ENGINEERING + MANAGEMENT

HUSSON

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

560, 580 & 590 SIXTH STREET RESIDENTIAL
COLLINGWOOD, ONTARIO

PREPARED FOR:
Mr. BRUCE SMITH
2788035 ONTARIO INC.
20 BLYTH HILL ROAD
TORONTO, ON M4N 3L4

DATE: JULY 2023

PROJECT: 17856

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

560, 580 & 590 SIXTH STREET
RESIDENTIAL
COLLINGWOOD, ONTARIO

PREPARED FOR:

Mr. BRUCE SMITH
2788035 ONTARIO INC.
20 BLYTH HILL ROAD
TORONTO, ON M4N 3L4

DATE: JULY 2023

PROJECT NO. 17856

PREPARED BY HUSSON
200 CACHET WOODS COURT, SUITE 204
MARKHAM, ON L6C 0Z8
GENERAL@HUSSON.CA

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

LIST OF DRAWINGS

1.0 INTRODUCTION

The purpose of this report is to provide functional servicing and stormwater management design information in support of approval of the construction of 70 townhouses and a 231-unit high density residential block located at 560, 580 and 590 Sixth Street in Collingwood, Ontario.

At the time of preparing this report, it is our understanding that the north portion of the property located at 590 Sixth Street has been retained by the current owner and the south portion has been acquired by our client to be developed at this time. This report has been prepared assuming that the northern portion 590 Sixth Street property will be developed into 11 townhouses in the future to ensure adequate capacity is allowed for in the proposed municipal services being installed.

This report describes the manner in which water distribution, wastewater collection and storm drainage systems will be delivered to site boundaries, and how these systems will be extended to service the lots.

The stormwater management component of this report demonstrates how the proposed development will meet the stormwater management (SWM) criteria outlined by the review agencies. This report outlines measures that will be undertaken to deal with water quantity and quality as well as erosion control measures to be implemented during construction.

1.1 Site Description

The 6.52ha subject lands are located on the south side of Sixth Street east of the Black Ash Creek. The proposed development is bounded by Black Ash Meadows Residential Development (*BAMRD*) to the south and industrial lands to the east. Refer to **Figure 1** for the site location.

1.2 Background

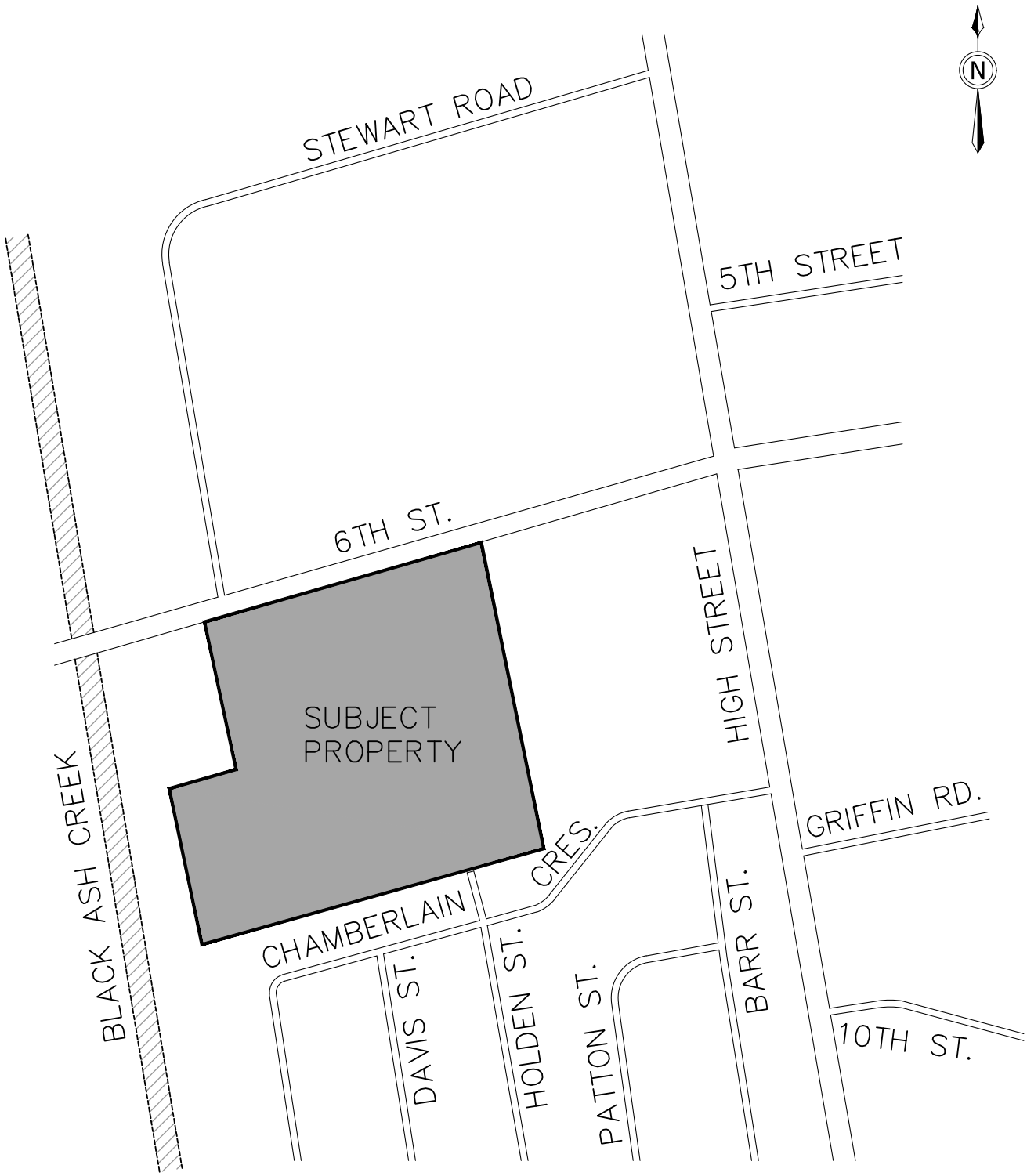
The following information has been referenced in preparing this report:

- GIS Mapping showing Water and Sanitary sewers in proximity to the site.
- Drawing PP-2 – Sixth Street
- Drawing 97-23 – Stewart Road
- Sanitary Sewer Catchment Map and Design Sheet prepared by C.C. Tatham & Associates Limited dated January 2015
- Black Ash Creek Subwatershed Plan prepared by NVCA dated August 2000.
- Black Ash Meadows Subdivision – Final Stormwater Management Design Report by C.C. Tatham & Associates dated January 2006.
- Topographic Survey prepared by Van Harten Surveying Inc.
- Preliminary Geotechnical Investigation prepared by Golder Associates.

In addition to the background information, the Town of Collingwood Development Standards were reviewed to determine the requirements for servicing the subject property.

2.0 WATER SUPPLY

The subject lands are located within the municipal limits of the Town of Collingwood. Existing watermains in the vicinity of the site include:



HUSSON
ENGINEERING + MANAGEMENT
P 905.709.5825
1725 16TH AVENUE, SUITE 103
RICHMOND HILL, ON L4B 4C6
HUSSON.CA

FIGURE 1

560, 580 & 590 SIXTH STREET

SITE LOCATION PLAN

DATE: JULY 2023 SCALE: N.T.S. PROJECT: 17856

- 400mm diameter ductile iron watermain on the north side of Sixth Street.
- 300mm diameter ductile iron watermain on the west side of Stewart Road.
- 150mm diameter ductile iron watermain on the north side of Chamberlain Crescent.
- 150mm diameter ductile iron watermain on the west side of Holden Street.

The property is proposed to be serviced by installing a 250mm diameter watermain from Sixth Street along Street A to Street B and across Street B to the eastern limit of the subject property. The existing 150mm watermain on Holden Street in the *BAMRD* will be extended into the subdivision to the intersection of Street A and Holden Street where is will connect to a proposed 200mm watermain that will complete the loop along both Street A and Holden to the 250 watermain along Street B. The proposed layout of the watermain is shown on **Drawing SW2.**

Based on the Town of Collingwood Design Standards, the following list summarizes the design requirements for the watermain:

- Average Daily Demand = 260 L/capita/day (0.003 L/capita/s)
- Maximum Daily Demand Factor = 2.0
- Peak Hourly Demand Factor = 4.5
- Assumed Townhouse Density = 2.4 persons per unit
- Assumed Apartment Density = 1.9 persons per unit

Using the above noted parameters, the following are the estimated water demands for the project:

Table 1: Estimated Water Demands

	Units	Density	Average Daily Demand (L/s)	Max. Day (L/s)	Peak Hour (L/s)	Est. Fire Demand (L/s)[1]
Townhouse Units	70	2.4	0.504	1.008	2.268	38.0
High Density Block	231	1.9	1.317	2.634	5.927	137.5

1. Fire flows for High Density Block based on Fire Underwriters Survey Calculations

These values are to be submitted to the Town of Collingwood for modeling to confirm available water pressures and confirm that the proposed sizing is adequate for the development.

3.0 SANITARY SERVICING

3.1 Site Sanitary Flows

The subject lands are located within the municipal limits of the Town of Collingwood. Existing sanitary sewers in the vicinity of the site include:

- 250mm diameter PVC Sanitary Sewer on Stewart Road.
- 250mm diameter PVC Sanitary Sewer on Chamberlain Crescent.
- 250mm diameter PVC Sanitary Sewer on Holden Street.

Based on discussions with the Town, the 560, 580 and 590 Sixth Street properties are to drain south to Holden Street in the *BAMRD* through the adjacent property to the east. However, due to the proposed site grading and existing sewer depths, the development is proposed to drain to two separate outlets. The townhouses on the 560 Sixth Street property as well as the high-density block are proposed to drain to the existing sewer on Holden Street which is consistent with the Town recommendation. The remainder of the townhouses on the 580 & 590 Sixth Street property will drain to the sanitary on Stewart Road which will be extended into the subject property. This sanitary sewer connects to the sanitary sewer on High Street which also accepts the wastewater flows from the *BAMRD*.

The sanitary flows from the subject property have been estimated by multiplying the average daily wastewater flow by the Harmon Peaking Factor. The following criteria have been used to estimate the average daily wastewater flow:

- Average Daily Domestic Flow = 260 L/day/capita (0.003 L/s/capita)
- Infiltration Allowance = 0.23 L/s/ha
- Townhouse Unit Density = 2.4 persons per unit
- High Density Block Unit Density = 1.9 persons per unit

The wastewater flows from the site are estimated based on the following:

- *Total Population = Townhouse Units x 2.4 p.p.u + High Density Units x 1.9 p.p.u.*
- *Wastewater Flow = Total Population x Average Daily Flow x Harmon Peaking Factor*
- *Infiltration Allowance = Site Area x Infiltration Rate*
- *Total Wastewater Flow = Wastewater Flow + Infiltration Allowance*

Based on these parameters, Town criteria and the drainage areas shown on **Figure 2**, the estimated sanitary flows from the development are:

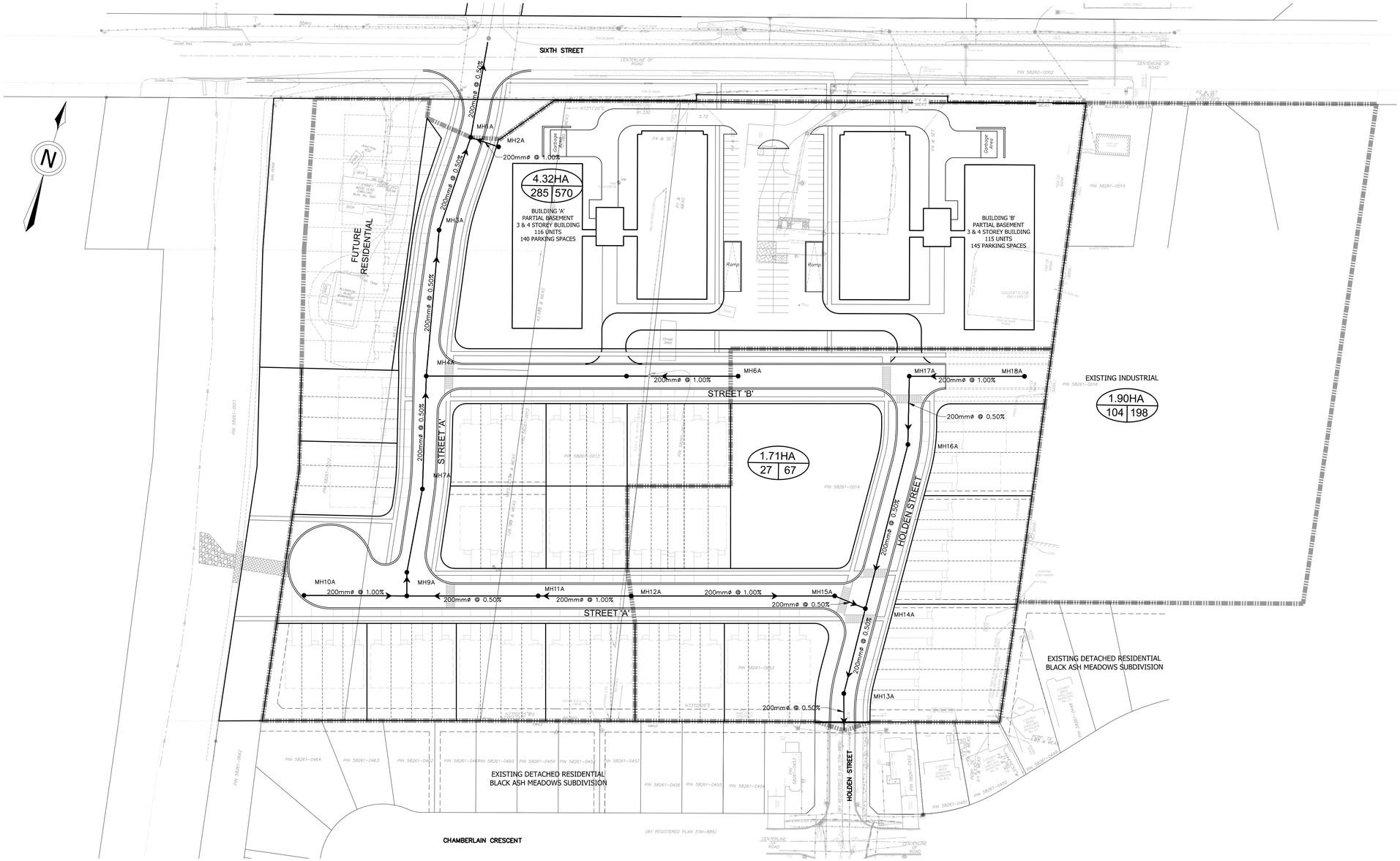
Table 2: Estimated Wastewater Flows

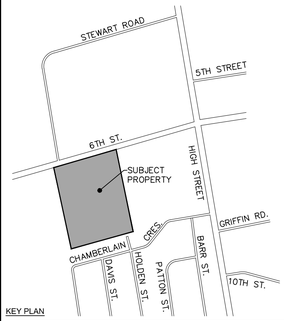
Proposed Outlet	Area (ha)	Total Population	Average Wastewater Flow (L/s)	Peaking Factor	Infiltration Allowance (L/s)	Total Flow (L/s)
Holden Street	3.61	265	0.80	4.10	0.83	4.1
Stewart Road	4.32	570	1.72	3.94	0.99	7.76

The flow listed above can be adequately conveyed within the subject property using the minimum sewer diameter of 200mm installed at a minimum slope of 0.5% as per the Town Standards.

As per discussions with the Town, the analysis of the capacity of the downstream system will be completed by the Town using the above calculated flows for the subject property.

The layout for the proposed sanitary sewer is shown on **Drawing SW2.**





KEY PLAN

LEGEND

SANITARY SEWER

SANITARY DRAINAGE AREA

0.72ha
14 72
DRAINAGE AREA
POPULATION
OF UNITS

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO TOWN OF COLLINGWOOD BENCHMARK No. 0011926U1669 HAVING AN ELEVATION OF 180.474m.

REV.No.	REVISION NOTE	DATE
4	ISSUED FOR DRAFT PLAN APPLICATION AND REZONING	23-07-11
3	ISSUED FOR NVCA REVIEW	23-03-10
2	ISSUED FOR PUBLIC MEETING	23-01-27
1	ISSUED FOR DRAFT PLAN APPLICATION AND REZONING	22-07-20

560, 580 & 590 SIXTH STREET
COLLINGWOOD, ON

HUSSON
ENGINEERING + MANAGEMENT
P 905.709.5825
1725 16TH AVENUE, SUITE 103
RICHMOND HILL, ON L4B 4C6
HUSSON.CA

FIGURE 2
SANITARY DRAINAGE PLAN

DATE: JULY 11, 2023 SCALE: 1:750 PROJECT: 17856
DESIGNED BY: EDG CHECKED BY: EJM
DRAWN BY: EDG CHECKED BY: EJM

4.0 STORM SERVICING

4.1 Existing Storm Drainage

The subject property is located within the municipal boundary of the Town Collingwood with a portion of the site (590 Sixth Street) draining west to the Black Ash Creek. The drainage for the remainder of the property (560 & 580 Sixth Street) has been blocked by the placement of fill on the 590 Sixth Street property which was placed during the Black Ash Creek improvements. The drainage for the 560 & 580 Sixth Street property is collected in the rear yard catchbasins of the BAMRD site. There are some low areas which are wet in the spring. A portion of the 560 Sixth Street property collects in a low-lying area located along the east property line.

4.2 Proposed Storm Drainage

Based on the discussions with the Town during the pre-consultation meeting, the stormwater runoff from the 580 Sixth Street property was to drain the *BAMRD* and ultimately to the Stormwater Management Pond located on the south west corner of High Street and Sixth Street. The drainage area for 590 Sixth Street was not accounted for in the *BAMRD* SWM pond. The Town has indicated that the preferred option for the major and minor drainage system will be to direct the 580 & 590 Sixth Street runoff to the Black Ash Creek located to the west of the property while providing Enhanced Quality Control (80% Total Suspended Solid Removal) for the runoff as per MOE Guidelines. This outlet configuration was approved by the NVCA in 2018 during Draft Plan Approval for the 580 / 590 properties. This will be discussed in further detail in Section 5.0 of this report. The remainder of the site (560 Sixth Street) will continue to drain to the BAMRD pond. This drainage divide maintains capacity in the existing *BAMRD* SWM pond for the adjacent property to the east (self-storage property) should it ever re-develop.

A storm sewer system will be constructed to collect minor system drainage from the 5-year design storm as well as the foundation drains. Minor system drainage will be conveyed either directly to the Black Ash Creek with the outlet elevations located a minimum of 0.5m above the bottom of the creek or to the existing storm sewer on Holden Street with the drainage divide being generally between the existing 580 and 560 Sixth Street properties.

As per Town Standards, foundation drains are not to be connected directly to the municipal storm sewer. Therefore, sump pumps per the Town of Collingwood Standard are to be installed on lots as required.

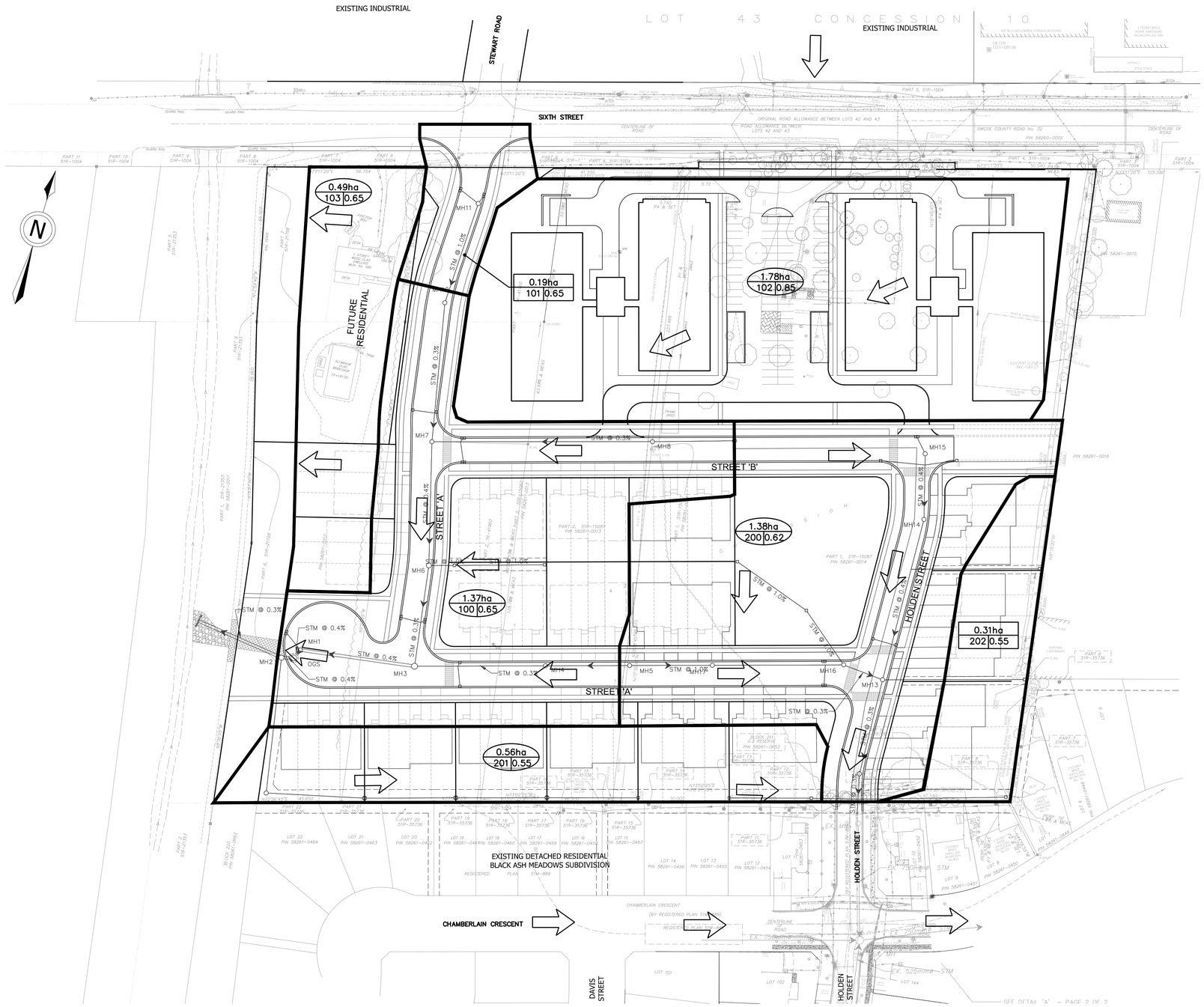
Refer to **Drawing SW1** for the proposed site grading and major system drainage paths and **Drawing SW2** for the proposed storm servicing.

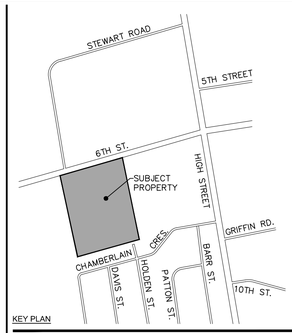
The storm drainage areas and parameters are shown on **Figure 2.**

5.0 STORMWATER MANAGEMENT

5.1 Design Criteria

Based on discussions with the Town, the following Stormwater Management criteria are to be met for the proposed development:





KEY PLAN

LEGEND

- PROPOSED STORM
- EXISTING STORM
- FUTURE STORM
- SINGLE CATCHBASINS
- SUPERCATCHBASINS TO CAPTURE 100 YR FLOW
- DRAINAGE AREA
- OVERLAND FLOW ROUTE
- 0.48ha / 100 / 0.75 — 100YR CATCHMENT AREA, RUNOFF COEFFICIENT, CATCHMENT ID
- 0.48ha / 100 / 0.75 — 100YR CATCHMENT AREA, RUNOFF COEFFICIENT, CATCHMENT ID

MAJOR DRAINAGE TO BLACK ASH CREEK

CATCHMENT	AREA (ha)	RUNOFF COEFFICIENT
100	1.37	0.65
101	0.19	0.65
102	1.78	0.85
Total To OGS	**3.34**	**0.76**
103	0.49	0.65
Total to Creek	**3.83**	**0.75**

MINOR DRAINAGE TO BLACK ASH CREEK

CATCHMENT	AREA (ha)	RUNOFF COEFFICIENT
100	1.37	0.65
101	0.19	0.65
102	1.78	0.85
Total To OGS	**3.34**	**0.76**
103	0.49	0.65
201	0.42	0.55
Total to Creek	**4.25**	**0.73**

MAJOR DRAINAGE TO BLACK ASH MEADOWS SUBDIVISION

CATCHMENT	AREA (ha)	RUNOFF COEFFICIENT
200	1.38	0.62
201	0.56	0.55
202	0.31	0.55
TOTAL	**2.25**	**0.59**

MINOR DRAINAGE TO BLACK ASH MEADOWS SUBDIVISION

CATCHMENT	AREA (ha)	RUNOFF COEFFICIENT
200	1.38	0.62
201	0.14	0.55
202	0.31	0.55
TOTAL	**1.83**	**0.60**

THE FOLLOWING RUN-OFF COEFFICIENTS WERE USED IN ESTABLISHING THE COMPOSITE RUN-OFF COEFFICIENT FOR EACH CATCHMENT

- LANDSCAPE AREA = 0.25
- PARK = 0.25
- PAVING = 0.90
- BUILDING = 0.90

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO TOWN OF COLLINGWOOD BENCHMARK No. 0011926U1669 HAVING AN ELEVATION OF 180.474m.

REV.No.	REVISION NOTE	DATE
4	ISSUED FOR DRAFT PLAN APPLICATION AND REZONING	23-07-11
3	ISSUED FOR NVCA REVIEW	23-03-10
2	ISSUED FOR PUBLIC MEETING	23-01-27
1	ISSUED FOR DRAFT PLAN APPLICATION AND REZONING	22-07-20

560, 580 & 590 SIXTH STREET
COLLINGWOOD, ON

HUSSON
ENGINEERING + MANAGEMENT
P 905.709.6826
1735 16TH AVENUE, SUITE 103
RICHMOND HILL, ON L4B 4C6
HUSSON.CA

FIGURE 3
STORM DRAINAGE PLAN

DATE: JULY 11, 2023 SCALE: 1:750 PROJECT: 17856
DESIGNED BY: EDG CHECKED BY: EJM
DRAWN BY: EDG CHECKED BY: EJM

- Quantity Control – No quantity controls are required. Provide a major and minor drainage system outlet for the proposed development that can convey the 100-year storm flows to Black Ash Creek without impacting the adjacent properties for the 580 and 590 Sixth Street Properties. The drainage from the 560 Sixth Street property is to be directed to Holden Street with no quantity controls as these are provided at the existing stormwater management pond.
- Quality Control – Provide Enhanced Treatment of the stormwater run-off prior to discharging to the Black Ash Creek. No treatment is required for the flows discharging to Holden Street as quality control is provided by the existing stormwater management pond.

5.2 Major and Minor System Drainage

As directed by the Town of Collingwood, the 580 and 590 Sixth Street properties are proposed to drain to existing Black Ash Creek located to the west of the subject properties and the 560 Sixth Street is to drain south east to the *BAMRD pond.* This concept was approved by both NVCA and the Town of Collingwood with the original Draft Plan submission for the 580 & 590 Sixth Street sites in 2018.

A storm sewer system is proposed to convey the 5-year storm runoff from the subject lands as well as the 100-year run-off from the site via an overland flow route to the two proposed outlets. A preliminary layout of the proposed storm sewers is shown on **Drawing SW2** and the proposed drainage catchments can be referenced on **Figure 3**.

Storm Flows to Black Ash Creek

For the proposed outlet to the Black Ash Creek, a minor system to convey the 5 year storm and an overland flow route has been designed to direct runoff from the western portion of the subject lands towards the proposed turning circle at the southwest corner of the subject property. At this point, an overland flow spillway will be constructed to the top of the east bank of the Black Ash Creek and down to the creek bottom. This outlet was approved by the NVCA in 2018 as part of the original Draft Plan approval for the site.

To estimate the major system flows to the proposed outlet, the Rational Method has been used to estimate the run-off volume from the site based on the parameters shown on **Figure 3**. Based on a Time of Concentration of 10 minutes, the major system flow from the development is estimated to be 1.031 m^3/s in the 100-year storm event.

The detailed calculations for the flows are included in **Appendix A**.

Based on the estimated flows, a 3.0m wide overland flow path with a minimum depth of 0.14m is capable of conveying the proposed flow to the top of the east bank. In order to prevent erosion of the overland flow path from eroding and depositing sediment into the Black Ash Creek, overland flow path from the end of the proposed turning circle to the top of the east bank of the Black Ash Creek will be lined with turfstone. This will also allow for a maintenance contractor to access and cleanout the proposed Oil Grit Separator being installed for Quality Control. Additionally, the east slope of the Black Ash Creek will be lined with rip-rap to prevent any erosion of the slope as well as further disperse the overland flow from the site. Detailed calculations showing the capacity of the overland flow path and rip rap sizing have been included in **Appendix A.**

Storm Flows to Holden Street

For the proposed outlet to the Holden Street, a minor system to convey the 5-year storm and overland flow route has been incorporated to direct runoff from both the 560 Sixth Street portion of subject lands as well as the rear of the lots backing on to the BAMRD towards the existing municipal right of way at the southeast corner of the subject property. This outlet was originally contemplated as part of the design of the BAMRD to the south of the subject lands.

As noted in the BAMRD SWM Report, the BAMRD Pond has been sized for a drainage 6.81ha at a run-off coefficient of 0.48. Using the Rational Method with an estimated time of concentration of 13.5 minutes for the approximately 300m long drainage area. Based on these parameters, the following is a summary of the estimated flows to the BAMRD using the Rational Method to estimate the flows:

Table 3: Existing Flows to Holden Street

Design Storm	Flow Rate (m^3/s)
2 Year	0.607
5 Year	0.797
10 Year	0.924
25 Year	1.081
50 Year	1.201
100 Year	1.320

Under the current development proposal as shown on **Figure 3**, the total drainage area being directed towards Holden Street has been reduced to 2.25ha with a design run-off coefficient of 0.57. Using the Rational Method with a time of concentration of 11.8 minutes, the proposed flows to Holden Street are as follows:

Table 4: Proposed Flows to Holden Street

Design Storm	Flow Rate (m^3/s)
2 Year	0.256
5 Year	0.336
10 Year	0.389
25 Year	0.455
50 Year	0.504
100 Year	0.555

Therefore, the current proposal will not adversely impact the downstream sewers or pond as the proposed flows are less than the original design flows for the property. The detailed calculations are included in **Appendix A**.

5.3 Quality Control

As per direction from Town of Collingwood, the flows that outlet to the Black Ash Creek are to be the treated per MOE requirements. The required level of treatment for the subject property is Level 1 Enhanced which is 80% removal of Total Suspended Solids (TSS). To meet this requirement, a PMSU30_35_6 CDS unit (or approved equivalent will be installed upstream of the headwall to treat the flows from the subject property. The unit has been sized to treat a catchment area of 3.34ha with a runoff coefficient of 0.76. This will provide 80.4% TSS removal and treat 97.0% of annual rainfall.

The details for the proposed unit can be seen in **Appendix B.**

6.0 EROSION AND SEDIMENT CONTROL PLAN

The sediment control plan for this site consists of the following:

- A sediment control fence will be installed along the perimeter of the site where the grade will direct flows off-site.
- Site access will be limited to one entrance. A gravel access pad will be installed for staging of construction material and vehicles.
- Any mud tracked from the site should be swept immediately and a sweeper truck should be used as necessary to remove any additional debris.
- Trucks leaving the site should be covered with tarpaulin.
- During dry weather, above freezing construction periods, dust control measures including wetting the site and egress points should be implemented on an as needed basis.
- Once the storm sewer system has been constructed, catchbasin sediment control and protection devices will be installed and maintained until the site is ready to be paved.

Erosion measures will be in place prior stripping topsoil from the site. A program will be in place to monitor and maintain the erosion and sediment controls. The sediment controls will be inspected by the Site Engineer and contractor:

- Once every 7 days and/or
- Within 24 hours following any significant rainfall event or snowmelt.

The inspection frequency can be extended to monthly inspections if there is no construction activity on-site. Proper construction sequencing will also help with erosion and sediment control. The following schedule is recommended based on preloading the site per the recommendations from the Geotechnical Engineer:

1. Install sediment control fence and access road.
2. Construct permanent outlet to the Black Ash Creek and restore.
3. Install perimeter swales and temporary sediment control pond.
4. Rough grade site to pre-load elevations.
5. Spread topsoil and hydroseed site to prevent sediment run-off during duration of pre-loading.
6. Replace sediment control fence following completion of pre-loading.
7. Re-establish sediment control pond and confirm outlet is functioning as designed.

8. Install services and sediment control devices on new catchbasins.
9. Decommission sediment control pond.
10. Complete road and house construction and landscape site.
11. Remove sediment controls once the site has been stabilized.

6.1 Sediment Pond Design Parameters

An on-site sediment control pond will be provided to for the majority of the site runoff following pre-loading of the site. The pond will require the installation of the permanent outlet for the site. At the point of detailed design, the pond grading and outlet structures are to be designed to meet the following parameters**.**

- The pond will be graded with a 4:1 length to width ratio and a minimum of 48-hour drawdown time, therefore, 125m^3/ha is to be used as the sizing requirement for the permanent pool volume. The required storage volume for the active storage was also based on 125m^3/ha. The required storage volume for the active and permanent pool, based on a 2.45ha contributing area is 306.5m^3.
- An emergency overflow weir will be provided to the permanent overland flow path from the site.
- The pond will outlet through a perforated riser pipe structure, wrapped in a gravel jacket. The sediment pond will use an orifice plate, set at the permanent pool water level to provide a minimum detention time of 48 hours.
- Two sediment forebays are to be provided in the pond design. The forebay length will be estimated using settling calculations and dispersion length, as recommended in the MOE guidelines.

7.0 CONCLUSIONS

The functional servicing report has demonstrated that the proposed infill development will be designed as follows:

- Water service will be provided to the subject property by connecting to the existing watermain located on Sixth Street with the existing 150mm diameter watermain on Holden Street in the Black Ash Meadows Residential Development.
- Gravity sanitary drainage will be provided by extending the existing sanitary sewers on Stewart Road and Holden Street into the subject property.
- Level 1 (Enhanced) Quality Control for stormwater runoff from the subject property will be provided by installing an Oil Grit Separator upstream of the storm outlet to the creek and utilizing the existing SWM facility at the southwest corner of High Street and Sixth Street.
- Major system outlets for the subject property will be provided by way of an overland flow routes to the two approved outlets.
- The proposed development scheme for the site as recommended by the Town of Collingwood can be achieved.

The results of this analysis determine that the municipal services can be extended and adequately service the proposed development.

Ed McGriskin, P.Eng.

HUSSON

APPENDIX A

STORMWATER CALCULATIONS

Rational Method Calc.

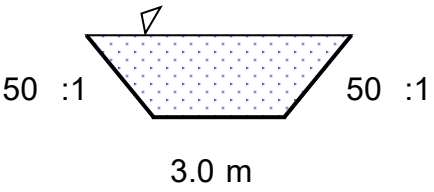
Project:	580&590 Sixth Street
Project No.:	17856
Municipality:	Collingwood
Outlet	Black Ash Creek - Overland Flow

100YR Post Development Peak Flows

	POST
Runoff Coefficient (C) =	0.70
Area (A) =	3.150
A:	2193.1
B:	9.04
C:	0.871
Tc:	10.000
Intensity (I) mm/hr =	168.4
Peak Flow (Q) L/s =	1031.8

Flow in a Trapezoidal Channel

Project:	17856
Project No.:	Sixth Street Collingwood
Section Location:	Overland Flow to Black Ash Creek



Input		
Channel Grade =	1.4%	
Side Slopes =	50.0:1	m/m
Bottom Width =	3	m
Manning's 'n' =	0.03	
γb	9810	N/m^3

Calculations		
Velocity =	0.74	m/s
Area=	1.386	m^2
Wetted Perimeter =	16.922	m
Hydraulic Radius =	0.082	m

Solve		
Estimated Flow Depth =	0.139	m
Flow =	1.031	cms

Shear Stress on Channel Bed		
b_w/y	21.6	m/m
K_b	1.953773	
τ_b	21.98241	Pa

Shear Stress on Side Slope		
K_{bk}	2.674479	
τ_s	30.09126	Pa

Time of Concentration Estimates

Bransby Williams Formula

Project: 560, 580 and 590 Sixth Street Colllingwood
Project No.: 17856
Catchment ID: Existing to Holden Street

Bransby Williams Equation

recommended for watersheds where C>0.4

$$t_c = \frac{0.057L}{S_w^{0.2} A^{0.1}}$$

Input Data:

watershed length (L)	250	m
Watershed Slope (S_w):	0.5	%
Watershed Area (A)	6.81	ha

Time of Concentration (t_c **13.5** **min**

Time to Peak (t_p):

for NASHYD use:

$$t_p = t_c\left(\frac{N-1}{N}\right)$$

Number of linear reservoirs 3

Time to Peak (t_p): 0.15 hours

Time of Concentration Estimates

Bransby Williams Formula

Project: 560, 580 and 590 Sixth Street Colllingwood
Project No.: 17856
Catchment ID: Proposed to Holden Street

Bransby Williams Equation

recommended for watersheds where C>0.4

$$t_c = \frac{0.057L}{S_w^{0.2} A^{0.1}}$$

Input Data:

watershed length (L)	195	m
Watershed Slope (S_w):	0.5	%
Watershed Area (A)	2.25	ha

Time of Concentration (t_c): 11.8 min

Time to Peak (t_p):

for NASHYD use:

$$t_p = t_c\left(\frac{N-1}{N}\right)$$

Number of linear reservoirs (N): 3

Time to Peak (t_p): 0.13 hours

Rational Method Calc.

Project:	580&590 Sixth Street
Project No.:	17856
Municipality:	Collingwood
Outlet	Holden Street - Existing BAMRD Design Flow

	2YR	5YR	10YR	25YR	50YR	100YR
Runoff Coefficient (C) =	0.48	0.48	0.48	0.48	0.48	0.48
Area (A) =	6.810	6.810	6.810	6.810	6.810	6.810
A:	807.44	1135.4	1387	1676.2	1973.1	2193.1
B:	6.75	7.5	7.97	8.3	9	9.04
C:	0.828	0.841	0.852	0.858	0.868	0.871
Tc:	13.500	13.500	13.500	13.500	13.500	13.500
Intensity (I) mm/hr =	66.9	87.7	101.7	119.1	132.3	145.4
Peak Flow (Q) L/s =	607.4	796.6	923.5	1081.5	1201.0	1320.4

Rational Method Calc.

Project:	580&590 Sixth Street
Project No.:	17856
Municipality:	Collingwood
Outlet	Holden Street - Proposed BAMRD Flow

	2YR	5YR	10YR	25YR	50YR	100YR
Runoff Coefficient (C) =	0.57	0.57	0.57	0.57	0.57	0.57
Area (A) =	2.250	2.250	2.250	2.250	2.250	2.250
A:	807.44	1135.4	1387	1676.2	1973.1	2193.1
B:	6.75	7.5	7.97	8.3	9	9.04
C:	0.828	0.841	0.852	0.858	0.868	0.871
Tc:	11.800	11.800	11.800	11.800	11.800	11.800
Intensity (I) mm/hr =	71.9	94.2	109.1	127.7	141.6	155.7
Peak Flow (Q) L/s =	256.3	335.5	388.7	454.9	504.5	554.7

HUSSON

APPENDIX B

OIL GRIT SEPERATOR DETAILS

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name:	560, 580 & 590 Sixth Street	**Engineer:**	**Husson**
Location:	Collingwood, ON	**Contact:**	Wendy Zhang
OGS #:	OGS	**Report Date:**	10-Jul-23

Area	3.34	ha	**Rainfall Station #**	203	
Weighted C	0.76		**Particle Size Distribution**	FINE	
CDS Model	3035		**CDS Treatment Capacity**	108	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.5	8.7%	8.7%	3.5	3.5	3.3	97.9	8.6
1.0	10.8%	19.6%	7.1	7.1	6.6	97.0	10.5
1.5	9.5%	29.0%	10.6	10.6	9.8	96.0	9.1
2.0	8.4%	37.4%	14.1	14.1	13.1	95.1	8.0
2.5	6.8%	44.2%	17.6	17.6	16.4	94.2	6.4
3.0	5.6%	49.8%	21.2	21.2	19.7	93.2	5.2
3.5	5.1%	54.9%	24.7	24.7	23.0	92.3	4.7
4.0	4.9%	59.8%	28.2	28.2	26.2	91.3	4.5
4.5	4.1%	63.9%	31.8	31.8	29.5	90.4	3.7
5.0	3.5%	67.4%	35.3	35.3	32.8	89.5	3.1
6.0	4.9%	72.3%	42.3	42.3	39.3	87.6	4.3
7.0	4.0%	76.3%	49.4	49.4	45.9	85.7	3.4
8.0	3.2%	79.5%	56.5	56.5	52.5	83.8	2.7
9.0	2.2%	81.7%	63.5	63.5	59.0	81.9	1.8
10.0	2.0%	83.7%	70.6	70.6	65.6	80.1	1.6
15.0	8.2%	91.9%	105.9	105.9	98.4	70.7	5.8
20.0	3.4%	95.2%	141.1	107.6	100.0	53.5	1.8
25.0	2.5%	97.7%	176.4	107.6	100.0	42.8	1.1
30.0	1.4%	99.1%	211.7	107.6	100.0	35.7	0.5
35.0	0.3%	99.4%	247.0	107.6	100.0	30.6	0.1
40.0	0.6%	100.0%	282.3	107.6	100.0	26.8	0.2
45.0	0.0%	100.0%	317.6	107.6	100.0	23.8	0.0
50.0	0.0%	100.0%	352.8	107.6	100.0	21.4	0.0
							86.9

Removal Efficiency Adjustment[2] = 6.5%

Predicted Net Annual Load Removal Efficiency = 80.4%

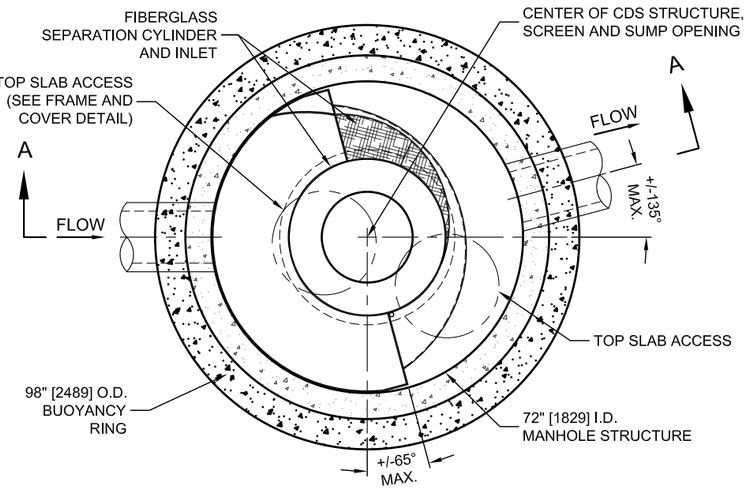
Predicted % Annual Rainfall Treated = 97.0%

1 - Based on 27 years of hourly rainfall data from Canadian Station 6110557, Barrie ON

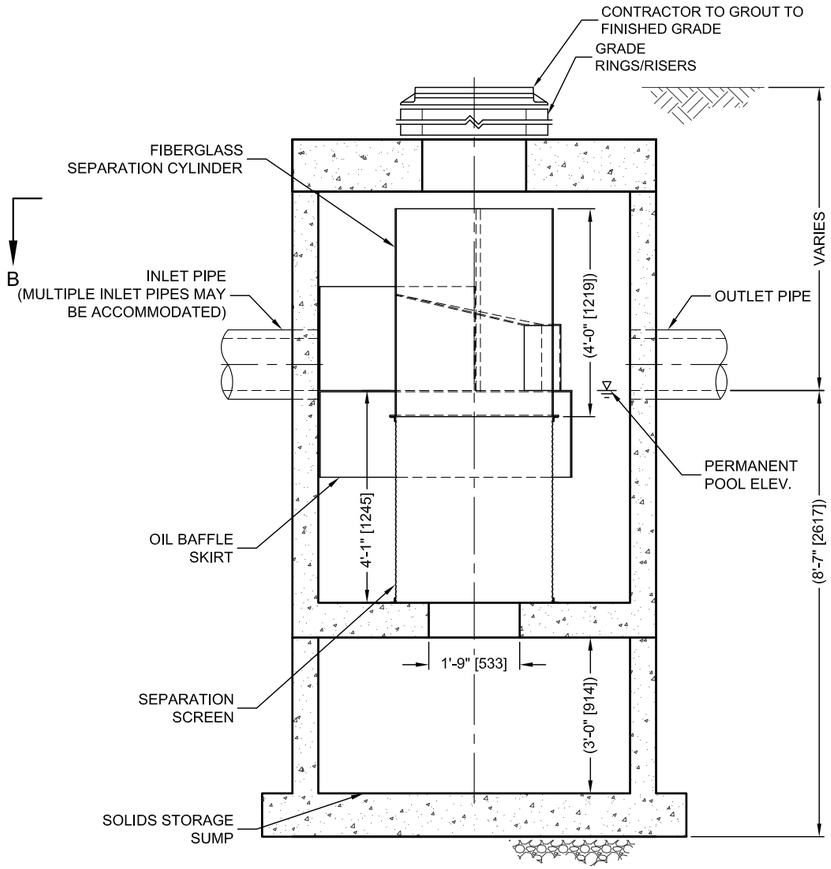
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

3 - CDS Efficiency based on testing conducted at the University of Central Florida

4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications



PLAN VIEW B-B
N.T.S.



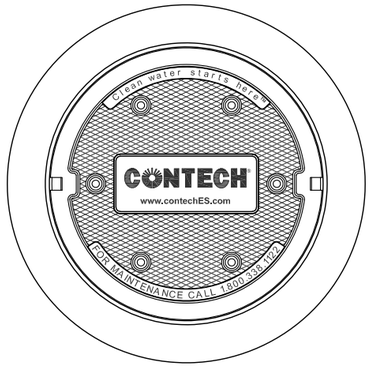
ELEVATION A-A
N.T.S.

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,848; 6,641,720; 8,511,500; 8,581,783; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

CDS PMSU3035-6-C DESIGN NOTES

THE STANDARD CDS PMSU3035-6-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
CUSTOMIZABLE SUMP DEPTH AVAILABLE
ANTI-FLOTATION DESIGN AVAILABLE UPON REQUEST



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (CFS OR L/s)	*
PEAK FLOW RATE (CFS OR L/s)	*
RETURN PERIOD OF PEAK FLOW (YRS)	*
SCREEN APERTURE (2400 OR 4700)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CDS PMSU3035-6-C
INLINE CDS
STANDARD DETAIL

HUSSON

ENGINEERING + MANAGEMENT

1725 16TH AVENUE, SUITE 103
RICHMOND HILL, ON L4B 4C6
HUSSON.CA