



87-95 Seagram Drive

Functional Servicing and Stormwater Management Report

Project Location:

87-95 Seagram Drive, Waterloo, ON

Prepared for:

Masri O Inc. Architects
100-609 Kump Drive, Waterloo, ON

Prepared by:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, ON N2B 3X9

December 15, 2025

MTE File No.: 61809_001





Contents

1.0	Introduction.....	1
2.0	Criteria.....	3
2.1	Existing Topography	3
2.2	Existing Servicing.....	3
2.2.1	Water	3
2.2.2	Sanitary	3
2.2.3	Storm.....	3
2.3	Existing Soils Information.....	3
2.4	Reviewing Agencies.....	4
3.0	Methodology.....	4
3.1	Proposed Grading.....	4
3.2	Proposed Servicing.....	4
3.2.1	Water	4
3.2.2	Sanitary	5
3.2.3	Storm.....	6
4.0	Preliminary Stormwater Management Design.....	6
4.1	SWM Criteria.....	6
4.2	Water Quantity Control.....	6
4.3	Water Quality Control.....	10
4.4	Erosion and Sediment Control	10
5.0	Conclusions and Recommendations	11

Figures

Figure 1.0 – Site Location Plan	2
Figure 2.0 – Pre-Development Catchment Areas.....	8
Figure 3.0 – Post-Development Catchment Areas	9

Tables

Table 3.1 – Required Demands	4
Table 3.2 – Results of Flow Tests	5
Table 4.1 – Catchment Parameters.....	7
Table 4.2 – Summary of Flows.....	7

Appendices

Appendix A	Fire Flow Analysis Design Sheets
Appendix B	Sanitary Sewer Design Sheet
Appendix C	Storm Sewer Design Sheet
Appendix D	Stormceptor Output
Appendix E	MIDUSS Output

Drawing

Removals Plan	
MTE Drawing No. C1.1	Appended
Functional Grading Plan	
MTE Drawing No. C2.1	Appended
Functional Servicing Plan	
MTE Drawing No. C2.2	Appended

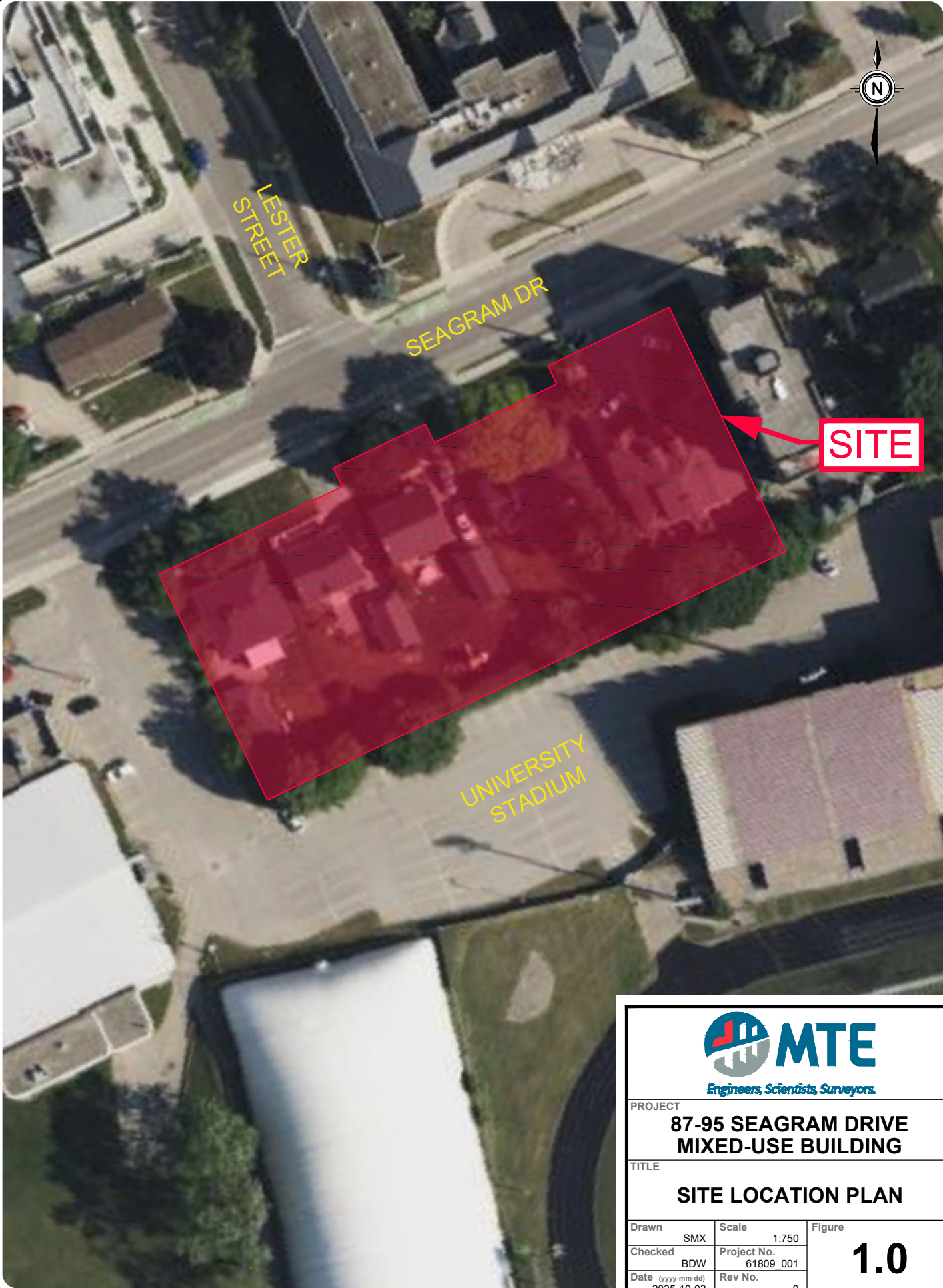
1.0 INTRODUCTION

MTE Consultants Inc. was retained by Masri O Inc. Architects to complete a Functional Servicing and Stormwater Management Report for a new residential development to be constructed at 87-95 Seagram Drive (herein referred to as 'the Site') in the City of Waterloo in support of the Official Plan Amendment and Zoning By-Law Amendment Applications. The current zoning of the site is RMU-81 and UC-81, dependent on the lot. The property is to be consolidated and proposed to be re-zoned as RMU-81(_).

The property is bounded to the north by Seagram Drive, to the east by residential property, and to the south and west by parking at University Stadium. For the exact location of the Site refer to Figure 1.0.

The proposed development for the Site is the demolition of five existing residential homes and construction of a 34-storey residential building complete with commercial space, surface and underground parking.

The purpose of this study is to support the Official Plan Amendment and Zoning By-Law Amendment Applications. This will be accomplished by reviewing the opportunities and constraints for the subject property with respect to servicing, grading, and stormwater management; reviewing the requirements of the reviewing agencies; describing the development concept; and demonstrating the functional serviceability of the property. Pending approval of the Amendment application, detailed design of the site will commence and be submitted to the City in support of Site Plan Approval.



PROJECT			Figure 1.0
87-95 SEAGRAM DRIVE MIXED-USE BUILDING			
TITLE			
SITE LOCATION PLAN			
Drawn	SMX	Scale 1:750	
Checked	BDW	Project No. 61809_001	
Date (yyyy-mm-dd)		Rev No.	
2025-10-02		0	

2.0 CRITERIA

2.1 Existing Topography

The Site encompasses an area of 0.34ha and currently comprises five residential buildings, sheds, driveways and green space. In the existing condition, surface runoff from the Site drains east to west and then splits, some draining north to Seagram Drive, and the remaining draining south toward University Stadium. There is an elevation difference of approximately 2.0m between the east and west property lines. The Site is approximately 39% impervious in the existing condition.

2.2 Existing Servicing

2.2.1 Water

There is an existing 400mm diameter municipal watermain along the south side of Seagram Drive that reduces to a 200mm diameter watermain across the Site frontage, as well as a 150mm diameter municipal watermain along the north side of Seagram Drive. The closest municipal fire hydrant is located along the Seagram Drive property line, at the approximate centre of the frontage. All existing domestic water services to the existing dwellings to be demolished will be removed and capped at the municipal watermain as part of the redevelopment of the Site.

2.2.2 Sanitary

There is a 200mm diameter sanitary sewer along Seagram Drive which drains toward the west, upsizing to a 375mm diameter sewer at the intersection of Seagram Drive and Lester Street. The closest manhole is located at the intersection of Seagram Drive and Lester Street and is approximately 3.0m deep. All existing sanitary connections to the existing dwellings to be demolished will be capped at property line as part of the redevelopment of the Site.

2.2.3 Storm

There is a 375mm diameter storm sewer along Seagram Drive that drains towards the west. The closest existing catchbasin-manhole is located at the intersection of Seagram Drive and Lester Street and is approximately 1.1m deep. Surface runoff from the site splits, with the north half of the Site conveyed overland to the north where it enters the Seagram Drive storm sewer system and the south half of the Site conveyed overland to the south and west where it enters the storm sewer system within the neighbouring property (University Stadium).

2.3 Existing Soils Information

Eight boreholes, two with monitoring wells, were advanced by Chung and Vander Doelen Engineering on June 22, 2023, in order to determine the underlying soil conditions. The subsurface stratigraphy is generally comprised of topsoil and fill underlain by compact to very dense fine granular deposits. The fine granular deposits were underlain by a stiff to hard clayey silt till which was further underlain by a very dense sand and silt till.

Groundwater was contacted in both monitoring wells at approximately 2.8 to 3.1 meters below existing grade, at corresponding elevations of 331.4 and 331.9, respectively. Since the proposed underground parking will be below the groundwater table, the basement walls and floor slabs will have to be waterproofed. For additional details and recommendations refer to the Geotechnical Investigation prepared by Chung and Vander Doelen, dated July 28, 2023.

2.4 Reviewing Agencies

Grading, servicing and stormwater management designs as well as this Functional Servicing and Stormwater Management Report will be required for submission to the City of Waterloo in support of the Official Plan Amendment and the Zoning By-Law Amendment. The City will also be responsible for the review and approval of the site plan, site grading, servicing, stormwater management, lighting and landscape design in support of Site Plan Approval and ultimately issuing building permits.

3.0 METHODOLOGY

Preliminary grading and servicing strategies for the proposed development have been developed based on the topographic survey, plan and profile information, and Site Plan prepared by Masri O Inc. Architects, dated November 5, 2025.

3.1 Proposed Grading

The proposed development will have one 34-storey building including a podium and two towers, complete with two entrances off of Seagram Drive, one to underground parking and one to surface parking. The proposed grading strategy will respect the existing grades along all property lines. Regrading will involve utilizing a retaining wall to raise grades along the south and west edges of the property to direct storm runoff to the area drains and Seagram Drive. To account for the fall along Seagram Drive, the finished floor elevations across the building will be stepped.

3.2 Proposed Servicing

3.2.1 Water

Two municipal watermain are available along Seagram Drive, a 150mm diameter municipal watermain and a 400mm diameter municipal watermain. It is proposed that the service connection is made to the 400mm diameter watermain since the existing water services to 87-95 Seagram Drive and the existing municipal hydrant along Seagram drive are serviced by this watermain. The required private water service size will be determined during detailed design but will likely be 200mm diameter. The water service will connect into the northeast corner of the proposed building. The proposed building will be sprinklered. It is anticipated that a fire department connection, location to be confirmed at detailed design, will be located within 45m of the existing municipal fire hydrant located on Seagram Drive, central to the site along the north property line.

Preliminary domestic and fire demands for the proposed development were calculated and summarized in the table below. Refer to Appendix A for further details.

Table 3.1 – Required Demands

Scenario	Demand
Max Day	6.39L/s
OBC Fire Flow	9,000L/min
FUS Fire Flow	23,000L/min

It should be noted that an internal booster pump will likely be specified in the building to achieve appropriate flow and pressure on the upper floors given the proposed height of the building.

The pressure and flow at the existing hydrant must be sufficient for firefighting conditions as established by the Ontario Building Code (2012). The minimum residual pressure under firefighting conditions is 140kPa (20.3psi) per OBC 2012 A-3.2.5.7 3(b).

Many municipalities in Ontario use both the OBC and the FUS fire flow requirements for assessing firefighting water supply requirements. Ideally, fire flow demands for new developments are calculated based on the FUS criteria; however, it is not reasonable to expect that the existing municipal watermain infrastructure always has the operational capacity to supply water at the rates prescribed in the FUS guidelines. As a result, at no time shall the available fire flow be less than that required by the Ontario Building Code.

For this design, information obtained from the hydrant flow test completed on July 23, 2025 by Northern Sprinkler Design on the municipal hydrants located on Seagram Drive was utilized. The hydrants both connect into the same municipal watermain: the residual hydrant connects to the 400mm diameter municipal watermain and the flowing hydrant connects after the reducer to the 200mm diameter municipal watermain. The following table illustrates the results of the testing completed by Northern Sprinkler Design.

Table 3.2 – Results of Flow Tests

Results of Flow Tests Completed July 23, 2025					
Test #	Outlet Inside Diameter (in.)	Number of Outlets	Pitot Pressure (psi)	Residual Pressure (psi)	Flow @ Residual (gal/min)
1	n/a	n/a	n/a	62	0
2	2.5	1	47	60	1151
3	2.5	2	24+24	58	1662

Refer to Appendix A for the information obtained by Northern Sprinkler Design.

The residual pressure at the existing municipal hydrant was calculated to be 374kPa for a flow rate of 9,000L/min (150L/s) per OBC fire flow requirements, which is greater than the minimum allowable pressure of 140kPa. The residual pressure at the existing municipal hydrant was calculated to be 123kPa for a flow rate of 23,000L/min (383L/s) per FUS fire flow requirements which is less than the minimum allowable pressure. Refer to Appendix A for water demand design sheets.

Based on the flow tests provided by Northern Sprinkler Design it can be concluded that the minimum water supply flow rate of 9,000L/min (per OBC calculation) can be delivered to the existing hydrant with a residual pressure (at the nozzle of the hydrant) under firefighting conditions of 374kPa, thus meeting the minimum requirements of the Ontario Building Code (2012).

3.2.2 Sanitary

A sanitary flow design sheet has been prepared to determine the flows anticipated to be generated by the proposed development. Under the proposed zoning of RMU-81, with the proposed building having 522 units and a commercial area of 0.05ha within a site area of 0.34ha, the maximum anticipated peak sanitary flow generation rate is 11.1L/s.

It is proposed that the site will be serviced by a new 200mm diameter sanitary connecting into the northeast corner of the proposed building. The private sanitary sewer is proposed to be installed with a 2.0% slope, providing a resulting capacity of 46.3L/sec. The sanitary flows for the underground levels will need to be pumped to the sanitary outlet. The service sizes and inverts will be confirmed at detailed design.

It is requested that the City input the proposed sanitary flow rate into their model to analyze the capacity of the existing sanitary infrastructure.

3.2.3 Storm

A new 300mm diameter storm sewer will connect into the existing catchbasin manhole on Seagram Drive. Runoff from the roof and area drains will be directed through the building, to an internal storage tank in the underground parking level and then towards the new storm service. The runoff from the remainder of the site will be directed towards Seagram Drive right-of-way, with minor perimeter drainage also being conveyed toward the University Stadium parking lot.

4.0 PRELIMINARY STORMWATER MANAGEMENT DESIGN

4.1 SWM Criteria

The stormwater management design criteria for the subject Site, as established by the City of Waterloo, are as follows:

- i) Attenuation of the post-development peak flows for the 2-, 5-, and 100-year storm event to the pre-development (existing) peak flow.
- ii) Implementation of Enhanced (Level 1) water quality controls.
- iii) Implementation of Erosion and Sediment Control measures.

4.2 Water Quantity Control

In order to successfully complete the preliminary stormwater management design for the site, the following specific tasks were undertaken:

- i) Calculate the allowable runoff rates using MIDUSS NET.
- ii) Determine the percent impervious of the site and catchment parameters for inclusion in MIDUSS modeling.
- iii) Calculate post-development runoff hydrographs using MIDUSS NET.

The following table summarizes the catchments used in modeling of the site. The post-development condition was separated into four catchment areas; the towers, the controlled area, the uncontrolled area draining overland to Seagram Drive and the uncontrolled area draining towards University Stadium. Figure 2.0 illustrates the limits of the pre-development catchment areas. Figure 3.0 illustrates the limits of the post-development catchment areas.

Table 4.1 – Catchment Parameters

#	Catchment	Area (m)	% Impervious	Pervious CN	Impervious CN	Slope (%)	Flow Length (m)
Pre-Development Catchment Areas							
101	To Seagram	0.133	52	79	98	8	42.0
102	To Stadium	0.207	31	79	98	4	23.0
Post-Development Catchment Areas							
201	Towers	0.122	100	79	98	2	7.5
202	Controlled	0.140	88	79	98	2	8.0
203	Uncontrolled to Seagram	0.054	38	79	98	2	7.0
204	Uncontrolled to Stadium	0.024	0	79	98	20	2.0

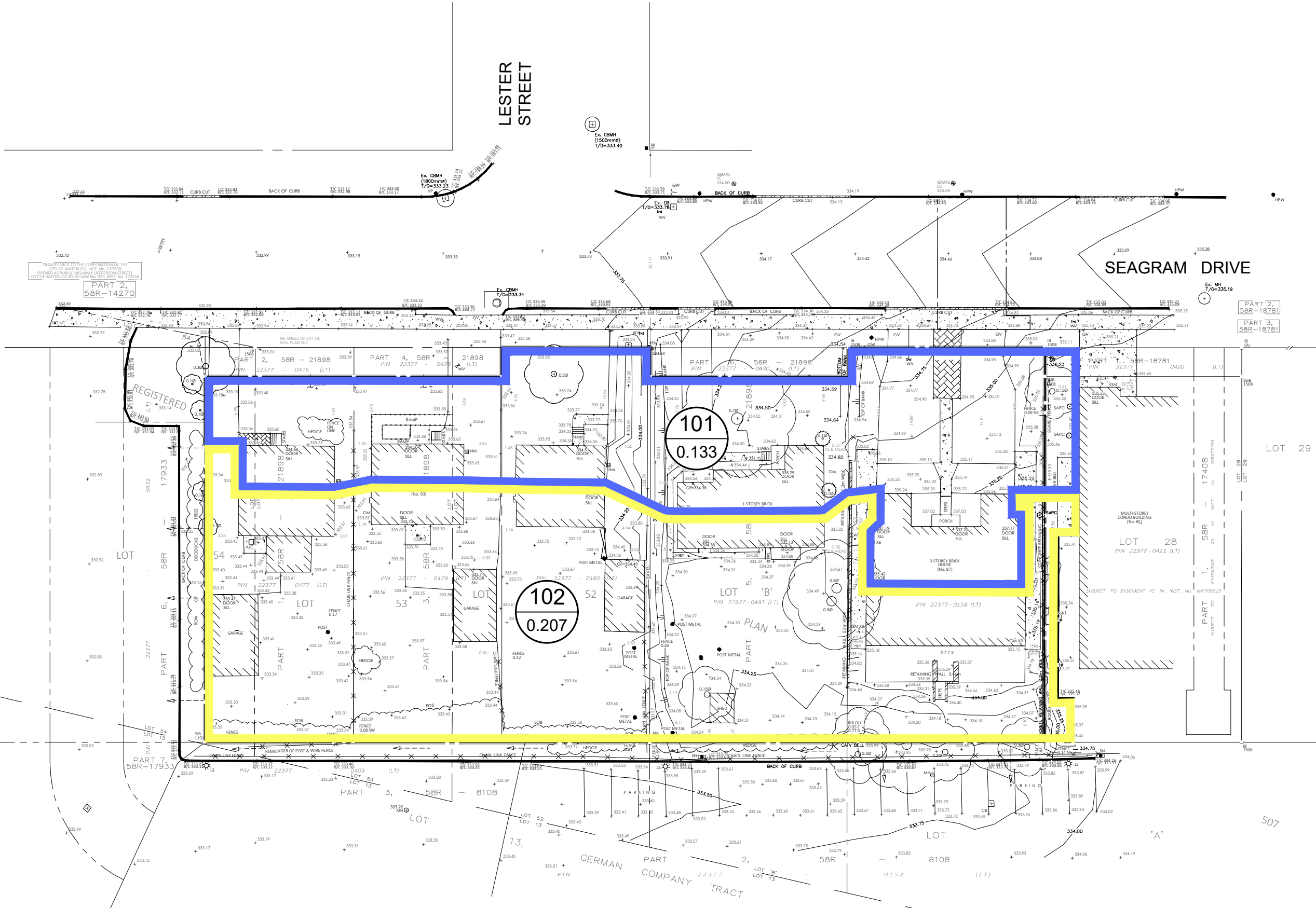
Based on the soils found on Site, including fine granular deposits underlain by stiff to hard clayey silt till, a value of 79 was used for the pervious CN.

In order to achieve the stormwater management requirements for the Site, runoff generated on the two towers will be controlled using flow control roof drains. Furthermore, parking areas, the podium and the towers will be controlled using an internal 62.5m³ storage tank and a 165mm diameter orifice plate. The proposed tank location will be confirmed and coordinated at detailed designed. The following table summarizes the expected flows that will be generated by the whole site. Please note that these flows are subject to change during detailed design.

Table 4.2 – Summary of Flows

Modelling Condition	2-Year Storm Event (m ³ /s)	5-Year Storm Event (m ³ /s)	100-Year Storm Event (m ³ /s)
Pre-Development	0.030	0.044	0.108
Post-Development	0.028	0.038	0.068

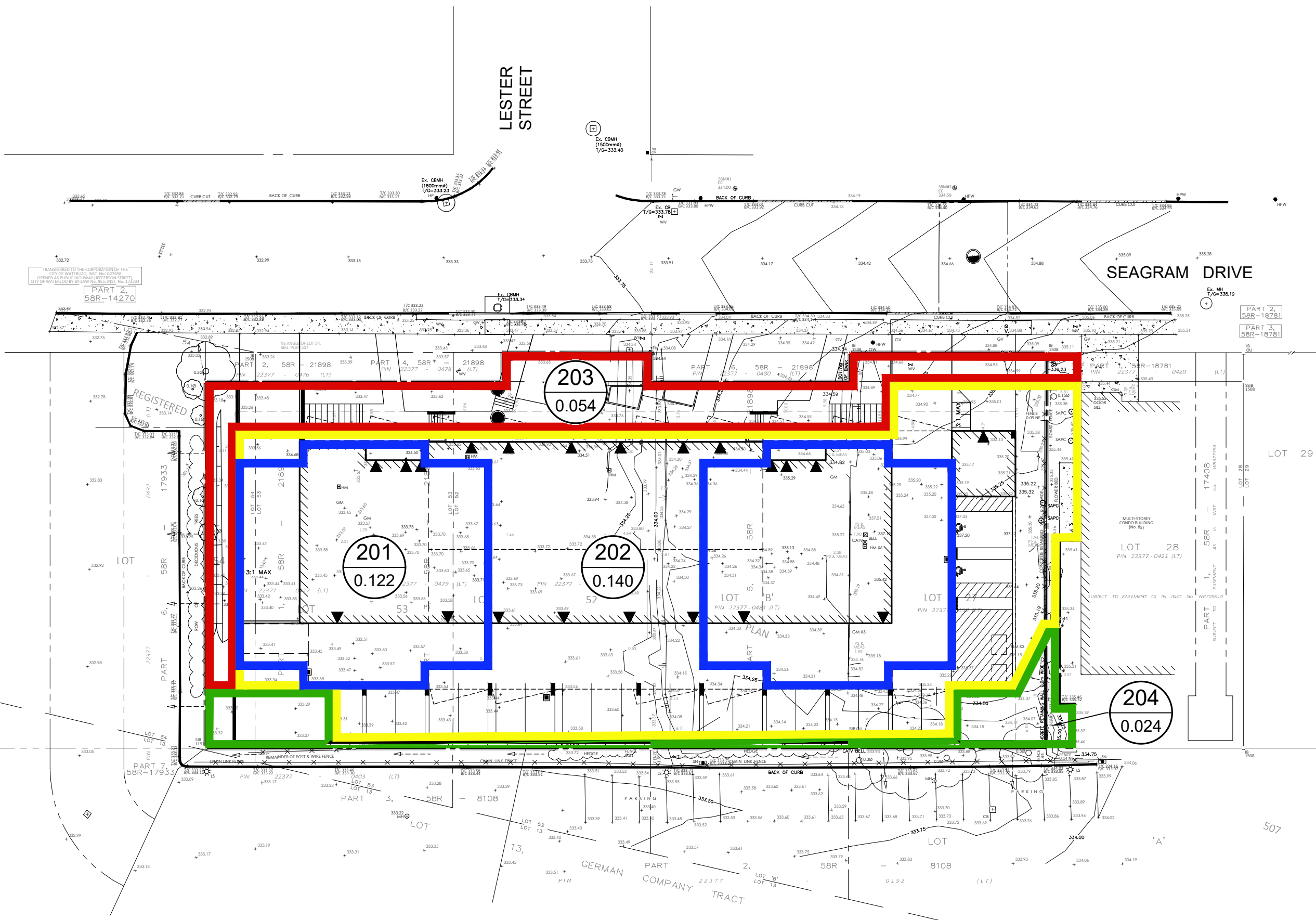
As summarized in Table 4.2 above, the post-development flow rate for the 2-, 5- and 100-year storm events are controlled to the pre-development flow rates. Refer to Appendix D for the MIDUSS output.



LEGEND

- CATCHMENT 101
- CATCHMENT 102
- SUB-CATCHMENT NUMBER
- AREA (ha.)

 Engineers, Scientists, Surveyors.			
PROJECT 87-95 SEAGRAM DRIVE MIXED-USE BUILDING			
TITLE PRE-DEVELOPMENT CATCHMENT AREAS			
Drawn SMX	Scale 1:400	Figure 2.0	
Checked BDW	Project No. 61809_001		
Date (yyyy-mm-dd) 2025-09-24	Rev No. 0		



LEGEND

- CATCHMENT 201
- CATCHMENT 202
- CATCHMENT 203
- CATCHMENT 204

201
0.122
SUB-CATCHMENT
NUMBER
AREA (ha.)



MTE
Engineers, Scientists, Surveyors.

PROJECT
**87-95 SEAGRAM DRIVE
MIXED-USE BUILDING**

TITLE
**POST-DEVELOPMENT
CATCHMENT AREAS**

Drawn SMX	Scale 1:400	Figure 3.0
Checked BDW	Project No. 61809_001	
Date (yyyy-mm-dd) 2025-09-24	Rev No. 0	

4.3 Water Quality Control

A Stormceptor Model EF04 will be installed on the storm sewer system to provide water quality control for the Site. The chosen unit is expected to provide Level 1 water quality control. Refer to Appendix A for the sizing output from the Stormceptor Expert program. The Stormceptor will require regular annual maintenance to ensure it is operating properly. The owner may be required to enter into a maintenance agreement with a suitable contractor to complete this work. In addition, all the storm structures will have a 600mm sump.

4.4 Erosion and Sediment Control

Precautions will need to be taken during construction to limit erosion and sedimentation. During detailed design, a Conceptual Workspace Management Plan will be completed. Typically, the following measures are recommended during construction for erosion and sedimentation control:

- i) Erosion and sedimentation facilities are to be installed prior to any area grading operations.
- ii) All erosion control measures are to be inspected and monitored by the contractor and repairs are to be completed as required.
- iii) All materials and equipment used for the purpose of site preparation and project completion should be operated and stored in a manner that prevents any deleterious substance from leaving the Site.
- iv) To minimize the amount of mud being tracked onto the roadway, a mud mat should be installed at the primary construction entrance.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the foregoing analysis, it is concluded that:

- i) The proposed grading design will respect the natural topography of the site to achieve a reasonable cut/fill balance where possible.
- ii) Existing municipal infrastructure for water, sanitary, and storm is available within the Seagram Drive right-of-way and will be utilized to service the proposed development.
- iii) The expected maximum day domestic water demand for the Site is 6.39L/s. Based on preliminary analysis, the maximum OBC fire flow demand is estimated to be 9,000L/min (150L/s) and the existing municipal hydrant can provide adequate pressure for fire protection. These flow rates are provided to the City for inclusion in their water system model and confirmation of available capacity.
- iv) The expected peak sanitary flow rate from the Site is 11.1L/s. This flow rate is provided to the City for inclusion in their model to evaluate available capacity and determine if any downstream constraints exist within the existing municipal sanitary system.
- v) The SWM criteria can be satisfied with the implementation of onsite controls for water quantity and water quality.
- vi) Additional grading, servicing and stormwater management details will be provided during detailed design.

All of which is respectfully submitted,

MTE Consultants Inc.



Lynn Ingram, P. Eng

Design Engineer

519-743-6500

lingram@mte85.com

BDW:dlb

https://mte85.sharepoint.com/sites/61809_001/Shared Documents/Reports/FSSWM/rpt_2025-12-03_FSSWM.docx

Appendix A

Fire Flow Analysis Design Sheets



87-95 Seagram Drive

FIRE FLOW DEMANDS

Waterloo, Ontario

Project #: 61809_001

Date Printed: 12/9/2025

Design By: BDW

Checked By: LEI

								Fire Flow ²													Domestic Flow ^{3,4}							
Development Information ¹								Ontario Building Code					Fire Underwriters Survey															
Node ID / Area ID / Building #	F.F.E. (m.a.s.l.)	Description	# of Units	Population	Bldg Area (1 st Floor)	Total Bldg Area	Building Volume	K	V	S _{tot}	Q	F	F	C	A	F	(2) Occupancy Reduction	(3) Sprinkler Protection	(4) Building Exposure	F	F	Fire Flow (Max OBC/FUS)	MOE Guidelines	Average Day	Max Day	Peak Hour	Minimum Hour	Max Day + Fire Flow
				# of people	m ²	m ²	m ³																L/s	L/s	L/s	L/s	L/s	L/s
	Varies	Apartment	522	924	2,095	45,461	147,225	10	147,225	2.00	2,944,496	9,000	150	0.80	10,816	18,304	-15%	-30%	75%	23,000	383	383	2.406	2.406	6.617	9.937	0.962	390
TOTALS FOR SITE			522	924	2095	45461	147225	Max Fire Flow = 150					Max Fire Flow = 383					383	2.41	2.41	6.62	9.94	0.96	390				

Sum of Maximum Day Flows + Largest Fire Flow (L/s) = 390

Assumptions:

- 1 The building areas and populations are based on the Site Plan by Masri O Inc. Architects. Assumed 1.77 persons per unit as per Region of Waterloo Water and Wastewater Monitoring Report 2017.
- 2 The building construction is non-combustible construction with fire separation and fire resistant ratings. The building classification will be A2 for amenity use, D for commercial and C for residential. The FUS total effective area (A) for a building with a construction coefficient below 1.0 was based on the two largest adjoining floor areas plus 50% of all floors immediately above them up to a maximum of eight.
- 3 Average Daily Demands for each building are based on "*Tri City Water Distribution Master Plan Final Report*" by AECOM, Dated May 2009 :
Residential = 225 L/cap/day
- 4 Peaking Factors based on "*Design Guidelines for Drinking-Water Systems*" (MOE, 2008):

Average Day = 1

Maximum Day = 2.75

Peak Hour = 4.13

Minimum Hour = 0.4



PROJECT INFORMATION

Project Name:	87 Seagram Drive Flow Test	Design Project #:	2025-NSD-087
Site Address:	87 Seagram Drive Waterloo ON	Const. Project #:	NA
City Contact:	Jeff Shultz x 30322	Phone #:	519-886-2310
Flow Tester:	Rob Smith	Phone #:	226-376-3053
Technical Contact:	Andy Coghlin	Phone #:	519-476-0761

SITE INFORMATION

SITE MAP



Note: If the main is a dead end, the flowing hydrant shall be closest to the dead end

ITEMS TO LABEL ON MAP	HYDRANTS USED	MAIN SIZE
☒ Static / Residual & Flow Hydrants	☒ City Hydrant(s)	City:
☐ Flow Direction (if the main is dead end)	☐ Site Hydrant(s)	Site:

SITE NOTES



TEST INFORMATION							
Minimum Required Flow:		NA			Min Ports:		2
Personnel Present:		Rob Smith			Test Date:		2025-07-23
City / External Company:		Waterloo Utilities			Test Time:		10:00am
TEST EQUIPMENT							
☐ Hose Monsters with built in Pitot				Hose length used:			
☐ Hand held pitot gauge				☒ Pollard diffuser elbow with built in Pitot			
☐ Other:							
TEST RESULTS							
Number of Ports	Outlet Size (IN)	Discharge Coefficient	Pitot Reading (PSI)			Total Flow (GPM)	Static / Residual Pressure (PSI)
0 Ports							62
1 Port	2.5	0.9	47			1,151	60
2 Ports	2.5	0.9	25	24		1,662	58
3 Ports	2.5	0.9				0	
4 Ports	2.5	0.9				0	
0 Ports	STATIC RE-CHECK						62
TEST NOTES							
HYDRAULIC ADJUSTMENTS (FOR OFFICE USE ONLY)							
ADJUSTMENTS FOR HYDRAULIC GRADE LINE (HGL)							
Reservoir HGL (m):				Site Elevation (m):			
Theoretical Static Head (PSI):		0		PSI to subtract from test pressures:		0	
OTHER HYDRAULIC ADJUSTMENTS							
Other adjustment as required by the City / AHJ:							



87-95 Seagram Drive

FIRE FLOW ANALYSIS

Waterloo, Ontario

Project Number: 61809_001

Date: October 2, 2025

Design By: BDW

Checked By: LEI

File: Q:\61809_001\Fire Flow\61809_001_Site Water Demand & Fire Flow Analysis - 2025-10-02.xlsx

CALCULATION OF RESIDUAL PRESSURE AT WEST STREET MUNICIPAL HYDRANT - OBC

1. Boundary Conditions (Based on Fire Flow Test Results):			
	Metric	Imperial	
P0 - Starting Pressure	43.60 m	62 psi	
P1 - Pressure at Q1	40.79 m	58 psi	
Q1 - From Fire Flow Test	6291 L/min	1662 U.S. gal/min	
Q2 - Required Flow	9000 L/min	2378 U.S. gal/min	Note: Maximum fire flow demand to maintain a minimum pressure of 140 kPa.
P-loss 1	2.81 m	4 psi	
P-loss 2	5.46 m	8 psi	
P2 - Residual Pressure	38.14 m	54 psi	Extrapolated from Fire Flow Test Results

ANALYSIS SUMMARY

Total Losses	0.000 m 0.00 kPa	0.0 psi	
Residual Pressure after Losses	38.14 m 374 kPa	54.3 psi	PASS
<i>Allowable Residual Pressure</i>	<i>140 kPa</i>	<i>20.3 psi</i>	



87-95 Seagram Drive

FIRE FLOW ANALYSIS

Waterloo, Ontario

Project Number: 61809_001

Date: October 2, 2025

Design By: BDW

Checked By: LEI

File: Q:\61809_001\Fire Flow\61809_001_Site Water Demand & Fire Flow Analysis - 2025-10-02.xlsx

CALCULATION OF RESIDUAL PRESSURE AT WEST STREET MUNICIPAL HYDRANT - FUS

1. Boundary Conditions (Based on Fire Flow Test Results):			
	Metric	Imperial	
P0 - Starting Pressure	43.60 m	62 psi	
P1 - Pressure at Q1	40.79 m	58 psi	
Q1 - From Fire Flow Test	6291 L/min	1662 U.S. gal/min	
Q2 - Required Flow	23000 L/min	6076 U.S. gal/min	Note: Maximum fire flow demand to maintain a minimum pressure of 140 kPa.
P-loss 1	2.81 m	4 psi	
P-loss 2	31.03 m	44 psi	
P2 - Residual Pressure	12.57 m	18 psi	Extrapolated from Fire Flow Test Results

ANALYSIS SUMMARY

Total Losses	0.000 m		
	0.00 kPa	0.0 psi	
Residual Pressure after Losses	12.57 m		
	123 kPa	17.9 psi	FAIL
Allowable Residual Pressure	140 kPa	20.3 psi	

Appendix B

Sanitary Sewer Design Sheet

87-95 Seagram Drive CITY OF WATERLOO				SANITARY SEWER DESIGN SHEET ENGINEERING AND PUBLIC WORKS								Design Parameters Average Daily Flow Residential 0.00318 L/s/c Commercial 0.95 L/s/ha Industrial 0.40 L/s/ha Inst. / School 0.25 L/s/ha Mannings "n" 0.013 Min. Velocity 0.6 m/sec Max. Velocity 3.0 m/sec Residential Harmon Peaking Factor (F) $F = 1 + 14/(4 + P^{0.5})$ Commercial Peaking Factor = 2.5 Residential Areas Infiltration 0.25 L/s/ha																																						
Project Number: 61809_001 Date: November 19, 2025 Design By: BDW Checked By: LEI File: Q:\61809_001\61809_001 Sanitary Sewer Design Sheet Waterloo (SSMS) Rev8.xls																																																		
LOCATION				RESIDENTIAL AREAS AND POPULATION								SCHOOL, INSTITUTIONAL			COMMERCIAL			INDUSTRIAL				INFILTRATION			DESIGN																									
STREET		AREA NO.		MANHOLE LOCATION FROM MH TO MH		AREA		No. UNITS @ 1.77 PPU		No. UNITS @ 2.18 PPU		POPUL.		CUMUL POPUL.		PEAK FACTOR "F"		PEAK RES. FLOW		HECTARES AND FLOW OF EACH ZONING						TOTALS- C-I FLOW	AREA		CUMUL AREA		INFIL FLOW		TOTAL VOLUME FLOW		LENGTH		SLOPE		PIPE SIZE		CAPACITY		FULL FLOW VELOCITY							
																				0.25 L/s/ha		0.95 L/s/ha		0.40 L/s/ha																										
																				AREA		CUMUL AREA		PEAK FLOW																					AREA		CUMUL AREA		PEAK FLOW	
																				ha		ha		L/sec																					ha		ha		L/sec	
Seagram Drive				1		BLDG 1A		0.34		522.00		0.924		0.924		3.821888		11.2393								0.1069	0.34		0.34		0.0850		11.4312		17.7		2.00		200		46.3604		1.476							

Appendix C

Storm Sewer Design Sheet

#7-95 Seagram Drive				STORM SEWER DESIGN SHEET				Design Parameters											
CITY OF WATERLOO								<u>100 YEAR STORM</u>											
Project Number: 61809-100 Date: 10/3/2025 Design By: BDW Checked By: LEI File: Q:\61809_001\61809-100 Storm Sewer Design Sheet Waterloo(SSMS)_Rev9.xlsx				ENGINEERING AND PUBLIC WORKS				Q=kAIR, k=0.00277 Manning's "n" 0.013 Intensity (I) = a/(tc+b) ^c Min. Velocity 0.600 m/s a = 4692 Max. Velocity 6.000 m/s b = 17.437 c = 0.956											
LOCATION				STORMWATER FLOW 5 YEAR STORM								DESIGN							
STREET	AREA NUMBER	MANHOLE LOCATION		AREA (A)	RUNOFF COEFF. (C)	A x C	CUMUL. A x C	CONCENTRATION TIME	RAIN INTENSITY (I)	FLOW (Q)	PIPE SIZE	LENGTH	SLOPE	CAPACITY	FULL FLOW VELOCITY	PIPE FULL			
		FROM MH	TO MH																
		ha	ha														ha	min	min
Seagram Drive		1 BLDG	MH1							46.00000	300	2.4	2.00	136.75552	1.9347	33.64			
		MH1	EF04							46.00000	300	3.0	0.50	68.37776	0.9673	67.27			
		EF04	Ex. MH							46.00000	300	8.4	0.50	68.37776	0.9673	67.27			
		*Note: Flows were taken from MIDUSS 100 year output for controlled flows																	

Appendix D

Stormceptor Output

Imbrium® Systems

ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

10/02/2025

Province:	Ontario	Project Name:	87-95 Seagram
City:	Waterloo	Project Number:	61809_001
Nearest Rainfall Station:	WATERLOO WELLINGTON AP	Designer Name:	Isabelle Wilson
Climate Station Id:	6149387	Designer Company:	MTE
Years of Rainfall Data:	34	Designer Email:	bwilson@mte85.com
		Designer Phone:	519-743-6500
Site Name:		EOR Name:	
		EOR Company:	
Drainage Area (ha):	0.34	EOR Email:	
% Imperviousness:	82.00	EOR Phone:	###-###-####
Runoff Coefficient 'c': 0.79			

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	10.20
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	347
Estimated Average Annual Sediment Volume (L/yr):	282

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	89
EFO5	93
EFO6	95
EFO8	98
EFO10	99
EFO12	100

Recommended Stormceptor EFO Model: **EFO4**

Estimated Net Annual Sediment (TSS) Load Reduction (%): **89**

Water Quality Runoff Volume Capture (%): **> 90**

THIRD-PARTY TESTING AND VERIFICATION

► **Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

► **Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

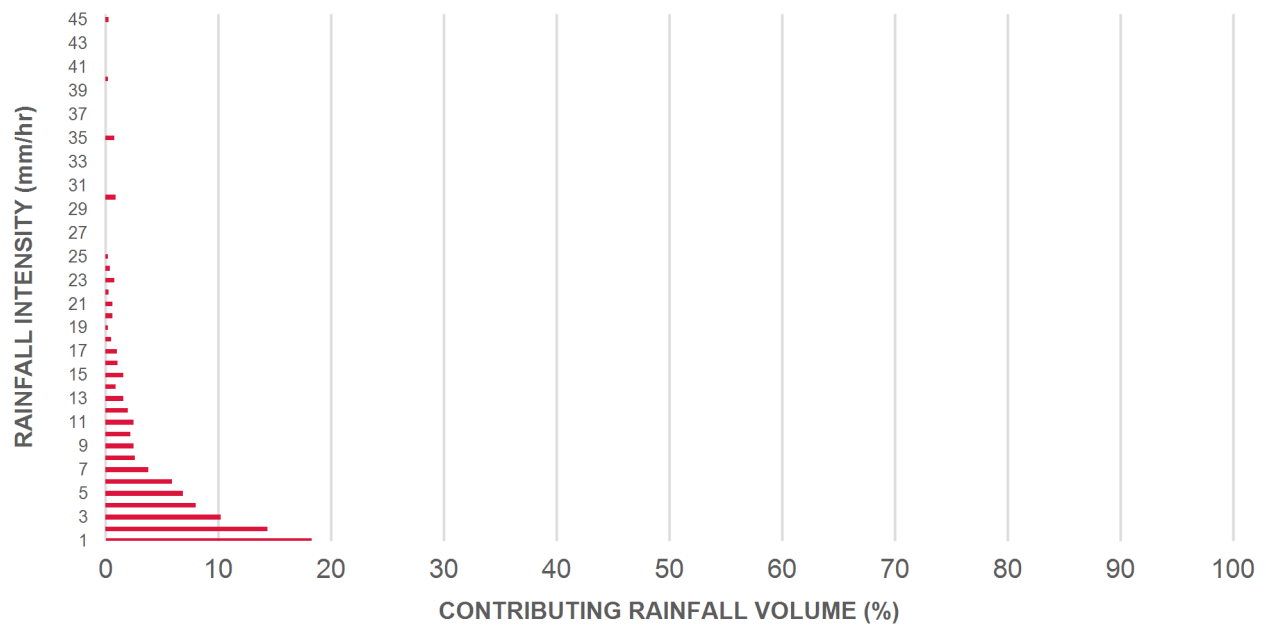
► The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

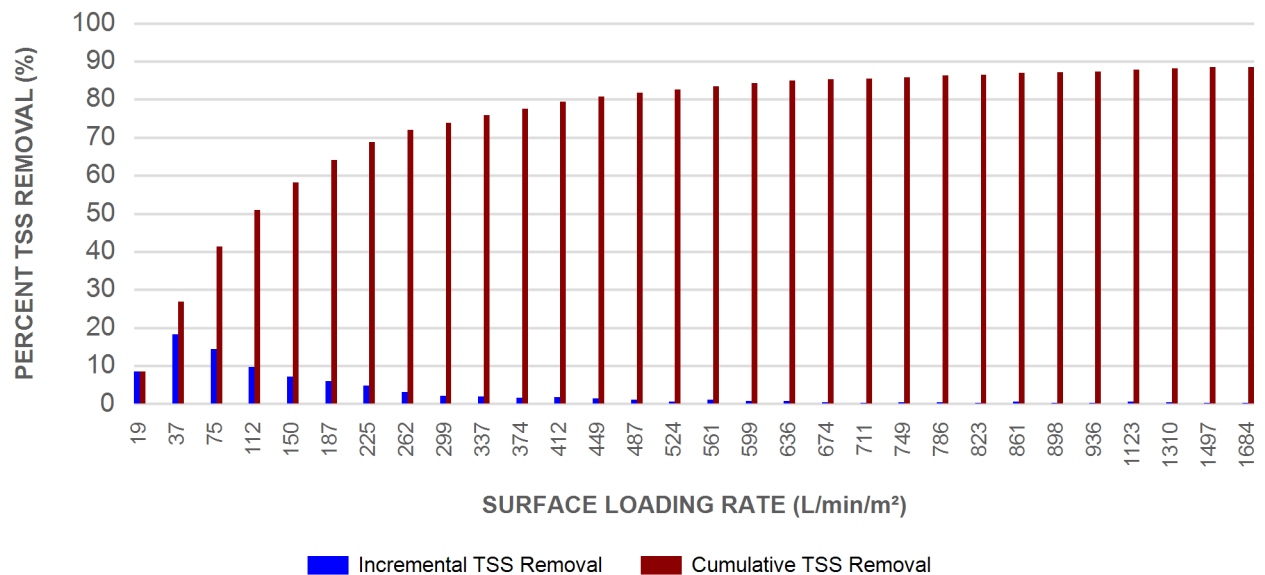
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	0.37	22.0	19.0	100	8.5	8.5
1.00	18.3	26.8	0.75	45.0	37.0	100	18.3	26.8
2.00	14.4	41.3	1.50	90.0	75.0	100	14.4	41.3
3.00	10.2	51.5	2.25	135.0	112.0	95	9.7	50.9
4.00	8.0	59.5	2.99	180.0	150.0	89	7.2	58.1
5.00	6.9	66.4	3.74	225.0	187.0	86	5.9	64.0
6.00	5.9	72.3	4.49	269.0	225.0	82	4.8	68.8
7.00	3.8	76.1	5.24	314.0	262.0	80	3.0	71.9
8.00	2.6	78.7	5.99	359.0	299.0	78	2.0	73.9
9.00	2.5	81.1	6.74	404.0	337.0	77	1.9	75.8
10.00	2.2	83.3	7.49	449.0	374.0	75	1.6	77.5
11.00	2.5	85.8	8.23	494.0	412.0	73	1.8	79.3
12.00	2.0	87.8	8.98	539.0	449.0	72	1.4	80.7
13.00	1.6	89.4	9.73	584.0	487.0	70	1.1	81.8
14.00	0.9	90.4	10.48	629.0	524.0	68	0.6	82.5
15.00	1.6	91.9	11.23	674.0	561.0	66	1.0	83.5
16.00	1.1	93.0	11.98	719.0	599.0	65	0.7	84.2
17.00	1.0	94.0	12.73	764.0	636.0	64	0.7	84.9
18.00	0.5	94.6	13.47	808.0	674.0	64	0.4	85.3
19.00	0.2	94.8	14.22	853.0	711.0	64	0.1	85.4
20.00	0.6	95.4	14.97	898.0	749.0	64	0.4	85.8
21.00	0.6	96.1	15.72	943.0	786.0	63	0.4	86.2
22.00	0.3	96.4	16.47	988.0	823.0	63	0.2	86.4
23.00	0.8	97.2	17.22	1033.0	861.0	63	0.5	86.9
24.00	0.4	97.6	17.97	1078.0	898.0	62	0.3	87.2
25.00	0.2	97.8	18.71	1123.0	936.0	62	0.1	87.3
30.00	0.9	98.7	22.46	1347.0	1123.0	59	0.5	87.8
35.00	0.8	99.5	26.20	1572.0	1310.0	54	0.5	88.2
40.00	0.2	99.7	29.94	1797.0	1497.0	49	0.1	88.4
45.00	0.3	100.0	33.69	2021.0	1684.0	44	0.1	88.5
Estimated Net Annual Sediment (TSS) Load Reduction =								88 %

Climate Station ID: 6149387 Years of Rainfall Data: 34

RAINFALL DATA FROM WATERLOO WELLINGTON AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

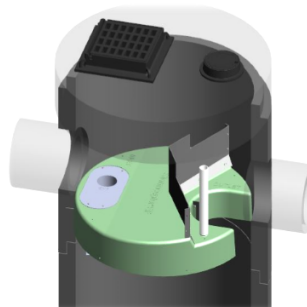
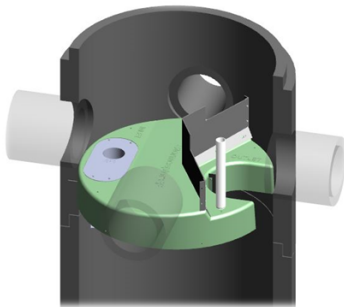
► **Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

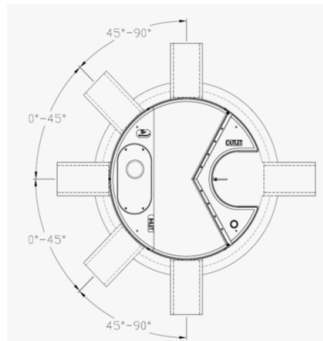
DESIGN FLEXIBILITY

► **Stormceptor® EF and EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

► While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.



**INLET-TO-OUTLET DROP**

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1.

For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>

STANDARD PERFORMANCE SPECIFICATION FOR “OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m ³ sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m ³ sediment / 420 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m ³ sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m ³ sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m ³ sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m ³ sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m² to 1400 L/min/m², and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m² and 1400 L/min/m² shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m² shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m². No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m².

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m² shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m², and shall be calculated using a simple proportioning formula, with 1400 L/min/m² in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m².

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m².

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid

Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators**, with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m² to 2600 L/min/m²) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Appendix E

MIDUSS Output

Pre-Development

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        Q:\61809_001\SWM\PRE DEVELOPMENT\
"                                              2025-08-19"
"          Output filename:                    2y PreB.out"
"          Licensee name:                      A"
"          Company                            "
"          Date & Time last used:              8/19/2025 at 2:16:20 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          1101.000 Coefficient A"
"          9.258  Constant B"
"          0.882  Exponent C"
"          0.400  Fraction R"
"          180.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity      105.659  mm/hr"
"          Total depth            32.400  mm"
"          6  002hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          101  101 - To Seagram"
"          52.000 % Impervious"
"          0.133  Total Area"
"          42.000 Flow length"
"          8.000  Overland Slope"
"          0.064  Pervious Area"
"          42.000 Pervious length"
"          8.000  Pervious slope"
"          0.069  Impervious Area"
"          42.000 Impervious length"
"          8.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          79.000 Pervious SCS Curve No."
"          0.218  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          6.752  Pervious Initial abstraction"
"          0.015  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.836  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"
"          0.015  0.000  0.000  0.000 c.m/sec"

```

	Catchment 101	Pervious	Impervious	Total Area	
"	Surface Area	0.064	0.069	0.133	hectare"
"	Time of concentration	18.895	1.814	5.123	minutes"
"	Time to Centroid	121.537	88.993	95.298	minutes"
"	Rainfall depth	32.400	32.400	32.400	mm"
"	Rainfall volume	20.68	22.41	43.09	c.m"
"	Rainfall losses	25.351	5.325	14.938	mm"
"	Runoff depth	7.049	27.075	17.462	mm"
"	Runoff volume	4.50	18.72	23.23	c.m"
"	Runoff coefficient	0.218	0.836	0.539	"
"	Maximum flow	0.002	0.015	0.015	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.015	0.015	0.000	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.015	0.015	0.015	0.000"
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				
"	1 Node #"				
"	Total Site"				
"	Maximum flow		0.015		c.m/sec"
"	Hydrograph volume		23.225		c.m"
"		0.015	0.015	0.015	0.015"
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"		0.015	0.000	0.015	0.015"
" 33	CATCHMENT 102"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	102 102 - To Stadium"				
"	31.000 % Impervious"				
"	0.207 Total Area"				
"	23.000 Flow length"				
"	4.000 Overland Slope"				
"	0.143 Pervious Area"				
"	23.000 Pervious length"				
"	4.000 Pervious slope"				
"	0.064 Impervious Area"				
"	23.000 Impervious length"				
"	4.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	79.000 Pervious SCS Curve No."				
"	0.217 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	6.752 Pervious Initial abstraction"				
"	0.015 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.834 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				

```

"      0.518  Impervious Initial abstraction"
"      0.015      0.000      0.015      0.015 c.m/sec"
"      Catchment 102      Pervious  Impervious Total Area "
"      Surface Area      0.143      0.064      0.207      hectare"
"      Time of concentration 16.208      1.556      6.935      minutes"
"      Time to Centroid      118.251      88.587      99.478      minutes"
"      Rainfall depth      32.400      32.400      32.400      mm"
"      Rainfall volume      46.28      20.79      67.07      c.m"
"      Rainfall losses      25.356      5.374      19.162      mm"
"      Runoff depth      7.044      27.026      13.238      mm"
"      Runoff volume      10.06      17.34      27.40      c.m"
"      Runoff coefficient      0.217      0.834      0.409      "
"      Maximum flow      0.004      0.014      0.015      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"      0.015      0.015      0.015      0.015"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"      0.015      0.015      0.015      0.015"
" 40      HYDROGRAPH Combine 1"
"      6      Combine "
"      1      Node #"
"      Total Site"
"      Maximum flow      0.030      c.m/sec"
"      Hydrograph volume      50.629      c.m"
"      0.015      0.015      0.015      0.030"
" 40      HYDROGRAPH Confluence 1"
"      7      Confluence "
"      1      Node #"
"      Total Site"
"      Maximum flow      0.030      c.m/sec"
"      Hydrograph volume      50.629      c.m"
"      0.015      0.030      0.015      0.000"
" 38      START/RE-START TOTALS 1"
"      3      Runoff Totals on EXIT"
"      Total Catchment area      0.340      hectare"
"      Total Impervious area      0.133      hectare"
"      Total % impervious      39.215"
" 19      EXIT"

```

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                      Q:\61809_001\SWM\PRE DEVELOPMENT\
"                                           2025-08-19"
"          Output filename:                    5y PreB.out"
"          Licensee name:                      A"
"          Company                            "
"          Date & Time last used:              8/19/2025 at 2:15:10 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          1755.000 Coefficient A"
"          12.347  Constant B"
"          0.895  Exponent C"
"          0.400  Fraction R"
"          180.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          136.512  mm/hr"
"          Total depth                47.549  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          101  101 - To Seagram"
"          52.000 % Impervious"
"          0.133  Total Area"
"          42.000 Flow length"
"          8.000  Overland Slope"
"          0.064  Pervious Area"
"          42.000 Pervious length"
"          8.000  Pervious slope"
"          0.069  Impervious Area"
"          42.000 Impervious length"
"          8.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          79.000 Pervious SCS Curve No."
"          0.323  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          6.752  Pervious Initial abstraction"
"          0.015  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.879  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"
"          0.022  0.000  0.000  0.000 c.m/sec"

```

	Catchment 101	Pervious	Impervious	Total Area	
"	Surface Area	0.064	0.069	0.133	hectare"
"	Time of concentration	13.837	1.611	4.705	minutes"
"	Time to Centroid	113.719	88.032	94.532	minutes"
"	Rainfall depth	47.549	47.549	47.549	mm"
"	Rainfall volume	30.36	32.88	63.24	c.m"
"	Rainfall losses	32.211	5.757	18.455	mm"
"	Runoff depth	15.338	41.792	29.094	mm"
"	Runoff volume	9.79	28.90	38.70	c.m"
"	Runoff coefficient	0.323	0.879	0.612	"
"	Maximum flow	0.004	0.021	0.022	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.022	0.022	0.000	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.022	0.022	0.022	0.000"
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				
"	1 Node #"				
"	Total Site"				
"	Maximum flow		0.022		c.m/sec"
"	Hydrograph volume		38.695		c.m"
"		0.022	0.022	0.022	0.022"
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"		0.022	0.000	0.022	0.022"
" 33	CATCHMENT 102"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	102 102 - To Stadium"				
"	31.000 % Impervious"				
"	0.207 Total Area"				
"	23.000 Flow length"				
"	4.000 Overland Slope"				
"	0.143 Pervious Area"				
"	23.000 Pervious length"				
"	4.000 Pervious slope"				
"	0.064 Impervious Area"				
"	23.000 Impervious length"				
"	4.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	79.000 Pervious SCS Curve No."				
"	0.322 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	6.752 Pervious Initial abstraction"				
"	0.015 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.876 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				

"	0.518	Impervious Initial abstraction"			
"		0.022	0.000	0.022	0.022 c.m/sec"
"		Catchment 102	Pervious	Impervious	Total Area "
"		Surface Area	0.143	0.064	0.207 hectare"
"		Time of concentration	11.870	1.382	6.101 minutes"
"		Time to Centroid	111.238	87.733	98.310 minutes"
"		Rainfall depth	47.549	47.549	47.549 mm"
"		Rainfall volume	67.91	30.51	98.43 c.m"
"		Rainfall losses	32.233	5.879	24.063 mm"
"		Runoff depth	15.316	41.670	23.486 mm"
"		Runoff volume	21.88	26.74	48.62 c.m"
"		Runoff coefficient	0.322	0.876	0.494 "
"		Maximum flow	0.010	0.020	0.022 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.022	0.022	0.022	0.022"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.022	0.022	0.022	0.022"
" 40		HYDROGRAPH Combine 1"			
"	6	Combine "			
"	1	Node #"			
"		Total Site"			
"		Maximum flow	0.044	c.m/sec"	
"		Hydrograph volume	87.311	c.m"	
"		0.022	0.022	0.022	0.044"
" 40		HYDROGRAPH Confluence 1"			
"	7	Confluence "			
"	1	Node #"			
"		Total Site"			
"		Maximum flow	0.044	c.m/sec"	
"		Hydrograph volume	87.311	c.m"	
"		0.022	0.044	0.022	0.000"
" 38		START/RE-START TOTALS 1"			
"	3	Runoff Totals on EXIT"			
"		Total Catchment area	0.340	hectare"	
"		Total Impervious area	0.133	hectare"	
"		Total % impervious	39.215"		
" 19		EXIT"			

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        Q:\61809_001\SWM\PRE DEVELOPMENT\
"                                              2025-08-19"
"          Output filename:                    100y PreB.out"
"          Licensee name:                      A"
"          Company                            "
"          Date & Time last used:              8/19/2025 at 2:12:08 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          4692.000 Coefficient A"
"          17.437  Constant B"
"          0.956  Exponent C"
"          0.400  Fraction R"
"          180.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity      239.793  mm/hr"
"          Total depth            89.960  mm"
"          6  100hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          101  101 - To Seagram"
"          52.000 % Impervious"
"          0.133  Total Area"
"          42.000 Flow length"
"          8.000  Overland Slope"
"          0.064  Pervious Area"
"          42.000 Pervious length"
"          8.000  Pervious slope"
"          0.069  Impervious Area"
"          42.000 Impervious length"
"          8.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          79.000 Pervious SCS Curve No."
"          0.508  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          6.752  Pervious Initial abstraction"
"          0.015  Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.922  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"
"          0.046  0.000  0.000  0.000 c.m/sec"

```

	Catchment 101	Pervious	Impervious	Total Area	
"	Surface Area	0.064	0.069	0.133	hectare"
"	Time of concentration	8.817	1.270	3.815	minutes"
"	Time to Centroid	103.257	85.801	91.686	minutes"
"	Rainfall depth	89.960	89.960	89.960	mm"
"	Rainfall volume	57.43	62.22	119.65	c.m"
"	Rainfall losses	44.239	6.988	24.869	mm"
"	Runoff depth	45.721	82.972	65.091	mm"
"	Runoff volume	29.19	57.38	86.57	c.m"
"	Runoff coefficient	0.508	0.922	0.724	"
"	Maximum flow	0.016	0.040	0.046	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.046	0.046	0.000	0.000"
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"		0.046	0.046	0.046	0.000"
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				
"	1 Node #"				
"	Total Site"				
"	Maximum flow		0.046		c.m/sec"
"	Hydrograph volume		86.571		c.m"
"		0.046	0.046	0.046	0.046"
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"		0.046	0.000	0.046	0.046"
" 33	CATCHMENT 102"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	102 102 - To Stadium"				
"	31.000 % Impervious"				
"	0.207 Total Area"				
"	23.000 Flow length"				
"	4.000 Overland Slope"				
"	0.143 Pervious Area"				
"	23.000 Pervious length"				
"	4.000 Pervious slope"				
"	0.064 Impervious Area"				
"	23.000 Impervious length"				
"	4.000 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	79.000 Pervious SCS Curve No."				
"	0.509 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	6.752 Pervious Initial abstraction"				
"	0.015 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.915 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				

```

"      0.518  Impervious Initial abstraction"
"      0.064      0.000      0.046      0.046 c.m/sec"
"      Catchment 102      Pervious  Impervious Total Area "
"      Surface Area      0.143      0.064      0.207      hectare"
"      Time of concentration 7.563      1.090      4.670      minutes"
"      Time to Centroid 101.724      85.591      94.513      minutes"
"      Rainfall depth 89.960      89.960      89.960      mm"
"      Rainfall volume 128.49      57.73      186.22      c.m"
"      Rainfall losses 44.204      7.658      32.875      mm"
"      Runoff depth 45.756      82.302      57.085      mm"
"      Runoff volume 65.35      52.81      118.17      c.m"
"      Runoff coefficient 0.509      0.915      0.635      "
"      Maximum flow 0.038      0.037      0.064      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"      0.064      0.064      0.046      0.046"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"      0.064      0.064      0.064      0.046"
" 40      HYDROGRAPH Combine 1"
"      6      Combine "
"      1      Node #"
"      Total Site"
"      Maximum flow      0.108      c.m/sec"
"      Hydrograph volume 204.738      c.m"
"      0.064      0.064      0.064      0.108"
" 40      HYDROGRAPH Confluence 1"
"      7      Confluence "
"      1      Node #"
"      Total Site"
"      Maximum flow      0.108      c.m/sec"
"      Hydrograph volume 204.738      c.m"
"      0.064      0.108      0.064      0.000"
" 38      START/RE-START TOTALS 1"
"      3      Runoff Totals on EXIT"
"      Total Catchment area      0.340      hectare"
"      Total Impervious area      0.133      hectare"
"      Total % impervious      39.215"
" 19      EXIT"

```

Post-Development

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                        Q:\61809_001\SWM\POST DEVELOPMENT\
"                                              2025-11-14"
"          Output filename:                    2YR POSTa.out"
"          Licensee name:                      A"
"          Company                            "
"          Date & Time last used:              11/14/2025 at 4:15:24 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          1101.000 Coefficient A"
"          9.258  Constant B"
"          0.882  Exponent C"
"          0.400  Fraction R"
"          180.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity      105.659  mm/hr"
"          Total depth            32.400  mm"
"          6  002hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 201"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          201  201 - Towers"
"          100.000 % Impervious"
"          0.122  Total Area"
"          7.500  Flow length"
"          2.000  Overland Slope"
"          0.000  Pervious Area"
"          7.500  Pervious length"
"          2.000  Pervious slope"
"          0.122  Impervious Area"
"          7.500  Impervious length"
"          2.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          79.000  Pervious SCS Curve No."
"          0.000  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          6.752  Pervious Initial abstraction"
"          0.015  Impervious Manning 'n'"
"          98.000  Impervious SCS Curve No."
"          0.816  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"
"          0.028  0.000  0.000  0.000 c.m/sec"

```

	Catchment 201	Pervious	Impervious	Total Area	
	Surface Area	0.000	0.122	0.122	hectare"
	Time of concentration	10.187	0.978	0.978	minutes"
	Time to Centroid	110.768	87.837	87.837	minutes"
	Rainfall depth	32.400	32.400	32.400	mm"
	Rainfall volume	0.00	39.53	39.53	c.m"
	Rainfall losses	25.372	5.951	5.951	mm"
	Runoff depth	7.028	26.449	26.449	mm"
	Runoff volume	0.00	32.27	32.27	c.m"
	Runoff coefficient	0.000	0.816	0.816	"
	Maximum flow	0.000	0.028	0.028	c.m/sec"
40	HYDROGRAPH Add Runoff "				
	4 Add Runoff "				
		0.028	0.028	0.000	0.000"
54	POND DESIGN"				
	0.028	Current peak flow	c.m/sec"		
	0.035	Target outflow	c.m/sec"		
	32.3	Hydrograph volume	c.m"		
	11.	Number of stages"			
	0.000	Minimum water level	metre"		
	0.150	Maximum water level	metre"		
	0.000	Starting water level	metre"		
	0	Keep Design Data: 1 = True; 0 = False"			
		Level Discharge	Volume"		
		0.000	0.000	0.000"	
		0.01500	0.00135	0.06825"	
		0.03000	0.00270	0.5460"	
		0.04500	0.00405	1.843"	
		0.06000	0.00540	4.368"	
		0.07500	0.00675	8.531"	
		0.09000	0.00810	14.742"	
		0.1050	0.00945	23.410"	
		0.1200	0.01080	34.944"	
		0.1350	0.01215	48.549"	
		0.1500	0.01350	62.199"	
	1.	ROOFTOP"			
		Roof area	Store area	Area/drain	Drain flow
		hectare	hectare	sq.metre	L/min/25mm
		0.122	0.091	150.000	22.500
					g H:1V"
					50.000"
		Using 6 roofdrains on roofstorage area of 910. square metre"			
		Peak outflow		0.008	c.m/sec"
		Maximum level		0.085	metre"
		Maximum storage		12.639	c.m"
		Centroidal lag		1.748	hours"
		0.028	0.028	0.008	0.000 c.m/sec"
40		HYDROGRAPH	Combine	1"	
	6	Combine "			
	1	Node #"			
		Total Controlled"			
		Maximum flow		0.008	c.m/sec"
		Hydrograph volume		32.271	c.m"

"		0.028	0.028	0.008	0.008"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"		0.028	0.000	0.008	0.008"
" 33	CATCHMENT 202"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	1	SCS method"			
"	202	202 - Controlled"			
"	88.000	% Impervious"			
"	0.140	Total Area"			
"	8.000	Flow length"			
"	2.000	Overland Slope"			
"	0.017	Pervious Area"			
"	8.000	Pervious length"			
"	2.000	Pervious slope"			
"	0.123	Impervious Area"			
"	8.000	Impervious length"			
"	2.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	79.000	Pervious SCS Curve No."			
"	0.217	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	6.752	Pervious Initial abstraction"			
"	0.015	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			
"	0.819	Impervious Runoff coefficient"			
"	0.100	Impervious Ia/S coefficient"			
"	0.518	Impervious Initial abstraction"			
"		0.029	0.000	0.008	0.008 c.m/sec"
"	Catchment 202	Pervious	Impervious	Total Area	"
"	Surface Area	0.017	0.123	0.140	hectare"
"	Time of concentration	10.589	1.017	1.351	minutes"
"	Time to Centroid	111.247	87.897	88.713	minutes"
"	Rainfall depth	32.400	32.400	32.400	mm"
"	Rainfall volume	5.44	39.92	45.36	c.m"
"	Rainfall losses	25.358	5.873	8.211	mm"
"	Runoff depth	7.042	26.527	24.189	mm"
"	Runoff volume	1.18	32.68	33.86	c.m"
"	Runoff coefficient	0.217	0.819	0.747	"
"	Maximum flow	0.001	0.029	0.029	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.029	0.029	0.008	0.008"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		0.029	0.029	0.029	0.008"
" 40	HYDROGRAPH Combine 1"				
"	6	Combine "			
"	1	Node #"			
"	Total Controlled"				

"		Maximum flow	0.035	c.m/sec"
"		Hydrograph volume	66.136	c.m"
"		0.029 0.029 0.029	0.035"	
" 40		HYDROGRAPH Confluence	1"	
"	7	Confluence "		
"	1	Node #"		
"		Total Controlled"		
"		Maximum flow	0.035	c.m/sec"
"		Hydrograph volume	66.136	c.m"
"		0.029 0.035 0.029	0.000"	
" 54		POND DESIGN"		
"	0.035	Current peak flow	c.m/sec"	
"	0.035	Target outflow	c.m/sec"	
"	66.1	Hydrograph volume	c.m"	
"	7.	Number of stages"		
"	332.306	Minimum water level	metre"	
"	333.750	Maximum water level	metre"	
"	332.306	Starting water level	metre"	
"	0	Keep Design Data: 1 = True; 0 = False"		
"		Level Discharge	Volume"	
"	332.307	0.000	0.000"	
"	332.500	0.01719	1.01E-05"	
"	332.750	0.03443	12.500"	
"	333.000	0.04556	25.000"	
"	333.250	0.05446	37.500"	
"	333.500	0.06210	50.000"	
"	333.750	0.06889	62.500"	
"	1.	ORIFICES"		
"		Orifice Orifice Orifice Number of"		
"		invert coefficie diameter orifices"		
"	332.307	0.630	0.1650 1.000"	
"		Peak outflow	0.023 c.m/sec"	
"		Maximum level	332.588 metre"	
"		Maximum storage	4.381 c.m"	
"		Centroidal lag	1.629 hours"	
"	0.029 0.035 0.023	0.000 c.m/sec"		
" 40		HYDROGRAPH Combine	2"	
"	6	Combine "		
"	2	Node #"		
"		Total Site"		
"		Maximum flow	0.023 c.m/sec"	
"		Hydrograph volume	66.065 c.m"	
"		0.029 0.035 0.023	0.023"	
" 40		HYDROGRAPH Start - New Tributary"		
"	2	Start - New Tributary"		
"		0.029 0.000 0.023	0.023"	
" 33		CATCHMENT 203"		
"	1	Triangular SCS"		
"	1	Equal length"		
"	1	SCS method"		
"	203	203 - Uncontrolled to Seagram"		

```

"      38.000    % Impervious"
"      0.054    Total Area"
"      7.000    Flow length"
"      2.000    Overland Slope"
"      0.033    Pervious Area"
"      7.000    Pervious length"
"      2.000    Pervious slope"
"      0.021    Impervious Area"
"      7.000    Impervious length"
"      2.000    Impervious slope"
"      0.250    Pervious Manning 'n'"
"      79.000    Pervious SCS Curve No."
"      0.216    Pervious Runoff coefficient"
"      0.100    Pervious Ia/S coefficient"
"      6.752    Pervious Initial abstraction"
"      0.015    Impervious Manning 'n'"
"      98.000    Impervious SCS Curve No."
"      0.814    Impervious Runoff coefficient"
"      0.100    Impervious Ia/S coefficient"
"      0.518    Impervious Initial abstraction"
"      0.005      0.000      0.023      0.023 c.m/sec"
"      Catchment 203      Pervious      Impervious      Total Area "
"      Surface Area      0.033      0.021      0.054      hectare"
"      Time of concentration 9.774      0.938      3.613      minutes"
"      Time to Centroid 110.275      87.778      94.588      minutes"
"      Rainfall depth 32.400      32.400      32.400      mm"
"      Rainfall volume 10.85      6.65      17.50      c.m"
"      Rainfall losses 25.387      6.041      18.035      mm"
"      Runoff depth 7.014      26.359      14.365      mm"
"      Runoff volume 2.35      5.41      7.76      c.m"
"      Runoff coefficient 0.216      0.814      0.443      "
"      Maximum flow 0.001      0.005      0.005      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"      0.005      0.005      0.023      0.023"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"      0.005      0.005      0.005      0.023"
" 40      HYDROGRAPH Combine 2"
"      6      Combine "
"      2      Node #"
"      Total Site"
"      Maximum flow 0.027      c.m/sec"
"      Hydrograph volume 73.822      c.m"
"      0.005      0.005      0.005      0.027"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"      0.005      0.000      0.005      0.027"
" 33      CATCHMENT 204"
"      1      Triangular SCS"
"      1      Equal length"

```

```

"          1   SCS method"
"          204 204 - Uncontrolled to Stadium"
"          0.000 % Impervious"
"          0.024 Total Area"
"          2.000 Flow length"
"         20.000 Overland Slope"
"          0.024 Pervious Area"
"          2.000 Pervious length"
"         20.000 Pervious slope"
"          0.000 Impervious Area"
"          2.000 Impervious length"
"         20.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"         79.000 Pervious SCS Curve No."
"          0.215 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          6.752 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"         98.000 Impervious SCS Curve No."
"          0.000 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"
"              0.001      0.000      0.005      0.027 c.m/sec"
"          Catchment 204      Pervious      Impervious      Total Area  "
"          Surface Area      0.024      0.000      0.024      hectare"
"          Time of concentration 2.310      0.222      2.310      minutes"
"          Time to Centroid      100.859      86.410      100.859      minutes"
"          Rainfall depth      32.400      32.400      32.400      mm"
"          Rainfall volume      7.78      0.00      7.78      c.m"
"          Rainfall losses      25.448      8.741      25.448      mm"
"          Runoff depth      6.952      23.659      6.952      mm"
"          Runoff volume      1.67      0.00      1.67      c.m"
"          Runoff coefficient      0.215      0.000      0.215      "
"          Maximum flow      0.001      0.000      0.001      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"          4      Add Runoff "
"              0.001      0.001      0.005      0.027"
" 40          HYDROGRAPH Copy to Outflow"
"          8      Copy to Outflow"
"              0.001      0.001      0.001      0.027"
" 40          HYDROGRAPH Combine      2"
"          6      Combine "
"          2      Node #"
"          Total Site"
"          Maximum flow      0.028      c.m/sec"
"          Hydrograph volume      75.491      c.m"
"              0.001      0.001      0.001      0.028"
" 38          START/RE-START TOTALS 204"
"          3      Runoff Totals on EXIT"
"          Total Catchment area      0.340      hectare"
"          Total Impervious area      0.266      hectare"

```

"	Total % impervious	78.153"
" 19	EXIT"	

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                      Q:\61809_001\SWM\POST DEVELOPMENT\
"                                           2025-11-14"
"          Output filename:                      5YR POSTa.out"
"          Licensee name:                      A"
"          Company                      "
"          Date & Time last used:                      11/14/2025 at 4:08:24 PM"
" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          1755.000  Coefficient A"
"          12.347  Constant B"
"          0.895  Exponent C"
"          0.400  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          136.512  mm/hr"
"          Total depth          47.549  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          201  201 - Towers"
"          100.000  % Impervious"
"          0.122  Total Area"
"          7.500  Flow length"
"          2.000  Overland Slope"
"          0.000  Pervious Area"
"          7.500  Pervious length"
"          2.000  Pervious slope"
"          0.122  Impervious Area"
"          7.500  Impervious length"
"          2.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          79.000  Pervious SCS Curve No."
"          0.000  Pervious Runoff coefficient"
"          0.100  Pervious Ia/S coefficient"
"          6.752  Pervious Initial abstraction"
"          0.015  Impervious Manning 'n'"
"          98.000  Impervious SCS Curve No."
"          0.852  Impervious Runoff coefficient"
"          0.100  Impervious Ia/S coefficient"
"          0.518  Impervious Initial abstraction"
"          0.039  0.000  0.000  0.000 c.m/sec"

```

```

"          Catchment 201          Pervious    Impervious    Total Area  "
"          Surface Area          0.000      0.122      0.122      hectare"
"          Time of concentration  7.460      0.869      0.869      minutes"
"          Time to Centroid      105.764    87.072    87.072    minutes"
"          Rainfall depth        47.549    47.549    47.549    mm"
"          Rainfall volume       0.00      58.01     58.01     c.m"
"          Rainfall losses       32.263    7.061     7.061     mm"
"          Runoff depth          15.286    40.488    40.488    mm"
"          Runoff volume         0.00      49.40     49.40     c.m"
"          Runoff coefficient     0.000     0.852     0.852     "
"          Maximum flow          0.000     0.039     0.039     c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4      Add Runoff "
"                  0.039      0.039      0.000      0.000"
" 54      POND DESIGN"
"          0.039      Current peak flow      c.m/sec"
"          0.035      Target outflow      c.m/sec"
"          49.4      Hydrograph volume      c.m"
"          11.      Number of stages"
"          0.000      Minimum water level      metre"
"          0.150      Maximum water level      metre"
"          0.000      Starting water level      metre"
"          0      Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge      Volume"
"                  0.000      0.000      0.000"
"                  0.01500      0.00135      0.06825"
"                  0.03000      0.00270      0.5460"
"                  0.04500      0.00405      1.843"
"                  0.06000      0.00540      4.368"
"                  0.07500      0.00675      8.531"
"                  0.09000      0.00810      14.742"
"                  0.1050      0.00945      23.410"
"                  0.1200      0.01080      34.944"
"                  0.1350      0.01215      48.549"
"                  0.1500      0.01350      62.199"
"          1.      ROOFTOP"
"                  Roof area      Store area      Area/drain      Drain flow      Roof slope"
"                  hectare      hectare      sq.metre      L/min/25mm      g H:1V"
"                  0.122      0.091      150.000      22.500      50.000"
"                  Using 6 roofdrains on roofstorage area of 910. square metre"
"                  Peak outflow      0.009      c.m/sec"
"                  Maximum level      0.101      metre"
"                  Maximum storage      21.072      c.m"
"                  Centroidal lag      1.864      hours"
"                  0.039      0.039      0.009      0.000 c.m/sec"
" 40      HYDROGRAPH      Combine      1"
"          6      Combine "
"          1      Node #"
"                  Total Controlled"
"                  Maximum flow      0.009      c.m/sec"
"                  Hydrograph volume      49.376      c.m"

```

"		0.039	0.039	0.009	0.009"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"		0.039	0.000	0.009	0.009"
" 33	CATCHMENT 202"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	1	SCS method"			
"	202	202 - Controlled"			
"	88.000	% Impervious"			
"	0.140	Total Area"			
"	8.000	Flow length"			
"	2.000	Overland Slope"			
"	0.017	Pervious Area"			
"	8.000	Pervious length"			
"	2.000	Pervious slope"			
"	0.123	Impervious Area"			
"	8.000	Impervious length"			
"	2.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	79.000	Pervious SCS Curve No."			
"	0.322	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	6.752	Pervious Initial abstraction"			
"	0.015	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			
"	0.854	Impervious Runoff coefficient"			
"	0.100	Impervious Ia/S coefficient"			
"	0.518	Impervious Initial abstraction"			
"		0.039	0.000	0.009	0.009 c.m/sec"
"	Catchment 202	Pervious	Impervious	Total Area	"
"	Surface Area	0.017	0.123	0.140	hectare"
"	Time of concentration	7.755	0.903	1.238	minutes"
"	Time to Centroid	106.120	87.109	88.039	minutes"
"	Rainfall depth	47.549	47.549	47.549	mm"
"	Rainfall volume	7.99	58.58	66.57	c.m"
"	Rainfall losses	32.232	6.924	9.961	mm"
"	Runoff depth	15.317	40.625	37.588	mm"
"	Runoff volume	2.57	50.05	52.62	c.m"
"	Runoff coefficient	0.322	0.854	0.791	"
"	Maximum flow	0.001	0.039	0.039	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.039	0.039	0.009	0.009"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		0.039	0.039	0.039	0.009"
" 40	HYDROGRAPH Combine 1"				
"	6	Combine "			
"	1	Node #"			
"	Total Controlled"				

"		Maximum flow	0.046	c.m/sec"
"		Hydrograph volume	101.999	c.m"
"		0.039 0.039 0.039	0.046"	
" 40		HYDROGRAPH Confluence	1"	
"	7	Confluence "		
"	1	Node #"		
"		Total Controlled"		
"		Maximum flow	0.046	c.m/sec"
"		Hydrograph volume	101.999	c.m"
"		0.039 0.046 0.039	0.000"	
" 54		POND DESIGN"		
"	0.046	Current peak flow	c.m/sec"	
"	0.035	Target outflow	c.m/sec"	
"	102.0	Hydrograph volume	c.m"	
"	7.	Number of stages"		
"	332.306	Minimum water level	metre"	
"	333.750	Maximum water level	metre"	
"	332.306	Starting water level	metre"	
"	0	Keep Design Data: 1 = True; 0 = False"		
"		Level Discharge	Volume"	
"	332.307	0.000	0.000"	
"	332.500	0.01719	1.01E-05"	
"	332.750	0.03443	12.500"	
"	333.000	0.04556	25.000"	
"	333.250	0.05446	37.500"	
"	333.500	0.06210	50.000"	
"	333.750	0.06889	62.500"	
"	1.	ORIFICES"		
"		Orifice Orifice Orifice Number of"		
"		invert coefficie diameter orifices"		
"	332.307	0.630	0.1650 1.000"	
"		Peak outflow	0.029 c.m/sec"	
"		Maximum level	332.679 metre"	
"		Maximum storage	8.927 c.m"	
"		Centroidal lag	1.692 hours"	
"	0.039 0.046	0.029	0.000 c.m/sec"	
" 40		HYDROGRAPH Combine	2"	
"	6	Combine "		
"	2	Node #"		
"		Total Site"		
"		Maximum flow	0.029 c.m/sec"	
"		Hydrograph volume	101.221 c.m"	
"		0.039 0.046 0.029	0.029"	
" 40		HYDROGRAPH Start - New Tributary"		
"	2	Start - New Tributary"		
"		0.039 0.000 0.029	0.029"	
" 33		CATCHMENT 203"		
"	1	Triangular SCS"		
"	1	Equal length"		
"	1	SCS method"		
"	203	203 - Uncontrolled to Seagram"		

```

"      38.000  % Impervious"
"      0.054  Total Area"
"      7.000  Flow length"
"      2.000  Overland Slope"
"      0.033  Pervious Area"
"      7.000  Pervious length"
"      2.000  Pervious slope"
"      0.021  Impervious Area"
"      7.000  Impervious length"
"      2.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      79.000  Pervious SCS Curve No."
"      0.321  Pervious Runoff coefficient"
"      0.100  Pervious Ia/S coefficient"
"      6.752  Pervious Initial abstraction"
"      0.015  Impervious Manning 'n'"
"      98.000  Impervious SCS Curve No."
"      0.848  Impervious Runoff coefficient"
"      0.100  Impervious Ia/S coefficient"
"      0.518  Impervious Initial abstraction"
"      0.007      0.000      0.029      0.029 c.m/sec"
"      Catchment 203      Pervious      Impervious      Total Area  "
"      Surface Area      0.033      0.021      0.054      hectare"
"      Time of concentration  7.158      0.834      3.247      minutes"
"      Time to Centroid      105.456      87.047      94.073      minutes"
"      Rainfall depth      47.549      47.549      47.549      mm"
"      Rainfall volume      15.92      9.76      25.68      c.m"
"      Rainfall losses      32.290      7.212      22.760      mm"
"      Runoff depth      15.259      40.337      24.789      mm"
"      Runoff volume      5.11      8.28      13.39      c.m"
"      Runoff coefficient      0.321      0.848      0.521      "
"      Maximum flow      0.003      0.006      0.007      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"      0.007      0.007      0.029      0.029"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"      0.007      0.007      0.007      0.029"
" 40      HYDROGRAPH Combine 2"
"      6      Combine "
"      2      Node #"
"      Total Site"
"      Maximum flow      0.035      c.m/sec"
"      Hydrograph volume      114.607      c.m"
"      0.007      0.007      0.007      0.035"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"      0.007      0.000      0.007      0.035"
" 33      CATCHMENT 204"
"      1      Triangular SCS"
"      1      Equal length"

```

```

"          1   SCS method"
"        204   204 - Uncontrolled to Stadium"
"       0.000   % Impervious"
"       0.024   Total Area"
"       2.000   Flow length"
"      20.000   Overland Slope"
"       0.024   Pervious Area"
"       2.000   Pervious length"
"      20.000   Pervious slope"
"       0.000   Impervious Area"
"       2.000   Impervious length"
"      20.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      79.000   Pervious SCS Curve No."
"       0.319   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       6.752   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"           0.002   0.000   0.007   0.035 c.m/sec"
"      Catchment 204      Pervious      Impervious      Total Area  "
"      Surface Area      0.024      0.000      0.024      hectare"
"      Time of concentration 1.692      0.197      1.692      minutes"
"      Time to Centroid    98.297      85.544      98.297      minutes"
"      Rainfall depth      47.549      47.549      47.549      mm"
"      Rainfall volume      11.41      0.00      11.41      c.m"
"      Rainfall losses      32.390      11.099      32.390      mm"
"      Runoff depth        15.159      36.450      15.159      mm"
"      Runoff volume        3.64      0.00      3.64      c.m"
"      Runoff coefficient    0.319      0.000      0.319      "
"      Maximum flow        0.002      0.000      0.002      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"           0.002   0.002   0.007   0.035"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"           0.002   0.002   0.002   0.035"
" 40      HYDROGRAPH Combine 2"
"      6      Combine "
"      2      Node #"
"      Total Site"
"      Maximum flow          0.038   c.m/sec"
"      Hydrograph volume      118.245   c.m"
"           0.002   0.002   0.002   0.038"
" 38      START/RE-START TOTALS 204"
"      3      Runoff Totals on EXIT"
"      Total Catchment area          0.340   hectare"
"      Total Impervious area          0.266   hectare"

```

"	Total % impervious	78.153"
" 19	EXIT"	

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 7, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                      Q:\61809_001\SWM\POST DEVELOPMENT\
"                                           2025-11-14"
"          Output filename:                    100YR POSTa.out"
"          Licensee name:                      A"
"          Company                            "
"          Date & Time last used:              11/14/2025 at 4:41:07 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          4692.000 Coefficient A"
"          17.437  Constant B"
"          0.956   Exponent C"
"          0.400   Fraction R"
"          180.000 Duration"
"          1.000   Time step multiplier"
"          Maximum intensity          239.793  mm/hr"
"          Total depth                89.960  mm"
"          6  100hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 201"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"          201 201 - Towers"
"          100.000 % Impervious"
"          0.122  Total Area"
"          7.500  Flow length"
"          2.000  Overland Slope"
"          0.000  Pervious Area"
"          7.500  Pervious length"
"          2.000  Pervious slope"
"          0.122  Impervious Area"
"          7.500  Impervious length"
"          2.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          79.000 Pervious SCS Curve No."
"          0.000 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          6.752 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.875 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"
"          0.070  0.000  0.000  0.000 c.m/sec"

```

```

"          Catchment 201          Pervious    Impervious Total Area "
"          Surface Area          0.000      0.122      0.122      hectare"
"          Time of concentration 4.754      0.685      0.685      minutes"
"          Time to Centroid      98.148     85.208     85.208     minutes"
"          Rainfall depth        89.960     89.960     89.960     mm"
"          Rainfall volume        0.00      109.75     109.75     c.m"
"          Rainfall losses        44.320     11.221     11.221     mm"
"          Runoff depth           45.640     78.739     78.739     mm"
"          Runoff volume           0.00      96.06      96.06      c.m"
"          Runoff coefficient      0.000     0.875     0.875      "
"          Maximum flow           0.000     0.070     0.070     c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4 Add Runoff "
"              0.070      0.070      0.000      0.000"
" 54      POND DESIGN"
"          0.070 Current peak flow c.m/sec"
"          0.035 Target outflow c.m/sec"
"          96.1 Hydrograph volume c.m"
"          11. Number of stages"
"          0.000 Minimum water level metre"
"          0.150 Maximum water level metre"
"          0.000 Starting water level metre"
"          0 Keep Design Data: 1 = True; 0 = False"
"              Level Discharge Volume"
"              0.000      0.000      0.000"
"              0.01500    0.00135    0.06825"
"              0.03000    0.00270    0.5460"
"              0.04500    0.00405    1.843"
"              0.06000    0.00540    4.368"
"              0.07500    0.00675    8.531"
"              0.09000    0.00810   14.742"
"              0.1050    0.00945   23.410"
"              0.1200    0.01080   34.944"
"              0.1350    0.01215   48.549"
"              0.1500    0.01350   62.199"
"          1. ROOFTOP"
"              Roof area Store area Area/drain Drain flow Roof slope"
"              hectare hectare sq.metre L/min/25mm g H:1V"
"              0.122      0.091    150.000    22.500    50.000"
"          Using 6 roofdrains on roofstorage area of 910. square metre"
"          Peak outflow          0.012 c.m/sec"
"          Maximum level          0.136 metre"
"          Maximum storage        49.683 c.m"
"          Centroidal lag         2.174 hours"
"              0.070      0.070      0.012      0.000 c.m/sec"
" 40      HYDROGRAPH Combine 1"
"          6 Combine "
"          1 Node #"
"          Total Controlled"
"          Maximum flow          0.012 c.m/sec"
"          Hydrograph volume      96.062 c.m"

```

"		0.070	0.070	0.012	0.012"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"		0.070	0.000	0.012	0.012"
" 33	CATCHMENT 202"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	1	SCS method"			
"	202	202 - Controlled"			
"	88.000	% Impervious"			
"	0.140	Total Area"			
"	8.000	Flow length"			
"	2.000	Overland Slope"			
"	0.017	Pervious Area"			
"	8.000	Pervious length"			
"	2.000	Pervious slope"			
"	0.123	Impervious Area"			
"	8.000	Impervious length"			
"	2.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	79.000	Pervious SCS Curve No."			
"	0.507	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	6.752	Pervious Initial abstraction"			
"	0.015	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			
"	0.879	Impervious Runoff coefficient"			
"	0.100	Impervious Ia/S coefficient"			
"	0.518	Impervious Initial abstraction"			
"		0.074	0.000	0.012	0.012 c.m/sec"
"	Catchment 202	Pervious	Impervious	Total Area	"
"	Surface Area	0.017	0.123	0.140	hectare"
"	Time of concentration	4.941	0.712	1.020	minutes"
"	Time to Centroid	98.385	85.204	86.165	minutes"
"	Rainfall depth	89.960	89.960	89.960	mm"
"	Rainfall volume	15.11	110.83	125.94	c.m"
"	Rainfall losses	44.326	10.864	14.880	mm"
"	Runoff depth	45.634	79.096	75.080	mm"
"	Runoff volume	7.67	97.45	105.11	c.m"
"	Runoff coefficient	0.507	0.879	0.835	"
"	Maximum flow	0.005	0.071	0.074	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.074	0.074	0.012	0.012"
" 40	HYDROGRAPH Copy to Outflow"				
"	8	Copy to Outflow"			
"		0.074	0.074	0.074	0.012"
" 40	HYDROGRAPH Combine 1"				
"	6	Combine "			
"	1	Node #"			
"	Total Controlled"				

"		Maximum flow	0.083	c.m/sec"
"		Hydrograph volume	201.175	c.m"
"		0.074 0.074 0.074	0.083"	
" 40		HYDROGRAPH Confluence	1"	
"	7	Confluence "		
"	1	Node #"		
"		Total Controlled"		
"		Maximum flow	0.083	c.m/sec"
"		Hydrograph volume	201.175	c.m"
"		0.074 0.083 0.074	0.000"	
" 54		POND DESIGN"		
"	0.083	Current peak flow	c.m/sec"	
"	0.035	Target outflow	c.m/sec"	
"	201.2	Hydrograph volume	c.m"	
"	7.	Number of stages"		
"	332.306	Minimum water level	metre"	
"	333.750	Maximum water level	metre"	
"	332.306	Starting water level	metre"	
"	0	Keep Design Data: 1 = True; 0 = False"		
"		Level Discharge	Volume"	
"	332.307	0.000	0.000"	
"	332.500	0.01719	1.01E-05"	
"	332.750	0.03443	12.500"	
"	333.000	0.04556	25.000"	
"	333.250	0.05446	37.500"	
"	333.500	0.06210	50.000"	
"	333.750	0.06889	62.500"	
"	1.	ORIFICES"		
"		Orifice Orifice Orifice Number of"		
"		invert coefficie diameter orifices"		
"	332.307	0.630 0.1650	1.000"	
"		Peak outflow	0.046 c.m/sec"	
"		Maximum level	333.010 metre"	
"		Maximum storage	25.503 c.m"	
"		Centroidal lag	1.858 hours"	
"	0.074 0.083	0.046 0.000	c.m/sec"	
" 40		HYDROGRAPH Combine	2"	
"	6	Combine "		
"	2	Node #"		
"		Total Site"		
"		Maximum flow	0.046 c.m/sec"	
"		Hydrograph volume	201.088 c.m"	
"		0.074 0.083 0.046	0.046"	
" 40		HYDROGRAPH Start - New Tributary"		
"	2	Start - New Tributary"		
"		0.074 0.000 0.046	0.046"	
" 33		CATCHMENT 203"		
"	1	Triangular SCS"		
"	1	Equal length"		
"	1	SCS method"		
"	203	203 - Uncontrolled to Seagram"		

"	38.000	% Impervious"			
"	0.054	Total Area"			
"	7.000	Flow length"			
"	2.000	Overland Slope"			
"	0.033	Pervious Area"			
"	7.000	Pervious length"			
"	2.000	Pervious slope"			
"	0.021	Impervious Area"			
"	7.000	Impervious length"			
"	2.000	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	79.000	Pervious SCS Curve No."			
"	0.507	Pervious Runoff coefficient"			
"	0.100	Pervious Ia/S coefficient"			
"	6.752	Pervious Initial abstraction"			
"	0.015	Impervious Manning 'n'"			
"	98.000	Impervious SCS Curve No."			
"	0.871	Impervious Runoff coefficient"			
"	0.100	Impervious Ia/S coefficient"			
"	0.518	Impervious Initial abstraction"			
"		0.018	0.000	0.046	0.046 c.m/sec"
"		Catchment 203	Pervious	Impervious	Total Area "
"		Surface Area	0.033	0.021	0.054 hectare"
"		Time of concentration	4.561	0.657	2.558 minutes"
"		Time to Centroid	97.918	85.208	91.397 minutes"
"		Rainfall depth	89.960	89.960	89.960 mm"
"		Rainfall volume	30.12	18.46	48.58 c.m"
"		Rainfall losses	44.392	11.616	31.938 mm"
"		Runoff depth	45.568	78.344	58.023 mm"
"		Runoff volume	15.26	16.08	31.33 c.m"
"		Runoff coefficient	0.507	0.871	0.645 "
"		Maximum flow	0.010	0.012	0.018 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.018	0.018	0.046	0.046"
" 40		HYDROGRAPH Copy to Outflow"			
"	8	Copy to Outflow"			
"		0.018	0.018	0.018	0.046"
" 40		HYDROGRAPH Combine 2"			
"	6	Combine "			
"	2	Node #"			
"		Total Site"			
"		Maximum flow		0.062	c.m/sec"
"		Hydrograph volume		232.420	c.m"
"		0.018	0.018	0.018	0.062"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.018	0.000	0.018	0.062"
" 33		CATCHMENT 204"			
"	1	Triangular SCS"			
"	1	Equal length"			

```

"          1  SCS method"
"        204  204 - Uncontrolled to Stadium"
"        0.000 % Impervious"
"        0.024 Total Area"
"        2.000 Flow length"
"       20.000 Overland Slope"
"        0.024 Pervious Area"
"        2.000 Pervious length"
"       20.000 Pervious slope"
"        0.000 Impervious Area"
"        2.000 Impervious length"
"       20.000 Impervious slope"
"        0.250 Pervious Manning 'n'"
"       79.000 Pervious SCS Curve No."
"        0.496 Pervious Runoff coefficient"
"        0.100 Pervious Ia/S coefficient"
"        6.752 Pervious Initial abstraction"
"        0.015 Impervious Manning 'n'"
"       98.000 Impervious SCS Curve No."
"        0.000 Impervious Runoff coefficient"
"        0.100 Impervious Ia/S coefficient"
"        0.518 Impervious Initial abstraction"
"              0.007      0.000      0.018      0.062 c.m/sec"
"      Catchment 204      Pervious      Impervious      Total Area  "
"      Surface Area      0.024      0.000      0.024      hectare"
"      Time of concentration 1.078      0.155      1.078      minutes"
"      Time to Centroid    93.364      83.539      93.364      minutes"
"      Rainfall depth      89.960      89.960      89.960      mm"
"      Rainfall volume     21.59      0.00      21.59      c.m"
"      Rainfall losses     45.359      16.984      45.359      mm"
"      Runoff depth        44.601      72.976      44.601      mm"
"      Runoff volume       10.70      0.00      10.70      c.m"
"      Runoff coefficient   0.496      0.000      0.496      "
"      Maximum flow        0.007      0.000      0.007      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.007      0.007      0.018      0.062"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"              0.007      0.007      0.007      0.062"
" 40      HYDROGRAPH Combine 2"
"      6      Combine "
"      2      Node #"
"      Total Site"
"      Maximum flow              0.068      c.m/sec"
"      Hydrograph volume        243.124      c.m"
"              0.007      0.007      0.007      0.068"
" 38      START/RE-START TOTALS 204"
"      3      Runoff Totals on EXIT"
"      Total Catchment area              0.340      hectare"
"      Total Impervious area              0.266      hectare"

```

"	Total % impervious	78.153"
" 19	EXIT"	