.23
0.500	2.82	2.083	7.06	3.667	15.52	5.25	2.82
0.583	2.82	2.167	7.06	3.750	7.06	5.33	2.82
0.667	2.82	2.250	8.47	3.833	7.06	5.42	2.82
0.750	4.23	2.333	8.47	3.917	7.05	5.50	2.82
0.833	4.23	2.417	8.47	4.000	7.06	5.58	2.82
0.917	4.23	2.500	8.47	4.083	7.05	5.67	2.82
1.000	4.23	2.583	8.47	4.167	7.06	5.75	2.82
1.083	4.23	2.667	8.47	4.250	5.64	5.83	2.82
1.167	4.23	2.750	42.33	4.333	5.64	5.92	2.82
1.250	4.23	2.833	42.33	4.417	5.64	6.00	2.82
1.333	4.23	2.917	76.19	4.500	5.64	6.08	2.82
1.417	4.23	3.000	76.19	4.583	5.64	6.17	2.82
1.500	4.23	3.083	110.06	4.667	5.64		
1.583	4.23	3.167	110.06	4.750	4.23		

Unit Hyd Qpeak (cms)= 1.118

PEAK FLOW (cms)= 0.434 (i)
TIME TO PEAK (hrs)= 3.417
RUNOFF VOLUME (mm)= 18.291
TOTAL RAINFALL (mm)= 70.550
RUNOFF COEFFICIENT = 0.259

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0001):	18.47	0.740	3.33	15.71
+ ID2= 2 (0002):	11.42	0.434	3.42	18.29
ID = 3 (0016):	29.89	1.148	3.33	16.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:04 50yr 6hr 10min SCS Type II **
****

READ STORM Ptotal= 78.10 mm	Filename: C:\Users\lparsons\AppData\Local\Temp\1c7a4083-4b82-41cd-98e3-f8f070a6fcdd\1bb8ea63
	Comments: 50yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	7.81	3.33	17.18	5.00	4.69
0.17	3.12	1.83	7.81	3.50	17.18	5.17	3.12
0.33	3.12	2.00	7.81	3.67	7.81	5.33	3.12
0.50	3.12	2.17	9.37	3.83	7.81	5.50	3.12
0.67	4.69	2.33	9.37	4.00	7.81	5.67	3.12
0.83	4.69	2.50	9.37	4.17	6.25	5.83	3.12
1.00	4.69	2.67	46.86	4.33	6.25	6.00	3.12
1.17	4.69	2.83	84.35	4.50	6.25		
1.33	4.69	3.00	121.84	4.67	4.69		
1.50	4.69	3.17	17.18	4.83	4.69		

CALIB NASHYD (0001) ID= 1 DT= 5.0 min	Area (ha)= 18.47	Curve Number (CN)= 55.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.29	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.69	3.250	17.18	4.83	4.69

0.167	0.00	1.750	7.81	3.333	17.18	4.92	4.69
0.250	3.12	1.833	7.81	3.417	17.18	5.00	4.69
0.333	3.12	1.917	7.81	3.500	17.18	5.08	4.69
0.417	3.12	2.000	7.81	3.583	17.18	5.17	4.69
0.500	3.12	2.083	7.81	3.667	17.18	5.25	3.12
0.583	3.12	2.167	7.81	3.750	7.81	5.33	3.12
0.667	3.12	2.250	9.37	3.833	7.81	5.42	3.12
0.750	4.69	2.333	9.37	3.917	7.81	5.50	3.12
0.833	4.69	2.417	9.37	4.000	7.81	5.58	3.12
0.917	4.69	2.500	9.37	4.083	7.81	5.67	3.12
1.000	4.69	2.583	9.37	4.167	7.81	5.75	3.12
1.083	4.69	2.667	9.37	4.250	6.25	5.83	3.12
1.167	4.69	2.750	46.86	4.333	6.25	5.92	3.12
1.250	4.69	2.833	46.86	4.417	6.25	6.00	3.12
1.333	4.69	2.917	84.35	4.500	6.25	6.08	3.12
1.417	4.69	3.000	84.35	4.583	6.25	6.17	3.12
1.500	4.69	3.083	121.84	4.667	6.25		
1.583	4.69	3.167	121.84	4.750	4.69		

Unit Hyd Qpeak (cms)= 2.433

PEAK FLOW (cms)= 0.899 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 19.014
TOTAL RAINFALL (mm)= 78.100
RUNOFF COEFFICIENT = 0.243

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0002)	Area (ha)=	11.42	Curve Number (CN)=	60.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.39			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.69	3.250	17.18	4.83	4.69
0.167	0.00	1.750	7.81	3.333	17.18	4.92	4.69
0.250	3.12	1.833	7.81	3.417	17.18	5.00	4.69
0.333	3.12	1.917	7.81	3.500	17.18	5.08	4.69
0.417	3.12	2.000	7.81	3.583	17.18	5.17	4.69
0.500	3.12	2.083	7.81	3.667	17.18	5.25	3.12
0.583	3.12	2.167	7.81	3.750	7.81	5.33	3.12
0.667	3.12	2.250	9.37	3.833	7.81	5.42	3.12
0.750	4.69	2.333	9.37	3.917	7.81	5.50	3.12
0.833	4.69	2.417	9.37	4.000	7.81	5.58	3.12
0.917	4.69	2.500	9.37	4.083	7.81	5.67	3.12
1.000	4.69	2.583	9.37	4.167	7.81	5.75	3.12
1.083	4.69	2.667	9.37	4.250	6.25	5.83	3.12
1.167	4.69	2.750	46.86	4.333	6.25	5.92	3.12
1.250	4.69	2.833	46.86	4.417	6.25	6.00	3.12
1.333	4.69	2.917	84.35	4.500	6.25	6.08	3.12
1.417	4.69	3.000	84.35	4.583	6.25	6.17	3.12
1.500	4.69	3.083	121.84	4.667	6.25		
1.583	4.69	3.167	121.84	4.750	4.69		

Unit Hyd Qpeak (cms)= 1.118

PEAK FLOW (cms)= 0.525 (i)
TIME TO PEAK (hrs)= 3.417
RUNOFF VOLUME (mm)= 22.039
TOTAL RAINFALL (mm)= 78.100
RUNOFF COEFFICIENT = 0.282

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	18.47	0.899	3.33	19.01
+ ID2= 2 (0002):	11.42	0.525	3.42	22.04
ID = 3 (0016):	29.89	1.395	3.33	20.17

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:05 100yr 6hr 10min SCS Type II **
****

READ STORM	Filename: C:\Users\lparsons\AppData\Local\Temp\1c7a4083-4b82-41cd-98e3-f8f070a6fcdd\26299ead
Ptotal= 85.57 mm	Comments: 100yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	8.56	3.33	18.83	5.00	5.13
0.17	3.42	1.83	8.56	3.50	18.83	5.17	3.42
0.33	3.42	2.00	8.56	3.67	8.56	5.33	3.42
0.50	3.42	2.17	10.27	3.83	8.56	5.50	3.42
0.67	5.13	2.33	10.27	4.00	8.56	5.67	3.42
0.83	5.13	2.50	10.27	4.17	6.85	5.83	3.42
1.00	5.13	2.67	51.34	4.33	6.85	6.00	3.42
1.17	5.13	2.83	92.42	4.50	6.85		
1.33	5.13	3.00	133.49	4.67	5.13		

1.50	5.13	3.17	18.83	4.83	5.13

CALIB NASHYD (0001) ID= 1 DT= 5.0 min	Area (ha)= 18.47	Curve Number (CN)= 55.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.29	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	5.13	3.250	18.83	4.83	5.13
0.167	0.00	1.750	8.56	3.333	18.83	4.92	5.13
0.250	3.42	1.833	8.56	3.417	18.83	5.00	5.13
0.333	3.42	1.917	8.56	3.500	18.83	5.08	5.13
0.417	3.42	2.000	8.56	3.583	18.83	5.17	5.13
0.500	3.42	2.083	8.56	3.667	18.83	5.25	3.42
0.583	3.42	2.167	8.56	3.750	8.56	5.33	3.42
0.667	3.42	2.250	10.27	3.833	8.56	5.42	3.42
0.750	5.13	2.333	10.27	3.917	8.56	5.50	3.42
0.833	5.13	2.417	10.27	4.000	8.56	5.58	3.42
0.917	5.13	2.500	10.27	4.083	8.56	5.67	3.42
1.000	5.13	2.583	10.27	4.167	8.56	5.75	3.42
1.083	5.13	2.667	10.27	4.250	6.85	5.83	3.42
1.167	5.13	2.750	51.34	4.333	6.85	5.92	3.42
1.250	5.13	2.833	51.34	4.417	6.85	6.00	3.42
1.333	5.13	2.917	92.42	4.500	6.85	6.08	3.42
1.417	5.13	3.000	92.42	4.583	6.85	6.17	3.42
1.500	5.13	3.083	133.49	4.667	6.85		
1.583	5.13	3.167	133.49	4.750	5.13		

Unit Hyd Qpeak (cms)= 2.433

PEAK FLOW (cms)= 1.068 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 22.500
TOTAL RAINFALL (mm)= 85.570
RUNOFF COEFFICIENT = 0.263

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (0002) ID= 1 DT= 5.0 min	Area (ha)= 11.42	Curve Number (CN)= 60.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.39	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	5.13	3.250	18.83	4.83	5.13
0.167	0.00	1.750	8.56	3.333	18.83	4.92	5.13
0.250	3.42	1.833	8.56	3.417	18.83	5.00	5.13
0.333	3.42	1.917	8.56	3.500	18.83	5.08	5.13
0.417	3.42	2.000	8.56	3.583	18.83	5.17	5.13
0.500	3.42	2.083	8.56	3.667	18.83	5.25	3.42
0.583	3.42	2.167	8.56	3.750	8.56	5.33	3.42
0.667	3.42	2.250	10.27	3.833	8.56	5.42	3.42
0.750	5.13	2.333	10.27	3.917	8.56	5.50	3.42
0.833	5.13	2.417	10.27	4.000	8.56	5.58	3.42
0.917	5.13	2.500	10.27	4.083	8.56	5.67	3.42
1.000	5.13	2.583	10.27	4.167	8.56	5.75	3.42
1.083	5.13	2.667	10.27	4.250	6.85	5.83	3.42
1.167	5.13	2.750	51.34	4.333	6.85	5.92	3.42
1.250	5.13	2.833	51.34	4.417	6.85	6.00	3.42
1.333	5.13	2.917	92.42	4.500	6.85	6.08	3.42
1.417	5.13	3.000	92.42	4.583	6.85	6.17	3.42
1.500	5.13	3.083	133.49	4.667	6.85		
1.583	5.13	3.167	133.49	4.750	5.13		

Unit Hyd Qpeak (cms)= 1.118

PEAK FLOW (cms)= 0.622 (i)
TIME TO PEAK (hrs)= 3.417
RUNOFF VOLUME (mm)= 25.973
TOTAL RAINFALL (mm)= 85.570
RUNOFF COEFFICIENT = 0.304

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0001):	18.47	1.068	3.33	22.50
	+ ID2= 2 (0002):	11.42	0.622	3.42	25.97
	ID = 3 (0016):	29.89	1.657	3.33	23.83

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Post-Development VO Outputs

```
*******************************************
** SIMULATION:00 2yr 6hr 10min SCS Type II **
*******************************************

--------------------
|    READ STORM    |    Filename: C:\Users\lparsons\AppD
|                  |              ata\Local\Temp\
|                  |              1c7a4083-4b82-41cd-98e3-f8f070a6fcdd\ec0238c9
| Ptotal= 39.43 mm |    Comments: 2yr 6hr 10min SCS Type II
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	3.94	3.33	8.67	5.00	2.37
0.17	1.58	1.83	3.94	3.50	8.67	5.17	1.58
0.33	1.58	2.00	3.94	3.67	3.94	5.33	1.58
0.50	1.58	2.17	4.73	3.83	3.94	5.50	1.58
0.67	2.37	2.33	4.73	4.00	3.94	5.67	1.58
0.83	2.37	2.50	4.73	4.17	3.15	5.83	1.58
1.00	2.37	2.67	23.66	4.33	3.15	6.00	1.58
1.17	2.37	2.83	42.58	4.50	3.15		
1.33	2.37	3.00	61.51	4.67	2.37		
1.50	2.37	3.17	8.67	4.83	2.37		

```
--------------------------------------------------------------------------------

--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  18.47   Curve Number   (CN)= 55.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.29

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	2.37	3.250	8.68	4.83	2.37
0.167	0.00	1.750	3.94	3.333	8.67	4.92	2.37
0.250	1.58	1.833	3.94	3.417	8.67	5.00	2.37
0.333	1.58	1.917	3.94	3.500	8.67	5.08	2.37
0.417	1.58	2.000	3.94	3.583	8.67	5.17	2.37
0.500	1.58	2.083	3.94	3.667	8.67	5.25	1.58
0.583	1.58	2.167	3.94	3.750	3.94	5.33	1.58
0.667	1.58	2.250	4.73	3.833	3.94	5.42	1.58
0.750	2.37	2.333	4.73	3.917	3.94	5.50	1.58
0.833	2.37	2.417	4.73	4.000	3.94	5.58	1.58
0.917	2.37	2.500	4.73	4.083	3.94	5.67	1.58
1.000	2.37	2.583	4.73	4.167	3.94	5.75	1.58
1.083	2.37	2.667	4.73	4.250	3.15	5.83	1.58
1.167	2.37	2.750	23.66	4.333	3.15	5.92	1.58
1.250	2.37	2.833	23.66	4.417	3.15	6.00	1.58
1.333	2.37	2.917	42.58	4.500	3.15	6.08	1.58
1.417	2.37	3.000	42.58	4.583	3.15	6.17	1.58
1.500	2.37	3.083	61.51	4.667	3.15		
1.583	2.37	3.167	61.51	4.750	2.37		

```
    Unit Hyd Qpeak  (cms)=   2.433

    PEAK FLOW       (cms)=   0.223 (i)
    TIME TO PEAK    (hrs)=   3.333
    RUNOFF VOLUME    (mm)=   4.891
    TOTAL RAINFALL   (mm)=  39.430
    RUNOFF COEFFICIENT   =   0.124

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=  11.42   Curve Number   (CN)= 60.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	2.37	3.250	8.68	4.83	2.37
0.167	0.00	1.750	3.94	3.333	8.67	4.92	2.37
0.250	1.58	1.833	3.94	3.417	8.67	5.00	2.37
0.333	1.58	1.917	3.94	3.500	8.67	5.08	2.37
0.417	1.58	2.000	3.94	3.583	8.67	5.17	2.37
0.500	1.58	2.083	3.94	3.667	8.67	5.25	1.58
0.583	1.58	2.167	3.94	3.750	3.94	5.33	1.58
0.667	1.58	2.250	4.73	3.833	3.94	5.42	1.58
0.750	2.37	2.333	4.73	3.917	3.94	5.50	1.58
0.833	2.37	2.417	4.73	4.000	3.94	5.58	1.58
0.917	2.37	2.500	4.73	4.083	3.94	5.67	1.58
1.000	2.37	2.583	4.73	4.167	3.94	5.75	1.58
1.083	2.37	2.667	4.73	4.250	3.15	5.83	1.58
1.167	2.37	2.750	23.66	4.333	3.15	5.92	1.58
1.250	2.37	2.833	23.66	4.417	3.15	6.00	1.58
1.333	2.37	2.917	42.58	4.500	3.15	6.08	1.58
1.417	2.37	3.000	42.58	4.583	3.15	6.17	1.58
1.500	2.37	3.083	61.51	4.667	3.15		
1.583	2.37	3.167	61.51	4.750	2.37		

```
    Unit Hyd Qpeak  (cms)=   1.118

    PEAK FLOW       (cms)=   0.134 (i)
    TIME TO PEAK    (hrs)=   3.500
    RUNOFF VOLUME    (mm)=   5.817
    TOTAL RAINFALL   (mm)=  39.430
```

RUNOFF COEFFICIENT = 0.148

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0001):	18.47	0.223	3.33	4.89
	+ ID2= 2 (0002):	11.42	0.134	3.50	5.82
	ID = 3 (0016):	29.89	0.349	3.42	5.24

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:01 5yr 6hr 10min SCS Type II **
****

READ STORM	Filename: C:\Users\lparsons\AppData\Local\Temp\1c7a4083-4b82-41cd-98e3-f8f070a6fcdd\adb10d6b
Ptotal= 52.04 mm	Comments: 5yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	5.20	3.33	11.45	5.00	3.12
0.17	2.08	1.83	5.20	3.50	11.45	5.17	2.08
0.33	2.08	2.00	5.20	3.67	5.20	5.33	2.08
0.50	2.08	2.17	6.24	3.83	5.20	5.50	2.08
0.67	3.12	2.33	6.24	4.00	5.20	5.67	2.08
0.83	3.12	2.50	6.24	4.17	4.16	5.83	2.08
1.00	3.12	2.67	31.22	4.33	4.16	6.00	2.08
1.17	3.12	2.83	56.20	4.50	4.16		
1.33	3.12	3.00	81.18	4.67	3.12		
1.50	3.12	3.17	11.45	4.83	3.12		

CALIB					
NASHYD (0001)	Area (ha)=	18.47	Curve Number (CN)=	55.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.29			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.12	3.250	11.45	4.83	3.12
0.167	0.00	1.750	5.20	3.333	11.45	4.92	3.12
0.250	2.08	1.833	5.20	3.417	11.45	5.00	3.12
0.333	2.08	1.917	5.20	3.500	11.45	5.08	3.12
0.417	2.08	2.000	5.20	3.583	11.45	5.17	3.12
0.500	2.08	2.083	5.20	3.667	11.45	5.25	2.08
0.583	2.08	2.167	5.20	3.750	5.20	5.33	2.08
0.667	2.08	2.250	6.24	3.833	5.20	5.42	2.08
0.750	3.12	2.333	6.24	3.917	5.20	5.50	2.08
0.833	3.12	2.417	6.24	4.000	5.20	5.58	2.08
0.917	3.12	2.500	6.24	4.083	5.20	5.67	2.08
1.000	3.12	2.583	6.24	4.167	5.20	5.75	2.08
1.083	3.12	2.667	6.24	4.250	4.16	5.83	2.08
1.167	3.12	2.750	31.22	4.333	4.16	5.92	2.08
1.250	3.12	2.833	31.22	4.417	4.16	6.00	2.08
1.333	3.12	2.917	56.20	4.500	4.16	6.08	2.08
1.417	3.12	3.000	56.20	4.583	4.16	6.17	2.08
1.500	3.12	3.083	81.18	4.667	4.16		
1.583	3.12	3.167	81.18	4.750	3.12		

Unit Hyd Qpeak (cms)= 2.433

PEAK FLOW (cms)= 0.403 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 8.678
TOTAL RAINFALL (mm)= 52.040
RUNOFF COEFFICIENT = 0.167

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0002)	Area (ha)=	11.42	Curve Number (CN)=	60.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.39			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.12	3.250	11.45	4.83	3.12
0.167	0.00	1.750	5.20	3.333	11.45	4.92	3.12
0.250	2.08	1.833	5.20	3.417	11.45	5.00	3.12
0.333	2.08	1.917	5.20	3.500	11.45	5.08	3.12
0.417	2.08	2.000	5.20	3.583	11.45	5.17	3.12
0.500	2.08	2.083	5.20	3.667	11.45	5.25	2.08
0.583	2.08	2.167	5.20	3.750	5.20	5.33	2.08
0.667	2.08	2.250	6.24	3.833	5.20	5.42	2.08
0.750	3.12	2.333	6.24	3.917	5.20	5.50	2.08

0.833	3.12	2.417	6.24	4.000	5.20	5.58	2.08
0.917	3.12	2.500	6.24	4.083	5.20	5.67	2.08
1.000	3.12	2.583	6.24	4.167	5.20	5.75	2.08
1.083	3.12	2.667	6.24	4.250	4.16	5.83	2.08
1.167	3.12	2.750	31.22	4.333	4.16	5.92	2.08
1.250	3.12	2.833	31.22	4.417	4.16	6.00	2.08
1.333	3.12	2.917	56.20	4.500	4.16	6.08	2.08
1.417	3.12	3.000	56.20	4.583	4.16	6.17	2.08
1.500	3.12	3.083	81.18	4.667	4.16		
1.583	3.12	3.167	81.18	4.750	3.12		

Unit Hyd Qpeak (cms)= 1.118

PEAK FLOW (cms)= 0.238 (i)
TIME TO PEAK (hrs)= 3.500
RUNOFF VOLUME (mm)= 10.225
TOTAL RAINFALL (mm)= 52.040
RUNOFF COEFFICIENT = 0.196

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0001):	18.47	0.403	3.33	8.68
	+ ID2= 2 (0002):	11.42	0.238	3.50	10.23
	ID = 3 (0016):	29.89	0.626	3.42	9.27

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:02 10yr 6hr 10min SCS Type II **
****

READ STORM	Filename: C:\Users\lparsons\AppData\Local\Temp\1c7a4083-4b82-41cd-98e3-f8f070a6fcdd\064c0b53
Ptotal= 60.19 mm	Comments: 10yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	6.02	3.33	13.24	5.00	3.61
0.17	2.41	1.83	6.02	3.50	13.24	5.17	2.41
0.33	2.41	2.00	6.02	3.67	6.02	5.33	2.41
0.50	2.41	2.17	7.22	3.83	6.02	5.50	2.41
0.67	3.61	2.33	7.22	4.00	6.02	5.67	2.41
0.83	3.61	2.50	7.22	4.17	4.82	5.83	2.41
1.00	3.61	2.67	36.11	4.33	4.82	6.00	2.41
1.17	3.61	2.83	65.01	4.50	4.82		
1.33	3.61	3.00	93.90	4.67	3.61		
1.50	3.61	3.17	13.24	4.83	3.61		

CALIB NASHYD (0001) ID= 1 DT= 5.0 min					
	Area	(ha)=	18.47	Curve Number (CN)=	55.0
	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		0.29		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.61	3.250	13.24	4.83	3.61
0.167	0.00	1.750	6.02	3.333	13.24	4.92	3.61
0.250	2.41	1.833	6.02	3.417	13.24	5.00	3.61
0.333	2.41	1.917	6.02	3.500	13.24	5.08	3.61
0.417	2.41	2.000	6.02	3.583	13.24	5.17	3.61
0.500	2.41	2.083	6.02	3.667	13.24	5.25	2.41
0.583	2.41	2.167	6.02	3.750	6.02	5.33	2.41
0.667	2.41	2.250	7.22	3.833	6.02	5.42	2.41
0.750	3.61	2.333	7.22	3.917	6.02	5.50	2.41
0.833	3.61	2.417	7.22	4.000	6.02	5.58	2.41
0.917	3.61	2.500	7.22	4.083	6.02	5.67	2.41
1.000	3.61	2.583	7.22	4.167	6.02	5.75	2.41
1.083	3.61	2.667	7.22	4.250	4.82	5.83	2.41
1.167	3.61	2.750	36.11	4.333	4.82	5.92	2.41
1.250	3.61	2.833	36.11	4.417	4.82	6.00	2.41
1.333	3.61	2.917	65.00	4.500	4.82	6.08	2.41
1.417	3.61	3.000	65.01	4.583	4.82	6.17	2.41
1.500	3.61	3.083	93.90	4.667	4.82		
1.583	3.61	3.167	93.90	4.750	3.61		

Unit Hyd Qpeak (cms)= 2.433

PEAK FLOW (cms)= 0.541 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 11.576
TOTAL RAINFALL (mm)= 60.190
RUNOFF COEFFICIENT = 0.192

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (0002) ID= 1 DT= 5.0 min					
	Area	(ha)=	11.42	Curve Number (CN)=	60.0
	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00

---------- U.H. Tp(hrs)= 0.39

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.61	3.250	13.24	4.83	3.61
0.167	0.00	1.750	6.02	3.333	13.24	4.92	3.61
0.250	2.41	1.833	6.02	3.417	13.24	5.00	3.61
0.333	2.41	1.917	6.02	3.500	13.24	5.08	3.61
0.417	2.41	2.000	6.02	3.583	13.24	5.17	3.61
0.500	2.41	2.083	6.02	3.667	13.24	5.25	2.41
0.583	2.41	2.167	6.02	3.750	6.02	5.33	2.41
0.667	2.41	2.250	7.22	3.833	6.02	5.42	2.41
0.750	3.61	2.333	7.22	3.917	6.02	5.50	2.41
0.833	3.61	2.417	7.22	4.000	6.02	5.58	2.41
0.917	3.61	2.500	7.22	4.083	6.02	5.67	2.41
1.000	3.61	2.583	7.22	4.167	6.02	5.75	2.41
1.083	3.61	2.667	7.22	4.250	4.82	5.83	2.41
1.167	3.61	2.750	36.11	4.333	4.82	5.92	2.41
1.250	3.61	2.833	36.11	4.417	4.82	6.00	2.41
1.333	3.61	2.917	65.00	4.500	4.82	6.08	2.41
1.417	3.61	3.000	65.01	4.583	4.82	6.17	2.41
1.500	3.61	3.083	93.90	4.667	4.82		
1.583	3.61	3.167	93.90	4.750	3.61		

Unit Hyd Qpeak (cms)= 1.118

PEAK FLOW (cms)= 0.319 (i)
TIME TO PEAK (hrs)= 3.417
RUNOFF VOLUME (mm)= 13.564
TOTAL RAINFALL (mm)= 60.190
RUNOFF COEFFICIENT = 0.225

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0001):	18.47	0.541	3.33	11.58
	+ ID2= 2 (0002):	11.42	0.319	3.42	13.56
	ID = 3 (0016):	29.89	0.840	3.33	12.34

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:03 25yr 6hr 10min SCS Type II **
****

READ STORM	Filename: C:\Users\lparsons\AppData\Local\Temp\1c7a4083-4b82-41cd-98e3-f8f070a6fcdd\a9720736
Ptotal= 70.55 mm	Comments: 25yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	7.06	3.33	15.52	5.00	4.23
0.17	2.82	1.83	7.06	3.50	15.52	5.17	2.82
0.33	2.82	2.00	7.06	3.67	7.06	5.33	2.82
0.50	2.82	2.17	8.47	3.83	7.06	5.50	2.82
0.67	4.23	2.33	8.47	4.00	7.06	5.67	2.82
0.83	4.23	2.50	8.47	4.17	5.64	5.83	2.82
1.00	4.23	2.67	42.33	4.33	5.64	6.00	2.82
1.17	4.23	2.83	76.19	4.50	5.64		
1.33	4.23	3.00	110.06	4.67	4.23		
1.50	4.23	3.17	15.52	4.83	4.23		

CALIB		
NASHYD (0001)	Area (ha)= 18.47	Curve Number (CN)= 55.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.29	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.23	3.250	15.52	4.83	4.23
0.167	0.00	1.750	7.06	3.333	15.52	4.92	4.23
0.250	2.82	1.833	7.06	3.417	15.52	5.00	4.23
0.333	2.82	1.917	7.06	3.500	15.52	5.08	4.23
0.417	2.82	2.000	7.06	3.583	15.52	5.17	4.23
0.500	2.82	2.083	7.06	3.667	15.52	5.25	2.82
0.583	2.82	2.167	7.06	3.750	7.06	5.33	2.82
0.667	2.82	2.250	8.47	3.833	7.06	5.42	2.82
0.750	4.23	2.333	8.47	3.917	7.05	5.50	2.82
0.833	4.23	2.417	8.47	4.000	7.06	5.58	2.82
0.917	4.23	2.500	8.47	4.083	7.05	5.67	2.82
1.000	4.23	2.583	8.47	4.167	7.06	5.75	2.82
1.083	4.23	2.667	8.47	4.250	5.64	5.83	2.82
1.167	4.23	2.750	42.33	4.333	5.64	5.92	2.82
1.250	4.23	2.833	42.33	4.417	5.64	6.00	2.82
1.333	4.23	2.917	76.19	4.500	5.64	6.08	2.82
1.417	4.23	3.000	76.19	4.583	5.64	6.17	2.82
1.500	4.23	3.083	110.06	4.667	5.64		

1.583	4.23	3.167	110.06	4.750	4.23

Unit Hyd Qpeak (cms)= 2.433

PEAK FLOW (cms)= 0.740 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 15.711
TOTAL RAINFALL (mm)= 70.550
RUNOFF COEFFICIENT = 0.223

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (0002) ID= 1 DT= 5.0 min	Area (ha)= 11.42	Curve Number (CN)= 60.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.39	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.23	3.250	15.52	4.83	4.23
0.167	0.00	1.750	7.06	3.333	15.52	4.92	4.23
0.250	2.82	1.833	7.06	3.417	15.52	5.00	4.23
0.333	2.82	1.917	7.06	3.500	15.52	5.08	4.23
0.417	2.82	2.000	7.06	3.583	15.52	5.17	4.23
0.500	2.82	2.083	7.06	3.667	15.52	5.25	2.82
0.583	2.82	2.167	7.06	3.750	7.06	5.33	2.82
0.667	2.82	2.250	8.47	3.833	7.06	5.42	2.82
0.750	4.23	2.333	8.47	3.917	7.05	5.50	2.82
0.833	4.23	2.417	8.47	4.000	7.06	5.58	2.82
0.917	4.23	2.500	8.47	4.083	7.05	5.67	2.82
1.000	4.23	2.583	8.47	4.167	7.06	5.75	2.82
1.083	4.23	2.667	8.47	4.250	5.64	5.83	2.82
1.167	4.23	2.750	42.33	4.333	5.64	5.92	2.82
1.250	4.23	2.833	42.33	4.417	5.64	6.00	2.82
1.333	4.23	2.917	76.19	4.500	5.64	6.08	2.82
1.417	4.23	3.000	76.19	4.583	5.64	6.17	2.82
1.500	4.23	3.083	110.06	4.667	5.64		
1.583	4.23	3.167	110.06	4.750	4.23		

Unit Hyd Qpeak (cms)= 1.118

PEAK FLOW (cms)= 0.434 (i)
TIME TO PEAK (hrs)= 3.417
RUNOFF VOLUME (mm)= 18.291
TOTAL RAINFALL (mm)= 70.550
RUNOFF COEFFICIENT = 0.259

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0001):	18.47	0.740	3.33	15.71
+ ID2= 2 (0002):	11.42	0.434	3.42	18.29
ID = 3 (0016):	29.89	1.148	3.33	16.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:04 50yr 6hr 10min SCS Type II **
****

READ STORM Ptotal= 78.10 mm	Filename: C:\Users\lparsons\AppData\Local\Temp\1c7a4083-4b82-41cd-98e3-f8f070a6fcdd\1bb8ea63
	Comments: 50yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	7.81	3.33	17.18	5.00	4.69
0.17	3.12	1.83	7.81	3.50	17.18	5.17	3.12
0.33	3.12	2.00	7.81	3.67	7.81	5.33	3.12
0.50	3.12	2.17	9.37	3.83	7.81	5.50	3.12
0.67	4.69	2.33	9.37	4.00	7.81	5.67	3.12
0.83	4.69	2.50	9.37	4.17	6.25	5.83	3.12
1.00	4.69	2.67	46.86	4.33	6.25	6.00	3.12
1.17	4.69	2.83	84.35	4.50	6.25		
1.33	4.69	3.00	121.84	4.67	4.69		
1.50	4.69	3.17	17.18	4.83	4.69		

CALIB NASHYD (0001) ID= 1 DT= 5.0 min	Area (ha)= 18.47	Curve Number (CN)= 55.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.29	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.69	3.250	17.18	4.83	4.69

0.167	0.00	1.750	7.81	3.333	17.18	4.92	4.69
0.250	3.12	1.833	7.81	3.417	17.18	5.00	4.69
0.333	3.12	1.917	7.81	3.500	17.18	5.08	4.69
0.417	3.12	2.000	7.81	3.583	17.18	5.17	4.69
0.500	3.12	2.083	7.81	3.667	17.18	5.25	3.12
0.583	3.12	2.167	7.81	3.750	7.81	5.33	3.12
0.667	3.12	2.250	9.37	3.833	7.81	5.42	3.12
0.750	4.69	2.333	9.37	3.917	7.81	5.50	3.12
0.833	4.69	2.417	9.37	4.000	7.81	5.58	3.12
0.917	4.69	2.500	9.37	4.083	7.81	5.67	3.12
1.000	4.69	2.583	9.37	4.167	7.81	5.75	3.12
1.083	4.69	2.667	9.37	4.250	6.25	5.83	3.12
1.167	4.69	2.750	46.86	4.333	6.25	5.92	3.12
1.250	4.69	2.833	46.86	4.417	6.25	6.00	3.12
1.333	4.69	2.917	84.35	4.500	6.25	6.08	3.12
1.417	4.69	3.000	84.35	4.583	6.25	6.17	3.12
1.500	4.69	3.083	121.84	4.667	6.25		
1.583	4.69	3.167	121.84	4.750	4.69		

Unit Hyd Qpeak (cms)= 2.433

PEAK FLOW (cms)= 0.899 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 19.014
TOTAL RAINFALL (mm)= 78.100
RUNOFF COEFFICIENT = 0.243

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0002)	Area (ha)=	11.42	Curve Number (CN)=	60.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.39			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.69	3.250	17.18	4.83	4.69
0.167	0.00	1.750	7.81	3.333	17.18	4.92	4.69
0.250	3.12	1.833	7.81	3.417	17.18	5.00	4.69
0.333	3.12	1.917	7.81	3.500	17.18	5.08	4.69
0.417	3.12	2.000	7.81	3.583	17.18	5.17	4.69
0.500	3.12	2.083	7.81	3.667	17.18	5.25	3.12
0.583	3.12	2.167	7.81	3.750	7.81	5.33	3.12
0.667	3.12	2.250	9.37	3.833	7.81	5.42	3.12
0.750	4.69	2.333	9.37	3.917	7.81	5.50	3.12
0.833	4.69	2.417	9.37	4.000	7.81	5.58	3.12
0.917	4.69	2.500	9.37	4.083	7.81	5.67	3.12
1.000	4.69	2.583	9.37	4.167	7.81	5.75	3.12
1.083	4.69	2.667	9.37	4.250	6.25	5.83	3.12
1.167	4.69	2.750	46.86	4.333	6.25	5.92	3.12
1.250	4.69	2.833	46.86	4.417	6.25	6.00	3.12
1.333	4.69	2.917	84.35	4.500	6.25	6.08	3.12
1.417	4.69	3.000	84.35	4.583	6.25	6.17	3.12
1.500	4.69	3.083	121.84	4.667	6.25		
1.583	4.69	3.167	121.84	4.750	4.69		

Unit Hyd Qpeak (cms)= 1.118

PEAK FLOW (cms)= 0.525 (i)
TIME TO PEAK (hrs)= 3.417
RUNOFF VOLUME (mm)= 22.039
TOTAL RAINFALL (mm)= 78.100
RUNOFF COEFFICIENT = 0.282

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	18.47	0.899	3.33	19.01
+ ID2= 2 (0002):	11.42	0.525	3.42	22.04
ID = 3 (0016):	29.89	1.395	3.33	20.17

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:05 100yr 6hr 10min SCS Type II **
****

READ STORM	Filename: C:\Users\lparsons\AppData\Local\Temp\1c7a4083-4b82-41cd-98e3-f8f070a6fcdd\26299ead
Ptotal= 85.57 mm	Comments: 100yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	8.56	3.33	18.83	5.00	5.13
0.17	3.42	1.83	8.56	3.50	18.83	5.17	3.42
0.33	3.42	2.00	8.56	3.67	8.56	5.33	3.42
0.50	3.42	2.17	10.27	3.83	8.56	5.50	3.42
0.67	5.13	2.33	10.27	4.00	8.56	5.67	3.42
0.83	5.13	2.50	10.27	4.17	6.85	5.83	3.42
1.00	5.13	2.67	51.34	4.33	6.85	6.00	3.42
1.17	5.13	2.83	92.42	4.50	6.85		
1.33	5.13	3.00	133.49	4.67	5.13		

1.50	5.13	3.17	18.83	4.83	5.13

CALIB NASHYD (0001) ID= 1 DT= 5.0 min	Area (ha)= 18.47	Curve Number (CN)= 55.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.29	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	5.13	3.250	18.83	4.83	5.13
0.167	0.00	1.750	8.56	3.333	18.83	4.92	5.13
0.250	3.42	1.833	8.56	3.417	18.83	5.00	5.13
0.333	3.42	1.917	8.56	3.500	18.83	5.08	5.13
0.417	3.42	2.000	8.56	3.583	18.83	5.17	5.13
0.500	3.42	2.083	8.56	3.667	18.83	5.25	3.42
0.583	3.42	2.167	8.56	3.750	8.56	5.33	3.42
0.667	3.42	2.250	10.27	3.833	8.56	5.42	3.42
0.750	5.13	2.333	10.27	3.917	8.56	5.50	3.42
0.833	5.13	2.417	10.27	4.000	8.56	5.58	3.42
0.917	5.13	2.500	10.27	4.083	8.56	5.67	3.42
1.000	5.13	2.583	10.27	4.167	8.56	5.75	3.42
1.083	5.13	2.667	10.27	4.250	6.85	5.83	3.42
1.167	5.13	2.750	51.34	4.333	6.85	5.92	3.42
1.250	5.13	2.833	51.34	4.417	6.85	6.00	3.42
1.333	5.13	2.917	92.42	4.500	6.85	6.08	3.42
1.417	5.13	3.000	92.42	4.583	6.85	6.17	3.42
1.500	5.13	3.083	133.49	4.667	6.85		
1.583	5.13	3.167	133.49	4.750	5.13		

Unit Hyd Qpeak (cms)= 2.433

PEAK FLOW (cms)= 1.068 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 22.500
TOTAL RAINFALL (mm)= 85.570
RUNOFF COEFFICIENT = 0.263

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (0002) ID= 1 DT= 5.0 min	Area (ha)= 11.42	Curve Number (CN)= 60.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.39	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	5.13	3.250	18.83	4.83	5.13
0.167	0.00	1.750	8.56	3.333	18.83	4.92	5.13
0.250	3.42	1.833	8.56	3.417	18.83	5.00	5.13
0.333	3.42	1.917	8.56	3.500	18.83	5.08	5.13
0.417	3.42	2.000	8.56	3.583	18.83	5.17	5.13
0.500	3.42	2.083	8.56	3.667	18.83	5.25	3.42
0.583	3.42	2.167	8.56	3.750	8.56	5.33	3.42
0.667	3.42	2.250	10.27	3.833	8.56	5.42	3.42
0.750	5.13	2.333	10.27	3.917	8.56	5.50	3.42
0.833	5.13	2.417	10.27	4.000	8.56	5.58	3.42
0.917	5.13	2.500	10.27	4.083	8.56	5.67	3.42
1.000	5.13	2.583	10.27	4.167	8.56	5.75	3.42
1.083	5.13	2.667	10.27	4.250	6.85	5.83	3.42
1.167	5.13	2.750	51.34	4.333	6.85	5.92	3.42
1.250	5.13	2.833	51.34	4.417	6.85	6.00	3.42
1.333	5.13	2.917	92.42	4.500	6.85	6.08	3.42
1.417	5.13	3.000	92.42	4.583	6.85	6.17	3.42
1.500	5.13	3.083	133.49	4.667	6.85		
1.583	5.13	3.167	133.49	4.750	5.13		

Unit Hyd Qpeak (cms)= 1.118

PEAK FLOW (cms)= 0.622 (i)
TIME TO PEAK (hrs)= 3.417
RUNOFF VOLUME (mm)= 25.973
TOTAL RAINFALL (mm)= 85.570
RUNOFF COEFFICIENT = 0.304

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	18.47	1.068	3.33	22.50
+ ID2= 2 (0002):	11.42	0.622	3.42	25.97
ID = 3 (0016):	29.89	1.657	3.33	23.83

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:00 2yr 6hr 10min SCS Type II **
****

READ STORM	Filename: C:\Users\lparsons\AppData\Local\Temp\2e2b45a1-220b-44f7-bf6a-5876d87374f3\ec0238c9
Ptotal= 39.43 mm	Comments: 2yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	3.94	3.33	8.67	5.00	2.37
0.17	1.58	1.83	3.94	3.50	8.67	5.17	1.58
0.33	1.58	2.00	3.94	3.67	3.94	5.33	1.58
0.50	1.58	2.17	4.73	3.83	3.94	5.50	1.58
0.67	2.37	2.33	4.73	4.00	3.94	5.67	1.58
0.83	2.37	2.50	4.73	4.17	3.15	5.83	1.58
1.00	2.37	2.67	23.66	4.33	3.15	6.00	1.58
1.17	2.37	2.83	42.58	4.50	3.15		
1.33	2.37	3.00	61.51	4.67	2.37		
1.50	2.37	3.17	8.67	4.83	2.37		

CALIB NASHYD (0013) ID= 1 DT= 5.0 min	Area (ha)= 9.57 Curve Number (CN)= 59.0 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.18

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	2.37	3.250	8.68	4.83	2.37
0.167	0.00	1.750	3.94	3.333	8.67	4.92	2.37
0.250	1.58	1.833	3.94	3.417	8.67	5.00	2.37
0.333	1.58	1.917	3.94	3.500	8.67	5.08	2.37
0.417	1.58	2.000	3.94	3.583	8.67	5.17	2.37
0.500	1.58	2.083	3.94	3.667	8.67	5.25	1.58
0.583	1.58	2.167	3.94	3.750	3.94	5.33	1.58
0.667	1.58	2.250	4.73	3.833	3.94	5.42	1.58
0.750	2.37	2.333	4.73	3.917	3.94	5.50	1.58
0.833	2.37	2.417	4.73	4.000	3.94	5.58	1.58
0.917	2.37	2.500	4.73	4.083	3.94	5.67	1.58
1.000	2.37	2.583	4.73	4.167	3.94	5.75	1.58
1.083	2.37	2.667	4.73	4.250	3.15	5.83	1.58
1.167	2.37	2.750	23.66	4.333	3.15	5.92	1.58
1.250	2.37	2.833	23.66	4.417	3.15	6.00	1.58
1.333	2.37	2.917	42.58	4.500	3.15	6.08	1.58
1.417	2.37	3.000	42.58	4.583	3.15	6.17	1.58
1.500	2.37	3.083	61.51	4.667	3.15		
1.583	2.37	3.167	61.51	4.750	2.37		

Unit Hyd Qpeak (cms)= 2.030

PEAK FLOW (cms)= 0.183 (i)
TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 5.604
TOTAL RAINFALL (mm)= 39.430
RUNOFF COEFFICIENT = 0.142

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (0015) ID= 1 DT= 5.0 min	Area (ha)= 6.32 Total Imp(%)= 46.00 Dir. Conn.(%)= 23.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.91	3.41
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	5.00	5.00
Length	(m)=	205.33	30.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	2.37	3.250	8.68	4.83	2.37
0.167	0.00	1.750	3.94	3.333	8.67	4.92	2.37
0.250	1.58	1.833	3.94	3.417	8.67	5.00	2.37
0.333	1.58	1.917	3.94	3.500	8.67	5.08	2.37
0.417	1.58	2.000	3.94	3.583	8.67	5.17	2.37
0.500	1.58	2.083	3.94	3.667	8.67	5.25	1.58
0.583	1.58	2.167	3.94	3.750	3.94	5.33	1.58
0.667	1.58	2.250	4.73	3.833	3.94	5.42	1.58
0.750	2.37	2.333	4.73	3.917	3.94	5.50	1.58
0.833	2.37	2.417	4.73	4.000	3.94	5.58	1.58
0.917	2.37	2.500	4.73	4.083	3.94	5.67	1.58
1.000	2.37	2.583	4.73	4.167	3.94	5.75	1.58
1.083	2.37	2.667	4.73	4.250	3.15	5.83	1.58
1.167	2.37	2.750	23.66	4.333	3.15	5.92	1.58
1.250	2.37	2.833	23.66	4.417	3.15	6.00	1.58
1.333	2.37	2.917	42.58	4.500	3.15	6.08	1.58
1.417	2.37	3.000	42.58	4.583	3.15	6.17	1.58
1.500	2.37	3.083	61.51	4.667	3.15		
1.583	2.37	3.167	61.51	4.750	2.37		

Max.Eff.Inten.(mm/hr)=		61.51	25.11
	over (min)	5.00	15.00
Storage Coeff.	(min)=	2.95 (ii)	10.79 (ii)

```
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.28         0.09
                                                  *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.14          0.362 (iii)
     TIME TO PEAK    (hrs)=       3.17         3.25           3.17
     RUNOFF VOLUME    (mm)=      38.43         8.89          15.69
     TOTAL RAINFALL   (mm)=      39.43        39.43          39.43
     RUNOFF COEFFICIENT   =       0.97         0.23           0.40

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.0680      0.0734
                          0.0040      0.0056   |    0.0930      0.0831
                          0.0070      0.0115   |    0.1120      0.0932
                          0.0090      0.0178   |    0.1280      0.1038
                          0.0110      0.0245   |    0.1420      0.1149
                          0.0120      0.0316   |    0.1540      0.1265
                          0.0130      0.0391   |    0.1660      0.1385
                          0.0150      0.0470   |    0.1770      0.1511
                          0.0160      0.0553   |    0.1870      0.1642
                          0.0310      0.0641   |    0.2060      0.1879

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0015)      6.324      0.362      3.17      15.69
   OUTFLOW: ID= 1 (  0010)      6.324      0.043      4.08      15.63

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.99
                  TIME SHIFT OF PEAK FLOW         (min)= 55.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0672

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     6.32   0.043     4.08    15.63
     + ID2= 2 (  0013):     9.57   0.183     3.25     5.60
       ================================================
       ID = 3 (  0014):    15.89   0.198     3.25     9.59

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0012)|   Area    (ha)=   2.70   Curve Number   (CN)= 58.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.11

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 1.667    2.37 | 3.250    8.68 |  4.83    2.37
               0.167    0.00 | 1.750    3.94 | 3.333    8.67 |  4.92    2.37
               0.250    1.58 | 1.833    3.94 | 3.417    8.67 |  5.00    2.37
               0.333    1.58 | 1.917    3.94 | 3.500    8.67 |  5.08    2.37
               0.417    1.58 | 2.000    3.94 | 3.583    8.67 |  5.17    2.37
               0.500    1.58 | 2.083    3.94 | 3.667    8.67 |  5.25    1.58
               0.583    1.58 | 2.167    3.94 | 3.750    3.94 |  5.33    1.58
               0.667    1.58 | 2.250    4.73 | 3.833    3.94 |  5.42    1.58
               0.750    2.37 | 2.333    4.73 | 3.917    3.94 |  5.50    1.58
               0.833    2.37 | 2.417    4.73 | 4.000    3.94 |  5.58    1.58
               0.917    2.37 | 2.500    4.73 | 4.083    3.94 |  5.67    1.58
               1.000    2.37 | 2.583    4.73 | 4.167    3.94 |  5.75    1.58
               1.083    2.37 | 2.667    4.73 | 4.250    3.15 |  5.83    1.58
               1.167    2.37 | 2.750   23.66 | 4.333    3.15 |  5.92    1.58
               1.250    2.37 | 2.833   23.66 | 4.417    3.15 |  6.00    1.58
               1.333    2.37 | 2.917   42.58 | 4.500    3.15 |  6.08    1.58
               1.417    2.37 | 3.000   42.58 | 4.583    3.15 |  6.17    1.58
               1.500    2.37 | 3.083   61.51 | 4.667    3.15 |
               1.583    2.37 | 3.167   61.51 | 4.750    2.37 |

    Unit Hyd Qpeak  (cms)=   0.938

    PEAK FLOW       (cms)=   0.067 (i)
    TIME TO PEAK    (hrs)=   3.167
    RUNOFF VOLUME    (mm)=   5.329
    TOTAL RAINFALL   (mm)=  39.430
    RUNOFF COEFFICIENT   =   0.135

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0004)|   Area    (ha)=  11.12
|ID= 1 DT= 5.0 min |   Total Imp(%)=  48.00   Dir. Conn.(%)=  24.00
--------------------

                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       5.34         5.78
```

Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	5.00	5.00
Length	(m)=	272.27	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	2.37	3.250	8.68	4.83	2.37
0.167	0.00	1.750	3.94	3.333	8.67	4.92	2.37
0.250	1.58	1.833	3.94	3.417	8.67	5.00	2.37
0.333	1.58	1.917	3.94	3.500	8.67	5.08	2.37
0.417	1.58	2.000	3.94	3.583	8.67	5.17	2.37
0.500	1.58	2.083	3.94	3.667	8.67	5.25	1.58
0.583	1.58	2.167	3.94	3.750	3.94	5.33	1.58
0.667	1.58	2.250	4.73	3.833	3.94	5.42	1.58
0.750	2.37	2.333	4.73	3.917	3.94	5.50	1.58
0.833	2.37	2.417	4.73	4.000	3.94	5.58	1.58
0.917	2.37	2.500	4.73	4.083	3.94	5.67	1.58
1.000	2.37	2.583	4.73	4.167	3.94	5.75	1.58
1.083	2.37	2.667	4.73	4.250	3.15	5.83	1.58
1.167	2.37	2.750	23.66	4.333	3.15	5.92	1.58
1.250	2.37	2.833	23.66	4.417	3.15	6.00	1.58
1.333	2.37	2.917	42.58	4.500	3.15	6.08	1.58
1.417	2.37	3.000	42.58	4.583	3.15	6.17	1.58
1.500	2.37	3.083	61.51	4.667	3.15		
1.583	2.37	3.167	61.51	4.750	2.37		

Max.Eff.Inten.(mm/hr)	=	61.51	22.36	
over (min)		5.00	15.00	
Storage Coeff. (min)	=	3.49 (ii)	13.25 (ii)	
Unit Hyd. Tpeak (min)	=	5.00	15.00	
Unit Hyd. peak (cms)	=	0.26	0.08	
				TOTALS
PEAK FLOW (cms)	=	0.45	0.20	0.605 (iii)
TIME TO PEAK (hrs)	=	3.17	3.33	3.17
RUNOFF VOLUME (mm)	=	38.43	7.76	15.12
TOTAL RAINFALL (mm)	=	39.43	39.43	39.43
RUNOFF COEFFICIENT	=	0.97	0.20	0.38

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 57.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0011)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1318	0.2828
	0.0019	0.0087	0.1425	0.3197
	0.0108	0.0342	0.1524	0.3580
	0.0152	0.0609	0.1617	0.3977
	0.0187	0.0888	0.1705	0.4388
	0.0464	0.1179	0.1788	0.4813
	0.0739	0.1483	0.1868	0.5253
	0.0922	0.1800	0.1944	0.5707
	0.1072	0.2129	0.2018	0.6176
	0.1202	0.2472	0.2202	0.7502

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0004)		11.120	0.605	3.17	15.12
OUTFLOW: ID= 1 (0011)		11.120	0.051	4.67	15.02
PEAK FLOW REDUCTION [Qout/Qin](%)=		8.41			
TIME SHIFT OF PEAK FLOW (min)=		90.00			
MAXIMUM STORAGE USED (ha.m.)=		0.1228			

ADD HYD (0016)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0011):	11.12	0.051	4.67	15.02
	+ ID2= 2 (0012):	2.70	0.067	3.17	5.33
	ID = 3 (0016):	13.82	0.083	3.17	13.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0042)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0014):	15.89	0.198	3.25	9.59
	+ ID2= 2 (0016):	13.82	0.083	3.17	13.12
	ID = 3 (0042):	29.71	0.267	3.25	11.24

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:01 5yr 6hr 10min SCS Type II **
****

READ STORM	Filename: C:\Users\lparsons\AppData\Local\Temp\2e2b45a1-220b-44f7-bf6a-5876d87374f3\adb10d6b
Ptotal= 52.04 mm	Comments: 5yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	5.20	3.33	11.45	5.00	3.12
0.17	2.08	1.83	5.20	3.50	11.45	5.17	2.08
0.33	2.08	2.00	5.20	3.67	5.20	5.33	2.08
0.50	2.08	2.17	6.24	3.83	5.20	5.50	2.08
0.67	3.12	2.33	6.24	4.00	5.20	5.67	2.08
0.83	3.12	2.50	6.24	4.17	4.16	5.83	2.08
1.00	3.12	2.67	31.22	4.33	4.16	6.00	2.08
1.17	3.12	2.83	56.20	4.50	4.16		
1.33	3.12	3.00	81.18	4.67	3.12		
1.50	3.12	3.17	11.45	4.83	3.12		

CALIB	
NASHYD (0013)	Area (ha)= 9.57 Curve Number (CN)= 59.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.18

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.12	3.250	11.45	4.83	3.12
0.167	0.00	1.750	5.20	3.333	11.45	4.92	3.12
0.250	2.08	1.833	5.20	3.417	11.45	5.00	3.12
0.333	2.08	1.917	5.20	3.500	11.45	5.08	3.12
0.417	2.08	2.000	5.20	3.583	11.45	5.17	3.12
0.500	2.08	2.083	5.20	3.667	11.45	5.25	2.08
0.583	2.08	2.167	5.20	3.750	5.20	5.33	2.08
0.667	2.08	2.250	6.24	3.833	5.20	5.42	2.08
0.750	3.12	2.333	6.24	3.917	5.20	5.50	2.08
0.833	3.12	2.417	6.24	4.000	5.20	5.58	2.08
0.917	3.12	2.500	6.24	4.083	5.20	5.67	2.08
1.000	3.12	2.583	6.24	4.167	5.20	5.75	2.08
1.083	3.12	2.667	6.24	4.250	4.16	5.83	2.08
1.167	3.12	2.750	31.22	4.333	4.16	5.92	2.08
1.250	3.12	2.833	31.22	4.417	4.16	6.00	2.08
1.333	3.12	2.917	56.20	4.500	4.16	6.08	2.08
1.417	3.12	3.000	56.20	4.583	4.16	6.17	2.08
1.500	3.12	3.083	81.18	4.667	4.16		
1.583	3.12	3.167	81.18	4.750	3.12		

Unit Hyd Qpeak (cms)= 2.030

PEAK FLOW (cms)= 0.325 (i)
TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 9.870
TOTAL RAINFALL (mm)= 52.040
RUNOFF COEFFICIENT = 0.190

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0015)	Area (ha)= 6.32
ID= 1 DT= 5.0 min	Total Imp(%)= 46.00 Dir. Conn.(%)= 23.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.91	3.41
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	5.00	5.00
Length	(m)=	205.33	30.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.12	3.250	11.45	4.83	3.12
0.167	0.00	1.750	5.20	3.333	11.45	4.92	3.12
0.250	2.08	1.833	5.20	3.417	11.45	5.00	3.12
0.333	2.08	1.917	5.20	3.500	11.45	5.08	3.12
0.417	2.08	2.000	5.20	3.583	11.45	5.17	3.12
0.500	2.08	2.083	5.20	3.667	11.45	5.25	2.08
0.583	2.08	2.167	5.20	3.750	5.20	5.33	2.08
0.667	2.08	2.250	6.24	3.833	5.20	5.42	2.08
0.750	3.12	2.333	6.24	3.917	5.20	5.50	2.08
0.833	3.12	2.417	6.24	4.000	5.20	5.58	2.08
0.917	3.12	2.500	6.24	4.083	5.20	5.67	2.08
1.000	3.12	2.583	6.24	4.167	5.20	5.75	2.08
1.083	3.12	2.667	6.24	4.250	4.16	5.83	2.08
1.167	3.12	2.750	31.22	4.333	4.16	5.92	2.08
1.250	3.12	2.833	31.22	4.417	4.16	6.00	2.08
1.333	3.12	2.917	56.20	4.500	4.16	6.08	2.08
1.417	3.12	3.000	56.20	4.583	4.16	6.17	2.08
1.500	3.12	3.083	81.18	4.667	4.16		
1.583	3.12	3.167	81.18	4.750	3.12		

Max.Eff.Inten.(mm/hr)=		81.18	41.95
	over (min)	5.00	10.00
Storage Coeff. (min)=		2.64 (ii)	9.02 (ii)
Unit Hyd. Tpeak (min)=		5.00	10.00

```
     Unit Hyd. peak  (cms)=       0.29         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.33         0.28          0.596 (iii)
     TIME TO PEAK    (hrs)=       3.17         3.25           3.17
     RUNOFF VOLUME    (mm)=      51.04        14.94          23.24
     TOTAL RAINFALL   (mm)=      52.04        52.04          52.04
     RUNOFF COEFFICIENT   =       0.98         0.29           0.45

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.0680      0.0734
                           0.0040      0.0056   |    0.0930      0.0831
                           0.0070      0.0115   |    0.1120      0.0932
                           0.0090      0.0178   |    0.1280      0.1038
                           0.0110      0.0245   |    0.1420      0.1149
                           0.0120      0.0316   |    0.1540      0.1265
                           0.0130      0.0391   |    0.1660      0.1385
                           0.0150      0.0470   |    0.1770      0.1511
                           0.0160      0.0553   |    0.1870      0.1642
                           0.0310      0.0641   |    0.2060      0.1879

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0015)      6.324      0.596      3.17      23.24
   OUTFLOW: ID= 1 (  0010)      6.324      0.103      3.75      23.18

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 17.35
                  TIME SHIFT OF PEAK FLOW         (min)= 35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0887

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     6.32   0.103     3.75    23.18
     + ID2= 2 (  0013):     9.57   0.325     3.25     9.87
       ================================================
       ID = 3 (  0014):    15.89   0.393     3.25    15.17
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0012)|   Area    (ha)=   2.70   Curve Number   (CN)= 58.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.11

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 1.667    3.12 | 3.250   11.45 |  4.83    3.12
               0.167    0.00 | 1.750    5.20 | 3.333   11.45 |  4.92    3.12
               0.250    2.08 | 1.833    5.20 | 3.417   11.45 |  5.00    3.12
               0.333    2.08 | 1.917    5.20 | 3.500   11.45 |  5.08    3.12
               0.417    2.08 | 2.000    5.20 | 3.583   11.45 |  5.17    3.12
               0.500    2.08 | 2.083    5.20 | 3.667   11.45 |  5.25    2.08
               0.583    2.08 | 2.167    5.20 | 3.750    5.20 |  5.33    2.08
               0.667    2.08 | 2.250    6.24 | 3.833    5.20 |  5.42    2.08
               0.750    3.12 | 2.333    6.24 | 3.917    5.20 |  5.50    2.08
               0.833    3.12 | 2.417    6.24 | 4.000    5.20 |  5.58    2.08
               0.917    3.12 | 2.500    6.24 | 4.083    5.20 |  5.67    2.08
               1.000    3.12 | 2.583    6.24 | 4.167    5.20 |  5.75    2.08
               1.083    3.12 | 2.667    6.24 | 4.250    4.16 |  5.83    2.08
               1.167    3.12 | 2.750   31.22 | 4.333    4.16 |  5.92    2.08
               1.250    3.12 | 2.833   31.22 | 4.417    4.16 |  6.00    2.08
               1.333    3.12 | 2.917   56.20 | 4.500    4.16 |  6.08    2.08
               1.417    3.12 | 3.000   56.20 | 4.583    4.16 |  6.17    2.08
               1.500    3.12 | 3.083   81.18 | 4.667    4.16 |
               1.583    3.12 | 3.167   81.18 | 4.750    3.12 |

     Unit Hyd Qpeak  (cms)=   0.938

     PEAK FLOW       (cms)=   0.118 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=   9.404
     TOTAL RAINFALL   (mm)=  52.040
     RUNOFF COEFFICIENT   =   0.181

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0004)|   Area    (ha)=  11.12
|ID= 1 DT= 5.0 min |   Total Imp(%)=  48.00   Dir. Conn.(%)=  24.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.34         5.78
     Dep. Storage     (mm)=       1.00         5.00
```

Average Slope	(%)=	5.00	5.00
Length	(m)=	272.27	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.12	3.250	11.45	4.83	3.12
0.167	0.00	1.750	5.20	3.333	11.45	4.92	3.12
0.250	2.08	1.833	5.20	3.417	11.45	5.00	3.12
0.333	2.08	1.917	5.20	3.500	11.45	5.08	3.12
0.417	2.08	2.000	5.20	3.583	11.45	5.17	3.12
0.500	2.08	2.083	5.20	3.667	11.45	5.25	2.08
0.583	2.08	2.167	5.20	3.750	5.20	5.33	2.08
0.667	2.08	2.250	6.24	3.833	5.20	5.42	2.08
0.750	3.12	2.333	6.24	3.917	5.20	5.50	2.08
0.833	3.12	2.417	6.24	4.000	5.20	5.58	2.08
0.917	3.12	2.500	6.24	4.083	5.20	5.67	2.08
1.000	3.12	2.583	6.24	4.167	5.20	5.75	2.08
1.083	3.12	2.667	6.24	4.250	4.16	5.83	2.08
1.167	3.12	2.750	31.22	4.333	4.16	5.92	2.08
1.250	3.12	2.833	31.22	4.417	4.16	6.00	2.08
1.333	3.12	2.917	56.20	4.500	4.16	6.08	2.08
1.417	3.12	3.000	56.20	4.583	4.16	6.17	2.08
1.500	3.12	3.083	81.18	4.667	4.16		
1.583	3.12	3.167	81.18	4.750	3.12		

Max.Eff.Inten.(mm/hr)	=	81.18	37.74	
over (min)		5.00	15.00	
Storage Coeff. (min)	=	3.13 (ii)	11.04 (ii)	
Unit Hyd. Tpeak (min)	=	5.00	15.00	
Unit Hyd. peak (cms)	=	0.27	0.09	
				TOTALS
PEAK FLOW (cms)	=	0.59	0.36	0.892 (iii)
TIME TO PEAK (hrs)	=	3.17	3.25	3.17
RUNOFF VOLUME (mm)	=	51.04	13.15	22.24
TOTAL RAINFALL (mm)	=	52.04	52.04	52.04
RUNOFF COEFFICIENT	=	0.98	0.25	0.43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 57.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0011)	OVERFLOW IS OFF

IN= 2---> OUT= 1			
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1318	0.2828
	0.0019	0.0087	0.1425	0.3197
	0.0108	0.0342	0.1524	0.3580
	0.0152	0.0609	0.1617	0.3977
	0.0187	0.0888	0.1705	0.4388
	0.0464	0.1179	0.1788	0.4813
	0.0739	0.1483	0.1868	0.5253
	0.0922	0.1800	0.1944	0.5707
	0.1072	0.2129	0.2018	0.6176
	0.1202	0.2472	0.2202	0.7502

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0004)	11.120	0.892	3.17	22.24
OUTFLOW: ID= 1 (0011)	11.120	0.088	4.25	22.14

PEAK FLOW REDUCTION [Qout/Qin](%)= 9.84
TIME SHIFT OF PEAK FLOW (min)= 65.00
MAXIMUM STORAGE USED (ha.m.)= 0.1724

ADD HYD (0016)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	11.12	0.088	4.25	22.14
+ ID2= 2 (0012):	2.70	0.118	3.17	9.40
ID = 3 (0016):	13.82	0.147	3.17	19.65

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0042)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0014):	15.89	0.393	3.25	15.17
+ ID2= 2 (0016):	13.82	0.147	3.17	19.65
ID = 3 (0042):	29.71	0.531	3.25	17.25

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:02 10yr 6hr 10min SCS Type II **
****

READ STORM	Filename: C:\Users\lparsons\AppD ata\Local\Temp\ 2e2b45a1-220b-44f7-bf6a-5876d87374f3\064c0b53 Comments: 10yr 6hr 10min SCS Type II
Ptotal= 60.19 mm	

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	6.02	3.33	13.24	5.00	3.61
0.17	2.41	1.83	6.02	3.50	13.24	5.17	2.41
0.33	2.41	2.00	6.02	3.67	6.02	5.33	2.41
0.50	2.41	2.17	7.22	3.83	6.02	5.50	2.41
0.67	3.61	2.33	7.22	4.00	6.02	5.67	2.41
0.83	3.61	2.50	7.22	4.17	4.82	5.83	2.41
1.00	3.61	2.67	36.11	4.33	4.82	6.00	2.41
1.17	3.61	2.83	65.01	4.50	4.82		
1.33	3.61	3.00	93.90	4.67	3.61		
1.50	3.61	3.17	13.24	4.83	3.61		

CALIB NASHYD (0013) ID= 1 DT= 5.0 min	Area (ha)= 9.57 Curve Number (CN)= 59.0 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.18

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.61	3.250	13.24	4.83	3.61
0.167	0.00	1.750	6.02	3.333	13.24	4.92	3.61
0.250	2.41	1.833	6.02	3.417	13.24	5.00	3.61
0.333	2.41	1.917	6.02	3.500	13.24	5.08	3.61
0.417	2.41	2.000	6.02	3.583	13.24	5.17	3.61
0.500	2.41	2.083	6.02	3.667	13.24	5.25	2.41
0.583	2.41	2.167	6.02	3.750	6.02	5.33	2.41
0.667	2.41	2.250	7.22	3.833	6.02	5.42	2.41
0.750	3.61	2.333	7.22	3.917	6.02	5.50	2.41
0.833	3.61	2.417	7.22	4.000	6.02	5.58	2.41
0.917	3.61	2.500	7.22	4.083	6.02	5.67	2.41
1.000	3.61	2.583	7.22	4.167	6.02	5.75	2.41
1.083	3.61	2.667	7.22	4.250	4.82	5.83	2.41
1.167	3.61	2.750	36.11	4.333	4.82	5.92	2.41
1.250	3.61	2.833	36.11	4.417	4.82	6.00	2.41
1.333	3.61	2.917	65.00	4.500	4.82	6.08	2.41
1.417	3.61	3.000	65.01	4.583	4.82	6.17	2.41
1.500	3.61	3.083	93.90	4.667	4.82		
1.583	3.61	3.167	93.90	4.750	3.61		

Unit Hyd Qpeak (cms)= 2.030

PEAK FLOW (cms)= 0.433 (i)
TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 13.108
TOTAL RAINFALL (mm)= 60.190
RUNOFF COEFFICIENT = 0.218

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (0015) ID= 1 DT= 5.0 min	Area (ha)= 6.32 Total Imp(%)= 46.00 Dir. Conn.(%)= 23.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.91	3.41
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	5.00	5.00
Length	(m)=	205.33	30.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.61	3.250	13.24	4.83	3.61
0.167	0.00	1.750	6.02	3.333	13.24	4.92	3.61
0.250	2.41	1.833	6.02	3.417	13.24	5.00	3.61
0.333	2.41	1.917	6.02	3.500	13.24	5.08	3.61
0.417	2.41	2.000	6.02	3.583	13.24	5.17	3.61
0.500	2.41	2.083	6.02	3.667	13.24	5.25	2.41
0.583	2.41	2.167	6.02	3.750	6.02	5.33	2.41
0.667	2.41	2.250	7.22	3.833	6.02	5.42	2.41
0.750	3.61	2.333	7.22	3.917	6.02	5.50	2.41
0.833	3.61	2.417	7.22	4.000	6.02	5.58	2.41
0.917	3.61	2.500	7.22	4.083	6.02	5.67	2.41
1.000	3.61	2.583	7.22	4.167	6.02	5.75	2.41
1.083	3.61	2.667	7.22	4.250	4.82	5.83	2.41
1.167	3.61	2.750	36.11	4.333	4.82	5.92	2.41
1.250	3.61	2.833	36.11	4.417	4.82	6.00	2.41
1.333	3.61	2.917	65.00	4.500	4.82	6.08	2.41
1.417	3.61	3.000	65.01	4.583	4.82	6.17	2.41
1.500	3.61	3.083	93.90	4.667	4.82		
1.583	3.61	3.167	93.90	4.750	3.61		

Max.Eff.Inten.(mm/hr)=		93.90	54.26
	over (min)	5.00	10.00
Storage Coeff.	(min)=	2.49 (ii)	8.25 (ii)
Unit Hyd. Tpeak	(min)=	5.00	10.00
Unit Hyd. peak	(cms)=	0.29	0.13

			TOTALS	
PEAK FLOW	(cms)=	0.38	0.37	0.743 (iii)
TIME TO PEAK	(hrs)=	3.17	3.17	3.17
RUNOFF VOLUME	(mm)=	59.19	19.37	28.53
TOTAL RAINFALL	(mm)=	60.19	60.19	60.19
RUNOFF COEFFICIENT	=	0.98	0.32	0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0010)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0680	0.0734
	0.0040	0.0056	0.0930	0.0831
	0.0070	0.0115	0.1120	0.0932
	0.0090	0.0178	0.1280	0.1038
	0.0110	0.0245	0.1420	0.1149
	0.0120	0.0316	0.1540	0.1265
	0.0130	0.0391	0.1660	0.1385
	0.0150	0.0470	0.1770	0.1511
	0.0160	0.0553	0.1870	0.1642
	0.0310	0.0641	0.2060	0.1879

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0015)	6.324	0.743	3.17	28.53
OUTFLOW: ID= 1 (0010)	6.324	0.131	3.75	28.47

PEAK FLOW REDUCTION [Qout/Qin](%)= 17.70
TIME SHIFT OF PEAK FLOW (min)= 35.00
MAXIMUM STORAGE USED (ha.m.)= 0.1068

ADD HYD (0014)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	6.32	0.131	3.75	28.47
+ ID2= 2 (0013):	9.57	0.433	3.25	13.11
ID = 3 (0014):	15.89	0.538	3.25	19.22

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (0012)	Area (ha)=	2.70	Curve Number (CN)= 58.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.11	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.61	3.250	13.24	4.83	3.61
0.167	0.00	1.750	6.02	3.333	13.24	4.92	3.61
0.250	2.41	1.833	6.02	3.417	13.24	5.00	3.61
0.333	2.41	1.917	6.02	3.500	13.24	5.08	3.61
0.417	2.41	2.000	6.02	3.583	13.24	5.17	3.61
0.500	2.41	2.083	6.02	3.667	13.24	5.25	2.41
0.583	2.41	2.167	6.02	3.750	6.02	5.33	2.41
0.667	2.41	2.250	7.22	3.833	6.02	5.42	2.41
0.750	3.61	2.333	7.22	3.917	6.02	5.50	2.41
0.833	3.61	2.417	7.22	4.000	6.02	5.58	2.41
0.917	3.61	2.500	7.22	4.083	6.02	5.67	2.41
1.000	3.61	2.583	7.22	4.167	6.02	5.75	2.41
1.083	3.61	2.667	7.22	4.250	4.82	5.83	2.41
1.167	3.61	2.750	36.11	4.333	4.82	5.92	2.41
1.250	3.61	2.833	36.11	4.417	4.82	6.00	2.41
1.333	3.61	2.917	65.00	4.500	4.82	6.08	2.41
1.417	3.61	3.000	65.01	4.583	4.82	6.17	2.41
1.500	3.61	3.083	93.90	4.667	4.82		
1.583	3.61	3.167	93.90	4.750	3.61		

Unit Hyd Qpeak (cms)= 0.938

PEAK FLOW	(cms)=	0.157 (i)
TIME TO PEAK	(hrs)=	3.167
RUNOFF VOLUME	(mm)=	12.504
TOTAL RAINFALL	(mm)=	60.190
RUNOFF COEFFICIENT	=	0.208

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0004)	Area (ha)=	11.12	
ID= 1 DT= 5.0 min	Total Imp(%)=	48.00	Dir. Conn.(%)= 24.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	5.34	5.78
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	5.00	5.00

Length (m)=	272.27	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	3.61	3.250	13.24	4.83	3.61
0.167	0.00	1.750	6.02	3.333	13.24	4.92	3.61
0.250	2.41	1.833	6.02	3.417	13.24	5.00	3.61
0.333	2.41	1.917	6.02	3.500	13.24	5.08	3.61
0.417	2.41	2.000	6.02	3.583	13.24	5.17	3.61
0.500	2.41	2.083	6.02	3.667	13.24	5.25	2.41
0.583	2.41	2.167	6.02	3.750	6.02	5.33	2.41
0.667	2.41	2.250	7.22	3.833	6.02	5.42	2.41
0.750	3.61	2.333	7.22	3.917	6.02	5.50	2.41
0.833	3.61	2.417	7.22	4.000	6.02	5.58	2.41
0.917	3.61	2.500	7.22	4.083	6.02	5.67	2.41
1.000	3.61	2.583	7.22	4.167	6.02	5.75	2.41
1.083	3.61	2.667	7.22	4.250	4.82	5.83	2.41
1.167	3.61	2.750	36.11	4.333	4.82	5.92	2.41
1.250	3.61	2.833	36.11	4.417	4.82	6.00	2.41
1.333	3.61	2.917	65.00	4.500	4.82	6.08	2.41
1.417	3.61	3.000	65.01	4.583	4.82	6.17	2.41
1.500	3.61	3.083	93.90	4.667	4.82		
1.583	3.61	3.167	93.90	4.750	3.61		

Max.Eff.Inten.(mm/hr)=	93.90	49.11	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.95 (ii)	10.07 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.28	0.10	
			TOTALS
PEAK FLOW (cms)=	0.69	0.49	1.098 (iii)
TIME TO PEAK (hrs)=	3.17	3.25	3.17
RUNOFF VOLUME (mm)=	59.19	17.15	27.24
TOTAL RAINFALL (mm)=	60.19	60.19	60.19
RUNOFF COEFFICIENT =	0.98	0.28	0.45

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 57.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0011) | IN= 2---> OUT= 1	OVERFLOW IS OFF

DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1318	0.2828
	0.0019	0.0087	0.1425	0.3197
	0.0108	0.0342	0.1524	0.3580
	0.0152	0.0609	0.1617	0.3977
	0.0187	0.0888	0.1705	0.4388
	0.0464	0.1179	0.1788	0.4813
	0.0739	0.1483	0.1868	0.5253
	0.0922	0.1800	0.1944	0.5707
	0.1072	0.2129	0.2018	0.6176
	0.1202	0.2472	0.2202	0.7502

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0004)	11.120	1.098	3.17	27.24
OUTFLOW: ID= 1 (0011)	11.120	0.106	4.25	27.14

PEAK FLOW REDUCTION [Qout/Qin](%)= 9.66
TIME SHIFT OF PEAK FLOW (min)= 65.00
MAXIMUM STORAGE USED (ha.m.)= 0.2105

ADD HYD (0016)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	11.12	0.106	4.25	27.14
+ ID2= 2 (0012):	2.70	0.157	3.17	12.50
ID = 3 (0016):	13.82	0.207	3.17	24.28

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0042)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0014):	15.89	0.538	3.25	19.22
+ ID2= 2 (0016):	13.82	0.207	3.17	24.28
ID = 3 (0042):	29.71	0.728	3.25	21.57

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:03 25yr 6hr 10min SCS Type II **
****

READ STORM Filename: C:\Users\lparsons\AppD

	ata\Local\Temp\
	2e2b45a1-220b-44f7-bf6a-5876d87374f3\a9720736
Ptotal= 70.55 mm	Comments: 25yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	7.06	3.33	15.52	5.00	4.23
0.17	2.82	1.83	7.06	3.50	15.52	5.17	2.82
0.33	2.82	2.00	7.06	3.67	7.06	5.33	2.82
0.50	2.82	2.17	8.47	3.83	7.06	5.50	2.82
0.67	4.23	2.33	8.47	4.00	7.06	5.67	2.82
0.83	4.23	2.50	8.47	4.17	5.64	5.83	2.82
1.00	4.23	2.67	42.33	4.33	5.64	6.00	2.82
1.17	4.23	2.83	76.19	4.50	5.64		
1.33	4.23	3.00	110.06	4.67	4.23		
1.50	4.23	3.17	15.52	4.83	4.23		

CALIB			
NASHYD (0013)	Area (ha)=	9.57	Curve Number (CN)= 59.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.18	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.23	3.250	15.52	4.83	4.23
0.167	0.00	1.750	7.06	3.333	15.52	4.92	4.23
0.250	2.82	1.833	7.06	3.417	15.52	5.00	4.23
0.333	2.82	1.917	7.06	3.500	15.52	5.08	4.23
0.417	2.82	2.000	7.06	3.583	15.52	5.17	4.23
0.500	2.82	2.083	7.06	3.667	15.52	5.25	2.82
0.583	2.82	2.167	7.06	3.750	7.06	5.33	2.82
0.667	2.82	2.250	8.47	3.833	7.06	5.42	2.82
0.750	4.23	2.333	8.47	3.917	7.05	5.50	2.82
0.833	4.23	2.417	8.47	4.000	7.06	5.58	2.82
0.917	4.23	2.500	8.47	4.083	7.05	5.67	2.82
1.000	4.23	2.583	8.47	4.167	7.06	5.75	2.82
1.083	4.23	2.667	8.47	4.250	5.64	5.83	2.82
1.167	4.23	2.750	42.33	4.333	5.64	5.92	2.82
1.250	4.23	2.833	42.33	4.417	5.64	6.00	2.82
1.333	4.23	2.917	76.19	4.500	5.64	6.08	2.82
1.417	4.23	3.000	76.19	4.583	5.64	6.17	2.82
1.500	4.23	3.083	110.06	4.667	5.64		
1.583	4.23	3.167	110.06	4.750	4.23		

Unit Hyd Qpeak (cms)= 2.030

PEAK FLOW (cms)= 0.586 (i)
TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 17.700
TOTAL RAINFALL (mm)= 70.550
RUNOFF COEFFICIENT = 0.251

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0015)	Area (ha)=	6.32	
ID= 1 DT= 5.0 min	Total Imp(%)=	46.00	Dir. Conn.(%)= 23.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.91	3.41
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	5.00	5.00
Length	(m)=	205.33	30.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.23	3.250	15.52	4.83	4.23
0.167	0.00	1.750	7.06	3.333	15.52	4.92	4.23
0.250	2.82	1.833	7.06	3.417	15.52	5.00	4.23
0.333	2.82	1.917	7.06	3.500	15.52	5.08	4.23
0.417	2.82	2.000	7.06	3.583	15.52	5.17	4.23
0.500	2.82	2.083	7.06	3.667	15.52	5.25	2.82
0.583	2.82	2.167	7.06	3.750	7.06	5.33	2.82
0.667	2.82	2.250	8.47	3.833	7.06	5.42	2.82
0.750	4.23	2.333	8.47	3.917	7.05	5.50	2.82
0.833	4.23	2.417	8.47	4.000	7.06	5.58	2.82
0.917	4.23	2.500	8.47	4.083	7.05	5.67	2.82
1.000	4.23	2.583	8.47	4.167	7.06	5.75	2.82
1.083	4.23	2.667	8.47	4.250	5.64	5.83	2.82
1.167	4.23	2.750	42.33	4.333	5.64	5.92	2.82
1.250	4.23	2.833	42.33	4.417	5.64	6.00	2.82
1.333	4.23	2.917	76.19	4.500	5.64	6.08	2.82
1.417	4.23	3.000	76.19	4.583	5.64	6.17	2.82
1.500	4.23	3.083	110.06	4.667	5.64		
1.583	4.23	3.167	110.06	4.750	4.23		

			TOTALS
Max.Eff.Inten.(mm/hr)=		110.06	71.21
	over (min)	5.00	10.00
Storage Coeff.	(min)=	2.34 (ii)	7.50 (ii)
Unit Hyd. Tpeak	(min)=	5.00	10.00
Unit Hyd. peak	(cms)=	0.30	0.13

```
     PEAK FLOW       (cms)=       0.44         0.50          0.943 (iii)
     TIME TO PEAK    (hrs)=       3.17         3.17           3.17
     RUNOFF VOLUME    (mm)=      69.55        25.51          35.64
     TOTAL RAINFALL   (mm)=      70.55        70.55          70.55
     RUNOFF COEFFICIENT   =       0.99         0.36           0.51

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.0680      0.0734
                          0.0040      0.0056   |    0.0930      0.0831
                          0.0070      0.0115   |    0.1120      0.0932
                          0.0090      0.0178   |    0.1280      0.1038
                          0.0110      0.0245   |    0.1420      0.1149
                          0.0120      0.0316   |    0.1540      0.1265
                          0.0130      0.0391   |    0.1660      0.1385
                          0.0150      0.0470   |    0.1770      0.1511
                          0.0160      0.0553   |    0.1870      0.1642
                          0.0310      0.0641   |    0.2060      0.1879

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0015)     6.324      0.943      3.17      35.64
   OUTFLOW: ID= 1 (  0010)     6.324      0.160      3.75      35.58

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 17.00
                  TIME SHIFT OF PEAK FLOW         (min)= 35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1330

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     6.32   0.160     3.75    35.58
     + ID2= 2 (  0013):     9.57   0.586     3.25    17.70
       ================================================
       ID = 3 (  0014):    15.89   0.724     3.25    24.82

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| CALIB            |
| NASHYD   (  0012)|   Area    (ha)=   2.70   Curve Number   (CN)= 58.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.11

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                                  ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 1.667    4.23 | 3.250   15.52 |  4.83    4.23
               0.167    0.00 | 1.750    7.06 | 3.333   15.52 |  4.92    4.23
               0.250    2.82 | 1.833    7.06 | 3.417   15.52 |  5.00    4.23
               0.333    2.82 | 1.917    7.06 | 3.500   15.52 |  5.08    4.23
               0.417    2.82 | 2.000    7.06 | 3.583   15.52 |  5.17    4.23
               0.500    2.82 | 2.083    7.06 | 3.667   15.52 |  5.25    2.82
               0.583    2.82 | 2.167    7.06 | 3.750    7.06 |  5.33    2.82
               0.667    2.82 | 2.250    8.47 | 3.833    7.06 |  5.42    2.82
               0.750    4.23 | 2.333    8.47 | 3.917    7.05 |  5.50    2.82
               0.833    4.23 | 2.417    8.47 | 4.000    7.06 |  5.58    2.82
               0.917    4.23 | 2.500    8.47 | 4.083    7.05 |  5.67    2.82
               1.000    4.23 | 2.583    8.47 | 4.167    7.06 |  5.75    2.82
               1.083    4.23 | 2.667    8.47 | 4.250    5.64 |  5.83    2.82
               1.167    4.23 | 2.750   42.33 | 4.333    5.64 |  5.92    2.82
               1.250    4.23 | 2.833   42.33 | 4.417    5.64 |  6.00    2.82
               1.333    4.23 | 2.917   76.19 | 4.500    5.64 |  6.08    2.82
               1.417    4.23 | 3.000   76.19 | 4.583    5.64 |  6.17    2.82
               1.500    4.23 | 3.083  110.06 | 4.667    5.64 |
               1.583    4.23 | 3.167  110.06 | 4.750    4.23 |

    Unit Hyd Qpeak  (cms)=   0.938

    PEAK FLOW       (cms)=   0.213 (i)
    TIME TO PEAK    (hrs)=   3.167
    RUNOFF VOLUME    (mm)=  16.906
    TOTAL RAINFALL   (mm)=  70.550
    RUNOFF COEFFICIENT   =   0.240

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0004)|   Area    (ha)=  11.12
|ID= 1 DT= 5.0 min |   Total Imp(%)=  48.00   Dir. Conn.(%)=  24.00
--------------------

                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       5.34          5.78
    Dep. Storage     (mm)=       1.00          5.00
    Average Slope     (%)=       5.00          5.00
    Length            (m)=     272.27         40.00
```

Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.23	3.250	15.52	4.83	4.23
0.167	0.00	1.750	7.06	3.333	15.52	4.92	4.23
0.250	2.82	1.833	7.06	3.417	15.52	5.00	4.23
0.333	2.82	1.917	7.06	3.500	15.52	5.08	4.23
0.417	2.82	2.000	7.06	3.583	15.52	5.17	4.23
0.500	2.82	2.083	7.06	3.667	15.52	5.25	2.82
0.583	2.82	2.167	7.06	3.750	7.06	5.33	2.82
0.667	2.82	2.250	8.47	3.833	7.06	5.42	2.82
0.750	4.23	2.333	8.47	3.917	7.05	5.50	2.82
0.833	4.23	2.417	8.47	4.000	7.06	5.58	2.82
0.917	4.23	2.500	8.47	4.083	7.05	5.67	2.82
1.000	4.23	2.583	8.47	4.167	7.06	5.75	2.82
1.083	4.23	2.667	8.47	4.250	5.64	5.83	2.82
1.167	4.23	2.750	42.33	4.333	5.64	5.92	2.82
1.250	4.23	2.833	42.33	4.417	5.64	6.00	2.82
1.333	4.23	2.917	76.19	4.500	5.64	6.08	2.82
1.417	4.23	3.000	76.19	4.583	5.64	6.17	2.82
1.500	4.23	3.083	110.06	4.667	5.64		
1.583	4.23	3.167	110.06	4.750	4.23		

			TOTALS
Max.Eff.Inten.(mm/hr)=	110.06	64.92	
over (min)	5.00	10.00	
Storage Coeff. (min)=	2.77 (ii)	9.14 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.28	0.12	
PEAK FLOW (cms)=	0.81	0.72	1.522 (iii)
TIME TO PEAK (hrs)=	3.17	3.25	3.17
RUNOFF VOLUME (mm)=	69.55	22.73	33.97
TOTAL RAINFALL (mm)=	70.55	70.55	70.55
RUNOFF COEFFICIENT =	0.99	0.32	0.48

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 57.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0011)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW	STORAGE	OUTFLOW	STORAGE
	(cms)	(ha.m.)	(cms)	(ha.m.)
	0.0000	0.0000	0.1318	0.2828
	0.0019	0.0087	0.1425	0.3197
	0.0108	0.0342	0.1524	0.3580
	0.0152	0.0609	0.1617	0.3977
	0.0187	0.0888	0.1705	0.4388
	0.0464	0.1179	0.1788	0.4813
	0.0739	0.1483	0.1868	0.5253
	0.0922	0.1800	0.1944	0.5707
	0.1072	0.2129	0.2018	0.6176
	0.1202	0.2472	0.2202	0.7502

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0004)	11.120	1.522	3.17	33.97
OUTFLOW: ID= 1 (0011)	11.120	0.126	4.33	33.86

PEAK FLOW REDUCTION [Qout/Qin](%)= 8.26
TIME SHIFT OF PEAK FLOW (min)= 70.00
MAXIMUM STORAGE USED (ha.m.)= 0.2645

ADD HYD (0016)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0011):	11.12	0.126	4.33	33.86
	+ ID2= 2 (0012):	2.70	0.213	3.17	16.91
	ID = 3 (0016):	13.82	0.293	3.17	30.55

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0042)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0014):	15.89	0.724	3.25	24.82
	+ ID2= 2 (0016):	13.82	0.293	3.17	30.55
	ID = 3 (0042):	29.71	0.982	3.25	27.48

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:04 50yr 6hr 10min SCS Type II **
****

READ STORM	Filename: C:\Users\lparsons\AppData\Local\Temp\

	2e2b45a1-220b-44f7-bf6a-5876d87374f3\1bb8ea63
Ptotal= 78.10 mm	Comments: 50yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	7.81	3.33	17.18	5.00	4.69
0.17	3.12	1.83	7.81	3.50	17.18	5.17	3.12
0.33	3.12	2.00	7.81	3.67	7.81	5.33	3.12
0.50	3.12	2.17	9.37	3.83	7.81	5.50	3.12
0.67	4.69	2.33	9.37	4.00	7.81	5.67	3.12
0.83	4.69	2.50	9.37	4.17	6.25	5.83	3.12
1.00	4.69	2.67	46.86	4.33	6.25	6.00	3.12
1.17	4.69	2.83	84.35	4.50	6.25		
1.33	4.69	3.00	121.84	4.67	4.69		
1.50	4.69	3.17	17.18	4.83	4.69		

CALIB NASHYD (0013) ID= 1 DT= 5.0 min	Area (ha)= 9.57	Curve Number (CN)= 59.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.18	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.69	3.250	17.18	4.83	4.69
0.167	0.00	1.750	7.81	3.333	17.18	4.92	4.69
0.250	3.12	1.833	7.81	3.417	17.18	5.00	4.69
0.333	3.12	1.917	7.81	3.500	17.18	5.08	4.69
0.417	3.12	2.000	7.81	3.583	17.18	5.17	4.69
0.500	3.12	2.083	7.81	3.667	17.18	5.25	3.12
0.583	3.12	2.167	7.81	3.750	7.81	5.33	3.12
0.667	3.12	2.250	9.37	3.833	7.81	5.42	3.12
0.750	4.69	2.333	9.37	3.917	7.81	5.50	3.12
0.833	4.69	2.417	9.37	4.000	7.81	5.58	3.12
0.917	4.69	2.500	9.37	4.083	7.81	5.67	3.12
1.000	4.69	2.583	9.37	4.167	7.81	5.75	3.12
1.083	4.69	2.667	9.37	4.250	6.25	5.83	3.12
1.167	4.69	2.750	46.86	4.333	6.25	5.92	3.12
1.250	4.69	2.833	46.86	4.417	6.25	6.00	3.12
1.333	4.69	2.917	84.35	4.500	6.25	6.08	3.12
1.417	4.69	3.000	84.35	4.583	6.25	6.17	3.12
1.500	4.69	3.083	121.84	4.667	6.25		
1.583	4.69	3.167	121.84	4.750	4.69		

Unit Hyd Qpeak (cms)= 2.030

PEAK FLOW (cms)= 0.709 (i)

TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 21.347
TOTAL RAINFALL (mm)= 78.100
RUNOFF COEFFICIENT = 0.273

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (0015) ID= 1 DT= 5.0 min	Area (ha)= 6.32	
	Total Imp(%)= 46.00	Dir. Conn.(%)= 23.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.91	3.41
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	5.00	5.00
Length (m)=	205.33	30.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.69	3.250	17.18	4.83	4.69
0.167	0.00	1.750	7.81	3.333	17.18	4.92	4.69
0.250	3.12	1.833	7.81	3.417	17.18	5.00	4.69
0.333	3.12	1.917	7.81	3.500	17.18	5.08	4.69
0.417	3.12	2.000	7.81	3.583	17.18	5.17	4.69
0.500	3.12	2.083	7.81	3.667	17.18	5.25	3.12
0.583	3.12	2.167	7.81	3.750	7.81	5.33	3.12
0.667	3.12	2.250	9.37	3.833	7.81	5.42	3.12
0.750	4.69	2.333	9.37	3.917	7.81	5.50	3.12
0.833	4.69	2.417	9.37	4.000	7.81	5.58	3.12
0.917	4.69	2.500	9.37	4.083	7.81	5.67	3.12
1.000	4.69	2.583	9.37	4.167	7.81	5.75	3.12
1.083	4.69	2.667	9.37	4.250	6.25	5.83	3.12
1.167	4.69	2.750	46.86	4.333	6.25	5.92	3.12
1.250	4.69	2.833	46.86	4.417	6.25	6.00	3.12
1.333	4.69	2.917	84.35	4.500	6.25	6.08	3.12
1.417	4.69	3.000	84.35	4.583	6.25	6.17	3.12
1.500	4.69	3.083	121.84	4.667	6.25		
1.583	4.69	3.167	121.84	4.750	4.69		

			TOTALS
Max.Eff.Inten.(mm/hr)=	121.84	84.33	
over (min)	5.00	10.00	
Storage Coeff. (min)=	2.24 (ii)	7.07 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.30	0.14	
PEAK FLOW (cms)=	0.49	0.61	1.098 (iii)

```
     TIME TO PEAK     (hrs)=       3.17         3.17          3.17
     RUNOFF VOLUME     (mm)=      77.10        30.28         41.05
     TOTAL RAINFALL    (mm)=      78.10        78.10         78.10
     RUNOFF COEFFICIENT   =       0.99         0.39          0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.0680      0.0734
                          0.0040      0.0056   |    0.0930      0.0831
                          0.0070      0.0115   |    0.1120      0.0932
                          0.0090      0.0178   |    0.1280      0.1038
                          0.0110      0.0245   |    0.1420      0.1149
                          0.0120      0.0316   |    0.1540      0.1265
                          0.0130      0.0391   |    0.1660      0.1385
                          0.0150      0.0470   |    0.1770      0.1511
                          0.0160      0.0553   |    0.1870      0.1642
                          0.0310      0.0641   |    0.2060      0.1879

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0015)     6.324     1.098      3.17      41.05
   OUTFLOW: ID= 1 (  0010)     6.324     0.179      3.75      40.99

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.30
                  TIME SHIFT OF PEAK FLOW         (min)= 35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1539

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     6.32   0.179     3.75    40.99
     + ID2= 2 (  0013):     9.57   0.709     3.25    21.35
       ================================================
       ID = 3 (  0014):    15.89   0.865     3.25    29.16

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
```

```
--------------------
| CALIB            |
| NASHYD   (  0012)|   Area    (ha)=   2.70   Curve Number   (CN)= 58.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.11

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                                  ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 1.667    4.69 | 3.250   17.18 |  4.83    4.69
               0.167    0.00 | 1.750    7.81 | 3.333   17.18 |  4.92    4.69
               0.250    3.12 | 1.833    7.81 | 3.417   17.18 |  5.00    4.69
               0.333    3.12 | 1.917    7.81 | 3.500   17.18 |  5.08    4.69
               0.417    3.12 | 2.000    7.81 | 3.583   17.18 |  5.17    4.69
               0.500    3.12 | 2.083    7.81 | 3.667   17.18 |  5.25    3.12
               0.583    3.12 | 2.167    7.81 | 3.750    7.81 |  5.33    3.12
               0.667    3.12 | 2.250    9.37 | 3.833    7.81 |  5.42    3.12
               0.750    4.69 | 2.333    9.37 | 3.917    7.81 |  5.50    3.12
               0.833    4.69 | 2.417    9.37 | 4.000    7.81 |  5.58    3.12
               0.917    4.69 | 2.500    9.37 | 4.083    7.81 |  5.67    3.12
               1.000    4.69 | 2.583    9.37 | 4.167    7.81 |  5.75    3.12
               1.083    4.69 | 2.667    9.37 | 4.250    6.25 |  5.83    3.12
               1.167    4.69 | 2.750   46.86 | 4.333    6.25 |  5.92    3.12
               1.250    4.69 | 2.833   46.86 | 4.417    6.25 |  6.00    3.12
               1.333    4.69 | 2.917   84.35 | 4.500    6.25 |  6.08    3.12
               1.417    4.69 | 3.000   84.35 | 4.583    6.25 |  6.17    3.12
               1.500    4.69 | 3.083  121.84 | 4.667    6.25 |
               1.583    4.69 | 3.167  121.84 | 4.750    4.69 |

     Unit Hyd Qpeak  (cms)=   0.938

     PEAK FLOW       (cms)=   0.257 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  20.407
     TOTAL RAINFALL   (mm)=  78.100
     RUNOFF COEFFICIENT   =   0.261

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0004)|   Area    (ha)=  11.12
|ID= 1 DT= 5.0 min |   Total Imp(%)=  48.00   Dir. Conn.(%)=  24.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.34          5.78
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       5.00          5.00
     Length            (m)=     272.27         40.00
     Mannings n           =      0.013         0.250
```

NOTE: RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	4.69	3.250	17.18	4.83	4.69
0.167	0.00	1.750	7.81	3.333	17.18	4.92	4.69
0.250	3.12	1.833	7.81	3.417	17.18	5.00	4.69
0.333	3.12	1.917	7.81	3.500	17.18	5.08	4.69
0.417	3.12	2.000	7.81	3.583	17.18	5.17	4.69
0.500	3.12	2.083	7.81	3.667	17.18	5.25	3.12
0.583	3.12	2.167	7.81	3.750	7.81	5.33	3.12
0.667	3.12	2.250	9.37	3.833	7.81	5.42	3.12
0.750	4.69	2.333	9.37	3.917	7.81	5.50	3.12
0.833	4.69	2.417	9.37	4.000	7.81	5.58	3.12
0.917	4.69	2.500	9.37	4.083	7.81	5.67	3.12
1.000	4.69	2.583	9.37	4.167	7.81	5.75	3.12
1.083	4.69	2.667	9.37	4.250	6.25	5.83	3.12
1.167	4.69	2.750	46.86	4.333	6.25	5.92	3.12
1.250	4.69	2.833	46.86	4.417	6.25	6.00	3.12
1.333	4.69	2.917	84.35	4.500	6.25	6.08	3.12
1.417	4.69	3.000	84.35	4.583	6.25	6.17	3.12
1.500	4.69	3.083	121.84	4.667	6.25		
1.583	4.69	3.167	121.84	4.750	4.69		

			TOTALS
Max.Eff.Inten.(mm/hr)=	121.84	77.26	
over (min)	5.00	10.00	
Storage Coeff. (min)=	2.66 (ii)	8.60 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.29	0.12	
PEAK FLOW (cms)=	0.90	0.87	1.771 (iii)
TIME TO PEAK (hrs)=	3.17	3.17	3.17
RUNOFF VOLUME (mm)=	77.10	27.10	39.10
TOTAL RAINFALL (mm)=	78.10	78.10	78.10
RUNOFF COEFFICIENT =	0.99	0.35	0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 57.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0011) / IN= 2---> OUT= 1 / DT= 5.0 min	OVERFLOW IS OFF			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1318	0.2828
	0.0019	0.0087	0.1425	0.3197
	0.0108	0.0342	0.1524	0.3580
	0.0152	0.0609	0.1617	0.3977
	0.0187	0.0888	0.1705	0.4388
	0.0464	0.1179	0.1788	0.4813
	0.0739	0.1483	0.1868	0.5253
	0.0922	0.1800	0.1944	0.5707
	0.1072	0.2129	0.2018	0.6176
	0.1202	0.2472	0.2202	0.7502

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0004)	11.120	1.771	3.17	39.10
OUTFLOW: ID= 1 (0011)	11.120	0.139	4.33	39.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.83
TIME SHIFT OF PEAK FLOW (min)= 70.00
MAXIMUM STORAGE USED (ha.m.)= 0.3065

ADD HYD (0016) / 1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	11.12	0.139	4.33	39.00
+ ID2= 2 (0012):	2.70	0.257	3.17	20.41
ID = 3 (0016):	13.82	0.351	3.17	35.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0042) / 1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0014):	15.89	0.865	3.25	29.16
+ ID2= 2 (0016):	13.82	0.351	3.17	35.36
ID = 3 (0042):	29.71	1.167	3.25	32.05

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:05 100yr 6hr 10min SCS Type II **
****

READ STORM | Filename: C:\Users\lparsons\AppData\Local\Temp\2e2b45a1-220b-44f7-bf6a-5876d87374f3\26299ead

| Ptotal= 85.57 mm | Comments: 100yr 6hr 10min SCS Type II

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.67	8.56	3.33	18.83	5.00	5.13
0.17	3.42	1.83	8.56	3.50	18.83	5.17	3.42
0.33	3.42	2.00	8.56	3.67	8.56	5.33	3.42
0.50	3.42	2.17	10.27	3.83	8.56	5.50	3.42
0.67	5.13	2.33	10.27	4.00	8.56	5.67	3.42
0.83	5.13	2.50	10.27	4.17	6.85	5.83	3.42
1.00	5.13	2.67	51.34	4.33	6.85	6.00	3.42
1.17	5.13	2.83	92.42	4.50	6.85		
1.33	5.13	3.00	133.49	4.67	5.13		
1.50	5.13	3.17	18.83	4.83	5.13		

CALIB NASHYD (0013) ID= 1 DT= 5.0 min	Area (ha)= 9.57 Curve Number (CN)= 59.0 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.18

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	5.13	3.250	18.83	4.83	5.13
0.167	0.00	1.750	8.56	3.333	18.83	4.92	5.13
0.250	3.42	1.833	8.56	3.417	18.83	5.00	5.13
0.333	3.42	1.917	8.56	3.500	18.83	5.08	5.13
0.417	3.42	2.000	8.56	3.583	18.83	5.17	5.13
0.500	3.42	2.083	8.56	3.667	18.83	5.25	3.42
0.583	3.42	2.167	8.56	3.750	8.56	5.33	3.42
0.667	3.42	2.250	10.27	3.833	8.56	5.42	3.42
0.750	5.13	2.333	10.27	3.917	8.56	5.50	3.42
0.833	5.13	2.417	10.27	4.000	8.56	5.58	3.42
0.917	5.13	2.500	10.27	4.083	8.56	5.67	3.42
1.000	5.13	2.583	10.27	4.167	8.56	5.75	3.42
1.083	5.13	2.667	10.27	4.250	6.85	5.83	3.42
1.167	5.13	2.750	51.34	4.333	6.85	5.92	3.42
1.250	5.13	2.833	51.34	4.417	6.85	6.00	3.42
1.333	5.13	2.917	92.42	4.500	6.85	6.08	3.42
1.417	5.13	3.000	92.42	4.583	6.85	6.17	3.42
1.500	5.13	3.083	133.49	4.667	6.85		
1.583	5.13	3.167	133.49	4.750	5.13		

Unit Hyd Qpeak (cms)= 2.030

PEAK FLOW (cms)= 0.837 (i)
TIME TO PEAK (hrs)= 3.250

RUNOFF VOLUME (mm)= 25.179
TOTAL RAINFALL (mm)= 85.570
RUNOFF COEFFICIENT = 0.294

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (0015) ID= 1 DT= 5.0 min	Area (ha)= 6.32 Total Imp(%)= 46.00 Dir. Conn.(%)= 23.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.91	3.41
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	5.00	5.00
Length	(m)=	205.33	30.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	5.13	3.250	18.83	4.83	5.13
0.167	0.00	1.750	8.56	3.333	18.83	4.92	5.13
0.250	3.42	1.833	8.56	3.417	18.83	5.00	5.13
0.333	3.42	1.917	8.56	3.500	18.83	5.08	5.13
0.417	3.42	2.000	8.56	3.583	18.83	5.17	5.13
0.500	3.42	2.083	8.56	3.667	18.83	5.25	3.42
0.583	3.42	2.167	8.56	3.750	8.56	5.33	3.42
0.667	3.42	2.250	10.27	3.833	8.56	5.42	3.42
0.750	5.13	2.333	10.27	3.917	8.56	5.50	3.42
0.833	5.13	2.417	10.27	4.000	8.56	5.58	3.42
0.917	5.13	2.500	10.27	4.083	8.56	5.67	3.42
1.000	5.13	2.583	10.27	4.167	8.56	5.75	3.42
1.083	5.13	2.667	10.27	4.250	6.85	5.83	3.42
1.167	5.13	2.750	51.34	4.333	6.85	5.92	3.42
1.250	5.13	2.833	51.34	4.417	6.85	6.00	3.42
1.333	5.13	2.917	92.42	4.500	6.85	6.08	3.42
1.417	5.13	3.000	92.42	4.583	6.85	6.17	3.42
1.500	5.13	3.083	133.49	4.667	6.85		
1.583	5.13	3.167	133.49	4.750	5.13		

				TOTALS
Max.Eff.Inten.(mm/hr)=		133.49	97.85	
over (min)		5.00	10.00	
Storage Coeff. (min)=		2.16 (ii)	6.71 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.31	0.14	
PEAK FLOW	(cms)=	0.54	0.72	1.257 (iii)
TIME TO PEAK	(hrs)=	3.17	3.17	3.17

```
     RUNOFF VOLUME    (mm)=      84.57        35.21          46.57
     TOTAL RAINFALL   (mm)=      85.57        85.57          85.57
     RUNOFF COEFFICIENT   =       0.99         0.41           0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.0680      0.0734
                          0.0040      0.0056   |    0.0930      0.0831
                          0.0070      0.0115   |    0.1120      0.0932
                          0.0090      0.0178   |    0.1280      0.1038
                          0.0110      0.0245   |    0.1420      0.1149
                          0.0120      0.0316   |    0.1540      0.1265
                          0.0130      0.0391   |    0.1660      0.1385
                          0.0150      0.0470   |    0.1770      0.1511
                          0.0160      0.0553   |    0.1870      0.1642
                          0.0310      0.0641   |    0.2060      0.1879

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0015)      6.324      1.257      3.17      46.57
   OUTFLOW: ID= 1 (  0010)      6.324      0.196      3.75      46.51

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.61
                  TIME SHIFT OF PEAK FLOW         (min)= 35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1759

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     6.32   0.196     3.75    46.51
     + ID2= 2 (  0013):     9.57   0.837     3.25    25.18
       ================================================
       ID = 3 (  0014):    15.89   1.010     3.25    33.67

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0012)|   Area    (ha)=   2.70   Curve Number   (CN)= 58.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.11

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                                  ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN |   TIME     RAIN |'  TIME     RAIN |   TIME     RAIN
                 hrs    mm/hr |    hrs    mm/hr |'   hrs    mm/hr |    hrs    mm/hr
               0.083     0.00 | 1.667     5.13 | 3.250   18.83 |  4.83     5.13
               0.167     0.00 | 1.750     8.56 | 3.333   18.83 |  4.92     5.13
               0.250     3.42 | 1.833     8.56 | 3.417   18.83 |  5.00     5.13
               0.333     3.42 | 1.917     8.56 | 3.500   18.83 |  5.08     5.13
               0.417     3.42 | 2.000     8.56 | 3.583   18.83 |  5.17     5.13
               0.500     3.42 | 2.083     8.56 | 3.667   18.83 |  5.25     3.42
               0.583     3.42 | 2.167     8.56 | 3.750    8.56 |  5.33     3.42
               0.667     3.42 | 2.250    10.27 | 3.833    8.56 |  5.42     3.42
               0.750     5.13 | 2.333    10.27 | 3.917    8.56 |  5.50     3.42
               0.833     5.13 | 2.417    10.27 | 4.000    8.56 |  5.58     3.42
               0.917     5.13 | 2.500    10.27 | 4.083    8.56 |  5.67     3.42
               1.000     5.13 | 2.583    10.27 | 4.167    8.56 |  5.75     3.42
               1.083     5.13 | 2.667    10.27 | 4.250    6.85 |  5.83     3.42
               1.167     5.13 | 2.750    51.34 | 4.333    6.85 |  5.92     3.42
               1.250     5.13 | 2.833    51.34 | 4.417    6.85 |  6.00     3.42
               1.333     5.13 | 2.917    92.42 | 4.500    6.85 |  6.08     3.42
               1.417     5.13 | 3.000    92.42 | 4.583    6.85 |  6.17     3.42
               1.500     5.13 | 3.083   133.49 | 4.667    6.85 |
               1.583     5.13 | 3.167   133.49 | 4.750    5.13 |

     Unit Hyd Qpeak  (cms)=   0.938

     PEAK FLOW       (cms)=   0.303 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  24.091
     TOTAL RAINFALL   (mm)=  85.570
     RUNOFF COEFFICIENT   =   0.282

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0004)|   Area    (ha)=  11.12
|ID= 1 DT= 5.0 min |   Total Imp(%)=  48.00   Dir. Conn.(%)=  24.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.34          5.78
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       5.00          5.00
     Length            (m)=     272.27         40.00
     Mannings n           =      0.013         0.250
```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	5.13	3.250	18.83	4.83	5.13
0.167	0.00	1.750	8.56	3.333	18.83	4.92	5.13
0.250	3.42	1.833	8.56	3.417	18.83	5.00	5.13
0.333	3.42	1.917	8.56	3.500	18.83	5.08	5.13
0.417	3.42	2.000	8.56	3.583	18.83	5.17	5.13
0.500	3.42	2.083	8.56	3.667	18.83	5.25	3.42
0.583	3.42	2.167	8.56	3.750	8.56	5.33	3.42
0.667	3.42	2.250	10.27	3.833	8.56	5.42	3.42
0.750	5.13	2.333	10.27	3.917	8.56	5.50	3.42
0.833	5.13	2.417	10.27	4.000	8.56	5.58	3.42
0.917	5.13	2.500	10.27	4.083	8.56	5.67	3.42
1.000	5.13	2.583	10.27	4.167	8.56	5.75	3.42
1.083	5.13	2.667	10.27	4.250	6.85	5.83	3.42
1.167	5.13	2.750	51.34	4.333	6.85	5.92	3.42
1.250	5.13	2.833	51.34	4.417	6.85	6.00	3.42
1.333	5.13	2.917	92.42	4.500	6.85	6.08	3.42
1.417	5.13	3.000	92.42	4.583	6.85	6.17	3.42
1.500	5.13	3.083	133.49	4.667	6.85		
1.583	5.13	3.167	133.49	4.750	5.13		

Max.Eff.Inten.(mm/hr)=	133.49	90.06	
over (min)	5.00	10.00	
Storage Coeff. (min)=	2.56 (ii)	8.15 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.29	0.13	
			TOTALS
PEAK FLOW (cms)=	0.98	1.04	2.028 (iii)
TIME TO PEAK (hrs)=	3.17	3.17	3.17
RUNOFF VOLUME (mm)=	84.57	31.65	44.35
TOTAL RAINFALL (mm)=	85.57	85.57	85.57
RUNOFF COEFFICIENT =	0.99	0.37	0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 57.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0011)	IN= 2---> OUT= 1	DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.1318	0.2828
0.0019	0.0087	0.1425	0.3197
0.0108	0.0342	0.1524	0.3580
0.0152	0.0609	0.1617	0.3977
0.0187	0.0888	0.1705	0.4388
0.0464	0.1179	0.1788	0.4813
0.0739	0.1483	0.1868	0.5253
0.0922	0.1800	0.1944	0.5707
0.1072	0.2129	0.2018	0.6176
0.1202	0.2472	0.2202	0.7502

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0004)	11.120	2.028	3.17	44.35
OUTFLOW: ID= 1 (0011)	11.120	0.150	4.42	44.24

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.42
TIME SHIFT OF PEAK FLOW (min)= 75.00
MAXIMUM STORAGE USED (ha.m.)= 0.3505

ADD HYD (0016)	1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0011):	11.12	0.150	4.42	44.24
	+ ID2= 2 (0012):	2.70	0.303	3.17	24.09
	ID = 3 (0016):	13.82	0.408	3.17	40.31

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0042)	1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0014):	15.89	1.010	3.25	33.67
	+ ID2= 2 (0016):	13.82	0.408	3.17	40.31
	ID = 3 (0042):	29.71	1.358	3.25	36.76

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Appendix C: Stage Storage

Stormwater Management Facility Outlet (Northern Pond)

Project Name: Burwash Road
Project Number: 23121

Designed By: LP
Date: 2026-08-06

Number of Stages (Max 5): 2

Outlet Configuration						
			Stage Number:	Stage 1	Stage 2	Total	Notes
			Control Type:	Orifice Tube	Orifice Tube		
			Orifice Diameter / Weir Width (m):	0.08	0.25		
			Invert Elevations (m):	181.16	181.95		
			Top of Catch Basin (m) / Included Angle (°):	0.00	0.00		
Discharge Table:	**Elevation (m)**	**Active Storage (m^3)**	**Total Storage (m^3)**	**Controlled Discharge Rate (m^3/s)**			
Bottom of Pond	**181.16**		**0**	**0.000**	**0.000**	**0.000**	
	181.21		28	0.002	0.000	0.002	
	181.26		56	0.004	0.000	0.004	
	181.31		85	0.006	0.000	0.006	
	181.36		115	0.007	0.000	0.007	
	181.41		146	0.008	0.000	0.008	
	181.46		178	0.009	0.000	0.009	
	181.51		211	0.010	0.000	0.010	
	181.56		245	0.011	0.000	0.011	
	181.61		280	0.011	0.000	0.011	
	181.66		316	0.012	0.000	0.012	
	181.71		353	0.013	0.000	0.013	
	181.76		391	0.013	0.000	0.013	
	181.81		430	0.014	0.000	0.014	
	181.86		470	0.014	0.000	0.014	
	181.91		511	0.015	0.000	0.015	
	181.96		553	0.016	0.000	0.016	
	182.01		597	0.016	0.005	0.021	
	182.06		641	0.017	0.015	0.031	
2 Year	**182.11**		**687**	**0.017**	**0.033**	**0.050**	**2 yr Req. 672 m^3 @ 182.10 m**
	182.16		734	0.017	0.051	0.068	
	182.21		782	0.018	0.064	0.082	
	182.26		831	0.018	0.075	0.093	
5 Year	**182.31**		**881**	**0.019**	**0.084**	**0.103**	**5 yr Req. 887 m^3 @ 182.31 m**
	182.36		932	0.019	0.093	0.112	
	182.41		984	0.020	0.101	0.120	
	182.46		1038	0.020	0.108	0.128	
10 Year	**182.51**		**1093**	**0.020**	**0.115**	**0.135**	**10 yr Req. 1068 m^3 @ 182.49 m**
	182.56		1149	0.021	0.121	0.142	
	182.61		1206	0.021	0.127	0.148	
	182.66		1265	0.022	0.133	0.154	
25 Year	**182.71**		**1324**	**0.022**	**0.139**	**0.160**	**25yr Req. 1330 m^3 @ 182.71 m**
	182.76		1386	0.022	0.144	0.166	
	182.81		1448	0.023	0.149	0.172	
	182.86		1511	0.023	0.154	0.177	
50 Year	**182.91**		**1576**	**0.023**	**0.159**	**0.182**	**50yr Req. 1539 m^3 @ 182.88 m**
	182.96		1642	0.024	0.164	0.187	
	183.01		1709	0.024	0.168	0.192	
100 Year	**183.06**		**1778**	**0.024**	**0.173**	**0.197**	**100yr Req. 1759 m^3 @ 183.04 m**
	183.11		1848	0.025	0.177	0.201	
Top of Pond	**183.16**		**1879**	**0.025**	**0.181**	**0.206**	

1. Orifice tube discharge calculated according to Q=0.8A(2gh)1/2
2. Weir discharge calculated according to Q=1.705LH1.5

Stormwater Management Facility Outlet (Southern Pond)

Project Name: Burwash Road
Project Number: 23121
Designed By: LP
Date: 2026-08-06

Number of Stages (Max 5): 2

Outlet Configuration						
			Stage Number:	Stage 1	Stage 2	Total	Notes
			Control Type:	Orifice Tube	Orifice Tube		
			Orifice Diameter / Weir Width (m):	0.10	0.20		
			Invert Elevations (m):	183.50	184.00		
			Top of Catch Basin (m) / Included Angle (°):	0.00	0.00		
Discharge Table:	**Elevation (m)**	**Active Storage (m^3)**	**Total Storage (m^3)**	**Controlled Discharge Rate (m^3/s)**			
Bottom of Pond	**183.50**		**0**	**0.000**	**0.000**	**0.000**	
	183.55		87	0.002	0.000	0.002	
	183.60		170	0.006	0.000	0.006	
	183.65		255	0.009	0.000	0.009	
	183.70		342	0.011	0.000	0.011	
	183.75		429	0.012	0.000	0.012	
	183.80		518	0.014	0.000	0.014	
	183.85		609	0.015	0.000	0.015	
	183.90		700	0.016	0.000	0.016	
	183.95		793	0.018	0.000	0.018	
	184.00		888	0.019	0.000	0.019	
	184.05		983	0.020	0.003	0.023	
	184.10		1080	0.021	0.011	0.031	
	184.15		1179	0.022	0.025	0.046	
2 Year	**184.20**		**1279**	**0.022**	**0.035**	**0.058**	**2 yr Req. 1228 m^3 @ 184.17 m**
	184.25		1380	0.023	0.043	0.066	
	184.30		1483	0.024	0.050	0.074	
	184.35		1587	0.025	0.056	0.081	
	184.40		1693	0.026	0.061	0.087	
5 Year	**184.45**		**1800**	**0.026**	**0.066**	**0.092**	**5 yr Req. 1724 m^3 @ 184.41 m**
	184.50		1908	0.027	0.070	0.097	
	184.55		2018	0.028	0.075	0.102	
10 Year	**184.60**		**2129**	**0.029**	**0.079**	**0.107**	**10 yr Req. 2105 m^3 @ 184.60 m**
	184.65		2242	0.029	0.083	0.112	
	184.70		2356	0.030	0.086	0.116	
	184.75		2472	0.030	0.090	0.120	
	184.80		2589	0.031	0.093	0.124	
25 Year	**184.85**		**2707**	**0.032**	**0.096**	**0.128**	**25 yr Req. 2645 m^3 @ 184.82 m**
	184.90		2828	0.032	0.100	0.132	
	184.95		2949	0.033	0.103	0.135	
50 Year	**185.00**		**3072**	**0.033**	**0.106**	**0.139**	**50 yr Req. 3065 m^3 @ 185.00m**
	185.05		3197	0.034	0.108	0.143	
	185.10		3323	0.035	0.111	0.146	
	185.15		3451	0.035	0.114	0.149	
100 Year	**185.20**		**3580**	**0.036**	**0.117**	**0.152**	**100 yr Req. 3505 m^3 @ 185.17m**
	185.25		3711	0.036	0.119	0.156	
	185.30		3843	0.037	0.122	0.159	
	185.35		3977	0.037	0.124	0.162	
	185.40		4112	0.038	0.127	0.165	
	185.45		4249	0.038	0.129	0.168	
	185.50		4388	0.039	0.132	0.170	
	185.55		4528	0.039	0.134	0.173	
	185.60		4670	0.040	0.136	0.176	
	185.65		4813	0.040	0.139	0.179	
	185.70		4958	0.041	0.141	0.182	
	185.75		5105	0.041	0.143	0.184	
	185.80		5253	0.042	0.145	0.187	
	185.85		5403	0.042	0.147	0.189	
	185.90		5554	0.043	0.149	0.192	
	185.95		5707	0.043	0.151	0.194	
	186.00		5862	0.044	0.153	0.197	
	186.05		6018	0.044	0.155	0.199	
	186.10		6176	0.044	0.157	0.202	
	186.15		6336	0.045	0.159	0.204	
	186.20		6497	0.045	0.161	0.207	
	186.25		6660	0.046	0.163	0.209	
	186.30		6825	0.046	0.165	0.211	
	186.35		6991	0.047	0.167	0.213	
	186.40		7159	0.047	0.169	0.216	
	186.45		7329	0.047	0.171	0.218	
Top of Pond	**186.50**		**7502**	**0.048**	**0.172**	**0.220**	

1. Orifice tube discharge calculated according to Q=0.8A(2gh)1/2
2. Weir discharge calculated according to Q=1.705LH1.5

Appendix D: Stormwater Conveyance

Channel Design Sheet

Project Name: 9380 Burwash Rd Baltimore **Designed By:** LP

Project No: 23121 **Date:** 2026-07-01

Channel Description	Peak Flows (m^3/s)	Bed Slope (%)	Side Slope (X : 1)	Bottom Width (m)	Depth (m)	Lining Material	Manning's Number	Cross Sectional Area	Channel Capacity	% Capacity	Flow Depth	Velocity
Conveyance Swale 1- PR1	1.26	2.00%	3.00	0.5	0.66	Earth, Grass	0.030	1.64 m^2	3.84 m^3/s	32.8%	0.41 m	1.77 m/s
Conveyance Swale 2- PR2	2.03	2.00%	3.00	0.5	0.66	Earth, Grass	0.030	1.64 m^2	3.84 m^3/s	52.9%	0.50 m	2.00 m/s

Appendix E: Water Quality

Water Quality Requirements

Project Name: Burwash Road **Designed By:** LP
Project No: 23121 **Date:** 2026-07-01

South Pond - Water Quality Calculations

Site Data			
Protection Level:		Enhanced	
Facility Type:		Wet Pond	
Area	=	11.13	ha
% Impervious Calculated	=	48%	%
Impervious Area	=	5.34	ha
Required Extended Detention Volume (Ved)**			
Ved	=	40	m^3/ha
	=	445	m^3
Total Required Storage Volume (Vs)*			
Vs	=	166	m^3/ha
	=	1847	m^3
Required Permanent Pool Volume (Vpp = Vs - Ved)			
Vpp	=	126	m^3/ha
	=	1402	m^3

*Required volumes calculated utilizing linear regression including a slope (m) of 236.44 and an intercept (b) of 52.5 based on the below table.

**Extended Detention is required only for wet facilities and based on the MOE reqirement of 40m^3/ha

Notes:

Table 3.2: Water Quality Storage Requirements based on Receiving Waters (MOE SWMPD Manual)

		Storage Volume (m^3/ha) for Impervious Level				
Protection Level	SWMP Type	0%	35%	55%	70%	85%
Enhanced 80% long-term S.S. removal	Infiltration	16.25	25	30	35	40
	Wetlands	36.25	80	105	120	140
	Hybrid Wet Pond/Wetland	40	110	150	175	195
	Wet Pond	52.5	140	190	225	250
Normal 70% long-term S.S. removal	Infiltration	20	20	20	25	30
	Wetlands	42.5	60	70	80	90
	Hybrid Wet Pond/Wetland	48.75	75	90	105	120
	Wet Pond	55	90	110	130	150
Basic 60% long-term S.S. removal	Infiltration	20	20	20	20	20
	Wetlands	60	60	60	60	60
	Hybrid Wet Pond/Wetland	42.5	60	70	75	80
	Wet Pond	33.75	60	75	85	95
	Dry Pond (Continuous Flow)	0	90	150	200	240

Appendix F: Geotechnical Information

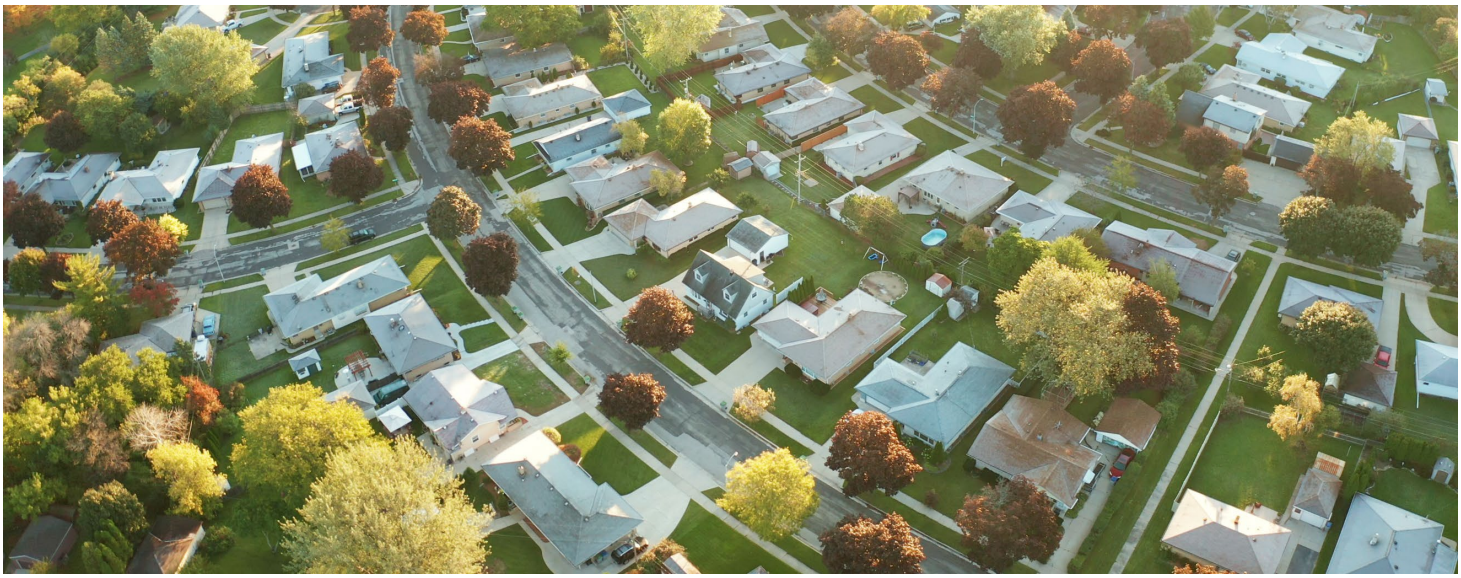
Hydrogeological and Geotechnical Investigation

Proposed Residential Development – 9380 Burwash Road, Baltimore, Ontario

Stalwood Homes

11 September 2026

→ The Power of Commitment



Contents

1. Introduction 4

2. Background 5

2.1 Site Description 5

2.2 Regional Setting 5

2.2.1 Existing Local Water Supplies 6

2.3 Previous Investigations 7

3. Methodology 7

3.1 Health and Safety 8

3.2 Utility Clearance 8

3.3 Test Pit and Borehole Advancement 8

3.4 Physical Laboratory Testing 9

3.5 Groundwater Level Monitoring 9

3.6 Water Balance 9

4. Field Investigation Results 10

4.1 Summary of Test Hole Information 10

4.2 Local Geology and Subsurface Conditions 11

4.3 Physical Laboratory Testing Results 12

4.4 Groundwater Observations and Measurements 12

4.5 Well Survey Results 13

5. Discussion and Recommendations 14

5.1 Hydrogeology 14

5.1.1 Hydrostratigraphic Units 14

5.1.2 Flow Direction 14

5.1.3 Construction Dewatering 14

5.1.4 Water Balance 15

5.1.4.1 Pre-Development Water Balance 15

5.1.4.2 Post-Development Water Balance (No Infiltration Enhancements) 16

5.1.4.3 Post-Development Water Balance (With Enhanced Infiltration) 17

5.2 Septic Waste Disposal 18

5.3 Geotechnical 18

5.3.1 Site Preparation, Grading and Backfill 18

5.3.2 Service Installation 19

5.3.3 Road Construction 19

5.3.4 Depth of Frost Penetration 20

5.3.5 Seismic Site Classification 20

5.3.6 Foundation Design 21

5.3.7 Slab-On-Grade Construction 22

5.3.8 Basement and Retaining Walls 23

5.3.9 Excavation and Temporary Shoring 23

5.4 Storm Water Management Pond 24

5.4.1 Construction Monitoring 24
6. Conclusions and Closure 25
Statement of Limitations 26

Table Index

Table 1 MECP Well Record Data 7
Table 2 Borehole and Test Pit Information 10
Table 3 Physical Laboratory Testing Results 12
Table 4 Monitoring Well Information 13
Table 5 Groundwater Levels and Elevations 13
Table 6 Summary of Thornthwaite Method Calculations 15
Table 7 Pre-Development Land Use Summary 15
Table 8 Pre-Development Water Balance Results 16
Table 9 Post-Development Land Use Summary 16
Table 10 Post-Development Water Balance Results 17
Table 11 Post-Development Water Balance Results (With Enhanced Infiltration) 17
Table 12 Pavement Structure for Local Roadway 20
Table 13 Minimum Depth (mbgs) / Elevation for Footings 21
Table 14 Preliminary Bearing Pressure for Foundation Design 21
Table 15 Soil Types and Slope Information 23

Figure Index

Figure 1 Site Location Plan 28
Figure 2 Test Hole Plan 29
Figure 3 Regional Topography 30
Figure 4 Physiography 31
Figure 5 Surficial Geology 32
Figure 6 Quaternary Geology 33
Figure 7 Bedrock Geology 34
Figure 8 Source Water Protection – HVAs and SGRAs 35
Figure 9 Source Water Protection – WHPAs 36
Figure 10 Groundwater Elevations 37

Appendices

Appendix A MECP Well Records
Appendix B Test Pit and Borehole Logs
Appendix C Geotechnical Laboratory Testing Results
Appendix D Water Balance Calculations

1. Introduction

GHD Limited (GHD) was retained by Stalwood Homes (Client) to conduct the following hydrogeological and geotechnical investigation of a proposed residential development located at 9380 Burwash Road in Baltimore, Ontario (herein referred to as "the Site"). The location of the Site is provided on the **Site Location Plan, Figure 1**.

The Site encompasses an area of nearly 30 hectares (ha) (i.e. 298,780.7 square metres) that is to include the development of up to 167 single-detached and semi-detached residential homes, stormwater management facilities, an open space block for parkland / recreational purposes, internal streets and a shared wastewater treatment facility (Block 11). There is also a gas line easement that crosses the Site. The future lots will be municipally serviced for drinking water and utilize a communal Miranda septic system. The concept plan was produced by Ecovue Consulting Services Inc. (Ecovue) dated June 30, 2026.

The purpose of the hydrogeological and geotechnical investigation was to obtain subsurface information regarding the soil and groundwater conditions at the test hole locations and prepare a report summarizing the conditions encountered. The hydrogeological portion of this report provides information regarding the groundwater depth and flow direction as well as water balance calculations based upon the provided concept plan. The geotechnical portion of this report provides engineering recommendations regarding earthwork construction, backfilling, groundwater control during construction, bearing capacity and foundations design, slab-on-grade design, service installation (bedding and backfill), and pavement structure for roadways.

The scope of work included a desktop review of available geological and groundwater mapping and a review of the Source Protection Information Atlas; a review of the Ministry of the Environment, Conservation and Parks (MECP) well records; a well survey of homes within approximately 500 m of the development lands; the drilling of boreholes and excavation of test pits to investigate the subsurface conditions; and installation of monitoring wells to facilitate water level measurements. In addition, a generic water balance evaluation was completed (i.e. pre- and post-development runoff / infiltration conditions) in support of potential mitigative options such as the use of LIDs strategies. GHD notes that the water balance evaluation does not include tasks associated with a storm water study and / or related design work. As the work at this stage is investigative, this report does not include an application for an Environmental Activity and Sector Registry (EASR) permit for construction dewatering, sewer use by-law testing etc.

This report is organized into the following sections:

Section 1.0 – Introduction: Outlines the purpose, objectives and scope of work, and presents the report organization.

Section 2.0 – Background: Provides a description of the existing Site conditions, background information and surrounding land uses. The regional environmental setting including the physiography, topography, surface water features and the surficial geology is presented. This section of the report also reviews information from the Source Protection Information Atlas. The source protection information for the Site is based upon information current as of January 30, 2026. Highly vulnerable aquifers, significant groundwater recharge areas and wellhead protection areas are protected under the Clean Water Act (2006).

Section 3.0 – Methodology: Describes the field activities and methodologies used to assess the hydrogeological and geotechnical conditions and to evaluate potential impacts associated with the undertaking.

Section 4.0 – Field Investigation Results: Provides a detailed description of the Site geology, hydrogeology and hydraulic properties of the underlying stratigraphy.

Section 5.0 – Discussion and Recommendations: Discusses the hydrostatic units and flow direction. A water balance evaluation was completed providing calculations of the expected pre- and post-development infiltration values based upon the information provided to GHD. This section also provides geotechnical recommendations for the proposed development based on the soil and groundwater conditions encountered at the test hole locations.

Section 6.0 – Conclusions and Closure: Provides the overall conclusion and closure of the report based upon the assessment findings of the document. This section is followed by a Statement of Limitations.

2. Background

2.1 Site Description

The Site is located at 9380 Burwash Road in Baltimore, Ontario and encompasses an area of nearly 30 ha (i.e. 298,780.7 square metres). The Site is situated within the Ganaraska Region Source Protection Area and is within a wellhead protection area (WHPA) zones C and D (score of 2 for both zones representing the lowest vulnerability) according to the Source Protection Atlas dated January 30, 2026, by the Ministry of the Environment, Conservation and Parks (MECP). WHPA-C is the zone through which it takes groundwater to travel between two (2) and five (5) years while WHPA-D is the zone through which it takes groundwater to travel between five (5) and 25 years.

At the time of GHD's field investigation, the Site predominantly consisted of agricultural pastureland with naturalized / treed areas located in the north / northeast area of the Site. The lands surrounding the Site consist of forest; residential lots; a public school; and a recreation centre. Lands to the east are privately serviced for water and septic while the lands to the south are on municipal services. At this time, it is understood by GHD that the Site developed is to be serviced on municipal water and a communal septic system.

GHD was provided with a concept plan illustrating the planned development to consist of up to 167 single-detached and semi-detached residential lots that will be developed in three (3) phases. The concept plan also depicted three (3) stormwater management blocks, a septic treatment block, an open space block to be used for parkland / recreational purposes, an internal road network and a gas line easement that crosses the Site.

2.2 Regional Setting

The area topography is generally considered to be rolling to hilly. There is a topographical divide on the Site with the lands sloping toward the northwest and southeast from the central east area with relief change on the order of about 20 m to the southeast area and on the order of about 40 m to the northwest area. At this time, GHD is unaware of final grading changes due to cut and fill activities. The regional topography is provided on **Figure 3**. Excess surface water will flow in accordance with local topography towards the northwest and southeast areas of the Site towards tributaries of Baltimore Creek to the north and south of the Site, respectively. Baltimore Creek is located to the west of the Site and flows into Cobourg Brook which discharges into Lake Ontario.

The Site is situated within the physiographic region known as the South Slope and locally within a drumlinized till plain (**Figure 4**) including a drumlin feature located northeast of the Site.

The surficial geology in the area of the Site, illustrated on **Figure 5**, consists predominantly of stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain. Within the low-lying tributary areas are modern alluvial deposits of clay, silt, sand and gravel.

The Quaternary geology (**Figure 6**) indicates that the majority of the Site is within a glaciolacustrine deposit described as sand, gravelly sand and gravel nearshore and beach deposits. Within the northeast portion of the Site is a small area consisting of a till described as undifferentiated, predominantly sandy silt to silt matrix, commonly rich in clasts, and often high in total matrix carbonate content.

The bedrock of the area consists of limestone of the Upper Ordovician era. Bedrock mapping is provided as **Figure 7**. The thickness of the overburden at the Site is expected to be between 50 and 75 m based on review of local MECP well records. Bedrock was not encountered in any of the boreholes or test pits excavated at the Site.

Based on the information reviewed from the "Source Water Protection Atlas", the Site is within the Ganaraska Region Source Protection Area. A small portion of the at the northernmost tip and southwest corner is depicted to be within a highly vulnerable aquifer (HVA). The eastern portion of the Site is indicated to be within a significant groundwater recharge area (SGRA). The HVA areas and SGRA are illustrated on **Figure 8**. A SGRA is defined as an area where water seeps into an aquifer from rain and melting snow, supplying water to the underlying aquifer. An HVA aquifer occurs where the subsurface material offers limited protection from contamination resulting from surface activities.

The Site is also within WHPA zones C and D (score of 2) as depicted on **Figure 9** due to a municipal well known as the "Creighton Heights Well Supply". At this location there are three (3) supply wells that are confined overburden wells at depths of 62, 64.9 and 63.4 m at Well 1, Well 6 and Well 7, respectively. A WHPA is defined as the surface and subsurface area surrounding a water well or well field that supplies a municipal residential system through which contaminants are reasonably likely to move so as to eventually reach the water well. Drinking water threats to the Creighton Heights well field can only occur based upon the Policy Applicability Map included in the Ganaraska Source Protection Plan. The location, scale and nature of an activity determine if it poses a low, moderate or significant threat to the municipal drinking water source. Policies in the Ganaraska Source Protection Plan only apply to significant drinking water threats. Within the Creighton Heights Wellhead Protection Area, the current existing significant drinking water threats include septic systems, home heating fuel oil and dense non-aqueous phase liquids (used in automotive industry). A source water risk assessment would be required to confirm the potential risk of the proposed development to the well supply.

The Site is not within a wellhead protection area Q1 or Q2. WHPA Q1/Q2 means that activities that take water without returning it to the same source may be a threat (Q1) and activities that reduce recharge may be a threat (Q2). This Site is not a WHPA Q1 or Q2 area. Activities that take water would include construction dewatering or other groundwater pumping. Pumping or dewatering activities may require appropriate permitting from the MECP but are not a concern from a source water protection perspective.

2.2.1 Existing Local Water Supplies

The Site and areas surrounding the Site are mixed for municipally serviced water and privately serviced water wells. GHD also conducted a well survey to assess the local water supplies. The results of the well survey were provided in a separate addendum letter dated December 16, 2024. The locations of historical, and potentially current, water wells and their corresponding data recorded by the MECP within about 500 m of the Site are provided in **Appendix A**. Based on the review of the well records, there are nearby domestic water supply wells located within 500 m of the Site. The well record information indicates there are 38 well records within 500 m of the Site consisting of:

- Twelve (12) dug / bored well records;
- Twenty-three (23) drilled overburden well records; and
- Three (3) bedrock well records.

There were also one (1) monitoring well record and three (3) abandonment records which are not considered in the statistical summary provided in **Table 1**. The data suggests that groundwater was encountered within dug / bored wells at an average depth of 4.7 m with an average yield of 14.7 L/min; within drilled overburden wells at an average depth of 49.8 m with an average yield of 39.1 L/min; and within drilled bedrock wells at an average depth of 64.1 m with an average yield of 40.3 L/min.

Table 1 MECP Well Record Data

Well Use	Well Type/Unit	No. Wells	Well Depth Min – Max (Avg) (mbgs)	Water Encountered Depth Min – Max (Avg) (mbgs)	Static WL Min – Max (mbgs)	Yield Min – Max (Avg) (L/min)
Water Supply	Overburden – Dug/Bored	12 (32%)	5.5 – 12.8 (7.1)	2.4 – 12.8 (4.7)	0.2 – 11.4 (3.7)	3.8 – 26.5 (14.7)
Water Supply	Overburden – Drilled	23 (61%)	15.2 – 86.9 (50.0)	15.2 – 84.7 (49.8)	0 – 45.7 (14.6)	7.6 – 113 (39.1)
Water Supply	Bedrock	3 (7%)	7.9 – 73.5 (43.3)	40.2 – 78.9 (64.1)	15 – 30.5 (22.9)	18.9 – 76 (40.3)
Total		**38**				
Monitoring Wells	Drilled	1	21.8	3.0	NA	NA
Abandonments	Unknown	3	8.9 – 71.3 (41.8)	22.3	NA	NA

Notes:
Data based on MECP well record information (refer to **Appendix A** for well information).
*Abandonments and monitoring well records are not included in the statistical data summarized in **Table 1**.

2.3 Previous Investigations

No previous hydrogeological or geotechnical investigation reports were provided to GHD for review.

3. Methodology

To achieve the purpose and objectives of this hydrogeological and geotechnical investigation, the following activities and tasks were undertaken:

– Preparation of a Site-specific health and safety plan and completed underground utility locate clearances including public and private locates;
– Conducted a walkover inspection of the Site;
– Advanced boreholes and test pits for obtaining hydrogeological and geotechnical parameters and installation of monitoring wells within select boreholes to facilitate future groundwater monitoring;
– Obtained groundwater levels from the drilled monitoring wells to evaluate depth to groundwater and flow direction;
– Surveyed ground elevations of the monitoring wells, boreholes, and test pit locations;
– Completed a well survey within 500 m of the Site to supplement the MECP well records;
– Geotechnical laboratory testing in accordance with the latest editions of the ASTM Standards; and,
– Prepared this geotechnical and hydrogeological investigation report providing factual data, analysis and recommendations including a water balance for assessing pre- and post-construction infiltration values.

3.1 Health and Safety

For projects that incorporate field activities, GHD conducts Health and Safety planning. For this project, a site-specific Health and Safety Plan (HASP) was prepared and implemented during the field activities. The HASP presents the visually observed Site conditions to identify potential physical hazards to field personnel. Required personal protective equipment was also listed in the HASP. It is mandatory for GHD personnel involved in the field program, to read and have a copy of the HASP available at the Site.

3.2 Utility Clearance

GHD completed a pre-drilling Site visit to review the Site conditions and access restrictions. Based on the limits of approach, the boreholes and test pits were positioned appropriately to avoid potential obstructions. The test holes were placed in the field based on our understanding of the proposed development.

Prior to initiating the subsurface investigation activities, the applicable utility companies (gas, hydro, network cables, water, wastewater, etc.) were contacted, to demarcate the location of their respective underground utilities to ensure that service lines would not be damaged during the investigative works.

GHD also retained a specialist private services locator (Utility Marx) to locate any underground private utilities that could potentially be present at the Site within the areas of intrusive work. The proposed boreholes and test pits were positioned at appropriate locations to avoid existing service lines.

3.3 Test Pit and Borehole Advancement

The scope of work consisted of advancing four (4) test pits on May 2, 2024, and eight (8) boreholes between August 19 and August 20, 2024. Three (3) of the boreholes (BH4-26, BH6-24, and BH8-24) were equipped as monitoring wells. The test pits and borehole locations are shown on **Figure 2**. Following their installation, the monitoring wells were documented with the MECP and became the property of the Site's owner. Test pit and borehole information is provided in **Table 2** with gradation testing results presented in **Table 3**. The completed monitoring well details are documented in **Table 4.** The logs of the test pits and boreholes / monitoring well details are presented in **Appendix B.**

The four (4) test pits (TP1-24 through TP4-24) were excavated to depths ranging from about 2.2 to 2.8 metres below ground surface (mbgs) by an excavator retained by the Client. The drilling work was carried out by a track-mounted drilling rig, supplied and operated by GET Drilling (GET) MECP-licensed well drillers, under the full-time supervision of a GHD technical representative. The boreholes were advanced to the termination depths ranging between 6.2 to 6.7 mbgs. The monitoring wells were installed by GET consistent with the requirements of Ontario Regulation (O. Reg.) 903 – Wells (R.R.O 1990).

The boreholes were advanced using continuous solid stem augers and soil samples were collected using a 50 millimetre (mm) outside diameter split spoon sampler in general accordance with the specifications of the Standard Penetration Test Method (ASTM D1586). The relative density or consistency of the subsurface soil layers were measured using the Standard Penetration Test (SPT) method, by counting the number of blows ('N') required to drive a conventional split barrel soil sampler 300 mm in depth. Groundwater level observations and measurements were made in the boreholes as drilling proceeded and upon completion of drilling.

Monitoring wells were constructed with 50 mm (2-inch) Schedule 40 PVC screen and casing. The well screens are 3.05 m (10 feet) in length and pre-slotted (No. 10 slot) (refer to **Table 3**). Silica sand pack was placed at the bottom of the monitoring well screen and typically extended 0.3 m above the screen. The remaining annular space was sealed with bentonite, and the wells were completed with protective monument style casings. The installation details for each monitoring well are provided in the respective borehole logs. GHD notes that installed monitoring wells will need to be abandoned in accordance with O. Reg. 903 once no longer required.

The monitoring wells and test pit locations were surveyed with an EOS Arrow Gold Plus that streams to the Real Time Kinetic (RTK) Network connected to the NAD 83 datum. The ground elevations are provided for engineering analysis purposes only and should be confirmed by a licensed surveyor.

3.4 Physical Laboratory Testing

The physical laboratory testing was completed in accordance with the latest editions of the ASTM standards. A GHD technical representative logged the soil samples encountered in the test holes and examined the samples as they were obtained. The recovered samples were transferred to the GHD laboratory, where they were reviewed by GHD. The detailed results of the examination are recorded on the test hole logs.

Soil samples retrieved during the test pit and drilling programs were submitted for physical testing. Moisture content testing was completed upon all of the recovered soil samples. Grain size analyses, consisting of hydrometer testing, were carried out on eight (8) selected samples collected from the test pits and three (3) selected samples collected from the drilled boreholes. The results of the moisture content and grain size distribution analyses results are recorded at their corresponding depths on the individual logs in **Appendix B**. The laboratory grain size distribution analyses are summarized in **Table 3** and the data is provided in **Appendix C**.

3.5 Groundwater Level Monitoring

Manual groundwater levels were collected using a Solinst water level meter. Groundwater levels were collected from the monitoring wells on September 12, 2024. The water levels are summarized in **Table 4**.

3.6 Water Balance

To understand the pre- and post-infiltration components, a water budget analysis was undertaken for the Site to evaluate the amount of water surplus generated for the existing and proposed Site conditions and assess the potential impacts that may occur in the recharge / discharge characteristics related to the proposed development. The water balance is considered at this time and can be confirmed upon receipt of the Draft Plan of Subdivision is provided.

For purposes of this water balance, the Site was assumed to act as one (1) subwatershed as groundwater flow is towards tributaries of Baltimore Creek and ultimately flows to Baltimore Creek. It is our opinion that groundwater infiltration should be maintained to support these receptors.

This evaluation is based upon the conceptual plan provided to GHD that includes the planned development of 167 lots in addition to stormwater management facilities, open space areas and an internal road network.

The objective of this water balance is to illustrate that post-development infiltration within the developable area can meet or be close to pre-development values. GHD utilized the Thornthwaite Method to complete this water balance. Based upon monthly temperature and precipitation average values, the method calculates water surplus. Infiltration rate into the subsurface is based upon soil types, land cover and topography and is based upon MOEE Hydrogeological Technical Information Requirements for Land Development Applications, April 1995. The computations have used detailed parameters such as precipitation (Oshawa weather station using data from 1991 to 2020 was used), regional evapotranspiration, infiltration and runoff. Weather data from Oshawa (climate station ID 6155875) was selected as it was the closest weather station to the Site (~58 km away) using the most updated weather normalized data. The detailed calculations are provided in **Appendix D**.

4. Field Investigation Results

The following sections provide a detailed description of the field activities completed including geology and hydrogeology of the Site based on the results of the investigation completed and on the available background information. Detailed stratigraphy is shown on the test hole logs.

It should be noted that the subsurface conditions are only confirmed at the test hole locations and may vary between and beyond the test hole locations. The boundaries between the various strata, as shown on the test hole logs are based on non-continuous sampling and drilling resistance noted and observed at the time of drilling. These boundaries represent an inferred transition between the various strata, rather than precise planes of geological change.

4.1 Summary of Test Hole Information

UTM coordinates and ground surface elevations for each borehole, monitoring well and test pit location were obtained by GHD during the subsurface exploration program in the approximate locations illustrated on **Figure 2**. The location of each test hole is referenced to UTM Zone 17, and ground elevations are based upon measurements obtained using EOS Arrow Gold Plus connected to the RTK network. The following table presents a summary of investigated depths, surface elevations, and UTM coordinates for the test hole locations:

Table 2 Borehole and Test Pit Information

Test Hole ID	Location – UTM Coordinates System		Test Hole Depth (m)	Ground Elevation (m)
	Northing	Easting		
BH1-24	4878565	729006	6.2	191.1
BH2-24	4878735	728961	6.2	196.7
BH3-24	4878870	729013	6.4	196.9
BH4-24	4878894	728849	6.7	186.6
BH5-24	4879089	728982	6.6	191.2
BH6-24	4878940	729117	6.2	200.1
BH7-24	4878749	729184	6.5	190.8
BH8-24	4878617	729170	6.2	181.9
TP1-24	4879078	729023	2.8	193.5
TP2-24	4878837	728902	2.8	192.0
TP3-24	4878690	728984	2.8	197.0
TP4-24	4878810	729182	2.2	192.5

It should be noted that the provided coordinates and elevations are approximate and should not be used for construction purposes. The ground elevations are provided for engineering analysis purposes only and should be confirmed by a licensed surveyor.

4.2 Local Geology and Subsurface Conditions

Based upon information obtained from this investigation, the following surficial materials and geologic deposits underlie the Site. Bedrock was not encountered within the investigation conducted by GHD.

- **Surficial Soil** – Topsoil
- **Native Deposit** – Silty Sand, Sandy Gravel
- **Native Deposit** – Silty Sand Till

Surficial Soils – Topsoil

A layer of surficial topsoil was encountered in the boreholes and test pits with the exception of boreholes BH1-24 and BH8-24. The topsoil layer in the test holes ranged from about 75 to 250 mm in thickness and averaged about 190 mm in thickness. This soil was observed to be in a damp, loose state, with a silty, highly organic content. As such, it is expected to be devoid of any structural engineering properties.

Native – Silty Sand

Below the topsoil (or surficially in boreholes BH1-24 and BH8-24) was a silty sand deposit. The silty sand material was comprised of sand and silt with varying amounts of gravel and clay and occasionally contained rootlets / organics. This layer was observed to extend to depths ranging from about 0.8 mbgs to 1.8 mbgs. The material was generally described as brown / light brown and described as moist.

The SPT N-values obtained from within the silty sand layer ranged from 3 blows / 300 mm to 21 blows / 300 mm indicating a generally very loose to compact in-situ relative density. The average SPT N-value for this soil deposit was approximately 9 blows / 300 mm indicating a loose in-situ relative density on average.

Based on grain size distribution analyses of two (2) selected samples, the native silty sand had compositional ranges of 14 to 18 percent gravel, 48 to 50 percent sand, 22 to 28 percent silt and 8 to 12 percent clay-sized particles. The measured moisture content of this till deposit ranged 6 to 16 percent by weight.

Native – Sandy Gravel

Below the topsoil and silty sand was a 1.3 m thick layer of gravelly sand at TP3-24 consisting of 68 percent gravel, 28 percent sand, 3 percent silt and 1 percent clay-sized particles. The gravelly sand layer was not observed within any other test hole.

Native – Silty Sand Till

Below the native silty sand / sandy gravel within all the test holes was a native glacial till deposit. The till was generally comprised of silt sand with varying amounts of gravel and clay. Auger grinding was observed during drilling due to occasional cobbles within the till layer. The till layer was observed to the bottom of all test holes. The material was generally described as light brown to grey and moist to wet.

The SPT N-values obtained from within the till layer ranged from 8 blows / 300 mm to over 100 blows / 300 mm indicating a generally loose to very dense in-situ relative density. The average SPT N-value for this soil deposit was approximately 52 blows / 300 mm indicating a very dense in-situ relative density on average.

Based on grain size distribution analyses of eight (8) selected samples, the till had compositional ranges of 9 to 39 percent gravel, 32 to 50 percent sand, 9 to 33 percent silt and 1 to 19 percent clay-sized particles. The measured moisture content of this till deposit ranged 5 to 14 percent by weight.

4.3 Physical Laboratory Testing Results

A total of eleven (11) samples collected from the soils encountered at the Site were selected for testing of grain size distribution analyses. The laboratory test results are summarized in the following table and detailed test results are presented in **Appendix C**.

Table 3 Physical Laboratory Testing Results

Test Hole ID	Sample Depth (mbgs)	Grain Size (%)				Soil Description (USCS Symbol)
		Gravel	Sand	Fines		
				Silt	Clay-size[(1)]	
TP1-24	1.2 – 1.5	18	48	22	12	Silty Sand (SM)
TP1-24	2.6 – 2.8	20	42	21	17	Till – Silty Sand (SM)
TP2-24	0.3 – 0.8	14	50	28	8	Silty Sand (SM)
TP2-24	1.6 – 1.8	11	50	22	17	Till – Silty Sand (SM)
TP2-24	2.6 – 2.8	26	40	20	14	Till – Silty Sand (SM)
TP3-24	1.5 – 1.7	68	28	3	1	Sandy Gravel (GP)
TP4-24	1.7 – 2.0	10	42	29	19	Till – Silty Sand (SM)
TP4-24	2.0 – 2.2	29	32	24	15	Till – Gravelly Silty Sand (SM)
BH4-24	2.3 – 2.9	18	41	27	16	Till – Silty Sand (SM)
BH5-24	0.8 – 1.4	9	43	33	15	Till – Silty Sand (SM)
BH8-24	3.0 – 3.4	39	49	9	3	Till – Sand and Gravel (SP-SM)
[(1)] Soil particles <2 µm						

4.4 Groundwater Observations and Measurements

Groundwater observations and measurements were collected from the open test holes during and upon completion of drilling or excavating. Groundwater seepage was encountered within boreholes BH1-24 and BH7-24 during the drilling process. Minor, slow groundwater seepage was noted during the test pit process within three (3) of the test pits and did not result in any significant accumulation within the test pits. Test pit TP3-24 did not encounter groundwater during the excavation process.

Monitoring wells were installed within three (3) of the boreholes. A summary of the monitoring well details are provided in **Table 4**. The accumulation depth refers to the approximate measured depth to groundwater within the open borehole upon completion of drilling. In general, soils become grey in colour at the depths where permanent groundwater may be encountered. The volume of groundwater from within the underlying deposits is generally expected to be minor; however, pockets of more permeable material may be encountered.

Table 4 Monitoring Well Information

Location	Ground Elevation (m)*	Screened Interval		Sandpack Interval (effective screen)		Screened Material	Groundwater Accumulation**	
		Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)		Depth (mbgs)	Elevation (m)
BH1-24	191.1	-	-	-	-	-	5.9	185.2
BH2-24	196.7	-	-	-	-	-	None to 190.5 m	
BH3-24	196.9	-	-	-	-	-	None to 190.5 m	
BH4-24	186.6	3.0 – 6.1	183.6 – 180.5	2.7 – 6.1	183.9 – 180.5	Till – Silty Sand	None to 179.9 m	
BH5-24	191.2	-	-	-	-	-	None to 184.6 m	
BH6-24	200.1	3.0 – 6.1	197.1 – 194.0	2.6 – 6.1	197.5 – 194.0	Till – Silty Sand	None to 193.9 m	
BH7-24	190.8	-	-	-	-	-	4.3	186.5
BH8-24	181.9	3.0 – 6.1	178.9 – 175.8	2.2 – 6.1	179.7 – 175.8	Till – Silty Sand	None to 175.7 m	

Notes:
m = metres; mbgs = metres below ground surface
- denotes no monitoring well installed
(*) Ground elevations were measured using an EOS Arrow Gold Plus GPS system and, are for the purposes of evaluating groundwater elevation and flow direction and should not be relied upon as a legal survey or topographic elevation survey.
(**) Groundwater accumulation noted in open borehole upon completion of drilling.

GHD collected groundwater levels from the monitoring wells on September 12, 2024. The water level data is summarized in **Table 5**.

Table 5 Groundwater Levels and Elevations

Monitoring Well ID	Ground Surface Elevation (m)	Well Pipe Stick Up (m)	Water Levels (measured on September 12, 2024)	
			Water Level (mbgs)	Groundwater Elevation (m)
BH4-24	186.6	1.1	3.1	184.5
BH6-24	200.1	1.1	3.3	196.8
BH8-24	181.9	0.8	1.0	180.9

Notes:
mbgs = metres below ground surface; m = metres
Ground surface elevations are for the purposes of evaluating groundwater elevation and flow direction and should not be relied upon as a legal survey or topographic elevation survey.

4.5 Well Survey Results

The well survey was documented within an addendum letter dated December 16, 2024. The wells surveyed appeared to generally be downgradient of the proposed development. The addendum letter indicated that impacts to downgradient wells are not expected from the proposed residential development. Additional details are provided in the addendum letter.

5. Discussion and Recommendations

5.1 Hydrogeology

5.1.1 Hydrostratigraphic Units

The primary hydrostratigraphic units (i.e. aquifer / aquitard units) underlying the Site include the following:

- **Topsoil** – unsaturated
- **Native Silty Sand / Sandy Gravel** – unsaturated to minor groundwater seepage (anticipated to be seasonal)
- **Silty Sand Till** – unsaturated to minor groundwater seepage (aquitard)

Based on the test hole investigation, the shallow sandy gravel and silt sand is generally expected to be unsaturated with some minor seepage expected to be encountered periodically across the Site. Seasonally or during significant storm events, surface water may infiltrate the topsoil and into these layers and may also become perched upon the underlying till deposit. In our opinion, the Site is hydraulically discontinuous within the shallow sand / gravel layer and there is not a shallow permanent groundwater table across the Site.

Similarly, the deeper till is also expected to be unsaturated. The till deposit is generally expected to act as an aquitard underlying the Site. There may also be thin sand seams throughout the unit providing a higher permeability conduit for potential groundwater flow; however, the volume of groundwater from these seams is generally expected to be minimal.

5.1.2 Flow Direction

Based upon the groundwater level data collected, there appears to be a flow divide at the Site as depicted on the **Groundwater Elevations, Figure 10**. The groundwater flow direction is indicated to be flowing radially from the central area of the Site toward the north, west and south. Groundwater flow through the till deposit is expected to be slow. It should be noted that groundwater levels are transient and tend to fluctuate with the seasons, periods of precipitation and temperature.

5.1.3 Construction Dewatering

Excavations are expected to extend into the underlying glacial till deposit for this development. Based upon our test pits and boreholes, very little groundwater seepage is expected to be encountered at depth within the till; however, if encountered the volume is anticipated to be minimal. Dewatering to remove groundwater seepage as well as surface water runoff and precipitation to ensure safe and dry working conditions may be required depending on the depth of the excavation and the time of the year. Pumping from collection sumps to an acceptable outlet will control this expected groundwater infiltration.

Should any excavations require more intensive dewatering or groundwater control, the use of filtered sumps, or other suitable method of dewatering is recommended. If short-term pumping of groundwater at volumes greater than 50,000 L/day is required during the construction stage, the Environmental Activity and Sector Registry (EASR) must be completed. Pumping groundwater at volumes greater than 50,000 L/day will depend on the season and construction methodology.

It is not the purpose of this report to assess the planned water taking related to any required dewatering work. Once the detailed design drawings have been prepared, a water taking assessment can be completed to determine requirements of dewatering and recommendations for an EASR application, should it be needed. At the construction stage of the development, any monitoring wells at the Site are to be decommissioned in accordance with O. Reg. 903 by a licensed and experienced contractor.

5.1.4 Water Balance

The following subsections describe the water balance and establish a post-development infiltration target for the proposed development. The Thornthwaite Method calculations are provided in **Appendix D.1** and are summarized in **Table 6**.

Table 6 Summary of Thornthwaite Method Calculations

Station	Precipitation (mm/yr)	Adjusted ET (mm/yr)	Surplus (mm/yr)
Oshawa (1991 – 2020)	906.4	591.6	314.8

The calculations indicate that 314.8 mm/year of water is available as either runoff or infiltration.

5.1.4.1 Pre-Development Water Balance

The pre-development water balance incorporated the existing soils, slope and agricultural areas. The infiltration factor for the area was calculated from the table of values presented in the "Land Development Guidelines"[1]. It is based on three sub-factors which are:

- Topography sub-factor;
- Soil sub-factor; and
- Cover sub-factor.

A topography factor ranging from 0.1 (hilly) to 0.2 (rolling) was utilized for the various areas of the Site. A soil factor of 0.4 was used to represent the shallow sand / silty sand / gravelly sand observed at the Site. The existing vegetation factor for the pre-development site ranged from agriculture (0.1) to forest areas (0.2). **Table 7** summarizes the expected pre-development water balance values for the Site. Based upon the values presented below, 99.7% of the Site is pervious and 0.3% is impervious.

Table 7 Pre-Development Land Use Summary

Land Use	Area (m^2)
Agricultural	182,201
Treed / Naturalized	106,240
Existing Residential -Rooftops -Driveway -Lawn	 -775 -910 -8655
TOTAL AREA	**298,781**

[1] MOEE Hydrogeological Technical Information Requirements for Land Development Applications. April 1995.

Table 8 summarizes the pre-development water balance calculations based upon the land uses observed by GHD:

Table 8 Pre-Development Water Balance Results

Area (m^2)	Area for Recharge (m^2)	Precipitation (m^3/yr)	ET (m^3/yr)	Runoff (m^3/yr)	Infiltration (m^3/yr)
298,781	298,006	270,815	176,073	25,385	69,358
% of Precipitation			65.0%	9.4	25.6

The detailed calculations are provided in **Appendix D**.**2**. Based upon the calculations, the pre-development infiltration is estimated to be 69,358 m^3/year for the Site or about 232 mm/year. In our opinion, the infiltration rate appears to be suitable for the Site given that the soils below the topsoil were generally observed to consist of sand, gravelly sand or silty sand.

5.1.4.2 Post-Development Water Balance (No Infiltration Enhancements)

The computation of the water budget was repeated for the proposed development assuming no infiltration enhancements, that is, runoff from impervious surfaces is unrecoverable and not infiltrated into the ground. The anticipated impact of the development is related to increased runoff from imperious surfaces such as roof tops and asphalt surfaces. These are assumed to be impervious surfaces with zero infiltration capacity in this model. A summary of the computations is based upon the conceptual plan provided to GHD. A summary of the post-development land use distribution is estimated as outlined in **Table 9**.

Table 9 Post-Development Land Use Summary

Land Use	Area (m^2)
Impervious Surfaces	
Residential – 167 single and semi-detached lots -rooftops (assuming each rooftop covers 465 sq.m.) -driveways (assuming each driveway is 15 m by 5 m)	 -78,120 -12,600
Asphalt -20 m right-of-way (assume 50% is asphalt)	 -20,318
Stormwater Facilities -Assume 75% of the stormwater facility is covered by impervious pond area	 -13,541
Shared Septic Treatment Area -Assume 25% of the facility is covered by impervious area	 -1,045
Impervious Areas (m^2) / % Impervious	**127,948 / 42.8%**
Pervious Surfaces	
Residential – 167 single and semi-detached lots -lawns	 -98,116
Asphalt -20 m right-of-way (assume 50% is lawn)	 -22,642
Stormwater Facilities -Assume 25% of the stormwater facility is covered by grassed areas	 -4,514
Shared Septic Treatment Area -Assume 75% of the facility is covered by pervious area	 -3,134
Gas Line Easement	

Land Use	Area (m^2)
-Assume naturalized area	-6,934
Open Space -Assume naturalized / treed area	 -35,493
Pervious Areas (m^2) / % Pervious	**170,833 / 57.2%**
Overall Site Area (m^2)	**298,781**

Based upon the areas outlined above, about 57% of the post-development Site is available for infiltration. This indicates a loss of more than 42% of the current pervious area.

The post-development infiltration calculations for the Site maintained the topography and soil infiltration factors established in the pre-development calculations. For landscaping / lawns, the infiltration factor was set at 0.15; however, for asphalt and rooftops the factor will be zero without consideration of infiltration enhancements / mitigation in this scenario. **Table 10** summarizes the post-development water balance calculations for the entire Site:

Table 10 Post-Development Water Balance Results

Area (m^2)	Area for Recharge (m^2)	Precipitation (m^3/yr)	ET (m^3/yr)	Runoff (m^3/yr)	Infiltration (m^3/yr)
298,781	170,833	270,815	124,262	106,360	40,193
% of Precipitation			45.9	39.3%	14.8%

Detailed calculations are provided in **Appendix D.3**. The post-development infiltration is estimated to be 40,193 m^3/year compared to pre-development. Based upon our calculations, the post-development infiltration deficit without infiltration from any impervious surfaces will be about 29,165 m^3/year representing a net reduction of about 42%.

5.1.4.3 Post-Development Water Balance (With Enhanced Infiltration)

Based upon the calculations presented above, infiltration and recharge to the shallow groundwater regime will be reduced by about 29,165 m^3/year for the pre-development site compared to post-development site and based upon the conceptual plan provided. The reduction does not consider the incorporation of LID strategies. LIDs may include downspout disconnection, infiltration trenches, enhanced grass swales, filter strips, bioretention etc.

GHD's calculations were done solely to demonstrate the general water balance for the Site based on the information provided and site-specific LID design criteria will be the responsibility of the stormwater engineer for the development, if required. However, for this development, it is reasonable to expect that the LID mitigation strategies will consider infiltration of roof top stormwater runoff to sodded areas for infiltration. Infiltration may also occur within ditches, side-margins, cracks etc. of internal asphalt roads and driveways. A 5% infiltration factor was included in the calculations to account for recharge related to internal roads (side margins, cracks, ditches etc). Based on our water balance calculations (refer to **Appendix D.4**), the pre-development water balance will be maintained by directing rooftop water to sodded areas / naturalized areas for infiltration (and assuming that 50% of the rooftop runoff will infiltrate). This strategy will maintain the pre-development infiltration and shallow groundwater baseflow. The following table summarizes the post-development water balance results utilizing downspout disconnection as the LID strategy:

Table 11 Post-Development Water Balance Results (With Enhanced Infiltration)

Area (m^2)	Area for Recharge (m^2)	Precipitation (m^3/yr)	ET (m^3/yr)	Runoff (m^3/yr)	Infiltration (m^3/yr)
298,781	170,833	270,815	124,262	77,216	69,337
% of Precipitation			45.9%	28.5%	25.6%

By infiltrating 50% of the rooftop runoff from each of the 167 single-detached or semi-detached lots, the pre-development infiltration will be maintained.

The following bullets are provided as potential options that could be further evaluated for feasibility at the Site and are for consideration only to improve infiltration:

- Reduction of grading to 0.5 – 1.0% slopes and swales to allow for additional evapotranspiration and infiltration.
- Scarification, or tilling of the soil to a depth of approximately 300 mm, would enhance evapotranspiration and infiltration within landscaped areas to overcome soil compaction that occurs during construction. Also, adding topsoil to a minimum depth of 300 mm to promote increased infiltration.

For further reducing stormwater runoff, landscaped areas could include the plantings of trees (for example), resulting in greater evapotranspiration and further decreasing runoff.

5.2 Septic Waste Disposal

GHD understands that a communal Miranda system will be used for septic waste disposal for this development. The system is an advanced sewage treatment system and will likely require approval through the applicable regulatory framework rather than a standard Part 8 septic system approval alone. Discussion of the Miranda system will be provided under separate cover by others.

5.3 Geotechnical

The Site encompasses an area of nearly 30 ha and is proposed to be developed with 167 single-detached and semi-detached residential lots. The development will include residential homes, stormwater management blocks, a septic treatment area, an open space block, and internal streets. The future lots will be serviced on municipal water and a communal septic system that services the development. A concept plan produced by Ecovue has been established at the time of this report.

Based upon the above comments and the borehole and test pit information, and assuming them to be representative of the subsoil conditions across the Site, the following comments and recommendations are offered.

5.3.1 Site Preparation, Grading and Backfill

Based on the subsurface conditions encountered in the test pits and boreholes, the Site is generally underlain by a surficial layer of topsoil underlain by native soils of very loose to very dense silty sand and sandy gravel which is underlain by silty sand till.

Any topsoil, vegetation, disturbed earth, organic and organic-bearing material should be removed from the footprint of the proposed building areas and from within pavement areas prior to site grading activities. If fill materials are encountered and contains topsoil / organics or rootlets, the material should not be used as backfill.

Prior to Site grading activity, the subgrade soils exposed after the removal of topsoil within proposed building areas should be visually inspected, compacted if required, and proof rolled using large axially loaded equipment. Any loose, organic, or unacceptable areas should be subexcavated and removed as directed by the Engineer and replaced with suitable fill materials compacted to a minimum of 98 percent Standard Proctor Maximum Dry Density (SPMDD). Clean earth fill used to raise grades in the proposed buildings should be placed in thin layers (200 mm thick or less) and compacted by a heavy appropriate roller to 98 percent SPMDD. Installation of engineered fill must be continuously monitored on a full-time basis by qualified geotechnical personnel.

The native soils encountered at the Site are generally suitable for reuse as backfill to raise site grades, as trench backfill during installation of buried services, or as pavement subgrade provided they are free of organic material, and are within the optimum moisture content. Control of moisture content during placement and compaction will be essential for maintaining adequate compaction. A final review and approval to reuse any soils should be made at the time of construction. If site soils cannot be reused as backfill, then an OPSS Granular “B” Type I material is recommended for general backfilling.

Backfill to basement foundation walls, should be accomplished using well graded Granular “B” Type I material complying with Ontario Provincial Standard Specifications (OPSS) 1010.

Installation of engineered fill, where required, must be continuously monitored on a full-time basis by qualified geotechnical personnel.

5.3.2 Service Installation

The materials encountered during this investigation at the anticipated service invert elevations consist of native till soils. As such, normal compacted bedding material, placed in the Class “B” or Class “C” arrangement, is recommended for all underground services. The recommended bedding material is Granular “A” or 19 mm crusher run (angular) stone, as per Ontario Provincial Standard Specifications (OPSS). The minimum recommended bedding thickness for the underground services is 150 mm. All bedding materials should be compacted to 100% of their Standard Proctor Maximum Dry Density (SPMDD). If trenching encounters overly wet or loose bedding subgrade, bedding material should consist of a graded clear stone product, such as HL-8 stone or High Performance Bedding (HPB), wrapped in non-woven geotextile fabric approximately equivalent to Terrafix 270R and placed in accordance with manufacture’s specifications.

Prior to placement of bedding, the exposed subgrade should be inspected by an experienced geotechnical engineer and any identified soft or loose areas should be subexcavated and replaced with suitably compacted fill. If the subgrade warrants, a woven geotextile (Terrafix 200W or approximate equivalent) may be required on the subgrade prior to bedding material, to protect soft and/or sensitive areas.

It is recommended that cover backfilling of the underground services be accomplished using Granular “A”, sand, or other suitable material as allowed by the Municipality’s standards, to a minimum of 300 mm above the pipe. Compaction of this material should attain 100 percent SPMDD. It is expected that the excavated, inorganic soils may be suitable for reuse as trench and road subgrade backfill, conditional upon suitable moisture content (within 2 % of optimum) and final review and approval by an experienced geotechnical engineer, at the beginning, and throughout the duration of construction. Compaction of any native soil in service trenches is recommended to be a minimum of 98 percent of its SPMDD.

It is recommended that the service bedding subgrade be inspected and approved by an experienced geotechnical engineer prior to placing the bedding fill, to ensure its suitability and consistency with conditions encountered during this investigation. Bedding and backfill materials, and compaction, should also be inspected and tested during placement.

5.3.3 Road Construction

Based on the results of this investigation, we would recommend the following procedures be implemented to prepare the proposed new roadways for its construction:

1. Remove any saturated or frozen earth, and boulders larger than 150 mm in diameter encountered at subgrade elevation for the full width of construction. It is expected that some of the excavated soils may be suitable for reuse as trench backfill, conditional upon suitable moisture content (within 2 % of optimum) and final review and approval by an experienced geotechnical engineer or representative at the time of construction.
2. Proof roll the subgrade for the purpose of detecting possible zones of overly wet or soft subgrade. Any unstable areas thus delineated should be reinforced with woven geotextile approximately equivalent to Terrafix 200W, or replaced with acceptable granular material compacted to a minimum of 98 percent of its SPMDD.
3. Contour the subgrade surface to prevent ponding of water during the construction and to promote rapid drainage of the sub-base and base course materials.
4. To maximize drainage potential, and ensure satisfactory pavement performance, 150 mm diameter perforated pipe subdrains should be installed along any curb lines. The pipe should be encased in filter fabric and surrounded by clear stone aggregate or another suitable free-draining material. It is recommended that the subdrains outlet to the storm sewer system.

5. Construct transitions between varying depths of granular base materials at a rate of 1:10 minimum.

It is expected that the proposed new roads will experience relatively low traffic volumes consisting of passenger vehicles and occasional heavy service trucks. In this regard, based on the subgrade soils encountered in our test holes the following minimum flexible pavement structure is recommended for roadway construction.

Table 12 Pavement Structure for Local Roadway

Profile	Material	Minimum Thickness (mm)	In Conformance with Form
Asphalt Surface	H.L.3	40	OPSS 1150
Asphalt Base	H.L.8	50	
Granular Base	Granular "A"	150	OPSS 1010
Granular Subbase	Granular "B"	300	

The following steps are recommended for optimum construction of paved areas:

1. The Granular "A" and "B" courses should be compacted to a minimum 100 percent of their respective SPMDD's.
2. All asphaltic concrete courses should be placed, spread and compacted conforming to OPSS 310 or equivalent. All asphaltic concrete should be compacted to a minimum 92.0 percent of their respective laboratory Maximum Relative Density (MRD).
3. Adequate drainage should be provided to ensure satisfactory pavement performance.

It is recommended that all fill material be placed in uniform lifts not exceeding 200 mm in thickness before compaction. It is suggested that all granular material used as fill should have an in-situ moisture content within 2 percent of their optimum moisture content. All granular materials should be compacted to 100 percent SPMDD. Granular materials should consist of Granular "A" and Granular "B" conforming to the requirements of OPSS.MUNI 1010 or equivalent.

The performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved as much as practically possible. It is noted that the above recommended pavement structures are for the end use of the project. The most severe loading conditions on pavement areas and the subgrade may occur during construction. As such, during construction of the project, the recommended granular depths may not be sufficient to support loadings encountered. Consequently, special provisions such as restricted lanes, half-loads during paving, etc. may be required, especially if construction is carried out during unfavourable weather.

5.3.4 Depth of Frost Penetration

It is recommended that the buildings' perimeter foundations and those foundations within unheated areas should be protected from frost effects by at least 1.2 m of earth cover or equivalent insulation. All exterior footings, footings beneath unheated areas, and foundations exposed to freezing temperatures should have at least such earth cover or equivalent synthetic insulation for frost protection. During winter construction exposed surfaces to support foundations must be protected against freezing by means of loose straw and tarpaulins, heating, etc.

5.3.5 Seismic Site Classification

The latest Ontario Building Code (OBC) requires the assignment of a Seismic Site Class for calculations of earthquake design forces and the structural design based on a two percent probability of exceedance in 50 years. According to the latest OBC, the Seismic Site Class is a function of soil profile and is based on the average properties of the subsoil strata to a depth of 30 m below the ground surface. The OBC provides the following three methods to obtain the average properties for the top 30 m of the subsoil strata:

– Average shear wave velocity.
– Average Standard Penetration Test (SPT) values (uncorrected for overburden).
– Average undrained shear strength.

For design purposes, based on the criteria listed in Table 4.1.8.4.A. of the OBC and the results obtained from standard penetration resistance of the underlying subsurface conditions and our knowledge of the regional geology, a Seismic Site Class 'D' can be used for the design of the proposed buildings.

5.3.6 Foundation Design

The common practice for the Serviceability Limit State (SLS) design of most structures and building foundations is to limit the total and differential foundation settlements to 25 mm and 19 mm, respectively. However, other serviceability criteria for the proposed building may be determined by the structural engineer considering tolerable settlement that would not restrict the use or operation of the facility.

Based on the available geotechnical data, it is expected that structural loading for the proposed residential structures may be supported on spread and continuous strip footings founded on the approved compact to very dense native soils or on engineered fill constructed on the approved compact to dense native soils. Depths at which the compact to dense native soils were encountered at each borehole is summarized in **Table 13** below.

Table 13 Minimum Depth (mbgs) / Elevation for Footings

Borehole ID	Minimum Founding Depth (mbgs)	Minimum Founding Elevation (m)
BH1-24	1.1	190.0
BH2-24	0.8	195.9
BH3-24	0.8	196.1
BH4-24	0.8	185.8
BH5-24	0.8	190.5
BH6-24	1.5	198.6
BH7-24	3.0	187.8
BH8-24	1.5	180.3

For design purposes, it is recommended that footings constructed on the compact to very dense native soils or on engineered fill placed directly on such soils be proportioned using the following bearing capacities:

Table 14 Preliminary Bearing Pressure for Foundation Design

Parameter	Bearing Pressure		
	Compact to Dense Undisturbed Native Soils	Engineered Fill	
		Granular Fill(2)	Site Earth Borrow Fill(2)
Factored Bearing Capacity at ULS (1)	180 kPa	225 kPa	180 kPa
Bearing Capacity at SLS	120 kPa	150 kPa	120 kPa

Notes:
(1) Resistance factor Φ =0.5 applied to the ULS bearing pressure for design purposes.
(2) At least 0.3 m of Granular or Earth Borrow fill. Quality of material is to be approved prior to use as engineered fill.

Any engineered fill upon which footings are placed must be a minimum thickness corresponding to the notes that accompany the above table. Footings (and foundation walls) placed on engineered fill must be suitably reinforced; as a minimum, and where not already specified in the design drawings, this reinforcing should use 2 continuous runs of 15M rebar throughout the footings, and 2 runs of 15M rebar throughout near the top and bottom of the foundation walls.

The following is recommended for the construction of any engineered fill for the footings:

1. Remove any and all existing vegetation, topsoil, fill, organics, and organic-bearing soils to the competent, undisturbed native soil from within the area of the proposed engineered fill.
2. The area of the engineered fill should extend horizontally 1m beyond the outside edge of the building foundations and then extend downward at a 1:1 slope to the competent native soil.
3. The base of the engineered fill area must be approved by a member of GHD prior to placement of any fill, to ensure that all unsuitable materials have been removed, that the materials encountered are similar to those observed, and that the subgrade is suitable for the engineered fill.
4. All engineered fill material is to be approved by GHD at the time of construction.
5. Place approved engineered fill, in maximum 200 mm lifts, compacted to 100 percent of its SPMDD. Any fill material placed under wet conditions should consist of an approved, rock-based fill, with the inclusion of appropriate geotextile fabric around the rock-based fill should the rock fill contain enough voids to warrant. Rock-based fill material should be compacted by a plate tamper and visually inspected by a geotechnical engineer to confirm appropriate compaction.
6. Full-time testing and inspection of the engineered fill will be required, to ensure compliance with material and compaction specifications.

Under no circumstances should the foundations be placed above organic materials, loose, frozen subgrade, construction debris, or within ponded water. Prior to forming, all foundation excavations must be inspected and approved by a member of GHD's geotechnical group. This will ensure that the foundation bearing material has been prepared properly at the foundation subgrade level and that the soils exposed are similar to those encountered during this investigation.

Should basement or otherwise subgrade areas be incorporated into any of the buildings' designs, it is recommended that for drainage purposes, perimeter drains be installed about the structure in accordance with the Ontario Building Code (OBC). The subdrains would serve to drain seepage water that infiltrates the backfill, intersect any groundwater that may be present, and help relieve hydrostatic pressures due to any seasonally high groundwater levels. The drains should consist of a perforated pipe, at least 100 mm in diameter, surrounded by clear, crushed stone and suitable filter protection. The drain should discharge to a positive sump or other permanent frost-free outlet. It is also strongly recommended that the building's foundation walls be sealed and waterproofed.

5.3.7 Slab-On-Grade Construction

Floors may generally be constructed as normal slabs-on-grade, on granular or 19 mm clear stone over native, inorganic subsoils. The floor slab should be formed over a base course consisting of at least 150 mm of Granular "A" backfill as per OPSS compacted to a minimum of 100 percent of its SPMDD or 150 mm of 19 mm angular clear stone material underneath basement areas, compacted by a plate tamper as per OBC requirements. All grade increases or infilling below the granular "A" or clearstone should be constructed in accordance with the engineered fill steps provided in **Section 5.3.6** of this report.

If the groundwater table is intersected by any basement excavations, the floor slabs should incorporate under slab drains, and a vapour barrier should be installed beneath the slab to prevent migration of moisture vapour. The drain should discharge to a positive sump or other permanent frost-free outlet.

All fill placed as engineered fill must be inspected, approved and compaction verified by personnel from GHD.

5.3.8 Basement and Retaining Walls

It is recommended that free draining backfill consisting of Granular “B” Type I material complying with Ontario Provincial Standard Specifications (OPSS) 1010, to basement and retaining walls be provided. Walls may be designed for lateral earth pressures using the following equation:

p = k (w h + q), where:

- p = the lateral earth pressure in kPa acting on the subsurface wall at depth h;
- ka= the coefficient of active earth pressure;

  (= 0.3 for walls restrained from the bottom only);

  (= 0.5 for walls restrained at the top and bottom*);
- kp= the coefficient of passive earth pressure, (= 3.0);
- w= the granular or native soil bulk density in kN/m^3;

  (= 21.0 kN/m^3 for well compacted, OPSS-approved Granular "B" or native soils);
- h = the depth (in metres) below the exterior grade at which the earth pressure is being calculated; and
- q = the equivalent value of any surcharge (in kN/m3) acting on the ground surface adjacent to the walls.

(*) This value is recommended for rigid walls retaining compacted backfill.

The recommended value for the coefficient for sliding friction between the soil and the concrete is 0.4. Also, any additional surcharge loading that will influence the wall must be taken into account in its design.

5.3.9 Excavation and Temporary Shoring

The Occupational Health and Safety Act (OHSA) regulations require that if works must enter an excavation deeper than 1.2 m, the excavation must be suitably sloped and/or braced in accordance with the OHSA requirements. OHSA specifies maximum slope of the excavations for four broad soil types as summarized in the following table:

Table 15 Soil Types and Slope Information

Soil Type	Base of Slope	Maximum Slope Inclination
1	Within 1.2 metres of bottom	1 horizontal to 1 vertical
2	Within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
3	From bottom of excavation	1 horizontal to 1 vertical
4	From bottom of excavation	3 horizontal to 1 vertical

The native soils underlying the Site are considered Type 3 soils above the groundwater level, and Type 4 if affected by surface water or groundwater seepage. If the above recommended excavation side slopes cannot be maintained due to lack of space or any other reason, the excavation side slopes must be supported by an engineered shoring system. The shoring system should be designed in accordance with Canadian Engineering Foundation Manual (4th Edition) and the OHSA Regulations for Construction Projects.

It is anticipated that excavation for foundation can be made with conventional equipment. The presence of cobbles and boulders should be expected with the native soils.

An examination of the slopes should be carried out by qualified soils personnel before any worker enters the excavation. The exposed fill material and native soil should be protected against erosion from water run-off or rain.

5.4 Storm Water Management Pond

It is GHD's understanding that there are three (3) blocks on the concept plan (Blocks 2 to 4) identified for Storm Water Management Facilities (i.e. Storm Water Management Pond (SWMP)). Borehole BH1-24 was located in the area of Block 2, BH8-24 was located within Block 3, and borehole BH4-24 was located in the area of Block 4 as shown on the **Test Hole Plan, Figure 2**. The proposed base elevation of the SWMPs is not known at the time of writing this report; however, it is expected that the bottom of the SWMP will consist of compact to very dense silty sand glacial till native soils. The hydraulic conductivity of the silty sand till is estimated to be on the order of about 10^{-5} to 10^{-7} cm/sec. It is noted, however, that slight variations in the soil stratigraphy may cause variations in the permeability of the soil in both vertical and horizontal orientations.

Based on the soils observed, and the assumed base elevations, it appears that construction of the SWMPs in these areas are feasible. In general, excavation of the soils for the SWMPs is expected to be straightforward, provided that appropriate measures are taken during construction to minimize any overland or near-surficial flow of water into the area. Groundwater and surficial water inflow into the open SWMPs excavation may be encountered depending on the time of the year in which construction is conducted; however, this is expected to be controlled by pumping from within the excavation, along with further measures if required including upgradient cutoff trenching with appropriate drainage outletting.

It is recommended that the SWMPs subgrade surfaces be proof rolled, and a representative of GHD approve the subgrade prior to construction of the berms. Construction of the berms may utilize excavated soils, such as the silty sand and till native soils. Such operations should place soils in lifts no thicker than 150 mm prior to compaction and compacted to at least 95 percent SPMDD.

The native, undisturbed compact to dense sand and silt native soils are expected to have a sufficiently low permeability where they could substitute for a liner. An inspection of the excavated and exposed SWMPs surface should be performed at the time of construction, to assess whether any discrete or localized areas of increased hydraulic conductivity (such as sand and/or gravelly seams typically encountered within till soils) are present within the exposed soils, in which case such areas may be lined with a more suitable (i.e. less hydraulically conductive) material or an impermeable geosynthetic membrane.

For the purpose of the proposed SWMPs, the soils observed should be stable from slip circle failure if sloped at 3 horizontal to 1 vertical (3H:1V) or flatter in the long term both above and below the water table. Between the stable water level and the expected high water level, it is recommended that the slopes be lessened to 4H:1V (or flatter) to guard against erosion by wavelet action. The native material will require vegetative root mass (or otherwise suitable erosion protection) to minimize erosional forces on exposed slopes.

Slopes and berms of the SWMPs should be constructed to reduce or eliminate the effects of surficial erosion. Features to do so may include slope vegetation, installation of erosion or gabion mats, rip rap, and/or other acceptable stabilizing features.

5.4.1 Construction Monitoring

The foundation installations and any Engineered Fill placement must be closely monitored and inspected by qualified personnel to ensure consistency with the design bearing. The on-site review of the condition of the foundation soil as the foundations are constructed is an integral part of the geotechnical design function and is required by Section 6.2.2 of the Ontario Building Code 2012.

Qualified Geotechnical personnel should inspect and test all stages of the proposed development. Specifically, they should ensure that the materials and conditions comply with this geotechnical assessment report. In addition, qualified geotechnical personnel should provide material testing services prior to and during backfilling and/or grade

raising operation. Should soil conditions be encountered that vary from those described in this report, our office should be informed immediately such that the proper measures are undertaken.

6. Conclusions and Closure

Supporting data upon which our recommendations are based have been presented in the foregoing sections of this report and are governed by the physical properties of the subsurface materials that were encountered at the Site and assume that they are representative of the overall site conditions.

It is our opinion that the results of this hydrogeological and geotechnical investigation support the proposed residential development to be constructed upon a 29.88 ha area with a concept plan of up to 167 single-detached and semi-detached lots serviced on municipal water and a communal septic facility, three (3) stormwater management blocks, internal streets and an open block area.

We trust this report meets your immediate needs. Should any questions arise regarding any aspect of our report, please contact our office.

All of Which is Respectfully Submitted,

GHD





Leandro Ramos, P.Eng.
Senior Geotechnical Engineer

Robert Neck, P.Geo. (Limited)
Senior Geoscientist, Project Director

Statement of Limitations

This report is intended solely for Stalwood Homes and their designers and is prohibited for use by others without GHD's prior written consent. This report is considered GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to GHD. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

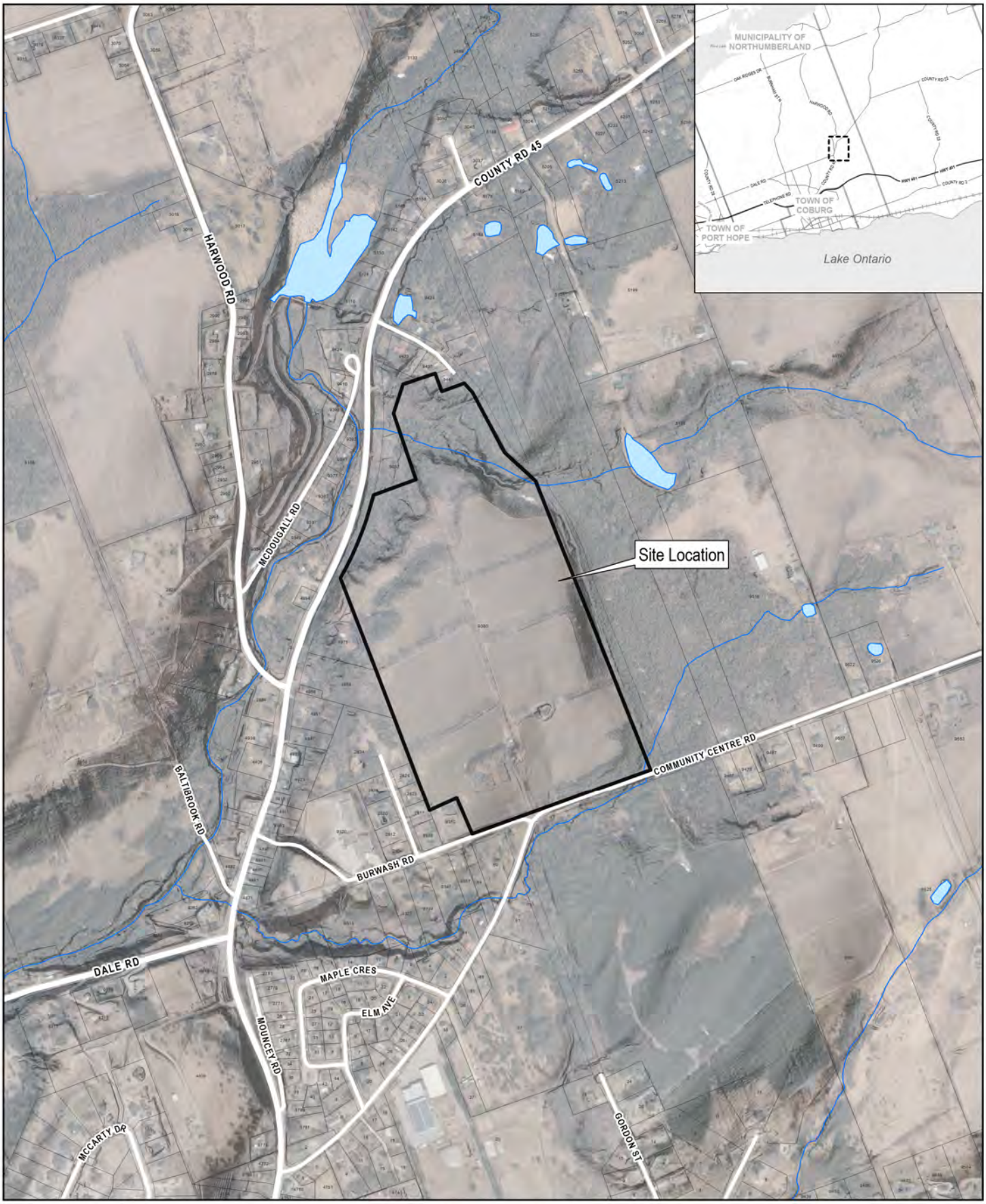
The recommendations made in this report are in accordance with our present understanding of the project, the current site use, ground surface elevation and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of geotechnical engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. 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.

All details of design and construction are rarely known at the time of completion of a geotechnical or hydrogeological assessment. The recommendations and comments made in the study report are based on our subsurface investigation and resulting understanding of the project, as defined at the time of the study. We should be retained to review our recommendations when the drawings and specifications are complete. Without this review, GHD will not be liable for any misunderstanding of our recommendations or their application and adaptation into the final design.

By issuing this report, GHD is the geotechnical engineer of record. It is recommended that GHD be retained during construction of all foundations and during earthwork operations to confirm the conditions of the subsoil are actually similar to those observed during our study. The intent of this requirement is to verify that conditions encountered during construction are consistent with the findings in the report and that inherent knowledge developed as part of our study is correctly carried forward to the construction phases.

It is important to emphasize that a soil investigation is, in fact, a random sampling of a site and the comments included in this report are based on the results obtained at the test locations only. The subsurface conditions confirmed at the test locations may vary at other locations. The subsurface conditions can also be significantly modified by the construction activities on site (e.g., excavation, dewatering and drainage, blasting, pile driving, etc.). These conditions can also be modified by exposure of soils or bedrock to humidity, dry periods or frost. Soil and groundwater conditions between and beyond the test locations may differ both horizontally and vertically from those encountered at the test locations and conditions may become apparent during construction which could not be detected or anticipated at the time of our investigation. Should any conditions at the site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations. If changed conditions are identified during construction, no matter how minor, the recommendations in this report shall be considered invalid until sufficient review and written assessment of said conditions by GHD is completed.

Figures



1:10,000

0 100 200 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

Stalwood Homes
9380 Burwash Road, Baltimore, ON
Municipality of Northumberland

Hydrogeological Assessment and
Preliminary Geotechnical Services Report

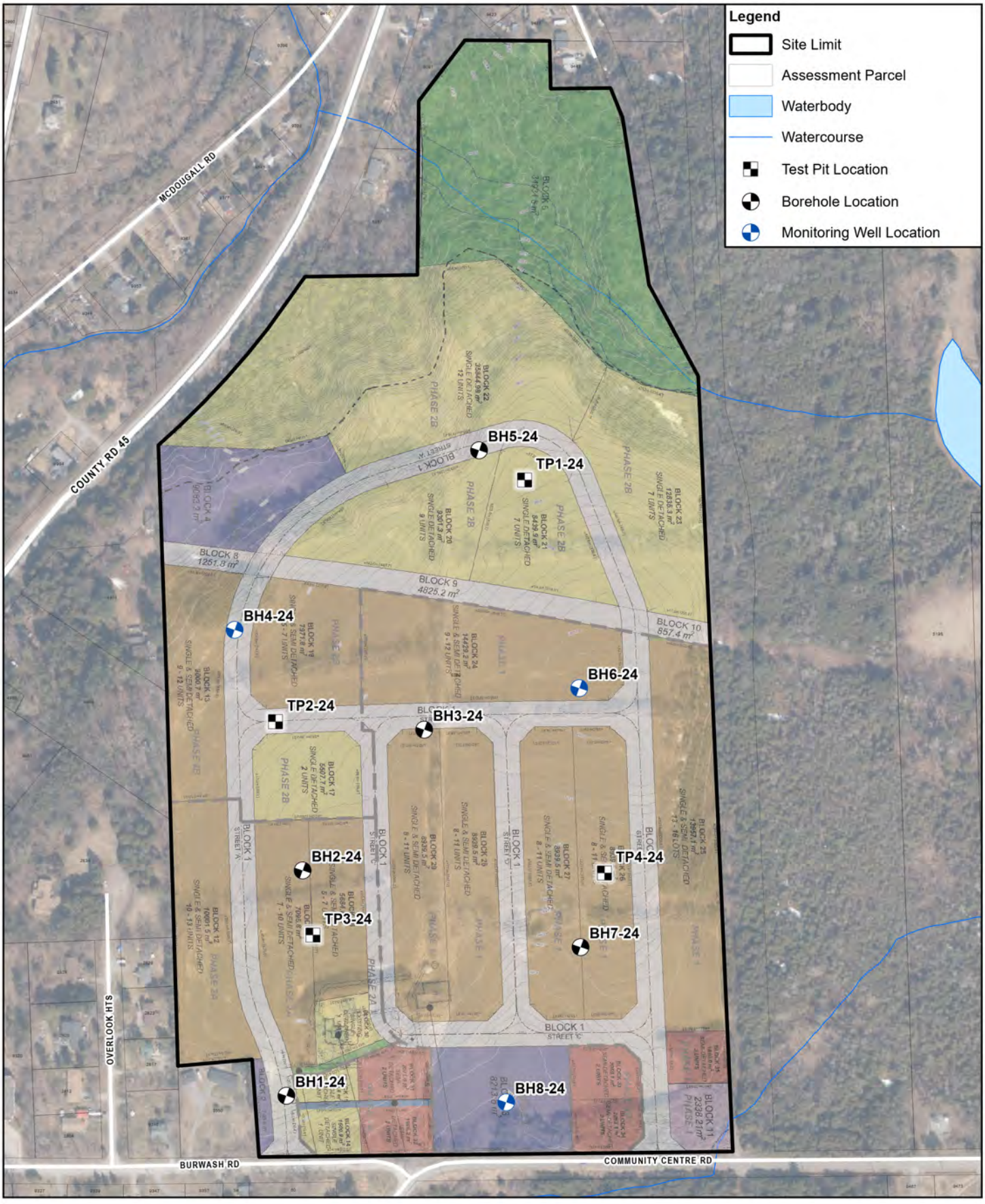
Site Location Plan

Project No. 12639057
Revision No.
Date Oct 30, 2024

Figure 1

Q:\GIS\PROJECTS\12639000s\12639057\GIS\Maps\Deliverables\202410_HydrogeologicalAssessmentAndPreliminaryGeotechnicalServicesReport\12639057_202410_GIS001_SiteLocationPlan.aprx
Print date: 30 Oct 2024 - 10:58

Attribution: Imagery accessed from the Ontario Imagery Web Map Service on Oct 30, 2024;
Produced by GHD Limited under Licence with the Ontario Ministry of Natural Resources and Forestry© King's Printer for Ontario, 2024.



1:4,000

0 40 80 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Stalwood Homes
9380 Burwash Road, Baltimore, ON
Municipality of Northumberland

Hydrogeological Assessment and
Preliminary Geotechnical Services Report

Test Hole Plan

Project No. 12639057
Revision No.
Date Sep 11, 2026

Figure 2

Q:\GIS\PROJECTS\12639000s\12639057\GIS\Maps\Deliverables\202410_HydrogeologicalAssessmentAndPreliminaryGeotechnicalServicesReport\12639057_202410_GIS002_BoreholeAndTestPitLocationPlan.aprx
Print date: 11 Sep 2026 - 14:11

Attribution: Concept Plan: CP1, Prepared by Ecovue on June 30, 2026, Imagery accessed from the Ontario Imagery Web Map Service on Sep 11, 2026; Produced by GHD Limited under Licence with the Ontario Ministry of Natural Resources and Forestry© King's Printer for Ontario, 2024.



1:10,000
0 100 200 300
Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

Stalwood Homes
9380 Burwash Road, Baltimore, ON
Municipality of Northumberland

Hydrogeological Assessment and
Preliminary Geotechnical Services Report

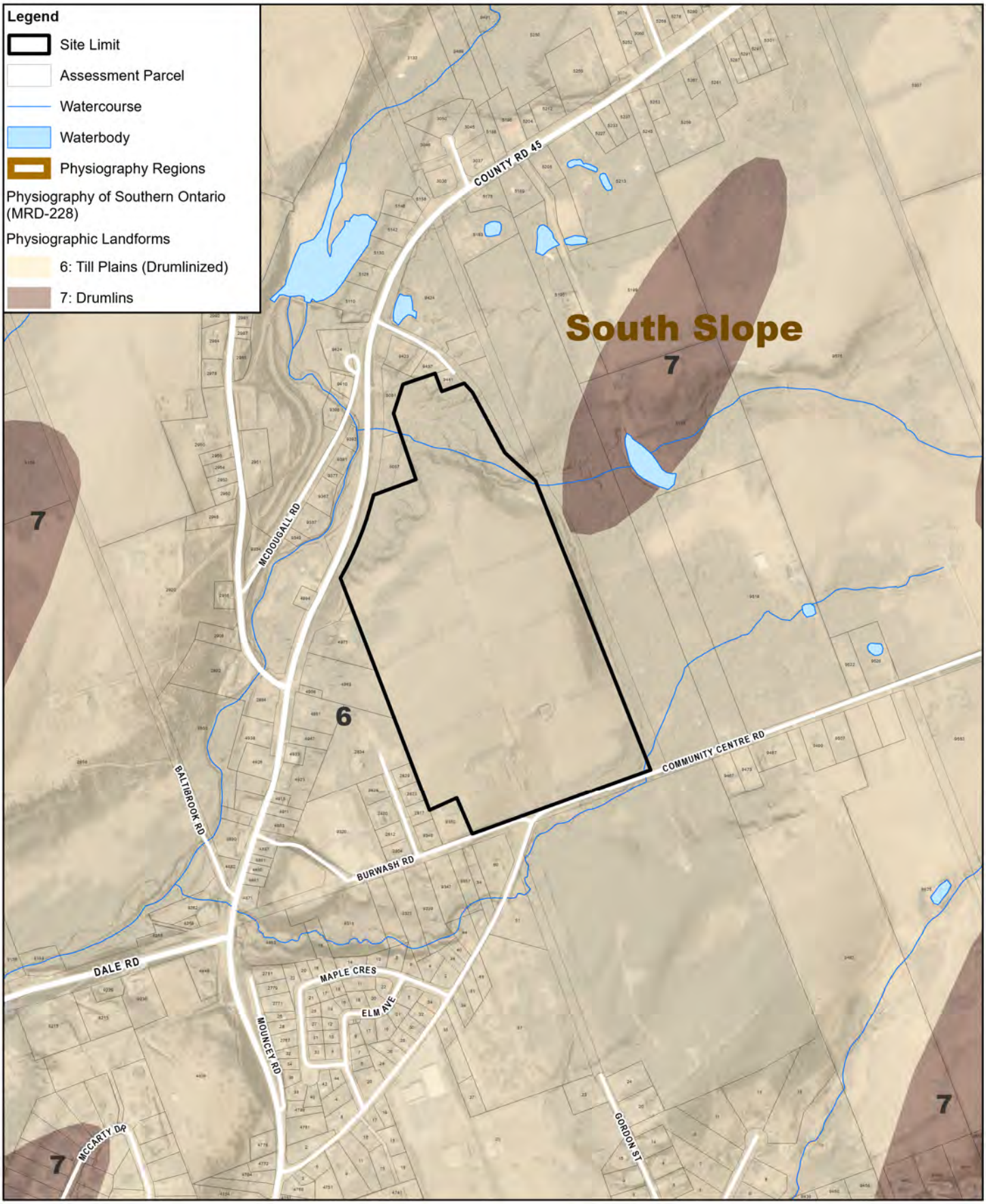
Regional Topography

Project No. 12639057
Revision No.
Date Oct 30, 2024

Figure 3

Q:\GIS\PROJECTS\12639000s\12639057\GIS\Maps\Deliverables\202410_HydrogeologicalAssessmentAndPreliminaryGeotechnicalServicesReport\12639057_202410_GIS003_RegionalTopography.aprx
Print date: 30 Oct 2024 - 11:00

Attribution: Imagery accessed from the Ontario Imagery Web Map Service on Oct 30, 2024;
Produced by GHD Limited under Licence with the Ontario Ministry of Natural Resources
and Forestry© King's Printer for Ontario, 2024



1:10,000

0 100 200 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

Stalwood Homes
9380 Burwash Road, Baltimore, ON
Municipality of Northumberland

Hydrogeological Assessment and Preliminary Geotechnical Services Report

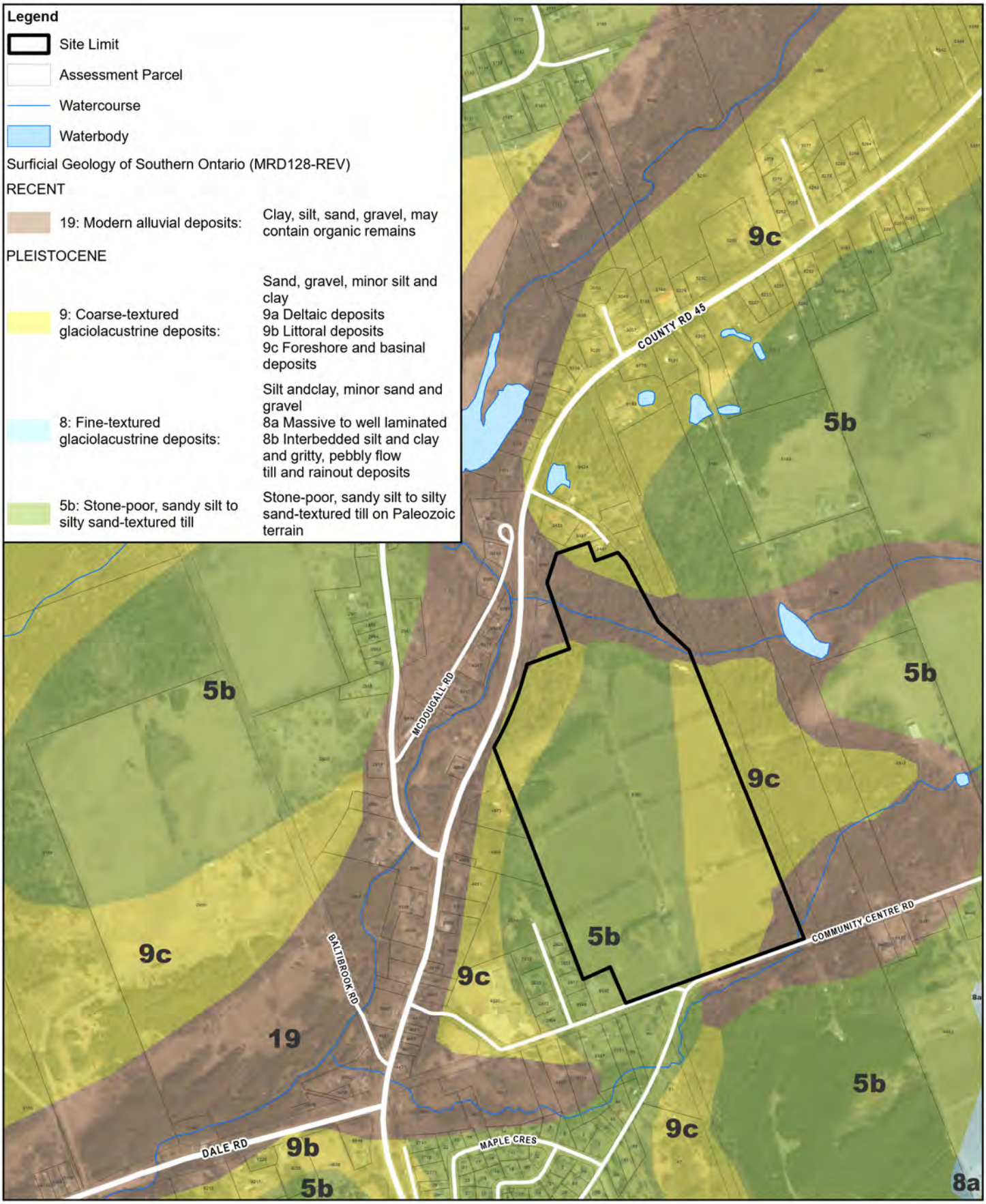
Physiography

Project No. 12639057
Revision No.
Date Oct 30, 2024

Figure 4

Q:\GIS\PROJECTS\12639000s\12639057\GIS\Maps\Deliverables\202410_HydrogeologicalAssessmentAndPreliminaryGeotechnicalServicesReport\12639057_202410_GIS004_Physiography.aprx
Print date: 30 Oct 2024 - 11:03

Attribution: Chapman, L.J. and Putnam, D.F. 2007. Physiography of Southern Ontario, Ontario Geological Survey, Miscellaneous Release--Data 228 ISBN 978-1-4249-5158-1.; Imagery accessed from the Ontario Imagery Web Map Service on Oct 30, 2024; Produced by GHD Limited under Licence with the Ontario Ministry of Natural Resources and Forestry© King's Printer for Ontario, 2024.



1:10,000
0 100 200 300
Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

Stalwood Homes
9380 Burwash Road, Baltimore, ON
Municipality of Northumberland

Hydrogeological Assessment and
Preliminary Geotechnical Services Report

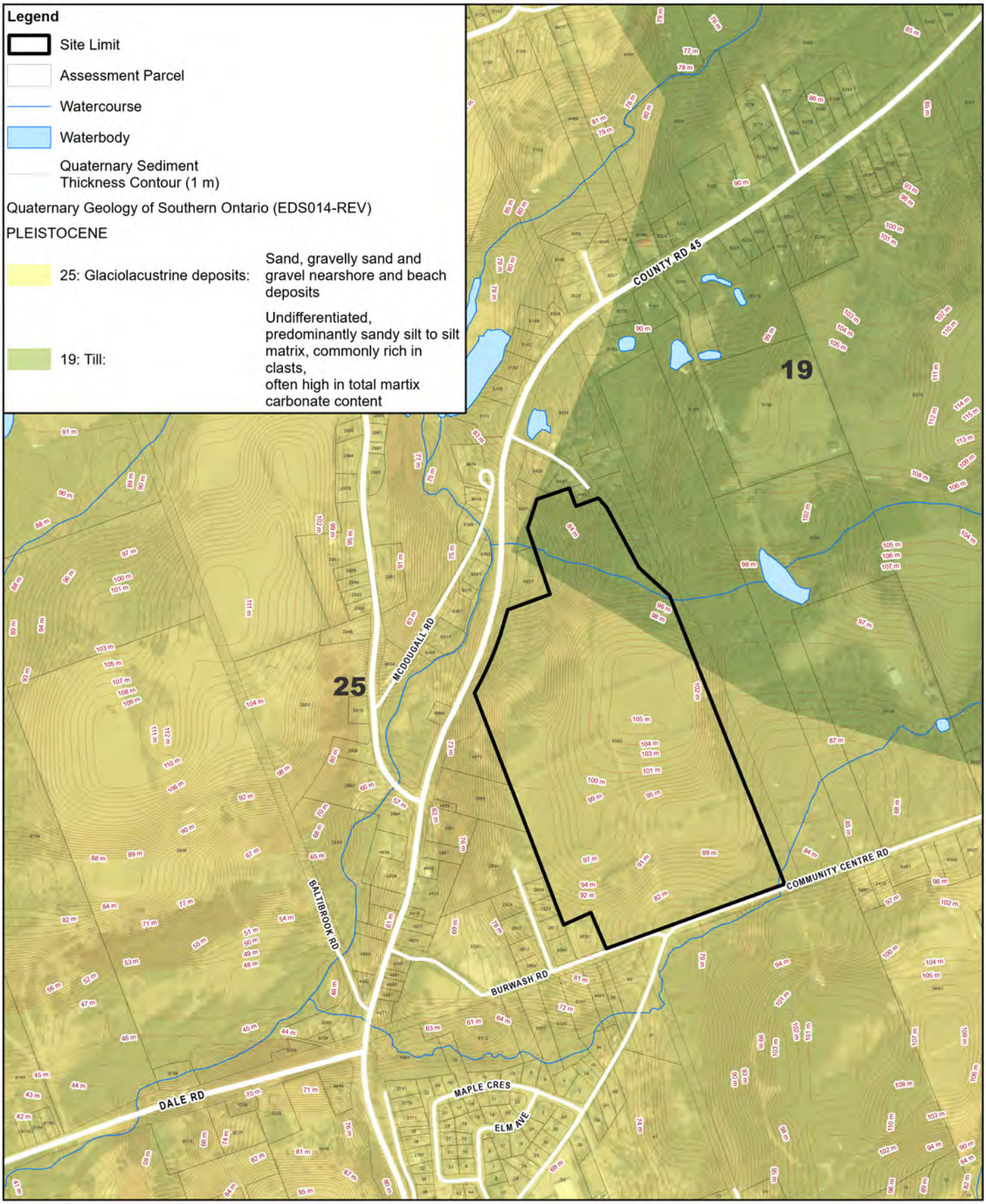
Surficial Geology

Project No. 12639057
Revision No.
Date Oct 30, 2024

Figure 5

Q:\GIS\PROJECTS\12639000s\12639057\GIS\Maps\Deliverables\202410_HydrogeologicalAssessmentAndPreliminaryGeotechnicalServicesReport\12639057_202410_GIS005_SurficialGeology.aprx
Print date: 30 Oct 2024 - 11:03

Attribution: MRD128-REV. Ontario Geological Survey 2010. Surficial geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 128 – Revised.; Imagery accessed from the Ontario Imagery Web Map Service on Oct 30, 2024; Produced by GHD Limited under Licence with the Ontario Ministry of Natural Resources and Forestry© King's Printer for Ontario, 2024.



1:10,000

0 100 200 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

Stalwood Homes
9380 Burwash Road, Baltimore, ON
Municipality of Northumberland

Hydrogeological Assessment and Preliminary Geotechnical Services Report

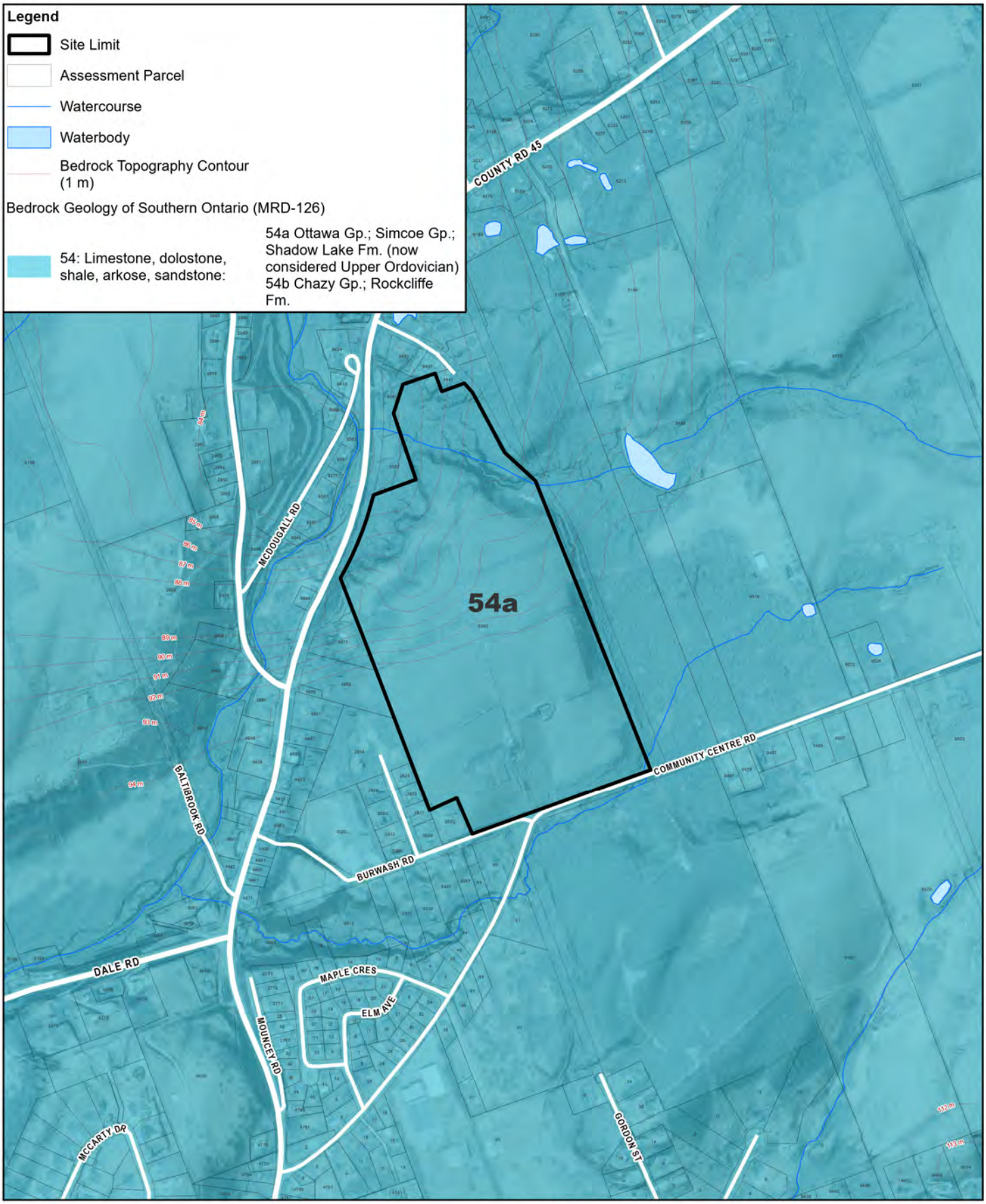
Quaternary Geology

Project No. 12639057
Revision No.
Date Oct 30, 2024

Figure 6

Q:\GIS\PROJECTS\12639000s\12639057\GIS\Maps\Deliverables\202410_HydrogeologicalAssessmentAndPreliminaryGeotechnicalServicesReport\12639057_202410_GIS006_QuaternaryGeology.aprx
Print date: 30 Oct 2024 - 11:04

Attribution: EDS014-REV Ontario Geological Survey, 1997. Quaternary geology, seamless coverage of the province of Ontario: Ontario Geological Survey, Data Set 14.; Quaternary Sediment Thickness Contour, ORMGP, 2022.; Imagery accessed from the Ontario Imagery Web Map Service on Oct 30, 2024; Produced by GHD Limited under Licence with the Ontario Ministry of Natural Resources and Forestry© King's Printer for Ontario, 2024.



1:10,000

0 100 200 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

Stalwood Homes
9380 Burwash Road, Baltimore, ON
Municipality of Northumberland

Hydrogeological Assessment and Preliminary Geotechnical Services Report

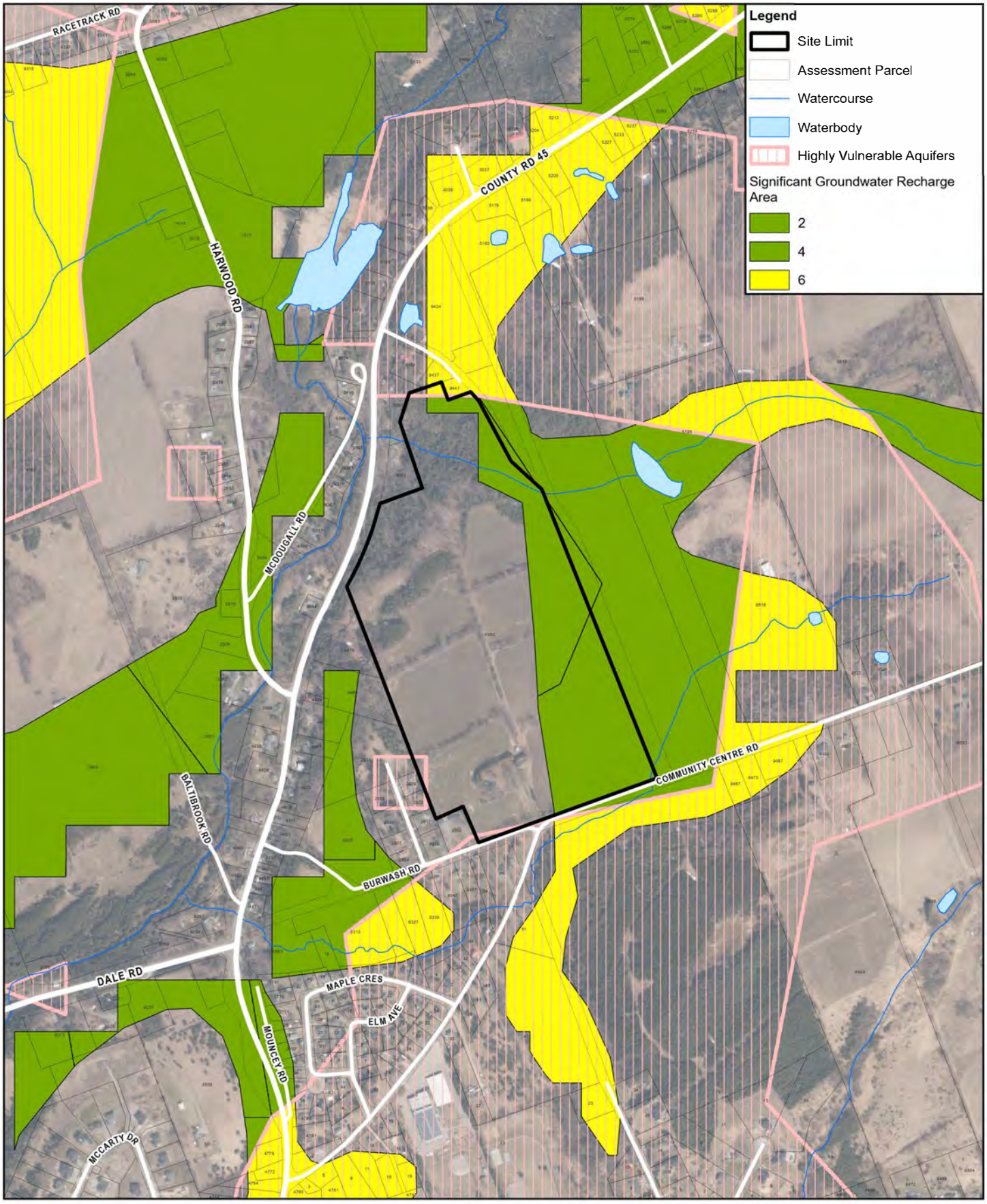
Bedrock Geology

Project No. 12639057
Revision No.
Date Oct 30, 2024

Figure 7

Q:\GIS\PROJECTS\12639000s\12639057\GIS\Maps\Deliverables\202410_HydrogeologicalAssessmentAndPreliminaryGeotechnicalServicesReport\12639057_202410_GIS007_QuaternaryGeology.aprx
Print date: 30 Oct 2024 - 11:04

Attribution: MRD126-REV: Ontario Geological Survey 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release---Data 126-Revision 1.; Bedrock Topography Contours, ORMGP, 2022; Imagery accessed from the Ontario Imagery Web Map Service on Oct 30, 2024; Produced by GHD Limited under Licence with the Ontario Ministry of Natural Resources and Forestry© King's Printer for Ontario, 2024.



1:10,000

0 100 200 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

Stalwood Homes
9380 Burwash Road, Baltimore, ON
Municipality of Northumberland
Hydrogeological Assessment and
Preliminary Geotechnical Services Report

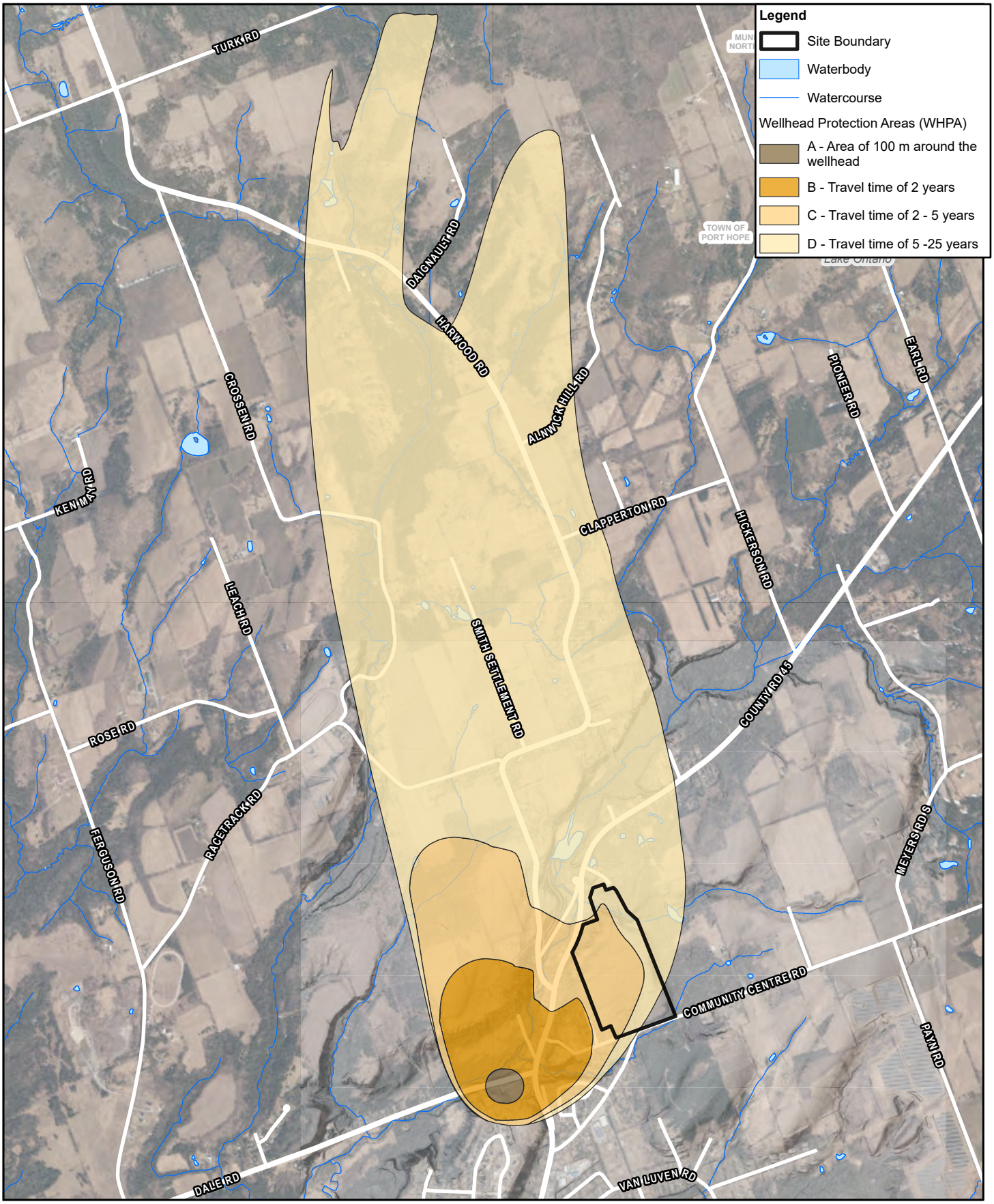
Significant Groundwater Recharge Areas and Highly Vulnerable Aquifers

Project No. 12639057
Revision No.
Date Oct 30, 2024

Figure 8

\GIS\PROJECTS\12639000s\12639057\GIS\Maps\Deliverables\202410_HydrogeologicalAssessmentAndPreliminaryGeotechnicalServicesReport\12639057_202410_GIS008_SignificantGroundwater
Print date: 30 Oct 2024 - 11:57

Attribution: Imagery accessed from the Ontario Imagery Web Map Service on Oct 30, 2024; Produced by GHD Limited under Licence with the Ontario Ministry of Natural Resources and Forestry© King's Printer for Ontario, 2024.



1:30,000

0 300 600 900

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

Stalwood Homes
9380 Burwash Road, Baltimore, ON
Municipality of Northumberland

Hydrogeological Assessment and
Preliminary Geotechnical Services Report

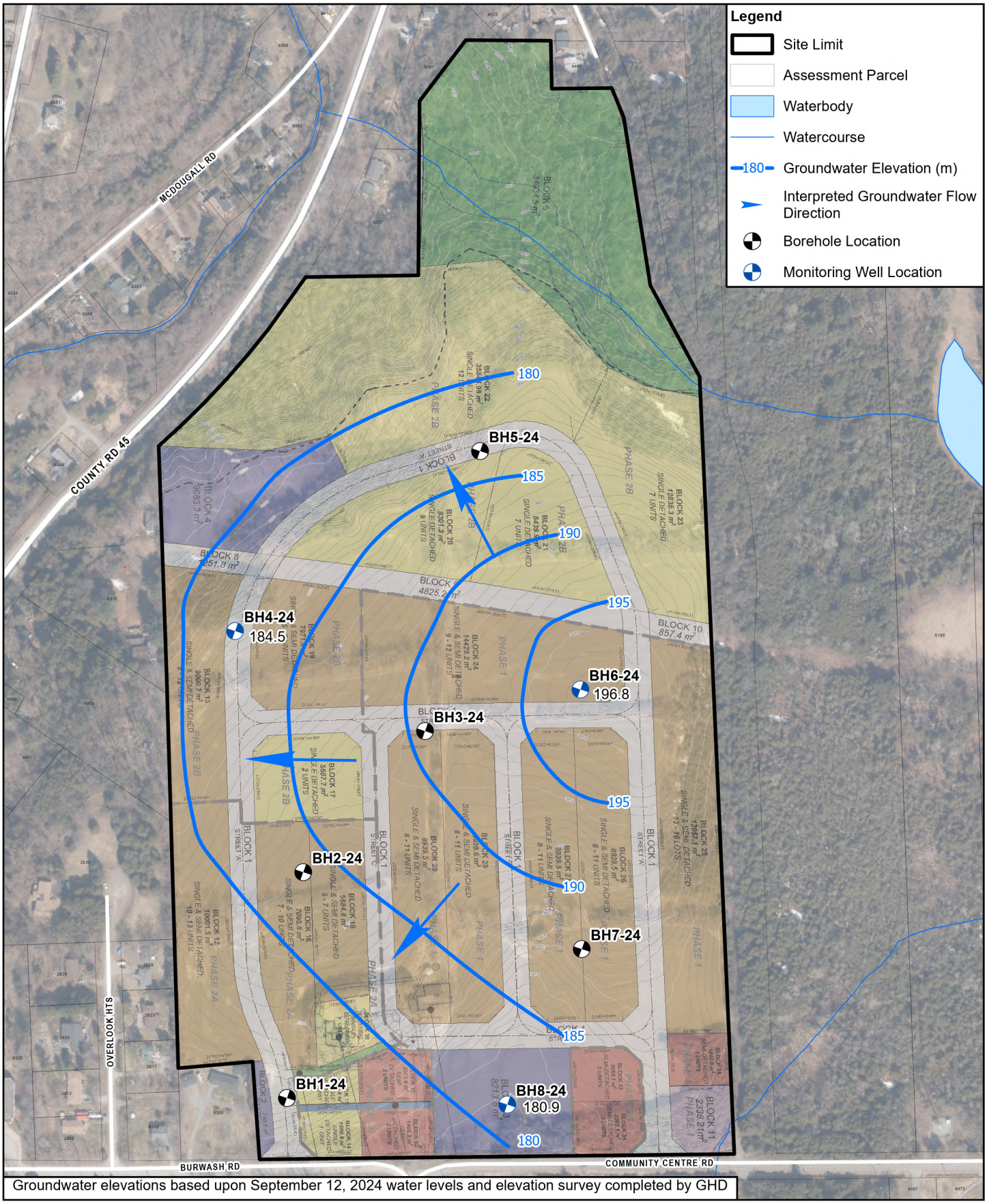
Wellhead Protection Area

Project No. 12639057
Revision No.
Date Nov 11, 2024

Figure 9

O:
\GIS\PROJECTS\12639000s\12639057\GIS\Maps\Deliverables\202410_HydrogeologicalAssessmentAndPreliminaryGeotechnicalServicesReport\12639057_202410_GIS011_WellHeadProtectionZones.a
Print date: 11 Nov 2024 - 12:18

Atribution: Imagery accessed from the Ontario Imagery Web Map Service on Nov 11, 2024; Produced by GHD Limited under Licence with the Ontario Ministry of Natural Resources and Forestry© King's Printer for Ontario, 2024.



Groundwater elevations based upon September 12, 2024 water levels and elevation survey completed by GHD

1:4,000

0 40 80 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Stalwood Homes
9380 Burwash Road, Baltimore, ON
Municipality of Northumberland

Hydrogeological Assessment and Preliminary Geotechnical Services Report

Groundwater Elevations

Project No. 12639057
Revision No.
Date Sep 14, 2026

Figure 10

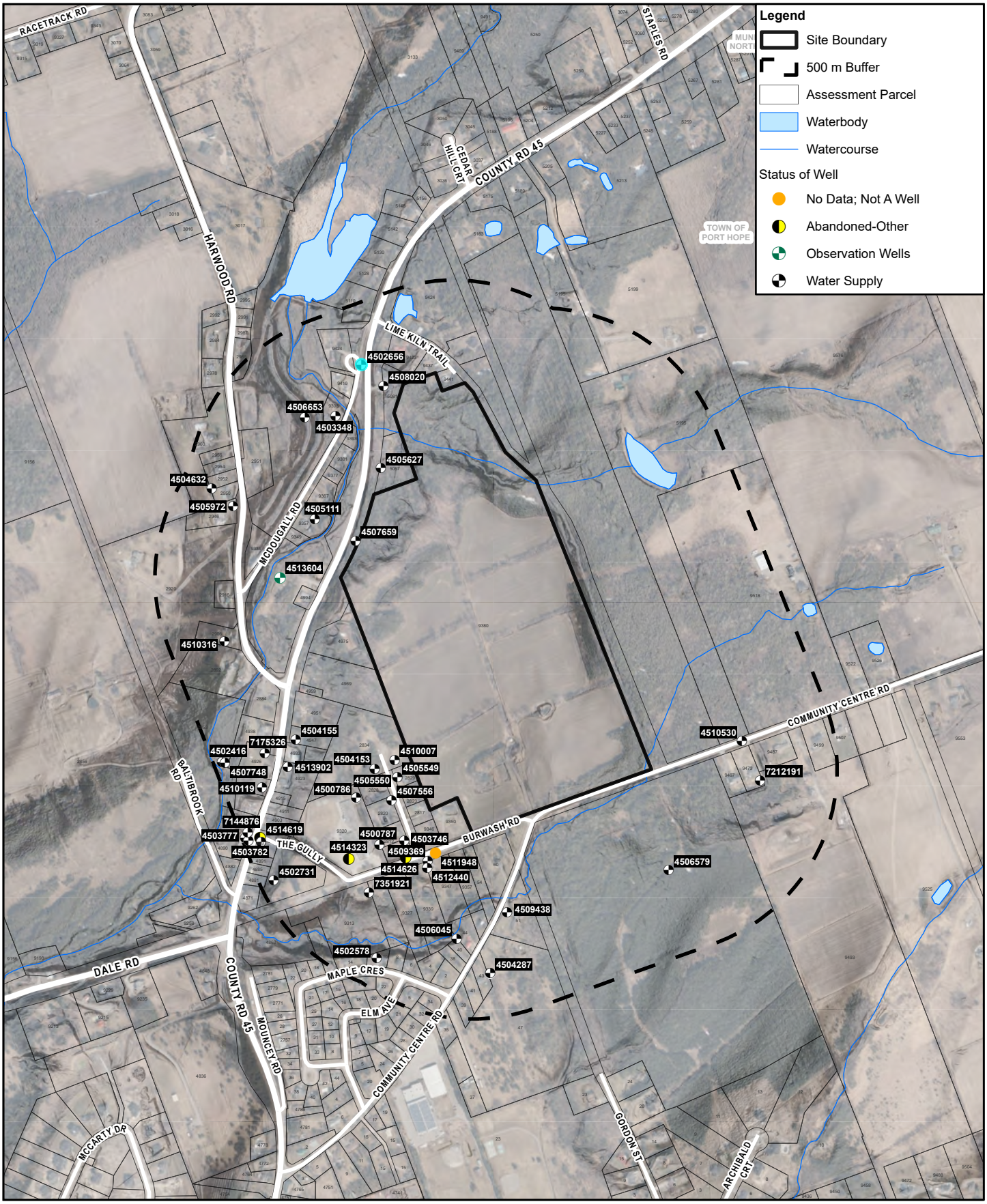
Q:\GIS\PROJECTS\12639000s\12639057\GIS\Maps\Deliverables\202410_HydrogeologicalAssessmentAndPreliminaryGeotechnicalServicesReport\12639057_202410_GIS012_GWElevations.aprx
Print date: 14 Sep 2026 - 10:31

Attribution: Concept Plan: CP1, Prepared by Ecovue on June 14, 2024; Imagery accessed from the Ontario Imagery Web Map Service on Sep 14, 2026; Produced by GHD Limited under Licence with the Ontario Ministry of Natural Resources and Forestry© King's Printer

Appendices

Appendix A

MECP Well Records



Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Stalwood Homes
9380 Burwash Road, Baltimore, ON
Municipality of Northumberland

Hydrogeological Assessment and
Preliminary Geotechnical Services Report

MECP Wells

Project No. 12639057
Revision No.
Date Nov 11, 2024

Figure A.1

O:\GIS\PROJECTS\12639000s\12639057\GIS\Maps\Deliverables\202410_HydrogeologicalAssessmentAndPreliminaryGeotechnicalServicesReport\12639057_202410_GIS010_MEPCWells.aprx
Print date: 11 Nov 2024 - 10:52

Atribution: Imagery accessed from the Ontario Imagery Web Map Service on Nov 11, 2024; Produced by GHD Limited under Licence with the Ontario Ministry of Natural Resources and Forestry© King's Printer for Ontario, 2024.

MECP WELL RECORD LISTINGS

Ministry of the Environment, Conservation & Parks (MECP)

© Water Well Information System (WWIS). Ministry of the Environment, Conservation, and Parks. 2021.
Powered by Location Intelligence

DISCLAIMER: All effort has been taken to ensure the accuracy of the data is the same as the source. There are instances where the original PDF document is different and in those cases, the PDF should be used instead.

17

Easting:	554310.00
Northing:	4742026.00
Elev (masl):	178.77

Latitude: 44.02474
Longitude: -78.145374

Well ID: 4500786

LOCATION

Lot:	008	**Tag:**	
Con:	03	**Audit No:**	
Municipality:	NORTHUMBERLAND	**Contractor License:**	4713
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	01-29-1960
Street:		**Received Date:**	04-25-1960
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	78.9432
Prim. Use:	n/a	**Depth to Bedrock (m):**	249
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Cable Tool	**Water Kind:**	FRESH

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	10828410
Pump Set (m):	n/a	**Pump Test ID**	994500786
SWL (ft)	100	**Flowing:**	N
Final Level:	150 ft	**Pump Duration (hr):**	6
Pump Rate:	10 GPM	**Pump Duration (m):**	0
Recom. Rate:	5 GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930467718	6	inch	STEEL	n/a	249 ft
2	930467719	6	inch	OPEN HOLE	n/a	259 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	PREVIOUSLY DUG	n/a	n/a	n/a	0	35 ft
2	CLAY	STONES	n/a	n/a	35	70 ft
3	MEDIUM SAND	n/a	n/a	n/a	70	212 ft
4	CLAY	n/a	n/a	n/a	212	249 ft
5	LIMESTONE	n/a	n/a	n/a	249	259 ft

End of Record

17

Easting:	557944.10
Northing:	4754766.00
Elev (masl):	179.15

Latitude: 44.023916
Longitude: -78.144853

Well ID: 4500787

LOCATION

Lot:	008	**Tag:**	
Con:	03	**Audit No:**	
Municipality:	NORTHUMBERLAND	**Contractor License:**	2113
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	03-28-1962
Street:		**Received Date:**	07-04-1962
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	16.4592
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Cable Tool	**Water Kind:**	FRESH

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	10828411
Pump Set (m):	n/a	**Pump Test ID**	994500787
SWL (ft)	11	**Flowing:**	N
Final Level:	50 ft	**Pump Duration (hr):**	3
Pump Rate:	4 GPM	**Pump Duration (m):**	0
Recom. Rate:	4 GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930467720	6	inch	STEEL	n/a	54 ft

Contains information licensed under the Open Government Licence – Ontario (2021).

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	2 ft
2	CLAY	STONES	n/a	GREY	2	53 ft
3	GRAVEL	MEDIUM SAND	n/a	n/a	53	54 ft

End of Record

17

Easting:	540904.00
Northing:	4726838.00
Elev (masl):	145.75

Latitude: 44.02545
Longitude: -78.148585

Well ID: 4502416

LOCATION

Lot: 008
Con: 03
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 3102
Well Completion Date: 06-13-1968
Received Date: 11-19-1968

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Boring

Well Depth (m): 6.096
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 12
Final Level: n/a ft
Pump Rate: n/a GPM
Recom. Rate: 2 GPM

Pipe ID: 10830022
Pump Test ID 994502416
Flowing: N
Pump Duration (hr): n/a
Pump Duration (m): n/a

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930470111	30	inch	CONCRETE	n/a	20 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	2 ft
2	CLAY	n/a	n/a	BLUE	2	12 ft
3	CLAY	n/a	n/a	GREY	12	20 ft

End of Record

18

Easting:	290876.70
Northing:	4889794.00
Elev (masl):	167.44

Latitude: 44.02194
Longitude: -78.14501

Well ID: 4502578

LOCATION

Lot: 007
Con: 02
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 2104
Well Completion Date: 10-18-1969
Received Date: 01-29-1970

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 61.5696
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 37
Final Level: 165 ft
Pump Rate: 30 GPM
Recom. Rate: 30 GPM

Pipe ID: 10830179
Pump Test ID 994502578
Flowing: N
Pump Duration (hr): 2
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930470340	6	inch	STEEL	n/a	195 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Contains information licensed under the Open Government Licence – Ontario (2021).

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	1 ft
2	MEDIUM SAND	n/a	n/a	BROWN	1	9 ft
3	GRAVEL	MEDIUM SAND	n/a	BROWN	9	22 ft
4	MEDIUM SAND	GRAVEL	n/a	GREY	22	35 ft
5	MEDIUM SAND	n/a	n/a	BROWN	35	73 ft
6	MEDIUM SAND	CLAY	n/a	BROWN	73	193 ft
7	MEDIUM SAND	GRAVEL	n/a	BLACK	193	202 ft

End of Record

17

Easting:	734932.30
Northing:	4873507.00
Elev (masl):	165.02

Latitude: 44.03229
Longitude: -78.144887

Well ID: 4502656

LOCATION

Lot: 007
Con: 03
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 3129
Well Completion Date: 04-13-1970
Received Date: 04-21-1970

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Boring

Well Depth (m): 6.7056
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 13
Final Level: 21 ft
Pump Rate: 8 GPM
Recom. Rate: 4 GPM

Pipe ID: 10830256
Pump Test ID 994502656
Flowing: N
Pump Duration (hr): 1
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930470443	30	inch	CONCRETE	n/a	22 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	1 ft
2	MEDIUM SAND	n/a	n/a	n/a	1	12 ft
3	CLAY	n/a	n/a	n/a	12	22 ft

End of Record

17

Easting:	738514.30
Northing:	4885824.00
Elev (masl):	165.53

Latitude: 44.023351
Longitude: -78.147438

Well ID: 4502731

LOCATION

Lot: 008
Con: 03
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 2306
Well Completion Date: 08-03-1970
Received Date: 09-08-1970

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 18.288
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 4
Final Level: 40 ft
Pump Rate: 2 GPM
Recom. Rate: 2 GPM

Pipe ID: 10830328
Pump Test ID 994502731
Flowing: N
Pump Duration (hr): 4
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930470540	6	inch	STEEL	n/a	60 ft

Contains information licensed under the Open Government Licence – Ontario (2021).

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	PREVIOUSLY DUG	n/a	n/a	n/a	0	26 ft
2	GRAVEL	CLAY	n/a	n/a	26	53 ft
3	MEDIUM SAND	GRAVEL	n/a	n/a	53	60 ft

End of Record

17

Easting:	721664.30
Northing:	4888757.00
Elev (masl):	158.82

Latitude: 44.031406
Longitude: -78.145553

Well ID: **4503348**

LOCATION

Lot: 007
Con: 03
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 2118
Well Completion Date: 01-30-1971
Received Date: 12-18-1972

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 47.244
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 20
Final Level: 40 ft
Pump Rate: 20 GPM
Recom. Rate: 5 GPM

Pipe ID: 10830828
Pump Test ID 994503348
Flowing: N
Pump Duration (hr): 1
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930471245	6	inch	STEEL	n/a	155 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	CLAY	n/a	n/a	GREY	0	155 ft

End of Record

18

Easting:	291271.70
Northing:	4887965.00
Elev (masl):	183.58

Latitude: 44.023964
Longitude: -78.144251

Well ID: **4503746**

LOCATION

Lot: 008
Con: 03
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 3129
Well Completion Date: 05-01-1974
Received Date: 06-10-1974

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Boring

Well Depth (m): 6.096
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 6
Final Level: 19 ft
Pump Rate: 7 GPM
Recom. Rate: 7 GPM

Pipe ID: 10831215
Pump Test ID 994503746
Flowing: N
Pump Duration (hr): 1
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930471722	30	inch	CONCRETE	n/a	20 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Contains information licensed under the Open Government Licence – Ontario (2021).

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	1 ft
2	GRAVEL	STONES	n/a	n/a	1	8 ft
3	CLAY	n/a	n/a	GREY	8	20 ft

End of Record

18

Easting:	287384.70
Northing:	4887580.00
Elev (masl):	152.25

Latitude: 44.024114
Longitude: -78.148087

Well ID: 4503777

LOCATION

Lot: 008
Con: 03
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 2104
Well Completion Date: 02-24-1974
Received Date: 06-18-1974

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 22.5552
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 15
Final Level: 67 ft
Pump Rate: 8 GPM
Recom. Rate: 8 GPM

Pipe ID: 10831245
Pump Test ID 994503777
Flowing: N
Pump Duration (hr): 3
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930471760	6	inch	STEEL	n/a	74 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	FILL	n/a	n/a	n/a	0	20 ft
2	CLAY	BOULDERS	n/a	BROWN	20	71 ft
3	GRAVEL	n/a	n/a	n/a	71	74 ft

End of Record

18

Easting:	286833.70
Northing:	4887118.00
Elev (masl):	152.49

Latitude: 44.024058
Longitude: -78.148015

Well ID: 4503782

LOCATION

Lot: 008
Con: 03
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 2105
Well Completion Date: 06-03-1974
Received Date: 07-03-1974

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 41.148
Depth to Bedrock (m): n/a
Depth to Water:
Water Kind:

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 0
Final Level: n/a ft
Pump Rate: 30 GPM
Recom. Rate: 30 GPM

Pipe ID: 10831250
Pump Test ID 994503782
Flowing: Y
Pump Duration (hr): n/a
Pump Duration (m): n/a

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930471765	6	inch	STEEL	n/a	135 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	PREV. DRILLED	n/a	n/a	n/a	0	74 ft

Contains information licensed under the Open Government Licence – Ontario (2021).

2	CLAY	n/a	n/a	BLUE	74	133	ft
3	GRAVEL	n/a	n/a	GREY	133	135	ft

End of Record

18

Easting:	289972.60
Northing:	4897491.00
Elev (masl):	186.70

Latitude: 44.025232
Longitude: -78.144902

Well ID: 4504153

LOCATION

Lot: 008
Con: 03
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 2104
Well Completion Date: 09-04-1975
Received Date: 09-11-1975

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 74.0664
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 120
Final Level: 130 ft
Pump Rate: 10 GPM
Recom. Rate: 6 GPM

Pipe ID: 10831582
Pump Test ID 994504153
Flowing: N
Pump Duration (hr): 3
Pump Duration (m): 30

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930472178	6	inch	STEEL	n/a	239 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	BOULDERS	CLAY	n/a	BROWN	0	20 ft
2	STONES	CLAY	n/a	GREY	20	80 ft
3	CLAY	STONES	n/a	GREY	80	240 ft
4	SAND	CLAY	n/a	GREY	240	243 ft

End of Record

18

Easting:	289934.60
Northing:	4897688.00
Elev (masl):	157.99

Latitude: 44.025792
Longitude: -78.146784

Well ID: 4504155

LOCATION

Lot: 008
Con: 03
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 2104
Well Completion Date: 09-11-1975
Received Date: 09-23-1975

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 48.768
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 15
Final Level: 30 ft
Pump Rate: 20 GPM
Recom. Rate: 15 GPM

Pipe ID: 10831584
Pump Test ID 994504155
Flowing: N
Pump Duration (hr): 3
Pump Duration (m): 30

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930472180	6	inch	STEEL	n/a	156 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	CLAY	BOULDERS	n/a	BROWN	0	15 ft
2	CLAY	GRAVEL	n/a	GREY	15	156 ft
3	SAND	n/a	n/a	GREY	156	160 ft

Contains information licensed under the Open Government Licence – Ontario (2021).

End of Record

18

Easting:	272579.60
Northing:	4919722.00
Elev (masl):	173.64

Latitude: 44.021601
Longitude: -78.142281

Well ID: 4504287

LOCATION

Lot: 007
Con: 02
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 2104
Well Completion Date: 02-10-1976
Received Date: 02-17-1976

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 62.484
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 70
Final Level: 190 ft
Pump Rate: 6 GPM
Recom. Rate: 5 GPM

Pipe ID: 10831711
Pump Test ID 994504287
Flowing: N
Pump Duration (hr): 9
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930472328	6	inch	STEEL	n/a	203 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	SOFT	n/a	BROWN	0	2 ft
2	GRAVEL	STONES	LOOSE	GREY	2	60 ft
3	CLAY	HARD	n/a	GREY	60	201 ft
4	SAND	LOOSE	n/a	GREY	201	205 ft

End of Record

17

Easting:	715795.30
Northing:	4897723.00
Elev (masl):	182.83

Latitude: 44.030222
Longitude: -78.148605

Well ID: 4504632

LOCATION

Lot: 008
Con: 03
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 4923
Well Completion Date: 03-18-1977
Received Date: 04-14-1977

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 37.7952
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLOUDY
Pump Set (m): n/a
SWL (ft) 15
Final Level: 110 ft
Pump Rate: 5 GPM
Recom. Rate: 5 GPM

Pipe ID: 10832041
Pump Test ID 994504632
Flowing: N
Pump Duration (hr): 2
Pump Duration (m): 30

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930472706	6	inch	STEEL	n/a	124 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	PREVIOUSLY DUG	n/a	n/a	n/a	0	26 ft
2	CLAY	STONES	n/a	GREY	26	120 ft
3	GRAVEL	SAND	n/a	GREY	120	124 ft

End of Record

Contains information licensed under the Open Government Licence – Ontario (2021).

18

Easting:	283979.70
Northing:	4905422.00
Elev (masl):	154.71

Latitude: 44.02962
Longitude: -78.146138

Well ID: 4505111

LOCATION

Lot:	007	**Tag:**	
Con:	03	**Audit No:**	
Municipality:	NORTHUMBERLAND	**Contractor License:**	5102
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	11-06-1978
Street:		**Received Date:**	11-23-1978
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	73.4568
Prim. Use:	n/a	**Depth to Bedrock (m):**	238
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Cable Tool	**Water Kind:**	Not stated

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	10832502
Pump Set (m):	n/a	**Pump Test ID**	994505111
SWL (ft)	50	**Flowing:**	N
Final Level:	100 ft	**Pump Duration (hr):**	1
Pump Rate:	20 GPM	**Pump Duration (m):**	40
Recom. Rate:	20 GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930473237	6	inch	STEEL	n/a	238 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	PREVIOUSLY DUG	n/a	n/a	n/a	0	25 ft
2	CLAY	n/a	n/a	GREY	25	90 ft
3	CLAY	SILT	n/a	GREY	90	210 ft
4	SAND	CLAY	n/a	BROWN	210	238 ft
5	LIMESTONE	n/a	n/a	GREY	238	241 ft

End of Record

18

Easting:	272929.60
Northing:	4919722.00
Elev (masl):	190.59

Latitude: 44.025074
Longitude: -78.14436

Well ID: 4505549

LOCATION

Lot:	008	**Tag:**	
Con:	03	**Audit No:**	
Municipality:	NORTHUMBERLAND	**Contractor License:**	4635
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	09-24-1980
Street:		**Received Date:**	02-06-1981
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	17.6784
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Rotary (Convent.)	**Water Kind:**	SALTY

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	10832861
Pump Set (m):	n/a	**Pump Test ID**	994505549
SWL (ft)	11	**Flowing:**	N
Final Level:	54 ft	**Pump Duration (hr):**	2
Pump Rate:	6 GPM	**Pump Duration (m):**	0
Recom. Rate:	n/a GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930473652	6	inch	STEEL	n/a	58 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	1 ft
2	CLAY	STONES	n/a	WHITE	1	37 ft
3	FINE GRAVEL	FINE SAND	n/a	BROWN	37	55 ft
4	COARSE GRAVEL	n/a	n/a	BROWN	55	58 ft

End of Record

Contains information licensed under the Open Government Licence – Ontario (2021).

18

Easting:	292709.70
Northing:	4883811.00
Elev (masl):	190.59

Latitude: 44.025074
Longitude: -78.14436

Well ID: 4505550

LOCATION

Lot:	008	**Tag:**	
Con:	03	**Audit No:**	
Municipality:	NORTHUMBERLAND	**Contractor License:**	4635
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	10-15-1980
Street:		**Received Date:**	02-06-1981
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	78.6384
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Rotary (Convent.)	**Water Kind:**	FRESH

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	10832862
Pump Set (m):	n/a	**Pump Test ID**	994505550
SWL (ft)	130	**Flowing:**	N
Final Level:	177 ft	**Pump Duration (hr):**	3
Pump Rate:	20 GPM	**Pump Duration (m):**	0
Recom. Rate:	n/a GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930473653	6	inch	STEEL	n/a	258 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	PREVIOUSLY DUG	n/a	n/a	n/a	0	58 ft
2	CLAY	n/a	n/a	WHITE	58	210 ft
3	CLAY	n/a	n/a	BLUE	210	253 ft
4	COARSE SAND	n/a	n/a	BROWN	253	258 ft

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	159.12

Latitude: 44.030471
Longitude: -78.144504

Well ID: 4505627

LOCATION

Lot:	007	**Tag:**	
Con:	03	**Audit No:**	
Municipality:	NORTHUMBERLAND	**Contractor License:**	3129
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	04-22-1981
Street:		**Received Date:**	09-11-1981
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	6.096
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Boring	**Water Kind:**	FRESH

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	10832937
Pump Set (m):	n/a	**Pump Test ID**	994505627
SWL (ft)	7	**Flowing:**	N
Final Level:	18 ft	**Pump Duration (hr):**	1
Pump Rate:	7 GPM	**Pump Duration (m):**	0
Recom. Rate:	5 GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930473733	30	inch	CONCRETE	n/a	20 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	1 ft
2	CLAY	n/a	n/a	GREY	1	10 ft
3	COARSE SAND WATER-BEARING		n/a	n/a	10	20 ft

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	

Latitude: 44.024033
Longitude: -78.147708

Well ID: 4505954

Contains information licensed under the Open Government Licence – Ontario (2021).

	Elev (masl):	153.86

LOCATION

Lot: 008
Con: 03
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 4635
Well Completion Date: 09-09-1983
Received Date: 11-28-1983

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: Commerical
Boring Method: Cable Tool

Well Depth (m): 45.4152
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 2
Final Level: 20 ft
Pump Rate: 20 GPM
Recom. Rate: n/a GPM

Pipe ID: 10833259
Pump Test ID 994505954
Flowing: N
Pump Duration (hr): 4
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930474086	6	inch	STEEL	n/a	149 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	2 ft
2	CLAY	n/a	n/a	WHITE	2	84 ft
3	CLAY	SAND	n/a	WHITE	84	89 ft
4	CLAY	n/a	n/a	WHITE	89	146 ft
5	COARSE GRAVEL	n/a	n/a	BROWN	146	149 ft

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	176.90

Latitude: 44.029895
Longitude: -78.1481

Well ID: **4505972**

LOCATION

Lot: 008
Con: 03
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 2104
Well Completion Date: 11-30-1983
Received Date: 01-03-1984

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 29.8704
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: Not stated

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 20
Final Level: 45 ft
Pump Rate: 8 GPM
Recom. Rate: 8 GPM

Pipe ID: 10833277
Pump Test ID 994505972
Flowing: N
Pump Duration (hr): 3
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930474107	6	inch	STEEL	n/a	98 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	SOFT	n/a	BROWN	0	1 ft
2	CLAY	GRAVEL	STONES	BROWN	1	18 ft
3	CLAY	GRAVEL	STONES	GREY	18	43 ft
4	CLAY	GRAVEL	PACKED	GREY	43	97 ft
5	COARSE GRAVEL	WATER-BEARING	LOOSE	BROWN	97	98 ft

End of Record

---

n/a

Easting:	<null>
Northing:	<null>

Latitude: 44.022224
Longitude: -78.143066

Well ID: **4506045**

Contains information licensed under the Open Government Licence – Ontario (2021).

n/a | **Elev (masl):** | 169.15

LOCATION

Lot:	007	**Tag:**	
Con:	02	**Audit No:**	
Municipality:	NORTHUMBERLAND	**Contractor License:**	3129
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	06-22-1984
Street:		**Received Date:**	07-23-1984
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	5.4864
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Boring	**Water Kind:**	FRESH

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	10833350
Pump Set (m):	n/a	**Pump Test ID**	994506045
SWL (ft)	8	**Flowing:**	N
Final Level:	16 ft	**Pump Duration (hr):**	1
Pump Rate:	5 GPM	**Pump Duration (m):**	0
Recom. Rate:	4 GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930474182	30	inch	CONCRETE	n/a	18 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	1 ft
2	CLAY	n/a	n/a	GREY	1	8 ft
3	GRAVEL	STONES	n/a	n/a	8	18 ft

End of Record

---

18 | **Easting:** | 279616.70 | **Latitude:** | 44.023292
Northing: | 4886797.00 | **Longitude:** | -78.137887
Elev (masl): | 204.04

Well ID: 4506579

LOCATION

Lot:	006	**Tag:**	
Con:	12	**Audit No:**	06484
Municipality:	NORTHUMBERLAND	**Contractor License:**	1847
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	08-15-1986
Street:		**Received Date:**	01-21-1987
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	10.0584
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Boring	**Water Kind:**	FRESH

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	10833880
Pump Set (m):	n/a	**Pump Test ID**	994506579
SWL (ft)	20	**Flowing:**	N
Final Level:	30 ft	**Pump Duration (hr):**	1
Pump Rate:	5 GPM	**Pump Duration (m):**	0
Recom. Rate:	4 GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930474742	30	inch	CONCRETE	n/a	33 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	1 ft
2	CLAY	n/a	n/a	n/a	1	10 ft
3	COARSE SAND	n/a	n/a	n/a	10	21 ft
4	FINE SAND	WATER-BEARING	n/a	n/a	21	33 ft

End of Record

---

n/a | **Easting:** | <null> | **Latitude:** | 44.031398
Northing: | <null> | **Longitude:** | -78.146294
Elev (masl): | 164.96

Well ID: 4506653

Contains information licensed under the Open Government Licence – Ontario (2021).

LOCATION

Lot:	006	**Tag:**	
Con:	03	**Audit No:**	05981
Municipality:	NORTHUMBERLAND	**Contractor License:**	3129
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	04-16-1987
Street:		**Received Date:**	04-28-1987
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	6.096
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Boring	**Water Kind:**	FRESH

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	10833954
Pump Set (m):	n/a	**Pump Test ID**	994506653
SWL (ft)	10	**Flowing:**	N
Final Level:	14 ft	**Pump Duration (hr):**	1
Pump Rate:	8 GPM	**Pump Duration (m):**	0
Recom. Rate:	4 GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930474815	30	inch	CONCRETE	n/a	20 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	1 ft
2	SAND	STONES	n/a	n/a	1	4 ft
3	CLAY	n/a	n/a	BROWN	4	15 ft
4	SAND	WATER-BEARING	GRAVEL	n/a	15	20 ft

End of Record

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	187.14

Latitude: 44.024673
Longitude: -78.14452

Well ID: **4507556**

LOCATION

Lot:	008	**Tag:**	
Con:	03	**Audit No:**	50043
Municipality:	NORTHUMBERLAND	**Contractor License:**	2104
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	12-06-1988
Street:		**Received Date:**	12-14-1988
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	76.5048
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Cable Tool	**Water Kind:**	Not stated

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	10834855
Pump Set (m):	n/a	**Pump Test ID**	994507556
SWL (ft)	90	**Flowing:**	N
Final Level:	150 ft	**Pump Duration (hr):**	1
Pump Rate:	18 GPM	**Pump Duration (m):**	30
Recom. Rate:	18 GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930475777	6	inch	STEEL	n/a	248 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	MEDIUM SAND	CLAY	n/a	BROWN	0	3 ft
2	GRAVEL	CLAY	STONES	GREY	3	30 ft
3	GRAVEL	CLAY	DENSE	GREY	30	31 ft
4	GRAVEL	CLAY	STONES	GREY	31	200 ft
5	CLAY	MEDIUM-GRAINED	n/a	GREY	200	230 ft
6	MEDIUM GRAVEL	CLAY	n/a	GREY	230	245 ft
7	MEDIUM SAND	WATER-BEARING	n/a	BROWN	245	251 ft

End of Record

n/a

Easting:	<null>
Northing:	<null>

Latitude: 44.029218
Longitude: -78.145176

Well ID: **4507659**

Contains information licensed under the Open Government Licence – Ontario (2021).

n/a | **Elev (masl):** 159.36

LOCATION

Lot: 007
Con: 03
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No: NA
Contractor License: 2104
Well Completion Date: 02-08-1989
Received Date: 02-20-1989

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 12.4968
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: Not stated

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 5
Final Level: 25 ft
Pump Rate: 7 GPM
Recom. Rate: 7 GPM

Pipe ID: 10834957
Pump Test ID 994507659
Flowing: N
Pump Duration (hr): 1
Pump Duration (m): 35

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930475887	6	inch	STEEL	n/a	39 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	CLAY	STONES	HARD	BROWN	0	12 ft
2	GRAVEL	STONES	HARD	GREY	12	25 ft
3	MEDIUM SAND	n/a	n/a	BROWN	25	37 ft
4	SAND	COARSE GRAVEL	n/a	BROWN	37	41 ft

End of Record

---

n/a

Easting: <null>
Northing: <null>
Elev (masl): 145.83

Latitude: 44.02543
Longitude: -78.148514

Well ID: **4507748**

LOCATION

Lot: 007
Con: 04
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No: 54762
Contractor License: 3129
Well Completion Date: 03-01-1989
Received Date: 03-14-1989

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Boring

Well Depth (m): 6.096
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 5
Final Level: n/a ft
Pump Rate: 8 GPM
Recom. Rate: 4 GPM

Pipe ID: 10835045
Pump Test ID 994507748
Flowing: N
Pump Duration (hr): 1
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930475986	30	inch	CONCRETE	n/a	20 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	1 ft
2	SAND	n/a	n/a	n/a	1	10 ft
3	QUICKSAND	n/a	n/a	n/a	10	20 ft

End of Record

17

Easting: 717896.30
Northing: 4887140.00
Elev (masl): 163.95

Latitude: 44.031899
Longitude: -78.144369

Well ID: **4508020**

Contains information licensed under the Open Government Licence – Ontario (2021).

LOCATION

Lot:	007
Con:	03
Municipality:	NORTHUMBERLAND
Township:	HAMILTON TOWNSHIP
Street:	
City:	n/a

Tag:	
Audit No:	54859
Contractor License:	3129
Well Completion Date:	06-02-1989
Received Date:	07-04-1989

WELL

Well Status:	Water Supply
Prim. Use:	n/a
Sec. Use:	n/a
Boring Method:	Boring

Well Depth (m):	7.0104
Depth to Bedrock (m):	12
Depth to Water:	ft
Water Kind:	FRESH

PUMP TEST

Test Method:	CLEAR
Pump Set (m):	n/a
SWL (ft)	4
Final Level:	10 ft
Pump Rate:	8 GPM
Recom. Rate:	4 GPM

Pipe ID:	10835317
Pump Test ID	994508020
Flowing:	N
Pump Duration (hr):	1
Pump Duration (m):	0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930476278	30	inch	CONCRETE	n/a	23 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	1 ft
2	CLAY	n/a	n/a	BROWN	1	8 ft
3	CLAY	n/a	n/a	BLUE	8	12 ft
4	CLAY	ROCK	n/a	n/a	12	20 ft
5	STONES	WATER-BEARING	n/a	n/a	20	23 ft

End of Record

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	181.19

Latitude: 44.02359
Longitude: -78.143699

Well ID: **4509369**

LOCATION

Lot:	007
Con:	02
Municipality:	NORTHUMBERLAND
Township:	HAMILTON TOWNSHIP
Street:	
City:	n/a

Tag:	
Audit No:	88941
Contractor License:	2553
Well Completion Date:	09-05-1991
Received Date:	10-11-1991

WELL

Well Status:	Water Supply
Prim. Use:	n/a
Sec. Use:	n/a
Boring Method:	Cable Tool

Well Depth (m):	76.8096
Depth to Bedrock (m):	n/a
Depth to Water:	ft
Water Kind:	FRESH

PUMP TEST

Test Method:	CLEAR
Pump Set (m):	n/a
SWL (ft)	69
Final Level:	175 ft
Pump Rate:	10 GPM
Recom. Rate:	10 GPM

Pipe ID:	10836662
Pump Test ID	994509369
Flowing:	N
Pump Duration (hr):	1
Pump Duration (m):	20

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930477768	6	inch	<null>	n/a	248 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	CLAY	TOPSOIL	n/a	BROWN	0	22 ft
2	HARDPAN	n/a	n/a	GREY	22	98 ft
3	FINE SAND	n/a	n/a	BROWN	98	99 ft
4	CLAY	HARD	n/a	GREY	99	215 ft
5	FINE SAND	n/a	n/a	BROWN	215	252 ft

End of Record

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	177.50

Latitude: 44.022652
Longitude: -78.141823

Well ID: **4509438**

Contains information licensed under the Open Government Licence – Ontario (2021).

LOCATION

Lot:	007	**Tag:**	
Con:	02	**Audit No:**	110260
Municipality:	NORTHUMBERLAND	**Contractor License:**	2104
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	10-02-1991
Street:		**Received Date:**	11-06-1991
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	67.9704
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Cable Tool	**Water Kind:**	Not stated

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	10836731
Pump Set (m):	n/a	**Pump Test ID**	994509438
SWL (ft)	78	**Flowing:**	N
Final Level:	194 ft	**Pump Duration (hr):**	2
Pump Rate:	8 GPM	**Pump Duration (m):**	40
Recom. Rate:	8 GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930477846	6	inch	STEEL	n/a	220 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	GRAVEL	CLAY	STONES	BROWN	0	22 ft
2	GRAVEL	CLAY	STONES	GREY	22	98 ft
3	SAND	GRAVEL	CLAY	GREY	98	142 ft
4	GRAVEL	CLAY	n/a	GREY	142	219 ft
5	COARSE SAND	GRAVEL	n/a	BLACK	219	223 ft

End of Record

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	190.72

Latitude: 44.025382
Longitude: -78.144412

Well ID: **4510007**

LOCATION

Lot:	008	**Tag:**	
Con:	03	**Audit No:**	134174
Municipality:	NORTHUMBERLAND	**Contractor License:**	2104
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	06-04-1993
Street:		**Received Date:**	07-08-1993
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	86.868
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Cable Tool	**Water Kind:**	FRESH

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	10837299
Pump Set (m):	n/a	**Pump Test ID**	994510007
SWL (ft)	150	**Flowing:**	N
Final Level:	185 ft	**Pump Duration (hr):**	6
Pump Rate:	6 GPM	**Pump Duration (m):**	0
Recom. Rate:	6 GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930478483	6	inch	STEEL	n/a	285 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	MEDIUM-GRAINED	n/a	BROWN	0	2 ft
2	CLAY	MEDIUM-GRAINED	n/a	BROWN	2	40 ft
3	CLAY	MEDIUM-GRAINED	n/a	GREY	40	278 ft
4	MEDIUM SAND	n/a	n/a	GREY	278	285 ft

End of Record

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	150.07

Latitude: 44.024985
Longitude: -78.147637

Well ID: **4510119**

Contains information licensed under the Open Government Licence – Ontario (2021).

LOCATION

Lot:	008	**Tag:**	
Con:	03	**Audit No:**	134406
Municipality:	NORTHUMBERLAND	**Contractor License:**	2553
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	09-04-1993
Street:		**Received Date:**	10-22-1993
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	48.4632
Prim. Use:	n/a	**Depth to Bedrock (m):**	157
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Cable Tool	**Water Kind:**	Not stated

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	10837411
Pump Set (m):	n/a	**Pump Test ID**	994510119
SWL (ft)	n/a	**Flowing:**	N
Final Level:	120 ft	**Pump Duration (hr):**	1
Pump Rate:	10 GPM	**Pump Duration (m):**	0
Recom. Rate:	7 GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930478610	6	inch	STEEL	n/a	n/a ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	MUCK	SANDY	n/a	BROWN	0	17 ft
2	SAND	PACKED	n/a	BROWN	17	37 ft
3	CLAY	n/a	n/a	GREY	37	102 ft
4	HARDPAN	n/a	n/a	GREY	102	131 ft
5	FINE SAND	n/a	n/a	BROWN	131	157 ft
6	LIMESTONE	n/a	n/a	GREY	157	159 ft

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	159.27

Latitude: 44.027544
Longitude: -78.148425

Well ID: 4510316

LOCATION

Lot:	008	**Tag:**	
Con:	03	**Audit No:**	128526
Municipality:	NORTHUMBERLAND	**Contractor License:**	4635
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	05-19-1994
Street:		**Received Date:**	07-18-1994
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	60.0456
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Cable Tool	**Water Kind:**	FRESH

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	10837608
Pump Set (m):	n/a	**Pump Test ID**	994510316
SWL (ft)	42	**Flowing:**	N
Final Level:	192 ft	**Pump Duration (hr):**	3
Pump Rate:	5 GPM	**Pump Duration (m):**	0
Recom. Rate:	3 GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930478846	6	inch	STEEL	n/a	194 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	1 ft
2	CLAY	GRAVEL	n/a	BROWN	1	48 ft
3	CLAY	GRAVEL	SAND	GREY	48	145 ft
4	CLAY	n/a	n/a	GREY	145	170 ft
5	SAND	GRAVEL	n/a	GREY	170	192 ft
6	SAND	n/a	n/a	BROWN	192	197 ft

End of Record

Contains information licensed under the Open Government Licence – Ontario (2021).

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	187.24

Latitude: 44.025495
Longitude: -78.136009

Well ID: 4510530

LOCATION

Lot: 005
Con: 02
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No: 152631
Contractor License: 4635
Well Completion Date: 11-18-1994
Received Date: 02-14-1995

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 15.24
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) n/a
Final Level: 10 ft
Pump Rate: 20 GPM
Recom. Rate: 8 GPM

Pipe ID: 10837820
Pump Test ID 994510530
Flowing: N
Pump Duration (hr): 1
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930479093	6	inch	STEEL	n/a	50 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	CLAY	STONES	BROWN	0	7 ft
2	CLAY	GRAVEL	n/a	BROWN	7	42 ft
3	COARSE GRAVEL	n/a	n/a	WHITE	42	49 ft
4	COARSE GRAVEL	n/a	n/a	BROWN	49	50 ft

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	182.90

Latitude: 44.02373
Longitude: -78.143505

Well ID: 4511948

LOCATION

Lot: 007
Con: 02
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No: 199731
Contractor License: 6874
Well Completion Date: 09-23-1999
Received Date: 10-12-1999

WELL

Well Status: <null>
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 12.8016
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 40
Final Level: 42 ft
Pump Rate: n/a GPM
Recom. Rate: n/a GPM

Pipe ID: 10839235
Pump Test ID 994511948
Flowing: N
Pump Duration (hr): 3
Pump Duration (m): n/a

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930480914	30	inch	CONCRETE	n/a	42 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	SAND	n/a	n/a	BROWN	0	42 ft

End of Record

Contains information licensed under the Open Government Licence – Ontario (2021).

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	180.09

Latitude: 44.023474
Longitude: -78.143717

Well ID: 4512440

LOCATION

Lot: 007
Con: 02
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No: 222370
Contractor License: 6874
Well Completion Date: 11-01-2000
Received Date: 11-27-2000

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 6.7056
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLEAR
Pump Set (m): n/a
SWL (ft) 11
Final Level: 22 ft
Pump Rate: 25 GPM
Recom. Rate: 1 GPM

Pipe ID: 10839727
Pump Test ID 994512440
Flowing: N
Pump Duration (hr): n/a
Pump Duration (m): n/a

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930481553	30	inch	CONCRETE	n/a	n/a ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	CLAY	n/a	n/a	BROWN	0	22 ft

End of Record

17

Easting:	705846.20
Northing:	4879562.00
Elev (masl):	152.13

Latitude: 44.028625
Longitude: -78.147026

Well ID: 4513604

LOCATION

Lot: 008
Con: 03
Municipality: NORTHUMBERLAND
Township: HAMILTON TOWNSHIP
Street:
City: n/a

Tag:
Audit No: 261577
Contractor License: 7125
Well Completion Date: 10-22-2003
Received Date: 11-18-2003

WELL

Well Status: Observation Wells
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Rotary (Convent.)

Well Depth (m): 21.6408
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method:
Pump Set (m):
SWL (ft)
Final Level:
Pump Rate:
Recom. Rate:

Pipe ID:
Pump Test ID
Flowing:
Pump Duration (hr):
Pump Duration (m):

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930834519	2	inch	PLASTIC	n/a	72 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	MEDIUM SAND	COARSE SAND	GRAVEL	GREY	0	20 ft
2	CLAY	SILTY	n/a	GREY	20	50 ft
3	CLAY	SILT	n/a	GREY	50	71 ft

End of Record

18

Easting:	285238.70
Northing:	4891228.00

Latitude: 44.025321
Longitude: -78.147

Well ID: 4513902

Contains information licensed under the Open Government Licence – Ontario (2021).

18 | **Elev (masl):** | 156.83

LOCATION

Lot:	020	**Tag:**	A000507
Con:	03	**Audit No:**	Z00599
Municipality:	NORTHUMBERLAND	**Contractor License:**	7115
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	04-13-2004
Street:	HWY 45 # 4923	**Received Date:**	07-05-2004
City:	BALTIMORE		

WELL

Well Status:	Water Supply	**Well Depth (m):**	56.38
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	m
Boring Method:	Cable Tool	**Water Kind:**	FRESH

PUMP TEST

Test Method:	n/a	**Pipe ID:**	11185127
Pump Set (m):	48.7	**Pump Test ID**	11192449
SWL (ft)	2.9	**Flowing:**	n/a
Final Level:	24 m	**Pump Duration (hr):**	3
Pump Rate:	30.2LPM	**Pump Duration (m):**	0
Recom. Rate:	22.5LPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930848720	15.2	cm	STEEL	0	54.8 m
2	930848721	n/a	cm	OPEN HOLE	54.8	56.38 m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	GRAVEL	HARD	n/a	GREY	0	0.6 m
2	CLAY	STONES	HARD	GREY	0.6	25.9 m
3	CLAY	SOFT	n/a	GREY	25.9	51.8 m
4	CLAY	SILT	HARD	GREY	51.8	54.8 m
5	CLAY	HARD	n/a	GREY	54.8	56.38 m

End of Record

17 | **Easting:** | 766302.70 | **Latitude:** 44.023683
Northing: 4879693.00 | **Longitude:** -78.145604
Elev (masl): 173.12

Well ID: **4514323**

LOCATION

Lot:	006	**Tag:**	A025524
Con:	03	**Audit No:**	Z25982
Municipality:	NORTHUMBERLAND	**Contractor License:**	7163
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	08-04-2005
Street:	9320 BURWASH RD (BALTIMORE PUBLIC SCHOOL)	**Received Date:**	08-11-2005
City:	BALTIMORE		

WELL

Well Status:	Abandoned-Other	**Well Depth (m):**	0
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	
Boring Method:	n/a	**Water Kind:**	

PUMP TEST

Test Method:	n/a	**Pipe ID:**	11337589
Pump Set (m):	n/a	**Pump Test ID**	11350078
SWL (ft)	22.3	**Flowing:**	n/a
Final Level:	n/a m	**Pump Duration (hr):**	n/a
Pump Rate:	n/a LPM	**Pump Duration (m):**	n/a
Recom. Rate:	n/a LPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930865489	15.85	cm	STEEL	1.22	71.34 m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

17 | **Easting:** | 763692.30 | **Latitude:** 44.024105
Northing: 4885754.00 | **Longitude:** -78.147729

Well ID: **4514619**

Contains information licensed under the Open Government Licence – Ontario (2021).

17	Elev (masl):	153.59

LOCATION

Lot:	009	**Tag:**	A028469
Con:	03	**Audit No:**	Z30477
Municipality:	NORTHUMBERLAND	**Contractor License:**	7115
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	04-07-2006
Street:	COUNTY RD 45&74	**Received Date:**	05-23-2006
City:	COBOURG		

WELL

Well Status:	Abandoned-Other	**Well Depth (m):**	0
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	
Boring Method:	n/a	**Water Kind:**	

PUMP TEST

Test Method:		**Pipe ID:**	
Pump Set (m):		**Pump Test ID**	
SWL (ft)		**Flowing:**	
Final Level:		**Pump Duration (hr):**	
Pump Rate:		**Pump Duration (m):**	
Recom. Rate:			

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

17	Easting:	759763.60
	Northing:	4882179.00
	Elev (masl):	179.84

Latitude: 44.023676
Longitude: -78.144231

Well ID: **4514626**

LOCATION

Lot:	008	**Tag:**	
Con:	03	**Audit No:**	Z26159
Municipality:	NORTHUMBERLAND	**Contractor License:**	3903
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	08-20-2005
Street:	GULLY RD	**Received Date:**	06-07-2006
City:	n/a		

WELL

Well Status:	Abandoned-Other	**Well Depth (m):**	0
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	
Boring Method:	n/a	**Water Kind:**	

PUMP TEST

Test Method:		**Pipe ID:**	
Pump Set (m):		**Pump Test ID**	
SWL (ft)		**Flowing:**	
Final Level:		**Pump Duration (hr):**	
Pump Rate:		**Pump Duration (m):**	
Recom. Rate:			

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

---

n/a	Easting:	<null>
	Northing:	<null>
	Elev (masl):	152.63

Latitude: 44.024203
Longitude: -78.148024

Well ID: **7144876**

Contains information licensed under the Open Government Licence – Ontario (2021).

LOCATION

Lot:	
Con:	03
Municipality:	NORTHUMBERLAND
Township:	HAMILTON TOWNSHIP
Street:	4890 CTY ROAD #45
City:	BALTIMORE

Tag:	A097105
Audit No:	Z111936
Contractor License:	3367
Well Completion Date:	04-21-2010
Received Date:	05-18-2010

WELL

Well Status:	Water Supply
Prim. Use:	n/a
Sec. Use:	n/a
Boring Method:	Cable Tool

Well Depth (m):	40.2336
Depth to Bedrock (m):	n/a
Depth to Water:	ft
Water Kind:	Untested

PUMP TEST

Test Method:	OTHER
Pump Set (m):	20
SWL (ft)	n/a
Final Level:	7 ft
Pump Rate:	12 GPM
Recom. Rate:	10 GPM

Pipe ID:	1003164999
Pump Test ID	1003165000
Flowing:	Y
Pump Duration (hr):	1
Pump Duration (m):	0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	1003165005	6.25	inch	STEEL	-2	132 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	PREV. DRILLED	n/a	n/a	n/a	0	132 ft

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	149.86

Latitude: 44.025577
Longitude: -78.147547

Well ID: **7175326**

LOCATION

Lot:	007
Con:	03
Municipality:	NORTHUMBERLAND
Township:	HAMILTON TOWNSHIP
Street:	4933 COUNTY RD 45
City:	n/a

Tag:	A123305
Audit No:	Z139570
Contractor License:	3367
Well Completion Date:	10-14-2011
Received Date:	01-19-2012

WELL

Well Status:	Water Supply
Prim. Use:	n/a
Sec. Use:	n/a
Boring Method:	Cable Tool

Well Depth (m):	46.9392
Depth to Bedrock (m):	n/a
Depth to Water:	ft
Water Kind:	FRESH

PUMP TEST

Test Method:	CLEAR
Pump Set (m):	40
SWL (ft)	5.67
Final Level:	9.42ft
Pump Rate:	8 GPM
Recom. Rate:	10 GPM

Pipe ID:	1004137081
Pump Test ID	1004137082
Flowing:	N
Pump Duration (hr):	1
Pump Duration (m):	n/a

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	1004137092	6.25	inch	STEEL	0	150 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	SAND	STONES	LOOSE	BROWN	0	20 ft
2	GRAVEL	SAND	LOOSE	BROWN	20	22 ft
3	CLAY	GRAVEL	DENSE	GREY	22	144 ft
4	SAND	n/a	LOOSE	BROWN	144	146 ft
5	CLAY	n/a	DENSE	GREY	146	150 ft
6	MEDIUM SAND	n/a	LOOSE	BROWN	150	154 ft

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	190.17

Latitude: 44.024801
Longitude: -78.135605

Well ID: **7212191**

Contains information licensed under the Open Government Licence – Ontario (2021).

LOCATION

Lot:	005	**Tag:**	A140658
Con:	02	**Audit No:**	Z161426
Municipality:	NORTHUMBERLAND	**Contractor License:**	6593
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	10-04-2013
Street:	9473 COMMUNITY CENTER RD	**Received Date:**	11-29-2013
City:	n/a		

WELL

Well Status:	Water Supply	**Well Depth (m):**	6.096
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Digging	**Water Kind:**	FRESH

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	1004981088
Pump Set (m):	n/a	**Pump Test ID**	1004981089
SWL (ft)	7	**Flowing:**	n/a
Final Level:	16.4ft	**Pump Duration (hr):**	1
Pump Rate:	27 GPM	**Pump Duration (m):**	n/a
Recom. Rate:	n/a GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	1004981095	36	inch	CONCRETE	0	20 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	BLACK	0	2 ft
2	CLAY	SAND	SILT	BROWN	2	14 ft
3	CLAY	STONES	DENSE	BLUE	14	20 ft

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	

Latitude: 44.023086
Longitude: -78.145146

Well ID: **7351921**

LOCATION

Lot:	n/a	**Tag:**	A250225
Con:	n/a	**Audit No:**	Z289997
Municipality:	NORTHUMBERLAND	**Contractor License:**	4635
Township:	HAMILTON TOWNSHIP	**Well Completion Date:**	03-05-2019
Street:	9313 BURWASH RD	**Received Date:**	01-23-2020
City:	BALTIMORE		

WELL

Well Status:	Water Supply	**Well Depth (m):**	64.008
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Cable Tool	**Water Kind:**	Untested

PUMP TEST

Test Method:	CLEAR	**Pipe ID:**	1008174251
Pump Set (m):	207	**Pump Test ID**	1008176760
SWL (ft)	65	**Flowing:**	N
Final Level:	73 ft	**Pump Duration (hr):**	1
Pump Rate:	10 GPM	**Pump Duration (m):**	n/a
Recom. Rate:	10 GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	1008176212	6	Inch	STEEL	0	210 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	n/a	n/a	n/a	0	1 ft
2	GRAVEL	SAND	CLAY	BROWN	1	19 ft
3	GRAVEL	CLAY	STONES	GREY	19	89 ft
4	CLAY	GRAVEL	n/a	GREY	89	198 ft
5	SAND	GRAVEL	n/a	BROWN	198	210 ft

End of Record

Contains information licensed under the Open Government Licence – Ontario (2021).

Appendix B

Test Pit and Borehole Logs

STRATIGRAPHIC AND INSTRUMENTATION RECORD
(Overburden)

BH1-24
Project No: 12639057

Client: Stalwood Homes
Project: Stalwood Homes, Burwash Subdivision, Baltimore, ON
Location: 9380 Burwash Road, Baltimore, ON

Drill Co.: GET
Drilling Method(s): Solid Stem Auger
Sampling Method(s): SS

Logged By: Claire Baggesen
Approved By: Leandro Ramos

Easting: 729006.00 E **Northing:** 4878565.00 N
Horiz. Datum: NAD83 / UTM zone 17N
Ground Elev.: 191.14 m **Elev. Datum:** MAMSL
Final Depth: 6.17 m
Hole Diameter(s): 205 mm

Date Started: 08/19/2024
Date Completed: 09/30/2024

Depth (Metres)	Elevation (Metres)	Strat Symbol	Stratigraphy	Drilling Method	Run Number	Recovery %	Sample Number	6 in Blow Counts	'N' Value	PID (ppm)	Chem. Analysis	Grain Size Analysis % (Gravel / Sand / Silt / Clay / Fines)	Unit Weight (kN/m3)	Water Content %	PL% - LL%	Water Content (%) / Atterberg Limits (%) / "N" Value (Standard) / C_u (Field, kPa) / C_u (Lab, kPa)	Water Level(s)
	191.14															10 20 30 40 50 60 70 80 90	
			SILTY SAND, trace gravel, occasional rootlets, brown, moist, loose	Solid Stem Auger	SS1	100	SS1	4-4-4-10	8					8			
			- light brown at 0.46m BGS														
1.0					SS2	100	SS2	18-17-22-20	39					7			
1.07	190.07		SILTY SAND TILL, trace gravel, trace clay, light brown, moist, dense														
			- compact at 1.52m BGS		SS3	58	SS3	19-8-8-10	16					9			
2.0																	
			- occasional cobble, wet, dense at 2.29m BGS		SS4	100	SS4	10-15-17-19	32					10			
3.0																	
			- very dense at 3.05m BGS - auger grinding from 3.05m BGS to 3.96m BGS		SS5	100	SS5	12-13-38-50 /127 mm	51					10			
4.0																	
					SS6	100	SS6	19-31-50/12 7 mm	81					11			
5.0																	
6.0					SS7	100	SS7	50/76 mm	R					14			
6.17	184.97		End of Drilling at 6.17 m.														
7.0																	
8.0																	
9.0																	

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ At Time of Drilling:5.94 m
▼ After Drilling:
N Value: R - Refusal

Well Screen Details

From (m BGS)	From (Elev. m)	To (m BGS)	To (Elev. m)	Slot Size(mm)	Material

STRATIGRAPHIC AND INSTRUMENTATION RECORD
(Overburden)

BH2-24
Project No: 12639057

Client: Stalwood Homes
Project: Stalwood Homes, Burwash Subdivision, Baltimore, ON
Location: 9380 Burwash Road, Baltimore, ON

Drill Co.: GET
Drilling Method(s): Solid Stem Auger
Sampling Method(s): SS

Logged By: Claire Baggesen
Approved By: Leandro Ramos

Easting: 728961.00 E **Northing:** 4878735.00 N
Horiz. Datum: NAD83 / UTM zone 17N
Ground Elev.: 196.70 m **Elev. Datum:** MAMSL
Final Depth: 6.17 m
Hole Diameter(s): 205 mm

Date Started: 08/19/2024
Date Completed: 09/30/2024

Depth (Metres)	Elevation (Metres)	Strat Symbol	Stratigraphy	Drilling Method	Run Number	Recovery %	Sample Number	6 in Blow Counts	'N' Value	PID (ppm)	Chem. Analysis	Grain Size Analysis % (Gravel / Sand / Silt / Clay / Fines)	Unit Weight (kN/m3)	Water Content %	PL% - LL%	Water Content (%) / Atterberg Limits (%) / "N" Value (Standard) / C_u (Field, kPa) / C_u (Lab, kPa)	Water Level(s)
	196.70		TOPSOIL (205 mm)													10 20 30 40 50 60 70 80 90	
0.21	196.50		SILTY SAND, brown, moist, very loose	Solid Stem Auger	SS1	100	SS1	3-1-2-1	3					9			
			- trace clay, light brown, compact at 0.76m BGS		SS2	100	SS2	7-11-10-6	21					6			
1.52	195.18		SILTY SAND TILL, trace clay, trace gravel, occasional cobbles, light brown, moist, compact		SS3	100	SS3	8-13-15-15	28					7			
			- dense at 2.29m BGS		SS4	100	SS4	15-17-26-24	43					7			
			- very dense from 3.05m BGS to 3.43m BGS		SS5	100	SS5	12-42-50/76 mm	92					5			
			- rock in tip of spoon, moist, very dense from 4.57m BGS to 4.85m BGS		SS6	100	SS6	16-50/127 mm	R					7			
					SS7	100	SS7	50/76 mm	R					5			
6.17	190.53		End of Drilling at 6.17 m.														

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ At Time of Drilling:Dry
▼ After Drilling:
N Value: R - Refusal

Well Screen Details

From (m BGS)	From (Elev. m)	To (m BGS)	To (Elev. m)	Slot Size(mm)	Material

STRATIGRAPHIC AND INSTRUMENTATION RECORD
(Overburden)

BH3-24
Project No: 12639057

Client: Stalwood Homes
Project: Stalwood Homes, Burwash Subdivision, Baltimore, ON
Location: 9380 Burwash Road, Baltimore, ON

Drill Co.: GET
Drilling Method(s): Solid Stem Auger
Sampling Method(s): SS

Logged By: Claire Baggesen
Approved By: Leandro Ramos

Easting: 729013.00 E **Northing:** 4878870.00 N
Horiz. Datum: NAD83 / UTM zone 17N
Ground Elev.: 196.91 m **Elev. Datum:** MAMSL
Final Depth: 6.35 m
Hole Diameter(s): 205 mm

Date Started: 08/19/2024
Date Completed: 09/30/2024

Depth (Metres)	Elevation (Metres)	Strat Symbol	Stratigraphy	Drilling Method	Run Number	Recovery %	Sample Number	6 in Blow Counts	'N' Value	PID (ppm)	Chem. Analysis	Grain Size Analysis % (Gravel / Sand / Silt / Clay / Fines)	Unit Weight (kN/m3)	Water Content %	PL% - LL%	Water Content (%) / Atterberg Limits (%) / "N" Value (Standard) / C_u (Field, kPa) / C_u (Lab, kPa)	Water Level(s)
	196.91		TOPSOIL (150 mm)													10 20 30 40 50 60 70 80 90	
0.15	196.76		SILTY SAND, trace rootlets, loose	Solid Stem Auger	SS1	100	SS1	5-4-4-12	8					11			
0.76	196.15		SILTY SAND TILL, some clay, trace gravel, light brown, moist to wet, compact		SS2	100	SS2	5-6-7-8	13					9			
			- coarse sand seam from 1.83m BGS to 1.88m BGS		SS3	100	SS3	5-13-16-15	29					7			
			- compact at 2.29m BGS		SS4	100	SS4	8-8-9-10	17					9			
			- trace clay at 3.05m BGS		SS5	100	SS5	3-5-7-28	12					10			
			- auger grinding from 3.96m BGS to 4.27m BGS														
			- occasional cobbles, very dense at 4.57m BGS		SS6	100	SS6	50/76 mm	R					5			
					SS7	100	SS7	5-50/102 mm	R					5			
6.35	190.56		End of Drilling at 6.35 m.														

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ At Time of Drilling:Dry
▼ After Drilling:
N Value: R - Refusal

Well Screen Details

From (m BGS)	From (Elev. m)	To (m BGS)	To (Elev. m)	Slot Size(mm)	Material

STRATIGRAPHIC AND INSTRUMENTATION RECORD
(Overburden)

BH4-24
Project No: 12639057

Client: Stalwood Homes
Project: Stalwood Homes, Burwash Subdivision, Baltimore, ON
Location: 9380 Burwash Road, Baltimore, ON

Drill Co.: GET
Drilling Method(s): Solid Stem Auger
Sampling Method(s): SS
Logged By: Claire Baggesen
Approved By: Leandro Ramos

Easting: 728849.00 E **Northing:** 4878894.00 N
Horiz. Datum: NAD83 / UTM zone 17N
Ground Elev.: 186.64 m **Elev. Datum:** MAMSL
Final Depth: 6.71 m
Hole Diameter(s): 205 mm

Date Started: 08/19/2024
Date Completed: 09/30/2024

Depth (Metres)	Elevation (Metres)	Strat Symbol	Stratigraphy	Drilling Method	Run Number	Recovery %	Sample Number	6 in Blow Counts	'N' Value	PID (ppm)	Chem. Analysis	Grain Size Analysis % (Gravel / Sand / Silt / Clay / Fines)	Unit Weight (kN/m3)	Water Content %	PL% - LL%	Water Level(s)	Monitoring Well
	186.64		TOPSOIL (205 mm)														
0.21	186.44		SILTY SAND, trace gravel, trace clay, light brown, moist, compact, rock in tip of spoon	Solid Stem Auger	SS1	33	SS1	5-3-9-7	12					14			
					SS2	100	SS2	5-4-7-7	11					9			
1.52	185.12		SILTY SAND TILL, some clay, trace to some gravel, light brown - auger grinding from 1.52m BGS to 1.83m BGS - dense at 2.29m BGS		SS3	100	SS3	4-6-19-20	25					9			
					SS4	100	SS4	14-20-25-29	45			18 / 41 / 27 / 16		7			
			- wet, dense at 3.05m BGS - auger grinding from 3.66m BGS to 3.81m BGS		SS5	21	SS5	12-21-30-35	51					11			
			- trace clay, very dense from 4.57m BGS to 4.95m BGS		SS6	100	SS6	10-26-50/76 mm	76					7			
			- grey, dense at 6.10m BGS		SS7	100	SS7	15-22-25-25	47					8			
6.71	179.93		End of Drilling at 6.71 m.														

Water Content (%) / Atterberg Limits (%) / "N" Value (Standard) / C_u (Field, kPa) / C_u (Lab, kPa)
10 20 30 40 50 60 70 80 90

Bentonite
Slotted Sand

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ At Time of Drilling:
▼ After Drilling:

Well Screen Details

From (m BGS)	From (Elev. m)	To (m BGS)	To (Elev. m)	Slot Size(mm)	Material
3.05	183.59	6.10	180.54		PVC

STRATIGRAPHIC AND INSTRUMENTATION RECORD
(Overburden)

BH5-24
Project No: 12639057

Client: Stalwood Homes
Project: Stalwood Homes, Burwash Subdivision, Baltimore, ON
Location: 9380 Burwash Road, Baltimore, ON

Drill Co.: GET
Drilling Method(s): Solid Stem Auger
Sampling Method(s): SS

Easting: 728982.00 E **Northing:** 4879089.00 N
Horiz. Datum: NAD83 / UTM zone 17N
Ground Elev.: 191.24 m **Elev. Datum:** MAMSL

Logged By: Claire Baggesen
Approved By: Leandro Ramos

Final Depth: 6.63 m
Hole Diameter(s): 205 mm

Date Started: 08/19/2024
Date Completed: 09/30/2024

Depth (Metres)	Elevation (Metres)	Strat Symbol	Stratigraphy	Drilling Method	Run Number	Recovery %	Sample Number	6 in Blow Counts	'N' Value	PID (ppm)	Chem. Analysis	Grain Size Analysis % Gravel	Sand	Silt	Clay	Fines	Unit Weight (kN/m3)	Water Content %	PL% - LL%	Water Content (%) / Atterberg Limits (%) / "N" Value (Standard) / C_u (Field, kPa) / C_u (Lab, kPa)	Water Level(s)
	191.24		TOPSOIL (205 mm)																	10 20 30 40 50 60 70 80 90	
0.21	191.04		SILTY SAND, trace gravel, trace clay, light brown, compact - auger grinding at 0.61m BGS	Solid Stem Auger	SS1	100	SS1	2-4-6-9	10									7			
0.76	190.48		SILTY SAND, TILL, some clay, trace gravel, light brown, compact		SS2	100	SS2	12-12-12-11	24			9	43	33	15			8			
			- moist to wet, compact at 1.52m BGS		SS3	100	SS3	6-7-5-6	12									8			
			- rock in tip of spoon, moist, compact at 2.29m BGS		SS4	95	SS4	5-6-7-50/10 2 mm	13									9			
			- dense at 3.05m BGS - trace clay, auger grinding from 3.35m BGS to 3.96m BGS		SS5	100	SS5	6-20-25-23	45									7			
			- very dense at 4.57m BGS		SS6	100	SS6	28-34-28-32	62									9			
					SS7	100	SS7	11-12-26-50/ 76 mm	38									8			
6.63	184.61		End of Drilling at 6.63 m.																		

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ At Time of Drilling:Dry
▼ After Drilling:

Well Screen Details

From (m BGS)	From (Elev. m)	To (m BGS)	To (Elev. m)	Slot Size(mm)	Material

STRATIGRAPHIC AND INSTRUMENTATION RECORD
(Overburden)

BH6-24
Project No: 12639057

Client: Stalwood Homes
Project: Stalwood Homes, Burwash Subdivision, Baltimore, ON
Location: 9380 Burwash Road, Baltimore, ON

Drill Co.: GET
Drilling Method(s): Solid Stem Auger
Sampling Method(s): SS
Logged By: Claire Baggesen
Approved By: Leandro Ramos

Easting: 729117.00 E **Northing:** 4878940.00 N
Horiz. Datum: NAD83 / UTM zone 17N
Ground Elev.: 200.09 m **Elev. Datum:** MAMSL
Final Depth: 6.20 m
Hole Diameter(s): 205 mm

Date Started: 08/19/2024
Date Completed: 09/30/2024

Depth (Metres)	Elevation (Metres)	Strat Symbol	Stratigraphy	Drilling Method	Run Number	Recovery %	Sample Number	6 in Blow Counts	'N' Value	PID (ppm)	Chem. Analysis	Grain Size Analysis % (Gravel / Sand / Silt / Clay / Fines)	Unit Weight (kN/m3)	Water Content %	PL% - LL%	Water Content (%) / Atterberg Limits (%) / "N" Value (Standard) / C_u (Field, kPa) / C_u (Lab, kPa) — 10 20 30 40 50 60 70 80 90	Water Level(s)	Monitoring Well
	200.09		TOPSOIL (255 mm)															
0.26	199.84		SILTY SAND, brown, moist, very loose	Solid Stem Auger	SS1	100	SS1	2-3-1-1	4					14				
1.0			- trace clay, trace gravel, loose at 1.07m BGS		SS2	100	SS2	3-2-4-11	6					12				Bentonite
1.52	198.57		SILTY SAND TILL, trace gravel, trace clay, light brown, moist, compact		SS3	100	SS3	10-8-7-5	15					9				
2.0			- occasional cobble, moist, compact at 1.52m BGS		SS4	100	SS4	4-5-6-10	11					11				
3.0					SS5	100	SS5	8-12-14-26	26					7				
4.0			- very dense from 4.57m BGS to 4.80m BGS		SS6	100	SS6	32-50/77 mm	R					7				Sand / Slotted
5.0																		
6.0					SS7	100	SS7	50/102 mm	R					8				
6.20	193.89		End of Drilling at 6.20 m.															
7.0																		
8.0																		
9.0																		

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ At Time of Drilling:
▼ After Drilling:
N Value: R - Refusal

Well Screen Details

From (m BGS)	From (Elev. m)	To (m BGS)	To (Elev. m)	Slot Size(mm)	Material
3.05	197.04	6.10	193.99		PVC

STRATIGRAPHIC AND INSTRUMENTATION RECORD
(Overburden)

BH7-24
Project No: 12639057

Client: Stalwood Homes
Project: Stalwood Homes, Burwash Subdivision, Baltimore, ON
Location: 9380 Burwash Road, Baltimore, ON

Drill Co.: GET
Drilling Method(s): Solid Stem Auger
Sampling Method(s): SS

Logged By: Claire Baggesen
Approved By: Leandro Ramos

Easting: 729184.00 E **Northing:** 4878749.00 N
Horiz. Datum: NAD83 / UTM zone 17N
Ground Elev.: 190.75 m **Elev. Datum:** MAMSL
Final Depth: 6.48 m
Hole Diameter(s): 205 mm

Date Started: 08/19/2024
Date Completed: 09/30/2024

Depth (Metres)	Elevation (Metres)	Strat Symbol	Stratigraphy	Drilling Method	Run Number	Recovery %	Sample Number	6 in Blow Counts	'N' Value	PID (ppm)	Chem. Analysis	Grain Size Analysis % (Gravel / Sand / Silt / Clay / Fines)	Unit Weight (kN/m3)	Water Content %	PL% - LL%	Water Content (%) / Atterberg Limits (%) / "N" Value (Standard) / C_u (Field, kPa) / C_u (Lab, kPa)	Water Level(s)
	190.75															10 20 30 40 50 60 70 80 90	
0.08	190.68		TOPSOIL (75 mm) SILTY SAND, trace gravel, dark brown, moist, loose - light brown at 0.23m BGS	Solid Stem Auger	SS1	100	SS1	2-2-4-6	6					9			
					SS2	100	SS2	6-4-4-6	8					11			
1.52	189.23		SILTY SAND TILL, trace clay, moist, loose		SS3	100	SS3	2-4-4-4	8					10			
			- moist to wet at 2.29m BGS		SS4	100	SS4	4-4-4-7	8					11			
			- compact at 3.05m BGS		SS5	100	SS5	8-15-14-22	29					7			▽
			- occasional cobbles, dense at 4.57m BGS		SS6	100	SS6	13-22-26-50 /102 mm	48					9			
			- grey, very dense at 6.10m BGS - sand seam from 6.17m BGS to 6.25m BGS		SS7	100	SS7	13-33-50/76 mm	83					9			
6.48	184.27		End of Drilling at 6.48 m.														

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ At Time of Drilling:4.27 m
▼ After Drilling:

Well Screen Details

From (m BGS)	From (Elev. m)	To (m BGS)	To (Elev. m)	Slot Size(mm)	Material

STRATIGRAPHIC AND INSTRUMENTATION RECORD
(Overburden)

BH8-24
Project No: 12639057

Client: Stalwood Homes
Project: Stalwood Homes, Burwash Subdivision, Baltimore, ON
Location: 9380 Burwash Road, Baltimore, ON

Drill Co.: GET
Drilling Method(s): Solid Stem Auger
Sampling Method(s): SS
Logged By: Claire Baggesen
Approved By: Leandro Ramos

Easting: 729170.00 E **Northing:** 4878617.00 N
Horiz. Datum: NAD83 / UTM zone 17N
Ground Elev.: 181.85 m **Elev. Datum:** MAMSL
Final Depth: 6.17 m
Hole Diameter(s): 205 mm

Date Started: 08/19/2024
Date Completed: 09/30/2024

Depth (Metres)	Elevation (Metres)	Strat Symbol	Stratigraphy	Drilling Method	Run Number	Recovery %	Sample Number	6 in Blow Counts	'N' Value	PID (ppm)	Chem. Analysis	Grain Size Analysis % (Gravel / Sand / Silt / Clay / Fines)	Unit Weight (kN/m3)	Water Content %	PL% - LL%	Water Content (%) / Atterberg Limits (%) / "N" Value (Standard) / C_u (Field, kPa) / C_u (Lab, kPa)	Water Level(s)	Monitoring Well
	181.85															10 20 30 40 50 60 70 80 90		
			SILTY SAND, some organics, dark brown, moist, loose	Solid Stem Auger	SS1	100	SS1	2-3-5-5	8					16				
			- light brown at 0.15m BGS															
1.0			- wet, very loose at 0.76m BGS		SS2	100	SS2	1-2-2-2	4					16				Bentonite
1.52	180.33		SILTY SAND TILL, some gravel, some clay, occasional cobbles, light brown, moist, compact		SS3	100	SS3	2-5-11-12	16					12				
2.0			- moist to wet, very dense at 2.29m BGS															
			- auger grinding on cobbles from 2.44m BGS to 2.80m BGS		SS4	100	SS4	12-13-28-50 /51 mm	41					8				
3.0			- trace clay, wet from 3.05m BGS to 3.40m BGS		SS5	100	SS5	13-50-50/51 mm	100			39 / 49 / 9 / 3		7				
4.0																		Sand
			- grey at 4.57m BGS		SS6	100	SS6	24-52-50/51 mm	102					7				Slotted
5.0																		
6.0					SS7	100	SS7	50/76 mm	R					7				
6.17	175.68		End of Drilling at 6.17 m.															
7.0																		
8.0																		
9.0																		

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ At Time of Drilling:
▼ After Drilling:
N Value: R - Refusal

Well Screen Details

From (m BGS)	From (Elev. m)	To (m BGS)	To (Elev. m)	Slot Size(mm)	Material
3.05	178.80	6.10	175.75		PVC

TEST PIT STRATIGRAPHIC RECORD

TP1-24
Project No: 12639057

Client: Stalwood Homes
Project: Stalwood Homes, Burwash Subdivision, Baltimore, ON
Location: 9380 Burwash Road, Baltimore, ON

Excavation Co.:
Test Pit Equipment: Excavator
Sample Method(s): GS

Easting: 729023.00 E **Northing:** 4879078.00 N
Horiz. Datum: NAD83 / UTM zone 17N
Elevation: 193.50 m ASD

Date Started: 30/09/2024
Date Completed: 30/09/2024

Logged By: Adam Bonner
Approved By: Leandro Ramos

Dimension:
Total Depth: 2.80 m

Depth (Metres)	Elevation (Metres)	Strat Symbol	Stratigraphy	Remarks	Sample Location	Sample Number	Analysis	PID (ppm)	Water Level(s)	Backfill
0.00	193.50		TOPSOIL (200 mm)							
0.20	193.30		SILTY SAND, some gravel, some clay, with to some buried topsoil and observed sand seam, light brown, moist							
			- Gravel: 18%; Sand: 48%; Silt: 22%; Clay: 12% at 1.20m BGS			GS1	G			
			- water seepage at 1.50m BGS							
1.80	191.70		SILTY SAND TILL, some gravel, some clay, trace cobbles, light brown, moist							
			- very dense Gravel: 20%; Sand: 42%; Silt: 21%; Clay: 17% at 2.60m BGS			GS2	G			
2.80	190.70		End of Test Pit at 2.80 m.							

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
At Time of Excavation:
After Excavation:
Grain Size Analysis: G

Backfill Details		
Description	From(ft BGS)	To(ft BGS)

TEST PIT STRATIGRAPHIC RECORD

TP2-24
Project No: 12639057

Client: Stalwood Homes
Project: Stalwood Homes, Burwash Subdivision, Baltimore, ON
Location: 9380 Burwash Road, Baltimore, ON

Excavation Co.:
Test Pit Equipment: Excavator
Sample Method(s): GS

Easting: 728902.00 E **Northing:** 4878837.00 N
Horiz. Datum: NAD83 / UTM zone 17N
Elevation: 192.00 m ASD

Date Started: 30/09/2024
Date Completed: 30/09/2024

Logged By: Adam Bonner
Approved By: Leandro Ramos

Dimension:
Total Depth: 2.80 m

Depth (Metres)	Elevation (Metres)	Strat Symbol	Stratigraphy	Remarks	Sample Location	Sample Number	Analysis	PID (ppm)	Water Level(s)	Backfill
0.00	192.00		TOPSOIL (250 mm)							
0.25	191.75		SILTY SAND, some gravel, trace clay, light brown, moist - Gravel: 14%; Sand: 50%; Silt: 28%; Clay: 8% at 0.30m BGS			GS1	G			
0.80	191.20		SILTY SAND TILL, some gravel, some clay, trace cobbles, light brown, moist - water seepage from 1.20m BGS to 1.60m BGS - Gravel: 11%; Sand: 50%; Silt: 22%; Clay: 17% at 1.60m BGS			GS2	G			
			- very dense Gravel: 26%; Sand: 40%; Silt: 20%; Clay: 14% at 2.60m BGS			GS3	G			
2.80	189.20		End of Test Pit at 2.80 m.							

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
At Time of Excavation:
After Excavation:
Grain Size Analysis: G

Backfill Details		
Description	From(ft BGS)	To(ft BGS)

TEST PIT STRATIGRAPHIC RECORD

TP3-24
Project No: 12639057

Client: Stalwood Homes
Project: Stalwood Homes, Burwash Subdivision, Baltimore, ON
Location: 9380 Burwash Road, Baltimore, ON

Excavation Co.:
Test Pit Equipment: Excavator
Sample Method(s): GS

Easting: 728984.00 E **Northing:** 4878690.00 N
Horiz. Datum: NAD83 / UTM zone 17N
Elevation: 197.00 m ASD

Date Started: 30/09/2024
Date Completed: 30/09/2024

Logged By: Adam Bonner
Approved By: Leandro Ramos

Dimension:
Total Depth: 2.80 m

Depth (Metres)	Elevation (Metres)	Strat Symbol	Stratigraphy	Remarks	Sample Location	Sample Number	Analysis	PID (ppm)	Water Level(s)	Backfill
0.00	197.00		TOPSOIL (200 mm)							
0.20	196.80		SILTY SAND, some gravel, some clay, light brown, moist							
1.00	196.00		SANDY GRAVEL, with cobbles, trace silt - Gravel: 68%; Sand: 28%; Silt: 3%; Clay: 1% at 1.50m BGS			GS1	G			
2.30	194.70		SILTY SAND TILL, some gravel, trace clay, trace cobbles, light brown							
2.80	194.20		End of Test Pit at 2.80 m.							

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
At Time of Excavation:
After Excavation:
Grain Size Analysis: G

Backfill Details		
Description	From(ft BGS)	To(ft BGS)

TEST PIT STRATIGRAPHIC RECORD

TP4-24
Project No: 12639057

Client: Stalwood Homes
Project: Stalwood Homes, Burwash Subdivision, Baltimore, ON
Location: 9380 Burwash Road, Baltimore, ON

Excavation Co.:
Test Pit Equipment: Excavator
Sample Method(s): GS

Easting: 728941.00 E **Northing:** 4877964.00 N
Horiz. Datum: NAD83 / UTM zone 17N
Elevation: 192.50 m ASD

Date Started: 30/09/2024
Date Completed: 30/09/2024

Logged By: Adam Bonner
Approved By: Leandro Ramos

Dimension:
Total Depth: 2.20 m

Depth (Metres)	Elevation (Metres)	Strat Symbol	Stratigraphy	Remarks	Sample Location	Sample Number	Analysis	PID (ppm)	Water Level(s)	Backfill
0.00	192.50									
			TOPSOIL (200 mm)							
0.20	192.30		SILTY SAND, some gravel, some clay, trace cobbles, light brown							
0.90	191.60		SILTY SAND TILL, trace to some gravel, some clay, light brown, moist - water seepage at 0.90m BGS							
			- Gravel: 10%; Sand: 42%; Silt: 29%; Clay: 19% at 1.70m BGS			GS1	G			
			- gravelly, very dense Gravel: 29%; Sand: 32%; Silt: 24%; Clay: 15% from 2.00m BGS to 2.20m BGS			GS2	G			
2.20	190.30		End of Test Pit at 2.20 m.							

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
At Time of Excavation:
After Excavation:
Grain Size Analysis: G

Backfill Details		
Description	From(ft BGS)	To(ft BGS)

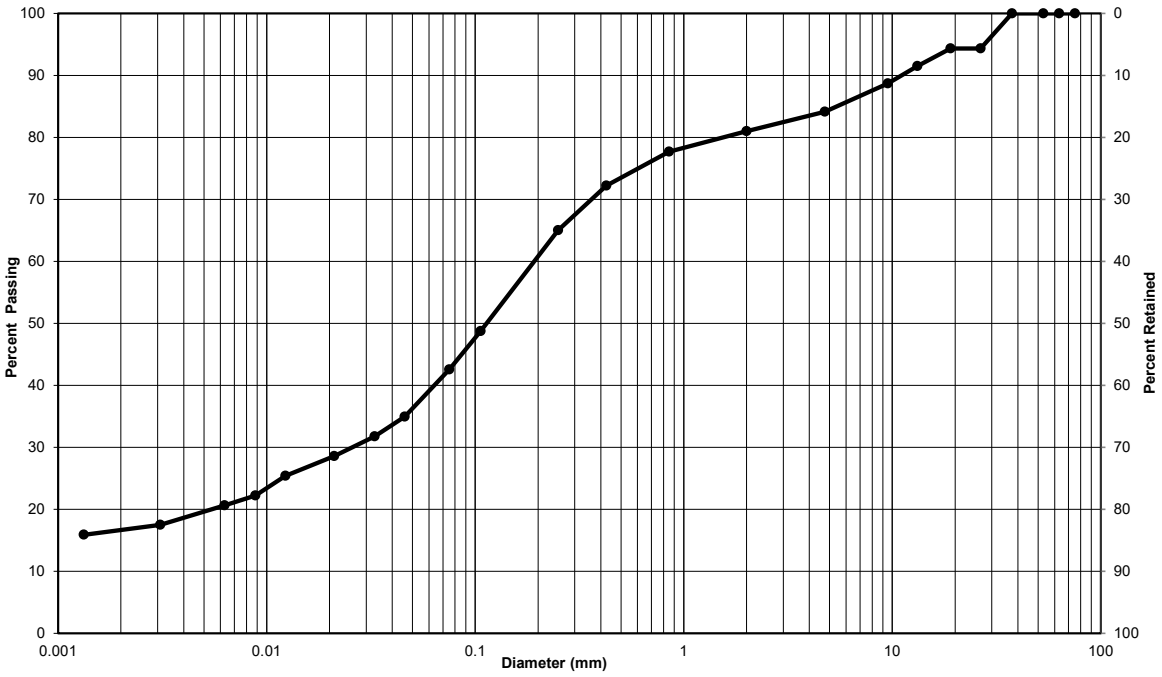
Appendix C

Geotechnical Laboratory Testing Results

Particle-Size Analysis of Soils

MTO LS-702/ASTM D422 (Geotechnical)

Client:	Stalwood Homes	**Lab No.:**	SS-24-53
Project/Site:	Burwash Subdivision, Baltimore, ON	**Project No.:**	12639057-01
Borehole No.:	BH4-24	Sample No.:	SS-4
Depth:	2.3 - 2.9 m	Enclosure:	C-1



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty sand, some clay and gravel	16	41	43
Silt-size particles (%) :	27		
Clay-size particles (%) (<0.002 mm):	16		

Additional laboratory reporting information available upon request.

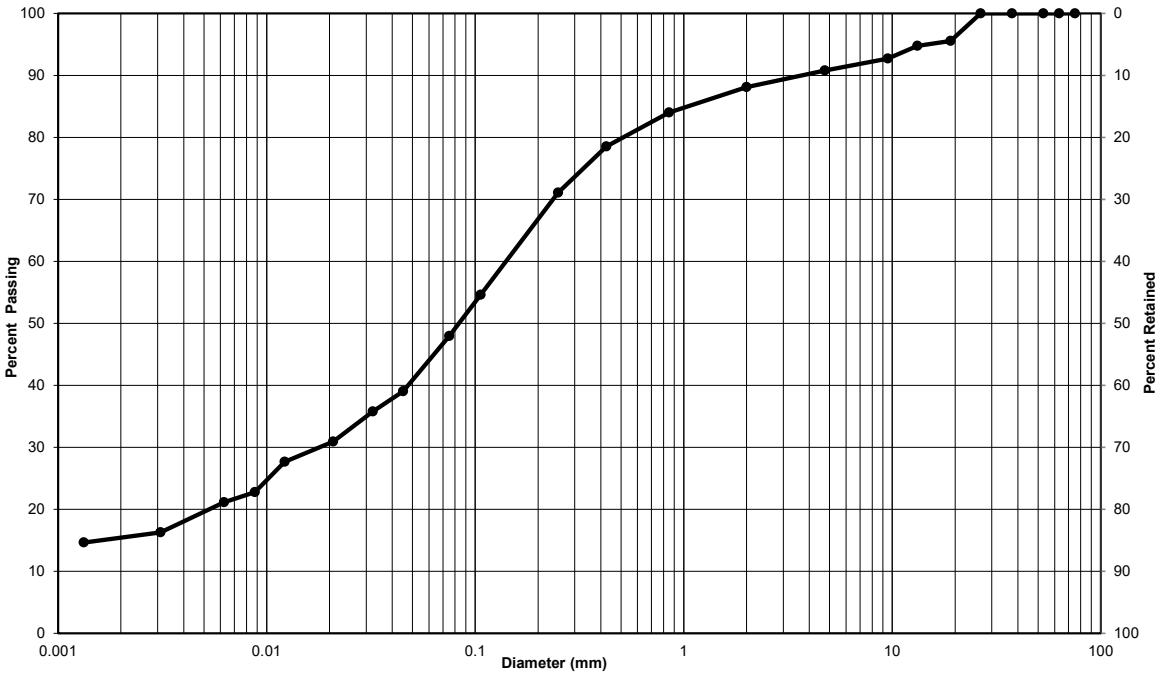
Remarks:

Performed by:	Josh Sullivan	**Date:**	August 29, 2024
Verified by:	Joe Sullivan	**Date:**	September 2, 2024
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Particle-Size Analysis of Soils

MTO LS-702/ASTM D422 (Geotechnical)

Client:	Stalwood Homes	**Lab No.:**	SS-24-53
Project/Site:	Burwash Subdivision, Baltimore, ON	**Project No.:**	12639057
Borehole No.:	BH5-24	Sample No.:	SS-2
Depth:	0.8 -1.4 m	Enclosure:	C-2



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty sand, some clay, trace gravel	9	43	48
Silt-size particles (%) :	33		
Clay-size particles (%) (<0.002 mm):	15		

Additional laboratory reporting information available upon request.

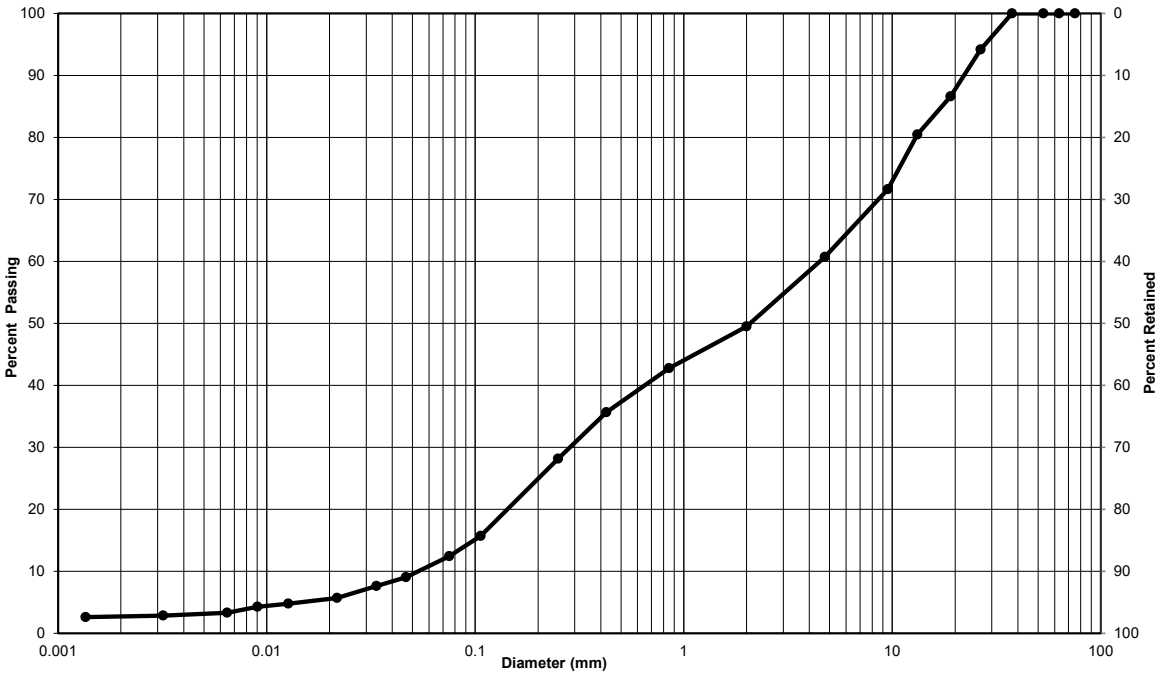
Remarks:

Performed by:	Josh Sullivan	**Date:**	August 29, 2024
Verified by:	Joe Sullivan	**Date:**	September 2, 2024
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Particle-Size Analysis of Soils

MTO LS-702/ASTM D422 (Geotechnical)

Client:	Stalwood Homes	**Lab No.:**	SS-24-53
Project/Site:	Burwash Subdivision, Baltimore, ON	**Project No.:**	12639057-01
Borehole No.:	BH8-24	Sample No.:	SS-5
Depth:	3.0 -3.4 m	Enclosure:	C-3



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Gravelly sand, trace silt and clay	39	49	12
Silt-size particles (%) :	9		
Clay-size particles (%) (<0.002 mm):	3		

Additional laboratory reporting information available upon request.

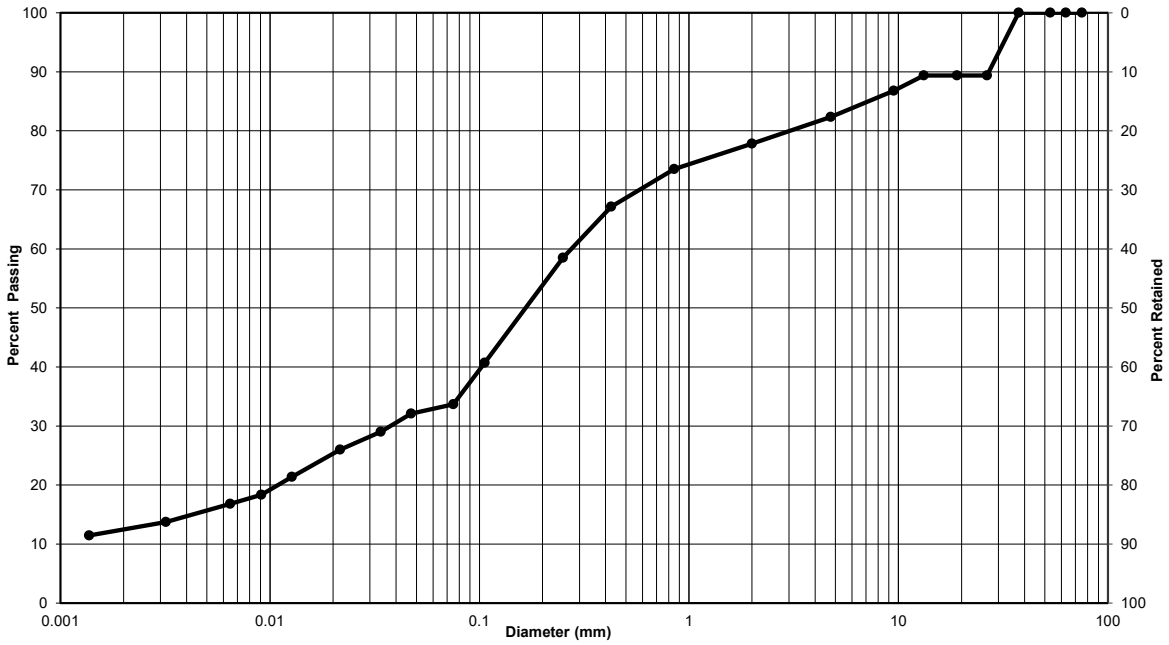
Remarks:

Performed by:	Josh Sullivan	**Date:**	August 29, 2024
Verified by:	Joe Sullivan	**Date:**	September 2, 2024
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Particle-Size Analysis of Soils

MTO LS-702/ASTM D422 (Geotechnical)

Client:	Stalwood Homes	**Lab No.:**	SS-24-24
Project/Site:	Burwash Subdivision, Baltimore, ON	**Project No.:**	12639057
Borehole No.:	TP-1	Sample No.:	GS-1
Depth:	1.2-1.5m	Enclosure:	C-4



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty sand, some gravel and clay	18	48	34
Silt-size particles (%) :	22		
Clay-size particles (%) (<0.002 mm):	12		

Additional laboratory reporting information available upon request.

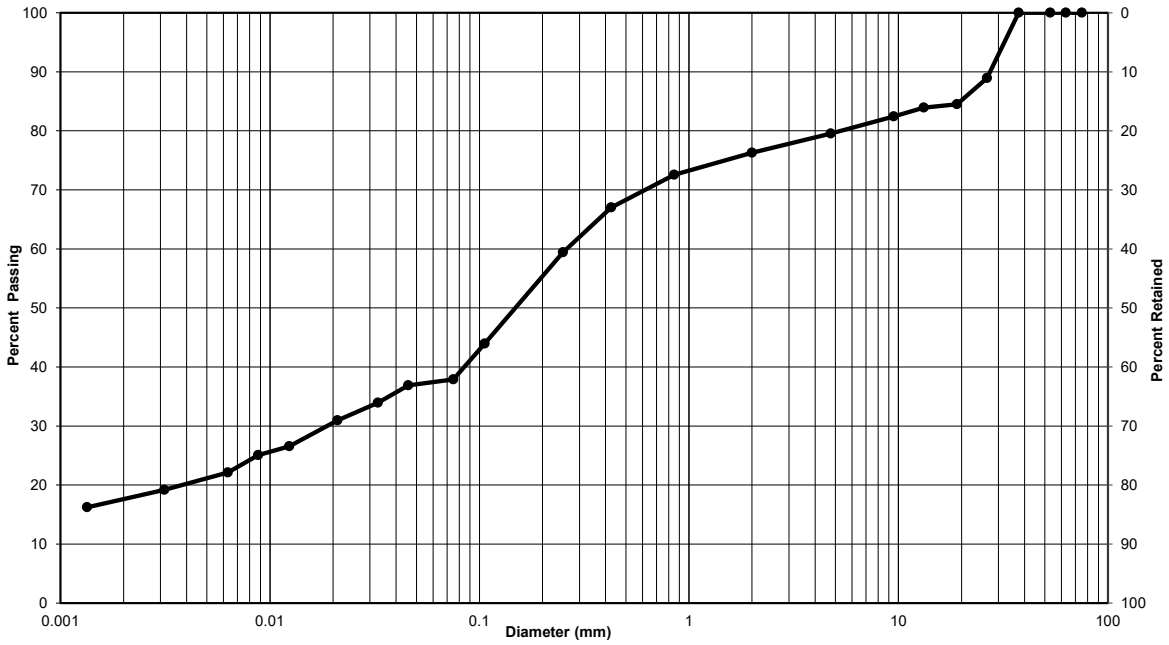
Remarks:

Performed by:	Josh Sullivan	**Date:**	May 7, 2024
Verified by:	Joe Sullivan	**Date:**	May 7, 2024
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Particle-Size Analysis of Soils

MTO LS-702/ASTM D422 (Geotechnical)

Client:	Stalwood Homes	**Lab No.:**	SS-24-24
Project/Site:	Burwash Subdivision, Baltimore, ON	**Project No.:**	12639057-01
Borehole No.:	TP-1	Sample No.:	GS-2
Depth:	2.6m-2.8m	Enclosure:	C-5



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty, gravelly sand, some clay	20	42	38
Silt-size particles (%) :	21		
Clay-size particles (%) (<0.002 mm):	17		

Additional laboratory reporting information available upon request.

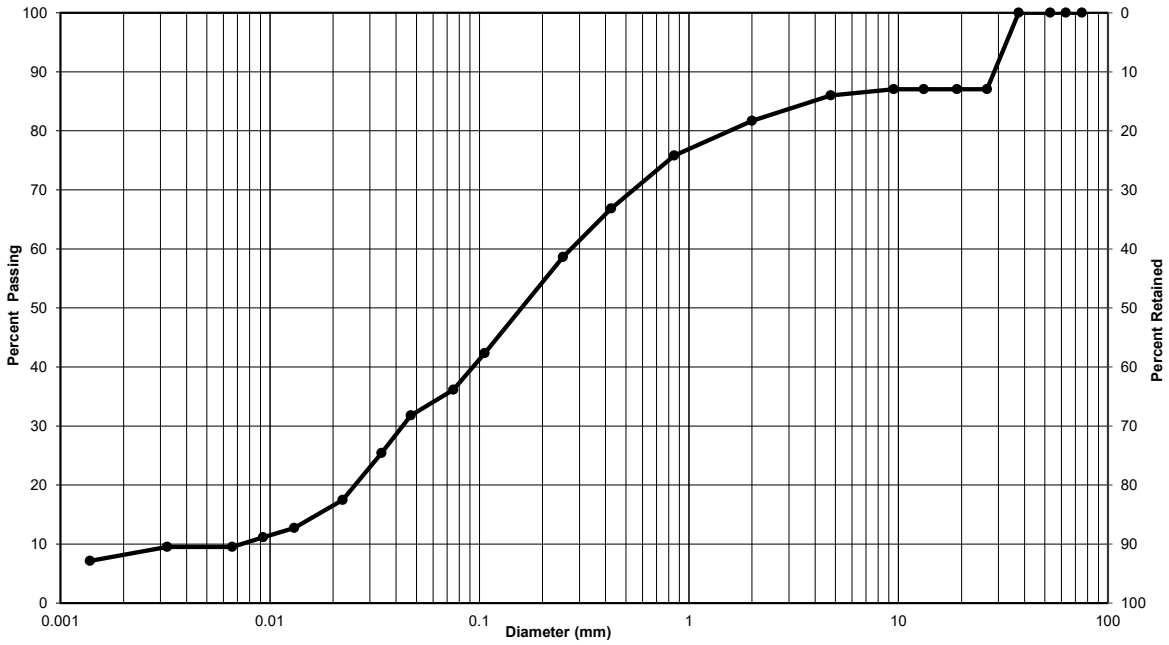
Remarks:

Performed by:	Josh Sullivan	**Date:**	May 7, 2024
Verified by:	Joe Sullivan	**Date:**	May 7, 2024
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Particle-Size Analysis of Soils

MTO LS-702/ASTM D422 (Geotechnical)

Client:	Stalwood Homes	**Lab No.:**	SS-24-24
Project/Site:	Burwash Subdivision, Baltimore, ON	**Project No.:**	12639057-01
Borehole No.:	TP-2	Sample No.:	GS-1
Depth:	250mm-800mm	Enclosure:	C-6



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty sand, some gravel, trace clay	14	50	36
Silt-size particles (%) :	28		
Clay-size particles (%) (<0.002 mm):	8		

Additional laboratory reporting information available upon request.

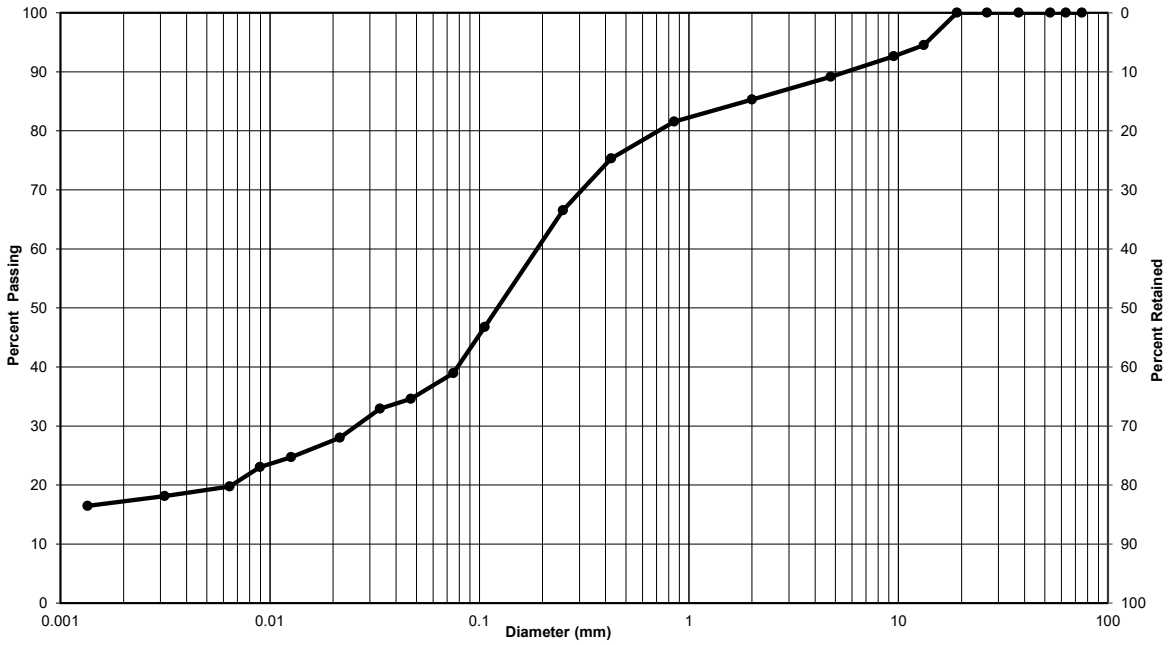
Remarks:

Performed by:	Josh Sullivan	**Date:**	May 7, 2024
Verified by:	Joe Sullivan	**Date:**	May 7, 2024
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Particle-Size Analysis of Soils

MTO LS-702/ASTM D422 (Geotechnical)

Client:	Stalwood Homes	**Lab No.:**	SS-24-24
Project/Site:	Burwash Subdivision, Baltimore, ON	**Project No.:**	12639057-01
Borehole No.:	TP-2	Sample No.:	GS-2
Depth:	1.6m-1.8m	Enclosure:	C-7



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty sand, some clay and gravel	11	50	39
Silt-size particles (%) :	22		
Clay-size particles (%) (<0.002 mm):	17		

Additional laboratory reporting information available upon request.

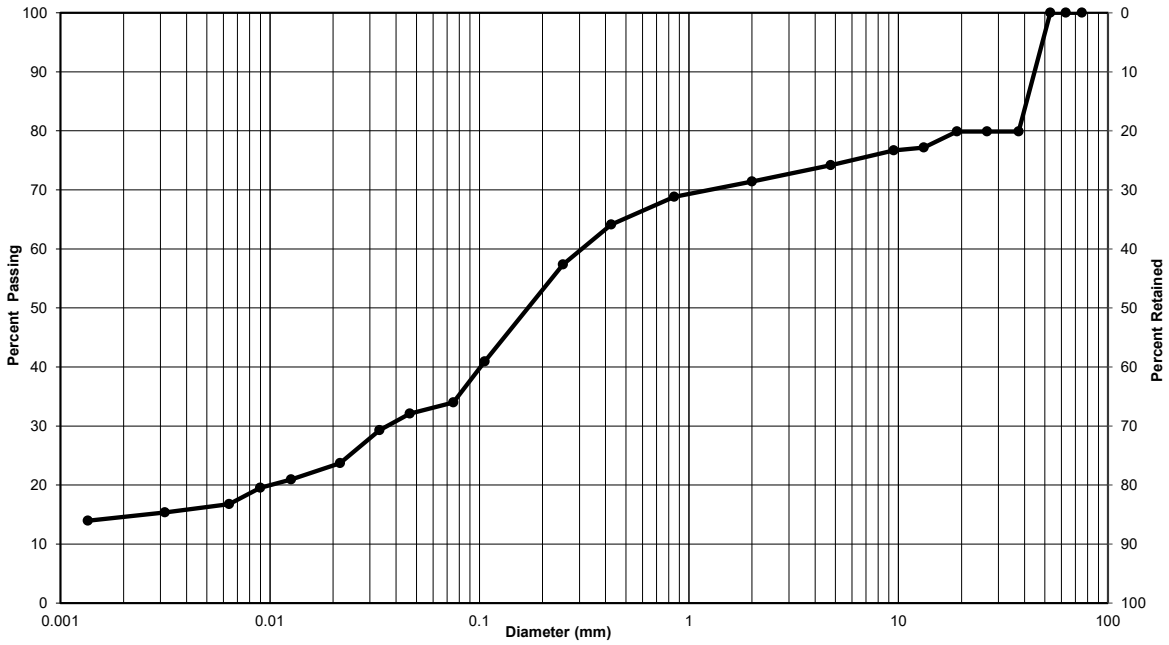
Remarks:

Performed by:	Josh Sullivan	**Date:**	May 7, 2024
Verified by:	Joe Sullivan	**Date:**	May 7, 2024
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Particle-Size Analysis of Soils

MTO LS-702/ASTM D422 (Geotechnical)

Client:	Stalwood Homes	**Lab No.:**	SS-24-24
Project/Site:	Burwash Subdivision, Baltimore, ON	**Project No.:**	12639057-01
Borehole No.:	TP-2	Sample No.:	GS-3
Depth:	2.6m-2.8m	Enclosure:	C-8



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Gravelly sand, some silt and clay	26	40	34
Silt-size particles (%) :	20		
Clay-size particles (%) (<0.002 mm):	14		

Additional laboratory reporting information available upon request.

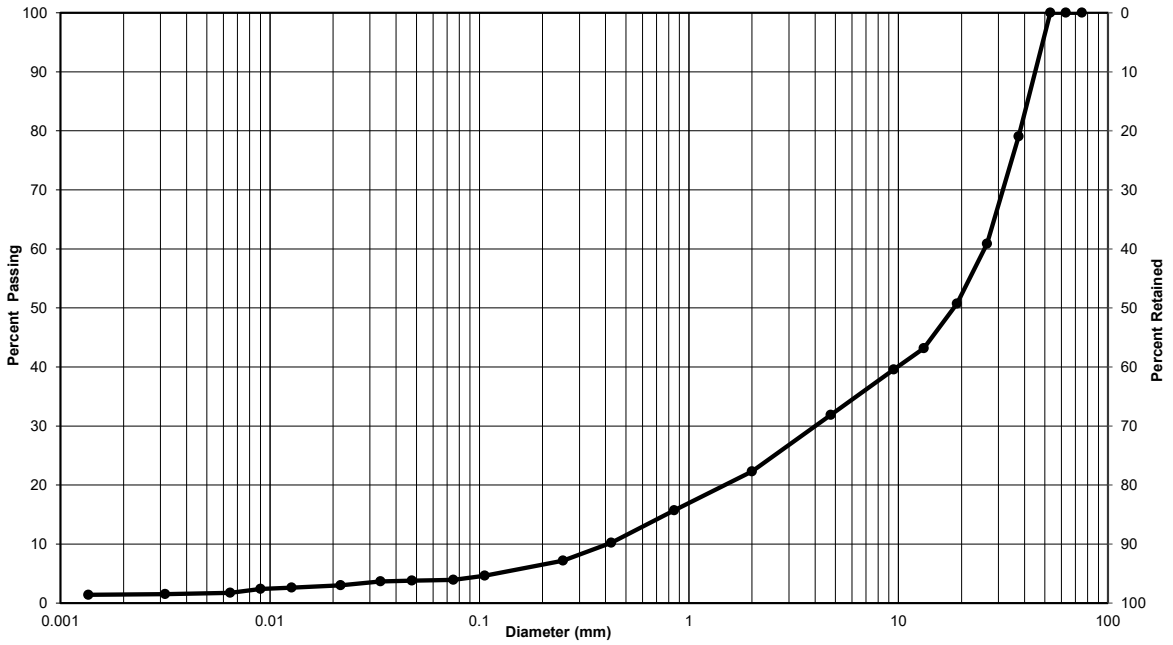
Remarks:

Performed by:	Josh Sullivan	**Date:**	May 7, 2024
Verified by:	Joe Sullivan	**Date:**	May 7, 2024
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Particle-Size Analysis of Soils

MTO LS-702/ASTM D422 (Geotechnical)

Client:	Stalwood Homes	**Lab No.:**	SS-24-24
Project/Site:	Burwash Subdivision, Baltimore, ON	**Project No.:**	12639057-01
Borehole No.:	TP-3	Sample No.:	GS-1
Depth:	1.5m-1.7m	Enclosure:	C-9



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sand gravel, trace silt and clay	68	28	4
Silt-size particles (%) :	3		
Clay-size particles (%) (<0.002 mm):	1		

Additional laboratory reporting information available upon request.

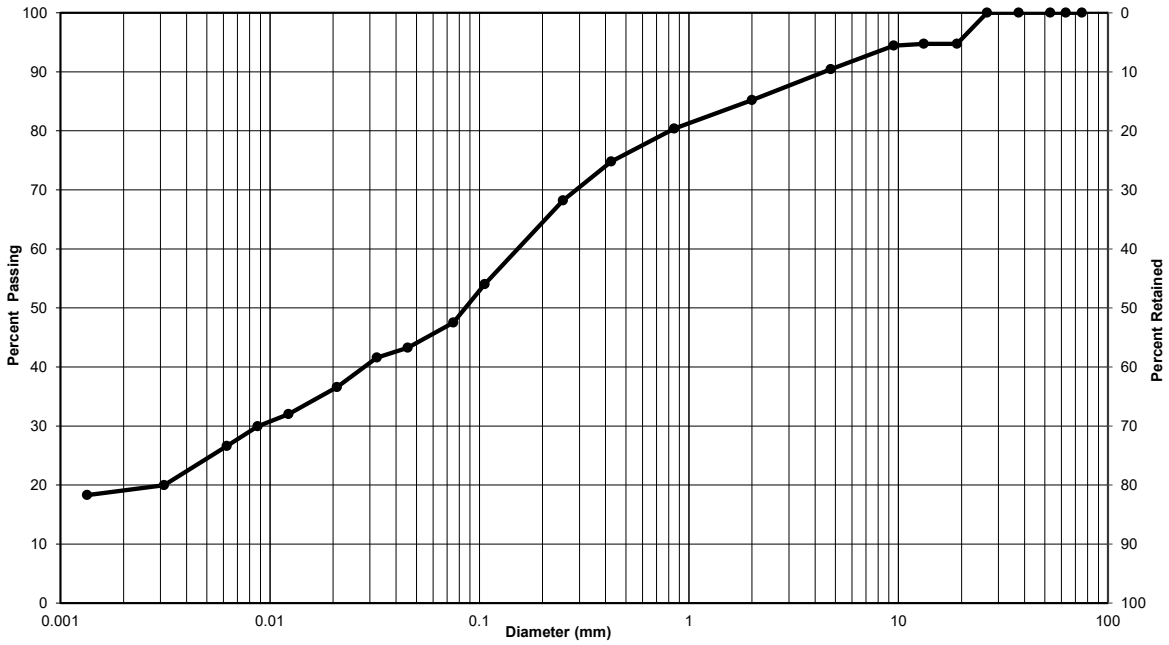
Remarks:

Performed by:	Josh Sullivan	**Date:**	May 7, 2024
Verified by:	Joe Sullivan	**Date:**	May 7, 2024
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Particle-Size Analysis of Soils

MTO LS-702/ASTM D422 (Geotechnical)

Client:	Stalwood Homes	**Lab No.:**	SS-24-24
Project/Site:	Burwash Subdivision, Baltimore, ON	**Project No.:**	12639057-01
Borehole No.:	TP-4	Sample No.:	GS-1
Depth:	1.7m-2.0m	Enclosure:	C-10



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty sand, some clay, trace gravel	10	42	48
Silt-size particles (%) :	29		
Clay-size particles (%) (<0.002 mm):	19		

Additional laboratory reporting information available upon request.

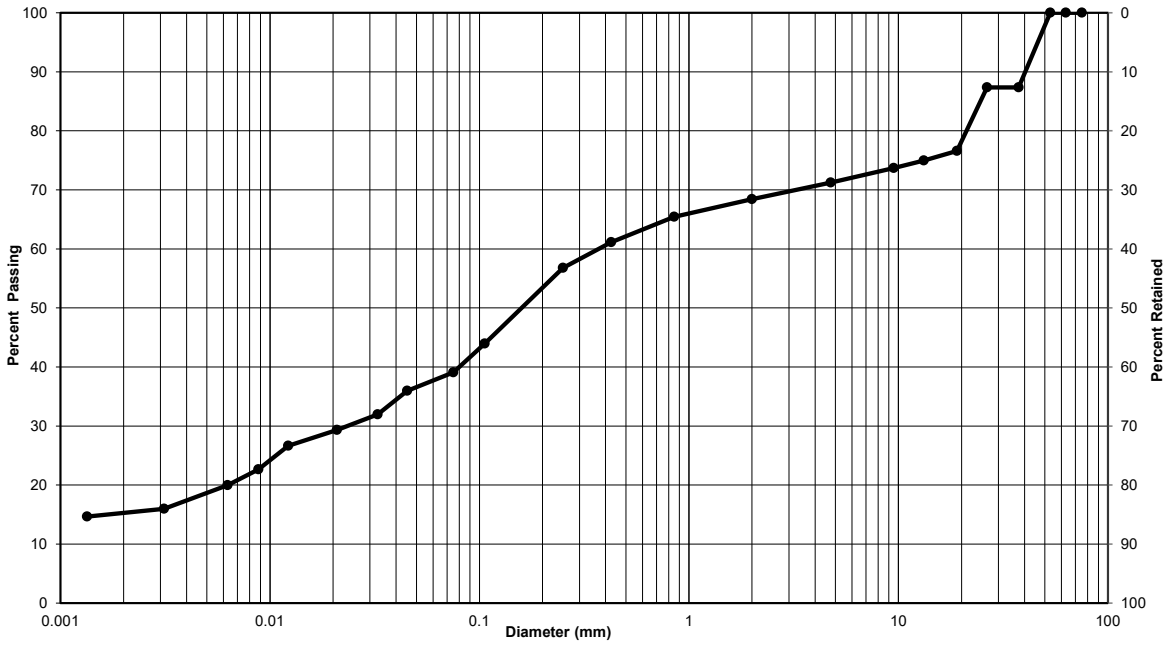
Remarks:

Performed by:	Josh Sullivan	**Date:**	May 7, 2024
Verified by:	Joe Sullivan	**Date:**	May 7, 2024
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Particle-Size Analysis of Soils

MTO LS-702/ASTM D422 (Geotechnical)

Client:	Stalwood Homes	**Lab No.:**	SS-24-24
Project/Site:	Burwash Subdivision, Baltimore, ON	**Project No.:**	12639057-01
Borehole No.:	TP-4	Sample No.:	GS-2
Depth:	2.0m-2.2m	Enclosure:	C-11



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Gravelly, silty sand, some clay	29	32	39
Silt-size particles (%) :	24		
Clay-size particles (%) (<0.002 mm):	15		

Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Josh Sullivan	**Date:**	May 7, 2024
Verified by:	Joe Sullivan	**Date:**	May 7, 2024
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Appendix D

Water Balance Calculations

Appendix D.1

Water Budget (Thornthwaite Method) - Average Values 1991-2020*

Weather Station: Oshawa

Climate Station: 6155875 **Elevation:** 139.9 masl **Distance Away:** ~ 58 km

Month	Mean Temperature (^{o}C)	Heat Index	Unadjusted Potential ET (mm)	Daylight Correction Factor	Adjusted ET (mm)	Total Precipitation (mm)
January	-5	0	0	0.78	0	74.7
February	-4.2	0	0	0.88	0	53.5
March	0.3	0.01	1.0	0.99	0.9	53.9
April	6.2	1.38	27.1	1.12	30.3	86.9
May	12.6	4.05	59.2	1.22	72.2	85.1
June	17.8	6.84	86.6	1.28	110.9	94.0
July	20.9	8.72	103.4	1.25	129.3	85.8
August	20.1	8.22	99.1	1.15	113.9	74.2
September	16.2	5.93	78.1	1.04	81.2	86.2
October	9.5	2.64	43.3	0.92	39.9	71.8
November	3.9	0.69	16.2	0.8	13.0	72.5
December	-1.2	0	0	0.76	0	67.8
TOTAL	8.1	38.5	514.0		591.6	906.4

TOTAL WATER SURPLUS: 314.8 mm

Notes:

*Average values of precipitation were used. Average values of temperature were also used.

Appendix D.2

Water Budget Pre-Development

General Description → / Detailed Description →	PRE-DEVELOPMENT SITE					TOTAL
	Agricultural	Treed / Naturalized	Existing Residential			
			Lawn	Rooftops	Driveway	
Area (m^2)	182201	106240	8655	775	910	298781
Pervious Area (m^2)	182201	106240	8655	0	910	298006
% Pervious	61.0%	35.6%	2.9%	0%	0.3%	99.7%
Impervious Area (m^2)	0	0	0	775	0	775
% Impervious	0%	0%	0%	0.3%	0%	0.3%
INFILTRATION FACTORS						
Topography Infiltration Factor	0.2	0.2	0.2	0	0.2	
Soil Infiltration Factor	0.4	0.4	0.4	0	0	
Land Cover Infiltration Factor	0.1	0.2	0.15	0	0	
MECP Infiltration Factor	0.7	0.8	0.75	0	0.2	
Actual Infiltration Factor	0.7	0.8	0.75	0.5	0.2	
Runoff Coefficient	0.3	0.2	0.25	0.5	0.8	
Runoff from Impervious Surfaces*	0	0	0	0.8	0.8	
INPUTS (PER UNIT AREA)						
Precipitation (mm/yr)	906	906	906	906	906	906
Run On (mm/yr)	0	0	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0	0	0
Total Inputs (mm/yr)	906	906	906	906	906	906
OUTPUTS (PER UNIT AREA)						
Precipitation Surplus (mm/yr)	315	315	315	725	725	317
Net Surplus (mm/yr)	315	315	315	725	725	317
Evaportranspiration (mm/yr)	592	592	592	181	181	589
Infiltration (mm/yr)	220	252	236	0	145	231
Rooftop Infiltration (mm/yr)	0	0	0	363	0	1
Total Infiltration (mm/yr)	220	252	236	363	145	232
Runoff Pervious Areas	94	63	79	0	580	84
Runoff Impervious Areas	0	0	0	363	0	1
Total Runoff (mm/yr)	94	63	79	363	580	85
Total Outputs (mm/yr)	906	906	906	906	906	906
Difference (Inputs - Outputs)	0	0	0	0	0	0
INPUTS (VOLUMES)						
Precipitation (m^3/yr)	165147	96296	7845	702	825	270815
Run On (m^3/yr)	0	0	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0	0	0
Total Inputs (m^3/yr)	165147	96296	7845	702	825	270815
OUTPUTS (VOLUMES)						
Precipitation Surplus (m^3/yr)	57354	33442	2724	562	660	94742
Net Surplus (m^3/yr)	57354	33442	2724	562	660	94742
Evaportranspiration (m^3/yr)	107793	62853	5120	140	165	176073
Infiltration (m^3/yr)	40148	26754	2043	0	132	69077
Rooftop Infiltration (m^3/yr)	0	0	0	281	0	281
Total Infiltration (m^3/yr)	40148	26754	2043	281	132	69358
Runoff Pervious Areas (m^3/yr)	17206	6688	681	0	528	25104
Runoff Impervious Areas (m^3/yr)	0	0	0	281	0	281
Total Runoff (m^3/yr)	17206	6688	681	281	528	25385
Total Outputs (m^3/yr)	165147	96296	7845	702	825	270815
Difference (Inputs - Outputs)	0	0	0	0	0	0

Notes:

Catchment areas based upon topography and groundwater levels.

Assume 50% of rooftop runoff infiltrates the ground in this scenario.

Appendix D.3

Water Budget Post-Development - No Mitigation Strategies

	POST-DEVELOPMENT SITE											TOTAL
General Description →	**Single & Semi-Detached Lots**			**Open Space**	**Shared Septic Treatment Area**		**Storm Water Facilities (Blocks 2-4)**		**Gas Line Easement**	**20 m Right-of-Way**		
Detailed Description →	Lawns	Rooftops	Driveways	Block 5	Grass	Impervious	Pond	Grass	Block 8 - 10	Asphalt	Grass	
Area (m^2)	98116	78120	12600	35493	3134	1045	13541	4514	6934	22642	22642	298781
Pervious Area (m^2)	98116	0	0	35493	3134	0	0	4514	6934	0	22642	170833
% Pervious	32.8%	0%	0%	11.9%	1.0%	0%	0%	1.5%	2.3%	0%	7.6%	57.2%
Impervious Area (m^2)	0	78120	12600	0	0	1045	13541	0	0	22642	0	127948
% Impervious	0%	26.1%	4.2%	0%	0%	0.3%	4.5%	0%	0%	7.6%	0%	42.8%
	INFILTRATION FACTORS											
Topography Infiltration Factor	0.2	0	0	0.1	0.2	0	0	0.15	0.2	0.2	0.2	
Soil Infiltration Factor	0.4	0	0	0.4	0.4	0	0	0.4	0.4	0	0.4	
Land Cover Infiltration Factor	0.15	0	0	0.2	0.15	0	0	0.15	0.15	0	0.15	
MECP Infiltration Factor	0.75	0	0	0.7	0.75	0	0	0.7	0.75	0.2	0.75	
Actual Infiltration Factor	0.75	0	0	0.7	0.75	0	0.05	0.7	0.75	0	0.75	
Runoff Coefficient	0.25	1	1	0.3	0.25	1	0.95	0.3	0.25	1	0.25	
Runoff from Impervious Surfaces*	0	0.8	0.8	0.8	0	0.8	0.8	0	0	0.8	0	
	INPUTS (PER UNIT AREA)											
Precipitation (mm/yr)	906	906	906	906	906	906	906	906	906	906	906	906
Run On (mm/yr)	0	0	0	0	0	0	0	0	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0	0	0	0	0	0	0	0	0
Total Inputs (mm/yr)	906	906	906	906	906	906	906	906	906	906	906	906
	OUTPUTS (PER UNIT AREA)											
Precipitation Surplus (mm/yr)	315	725	725	315	315	725	725	315	315	725	315	491
Net Surplus (mm/yr)	315	725	725	315	315	725	725	315	315	725	315	491
Evaportranspiration (mm/yr)	592	181	181	592	592	181	181	592	592	181	592	416
Infiltration (mm/yr)	236	0	0	220	236	0	36	220	236	0	236	135
Rooftop Infiltration (mm/yr)	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (mm/yr)	236	0	0	220	236	0	36	220	236	0	236	135
Runoff Pervious Areas	79	0	0	94	79	0	0	94	79	0	79	47
Runoff Impervious Areas	0	725	725	0	0	725	689	0	0	725	0	309
Total Runoff (mm/yr)	79	725	725	94	79	725	689	94	79	725	79	356
Total Outputs (mm/yr)	906	906	906	906	906	906	906	906	906	906	906	906
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0
	INPUTS (VOLUMES)											
Precipitation (m^3/yr)	88932	70808	11421	32171	2841	947	12274	4091	6285	20523	20523	270815
Run On (m^3/yr)	0	0	0	0	0	0	0	0	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0	0	0	0	0	0	0	0	0
Total Inputs (m^3/yr)	88932	70808	11421	32171	2841	947	12274	4091	6285	20523	20523	270815
	OUTPUTS (VOLUMES)											
Precipitation Surplus (m^3/yr)	30885	56646	9137	11173	987	758	9819	1421	2183	16418	7127	146553
Net Surplus (m^3/yr)	30885	56646	9137	11173	987	758	9819	1421	2183	16418	7127	146553
Evaportranspiration (m^3/yr)	58047	14162	2284	20998	1854	189	2455	2671	4102	4105	13395	124262
Infiltration (m^3/yr)	23164	0	0	7821	740	0	491	995	1637	0	5345	40193
Rooftop Infiltration (m^3/yr)	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (m^3/yr)	23164	0	0	7821	740	0	491	995	1637	0	5345	40193
Runoff Pervious Areas (m^3/yr)	7721	0	0	3352	247	0	0	426	546	0	1782	14073
Runoff Impervious Areas (m^3/yr)	0	56646	9137	0	0	758	9328	0	0	16418	0	92287
Total Runoff (m^3/yr)	7721	56646	9137	3352	247	758	9328	426	546	16418	1782	106360
Total Outputs (m^3/yr)	88932	70808	11421	32171	2841	947	12274	4091	6285	20523	20523	270815
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0

Notes:

Areas based upon Ecovue "Concept Plan CP-1" dwg. Referred to as Burwash Subdivision - Stalwood Homes c/o Anthony Dew (Part of 9380 Burwash Road) dated June 30, 2026

*Evaporation from impervious areas was assumed to be 20% of precipitation.

Asphalt has 0% infiltration capability

Single & Semi-Detached Lots: Assumed rooftops (houses, garages) covered 465 sq.m. (5000 sq.ft.) of each lot. Driveways assumed to be 15 m by 5 m. Remainder of the lot is assumed to be lawn.

Stormwater Facilities - assume 75% is covered by impervious pond and 25% by grass

Shared Septic Area - assume 25% is covered by impervious area and 75% is pervious

Appendix D.4

Water Budget Post-Development - With Downspout Disconnection Mitigation Strategies

	POST-DEVELOPMENT SITE											TOTAL
General Description →	**Single & Semi-Detached Lots**			**Open Space**	**Shared Septic Treatment Area**		**Storm Water Facilities (Blocks 2-4)**		**Gas Line Easement**	**20 m Right-of-Way**		
Detailed Description →	Lawns	Rooftops	Driveways	Block 5	Grass	Impervious	Pond	Grass	Block 8 - 10	Asphalt	Grass	
Area (m^2)	98116	78120	12600	35493	3134	1045	13541	4514	6934	22642	22642	298781
Pervious Area (m^2)	98116	0	0	35493	3134	0	0	4514	6934	0	22642	170833
% Pervious	32.8%	0%	0%	11.9%	1.0%	0%	0%	1.5%	2.3%	0%	7.6%	57.2%
Impervious Area (m^2)	0	78120	12600	0	0	1045	13541	0	0	22642	0	127948
% Impervious	0%	26.1%	4.2%	0%	0%	0.3%	4.5%	0%	0%	7.6%	0%	42.8%
	INFILTRATION FACTORS											
Topography Infiltration Factor	0.2	0	0	0.1	0.2	0	0	0.15	0.2	0.2	0.2	
Soil Infiltration Factor	0.4	0	0	0.4	0.4	0	0	0.4	0.4	0	0.4	
Land Cover Infiltration Factor	0.15	0	0	0.2	0.15	0	0	0.15	0.15	0	0.15	
MECP Infiltration Factor	0.75	0	0	0.7	0.75	0	0	0.7	0.75	0.2	0.75	
Actual Infiltration Factor	0.75	0	0	0.7	0.75	0	0.05	0.7	0.75	0.05	0.75	
Runoff Coefficient	0.25	1	1	0.3	0.25	1	0.95	0.3	0.25	0.95	0.25	
Runoff from Impervious Surfaces*	0	0.8	0.8	0.8	0	0.8	0.8	0	0	0.8	0	
	INPUTS (PER UNIT AREA)											
Precipitation (mm/yr)	906	906	906	906	906	906	906	906	906	906	906	906
Run On (mm/yr)	0	0	0	0	0	0	0	0	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0	0	0	0	0	0	0	0	0
Total Inputs (mm/yr)	906	906	906	906	906	906	906	906	906	906	906	906
	OUTPUTS (PER UNIT AREA)											
Precipitation Surplus (mm/yr)	315	725	725	315	315	725	725	315	315	725	315	491
Net Surplus (mm/yr)	315	725	725	315	315	725	725	315	315	725	315	491
Evaportranspiration (mm/yr)	592	181	181	592	592	181	181	592	592	181	592	416
Infiltration (mm/yr)	236	0	0	220	236	0	36	220	236	36	236	137
Downspout Disconnection LID Infiltration %	-	50%	-	-	-	-	-	-	-	-	-	-
Rooftop Infiltration (mm/yr)	0	363	0	0	0	0	0	0	0	0	0	95
Total Infiltration (mm/yr)	236	363	0	220	236	0	36	220	236	36	236	232
Runoff Pervious Areas	79	0	0	94	79	0	0	94	79	0	79	47
Runoff Impervious Areas	0	363	725	0	0	725	689	0	0	689	0	211
Total Runoff (mm/yr)	79	363	725	94	79	725	689	94	79	689	79	258
Total Outputs (mm/yr)	906	906	906	906	906	906	906	906	906	906	906	906
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0
	INPUTS (VOLUMES)											
Precipitation (m^3/yr)	88932	70808	11421	32171	2841	947	12274	4091	6285	20523	20523	270815
Run On (m^3/yr)	0	0	0	0	0	0	0	0	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0	0	0	0	0	0	0	0	0
Total Inputs (m^3/yr)	88932	70808	11421	32171	2841	947	12274	4091	6285	20523	20523	270815
	OUTPUTS (VOLUMES)											
Precipitation Surplus (m^3/yr)	30885	56646	9137	11173	987	758	9819	1421	2183	16418	7127	146553
Net Surplus (m^3/yr)	30885	56646	9137	11173	987	758	9819	1421	2183	16418	7127	146553
Evaportranspiration (m^3/yr)	58047	14162	2284	20998	1854	189	2455	2671	4102	4105	13395	124262
Infiltration (m^3/yr)	23164	0	0	7821	740	0	491	995	1637	821	5345	41014
Rooftop Infiltration (m^3/yr)	0	28323	0	0	0	0	0	0	0	0	0	28323
Total Infiltration (m^3/yr)	23164	28323	0	7821	740	0	491	995	1637	821	5345	69337
Runoff Pervious Areas (m^3/yr)	7721	0	0	3352	247	0	0	426	546	0	1782	14073
Runoff Impervious Areas (m^3/yr)	0	28323	9137	0	0	758	9328	0	0	15597	0	63143
Total Runoff (m^3/yr)	7721	28323	9137	3352	247	758	9328	426	546	15597	1782	77216
Total Outputs (m^3/yr)	88932	70808	11421	32171	2841	947	12274	4091	6285	20523	20523	270815
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0

Notes:

Areas based upon Ecovue "Concept Plan CP-1" dwg. Referred to as Burwash Subdivision - Stalwood Homes c/o Anthony Dew (Part of 9380 Burwash Road) dated June 30, 2026

*Evaporation from impervious areas was assumed to be 20% of precipitation.

Asphalt has 0% infiltration capability

Single & Semi-Detached Lots: Assumed rooftops (houses, garages) covered 465 sq.m. (5000 sq.ft.) of each lot. Driveways assumed to be 15 m by 5 m. Remainder of the lot is assumed to be lawn.

Stormwater Facilities - assume 75% is covered by impervious pond and 25% by grass

Shared Septic Area - assume 25% is covered by impervious area and 75% is pervious

Appendix D.5

Water Budget Summary

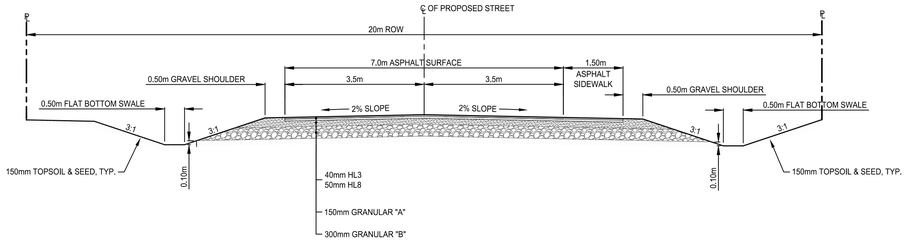
PARAMETER	SITE				
	Pre-Development	***Post-Development No Mitigation***	***Difference Pre- vs. Post-***	***Post-Development With Mitigation***	***Difference Pre- vs. Post-***
	INPUTS (VOLUMES)				
Precipitation (m^3/yr)	270815	270815	0%	270815	0%
Run On (m^3/yr)	0	0	0%	0	0%
Other Inputs (m^3/yr)	0	0	0%	0	0%
Total Inputs (m^3/yr)	270815	270815	0%	270815	0%
	OUTPUTS (VOLUMES)				
Precipitation Surplus (m^3/yr)	94742	146553	55%	146553	55%
Net Surplus (m^3/yr)	94742	146553	55%	146553	55%
Evapotranspiration (m^3/yr)	176073	124262	-29%	124262	-29%
Infiltration (m^3/yr)	69077	40193	-42%	41014	-41%
% Rooftop Runoff Infiltrated	--	--	--	50%	--
Rooftop Infiltration (m^3/yr)	281	0	0%	28323	--
Total Infiltration (m^3/yr)	69358	40193	-42%	69337	0.0%
Runoff Pervious Areas (m^3/yr)	25104	14073	-44%	14073	-44%
Runoff Impervious Areas (m^3/yr)	281	92287	32744%	63143	--
Total Runoff (m^3/yr)	25385	106360	319%	77216	204%
Total Outputs (m^3/yr)	270815	270815	0%	270815	0%



ghd.com

The Power of Commitment

Appendix G: Preliminary Design Drawings



TYPICAL ROAD SECTION

SCALE: 1:75

UNDISTURBED AREA

PROPOSED WASTEWATER TREATMENT BUILDING

PROPOSED OUTLET

PROPOSED WAT PRESSURE BOOST STATION

BLOCK 5 *34934.5 m²*

BLOCK 22 *12835.3 m²* SINGLE DETACHED *7 UNITS*

BLOCK 9 *957.4 m²*

BLOCK 24 *13957.1 m²* SINGLE & SEMI DETACHED *13 - 16 UNITS*

BLOCK 34 *1840.0 m²* SEMI-DETACHED *2 UNITS*

BLOCK 10 *2338.21m²*

BLOCK 1 STREET 'A'

BLOCK 25 *8939.5 m²* SINGLE & SEMI-DETACHED *8 - 11 UNITS*

BLOCK 20 *8439.9 m²* SINGLE DETACHED *7 UNITS*

BLOCK 21 *3[illegible]4.98 m²* SINGLE DETACHED *12 UNITS*

BLOCK 26 *8939.5 m²* SINGLE & SEMI-DETACHED *8 - 11 UNITS*

PROPOSED CULVERT

PROPOSED CULVERT

BLOCK 32 *2059.1 m²* SEMI-DETACHED *2 UNITS*

BLOCK 33 *2063.1 m²* SEMI-DETACHED *2 UNITS*

BLOCK 1 STREET 'D'

BLOCK 1 STREET 'B'

BLOCK 19 *9301.3 m²* SINGLE DETACHED *9 UNITS*

BLOCK 23 *14[illegible] m²* SINGLE & SEMI DETACHED *9 - 12 UNITS*

BLOCK 8 *4825.2 m²*

BLOCK 27 *8939.5 m²* SINGLE & SEMI-DETACHED *8 - 11 UNITS*

PROPOSED SWM POND

BLOCK 3 *8719.6 m²*

BLOCK 28 *8939.5 m²* SINGLE & SEMI DETACHED *8 - 11 UNITS*

PROPOSED CULVERT

PROPOSED CULVERT

BLOCK 30 *2077.8 m²* SEMI-DETACHED *2 UNITS*

BLOCK 31 *1906.2 m²* SEMI-DETACHED *2 UNITS*

BLOCK 1 STREET 'C'

BLOCK 29 EXISTING SINGLE DETACHED *1 UNIT*

BLOCK 16 *5507.7 m²* SINGLE DETACHED *2 UNITS*

BLOCK 17 *568[illegible].8 m²* SINGLE & SEMI DETACHED *5 - 7 UNITS*

BLOCK 13 *1500.9 m²* SINGLE DETACHED *1 UNIT*

BLOCK 18 *7971.8 m²* SINGLE & SEMI DETACHED *5 - 7 UNITS*

BLOCK 15 *7095.8 m²* SINGLE & SEMI DETACHED *7 - 10 UNITS*

BLOCK 6 *460.4 m²*

PROPOSED SANITARY LIFT STATION

PROPOSED SWM POND

BLOCK 4 *9083.2 m²*

BLOCK 7 *1251.8 m²*

BLOCK 12 *9000.[illegible] m²* SINGLE & SEMI DETACHED *9 - 12 UNITS*

BLOCK 11 *10001.5 m²* SINGLE & SEMI DETACHED *10 - 13 UNITS*

BLOCK 2 *740.8 m²*

PROPOSED CULVERT

EXISTING BARN STRUC *TO BE REMOVED*

EXISTING DITCH INLET CATCH BASINS

EXISTING RESIDENCE *TO REMAIN*

PROPOSED WAT PRESSURE PRESSURE REDUCING VALVE

COUNTY ROAD 45

MCDOUGALL ROAD

BURWASH ROAD

COMMUNITY CENTRE ROAD

OVERLOOK HEIGHTS

SURVEY

TOPOGRAPHIC SURVEY PROVIDED BY IBW SURVEYORS.
COORDINATE VALUES AND DIGITAL FILE ARE IN GRID SYSTEM, UTM ZONE 17, NAD83.
COMBINED SCALE FACTOR = 1.000223

ELEVATIONS

ELEVATIONS ARE GEODETIC AND REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD28) BY DIRECT MEASUREMENT TO A REAL TIME NETWORK SUPPLEMENTED WITH LIDAR DATA DERIVED FROM THE MNRF MAPPING UNIT FROM 2016-2018.

NOTES:

PR.	EX.	FEATURE
		EDGE OF PAVEMENT
		BACK OF CURB
		EDGE OF GRAVEL
		CENTRELINE OF ROAD
		DITCH
		SIDEWALK
		FENCE LINE
		RETAINING WALL
		LIGHT DUTY ASPHALT
		HEAVY DUTY ASPHALT
		GRASS/LANDSCAPED
		CONC. DRIVEWAY RAMP
		ASPH. DRIVEWAY RAMP
		INTERLOCK BRICK
		GAS MAIN
		OVERHEAD BELL
		UNDERGROUND BELL
		OVERHEAD HYDRO
		UNDERGROUND HYDRO
		WATERMAIN
		STORM SEWER
		SANITARY SEWER
		WATER SERVICE
		SANITARY SERVICE
		PROPERTY LINE
		RIGHT-OF-WAY
		WATER VALVE
		WELL
		SANITARY MANHOLE
		CATCH BASIN
		DOUBLE CATCH BASIN
		CATCH BASIN MANHOLE
		DOUBLE CB MANHOLE
		STORM MANHOLE
		FIRE HYDRANT
		IRON BAR
		LIGHT STANDARD
		MAILBOX
		ROAD SIGN
		CONIFEROUS TREE
		DECIDUOUS TREE
		OVERHEAD DOOR
		MAN DOOR
		ACCESSIBLE MAN DOOR

No.	REVISION	BY	DATE
1.	ISSUED FOR REVIEW	SD	2026-06-22

ENGAGE ENGINEERING
www.engageeng.ca • 171 King Street, Suite 120, Peterborough, ON • Phone: (705) 755-0427

BURWASH DEVELOPMENT

STALWOOD HOMES

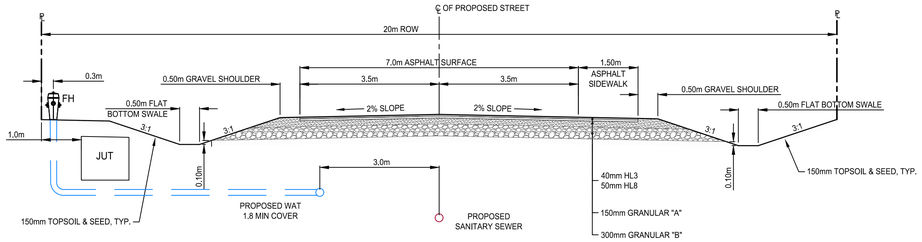
PRELIMINARY GRADING PLAN

TOWNSHIP OF HAMILTON

DRAWN BY: S.DINGMAN	STAMP:
DESIGNED BY: S.DINGMAN	
APPROVED BY: J.ARMSTRONG	
DATE: 2024-06-10	
SCALE: 1:1250	

PROJECT NUMBER:	SHEET NAME:	SHEET:
23121	GP	1 of 2

23121 - GP
Date: Aug. 05, 2026 - 9:19 am Plotted by: sdingman File name: S:\01 - Projects\23000\23121 - 8086 Burwash Rd Ballinrobe\02 Design\01 - Drawings\01 - Current Drawings\23121 - GP.dwg



TYPICAL ROAD SECTION

SCALE: 1:75

SURVEY

TOPOGRAPHIC SURVEY PROVIDED BY IBW SURVEYORS.
COORDINATE VALUES AND DIGITAL FILE ARE IN GRID SYSTEM, UTM ZONE 17, NAD83.
COMBINED SCALE FACTOR = 1.000223

ELEVATIONS

ELEVATIONS ARE GEODETIC AND REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (COVD28) BY DIRECT MEASUREMENT TO A REAL TIME NETWORK SUPPLEMENTED WITH LIDAR DATA DERIVED FROM THE MNRF MAPPING UNIT FROM 2016-2018.

NOTES:

PR.	EX.	FEATURE
		EDGE OF PAVEMENT
		BACK OF CURB
		EDGE OF GRAVEL
		CENTRELINE OF ROAD
		DITCH
		SIDEWALK
		FENCE LINE
		RETAINING WALL
		LIGHT DUTY ASPHALT
		HEAVY DUTY ASPHALT
		GRASS/LANDSCAPED
		CONC. DRIVEWAY RAMP
		ASPH. DRIVEWAY RAMP
		INTERLOCK BRICK
		GAS MAIN
		OVERHEAD BELL
		UNDERGROUND BELL
		OVERHEAD HYDRO
		UNDERGROUND HYDRO
		WATERMAIN
		STORM SEWER
		SANITARY SEWER
		SANITARY FORCEMAIN
CS WS SS		WATER SERVICE
		SANITARY SERVICE
		PROPERTY LINE
		RIGHT-OF-WAY
		WATER VALVE
		WELL
		SANITARY MANHOLE
		CATCH BASIN
		DOUBLE CATCH BASIN
		CATCH BASIN MANHOLE
		DOUBLE CB MANHOLE
		STORM MANHOLE
		FIRE HYDRANT
		IRON BAR
		LIGHT STANDARD
		MAILBOX
		ROAD SIGN
		CONIFEROUS TREE
		DECIDUOUS TREE
		OVERHEAD DOOR
		MAN DOOR
		ACCESSIBLE MAN DOOR

No.	REVISION	BY	DATE
1.	ISSUED FOR REVIEW	SD	2026-06-22

ENGAGE ENGINEERING
www.engageeng.ca ★ 171 King Street, Suite 120, Peterborough, ON ★ Phone: (705) 749-0407

BURWASH DEVELOPMENT

STALWOOD HOMES

PRELIMINARY SITE SERVICING PLAN

TOWNSHIP OF HAMILTON

DRAWN BY: S.DINGMAN	STAMP:
DESIGNED BY: S.DINGMAN	
APPROVED BY: J.ARMSTRONG	
DATE: 2024-06-10	
SCALE: 1:1250	

PROJECT NUMBER:	SHEET NAME:	SHEET:
23121	SS	2 of 2

23121 - SS
Date: Aug. 05, 2026 - 9:20 am Plotted by: sdingman File name: S:\01 - Projects\2300\23121 - 8380 Burwash Rd Ballinrod\02 Design\01 - Drawing\01 - Current Drawing\23121 - SS.dwg