S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS

Functional Servicing and Stormwater Management Report

Project Location:

517 Plains Road East,

Burlington, Ontario

Prepared For:

BryDec Development Inc.

Date: March 2026

SLA File No: 25092

3228 South Service Road, Suite 105, East Wing Burlington, Ontario L7N 3H8
Tel: 905-631-6978 www.sla.on.ca

TABLE OF CONTENTS

1.0 INTRODUCTION AND BACKGROUND....1

1.1 Overview....1

1.2 Background Information....1

1.0 STORM DRAINAGE & STORMWATER MANAGEMENT....2

1.1 Stormwater Management Criteria....2

1.2 Existing Conditions....3

1.3 Proposed Conditions....4

1.4 Water Quantity Control....5

1.5 Water Quality Control & Low Impact Development (LID)....7

1.5.1 Retention....7

1.6 Sediment and Erosion Control....8

2.0 SANITARY SEWER SERVICING....8

2.1 Existing Conditions....8

2.2 Sanitary Demand....8

3.0 DOMESTIC AND FIRE WATER SUPPLY SERVICING....9

3.1 Existing Conditions....9

3.2 Domestic Water Demand....10

3.3 Fire Flow Demand....10

3.4 Proposed Water Servicing....11

4.0 CONCLUSIONS AND RECOMMENDATIONS....11

Tables

Table 1.1 – Existing Condition Catchment Areas....3

Table 1.2– Existing Condition Stormwater Discharge....3

Table 1.3 – Allowable Catchment Area (To Plains Road East)....4

Table 1.4– Allowable Discharge Rate (To Plains Road East)....4

Table 1.5– Proposed Condition Catchment Areas....5

Table 1.6– Proposed Condition Stage-Storage-Discharge (Catchment 201)....6

Table 1.7– Proposed Condition Stormwater Discharge (To Plains Road East)....6

Table 2.1 – Post-Development Sanitary Sewer Discharge....9

Table 3.1– Post-Development Domestic Water Demand....10

Figures

Figure 1.0 – Location Plan....2

Appendices

Appendix A – Stormwater Management Information....Encl.

Appendix B – Quality Control Information....Encl.

Appendix C – Water Analysis Information....Encl.

1.0 INTRODUCTION AND BACKGROUND

1.1 Overview

S. Llewellyn & Associates Limited has been retained by BryDec Development Inc. to provide Consulting Engineering services for the proposed residential development at 517 Plains Road East in the City of Burlington. Refer to Figure 1.0 for the location plan.

The property is currently comprised of an existing 1-storey motel and associated asphalt parking lot. The proposed development is bound by Plains Road East to the south, Mary Street to the north, an existing motel to the east, and existing residential lands to the west.

The proposed development will consist of 11-storey mixed-use building containing a total of 179 residential units and 8 commercial units. It will also include two levels of underground parking structures, asphalt driveway, concrete walkways and associated landscape areas.

This Functional Servicing and Stormwater Management Report provides information on the proposed servicing, grading and stormwater management scheme for the development, submitted in support of the OPA and Re-Zoning application filed with the City of Burlington.

Please refer to the Preliminary Engineering Plans prepared by S. Llewellyn & Associates Limited and the Site Plan prepared by Lima Architects Inc. for additional information.

1.2 Background Information

The following documents were referenced in the preparation of this report:

Ref. 1: MOE Stormwater Management Practices Planning and Design Manual, Ministry of Environment (March 2003).

Ref. 2: City of Burlington Standard Specifications (City of Burlington, February 2022).

Ref. 3: Halton Region Water and Wastewater Linear Design Manual (Halton Region, November 2024).

Ref. 4: Low Impact Development Stormwater Management Planning and Design Guide (Credit Valley Conservation Authority / Toronto and Region Conservation Authority, 2010).

Ref. 5: Stormwater Management Design Guidelines (City of Burlington, May 21, 2020).

Ref. 6: Development Charges Background Study for Water, Wastewater, Roads & General Services Development Charges (Region of Halton, December 15, 2021).



Figure 1.0 – Location Plan

1.0 STORM DRAINAGE & STORMWATER MANAGEMENT

The following stormwater management (SWM) criteria will be applied to the site, in accordance with the City of Burlington, and Halton Region requirements:

1.1 Stormwater Management Criteria

Quantity Control

The 100-year post development flow rate shall be controlled to the 5-year pre-development flow rate. Additionally, the maximum pre-development imperviousness of 36% is to be used for the pre-development calculations.

Quality Control

The stormwater runoff from the proposed condition site must meet Level 1 (Enhanced) stormwater quality control (80% TSS removal, 90% average annual runoff treatment).

Infiltration/Volume Control

The first 5mm of rainfall is recommended to be retained and infiltrated or reused on site.

Erosion Control

Erosion and sediment control measures will be implemented in accordance with the standards of the City of Burlington.

1.2 Existing Conditions

Under existing conditions, subject site is occupied by a 1-storey motel with associated asphalt parking lot, which is bound by Plains Road East to the south, Mary Street to the north, an existing motel to the east, and existing residential lands to the west.

The topography of the site generally slopes south towards Plains Road East. Majority of the site drains to the existing catchbasins located within the asphalt parking lot. An existing 375mmø storm sewer flows west along Plains Road East. Mary Street contains a 375mmø storm sewer which flows east.

One catchment area has been identified under existing conditions.

Catchment 101's drainage area represents existing drainage from the subject site plus external drainage from neighboring lands to the west and northeast that is captured by the existing catchasins and conveyed to the existing 375mmø storm sewer on Plains Road East.

Table 1.1 below summarizes the parameters of the above-mentioned catchment area. For additional information, refer to the Pre-Development Storm Drainage Area Plan in Appendix A for details.

Table 1.1 – Existing Condition Catchment Areas

Catchment ID	Description	Area (ha)	% Impervious
101	Ex. Drainage towards Plains Road East	0.34	77%

The existing conditions discharge from the site was calculated using the SWMHYMO Hydrologic Modelling Program for the 2-year to 100-year City of Burlington design storms. A summary of the results can be found in Table 1.2, and the detailed SWMHYMO input/output information can be found in Appendix A.

Table 1.2– Existing Condition Stormwater Discharge

Storm Event	Catchment 101 (To Plains Road East) (m^3/s)
2-year	0.060
5-year	**0.079**
10-year	0.092
25-year	0.109
50-year	0.122
100-year	0.134

Allowable Discharge Rate

As per City of Burlington's design criteria for discharging to an existing storm sewer, the 100-year post-development flow rate shall be controlled to the 5-year pre-development flow rate. Though the percentage imperviousness of the drainage area discharging to the existing sewer (Catchment 101) is 77%, the maximum pre-development imperviousness of 36% will be used for the pre-development calculations for the existing drainage area - as the allowable discharge to the existing storm sewer. Refer to Table 1.3 below for the allowable catchment area to Plains Road East. The allowable discharge rate for the 5-year storm event has been calculated using the SWMHYMO Hydrologic Modelling Program and shown in Table 1.4 below.

Table 1.3 – Allowable Catchment Area (To Plains Road East)

Catchment ID	Description	Area (ha)	% Impervious	Runoff Coeff. (C)
101	Allowable discharge to Plains Road East	0.34	36%	0.77

Table 1.4– Allowable Discharge Rate (To Plains Road East)

Storm Event	Allowable Discharge to Existing Storm Sewer (m^3/s)
5-year	0.050
Note: Refer to SWMHYMO output file for the 5-year pre-development conditions allowable discharge rate to Plains Road East.	

1.3 Proposed Conditions

Under proposed conditions, the proposed development will consist of 11-storey mixed-use building containing a total of 179 residential units and 8 commercial units. It will also include two levels of underground parking structures, asphalt driveway, concrete walkways and associated landscape areas.

The proposed development will be graded in a way such that the existing drainage patterns are maintained– the entire site will drain towards Plain Road East. Emergency overland flow route will be directed towards Plains Road East from the landscape areas and walkways and towards Mary Street from the asphalt driveway, walkways and landscape areas.

Two catchment areas have been identified under proposed conditions.

Catchment 201's drainage area represents stormwater runoff from roof of the proposed building, walkways, and landscape areas which is captured and controlled by area drains and ultimately be discharged to the existing 375mmø storm sewer located along Plains Road East.

Catchment 202's drainage area represents stormwater runoff from walkways and landscape areas which sheet flows uncontrolled to Plains Road East.

Table 1.5 below summarizes the parameters of the two above-mentioned catchment areas. For additional information, refer to the Post-Development Storm Drainage Area Plan in Appendix A for details.

Table 1.5– Proposed Condition Catchment Areas

Catchment ID	Description	Area (ha)	% Impervious	Runoff Coeff. (C)
201	Controlled drainage towards Plains Road East	0.33	72%	0.74
202	Uncontrolled drainage towards Plains Road East	0.01	68%	0.69
	Total to Plains Road East	**0.34**	**72%**	**0.74**

Minor and Major Flows (up to 100-year event)

Minor flows from the site will be conveyed by the proposed 300mmø storm sewer, designed and constructed in accordance with the City of Burlington standards. It is proposed to discharge minor flows from the site to the existing 375mmø storm sewer fronting the site along Plains Road East.

Emergency Flows (greater than 100-year event)

Emergency flows from the site will be conveyed overland to Plains Road East and Mary Street. Proposed grading design for the subject site creates drainage splits and a spill point near the proposed driveway entrance on Mary Street which enables the emergency overland flows from the asphalt parking lot, walkways and landscape areas to be conveyed to Mary Street and from the rest of the site to be conveyed to Plains Road East (see Preliminary Grading and Erosion Control Plan for details).

1.4 Water Quantity Control

It is proposed to apply quantity control measures to the runoff from Catchment 201 by means of a pump having a minimum pumping capacity of 46 l/s located within the proposed cast-in-place concrete storage tank to restrict the post-development discharge from the site to the allowable discharge rate of 50 l/s.

With the installation of on-site quantity control measures for Catchment 201, it will be required to provide stormwater storage during storm events up to and including the 100-year event. To provide the required storage, it is proposed to install a cast-in-place concrete storage tank within the underground parking Level 1. Details of the proposed tank can be found on the Preliminary Site Servicing Plan. The stage-storage-discharge characteristics can be seen in Table 1.6 below and Appendix A for details.

Table 1.6– Proposed Condition Stage-Storage-Discharge (Catchment 201)			
Elevation (m)	**Dead Storage (m^3)**	**Active Storage (m^3)**	**Discharge (m^3/s)**
95.05 (Bottom of Tank)	0	0	0.0000
95.45 (0.40m Deep)	14	0	0.0000
95.58 (0.53m Deep) (Pump Elevation)	**19**	0	0.0000
95.85 (0.80m Deep)	29	10	0.0460
96.25 (1.20m Deep)	43	24	0.0460
96.65 (1.60m Deep)	58	39	0.0460
97.05 (2.00m Deep)	72	53	0.0460
97.11 (Tank Outlet Invert)	74	55	0.0460
97.55 (Top of Tank)	90	71	0.0460

An analysis was performed on the Proposed Condition site using the SWMHYMO hydrologic modeling program to determine the required volume of stormwater storage during the 2-year to 100-year City of Burlington design storms. A summary of the proposed condition discharge to Plains Road East can be found in Table 1.7. The detailed SWMHYMO input/output information can be found in Appendix A.

Table 1.7– Proposed Condition Stormwater Discharge (To Plains Road East)					
Storm Event	**Catchment 201 Controlled Discharge (m^3/s)**	**Catchment 202 Uncontrolled Discharge (m^3/s)**	**Total Discharge* (m^3/s)**	**Allowable Discharge (m^3/s)**	**Required Storage (m^3)**
2-year	0.046	0.002	0.048	0.050	12.1
5-year	0.046	0.002	0.048		20.8
10-year	0.046	0.003	0.049		27.4
25-year	0.046	0.003	0.049		36.4
50-year	0.046	0.003	0.049		44.1
100-year	0.046	0.004	0.050		52.1
*Total Discharge is determined using ADD HYD summation for Catchment 201 and 202 in SWMHYMO					

This analysis determined the following:

- The proposed condition discharge rates to Plains Road East will not exceed the allowable discharge rate during the 2-year to 100-year storm events with the installation of a pump control.
- Catchment 201 will require 52.1m^3 of stormwater storage during the 100-year event, which can be accommodated with the provision of an active storage of 71m^3 within the underground stormwater tank.

1.5 Water Quality Control & Low Impact Development (LID)

The proposed development is required to achieve a Level 1 "Enhanced" (80% TSS removal, 90% average annual runoff treatment) level of water quality protection. To achieve this criterion, discharge from Catchment 201 will be subject to treatment from a HydroStorm oil/grit separator before ultimately discharging to the existing 375mmø storm sewer along Plains Road East. (Refer to Preliminary Site Servicing Plan). The Hydroworks sizing software was used to determine the required size of HydroStorm Unit for the site. It was determined that a HydroStorm HS-6 will provide 83% TSS removal and 97% average annual runoff treatment, which satisfies the requirements for a "Normal" level of quality control. For additional information refer to Appendix B for the HydroStorm output file.

HydroStorm units require inspection and maintenance as per the manufacturer's specifications to ensure the unit operates properly. Refer to the HydroStorm Maintenance Manual in Appendix B for details.

1.5.1 Retention

As per the City of Burlington's consultation comments for the proposed development, a target of 5mm infiltration depth across the entire site is recommended. Providing this volume for infiltration or reuse on site would meet the water budget criterion set out in the City of Burlington's consultation comments.

The Runoff Volume Control Target (RVCT) for the site is calculated based on the methodology in the Sustainable Technologies Evaluation Program (STEP) from the Toronto and Region Conservation Authority (TRCA), Credit Valley Conservation (CVC) (Ref. 4).

The Runoff Volume Control Target (RVCT) calculation is as below:

Runoff Volume Control Target (RVCT)

= Runoff Depth * Area

= 5.0 mm * 0.001 m/mm * 0.31 ha * 10,000 m^2/ha

= 15.5m^3

Clean runoff from the rooftop of the proposed building can be captured and conveyed to the proposed underground storage tank. The required 15.5m^3 of stormwater runoff can be retained into the proposed underground stormwater tank that has a total storage capacity of 90m^3 (with a dead storage capacity of 19m^3 and active storage capacity of 71m^3). The design of water re-use will be considered at the detailed design stage and implemented if feasible.

1.6 Sediment and Erosion Control

In order to minimize erosion during the grading and site servicing period of construction, the following measures will be implemented:

- Install silt fencing along the outer boundary of the site to ensure that sediment does not migrate to the adjacent properties;
- Installation of a mud mat at the construction entrance to the site to minimize the amount of sediment transported off the site on construction vehicle tires;
- Locating stockpiled topsoil in an area that will not impact adjacent lands;
- Stabilizing all disturbed or landscaped areas with hydro seeding/sodding to minimize the opportunity for erosion;
- Install sediment control (silt sacks) in the existing catchbasins to ensure that no untreated runoff enters the existing conveyance system; and

To ensure and document the effectiveness of the erosion and sediment control structures, an appropriate inspection and maintenance program is necessary. The program will include the following activities:

- Inspection of the erosion and sediment controls (e.g., silt fences, sediment traps, outlets, vegetation, etc.) with follow up reports to the governing municipality; and
- The developer and/or his contractor shall be responsible for any costs incurred during the remediation of problem areas.

Details of the proposed erosion & sediment control measures are provided on the Preliminary Grading and Erosion Control Plan.

2.0 SANITARY SEWER SERVICING

2.1 Existing Conditions

There is an existing 200mmø sanitary sewer which flows east along Plains Road East. Mary Street contains an existing 200mmø sanitary sewer which flows east.

2.2 Sanitary Demand

Sanitary discharge from the site was estimated in accordance with Section 3.2 of Halton Region Water and Wastewater Linear Design Manual, 2024. Table 2.1 summarizes the sanitary sewer discharge rate for the proposed development.

Table 2.1 – Post-Development Sanitary Sewer Discharge

Population [A]	Avg. Demand [B] (l/s)	Peaking Factor [C]	Infiltration [D] (l/s)	Peak Flow [E] (l/s)
301 persons	0.75	4.08	0.09	**3.15**

[A] Population= 1. Residential: 1.66 persons/unit x 179 units = 297 persons

2. Commercial: 90 persons/hectare x 0.04 hectare = 4 persons

(Residential Population is determined based on the Section 3.2 of Halton Region Water and Wastewater Linear Deign Manual, 2024 and Region of Halton 2022 Development Charges Background Study, Commercial Population is determined based on Table 2-1 under Section 2.3 of Halton Region Water and Wastewater Linear Design Manual, 2024)

(No. of units and gross floor area information is taken from project statistic prepared by Lima Architects)

[B] Average demand = (215 l/cap/day x population) (As per table B-3 – Wastewater Flow Criteria in the Region of Halton 2022 Development Charges Background Study)

[C] Peaking Factor = $1+((14/(4+P^{0.5})))$ with P expressed in thousands Min = 2.0

[D] Infiltration flow based on 0.286 l/ha/sec infiltration rate x Site Area (0.31 hectares)

[E] Peak Flow = (Average Demand x Peaking Factor) + Infiltration

Based on Table 2.1, the estimated sanitary demand for the proposed mixes-use buildings is:

3.15 l/s

The proposed site will be serviced by a 200mmø sanitary sewer, designed and constructed in accordance with City of Burlington and Region of Halton standards. Drainage from this proposed sewer will be discharged to the existing 200mmø sanitary sewer fronting the site along Plains Road East.

The minimum grade of the proposed 200mmø sanitary sewer will be 2.0%. At this minimum grade, the proposed sanitary sewer will have a capacity of 0.046 m^3/s (46 l/s). Therefore, the proposed 200mmø sanitary sewer at a minimum grade of 2.0% is adequately sized to service the proposed development.

3.0 DOMESTIC AND FIRE WATER SUPPLY SERVICING

3.1 Existing Conditions

The existing municipal water distribution system consists of a 300mmø watermain located fronting the site along Plains Road East. Mary Street contains an existing 150mmø watermain. There is an existing municipal fire hydrant is located at the intersection of Plains Road East and Joan Drive.

3.2 Domestic Water Demand

Water demand for the site was estimated in accordance with the Halton Region Water and Wastewater Linear Design Manual. Table 3.1 summarizes the domestic water demand requirements for the Average Daily, Maximum Daily and Peaking Hourly demand scenarios.

Table 3.1– Post-Development Domestic Water Demand

Occupancy Type	Population [A]	Avg. Daily Demand [B] (l/s)	Max. Daily Peaking Factor [C]	Max. Hourly Peaking Factor [D]	Max. Daily Demand [E] (l/s)	Max. Hourly Demand [F] (l/s)
Residential	297 persons	0.91	2.25	4.0	**2.05**	**3.64**
Commercial	4 persons	0.01	2.25	2.25	**0.02**	**0.02**
				Total	**2.07**	**3.66**

[A] Population= 1. Residential: 1.66 persons/unit x 179 units = 297 persons

2. Commercial: 90 persons/hectare x 0.04 hectare = 4 persons

(Residential Population is determined based on the Section 3.2 of Halton Region Water and Wastewater Linear Deign Manual, 2024 and Region of Halton 2022 Development Charges Background Study, Commercial Population is determined based on Table 2-1 under Section 2.3 of Halton Region Water and Wastewater Linear Design Manual, 2024)

(No. of units and gross floor area information is taken from project statistic prepared by Lima Architects)

[B] Average daily demand = (265 l/cap/day x population)

(As per table B-1 – Water Demand Criteria for in the Region of Halton 2022 Development Charges Background Study)

[C] From Section 2.4 of Region of Halton Water and Wastewater Linear Design Manual (November 2024).

[D] From Table 2-2 of Region of Halton Water and Wastewater Linear Design Manual (November 2024).

[E] Max. Daily Demand = Avg. Daily Demand x Max. Daily Peaking Factor

[F] Max. Hourly Demand = Avg. Daily Demand x Max. Hourly Peaking Factor

3.3 Fire Flow Demand

Fire flow demand for the proposed development is governed by a number of guidelines and criteria, such as the Water Supply for Public Fire Protection (Fire Underwriters Survey, 2020), Ontario Building Code (OBC), and various codes and standards published by the National Fire Protection Association (NFPA).

The proposed building is non-combustible construction (C=0.8), with limited combustible occupancy (-15% correction) and a fully supervised sprinkler system (-50% correction). Exposure components are based on the following:

North Face: 0% correction (Greater than 30.0m)
South Face: 0% correction (Greater than 30.0m)
East Face: 20% correction (3.1m to 10m)
West Face: 20% correction (3.1m to 10m)
Total: 40%

It is estimated that the required fire flow for the proposed building will be **200 l/s**. See the Fire Flow Demand Requirements in Appendix C for details.

The existing hydrant fronting the site on Plains Road East is located within the 90m separation from the building face adjacent to a street (as per Sentence 3.2.5.5 of the 2024 Ontario Building Code), no additional private hydrants are proposed for this development.

There is currently no hydrant flow test data available. A hydrant flow test will be completed at a later date, if required, and included in an updated version of this report.

3.4 Proposed Water Servicing

Proposed water servicing for the site consists of connecting a proposed 200mmø watermain to the existing 300mmø watermain fronting the site along Plains Road East. The proposed 200mmø watermain will be spilt before the property line to provide a 150mmø domestic water service and a 200mmø fire water service to the proposed development. All proposed water services will be designed and constructed in accordance with City of Burlington and Region of Halton standards.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the information provided herein, it is concluded that the proposed development at 517 Plains Road East can be constructed to meet the requirements of the City of Burlington and Halton Region.

Therefore, it is recommended that:

- The development be graded and serviced in accordance with the Preliminary Grading and Erosion Control Plan and Preliminary Site Servicing Plan prepared by S. Llewellyn & Associates Limited;
- A Cast-in-place stormwater storage vault be constructed within the underground parking as per Preliminary Site Servicing Plan and this report to provide adequate stormwater storage;
- A pump having a minimum pumping capacity of 46 l/s be installed within the proposed cast-in-place concrete stormwater storage tank as per the Preliminary Site Servicing Plan and this report to provide adequate stormwater quantity control for the proposed site;
- Hydrostorm HS6 oil/grit separator be installed as per Preliminary Site Servicing Plan and this report to provide efficient stormwater quality control;
- The proposed sanitary and water servicing system be installed as per the Preliminary Site Servicing Plan and this report to adequately service the proposed development;
- Erosion and sediment controls to be installed as described in this report and shown on the Preliminary Grading and Erosion Control Plan to meet City of Burlington requirements;

We trust the information enclosed herein is satisfactory. Should you have any questions please do not hesitate to contact our office.

Prepared by:

S. LLEWELLYN & ASSOCIATES LIMITED



Y. Moradiya, C.E.T.

S. Nelson, P.Eng.

APPENDIX A

STORMWATER MANAGEMENT INFORMATION

S:\25092\Working\Current\25092 - DAPs.dwg

MARY STREET

JOAN DRIVE

WILLOWBROOK ROAD

EX. RESIDENTIAL LANDS

EX. RESIDENTIAL LANDS

EX. CRESTWOOD MOTEL

EX. COMMERCIAL LANDS

101
0.34
77
0.77

LEGEND

101	DRAINAGE AREA I.D.
4.90	DRAINAGE AREA (ha)
0	PERCENT IMPERVIOUS
0.25	RUNOFF COEFFICENT
	DRAINAGE BOUNDARY

PRE-DEVELOPMENT STORM DRAINAGE AREA PLAN

SCALE: 1:500

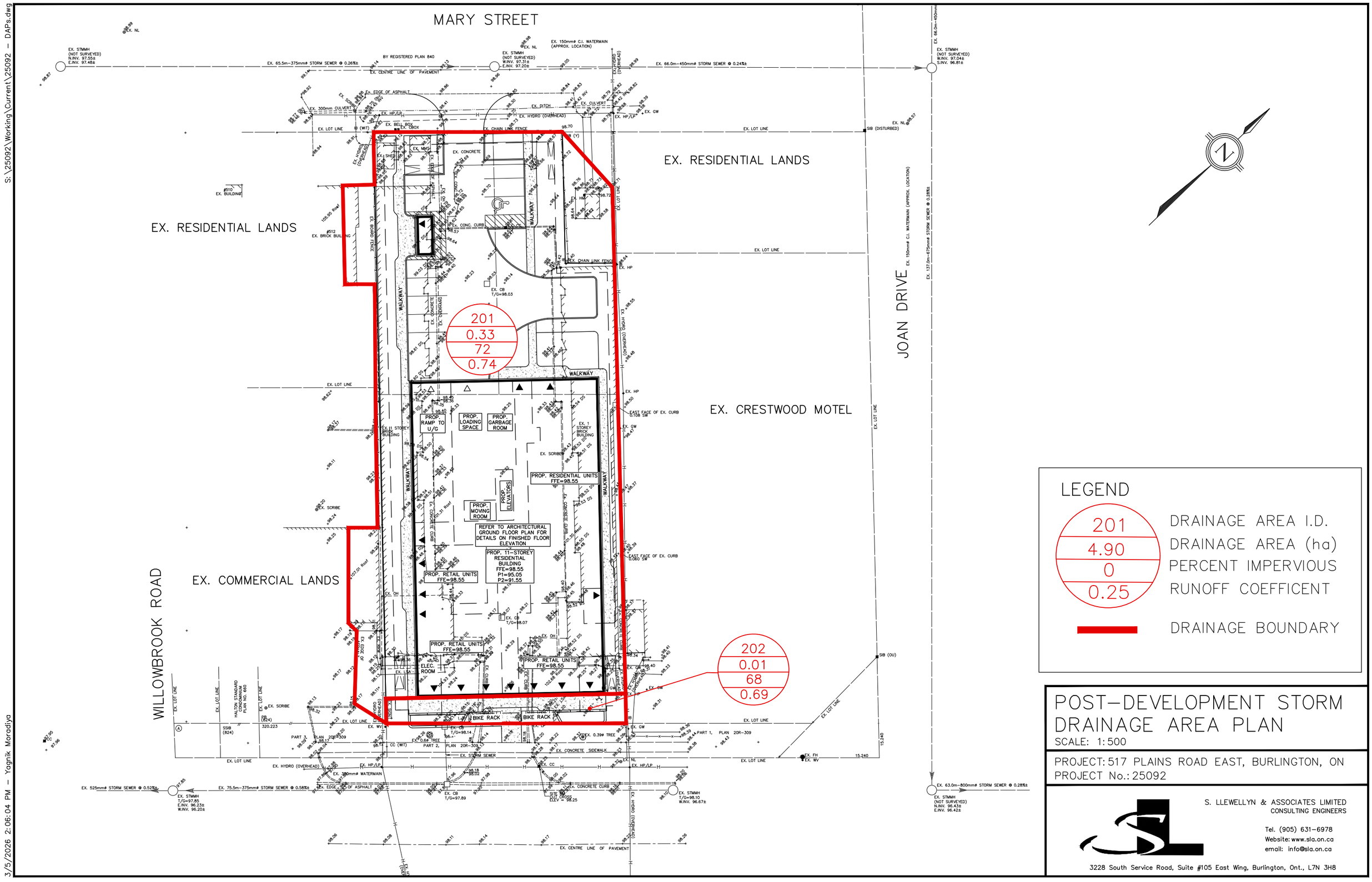
PROJECT: 517 PLAINS ROAD EAST, BURLINGTON, ON
PROJECT No.: 25092

S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS

Tel. (905) 631-6978
Website: www.sla.on.ca
email: info@sla.on.ca

3228 South Service Road, Suite #105 East Wing, Burlington, Ont., L7N 3H8

2/18/2026 12:33:20 PM - Yagnik Moradiya



S:\25092\Working\Current\25092 - DAPs.dwg

3/5/2026 2:06:04 PM - Yagnik Moradiya

517 Plains Road East
Burlington, ON

S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS

RUNOFF COEFFICIENT CALCULATIONS

Pre

		C-Value
Drainage Area #:	101	
Roof/Building Area (m²):	1317	0.95
Asphalt/Conc. Area (m²):	1316	0.90
Gravel Area (m²):l	0	0.80
Grass Area - Pervious (m²):	780	0.25
Total Area (m²):	3413	0.77
Impervious	2633	**0.77**
Pervious	780	**0.23**
Site	3413	

Post

		C-Value
Drainage Area #:	201	
Roof/Building Area (m²):	1482	0.95
Asphalt/Conc. Area (m²):	856	0.90
Grass Area - Pervious (m²):	928	0.25
Total Area (m²):	3266	0.74
Impervious	2338	**0.72**
Pervious	928	**0.28**
Site	3266	

Post

		C-Value
Drainage Area #:	202	
Roof/Building Area (m²):	0	0.95
Asphalt/Conc. Area (m²):	102	0.90
Grass Area - Pervious (m²):	47	0.25
Total Area (m²):	149	0.69
Impervious	102	**0.68**
Pervious	47	**0.32**
Site	149	

S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS

STAGE-STORAGE-DISCHARGE CALCULATIONS

Catchment 201
Outlet Device No. 1 (Quantity)

Type:	Pump
Diameter (mm)	**N/A**
Area (m^2)	N/A
Outlet Invert Elev. (m)	97.11
C/L Elev. (m)	N/A
Disch. Coeff. (C_d)	0.6
Discharge (Q) =	$C_d A (2 g H)^{0.5}$
Number of Orifices:	N/A

		SWM Pond Volumes				Outlet No. 1	
	Elevation m	Area m^2	Tank Incremental Volume m^3	Dead Storage Volume m^3	Active Storage Volume m^3	H m	Discharge m^3/s
Bottom of Tank	95.05	36	0	0	0	0.000	0.0000
0.40m Deep	95.45	36	14	14	0	0.000	0.0000
0.53m Deep (Pump Elevation)	95.58	36	5	**19**	0	0.000	0.0000
0.80m Deep	95.85	36	10	29	10	0.000	0.0460
1.20m Deep	96.25	36	14	43	24	0.000	0.0460
1.60m Deep	96.65	36	14	58	39	0.000	0.0460
2.00m Deep	97.05	36	14	72	53	0.000	0.0460
Tank Outlet Invert	97.11	36	2	74	55	0.400	0.0460
Top of Tank	97.55	36	16	90	71	0.400	0.0460

```
00001> 2     Metric units
00002> *#*************************************************************************|
00003> *#  Project Name: 517 PLAINS ROAD EAST
00004> *#               BURLINGTON, ONTARIO
00005> *#  JOB NUMBER  : 25092
00006> *#       Date   : FEBRUARY 2026
00007> *#    Revised   :
00008> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
00009> *#       File   : 25092.DAT
00010> *#*************************************************************************|
00011> *
00012> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[002]
00013>                     BUR6_002.stm
00014> *
00015> READ STORM          STORM_FILENAME "STORM.001"
00016> *
00017> *#*************************************************************************|
00018> *#
00019> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00020> *#        ============================================
00021> *#
00022> **#************************************************************************|
00023> *# CATCHMENT 101 - EXISTING CONDITIONS (Existing discharge to Plains Road East)
00024> CALIB STANDHYD      ID=[1], NHYD=["101"], DT=[1](min), AREA=[0.34](ha),
00025>                     XIMP=[0.77], TIMP=[0.77], DWF=[0](cms), LOSS=[2],
00026>                     SCS curve number CN=[75],
00027>                     Pervious   surfaces: IAper=[1.3](mm), SLPP=[2.0](%),
00028>                                          LGP=[10](m), MNP=[0.250], SCP=[0](min),
00029>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[2.5](%),
00030>                                          LGI=[15](m), MNI=[0.013], SCI=[0](min),
00031>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00032> **#************************************************************************|
00033> *# ALLOWABLE - EXISTING CONDITIONS (Allowable discharge to Plains Road East)
00034> CALIB STANDHYD      ID=[2], NHYD=["101"], DT=[1](min), AREA=[0.34](ha),
00035>                     XIMP=[0.36], TIMP=[0.36], DWF=[0](cms), LOSS=[2],
00036>                     SCS curve number CN=[75],
00037>                     Pervious   surfaces: IAper=[1.3](mm), SLPP=[2.0](%),
00038>                                          LGP=[10](m), MNP=[0.250], SCP=[0](min),
00039>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[2.0](%),
00040>                                          LGI=[15](m), MNI=[0.013], SCI=[0](min),
00041>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00042> *%-----------------|-------------------------------------------------------|
00043>
00044> *#*************************************************************************|
00045> *#
00046> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00047> *#        =============================================
00048> *#
00049> **#************************************************************************|
00050> *# CATCHMENT 201 - PROPOSED CONDITIONS (Controlled To Plains Road East)
00051> CALIB STANDHYD      ID=[3], NHYD=["201"], DT=[1](min), AREA=[0.33](ha),
00052>                     XIMP=[0.72], TIMP=[0.72], DWF=[0](cms), LOSS=[2],
00053>                     SCS curve number CN=[75],
00054>                     Pervious   surfaces: IAper=[1.3](mm), SLPP=[2.0](%),
00055>                                          LGP=[8](m), MNP=[0.250], SCP=[0](min),
00056>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[2.5](%),
00057>                                          LGI=[10](m), MNI=[0.013], SCI=[0](min),
00058>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00059> *%-----------------|-------------------------------------------------------|
00060> *# CATCHMENT 202 - PROPOSED CONDITIONS (Uncontrolled To Plains Road East)
00061> CALIB STANDHYD      ID=[4], NHYD=["202"], DT=[1](min), AREA=[0.01](ha),
00062>                     XIMP=[0.68], TIMP=[0.68], DWF=[0](cms), LOSS=[2],
00063>                     SCS curve number CN=[75],
00064>                     Pervious   surfaces: IAper=[1.3](mm), SLPP=[2.5](%),
00065>                                          LGP=[5](m), MNP=[0.250], SCP=[0](min),
```

```
00066>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[3.0](%),
00067>                                          LGI=[5](m), MNI=[0.013], SCI=[0](min),
00068>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00069> *%-----------------|-------------------------------------------------------|
00070> *# ROUTE CATCHMENT 201 THROUGH PUMP CONTROL
00071> *
00072> ROUTE RESERVOIR     IDout=[5],   NHYD=["201"],  IDin=[3],
00073>                     RDT=[1](min),
00074>                           TABLE of ( OUTFLOW-STORAGE ) values
00075>                                       (cms) - (ha-m)
00076>                                        0.0000 , 0.0000
00077>                                        0.0460 , 0.0010
00078>                                        0.0460 , 0.0024
00079>                                        0.0460 , 0.0039
00080>                                        0.0460 , 0.0053
00081>                                        0.0460 , 0.0055
00082>                                        0.0460 , 0.0071
00083>                                        -1  ,  -1    (max twenty pts)
00084>                           IDovf=[6], NHYDovf=["OVF"]
00085> *%-----------------|-------------------------------------------------------|
00086> ADD HYD             IDsum=[7], NHYD=["Total"], IDs to add=[5+6+4]
00087> *%-----------------|-------------------------------------------------------|
00088> * RUN REMAINING DESIGN STORMS (City of Burlington 5 TO 100-YR)
00089> *
00090> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[005]
00091>                     BUR6_005.stm
00092> *
00093> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[010]
00094>                     BUR6_010.stm
00095> *
00096> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[025]
00097>                     BUR6_025.stm
00098> *
00099> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[050]
00100>                     BUR6_050.stm
00101> *
00102> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[100]
00103>                     BUR6_100.stm
00104> *
00105> *%-----------------|-------------------------------------------------------|
00106> FINISH
00107>
00108>
00109>
00110>
00111>
00112>
00113>
00114>
00115>
00116>
00117>
00118>
00119>
00120>
00121>
00122>
```

```
00001> ================================================================================
00002>
00003>    SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
00004>    S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
00005>    SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
00006>        S  W W W  M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
00007>    SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9   =========
00008>                                                          9   9  9   9   # 3902680
00009>          StormWater Management HYdrologic Model           999    999    =========
00010>
00011>  ********************************************************************************
00012>  ***************************** SWMHYMO Ver/4.05  ********************************
00013>  *********  A single event and continuous hydrologic simulation model  *********
00014>  *********     based on the principles of HYMO and its successors      *********
00015>  *********                    OTTHYMO-83 and OTTHYMO-89.                *********
00016>  ********************************************************************************
00017>  ******** Distributed by:  J.F. Sabourin and Associates Inc.           *********
00018>  *********                  Ottawa,  Ontario: (613) 836-3884           *********
00019>  *********                  Gatineau, Quebec: (819) 243-6858           *********
00020>  *********                  E-Mail: swmhymo@jfsa.Com                   *********
00021>  ********************************************************************************
00022>
00023>  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00024>  +++++++++ Licensed user: S. Llewellyn & Associates Ltd                +++++++++
00025>  +++++++++                 Burlington          SERIAL#:3902680        +++++++++
00026>  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028>  ********************************************************************************
00029>  *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *********
00030>  *********           Maximum value for ID numbers  :     10           *********
00031>  *********           Max. number of rainfall points: 105408           *********
00032>  *********           Max. number of flow points    : 105408           *********
00033>  ********************************************************************************
00034>
00035>
00036>  **********************   D E T A I L E D   O U T P U T   **********************
00037>  ********************************************************************************
00038>  *         DATE: 2026-02-18     TIME: 11:19:18     RUN COUNTER: 000446         *
00039>  ********************************************************************************
00040>  * Input   filename: T:\projects\25092\SWMHYMO\25092.dat                        *
00041>  * Output  filename: T:\projects\25092\SWMHYMO\25092.out                        *
00042>  * Summary filename: T:\projects\25092\SWMHYMO\25092.sum                        *
00043>  * User comments:                                                              *
00044>  * 1:_____________________________________________________________________     *
00045>  * 2:_____________________________________________________________________     *
00046>  * 3:_____________________________________________________________________     *
00047>  ********************************************************************************
00048>
00049> --------------------------------------------------------------------------------
00050> 001:0001--------------------------------------------------------------------------
00051> *#*****************************************************************************|
00052> *#  Project Name: 517 PLAINS ROAD EAST
00053> *#               BURLINGTON, ONTARIO
00054> *#  JOB NUMBER  : 25092
00055> *#       Date   : FEBRUARY 2026
00056> *#    Revised   :
00057> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
00058> *#       File   : 25092.DAT
00059> *#*****************************************************************************|
00060> *
00061>   ** END OF RUN :   1
00062>
00063> ********************************************************************************
00064>
00065>
00066>
00067>
00068>
00069> --------------------
00070> | START            |  Project  dir.: T:\projects\25092\SWMHYMO\
00071> --------------------  Rainfall dir.: T:\projects\25092\SWMHYMO\
00072>     TZERO =   .00 hrs on       0
00073>     METOUT=   2 (output = METRIC)
00074>     NRUN  = 002
00075>     NSTORM=   1
00076>              #  1=BUR6_002.stm
00077> --------------------------------------------------------------------------------
00078> 002:0002--------------------------------------------------------------------------
00079> *#*****************************************************************************|
00080> *#  Project Name: 517 PLAINS ROAD EAST
00081> *#               BURLINGTON, ONTARIO
00082> *#  JOB NUMBER  : 25092
00083> *#       Date   : FEBRUARY 2026
00084> *#    Revised   :
00085> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
00086> *#       File   : 25092.DAT
00087> *#*****************************************************************************|
00088> *
00089> --------------------------------------------------------------------------------
00090> 002:0002--------------------------------------------------------------------------
00091> *
00092> --------------------
00093> | READ STORM       |    Filename: Burlington 2-yr 6hr CHICAGO  (A=681.52,
00094> | Ptotal=  40.93 mm|    Comments: Burlington 2-yr 6hr CHICAGO  (A=681.52,
00095> --------------------
00096>                TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00097>                 hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00098>                 .17   1.715 |   1.67   8.325 |   3.17   4.467 |   4.67   2.213
00099>                 .33   1.858 |   1.83  19.646 |   3.33   3.978 |   4.83   2.105
00100>                 .50   2.032 |   2.00  78.391 |   3.50   3.595 |   5.00   2.008
00101>                 .67   2.247 |   2.17  25.776 |   3.67   3.286 |   5.17   1.920
00102>                 .83   2.522 |   2.33  13.777 |   3.83   3.030 |   5.33   1.841
00103>                1.00   2.888 |   2.50   9.511 |   4.00   2.815 |   5.50   1.769
00104>                1.17   3.399 |   2.67   7.331 |   4.17   2.632 |   5.67   1.703
00105>                1.33   4.172 |   2.83   6.005 |   4.33   2.474 |   5.83   1.642
00106>                1.50   5.492 |   3.00   5.111 |   4.50   2.335 |   6.00   1.586
00107>
00108> --------------------------------------------------------------------------------
00109> 002:0003--------------------------------------------------------------------------
00110> *
00111> *#*****************************************************************************|
00112> *#
00113> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00114> *#        ==============================================
00115> *#
00116> **#****************************************************************************|
00117> *# CATCHMENT 101 - EXISTING CONDITIONS (Existing discharge to Plains Road East)
00118> ----------------------
00119> | CALIB STANDHYD     |   Area    (ha)=     .34
00120> | 01:101    DT= 1.00 |   Total Imp(%)=   77.00   Dir. Conn.(%)=   77.00
00121> ----------------------
00122>                              IMPERVIOUS    PERVIOUS (i)
00123>      Surface Area     (ha)=        .26          .08
00124>      Dep. Storage     (mm)=       1.00         1.30
00125>      Average Slope     (%)=       2.50         2.00
00126>      Length            (m)=      15.00        10.00
00127>      Mannings n            =       .013         .250
00128>
00129>      Max.eff.Inten.(mm/hr)=      78.39        23.83
00130>                 over (min)        1.00         6.00
00131>      Storage Coeff.  (min)=         .69 (ii)    6.14 (ii)
00132>      Unit Hyd. Tpeak (min)=        1.00         6.00
00133>      Unit Hyd. peak  (cms)=        1.30          .19
00134>                                                          *TOTALS*
00135>      PEAK FLOW       (cms)=         .06          .00          .060 (iii)
00136>      TIME TO PEAK    (hrs)=        2.00         2.05         2.000
00137>      RUNOFF VOLUME    (mm)=       39.93        12.64        33.655
00138>      TOTAL RAINFALL   (mm)=       40.93        40.93        40.933
00139>      RUNOFF COEFFICIENT   =         .98          .31          .822
00140>
00141>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00142>            CN* =  75.0    Ia = Dep. Storage  (Above)
00143>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00144>            THAN THE STORAGE COEFFICIENT.
00145>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00146>
00147> --------------------------------------------------------------------------------
00148> 002:0004--------------------------------------------------------------------------
00149> **#****************************************************************************|
00150> *# ALLOWABLE - EXISTING CONDITIONS (Allowable discharge to Plains Road East)
00151> ----------------------
00152> | CALIB STANDHYD     |   Area    (ha)=     .34
00153> | 02:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
00154> ----------------------
00155>                              IMPERVIOUS    PERVIOUS (i)
00156>      Surface Area     (ha)=        .12          .22
00157>      Dep. Storage     (mm)=       1.00         1.30
00158>      Average Slope     (%)=       2.00         2.00
00159>      Length            (m)=      15.00        10.00
00160>      Mannings n            =       .013         .250
00161>
00162>      Max.eff.Inten.(mm/hr)=      78.39        23.83
00163>                 over (min)        1.00         6.00
00164>      Storage Coeff.  (min)=         .73 (ii)    6.19 (ii)
00165>      Unit Hyd. Tpeak (min)=        1.00         6.00
00166>      Unit Hyd. peak  (cms)=        1.27          .18
00167>                                                          *TOTALS*
00168>      PEAK FLOW       (cms)=         .03          .01          .035 (iii)
00169>      TIME TO PEAK    (hrs)=        2.00         2.05         2.000
00170>      RUNOFF VOLUME    (mm)=       39.93        12.64        22.463
00171>      TOTAL RAINFALL   (mm)=       40.93        40.93        40.933
00172>      RUNOFF COEFFICIENT   =         .98          .31          .549
00173>
00174>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00175>            CN* =  75.0    Ia = Dep. Storage  (Above)
00176>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00177>            THAN THE STORAGE COEFFICIENT.
00178>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00179>
00180> --------------------------------------------------------------------------------
00181> 002:0005--------------------------------------------------------------------------
00182> *#*****************************************************************************|
00183> *#
00184> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00185> *#        ==============================================
00186> *#
00187> **#****************************************************************************|
00188> *# CATCHMENT 201 - PROPOSED CONDITIONS (Controlled To Plains Road East)
00189> ----------------------
00190> | CALIB STANDHYD     |   Area    (ha)=     .33
00191> | 03:201    DT= 1.00 |   Total Imp(%)=   72.00   Dir. Conn.(%)=   72.00
00192> ----------------------
00193>                              IMPERVIOUS    PERVIOUS (i)
00194>      Surface Area     (ha)=        .24          .09
00195>      Dep. Storage     (mm)=       1.00         1.30
00196>      Average Slope     (%)=       2.50         2.00
00197>      Length            (m)=      10.00         8.00
00198>      Mannings n            =       .013         .250
00199>
00200>      Max.eff.Inten.(mm/hr)=      78.39        24.55
00201>                 over (min)        1.00         5.00
00202>      Storage Coeff.  (min)=         .54 (ii)    5.25 (ii)
00203>      Unit Hyd. Tpeak (min)=        1.00         5.00
00204>      Unit Hyd. peak  (cms)=        1.43          .22
00205>                                                          *TOTALS*
00206>      PEAK FLOW       (cms)=         .05          .00          .056 (iii)
00207>      TIME TO PEAK    (hrs)=        1.97         2.03         2.000
00208>      RUNOFF VOLUME    (mm)=       39.93        12.64        32.290
00209>      TOTAL RAINFALL   (mm)=       40.93        40.93        40.933
00210>      RUNOFF COEFFICIENT   =         .98          .31          .789
00211>
00212>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00213>            CN* =  75.0    Ia = Dep. Storage  (Above)
00214>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00215>            THAN THE STORAGE COEFFICIENT.
00216>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00217>
00218> --------------------------------------------------------------------------------
00219> 002:0006--------------------------------------------------------------------------
00220> *# CATCHMENT 202 - PROPOSED CONDITIONS (Uncontrolled To Plains Road East)
00221> ----------------------
00222> | CALIB STANDHYD     |   Area    (ha)=     .01
00223> | 04:202    DT= 1.00 |   Total Imp(%)=   68.00   Dir. Conn.(%)=   68.00
00224> ----------------------
00225>                              IMPERVIOUS    PERVIOUS (i)
00226>      Surface Area     (ha)=        .01          .00
00227>      Dep. Storage     (mm)=       1.00         1.30
00228>      Average Slope     (%)=       3.00         2.50
00229>      Length            (m)=       5.00         5.00
00230>      Mannings n            =       .013         .250
00231>
00232>      Max.eff.Inten.(mm/hr)=      78.39        25.25
00233>                 over (min)        1.00         4.00
00234>      Storage Coeff.  (min)=         .34 (ii)    3.62 (ii)
00235>      Unit Hyd. Tpeak (min)=        1.00         4.00
00236>      Unit Hyd. peak  (cms)=        1.61          .30
00237>                                                          *TOTALS*
00238>      PEAK FLOW       (cms)=         .00          .00          .002 (iii)
00239>      TIME TO PEAK    (hrs)=        1.92         2.02         2.000
00240>      RUNOFF VOLUME    (mm)=       39.93        12.64        31.198
00241>      TOTAL RAINFALL   (mm)=       40.93        40.93        40.933
00242>      RUNOFF COEFFICIENT   =         .98          .31          .762
00243>
00244>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00245>            CN* =  75.0    Ia = Dep. Storage  (Above)
00246>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00247>            THAN THE STORAGE COEFFICIENT.
00248>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00249>
00250> --------------------------------------------------------------------------------
00251> 002:0007--------------------------------------------------------------------------
00252> *# ROUTE CATCHMENT 201 THROUGH PUMP CONTROL
00253> *
00254> ----------------------
00255> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
00256> |  IN>03:(201    )   |
00257> | OUT<05:(201    )   |    =========  OUTFLOW STORAGE TABLE  =========
00258> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00259>                             (cms)     (ha.m.)   |    (cms)    (ha.m.)
00260>                             .000  .0000E+00     |     .046  .5300E-02
00261>                             .046  .1000E-02     |     .046  .5500E-02
00262>                             .046  .2400E-02     |     .046  .7100E-02
00263>                             .046  .3900E-02     |     .000  .0000E+00
00264>
00265>      ROUTING RESULTS           AREA     QPEAK     TPEAK       R.V.
00266>      --------------------       (ha)     (cms)     (hrs)       (mm)
00267>      INFLOW >03: (201   )        .33      .056     2.000     32.290
00268>      OUTFLOW<05: (201   )        .33      .046     1.950     32.290
00269>     OVERFLOW<06: (OVF   )        .00      .000      .000       .000
00270>
```

```
                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   82.247
                    TIME SHIFT OF PEAK FLOW         (min)=    -3.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.1208E-02

------------------------------------------------------------------------------
002:0008------------------------------------------------------------------------
-----------------------
| ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 05:201            .33     .046    1.95  32.29    .000
                      +ID2 06:OVF            .00     .000     .00    .00    .000
                      +ID3 04:202            .01     .002    2.00  31.20    .000
                       ==========================================================
                       SUM 07:Total           .34     .048    2.00  32.26    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
002:0009------------------------------------------------------------------------
* RUN REMAINING DESIGN STORMS (City of Burlington 5 TO 100-YR)
*
  ** END OF RUN :   4

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



--------------------
| START            |  Project  dir.: T:\projects\25092\SWMHYMO\
--------------------  Rainfall dir.: T:\projects\25092\SWMHYMO\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 005
    NSTORM=   1
          #  1=BUR6_005.stm
------------------------------------------------------------------------------
005:0002------------------------------------------------------------------------
*#*****************************************************************************|
*#  Project Name: 517 PLAINS ROAD EAST
*#               BURLINGTON, ONTARIO
*#  JOB NUMBER  : 25092
*#       Date   : FEBRUARY 2026
*#    Revised   :
*#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
*#       File   : 25092.DAT
*#*****************************************************************************|
*
------------------------------------------------------------------------------
005:0002------------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: Burlington 5-yr 6hr CHICAGO    (A=802.04
| Ptotal=  53.05 mm|    Comments: Burlington 5-yr 6hr CHICAGO    (A=802.04
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .17   2.348 |   1.67  10.690 |   3.17   5.897 |   4.67   3.004
               .33   2.537 |   1.83  24.479 |   3.33   5.279 |   4.83   2.862
               .50   2.766 |   2.00 101.312 |   3.50   4.790 |   5.00   2.734
               .67   3.048 |   2.17  31.941 |   3.67   4.394 |   5.17   2.619
               .83   3.407 |   2.33  17.333 |   3.83   4.065 |   5.33   2.514
              1.00   3.881 |   2.50  12.145 |   4.00   3.788 |   5.50   2.419
              1.17   4.539 |   2.67   9.469 |   4.17   3.550 |   5.67   2.331
              1.33   5.523 |   2.83   7.826 |   4.33   3.344 |   5.83   2.251
              1.50   7.185 |   3.00   6.709 |   4.50   3.164 |   6.00   2.176

------------------------------------------------------------------------------
005:0003------------------------------------------------------------------------
*
*#*****************************************************************************|
*#
*#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#        ==============================================
*#
**#****************************************************************************|
*# CATCHMENT 101 - EXISTING CONDITIONS (Existing discharge to Plains Road East)
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .34
| 01:101    DT= 1.00 |   Total Imp(%)=   77.00   Dir. Conn.(%)=   77.00
----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .26          .08
     Dep. Storage     (mm)=        1.00         1.30
     Average Slope     (%)=        2.50         2.00
     Length            (m)=       15.00        10.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=      101.31        38.68
                   over (min)        1.00         5.00
     Storage Coeff.  (min)=         .62 (ii)    5.11 (ii)
     Unit Hyd. Tpeak (min)=        1.00         5.00
     Unit Hyd. peak  (cms)=        1.36          .22
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .07          .01          .079 (iii)
     TIME TO PEAK    (hrs)=        1.98         2.03         2.000
     RUNOFF VOLUME    (mm)=       52.05        19.63        44.596
     TOTAL RAINFALL   (mm)=       53.05        53.05        53.053
     RUNOFF COEFFICIENT   =         .98          .37          .841

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

------------------------------------------------------------------------------
005:0004------------------------------------------------------------------------
**#****************************************************************************|
*# ALLOWABLE - EXISTING CONDITIONS (Allowable discharge to Plains Road East)
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .34
| 02:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .12          .22
     Dep. Storage     (mm)=        1.00         1.30
     Average Slope     (%)=        2.00         2.00
     Length            (m)=       15.00        10.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=      101.31        38.68
                   over (min)        1.00         5.00
     Storage Coeff.  (min)=         .66 (ii)    5.15 (ii)
     Unit Hyd. Tpeak (min)=        1.00         5.00
     Unit Hyd. peak  (cms)=        1.32          .22
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .03          .02          .050 (iii)
     TIME TO PEAK    (hrs)=        1.98         2.03         2.000
     RUNOFF VOLUME    (mm)=       52.05        19.63        31.304
     TOTAL RAINFALL   (mm)=       53.05        53.05        53.053
     RUNOFF COEFFICIENT   =         .98          .37          .590

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

------------------------------------------------------------------------------
005:0005------------------------------------------------------------------------
*#*****************************************************************************|
*#
*#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#        ===============================================
*#
**#****************************************************************************|
*# CATCHMENT 201 - PROPOSED CONDITIONS (Controlled To Plains Road East)
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .33
| 03:201    DT= 1.00 |   Total Imp(%)=   72.00   Dir. Conn.(%)=   72.00
----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .24          .09
     Dep. Storage     (mm)=        1.00         1.30
     Average Slope     (%)=        2.50         2.00
     Length            (m)=       10.00         8.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=      101.31        39.68
                   over (min)        1.00         4.00
     Storage Coeff.  (min)=         .48 (ii)    4.37 (ii)
     Unit Hyd. Tpeak (min)=        1.00         4.00
     Unit Hyd. peak  (cms)=        1.48          .27
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .07          .01          .074 (iii)
     TIME TO PEAK    (hrs)=        1.95         2.02         2.000
     RUNOFF VOLUME    (mm)=       52.05        19.63        42.975
     TOTAL RAINFALL   (mm)=       53.05        53.05        53.053
     RUNOFF COEFFICIENT   =         .98          .37          .810

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

------------------------------------------------------------------------------
005:0006------------------------------------------------------------------------
*# CATCHMENT 202 - PROPOSED CONDITIONS (Uncontrolled To Plains Road East)
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .01
| 04:202    DT= 1.00 |   Total Imp(%)=   68.00   Dir. Conn.(%)=   68.00
----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .01          .00
     Dep. Storage     (mm)=        1.00         1.30
     Average Slope     (%)=        3.00         2.50
     Length            (m)=        5.00         5.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=      101.31        40.66
                   over (min)        1.00         3.00
     Storage Coeff.  (min)=         .30 (ii)    3.02 (ii)
     Unit Hyd. Tpeak (min)=        1.00         3.00
     Unit Hyd. peak  (cms)=        1.64          .37
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .00          .00          .002 (iii)
     TIME TO PEAK    (hrs)=        1.90         2.00         2.000
     RUNOFF VOLUME    (mm)=       52.05        19.63        41.679
     TOTAL RAINFALL   (mm)=       53.05        53.05        53.053
     RUNOFF COEFFICIENT   =         .98          .37          .786

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

------------------------------------------------------------------------------
005:0007------------------------------------------------------------------------
*# ROUTE CATCHMENT 201 THROUGH PUMP CONTROL
*
----------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>03:(201    )   |
| OUT<05:(201    )   |    =========  OUTFLOW STORAGE TABLE  =========
----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
                             .000  .0000E+00    |     .046  .5300E-02
                             .046  .1000E-02    |     .046  .5500E-02
                             .046  .2400E-02    |     .046  .7100E-02
                             .046  .3900E-02    |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >03: (201   )        .33      .074     2.000     42.975
     OUTFLOW<05: (201   )        .33      .046     1.900     42.975
    OVERFLOW<06: (OVF   )        .00      .000      .000       .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   61.781
                    TIME SHIFT OF PEAK FLOW         (min)=    -6.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.2081E-02

------------------------------------------------------------------------------
005:0008------------------------------------------------------------------------
-----------------------
| ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 05:201            .33     .046    1.90  42.98    .000
                      +ID2 06:OVF            .00     .000     .00    .00    .000
                      +ID3 04:202            .01     .002    2.00  41.68    .000
                       ==========================================================
                       SUM 07:Total           .34     .048    2.00  42.94    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
005:0009------------------------------------------------------------------------
* RUN REMAINING DESIGN STORMS (City of Burlington 5 TO 100-YR)
*
------------------------------------------------------------------------------
005:0002------------------------------------------------------------------------
*
  ** END OF RUN :   9

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


```

```
00541>
00542>
00543>
00544> --------------------
00545> | START            |  Project  dir.: T:\projects\25092\SWMHYMO\
00546> --------------------  Rainfall dir.: T:\projects\25092\SWMHYMO\
00547>     TZERO =   .00 hrs on       0
00548>     METOUT=   2 (output = METRIC)
00549>     NRUN  = 010
00550>     NSTORM=   1
00551>               #  1=BUR6_010.stm
00552> ----------------------------------------------------------------------------
00553> 010:0002----------------------------------------------------------------------
00554> *#*************************************************************************|
00555> *#  Project Name: 517 PLAINS ROAD EAST
00556> *#               BURLINGTON, ONTARIO
00557> *#  JOB NUMBER  : 25092
00558> *#       Date   : FEBRUARY 2026
00559> *#    Revised   :
00560> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
00561> *#       File   : 25092.DAT
00562> *#*************************************************************************|
00563> *
00564> ----------------------------------------------------------------------------
00565> 010:0002----------------------------------------------------------------------
00566> *
00567> --------------------
00568> | READ STORM       |    Filename: Burlington 10-yr 6hr CHICAGO      (A=918.
00569> | Ptotal=  61.10 mm|    Comments: Burlington 10-yr 6hr CHICAGO      (A=918.
00570> --------------------
00571>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00572>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00573>                .17   2.714 |   1.67  12.326 |   3.17   6.808 |   4.67   3.472
00574>                .33   2.933 |   1.83  28.176 |   3.33   6.095 |   4.83   3.308
00575>                .50   3.197 |   2.00 116.310 |   3.50   5.532 |   5.00   3.161
00576>                .67   3.523 |   2.17  36.748 |   3.67   5.075 |   5.17   3.027
00577>                .83   3.937 |   2.33  19.967 |   3.83   4.696 |   5.33   2.907
00578>               1.00   4.483 |   2.50  14.001 |   4.00   4.376 |   5.50   2.796
00579>               1.17   5.242 |   2.67  10.921 |   4.17   4.102 |   5.67   2.695
00580>               1.33   6.377 |   2.83   9.030 |   4.33   3.864 |   5.83   2.602
00581>               1.50   8.291 |   3.00   7.743 |   4.50   3.656 |   6.00   2.516
00582>
00583> ----------------------------------------------------------------------------
00584> 010:0003----------------------------------------------------------------------
00585> *
00586> *#*************************************************************************|
00587> *#
00588> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00589> *#        ============================================
00590> *#
00591> **#************************************************************************|
00592> *# CATCHMENT 101 - EXISTING CONDITIONS (Existing discharge to Plains Road East)
00593> ----------------------
00594> | CALIB STANDHYD     |   Area     (ha)=     .34
00595> | 01:101    DT= 1.00 |   Total Imp(%)=   77.00   Dir. Conn.(%)=   77.00
00596> ----------------------
00597>                              IMPERVIOUS    PERVIOUS (i)
00598>      Surface Area     (ha)=        .26          .08
00599>      Dep. Storage     (mm)=       1.00         1.30
00600>      Average Slope     (%)=       2.50         2.00
00601>      Length            (m)=      15.00        10.00
00602>      Mannings n            =       .013         .250
00603>
00604>      Max.eff.Inten.(mm/hr)=     116.31        49.04
00605>                    over (min)        1.00         5.00
00606>      Storage Coeff.  (min)=        .59 (ii)    4.67 (ii)
00607>      Unit Hyd. Tpeak (min)=       1.00         5.00
00608>      Unit Hyd. peak  (cms)=       1.39          .24
00609>                                                          *TOTALS*
00610>      PEAK FLOW       (cms)=        .08          .01          .092 (iii)
00611>      TIME TO PEAK    (hrs)=       1.98         2.03         2.000
00612>      RUNOFF VOLUME    (mm)=      60.10        24.75        51.971
00613>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
00614>      RUNOFF COEFFICIENT   =        .98          .41          .851
00615>
00616>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00617>            CN* =  75.0    Ia = Dep. Storage  (Above)
00618>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00619>            THAN THE STORAGE COEFFICIENT.
00620>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00621>
00622> ----------------------------------------------------------------------------
00623> 010:0004----------------------------------------------------------------------
00624> **#************************************************************************|
00625> *# ALLOWABLE - EXISTING CONDITIONS (Allowable discharge to Plains Road East)
00626> ----------------------
00627> | CALIB STANDHYD     |   Area     (ha)=     .34
00628> | 02:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
00629> ----------------------
00630>                              IMPERVIOUS    PERVIOUS (i)
00631>      Surface Area     (ha)=        .12          .22
00632>      Dep. Storage     (mm)=       1.00         1.30
00633>      Average Slope     (%)=       2.00         2.00
00634>      Length            (m)=      15.00        10.00
00635>      Mannings n            =       .013         .250
00636>
00637>      Max.eff.Inten.(mm/hr)=     116.31        49.04
00638>                    over (min)        1.00         5.00
00639>      Storage Coeff.  (min)=        .63 (ii)    4.71 (ii)
00640>      Unit Hyd. Tpeak (min)=       1.00         5.00
00641>      Unit Hyd. peak  (cms)=       1.36          .24
00642>                                                          *TOTALS*
00643>      PEAK FLOW       (cms)=        .04          .02          .061 (iii)
00644>      TIME TO PEAK    (hrs)=       1.98         2.03         2.000
00645>      RUNOFF VOLUME    (mm)=      60.10        24.75        37.479
00646>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
00647>      RUNOFF COEFFICIENT   =        .98          .41          .613
00648>
00649>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00650>            CN* =  75.0    Ia = Dep. Storage  (Above)
00651>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00652>            THAN THE STORAGE COEFFICIENT.
00653>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00654>
00655> ----------------------------------------------------------------------------
00656> 010:0005----------------------------------------------------------------------
00657> *#*************************************************************************|
00658> *#
00659> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00660> *#        =============================================
00661> *#
00662> **#************************************************************************|
00663> *# CATCHMENT 201 - PROPOSED CONDITIONS (Controlled To Plains Road East)
00664> ----------------------
00665> | CALIB STANDHYD     |   Area     (ha)=     .33
00666> | 03:201    DT= 1.00 |   Total Imp(%)=   72.00   Dir. Conn.(%)=   72.00
00667> ----------------------
00668>                              IMPERVIOUS    PERVIOUS (i)
00669>      Surface Area     (ha)=        .24          .09
00670>      Dep. Storage     (mm)=       1.00         1.30
00671>      Average Slope     (%)=       2.50         2.00
00672>      Length            (m)=      10.00         8.00
00673>      Mannings n            =       .013         .250
00674>
00675>      Max.eff.Inten.(mm/hr)=     116.31        50.25
00676>                    over (min)        1.00         4.00
00677>      Storage Coeff.  (min)=        .46 (ii)    4.00 (ii)
00678>      Unit Hyd. Tpeak (min)=       1.00         4.00
00679>      Unit Hyd. peak  (cms)=       1.51          .28
00680>                                                          *TOTALS*
00681>      PEAK FLOW       (cms)=        .08          .01          .087 (iii)
00682>      TIME TO PEAK    (hrs)=       1.98         2.02         2.000
00683>      RUNOFF VOLUME    (mm)=      60.10        24.75        50.204
00684>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
00685>      RUNOFF COEFFICIENT   =        .98          .41          .822
00686>
00687>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00688>            CN* =  75.0    Ia = Dep. Storage  (Above)
00689>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00690>            THAN THE STORAGE COEFFICIENT.
00691>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00692>
00693> ----------------------------------------------------------------------------
00694> 010:0006----------------------------------------------------------------------
00695> *# CATCHMENT 202 - PROPOSED CONDITIONS (Uncontrolled To Plains Road East)
00696> ----------------------
00697> | CALIB STANDHYD     |   Area     (ha)=     .01
00698> | 04:202    DT= 1.00 |   Total Imp(%)=   68.00   Dir. Conn.(%)=   68.00
00699> ----------------------
00700>                              IMPERVIOUS    PERVIOUS (i)
00701>      Surface Area     (ha)=        .01          .00
00702>      Dep. Storage     (mm)=       1.00         1.30
00703>      Average Slope     (%)=       3.00         2.50
00704>      Length            (m)=       5.00         5.00
00705>      Mannings n            =       .013         .250
00706>
00707>      Max.eff.Inten.(mm/hr)=     116.31        51.41
00708>                    over (min)        1.00         3.00
00709>      Storage Coeff.  (min)=        .29 (ii)    2.76 (ii)
00710>      Unit Hyd. Tpeak (min)=       1.00         3.00
00711>      Unit Hyd. peak  (cms)=       1.65          .40
00712>                                                          *TOTALS*
00713>      PEAK FLOW       (cms)=        .00          .00          .003 (iii)
00714>      TIME TO PEAK    (hrs)=       1.90         2.00         2.000
00715>      RUNOFF VOLUME    (mm)=      60.10        24.75        48.790
00716>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
00717>      RUNOFF COEFFICIENT   =        .98          .41          .799
00718>
00719>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00720>            CN* =  75.0    Ia = Dep. Storage  (Above)
00721>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00722>            THAN THE STORAGE COEFFICIENT.
00723>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00724>
00725> ----------------------------------------------------------------------------
00726> 010:0007----------------------------------------------------------------------
00727> *# ROUTE CATCHMENT 201 THROUGH PUMP CONTROL
00728> *
00729> ----------------------
00730> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
00731> |  IN>03:(201   )    |
00732> | OUT<05:(201   )    |    =========  OUTFLOW STORAGE TABLE  =========
00733> ----------------------    OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
00734>                             (cms)     (ha.m.)   |    (cms)     (ha.m.)
00735>                             .000  .0000E+00     |     .046  .5300E-02
00736>                             .046  .1000E-02     |     .046  .5500E-02
00737>                             .046  .2400E-02     |     .046  .7100E-02
00738>                             .046  .3900E-02     |     .000  .0000E+00
00739>
00740>      ROUTING RESULTS             AREA     QPEAK     TPEAK        R.V.
00741>      --------------------        (ha)     (cms)     (hrs)        (mm)
00742>      INFLOW >03: (201   )         .33      .087     2.000      50.204
00743>      OUTFLOW<05: (201   )         .33      .046     1.883      50.204
00744>     OVERFLOW<06: (OVF   )         .00      .000      .000       .000
00745>
00746>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00747>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
00748>                     PERCENTAGE OF TIME OVERFLOWING    (%)=       .00
00749>
00750>
00751>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   53.025
00752>                     TIME SHIFT OF PEAK FLOW          (min)=    -7.00
00753>                     MAXIMUM  STORAGE   USED       (ha.m.)=.2738E-02
00754>
00755> ----------------------------------------------------------------------------
00756> 010:0008----------------------------------------------------------------------
00757> ------------------------
00758> | ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00759> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00760>                        ID1 05:201          .33     .046    1.88  50.20    .000
00761>                       +ID2 06:OVF          .00     .000     .00    .00    .000
00762>                       +ID3 04:202          .01     .003    2.00  48.79    .000
00763>                        ========================================================
00764>                        SUM 07:Total         .34     .049    2.00  50.16    .000
00765>
00766>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00767>
00768> ----------------------------------------------------------------------------
00769> 010:0009----------------------------------------------------------------------
00770> * RUN REMAINING DESIGN STORMS (City of Burlington 5 TO 100-YR)
00771> *
00772> ----------------------------------------------------------------------------
00773> 010:0002----------------------------------------------------------------------
00774> *
00775> ----------------------------------------------------------------------------
00776> 010:0002----------------------------------------------------------------------
00777> *
00778>   ** END OF RUN :  24
00779>
00780> ****************************************************************************
00781>
00782>
00783>
00784>
00785>
00786> --------------------
00787> | START            |  Project  dir.: T:\projects\25092\SWMHYMO\
00788> --------------------  Rainfall dir.: T:\projects\25092\SWMHYMO\
00789>     TZERO =   .00 hrs on       0
00790>     METOUT=   2 (output = METRIC)
00791>     NRUN  = 025
00792>     NSTORM=   1
00793>               #  1=BUR6_025.stm
00794> ----------------------------------------------------------------------------
00795> 025:0002----------------------------------------------------------------------
00796> *#*************************************************************************|
00797> *#  Project Name: 517 PLAINS ROAD EAST
00798> *#               BURLINGTON, ONTARIO
00799> *#  JOB NUMBER  : 25092
00800> *#       Date   : FEBRUARY 2026
00801> *#    Revised   :
00802> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
00803> *#       File   : 25092.DAT
00804> *#*************************************************************************|
00805> *
00806> ----------------------------------------------------------------------------
00807> 025:0002----------------------------------------------------------------------
00808> *
00809> --------------------
00810> | READ STORM       |    Filename: Burlington 25-yr 6hr CHICAGO      (A=106
```

```
00811> | Ptotal=  71.35 mm|    Comments: Burlington 25-yr 6hr CHICAGO      (A=106
00812> --------------------
00813>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00814>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00815>                .17   3.182 |   1.67  14.410 |   3.17   7.968 |   4.67   4.068
00816>                .33   3.437 |   1.83  32.881 |   3.33   7.135 |   4.83   3.876
00817>                .50   3.746 |   2.00 135.380 |   3.50   6.477 |   5.00   3.704
00818>                .67   4.128 |   2.17  42.866 |   3.67   5.943 |   5.17   3.548
00819>                .83   4.612 |   2.33  23.321 |   3.83   5.499 |   5.33   3.407
00820>               1.00   5.251 |   2.50  16.365 |   4.00   5.125 |   5.50   3.278
00821>               1.17   6.138 |   2.67  12.771 |   4.17   4.805 |   5.67   3.160
00822>               1.33   7.465 |   2.83  10.563 |   4.33   4.527 |   5.83   3.051
00823>               1.50   9.700 |   3.00   9.061 |   4.50   4.284 |   6.00   2.950
00824>
00825> ------------------------------------------------------------------------------
00826> 025:0003----------------------------------------------------------------------
00827> *
00828> *#*************************************************************************|
00829> *#
00830> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00831> *#        ==============================================
00832> *#
00833> **#************************************************************************|
00834> *# CATCHMENT 101 - EXISTING CONDITIONS (Existing discharge to Plains Road East)
00835> ----------------------
00836> | CALIB STANDHYD     |   Area    (ha)=     .34
00837> | 01:101    DT= 1.00 |   Total Imp(%)=   77.00   Dir. Conn.(%)=   77.00
00838> ----------------------
00839>                                IMPERVIOUS    PERVIOUS (i)
00840>      Surface Area     (ha)=        .26          .08
00841>      Dep. Storage     (mm)=       1.00         1.30
00842>      Average Slope     (%)=       2.50         2.00
00843>      Length            (m)=      15.00        10.00
00844>      Mannings n             =       .013         .250
00845>
00846>      Max.eff.Inten.(mm/hr)=     135.38        64.67
00847>                    over (min)        1.00         4.00
00848>      Storage Coeff.  (min)=        .55 (ii)     4.21 (ii)
00849>      Unit Hyd. Tpeak (min)=       1.00         4.00
00850>      Unit Hyd. peak  (cms)=       1.42          .27
00851>                                                          *TOTALS*
00852>      PEAK FLOW       (cms)=        .10          .01          .109 (iii)
00853>      TIME TO PEAK    (hrs)=       1.97         2.02         2.000
00854>      RUNOFF VOLUME    (mm)=      70.35        31.71        61.461
00855>      TOTAL RAINFALL   (mm)=      71.35        71.35        71.347
00856>      RUNOFF COEFFICIENT   =        .99          .44          .861
00857>
00858>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00859>            CN* =  75.0    Ia = Dep. Storage  (Above)
00860>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00861>            THAN THE STORAGE COEFFICIENT.
00862>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00863>
00864> ------------------------------------------------------------------------------
00865> 025:0004----------------------------------------------------------------------
00866> **#************************************************************************|
00867> *# ALLOWABLE - EXISTING CONDITIONS (Allowable discharge to Plains Road East)
00868> ----------------------
00869> | CALIB STANDHYD     |   Area    (ha)=     .34
00870> | 02:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
00871> ----------------------
00872>                                IMPERVIOUS    PERVIOUS (i)
00873>      Surface Area     (ha)=        .12          .22
00874>      Dep. Storage     (mm)=       1.00         1.30
00875>      Average Slope     (%)=       2.00         2.00
00876>      Length            (m)=      15.00        10.00
00877>      Mannings n             =       .013         .250
00878>
00879>      Max.eff.Inten.(mm/hr)=     135.38        64.67
00880>                    over (min)        1.00         4.00
00881>      Storage Coeff.  (min)=        .59 (ii)     4.25 (ii)
00882>      Unit Hyd. Tpeak (min)=       1.00         4.00
00883>      Unit Hyd. peak  (cms)=       1.39          .27
00884>                                                          *TOTALS*
00885>      PEAK FLOW       (cms)=        .05          .03          .076 (iii)
00886>      TIME TO PEAK    (hrs)=       1.97         2.02         2.000
00887>      RUNOFF VOLUME    (mm)=      70.35        31.71        45.622
00888>      TOTAL RAINFALL   (mm)=      71.35        71.35        71.347
00889>      RUNOFF COEFFICIENT   =        .99          .44          .639
00890>
00891>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00892>            CN* =  75.0    Ia = Dep. Storage  (Above)
00893>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00894>            THAN THE STORAGE COEFFICIENT.
00895>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00896>
00897> ------------------------------------------------------------------------------
00898> 025:0005----------------------------------------------------------------------
00899> *#*************************************************************************|
00900> *#
00901> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00902> *#        ===============================================
00903> *#
00904> **#************************************************************************|
00905> *# CATCHMENT 201 - PROPOSED CONDITIONS (Controlled To Plains Road East)
00906> ----------------------
00907> | CALIB STANDHYD     |   Area    (ha)=     .33
00908> | 03:201    DT= 1.00 |   Total Imp(%)=   72.00   Dir. Conn.(%)=   72.00
00909> ----------------------
00910>                                IMPERVIOUS    PERVIOUS (i)
00911>      Surface Area     (ha)=        .24          .09
00912>      Dep. Storage     (mm)=       1.00         1.30
00913>      Average Slope     (%)=       2.50         2.00
00914>      Length            (m)=      10.00         8.00
00915>      Mannings n             =       .013         .250
00916>
00917>      Max.eff.Inten.(mm/hr)=     135.38        64.67
00918>                    over (min)        1.00         4.00
00919>      Storage Coeff.  (min)=        .43 (ii)     3.63 (ii)
00920>      Unit Hyd. Tpeak (min)=       1.00         4.00
00921>      Unit Hyd. peak  (cms)=       1.53          .30
00922>                                                          *TOTALS*
00923>      PEAK FLOW       (cms)=        .09          .01          .103 (iii)
00924>      TIME TO PEAK    (hrs)=       1.95         2.02         2.000
00925>      RUNOFF VOLUME    (mm)=      70.35        31.71        59.529
00926>      TOTAL RAINFALL   (mm)=      71.35        71.35        71.347
00927>      RUNOFF COEFFICIENT   =        .99          .44          .834
00928>
00929>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00930>            CN* =  75.0    Ia = Dep. Storage  (Above)
00931>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00932>            THAN THE STORAGE COEFFICIENT.
00933>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00934>
00935> ------------------------------------------------------------------------------
00936> 025:0006----------------------------------------------------------------------
00937> *# CATCHMENT 202 - PROPOSED CONDITIONS (Uncontrolled To Plains Road East)
00938> ----------------------
00939> | CALIB STANDHYD     |   Area    (ha)=     .01
00940> | 04:202    DT= 1.00 |   Total Imp(%)=   68.00   Dir. Conn.(%)=   68.00
00941> ----------------------
00942>                                IMPERVIOUS    PERVIOUS (i)
00943>      Surface Area     (ha)=        .01          .00
00944>      Dep. Storage     (mm)=       1.00         1.30
00945>      Average Slope     (%)=       3.00         2.50
00946>      Length            (m)=       5.00         5.00
00947>      Mannings n             =       .013         .250
00948>
00949>      Max.eff.Inten.(mm/hr)=     135.38        67.40
00950>                    over (min)        1.00         2.00
00951>      Storage Coeff.  (min)=        .27 (ii)     2.49 (ii)
00952>      Unit Hyd. Tpeak (min)=       1.00         2.00
00953>      Unit Hyd. peak  (cms)=       1.66          .48
00954>                                                          *TOTALS*
00955>      PEAK FLOW       (cms)=        .00          .00          .003 (iii)
00956>      TIME TO PEAK    (hrs)=       1.90         2.00         2.000
00957>      RUNOFF VOLUME    (mm)=      70.35        31.71        57.984
00958>      TOTAL RAINFALL   (mm)=      71.35        71.35        71.347
00959>      RUNOFF COEFFICIENT   =        .99          .44          .813
00960>
00961>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00962>            CN* =  75.0    Ia = Dep. Storage  (Above)
00963>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00964>            THAN THE STORAGE COEFFICIENT.
00965>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00966>
00967> ------------------------------------------------------------------------------
00968> 025:0007----------------------------------------------------------------------
00969> *# ROUTE CATCHMENT 201 THROUGH PUMP CONTROL
00970> *
00971> ----------------------
00972> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
00973> |  IN>03:(201    )   |
00974> | OUT<05:(201    )   |    =========  OUTFLOW STORAGE TABLE  =========
00975> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00976>                             (cms)     (ha.m.)   |    (cms)     (ha.m.)
00977>                              .000  .0000E+00   |     .046  .5300E-02
00978>                              .046  .1000E-02   |     .046  .5500E-02
00979>                              .046  .2400E-02   |     .046  .7100E-02
00980>                              .046  .3900E-02   |     .000  .0000E+00
00981>
00982>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00983>      ---------------------       (ha)     (cms)     (hrs)       (mm)
00984>      INFLOW >03: (201    )        .33      .103     2.000     59.529
00985>      OUTFLOW<05: (201    )        .33      .046     1.883     59.529
00986>     OVERFLOW<06: (OVF    )        .00      .000      .000      .000
00987>
00988>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00989>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00990>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00991>
00992>
00993>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   44.790
00994>                     TIME SHIFT OF PEAK FLOW         (min)=    -7.00
00995>                     MAXIMUM  STORAGE   USED       (ha.m.)=.3638E-02
00996>
00997> ------------------------------------------------------------------------------
00998> 025:0008----------------------------------------------------------------------
00999> ------------------------
01000> | ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01001> ------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
01002>                          ID1 05:201         .33      .046    1.88  59.53    .000
01003>                         +ID2 06:OVF         .00      .000     .00    .00    .000
01004>                         +ID3 04:202         .01      .003    2.00  57.98    .000
01005>                          ========================================================
01006>                          SUM 07:Total       .34      .049    2.00  59.48    .000
01007>
01008>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01009>
01010> ------------------------------------------------------------------------------
01011> 025:0009----------------------------------------------------------------------
01012> * RUN REMAINING DESIGN STORMS (City of Burlington 5 TO 100-YR)
01013> *
01014> ------------------------------------------------------------------------------
01015> 025:0002----------------------------------------------------------------------
01016> *
01017> ------------------------------------------------------------------------------
01018> 025:0002----------------------------------------------------------------------
01019> *
01020> ------------------------------------------------------------------------------
01021> 025:0002----------------------------------------------------------------------
01022> *
01023>   ** END OF RUN :  49
01024>
01025> ************************************************************************
01026>
01027>
01028>
01029>
01030>
01031> ----------------------
01032> | START            |  Project  dir.: T:\projects\25092\SWMHYMO\
01033> ----------------------  Rainfall dir.: T:\projects\25092\SWMHYMO\
01034>     TZERO =   .00 hrs on        0
01035>     METOUT=   2 (output = METRIC)
01036>     NRUN  = 050
01037>     NSTORM=   1
01038>               #  1=BUR6_050.stm
01039> ------------------------------------------------------------------------------
01040> 050:0002----------------------------------------------------------------------
01041> *#*************************************************************************|
01042> *#  Project Name: 517 PLAINS ROAD EAST
01043> *#               BURLINGTON, ONTARIO
01044> *#  JOB NUMBER  : 25092
01045> *#       Date   : FEBRUARY 2026
01046> *#    Revised   :
01047> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
01048> *#       File   : 25092.DAT
01049> *#*************************************************************************|
01050> *
01051> ------------------------------------------------------------------------------
01052> 050:0002----------------------------------------------------------------------
01053> *
01054> ----------------------
01055> | READ STORM        |    Filename: Burlington 50-yr 6hr CHICAGO      (A=1172
01056> | Ptotal=  78.93 mm|    Comments: Burlington 50-yr 6hr CHICAGO      (A=1172
01057> ----------------------
01058>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
01059>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
01060>                .17   3.533 |   1.67  15.961 |   3.17   8.836 |   4.67   4.516
01061>                .33   3.817 |   1.83  36.356 |   3.33   7.913 |   4.83   4.304
01062>                .50   4.160 |   2.00 149.296 |   3.50   7.185 |   5.00   4.113
01063>                .67   4.582 |   2.17  47.374 |   3.67   6.593 |   5.17   3.940
01064>                .83   5.119 |   2.33  25.806 |   3.83   6.102 |   5.33   3.783
01065>               1.00   5.827 |   2.50  18.121 |   4.00   5.688 |   5.50   3.640
01066>               1.17   6.809 |   2.67  14.149 |   4.17   5.333 |   5.67   3.509
01067>               1.33   8.278 |   2.83  11.707 |   4.33   5.025 |   5.83   3.388
01068>               1.50  10.753 |   3.00  10.045 |   4.50   4.755 |   6.00   3.277
01069>
01070> ------------------------------------------------------------------------------
01071> 050:0003----------------------------------------------------------------------
01072> *
01073> *#*************************************************************************|
01074> *#
01075> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
01076> *#        ==============================================
01077> *#
01078> **#************************************************************************|
01079> *# CATCHMENT 101 - EXISTING CONDITIONS (Existing discharge to Plains Road East)
01080> ----------------------
```

```
| CALIB STANDHYD     |   Area    (ha)=     .34
| 01:101    DT= 1.00 |   Total Imp(%)=   77.00   Dir. Conn.(%)=   77.00
---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .26          .08
     Dep. Storage     (mm)=      1.00         1.30
     Average Slope     (%)=      2.50         2.00
     Length            (m)=     15.00        10.00
     Mannings n             =     .013         .250

     Max.eff.Inten.(mm/hr)=    149.30        75.84
                  over (min)      1.00         4.00
     Storage Coeff.  (min)=       .53 (ii)    3.96 (ii)
     Unit Hyd. Tpeak (min)=      1.00         4.00
     Unit Hyd. peak  (cms)=      1.44          .28
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .11          .01          .122 (iii)
     TIME TO PEAK    (hrs)=      1.97         2.02         2.000
     RUNOFF VOLUME    (mm)=     77.93        37.13        68.548
     TOTAL RAINFALL   (mm)=     78.93        78.93        78.932
     RUNOFF COEFFICIENT   =       .99          .47          .868

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

-------------------------------------------------------------------------------
050:0004-----------------------------------------------------------------------
**#*************************************************************************|
*# ALLOWABLE - EXISTING CONDITIONS (Allowable discharge to Plains Road East)
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .34
| 02:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .12          .22
     Dep. Storage     (mm)=      1.00         1.30
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     15.00        10.00
     Mannings n             =     .013         .250

     Max.eff.Inten.(mm/hr)=    149.30        75.84
                  over (min)      1.00         4.00
     Storage Coeff.  (min)=       .57 (ii)    4.00 (ii)
     Unit Hyd. Tpeak (min)=      1.00         4.00
     Unit Hyd. peak  (cms)=      1.41          .28
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .05          .04          .087 (iii)
     TIME TO PEAK    (hrs)=      1.97         2.02         2.000
     RUNOFF VOLUME    (mm)=     77.93        37.13        51.821
     TOTAL RAINFALL   (mm)=     78.93        78.93        78.932
     RUNOFF COEFFICIENT   =       .99          .47          .657

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

-------------------------------------------------------------------------------
050:0005-----------------------------------------------------------------------
*#*************************************************************************|
*#
*#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#        ===============================================
*#
**#*************************************************************************|
*# CATCHMENT 201 - PROPOSED CONDITIONS (Controlled To Plains Road East)
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .33
| 03:201    DT= 1.00 |   Total Imp(%)=   72.00   Dir. Conn.(%)=   72.00
---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .24          .09
     Dep. Storage     (mm)=      1.00         1.30
     Average Slope     (%)=      2.50         2.00
     Length            (m)=     10.00         8.00
     Mannings n             =     .013         .250

     Max.eff.Inten.(mm/hr)=    149.30        77.38
                  over (min)      1.00         3.00
     Storage Coeff.  (min)=       .42 (ii)    3.39 (ii)
     Unit Hyd. Tpeak (min)=      1.00         3.00
     Unit Hyd. peak  (cms)=      1.55          .35
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .10          .02          .115 (iii)
     TIME TO PEAK    (hrs)=      1.95         2.00         2.000
     RUNOFF VOLUME    (mm)=     77.93        37.13        66.508
     TOTAL RAINFALL   (mm)=     78.93        78.93        78.932
     RUNOFF COEFFICIENT   =       .99          .47          .843

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

-------------------------------------------------------------------------------
050:0006-----------------------------------------------------------------------
*# CATCHMENT 202 - PROPOSED CONDITIONS (Uncontrolled To Plains Road East)
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .01
| 04:202    DT= 1.00 |   Total Imp(%)=   68.00   Dir. Conn.(%)=   68.00
---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .01          .00
     Dep. Storage     (mm)=      1.00         1.30
     Average Slope     (%)=      3.00         2.50
     Length            (m)=      5.00         5.00
     Mannings n             =     .013         .250

     Max.eff.Inten.(mm/hr)=    149.30        78.86
                  over (min)      1.00         2.00
     Storage Coeff.  (min)=       .26 (ii)    2.34 (ii)
     Unit Hyd. Tpeak (min)=      1.00         2.00
     Unit Hyd. peak  (cms)=      1.66          .50
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .00          .00          .003 (iii)
     TIME TO PEAK    (hrs)=      1.90         2.00         2.000
     RUNOFF VOLUME    (mm)=     77.93        37.13        64.877
     TOTAL RAINFALL   (mm)=     78.93        78.93        78.932
     RUNOFF COEFFICIENT   =       .99          .47          .822

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

-------------------------------------------------------------------------------
050:0007-----------------------------------------------------------------------
*# ROUTE CATCHMENT 201 THROUGH PUMP CONTROL
*
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>03:(201    )   |
| OUT<05:(201    )   |    =========  OUTFLOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)     (ha.m.)
                            .000  .0000E+00    |     .046  .5300E-02
                            .046  .1000E-02    |     .046  .5500E-02
                            .046  .2400E-02    |     .046  .7100E-02
                            .046  .3900E-02    |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >03: (201   )        .33      .115     2.000      66.508
     OUTFLOW<05: (201   )        .33      .046     1.867      66.508
    OVERFLOW<06: (OVF   )        .00      .000      .000       .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=       .00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   39.926
                    TIME SHIFT OF PEAK FLOW       (min)=    -8.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.4412E-02

-------------------------------------------------------------------------------
050:0008-----------------------------------------------------------------------
---------------------------
| ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
                         ID1 05:201          .33     .046    1.87  66.51    .000
                        +ID2 06:OVF          .00     .000     .00    .00    .000
                        +ID3 04:202          .01     .003    2.00  64.88    .000
                         ==========================================================
                         SUM 07:Total        .34     .049    2.00  66.46    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
050:0009-----------------------------------------------------------------------
* RUN REMAINING DESIGN STORMS (City of Burlington 5 TO 100-YR)
*
-------------------------------------------------------------------------------
050:0002-----------------------------------------------------------------------
*
-------------------------------------------------------------------------------
050:0002-----------------------------------------------------------------------
*
-------------------------------------------------------------------------------
050:0002-----------------------------------------------------------------------
*
-------------------------------------------------------------------------------
050:0002-----------------------------------------------------------------------
*
  ** END OF RUN :  99
*************************************************************************


---------------------
| START            |  Project  dir.: T:\projects\25092\SWMHYMO\
---------------------  Rainfall dir.: T:\projects\25092\SWMHYMO\
    TZERO =   .00 hrs on       0
    METOUT=  2 (output = METRIC)
    NRUN  = 100
    NSTORM=   1
              #  1=BUR6_100.stm
-------------------------------------------------------------------------------
100:0002-----------------------------------------------------------------------
*#*************************************************************************|
*#  Project Name: 517 PLAINS ROAD EAST
*#               BURLINGTON, ONTARIO
*#  JOB NUMBER  : 25092
*#       Date   : FEBRUARY 2026
*#    Revised   :
*#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
*#       File   : 25092.DAT
*#*************************************************************************|
*
-------------------------------------------------------------------------------
100:0002-----------------------------------------------------------------------
*
---------------------
| READ STORM       |    Filename: Burlington 100-yr 6hr CHICAGO        (A=
| Ptotal=  86.27 mm|    Comments: Burlington 100-yr 6hr CHICAGO        (A=
---------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
              hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              .17   3.862 |   1.67  17.445 |   3.17   9.657 |   4.67   4.936
              .33   4.172 |   1.83  39.736 |   3.33   8.649 |   4.83   4.704
              .50   4.546 |   2.00 163.177 |   3.50   7.853 |   5.00   4.495
              .67   5.008 |   2.17  51.779 |   3.67   7.206 |   5.17   4.306
              .83   5.595 |   2.33  28.205 |   3.83   6.670 |   5.33   4.135
             1.00   6.369 |   2.50  19.806 |   4.00   6.217 |   5.50   3.979
             1.17   7.443 |   2.67  15.465 |   4.17   5.829 |   5.67   3.835
             1.33   9.048 |   2.83  12.795 |   4.33   5.492 |   5.83   3.703
             1.50  11.752 |   3.00  10.979 |   4.50   5.197 |   6.00   3.581

-------------------------------------------------------------------------------
100:0003-----------------------------------------------------------------------
*
*#*************************************************************************|
*#
*#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#        ==============================================
*#
**#*************************************************************************|
*# CATCHMENT 101 - EXISTING CONDITIONS (Existing discharge to Plains Road East)
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .34
| 01:101    DT= 1.00 |   Total Imp(%)=   77.00   Dir. Conn.(%)=   77.00
---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .26          .08
     Dep. Storage     (mm)=      1.00         1.30
     Average Slope     (%)=      2.50         2.00
     Length            (m)=     15.00        10.00
     Mannings n             =     .013         .250

     Max.eff.Inten.(mm/hr)=    163.18        87.31
                  over (min)      1.00         4.00
     Storage Coeff.  (min)=       .51 (ii)    3.75 (ii)
     Unit Hyd. Tpeak (min)=      1.00         4.00
     Unit Hyd. peak  (cms)=      1.46          .29
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .12          .02          .134 (iii)
     TIME TO PEAK    (hrs)=      1.97         2.02         2.000
     RUNOFF VOLUME    (mm)=     85.27        42.56        75.448
     TOTAL RAINFALL   (mm)=     86.27        86.27        86.271
     RUNOFF COEFFICIENT   =       .99          .49          .875
```

```
01351>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01352>            CN* =  75.0    Ia = Dep. Storage  (Above)
01353>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01354>            THAN THE STORAGE COEFFICIENT.
01355>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01356>
01357> ---------------------------------------------------------------------------
01358> 100:0004-----------------------------------------------------------------------
01359> **#*************************************************************************|
01360> *# ALLOWABLE - EXISTING CONDITIONS (Allowable discharge to Plains Road East)
01361> ---------------------
01362> | CALIB STANDHYD     |   Area    (ha)=     .34
01363> | 02:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
01364> ---------------------
01365>                              IMPERVIOUS    PERVIOUS (i)
01366>      Surface Area     (ha)=        .12          .22
01367>      Dep. Storage     (mm)=       1.00         1.30
01368>      Average Slope     (%)=       2.00         2.00
01369>      Length            (m)=      15.00        10.00
01370>      Mannings n            =       .013         .250
01371>
01372>      Max.eff.Inten.(mm/hr)=     163.18        87.31
01373>                  over (min)        1.00         4.00
01374>      Storage Coeff.  (min)=        .55 (ii)    3.79 (ii)
01375>      Unit Hyd. Tpeak (min)=       1.00         4.00
01376>      Unit Hyd. peak  (cms)=       1.43          .29
01377>                                                          *TOTALS*
01378>      PEAK FLOW       (cms)=        .06          .04          .098 (iii)
01379>      TIME TO PEAK    (hrs)=       1.97         2.02         2.000
01380>      RUNOFF VOLUME    (mm)=      85.27        42.56        57.937
01381>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
01382>      RUNOFF COEFFICIENT   =        .99          .49          .672
01383>
01384>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01385>            CN* =  75.0    Ia = Dep. Storage  (Above)
01386>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01387>            THAN THE STORAGE COEFFICIENT.
01388>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01389>
01390> ---------------------------------------------------------------------------
01391> 100:0005-----------------------------------------------------------------------
01392> *#*************************************************************************|
01393> *#
01394> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
01395> *#        ===============================================
01396> *#
01397> **#************************************************************************|
01398> *# CATCHMENT 201 - PROPOSED CONDITIONS (Controlled To Plains Road East)
01399> ---------------------
01400> | CALIB STANDHYD     |   Area    (ha)=     .33
01401> | 03:201    DT= 1.00 |   Total Imp(%)=   72.00   Dir. Conn.(%)=   72.00
01402> ---------------------
01403>                              IMPERVIOUS    PERVIOUS (i)
01404>      Surface Area     (ha)=        .24          .09
01405>      Dep. Storage     (mm)=       1.00         1.30
01406>      Average Slope     (%)=       2.50         2.00
01407>      Length            (m)=      10.00         8.00
01408>      Mannings n            =       .013         .250
01409>
01410>      Max.eff.Inten.(mm/hr)=     163.18        89.00
01411>                  over (min)        1.00         3.00
01412>      Storage Coeff.  (min)=        .40 (ii)    3.22 (ii)
01413>      Unit Hyd. Tpeak (min)=       1.00         3.00
01414>      Unit Hyd. peak  (cms)=       1.56          .36
01415>                                                          *TOTALS*
01416>      PEAK FLOW       (cms)=        .11          .02          .127 (iii)
01417>      TIME TO PEAK    (hrs)=       1.95         2.00         2.000
01418>      RUNOFF VOLUME    (mm)=      85.27        42.56        73.312
01419>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
01420>      RUNOFF COEFFICIENT   =        .99          .49          .850
01421>
01422>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01423>            CN* =  75.0    Ia = Dep. Storage  (Above)
01424>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01425>            THAN THE STORAGE COEFFICIENT.
01426>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01427>
01428> ---------------------------------------------------------------------------
01429> 100:0006-----------------------------------------------------------------------
01430> *# CATCHMENT 202 - PROPOSED CONDITIONS (Uncontrolled To Plains Road East)
01431> ---------------------
01432> | CALIB STANDHYD     |   Area    (ha)=     .01
01433> | 04:202    DT= 1.00 |   Total Imp(%)=   68.00   Dir. Conn.(%)=   68.00
01434> ---------------------
01435>                              IMPERVIOUS    PERVIOUS (i)
01436>      Surface Area     (ha)=        .01          .00
01437>      Dep. Storage     (mm)=       1.00         1.30
01438>      Average Slope     (%)=       3.00         2.50
01439>      Length            (m)=       5.00         5.00
01440>      Mannings n            =       .013         .250
01441>
01442>      Max.eff.Inten.(mm/hr)=     163.18        90.63
01443>                  over (min)        1.00         2.00
01444>      Storage Coeff.  (min)=        .25 (ii)    2.22 (ii)
01445>      Unit Hyd. Tpeak (min)=       1.00         2.00
01446>      Unit Hyd. peak  (cms)=       1.67          .52
01447>                                                          *TOTALS*
01448>      PEAK FLOW       (cms)=        .00          .00          .004 (iii)
01449>      TIME TO PEAK    (hrs)=       1.90         2.00         2.000
01450>      RUNOFF VOLUME    (mm)=      85.27        42.56        71.604
01451>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
01452>      RUNOFF COEFFICIENT   =        .99          .49          .830
01453>
01454>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01455>            CN* =  75.0    Ia = Dep. Storage  (Above)
01456>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01457>            THAN THE STORAGE COEFFICIENT.
01458>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01459>
01460> ---------------------------------------------------------------------------
01461> 100:0007-----------------------------------------------------------------------
01462> *# ROUTE CATCHMENT 201 THROUGH PUMP CONTROL
01463> *
01464> ---------------------
01465> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
01466> |  IN>03:(201   )    |
01467> | OUT<05:(201   )    |    =========  OUTLFOW STORAGE TABLE  =========
01468> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
01469>                             (cms)     (ha.m.)   |    (cms)    (ha.m.)
01470>                              .000  .0000E+00   |     .046  .5300E-02
01471>                              .046  .1000E-02   |     .046  .5500E-02
01472>                              .046  .2400E-02   |     .046  .7100E-02
01473>                              .046  .3900E-02   |     .000  .0000E+00
01474>
01475>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
01476>      ---------------           (ha)     (cms)     (hrs)       (mm)
01477>      INFLOW >03: (201   )        .33       .127     2.000     73.312
01478>      OUTFLOW<05: (201   )        .33       .046     1.867     73.312
01479>     OVERFLOW<06: (OVF   )        .00       .000      .000       .000
01480>
01481>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
01482>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
01483>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
01484>
01485>
01486>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   36.160
01487>                    TIME SHIFT OF PEAK FLOW          (min)=    -8.00
01488>                    MAXIMUM  STORAGE   USED       (ha.m.)=.5208E-02
01489>
01490> ---------------------------------------------------------------------------
01491> 100:0008-----------------------------------------------------------------------
01492> ------------------------
01493> | ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01494> ------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
01495>                         ID1 05:201          .33     .046    1.87  73.31    .000
01496>                        +ID2 06:OVF          .00     .000     .00    .00    .000
01497>                        +ID3 04:202          .01     .004    2.00  71.60    .000
01498>                         ==========================================================
01499>                         SUM 07:Total        .34     .050    2.00  73.26    .000
01500>
01501>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01502>
01503> ---------------------------------------------------------------------------
01504> 100:0009-----------------------------------------------------------------------
01505> * RUN REMAINING DESIGN STORMS (City of Burlington 5 TO 100-YR)
01506> *
01507> ---------------------------------------------------------------------------
01508> 100:0002-----------------------------------------------------------------------
01509> *
01510> ---------------------------------------------------------------------------
01511> 100:0002-----------------------------------------------------------------------
01512> *
01513> ---------------------------------------------------------------------------
01514> 100:0002-----------------------------------------------------------------------
01515> *
01516> ---------------------------------------------------------------------------
01517> 100:0002-----------------------------------------------------------------------
01518> *
01519> ---------------------------------------------------------------------------
01520> 100:0002-----------------------------------------------------------------------
01521> *
01522>       FINISH
01523> ---------------------------------------------------------------------------
01524> ***************************************************************************
01525>      WARNINGS / ERRORS / NOTES
01526>      -------------------------
01527>    Simulation ended on 2026-02-18     at 11:19:20
01528> ===========================================================================
01529>
01530>
```

APPENDIX B

QUALITY CONTROL INFORMATION

Hydroworks Sizing Summary

517 Plains Road East
Burlington, Ontario

02-12-2026

Recommended Size: HS 6

A HydroStorm HS 6 is recommended to provide 80 % annual TSS removal based on a drainage area of 0.33 (ha) with an imperviousness of 72 % and Hamilton RBG, Ontario rainfall for the ETV Canada particle size distribution.

The recommended HydroStorm HS 6 treats 97 % of the annual runoff and provides 83 % annual TSS removal for the Hamilton RBG rainfall records and ETV Canada particle size distribution.

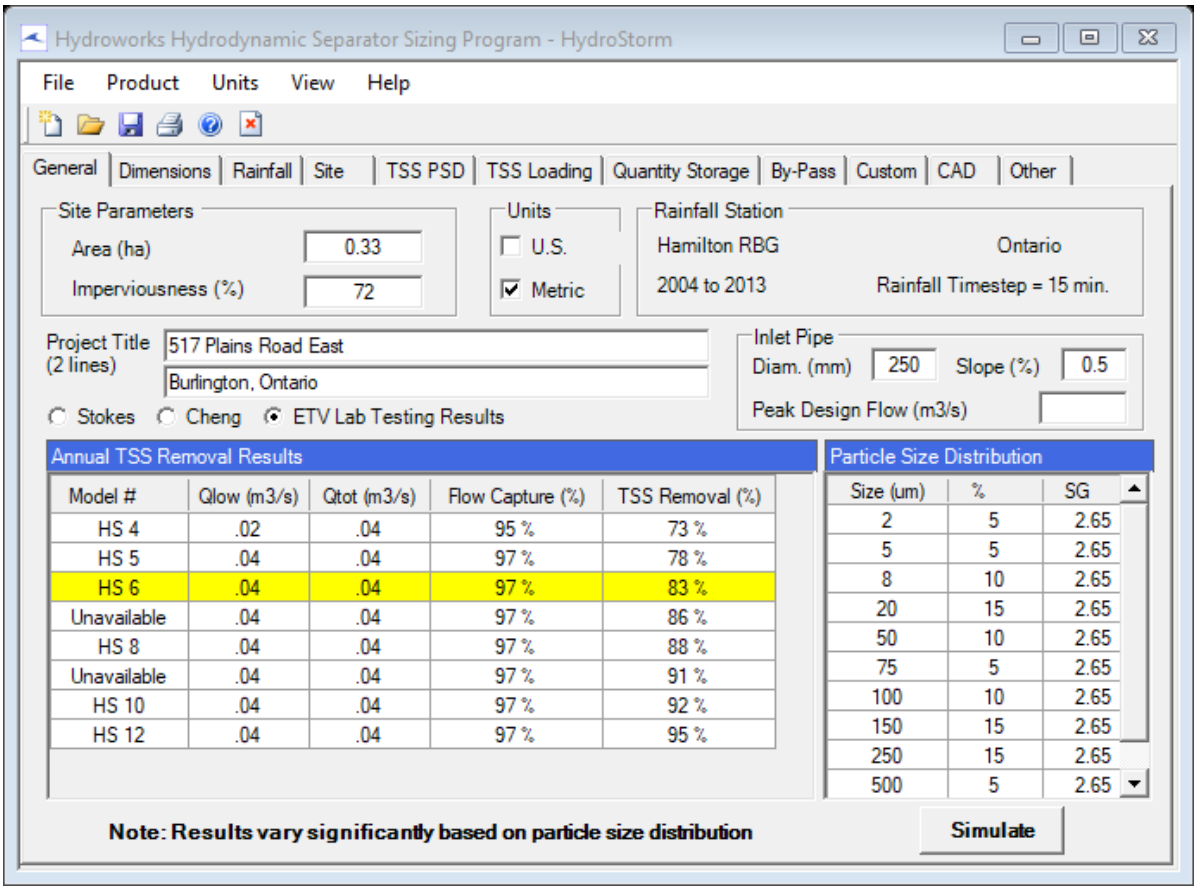
The HydroStorm has a headloss coefficient (K) of 1.04. Since a peak flow was not specified, headloss was calculated using the full pipe flow of .04 (m3/s) for the given 250 (mm) pipe diameter at .5% slope. The headloss was calculated to be 39 (mm) based on a flow depth of 250 (mm) (full pipe flow).

This summary report provides the main parameters that were used for sizing. These parameters are shown on the summary tables and graphs provided in this report.

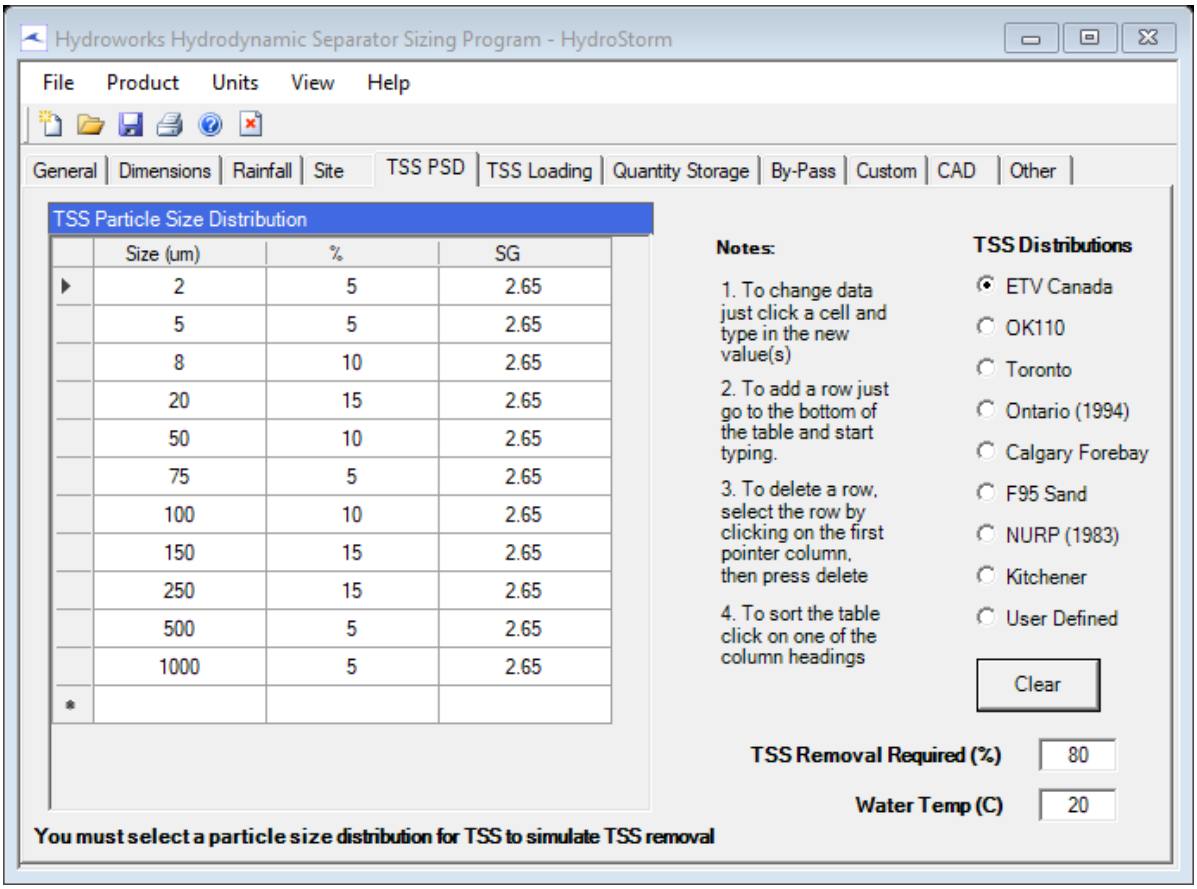
If you have any questions regarding this sizing summary please do not hesitate to contact Hydroworks at 888-290-7900 or email us at support@hydroworks.com.

The sizing program is for sizing purposes only and does not address any site specific parameters such as hydraulic gradeline, tailwater submergence, groundwater, soils bearing capacity, etc. Headloss calculations are not a hydraulic gradeline calculation since this requires a starting water level and an analysis of the entire system downstream of the HydroStorm . Design liability is only valid for lawsuits brought within the United States where Hydroworks has its corporate headquarters.

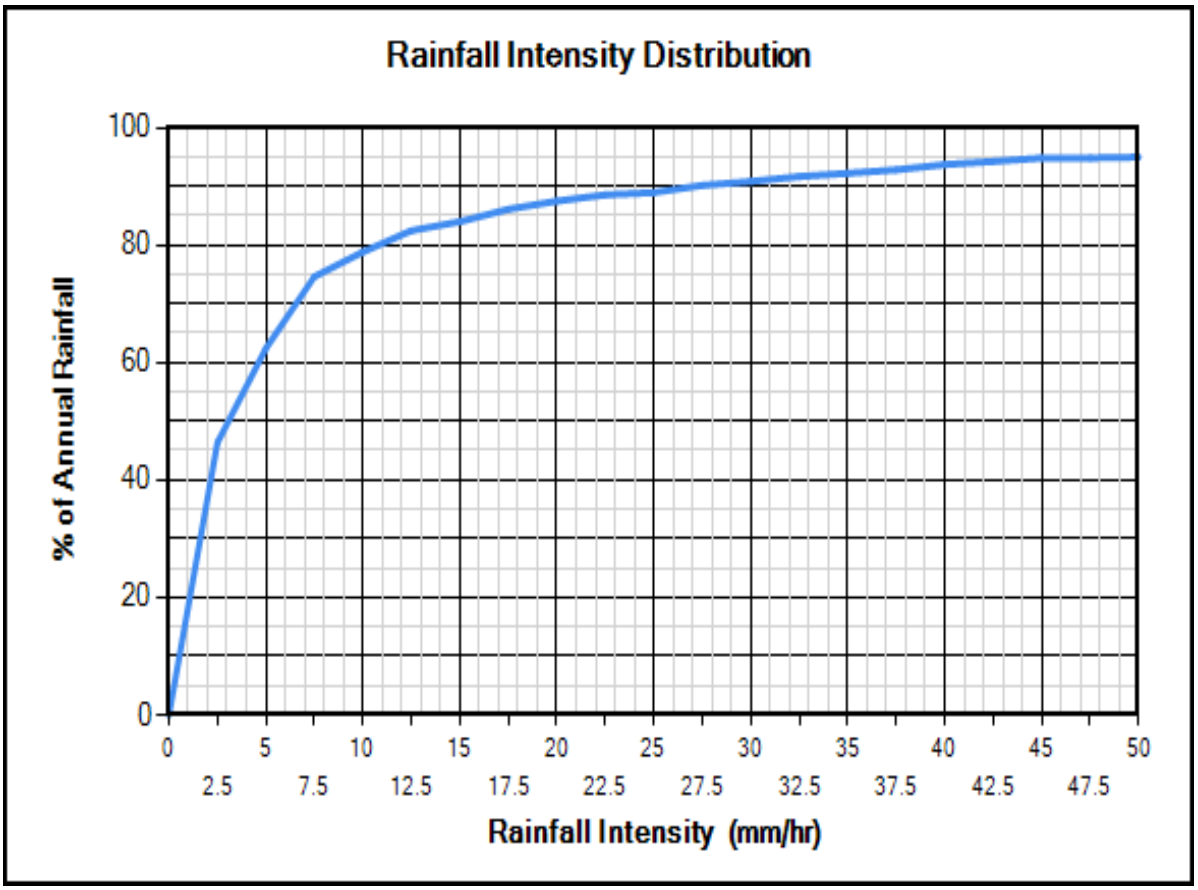
TSS Removal Sizing Summary



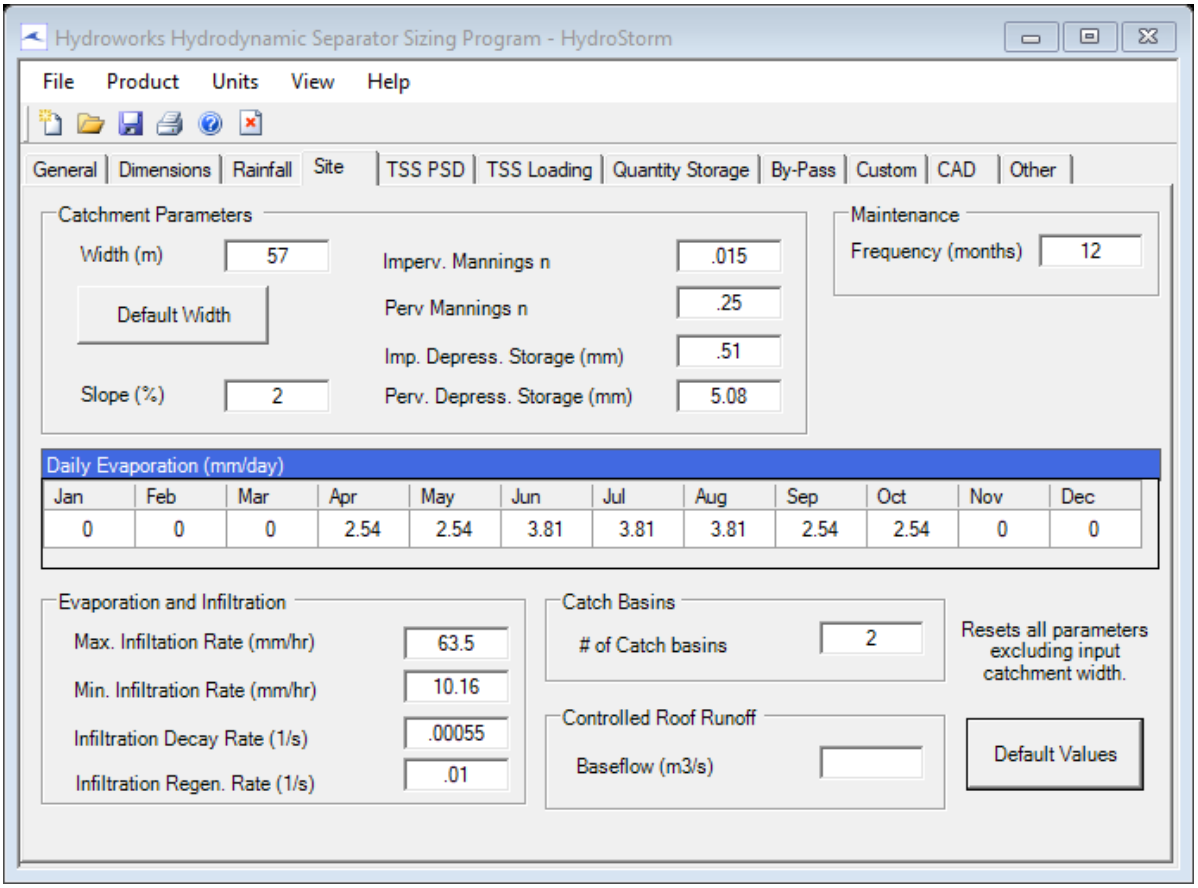
TSS Particle Size Distribution



Rainfall Station - Hamilton RBG, Ontario(2004 to 2013)



Site Physical Characteristics



Dimensions And Capacities

Hydroworks Hydrodynamic Separator Sizing Program - HydroStorm

File Product Units View Help

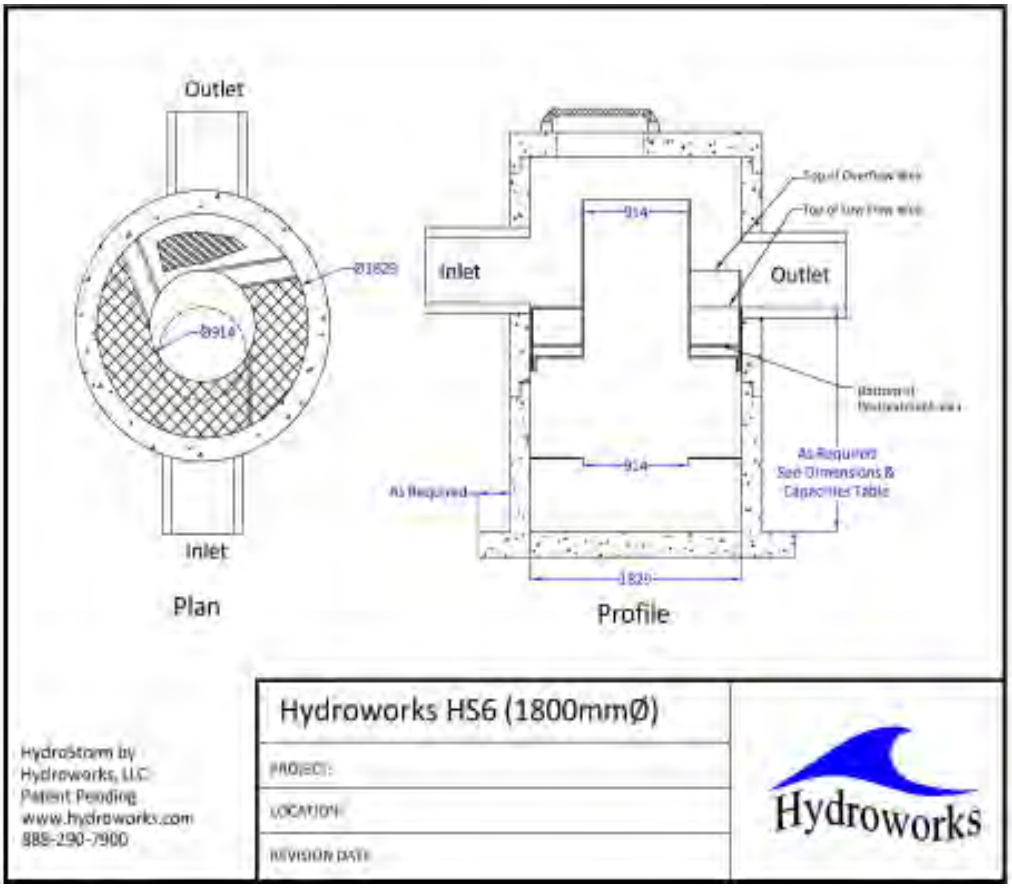
General | Dimensions | Rainfall | Site | TSS PSD | TSS Loading | Quantity Storage | By-Pass | Custom | CAD | Other

Dimensions and Capacities

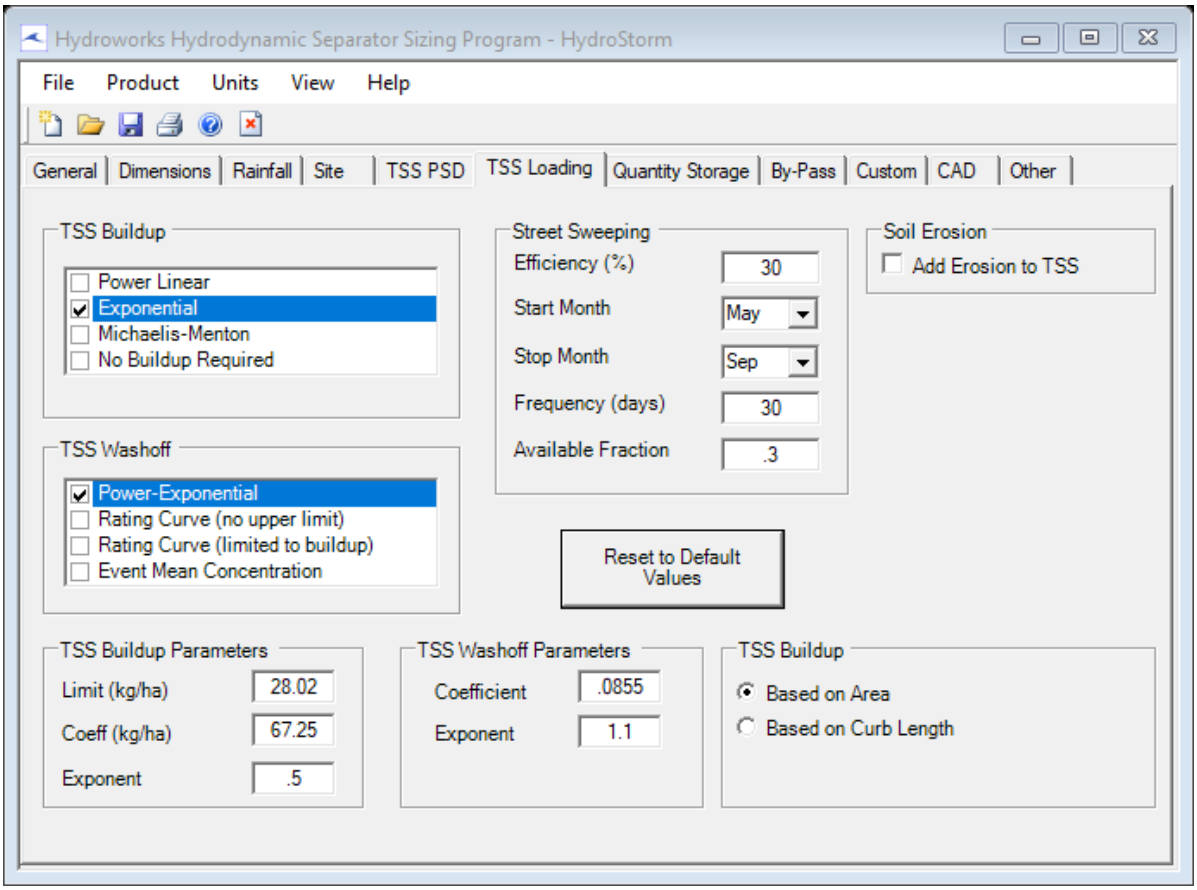
Model	Diam. (m)	Depth (m)	Float. Vol. (L)	Sediment Vol. (m3)	Total Vol. (m3)
HS 4	1.22	1.22	381	0.9	1.4
HS 5	1.52	1.52	642	1.8	2.8
HS 6	1.83	1.83	1041	3.2	4.8
HS 7	2.13	1.98	1575	4.6	7.1
HS 8	2.44	2.13	2354	6.3	10
HS 9	2.74	2.44	3242	9.3	14.4
HS 10	3.05	2.74	4327	13.2	20
HS 12	3.66	3.35	7164	23.8	35.2

Depth = Depth from outlet invert to inside bottom of tank

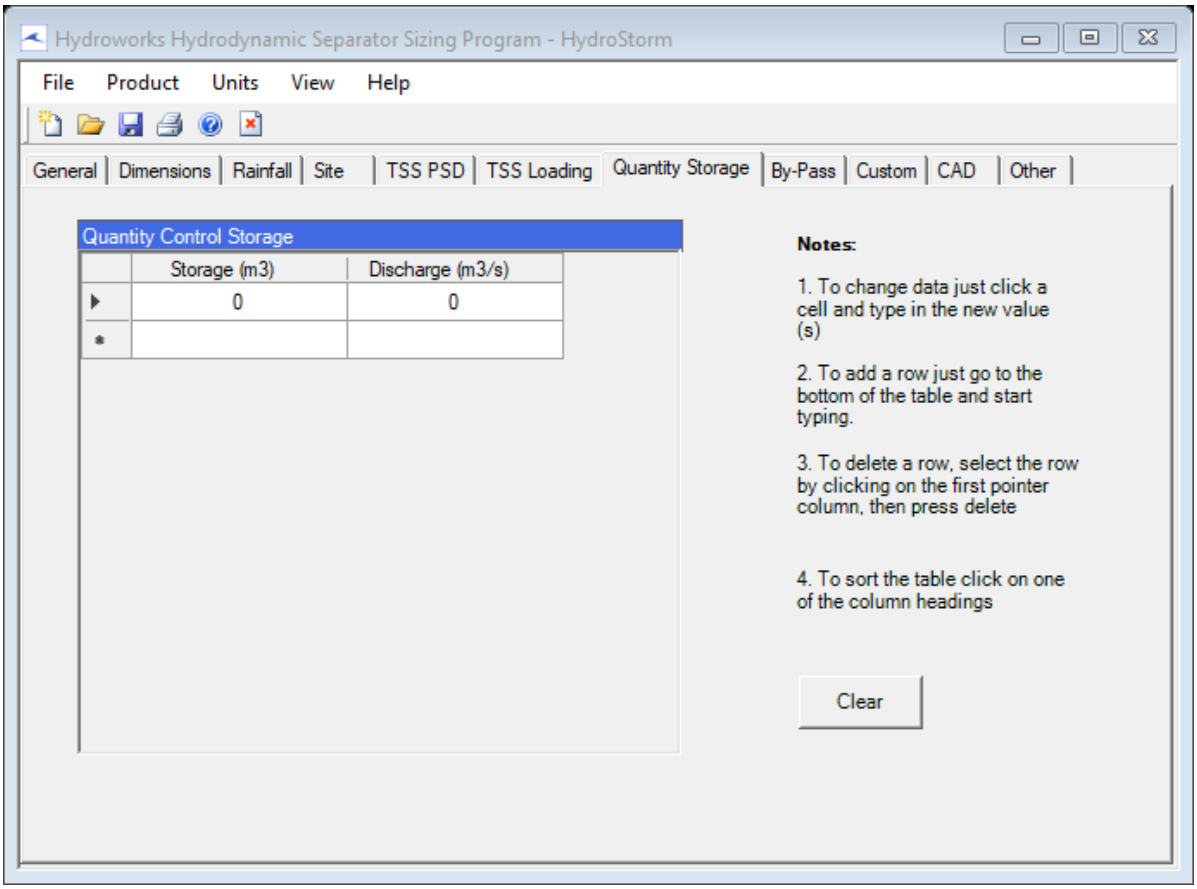
Generic HS 6 CAD Drawing



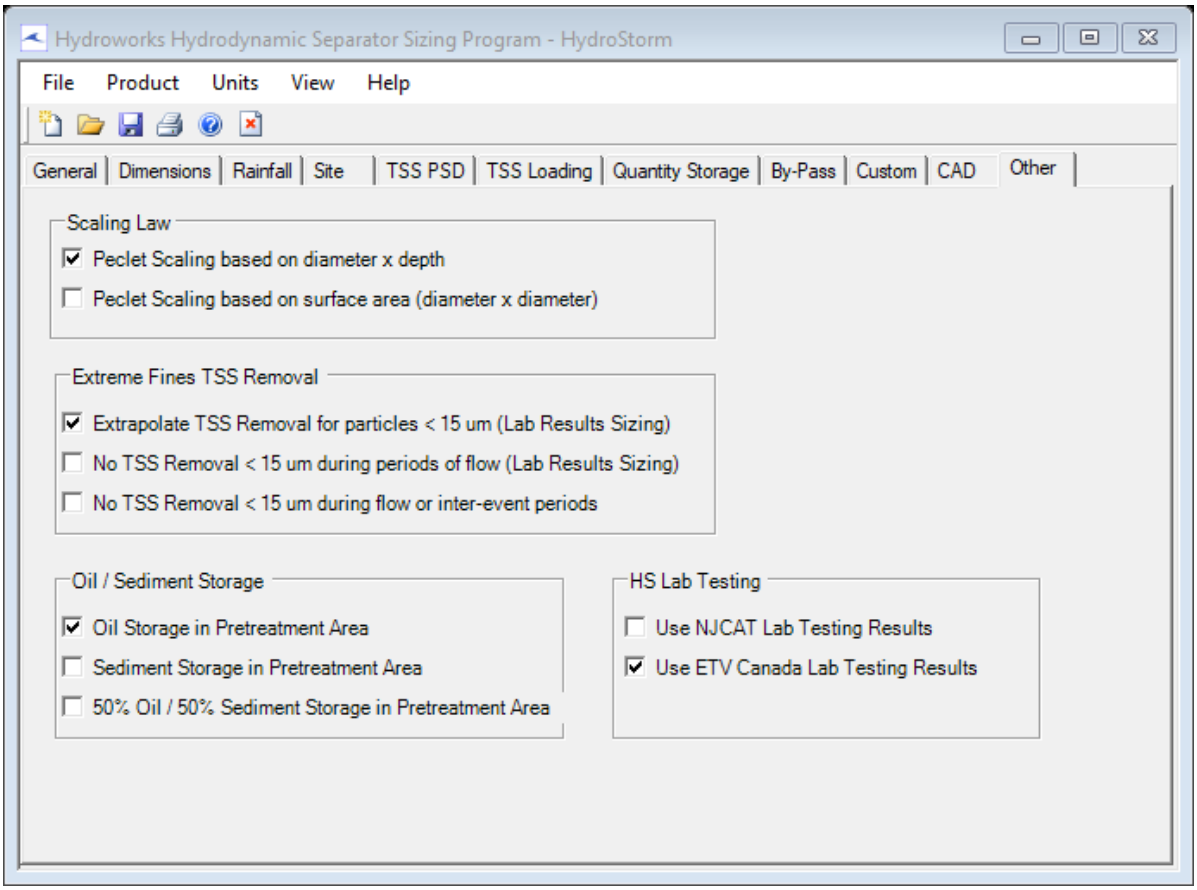
TSS Buildup And Washoff



Upstream Quantity Storage



Other Parameters



Hydroworks Sizing Program - Version 5.0
Copyright Hydroworks, LLC, 2020



Hydroworks® HydroStorm

Operations & Maintenance Manual

Version 1.0

Please call Hydroworks at 888-290-7900 or email us at support@hydroworks.com if you have any questions regarding the Inspection Checklist. Please fax a copy of the completed checklist to Hydroworks at 888-783-7271 for our records.

Introduction

The HydroStorm is a state of the art hydrodynamic separator. Hydrodynamic separators remove solids, debris and lighter than water (oil, trash, floating debris) pollutants from stormwater. Hydrodynamic separators and other water quality measures are mandated by regulatory agencies (Town/City, State, Federal Government) to protect storm water quality from pollution generated by urban development (traffic, people) as part of new development permitting requirements.

As storm water treatment structures fill up with pollutants they become less and less effective in removing new pollution. Therefore, it is important that storm water treatment structures be maintained on a regular basis to ensure that they are operating at optimum performance. The HydroStorm is no different in this regard and this manual has been assembled to provide the owner/operator with the necessary information to inspect and coordinate maintenance of their HydroStorm.

Hydroworks® HydroStorm Operation

The Hydroworks HydroStorm (HS) separator is a unique hydrodynamic by-pass separator. It incorporates a protected submerged pretreatment zone to collect larger solids, a treatment tank to remove finer solids, and a dual set of weirs to create a high flow bypass. High flows are conveyed directly to the outlet and do not enter the treatment area, however, the submerged pretreatment area still allows removal of coarse solids during high flows.

Under normal or low flows, water enters an inlet area with a horizontal grate. The area underneath the grate is submerged with openings to the main treatment area of the separator. Coarse solids fall through the grate and are either trapped in the pretreatment area or conveyed into the main treatment area depending on the flow rate. Fines are transported into the main treatment area. Openings and weirs in the pretreatment area allow entry of water and solids into the main treatment area and cause water to rotate in the main treatment area creating a vortex motion. Water in the main treatment area is forced to rise along the walls of the separator to discharge from the treatment area to the downstream pipe.

The vortex motion forces solids and floatables to the middle of the inner chamber. Floatables are trapped since the inlet to the treatment area is submerged. The design maximizes the retention of settled solids since solids are forced to the center of the inner chamber by the vortex motion of water while water must flow up the walls of the separator to discharge into the downstream pipe.

A set of high flow weirs near the outlet pipe create a high flow bypass over both the pretreatment area and main treatment chamber. The rate of flow into the treatment area is regulated by the number and size of openings into the treatment chamber and the height of by-pass weirs. High flows flow over the weirs directly to the outlet pipe preventing the scour and resuspension of any fines collected in the treatment chamber.

A central access tube is located in the structure to provide access for cleaning. The arrangement of the inlet area and bypass weirs near the outlet pipe facilitate the use of multiple inlet pipes.

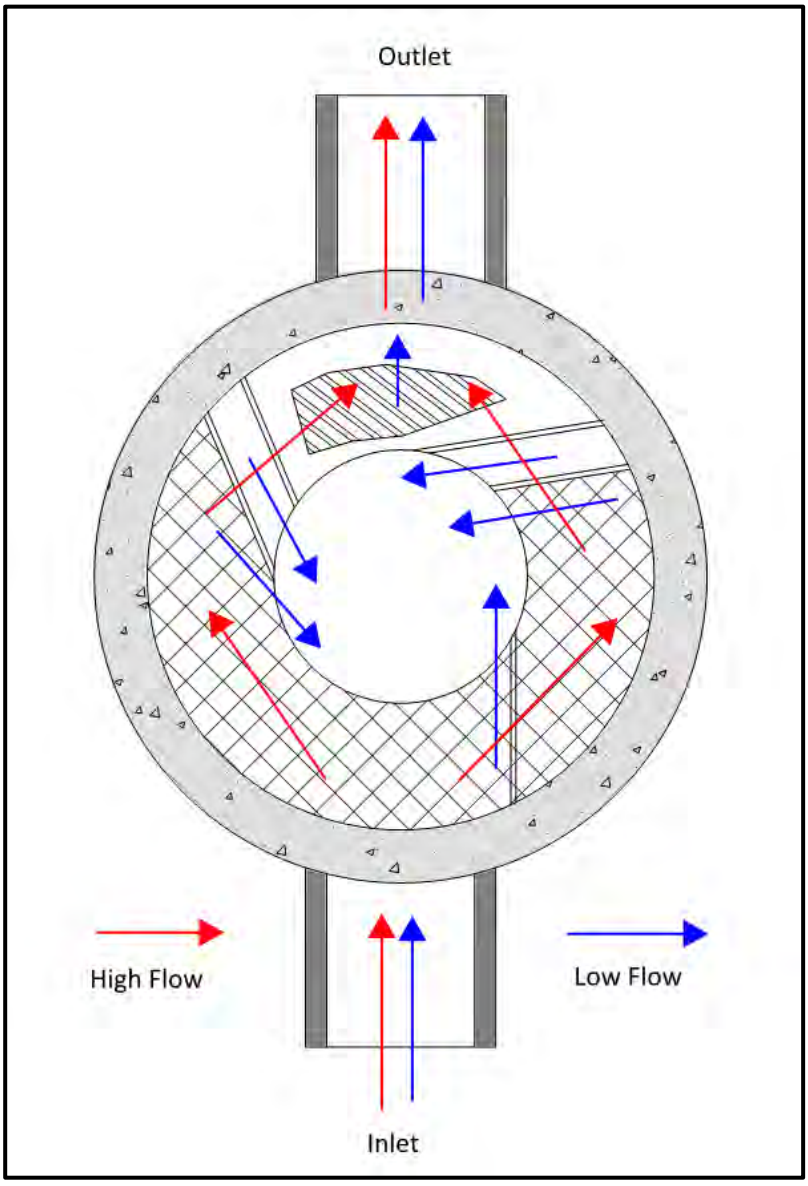


Figure 1. Hydroworks HydroStorm Operation – Plan View

Figure 2 is a profile view of the HydroStorm separator showing the flow patterns for low and high flows.

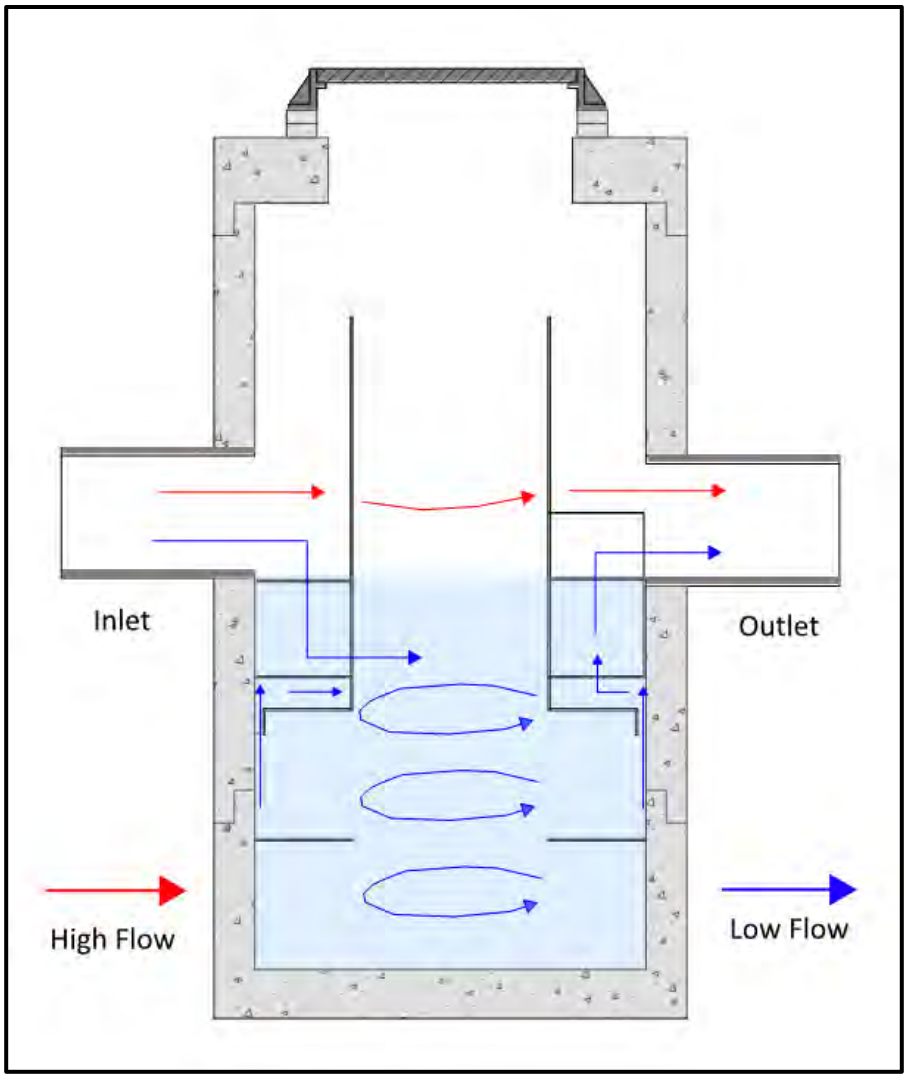


Figure 2. Hydroworks HydroStorm Operation – Profile View

The HS 4i is an inlet version of the HS 4 separator. There is a catch-basin grate on top of the HS 4i. A funnel sits sits underneath the grate on the frame and directs the water to the inlet side of the separator to ensure all lows flows are properly treated. The whole funnel is removed for inspection and cleaning.

Hydroworks

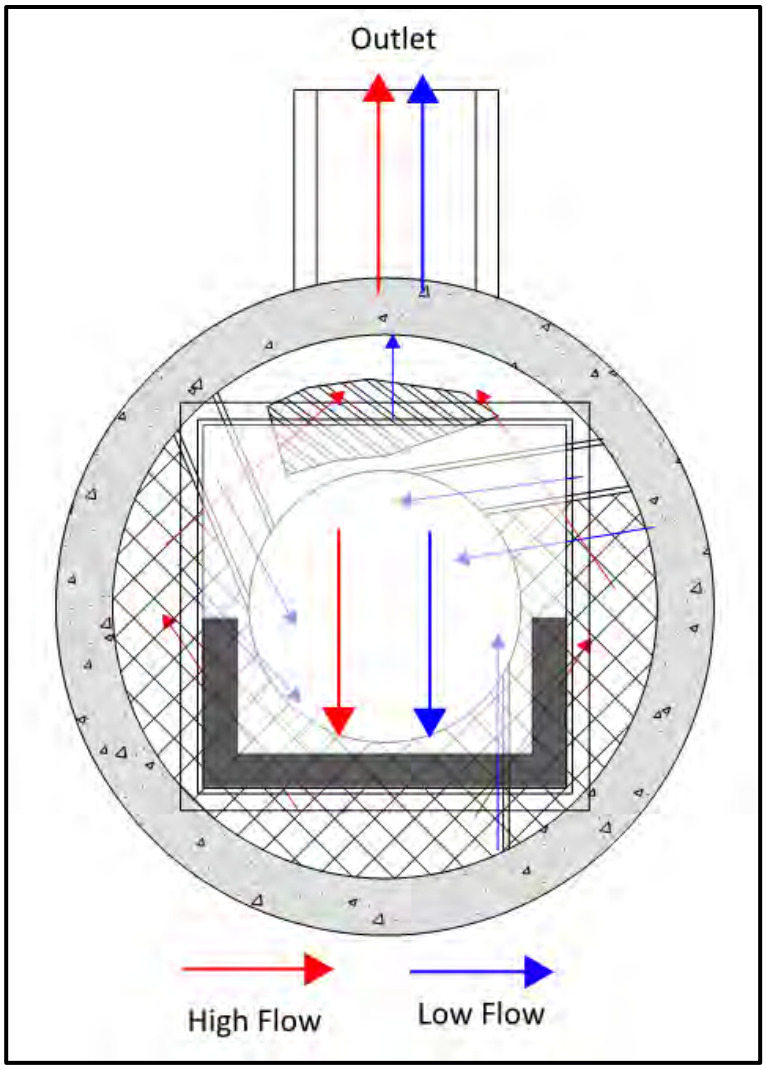


Figure 3. Hydroworks HS 4i Funnel

Inspection

Procedure

Floatables

A visual inspection can be conducted for floatables by removing the covers and looking down into the center access tube of the separator. Separators with an inlet grate (HS 4i or custom separator) will have a plastic funnel located under the grate that must be removed from the frame prior to inspection or maintenance. If you are missing a funnel please contact Hydroworks at the numbers provided at the end of this document.

Hydroworks

TSS/Sediment

Inspection for TSS build-up can be conducted using a Sludge Judge®, Core Pro®, AccuSludge® or equivalent sampling device that allows the measurement of the depth of TSS/sediment in the unit. These devices typically have a ball valve at the bottom of the tube that allows water and TSS to flow into the tube when lowering the tube into the unit. Once the unit touches the bottom of the device, it is quickly pulled upward such that the water and TSS in the tube forces the ball valve closed allowing the user to see a full core of water/TSS in the unit. The unit should be inspected for TSS through each of the access covers. Several readings (2 or 3) should be made at each access cover to ensure that an accurate TSS depth measurement is recorded.

Frequency

Construction Period

The HydroStorm separator should be inspected every four weeks and after every large storm (over 0.5" (12.5 mm) of rain) during the construction period.

Post-Construction Period

The Hydroworks HydroStorm separator should be inspected during the first year of operation for normal stabilized sites (grassed or paved areas). If the unit is subject to oil spills or runoff from unstabilized (storage piles, exposed soils) areas the HydroStorm separator should be inspected more frequently (4 times per year). The initial annual inspection will indicate the required future frequency of inspection and maintenance if the unit was maintained after the construction period.

Reporting

Reports should be prepared as part of each inspection and include the following information:

1. Date of inspection
2. GPS coordinates of Hydroworks unit
3. Time since last rainfall
4. Date of last inspection
5. Installation deficiencies (missing parts, incorrect installation of parts)
6. Structural deficiencies (concrete cracks, broken parts)
7. Operational deficiencies (leaks, blockages)
8. Presence of oil sheen or depth of oil layer
9. Estimate of depth/volume of floatables (trash, leaves) captured
10. Sediment depth measured
11. Recommendations for any repairs and/or maintenance for the unit
12. Estimation of time before maintenance is required if not required at time of inspection

A sample inspection checklist is provided at the end of this manual.

Maintenance

Procedure

The Hydroworks HydroStorm unit is typically maintained using a vacuum truck. There are numerous companies that can maintain the HydroStorm separator. Maintenance with a vacuum truck involves removing all of the water and sediment together. The water is then separated from the sediment on the truck or at the disposal facility.

A central access opening (24" or greater) is provided to the gain access to the lower treatment tank of the unit. This is the primary location to maintain by vacuum truck. The pretreatment area can also be vacuumed and/or flushed into the lower treatment tank of the separator for cleaning via the central access once the water level is lowered below the pretreatment floor.

In instances where a vacuum truck is not available other maintenance methods (i.e. clamshell bucket) can be used, but they will be less effective. If a clamshell bucket is used the water must be decanted prior to cleaning since the sediment is under water and typically fine in nature. Disposal of the water will depend on local requirements. Disposal options for the decanted water may include:

1. Discharge into a nearby sanitary sewer manhole
2. Discharge into a nearby LID practice (grassed swale, bioretention)
3. Discharge through a filter bag into a downstream storm drain connection

The local municipality should be consulted for the allowable disposal options for both water and sediments prior to any maintenance operation. Once the water is decanted the sediment can be removed with the clamshell bucket.

Disposal of the contents of the separator depend on local requirements. Maintenance of a Hydroworks HydroStorm unit will typically take 1 to 2 hours based on a vacuum truck and longer for other cleaning methods (i.e. clamshell bucket).

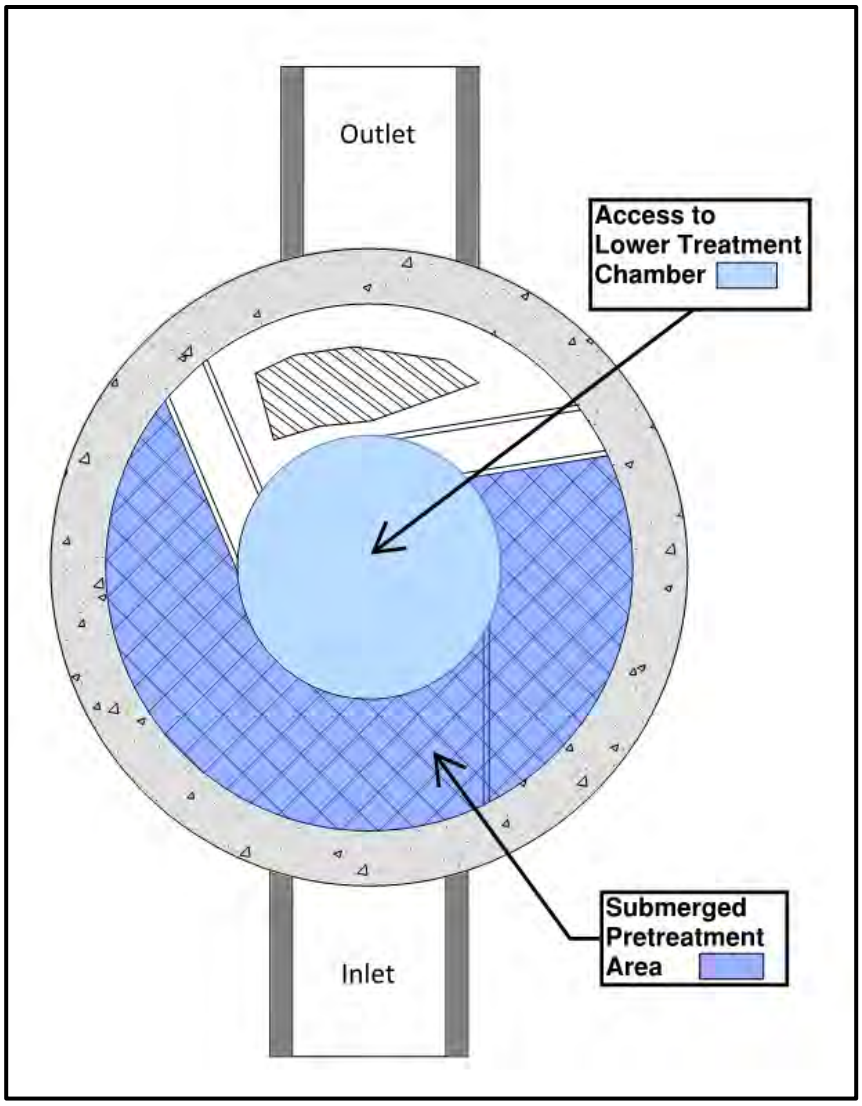


Figure 3. Maintenance Access

Frequency

Construction Period

A HydroStorm separator can fill with construction sediment quickly during the construction period. The HydroStorm must be maintained during the construction period when the depth of TSS/sediment reaches 24” (600 mm). It must also be maintained during the construction period if there is an appreciable depth of oil in the unit (more than a sheen) or if floatables other than oil cover over 50% of the area of the separator

The HydroStorm separator should be maintained at the end of the construction period, prior to operation for the post-construction period.

Post-Construction Period

The HydroStorm was independently tested by Alden Research Laboratory in 2017. A HydroStorm HS 4 was tested for scour with a 50% sediment depth of 0.5 ft. Therefore, maintenance for sediment accumulation is required if the depth of sediment is 1 ft or greater in separators with standard water (sump) depths (Table 1).

There will be designs with increased sediment storage based on specifications or site-specific criteria. A measurement of the total water depth in the separator through the central access tube should be taken and compared to water depth given in Table 1. The standard water depth from Table 1 should be subtracted from the measured water depth and the resulting extra depth should be added to the 1 ft to determine the site-specific sediment maintenance depth for that separator.

For example, if the measured water depth in the HS-7 is 7 feet, then the sediment maintenance depth for that HS-7 is 2 ft (= 1 + 7 – 6) and the separator does not need to be cleaned for sediment accumulation until the measure sediment depth is 2 ft.

The HydroStorm separator must also be maintained if there is an appreciable depth of oil in the unit (more than a sheen) or if floatables other than oil cover over 50% of the water surface of the separator.

Table 1 Standard Dimensions for Hydroworks HydroStorm Models

Model	Diameter (ft)	Total Water Depth (ft)	Sediment Maintenance Depth for Table 1 Total Water Depth(ft)
HS-3	3	3	1
HS-4	4	4	1
HS-5	5	4	1
HS-6	6	4	1
HS-7	7	6	1
HS-8	8	7	1
HS-9	9	7.5	1
HS-10	10	8	1
HS-11	11	9	1
HS-12	12	9.5	1

HYDROSTORM INSPECTION SHEET

Date _____
Date of Last Inspection _____

Site _____
City _____
State _____
Owner _____

GPS Coordinates _____

Date of last rainfall _____

Site Characteristics	**Yes**	**No**
Soil erosion evident	☐	☐
Exposed material storage on site	☐	☐
Large exposure to leaf litter (lots of trees)	☐	☐
High traffic (vehicle) area	☐	☐

HydroStorm	**Yes**	**No**
Obstructions in the inlet or outlet	☐ *	☐
Missing internal components	☐ **	☐
Improperly installed inlet or outlet pipes	☐ ***	☐
Internal component damage (cracked, broken, loose pieces)	☐ **	☐
Floating debris in the separator (oil, leaves, trash)	☐	☐
Large debris visible in the separator	☐ *	☐
Concrete cracks/deficiencies	☐ ***	☐
Exposed rebar	☐ **	☐
Water seepage (water level not at outlet pipe invert)	☐ ***	☐

Water level depth below outlet pipe invert _____"

Routine Measurements

Floating debris depth	**< 0.5" (13mm)**	☐	**>0.5" 13mm)**	☐ *
Floating debris coverage	**< 50% of surface area**	☐	**> 50% surface area**	☐ *
Sludge depth	**< 12" (300mm)**	☐	**> 12" (300mm)**	☐ *

* Maintenance required
** Repairs required
*** Further investigation is required

Hydroworks

Other Comments:

Hydroworks

Hydroworks® HydroStorm

One Year Limited Warranty

Hydroworks, LLC warrants, to the purchaser and subsequent owner(s) during the warranty period subject to the terms and conditions hereof, the Hydroworks HydroStorm to be free from defects in material and workmanship under normal use and service, when properly installed, used, inspected and maintained in accordance with Hydroworks written instructions, for the period of the warranty. The standard warranty period is 1 year.

The warranty period begins once the separator has been manufactured and is available for delivery. Any components determined to be defective, either by failure or by inspection, in material and workmanship will be repaired, replaced or remanufactured at Hydroworks' option provided, however, that by doing so Hydroworks, LLC will not be obligated to replace an entire insert or concrete section, or the complete unit. This warranty does not cover shipping charges, damages, labor, any costs incurred to obtain access to the unit, any costs to repair/replace any surface treatment/cover after repair/replacement, or other charges that may occur due to product failure, repair or replacement.

This warranty does not apply to any material that has been disassembled or modified without prior approval of Hydroworks, LLC, that has been subjected to misuse, misapplication, neglect, alteration, accident or act of God, or that has not been installed, inspected, operated or maintained in accordance with Hydroworks, LLC instructions and is in lieu of all other warranties expressed or implied. Hydroworks, LLC does not authorize any representative or other person to expand or otherwise modify this limited warranty.

The owner shall provide Hydroworks, LLC with written notice of any alleged defect in material or workmanship including a detailed description of the alleged defect upon discovery of the defect. Hydroworks, LLC should be contacted at 136 Central Ave., Clark, NJ 07066 or any other address as supplied by Hydroworks, LLC. (888-290-7900).

This limited warranty is exclusive. There are no other warranties, express or implied, or merchantability or fitness for a particular purpose and none shall be created whether under the uniform commercial code, custom or usage in the industry or the course of dealings between the parties. Hydroworks, LLC will replace any goods that are defective under this warranty as the sole and exclusive remedy for breach of this warranty.

Subject to the foregoing, all conditions, warranties, terms, undertakings or liabilities (including liability as to negligence), expressed or implied, and howsoever arising, as to the condition, suitability, fitness, safety, or title to the Hydroworks HydroStorm are hereby negated and excluded and Hydroworks, LLC gives and makes no such representation, warranty or undertaking except as expressly set forth herein. Under no circumstances shall Hydroworks, LLC be liable to the Purchaser or to any third party for product liability claims; claims arising from the design, shipment, or installation of the HydroStorm, or the cost of other goods or services related to the purchase and installation of the HydroStorm. For this Limited Warranty to apply, the HydroStorm must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and Hydroworks' written installation instructions.

Hydroworks, LLC expressly disclaims liability for special, consequential or incidental damages (even if it has been advised of the possibility of the same) or breach of expressed or implied warranty. Hydroworks, LLC shall not be liable for penalties or liquidated damages, including loss of production and profits; labor and materials; overhead costs; or other loss or expense incurred by the purchaser or any third party. Specifically excluded from limited warranty coverage are damages to the HydroStorm arising from ordinary wear and tear; alteration, accident, misuse, abuse or neglect; improper maintenance, failure of the product due to improper installation of the concrete sections or improper sizing; or any other event not caused by Hydroworks, LLC. This limited warranty represents Hydroworks' sole liability to the purchaser for claims related to the HydroStorm, whether the claim is based upon contract, tort, or other legal basis.

APPENDIX C

WATER ANALYSIS INFORMATION

FIRE FLOW DEMAND REQUIREMENTS - FIRE UNDERWRITERS SURVEY (FUS GUIDELINES)

Project Number: **25092**
Project Name: **517 Plains Road East**
Date: **Feb-26**

Fire flow demands for the FUS method is based on information and guidance provided in "Water Supply for Public Protection" (Fire Underwriters Survey, 2020).

An estimate of the fire flow required is given by the following formula:

$$F = 220\,C\sqrt{A} \qquad \textbf{(1)}$$

where:

F = the required fire flow in litres per minute
C = coefficient related to the type of construction
= 1.5 Type V for wood frame construction .
= 0.8 Type IV-A Mass Timber Construction
= 0.9 Type IV-B Mass Timber Construction
= 1.0 Type IV-C Mass Timber Construction
= 1.5 Type IV-D Mass Timber Construction
= 1.0 Type III Ordinary Construction
= 0.8 Type II Non Combustible Construction
= 0.6 Type I Fire Resistive Construction

A = Total floor area in square metres

				(1)		(2)			(3)		(4)		Final Adjusted Fire Flow	
Building / Location	# of Storeys	Total GFA (m^2)	Type of Construction	*Fire Flow "F"* (l/min)	(l/s)	*Occupancy* %	Adjustment (l/min)	Adjusted Fire Flow (l/min)	*Sprinkler* %	Adjustment (l/min)	*Exposure* %	Adjustment (l/min)	(l/min)	(l/s)
11-Storey Mixed-use Building	**11**	**8079**	**0.8**	16000	266.7	**-15**	-2400.0	**13600.0**	**-50**	-6800.0	40	5440.0	**12000**	**200**

Total Area Calculation :

Two largest ajoining floors plus 50% of any floors immediately above them up to eight floors

Floor	Area	Tot. Area	Cumm. Area
1	1322	1322	1322
2	1263	1263	1263
3-8	1250	7498	7498
9-11	1164	3491	3491
			8079

(2) Occupancy

Non-Combustible	-25%
Limited Combustible	-15%
Combustible	No Charge
Free Burning	15%
Rapid Burning	25%

(3) Sprinkler

Minimum credit for systems designed to NFPA 13 is 30%.

If the domestic and fire services are supplied by the same municipal water system, then take an additional 10%.

If the sprinkler system is fully supervised (ie. annunciator panel that alerts the Fire Dept., such as a school), then an additional 10% can be taken. Maximum credit = 50%.

(4) Exposure

0 to 3.0m	25%	
3.1 to 10m	20%	Calculate for all
10.1 to 20m	15%	sides. Maximum
20.1 to 30m	10%	charge shall not
Greater than 30	0%	exceed 75%

11-Storey Mixed-Use Building

Side	Exposure (m)	Charge (%)
North =	**> 30m**	**0**
South =	**> 30m**	**0**
East =	**3.1 to 10m**	**20**
West =	**3.1 to 10m**	**20**
Total Exposure =		***40***