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April 15, 2024 Project Number: 1474

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Attention: **Marc Pichette, P.Eng**

Subject: **Barrhaven Conservancy East Phase 3 & 4 FSR – Proposed Draft Plan Revisions – Preliminary HGL Analysis**

Introduction

Barrhaven Conservancy East Development is located in Barrhaven, Ontario, west of the Fraser-Clarke watercourse, east of Borrisokane Road, south of Strandherd Drive and north of the Jock River. The focus of this memo is to provide technical support for a proposed draft plan revision for a portion of the Conservancy East (Phase 3 & 4) land area (**~14.83 ha**).
The revisions to the draft plan affect a drainage area of approximately **14.52 ha** and are contained to the western extent of the greater Barrhaven Conservancy East development, within Phase 3 & 4. The incorporation of a residential site plan block replacing some of the previous single lots in the area and the increase in overall imperviousness from **57%** to **65%** for the drainage area above (**~14.52 ha**) triggered the FSR update. Note that the eastern portion of the development remains unaltered from the approved June 2022 SWM Report for this subdivision and the March 2024 SWM Report for Phase 2B of the Barrhaven Conservancy.

The following outlines the preliminary hydraulic grade line (HGL) assessment for the site, to ensure that the proposed minor system within the development is adequately sized to safely convey flows to the Jock River under various conditions. As such the following memo outlines the approach taken in assessing the development's HGL and summarises the findings of this analysis.

Analysis Approach

Preliminary hydraulic grade line calculations for the proposed Barrhaven Conservancy West development were completed using PCSWMM modelling software. Pipe data, storm sewer layout, drainage areas and imperviousness are as provided by DSEL. The March 2024 detailed PCSWMM model (**BCDC-P2B_v04.1**) submitted as part of the SWM Report for Phase 2B of the Barrhaven Conservancy, was the base used to build the latest PCSWMM model used in this analysis. Since Phase 3 & 4 are part of a complex storm sewer network connected to the other detailed phases, instead of only using the storm trunks for the preliminary HGL analysis as presented in the previous FSR submission, this analysis uses a detailed PCSWMM model that includes detailed drainage areas and the representation of the major and minor systems according to the preliminary servicing and grading design provided by DSEL.

The updates to the PCSWMM model within Phases 3 & 4 include changes to the subcatchment areas and imperviousness, as well as pipe data as per DSEL's latest preliminary servicing design. The minor system release rates for the residential site plan area incorporated into Phase 3 & 4 is limited to the 2-year Rational Method flow, with excess flows to the major system/street. For modelling purposes, the minor system capture rate for the residential site plan area was limited to 114% of the 2-year Rational Method flow in order to account for additional flows captured during the 100-year storm.

As with all other works completed for the Barrhaven Conservancy development phases, the preliminary HGL analysis was completed under two conditions:

- 100-year rainfall event on the development and a 5-year spring water level on the Jock River.
- 5-year rainfall event on the development and a 100-year spring water level on the Jock River.

Note that the water level along the Jock River through the length of this development varies, and as such the nearest corresponding upstream water surface elevation calculated by RVCA's HEC-RAS floodplain mapping model of the Jock River was applied at each of the respective storm sewer outlets. Also, note that assuming a 5-year spring water level on the Jock River for a 100-year rainfall event on the development is an inherently conservative assumption, as the critical storm for the proposed development is a summer (intense rainfall) event while the critical storm for the Jock River is a spring (snowmelt + rainfall) event. A preliminary Single Station Flood Frequency analysis was completed by JFSA using only summer flows (from May 15 to October 31) based on historical flow data recorded at the Moodie Drive Water Survey Canada gauge. This analysis found that the 100-year summer flow on the Jock River is around **99 m³/s**, while the 5-year spring flow is around **123 m³/s**, therefore the downstream boundary condition applied is conservative.

Within the proposed development, Oil and Grit Separators (OGS) units in conjunction with LID measures will be implemented to ensure the site meets quality control requirements. Preliminary OGS units and associated by-pass weir elevations have also been included in the model, as specified by Echelon Environmental. **Table 1** below outlines the OGS sizes and configurations as specified. Note that the trunk sewers for this development have been numbered 1-13, however only storm sewer systems **5**, **6**, **7** & **13** have been updated as part of this study.

Table 1: OGS Units Details

Trunk System	Area (ha)	Runoff Coefficient	CDS Model	CDS Inlet/Outlet Pipe (mm)	Weir Elev. (m)
Trunk 5	8.38	0.67	PMSU 5640 -10	750	90.053
Trunk 6	5.20	0.50	PMSU 4040 - 8	525	90.261
Trunk 7	5.58	0.74	PMSU 4040 - 8	600	90.310
Trunk 13	1.23	0.68	PMSU 2025 - 5	375	90.913
Total	**20.39**	**0.65**			

Results

The maximum HGL obtained at each MH has been extracted from the 5-year event / 100-year Jock River water level scenario and the 100-year event / 5-year Jock River water level scenario, with the results from this analysis provided in **Tables 2 & 3**, respectively. As all proposed units within this development will have sump pumps, the simulated HGL was compared against the top of MH elevation to ensure that all storm sewers infrastructure is sufficiently sized and is not surcharging to the major system during the assessed events.

From this analysis, it was found that the critical scenario for HGL within the development was the 5-year event and 100-year water level on the Jock River scenario. Based on this scenario, no MHs will have an HGL elevation above the top of MH (minimum freeboard of **0.04 m** at **MH-529_2**), with an average freeboard of **0.75 m** from the top of MH throughout the proposed development.

For the 100-year event and 5-year water level on the Jock River, no MHs will have HGL elevations above the top of MH (minimum freeboard of **0.07 m** at **MH-504**), with an average freeboard of **0.69 m** from the top of MH throughout the proposed development. As such it can be concluded that the proposed storm sewer infrastructure is sufficiently sized, to safely convey minor system flows from the development under various extreme conditions.

Conclusion

A preliminary HGL analysis for Phase 3 & 4 of the Barrhaven Conservancy East Development was completed using PCSWMM based on the updates and details provided by DSEL. From this analysis, it was found that the proposed storm sewer infrastructure is sufficiently sized to convey all minor system flows to the Jock River and will not result in any MHs surcharging to the street under extreme events such as 100-year rainfall event on the development and a 5-year spring water level on the Jock River and a 5-year event on the development and a 100-year spring water level on the Jock River, with the latter being the more critical scenario for the HGL within the development.

Yours truly,
JFSA Canada Inc.

Paulo Pickart, B.Eng, P.Eng
Water Resources Project Engineer

cc: J.F Sabourin, M.Eng, P.Eng
Director of Water Resources Projects

Figures

Figure 1: Minor System Overview
Figure 2: Major System Overview
Figure 3: Subcatchments Overview

Tables

Table 1: OGS Units Details
Table 2: HGL Result Tables - 5-Year BCDC Development & 100-Year Jock River
Table 3: HGL Result Tables - 100-Year BCDC Development & 5-Year Jock River

Attachments

Attachment A: DSEL Rational Method Calculations

Modelling Files – Provided Electronically

PCSWMM BCDC-P3&4_v05.3-005YrJock.inp
BCDC-P3&4_v05.3-100YrJock.inp

Legend

- Phase 3 & 4
- Site Plan

Conduits

- STM
- Overland
- CB
- CBMH
- CICB
- EX._CICB
- MH
- OGS
- RYCB
- Outfalls

SCALE: 1:5000

0 100 200 m

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DSEL

BCDC Phase 3 & 4
(FSR)

Figure 1: Minor System Overview

PROJECT	1474 (03)
DRAWN	PP
DATE	APRIL 2024

C:\Users\PauloPickart\J.F. Sabourin and Associates Inc\JFSA-OTTAWA-SERVER - Documents\PROJ\1474(03)-21\20240410-BCDC-Phase 3 & 4 - FSR 2\Design\GIS\20240412-Report Figures

Legend

- Phase 3 & 4
- Site Plan

Conduits

- Major System
- Overland

Junctions

- Maj
- Outfalls

SCALE: 1:5000

0 100 200 m

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BCDC Phase 3 & 4
(FSR)

Figure 2: Major System Overview

PROJECT	1474 (03)
DRAWN	PP
DATE	APRIL 2024

Legend

- Phase 3 & 4
- Site Plan
- Subcatchments
  - <ID>
  - <AREA>
  - <IMP>

SCALE: 1:5000

0 100 200 m

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DSEL

BCDC Phase 3 & 4
(FSR)

Figure 3: Subcatchments Overview

PROJECT	1474 (03)
DRAWN	PP
DATE	APRIL 2024

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Table 2: Freeboard Results - 5-Year Chicago 3 Hour Event & 100 Year Jock River Water Level

MH-ID	Invert Elevation (m)	Top of MH (m)	Max HGL (m)	Freeboard (m)
OGS_1	89.56	92.54	91.73	0.81
MH-100	90.96	93.27	92.56	0.71
MH-101	90.85	93.28	92.55	0.73
MH-102	90.65	93.06	92.48	0.58
MH-104	90.99	93.17	92.53	0.64
MH-105	90.53	93.17	92.46	0.71
MH-108	90.80	93.07	92.46	0.61
MH-109	90.36	92.98	92.40	0.58
MH-110	90.82	93.05	92.33	0.72
MH-111	90.70	93.12	92.49	0.63
MH-112	90.24	92.98	92.34	0.64
MH-114	90.64	92.97	92.32	0.65
MH-115	90.44	92.89	92.31	0.58
MH-116	90.12	92.79	92.26	0.53
MH-117	90.25	92.85	92.08	0.77
MH-1170	90.33	93.85	92.08	1.77
MH-118	90.70	93.05	92.17	0.88
MH-1180	90.62	92.84	92.16	0.68
MH-119	90.27	92.80	92.07	0.73
MH-120	89.93	92.76	92.01	0.75
MH-1201	90.67	93.02	91.80	1.22
MH-1202	90.45	92.90	91.71	1.19
MH-1203	90.33	92.86	91.71	1.15
MH-1206	90.62	93.06	91.93	1.13
MH-1207	90.51	92.99	91.85	1.14
MH-1209	90.22	92.86	91.76	1.10
MH-1209_2	90.22	92.80	91.96	0.84
MH-121	89.86	92.73	91.93	0.80
MH-122	89.82	92.68	91.89	0.80
MH-124	90.35	92.91	92.01	0.91
MH-1240	90.68	92.90	91.91	0.99
MH-125	90.36	92.87	91.84	1.03
MH-1250	90.63	92.86	92.09	0.77
MH-126	90.11	92.49	91.71	0.78
MH-128	89.56	92.54	91.77	0.77
MH-128_2	89.56	92.54	92.22	0.33
MH-1301	90.98	93.11	92.10	1.01
MH-1302	90.91	93.04	92.08	0.96
MH-1304	90.81	93.09	92.04	1.05
MH-1306	90.71	93.14	91.81	1.33
MH-1309	90.61	93.14	91.83	1.31
MH-1309_2	90.61	93.06	91.86	1.21
MH-200	90.51	93.18	92.27	0.91
MH-201	90.19	92.82	92.08	0.74
MH-203	90.00	92.89	91.99	0.91
MH-204	90.68	93.08	92.29	0.79
MH-205	90.28	92.83	92.14	0.69
MH-207	89.86	92.76	91.93	0.83

Table 2: Freeboard Results - 5-Year Chicago 3 Hour Event & 100 Year Jock River Water Level

MH-ID	Invert Elevation (m)	Top of MH (m)	Max HGL (m)	Freeboard (m)
MH-208	90.38	92.88	92.02	0.86
MH-209	89.78	92.73	91.89	0.84
MH-211	90.25	92.61	91.83	0.78
MH-212	89.91	92.55	91.80	0.75
MH-213	90.38	92.71	91.86	0.85
MH-214	90.15	92.67	91.81	0.86
MH-215	90.07	92.69	91.80	0.89
MH-216	89.63	92.61	91.78	0.83
MH-2160	89.67	92.61	91.80	0.81
MH-217	89.52	92.61	91.85	0.76
MH-217_2	89.52	92.61	92.13	0.48
MH-300	90.76	93.47	92.53	0.95
MH-301	90.81	93.31	92.50	0.81
MH-302	90.65	93.29	92.48	0.82
MH-3020	90.95	93.28	91.89	1.40
MH-303	90.41	93.45	92.54	0.91
MH-305	90.91	93.36	92.44	0.92
MH-306	90.53	93.19	92.43	0.76
MH-307	90.38	93.31	92.48	0.83
MH-308	90.69	93.07	92.40	0.67
MH-309	90.22	93.06	92.33	0.73
MH-3090	90.38	92.99	92.34	0.65
MH-310	90.45	93.11	92.45	0.66
MH-313	90.04	92.95	92.27	0.68
MH-315	90.67	93.26	92.33	0.93
MH-316	90.74	93.18	92.32	0.86
MH-317	90.44	93.14	92.22	0.92
MH-319	90.12	93.05	92.17	0.88
MH-320	89.90	92.93	92.16	0.77
MH-3200	90.66	92.89	92.03	0.86
MH-321	90.28	92.75	91.95	0.80
MH-322	90.07	92.74	91.88	0.86
MH-323	89.96	92.69	91.84	0.85
MH-325	89.79	92.80	92.01	0.79
MH-326	89.70	92.57	91.93	0.64
MH-327	89.60	92.45	91.77	0.68
MH-330	89.51	92.45	91.87	0.58
MH-330_2	89.51	92.45	92.25	0.21
MH-500	90.81	93.51	92.79	0.72
MH-501	90.55	93.25	92.66	0.59
MH-503	90.29	93.13	92.53	0.60
MH-504	90.58	93.05	92.68	0.37
MH-505	90.30	92.92	92.51	0.41
MH-507	90.19	93.10	92.50	0.60
MH-508	90.45	93.12	92.51	0.62
MH-510	89.91	92.99	92.42	0.57
MH-511	90.52	93.03	92.37	0.66
MH-513	89.80	92.84	92.36	0.48

Table 2: Freeboard Results - 5-Year Chicago 3 Hour Event & 100 Year Jock River Water Level

MH-ID	Invert Elevation (m)	Top of MH (m)	Max HGL (m)	Freeboard (m)
MH-515	90.45	92.99	92.35	0.64
MH-516	90.28	92.91	92.35	0.56
MH-519	89.98	92.91	92.32	0.59
MH-5190	90.47	93.05	92.35	0.70
MH-520	89.72	92.77	92.28	0.49
MH-521	89.64	92.77	92.14	0.63
MH-522	89.54	92.49	91.95	0.54
MH-523	90.60	93.03	92.32	0.71
MH-524	90.22	92.83	92.31	0.52
MH-5240	90.34	92.68	92.04	0.64
MH-526	89.97	92.60	91.90	0.70
MH-527	89.80	92.61	91.88	0.73
MH-528	89.50	92.43	91.87	0.56
MH-529	89.42	92.43	91.96	0.47
MH-529_2	89.42	92.43	92.39	0.04
MH-601	90.91	93.36	92.48	0.88
MH-602	90.67	93.05	92.41	0.64
MH-604	90.47	93.02	92.24	0.78
MH-606	90.23	92.94	92.14	0.80
MH-6060	90.40	92.94	92.17	0.78
MH-607	90.11	92.86	92.00	0.86
MH-6080	90.61	92.82	92.00	0.82
MH-609	90.31	92.82	91.90	0.92
MH-610	90.23	92.79	91.90	0.89
MH-611	89.82	92.50	91.82	0.68
MH-6110	90.13	92.50	91.86	0.64
MH-612	89.73	92.50	91.91	0.59
MH-612_2	89.72	92.50	92.11	0.39
MH-6120	90.06	92.50	91.86	0.64
MH-701	90.96	93.22	92.74	0.48
MH-702	90.83	93.29	92.71	0.58
MH-704	90.49	93.16	92.66	0.50
MH-705	90.35	93.17	92.50	0.67
MH-706	90.80	93.31	92.39	0.92
MH-707	90.19	92.97	92.35	0.62
MH-708	90.00	92.70	92.19	0.51
MH-709	89.81	92.58	91.98	0.60
MH-710	91.12	93.36	92.17	1.19
MH-711	90.91	92.67	92.17	0.50
MH-712	90.68	93.06	92.16	0.90
MH-713	90.41	93.03	92.16	0.88
MH-714	90.17	92.70	92.07	0.63
MH-715	90.12	92.63	92.06	0.57
MH-716	90.85	93.30	92.33	0.97
MH-717	90.48	92.90	92.34	0.57
MH-718	90.19	92.75	92.27	0.48
MH-719	90.00	92.70	92.07	0.63
MH-720	89.82	92.75	92.02	0.73

Table 2: Freeboard Results - 5-Year Chicago 3 Hour Event & 100 Year Jock River Water Level

MH-ID	Invert Elevation (m)	Top of MH (m)	Max HGL (m)	Freeboard (m)
MH-723	89.71	92.58	92.07	0.52
MH-723_2	89.71	92.60	92.18	0.42
MH-800	90.16	92.98	92.21	0.77
MH-801	90.07	92.81	92.18	0.63
MH-802	89.98	92.84	92.08	0.76
MH-803	89.89	92.82	91.93	0.89
MH-804	89.80	92.53	91.88	0.65
MH-805	89.67	92.51	91.88	0.63
MH-806	89.56	92.51	91.96	0.55
MH-806_2	89.56	92.51	92.41	0.10
MH-900	91.63	93.30	91.82	1.48
MH-901	91.47	93.52	91.79	1.73
OGS_12	90.22	92.80	91.73	1.07
OGS_13	90.61	93.06	91.79	1.27
OGS_2	89.52	92.61	91.81	0.80
OGS_3	89.51	92.45	91.90	0.55
OGS_5	89.42	92.43	92.39	0.04
OGS_6	89.73	92.50	91.93	0.57
OGS_7	89.72	92.60	92.01	0.59
OGS_8	89.56	92.51	91.99	0.52
			Min	0.04
			Max HGL (m)	1.77
			Average	0.75

Table 3: USF Freeboard Results - 100-Year Chicago 3 Hour Event & 5 Year Jock River Water Level

MH-ID	Invert Elevation (m)	Top of MH (m)	Max HGL (m)	Freeboard (m)
OGS_1	89.56	92.54	91.14	1.40
MH-100	90.96	93.27	92.95	0.32
MH-101	90.85	93.28	92.92	0.36
MH-102	90.65	93.06	92.83	0.23
MH-104	90.99	93.17	92.94	0.23
MH-105	90.53	93.17	92.80	0.37
MH-108	90.80	93.07	92.82	0.25
MH-109	90.36	92.98	92.72	0.26
MH-110	90.82	93.05	92.64	0.41
MH-111	90.70	93.12	92.79	0.33
MH-112	90.24	92.98	92.63	0.35
MH-114	90.64	92.97	92.63	0.34
MH-115	90.44	92.89	92.62	0.27
MH-116	90.12	92.79	92.51	0.28
MH-117	90.25	92.85	92.53	0.32
MH-1170	90.33	93.85	92.53	1.32
MH-118	90.70	93.05	92.67	0.38
MH-1180	90.62	92.84	92.55	0.29
MH-119	90.27	92.80	92.25	0.55
MH-120	89.93	92.76	92.07	0.69
MH-1201	90.67	93.02	91.75	1.27
MH-1202	90.45	92.90	91.40	1.50
MH-1203	90.33	92.86	91.31	1.55
MH-1206	90.62	93.06	91.81	1.25
MH-1207	90.51	92.99	91.65	1.34
MH-1209	90.22	92.86	91.17	1.69
MH-1209_2	90.22	92.80	91.15	1.65
MH-121	89.86	92.73	91.92	0.81
MH-122	89.82	92.68	91.83	0.86
MH-124	90.35	92.91	92.53	0.38
MH-1240	90.68	92.90	92.32	0.58
MH-125	90.36	92.87	92.09	0.78
MH-1250	90.63	92.86	92.39	0.47
MH-126	90.11	92.49	91.58	0.91
MH-128	89.56	92.54	91.23	1.31
MH-128_2	89.56	92.54	91.26	1.29
MH-1301	90.98	93.11	92.33	0.78
MH-1302	90.91	93.04	92.28	0.76
MH-1304	90.81	93.09	92.11	0.98
MH-1306	90.71	93.14	91.39	1.75
MH-1309	90.61	93.14	91.25	1.89
MH-1309_2	90.61	93.06	91.16	1.91
MH-200	90.51	93.18	92.73	0.45
MH-201	90.19	92.82	92.44	0.38
MH-203	90.00	92.89	92.28	0.61
MH-204	90.68	93.08	92.65	0.43
MH-205	90.28	92.83	92.55	0.28
MH-207	89.86	92.76	92.13	0.63

Table 3: USF Freeboard Results - 100-Year Chicago 3 Hour Event & 5 Year Jock River Water Level

MH-ID	Invert Elevation (m)	Top of MH (m)	Max HGL (m)	Freeboard (m)
MH-208	90.38	92.88	92.31	0.57
MH-209	89.78	92.73	91.96	0.77
MH-211	90.25	92.61	92.02	0.59
MH-212	89.91	92.55	91.84	0.71
MH-213	90.38	92.71	92.20	0.51
MH-214	90.15	92.67	92.00	0.67
MH-215	90.07	92.69	91.94	0.75
MH-216	89.63	92.61	91.56	1.05
MH-2160	89.67	92.61	91.65	0.96
MH-217	89.52	92.61	91.43	1.18
MH-217_2	89.52	92.61	91.32	1.29
MH-300	90.76	93.47	92.91	0.56
MH-301	90.81	93.31	92.90	0.41
MH-302	90.65	93.29	92.87	0.43
MH-3020	90.95	93.28	92.11	1.18
MH-303	90.41	93.45	92.91	0.54
MH-305	90.91	93.36	92.82	0.54
MH-306	90.53	93.19	92.82	0.37
MH-307	90.38	93.31	92.93	0.38
MH-308	90.69	93.07	92.86	0.21
MH-309	90.22	93.06	92.72	0.34
MH-3090	90.38	92.99	92.73	0.26
MH-310	90.45	93.11	92.71	0.40
MH-313	90.04	92.95	92.62	0.33
MH-315	90.67	93.26	92.63	0.63
MH-316	90.74	93.18	92.63	0.55
MH-317	90.44	93.14	92.53	0.61
MH-319	90.12	93.05	92.45	0.60
MH-320	89.90	92.93	92.42	0.51
MH-3200	90.66	92.89	92.45	0.44
MH-321	90.28	92.75	92.16	0.59
MH-322	90.07	92.74	91.95	0.79
MH-323	89.96	92.69	91.81	0.88
MH-325	89.79	92.80	92.13	0.67
MH-326	89.70	92.57	91.91	0.66
MH-327	89.60	92.45	91.59	0.86
MH-330	89.51	92.45	91.57	0.88
MH-330_2	89.51	92.45	91.49	0.97
MH-500	90.81	93.51	93.06	0.45
MH-501	90.55	93.25	92.96	0.29
MH-503	90.29	93.13	92.88	0.25
MH-504	90.58	93.05	92.98	0.07
MH-505	90.30	92.92	92.85	0.07
MH-507	90.19	93.10	92.83	0.27
MH-508	90.45	93.12	92.81	0.32
MH-510	89.91	92.99	92.72	0.27
MH-511	90.52	93.03	92.67	0.36
MH-513	89.80	92.84	92.61	0.23

Table 3: USF Freeboard Results - 100-Year Chicago 3 Hour Event & 5 Year Jock River Water Level

MH-ID	Invert Elevation (m)	Top of MH (m)	Max HGL (m)	Freeboard (m)
MH-515	90.45	92.99	92.63	0.36
MH-516	90.28	92.91	92.63	0.28
MH-519	89.98	92.91	92.56	0.35
MH-5190	90.47	93.05	92.68	0.38
MH-520	89.72	92.77	92.48	0.29
MH-521	89.64	92.77	92.17	0.60
MH-522	89.54	92.49	91.76	0.73
MH-523	90.60	93.03	92.64	0.39
MH-524	90.22	92.83	92.59	0.24
MH-5240	90.34	92.68	92.23	0.45
MH-526	89.97	92.60	91.77	0.83
MH-527	89.80	92.61	91.67	0.94
MH-528	89.50	92.43	91.58	0.85
MH-529	89.42	92.43	91.45	0.98
MH-529_2	89.42	92.43	92.10	0.33
MH-601	90.91	93.36	92.81	0.55
MH-602	90.67	93.05	92.73	0.32
MH-604	90.47	93.02	92.48	0.54
MH-606	90.23	92.94	92.32	0.62
MH-6060	90.40	92.94	92.35	0.59
MH-607	90.11	92.86	92.05	0.81
MH-6080	90.61	92.82	92.27	0.55
MH-609	90.31	92.82	91.85	0.97
MH-610	90.23	92.79	91.82	0.97
MH-611	89.82	92.50	91.69	0.81
MH-6110	90.13	92.50	91.74	0.76
MH-612	89.73	92.50	91.73	0.77
MH-612_2	89.72	92.50	91.63	0.87
MH-6120	90.06	92.50	91.70	0.80
MH-701	90.96	93.22	93.04	0.19
MH-702	90.83	93.29	93.03	0.26
MH-704	90.49	93.16	92.96	0.20
MH-705	90.35	93.17	92.82	0.35
MH-706	90.80	93.31	92.74	0.57
MH-707	90.19	92.97	92.57	0.40
MH-708	90.00	92.70	92.22	0.48
MH-709	89.81	92.58	91.78	0.80
MH-710	91.12	93.36	92.55	0.81
MH-711	90.91	92.67	92.56	0.11
MH-712	90.68	93.06	92.52	0.54
MH-713	90.41	93.03	92.38	0.66
MH-714	90.17	92.70	92.09	0.61
MH-715	90.12	92.63	92.04	0.59
MH-716	90.85	93.30	92.57	0.73
MH-717	90.48	92.90	92.57	0.34
MH-718	90.19	92.75	92.43	0.32
MH-719	90.00	92.70	91.98	0.72
MH-720	89.82	92.75	91.90	0.86

Table 3: USF Freeboard Results - 100-Year Chicago 3 Hour Event & 5 Year Jock River Water Level

MH-ID	Invert Elevation (m)	Top of MH (m)	Max HGL (m)	Freeboard (m)
MH-723	89.71	92.58	91.73	0.86
MH-723_2	89.71	92.60	91.63	0.97
MH-800	90.16	92.98	92.13	0.85
MH-801	90.07	92.81	92.09	0.72
MH-802	89.98	92.84	92.01	0.83
MH-803	89.89	92.82	91.95	0.87
MH-804	89.80	92.53	91.84	0.69
MH-805	89.67	92.51	91.65	0.86
MH-806	89.56	92.51	91.63	0.88
MH-806_2	89.56	92.51	91.65	0.86
MH-900	91.63	93.30	92.26	1.04
MH-901	91.47	93.52	92.09	1.43
OGS_12	90.22	92.80	91.16	1.64
OGS_13	90.61	93.06	91.18	1.88
OGS_2	89.52	92.61	91.33	1.28
OGS_3	89.51	92.45	91.48	0.97
OGS_5	89.42	92.43	91.37	1.06
OGS_6	89.73	92.50	91.63	0.87
OGS_7	89.72	92.60	91.64	0.96
OGS_8	89.56	92.51	91.61	0.90
			Min	0.07
			Max	1.91
			Average	0.69

JFSA
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS

Attachment A

DSEL Rational Method Calculations

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha)																FLOW						SEWER DATA							
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
Mineral Street																																
Contribution From Les Emmerson Drive (N), Pipe 300 - 503						0.00				0.00				0.00				0.00	10.69													
Contribution From Les Emmerson Drive (N), Pipe 501 - 503						1.44				0.00				0.00				0.00	13.59													
			0.07	0.68	0.13	1.57			0.00	0.00			0.00	0.00			0.00	0.00														
			0.11	0.60	0.18	1.75			0.00	0.00			0.00	0.00			0.00	0.00														
			0.11	0.65	0.20	1.95			0.00	0.00			0.00	0.00			0.00	0.00														
	503	507	0.12	0.80	0.27	2.22			0.00	0.00			0.00	0.00			0.00	0.00	13.59	65.31	88.41	103.56	151.28	145	825	825	CONC	0.10	62.5	453.9246	0.8492	1.2267	0.319
Contribution From Les Emmerson Drive (S), Pipe 303 - 507						0.78				0.00				0.00				0.00	11.37													
Contribution From Les Emmerson Drive (S), Pipe 505 - 507						1.09				0.00				0.00				0.00	10.37													
			0.08	0.73	0.16	4.25			0.00	0.00			0.00	0.00			0.00	0.00														
	507	510	0.08	0.76	0.17	4.42			0.00	0.00			0.00	0.00			0.00	0.00	14.82	62.21	84.16	98.56	143.93	275	825	825	CONC	0.10	58.5	453.9246	0.8492	1.1482	0.606
Contribution From Conservancy Drive, Pipe 307 - 510						0.32				0.38				0.00				0.00	10.95													
Contribution From Conservancy Drive, Pipe 508 - 510						0.00				1.19				0.00				0.00	12.19													
			0.10	0.55	0.15	4.89			0.00	1.57			0.00	0.00			0.00	0.00														
			0.26	0.55	0.39	5.28			0.00	1.57			0.00	0.00			0.00	0.00														
	510	513	0.26	0.60	0.43	5.71			0.00	1.57			0.00	0.00			0.00	0.00	15.96	59.58	80.57	94.34	137.74	467	1050	1050	CONC	0.10	62.5	863.5311	0.9973	1.0445	0.541
Contribution From Peninsula Road, Pipe 310 - 513						0.56				0.00				0.00				0.00	11.72													
Contribution From Peninsula Road, Pipe 511 - 513						0.91				0.00				0.00				0.00	12.16													
			0.14	0.59	0.23	7.42			0.00	1.57			0.00	0.00			0.00	0.00														
	513	520	0.15	0.56	0.24	7.66			0.00	1.57			0.00	0.00			0.00	0.00	17.01	57.40	77.59	90.83	132.59	561	1050	1050	CONC	0.10	60.0	863.5311	0.9973	1.0027	0.650
To Gallium Crescent, Pipe 520 - 521						7.66				1.57				0.00				0.00	18.01													
Gallium Crescent																																
			0.31	0.53	0.46	0.46			0.00	0.00			0.00	0.00			0.00	0.00														
	5240	526	0.48	0.68	0.91	1.38			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	106	450	450	CONC	0.25	118.5	142.5531	0.8963	2.2035	0.741
	526	527			0.00	1.38			0.00	0.00			0.00	0.00			0.00	0.00	12.20	69.27	93.84	109.95	160.65	95	525	525	CONC	0.20	11.0	192.3297	0.8885	0.2063	0.495
	527	528	0.27	0.56	0.43	1.80			0.00	0.00			0.00	0.00			0.00	0.00	12.41	68.64	92.98	108.94	159.17	124	825	825	CONC	0.10	46.5	453.9246	0.8492	0.9127	0.272
To Storm Outlet 5, Pipe 528 - 529						1.80				0.00				0.00				0.00	13.32													
Contribution From Mineral Street, Pipe 513 - 520						7.66				1.57				0.00				0.00	18.01													
Contribution From Sapling Grove, Pipe 519 - 520						2.03				0.00				0.00				0.00	14.97													
Contribution From Sapling Grove, Pipe 524 - 520						0.86				0.00				0.00				0.00	11.88													
	520	521	0.24	0.68	0.45	11.00			0.00	1.57			0.00	0.00			0.00	0.00	18.01	55.47	74.94	87.72	128.04	728	1050	1050	CONC	0.10	65.5	863.5311	0.9973	1.0947	0.843
	521	522	0.36	0.53	0.53	11.52			0.00	1.57			0.00	0.00			0.00	0.00	19.11	53.52	72.28	84.59	123.44	730	1050	1050	CONC	0.10	68.0	863.5311	0.9973	1.1364	0.845
	522	528			0.00	11.52			0.00	1.57			0.00	0.00			0.00	0.00	20.24	51.65	69.72	81.59	119.04	705	1050	1050	CONC	0.10	12.0	863.5311	0.9973	0.2005	0.816
To Storm Outlet 5, Pipe 528 - 529						11.52				1.57				0.00				0.00	20.44													
Storm Outlet 5																																
Contribution From Gallium Crescent, Pipe 522 - 528						11.52				1.57				0.00				0.00	20.44													
Contribution From Gallium Crescent, Pipe 527 - 528						1.80				0.00				0.00				0.00	13.32													
			0.01	0.43	0.01	13.34			0.00	1.57			0.00	0.00			0.00	0.00														
	528	529	0.40	0.67	0.74	14.08			0.00	1.57			0.00	0.00			0.00	0.00	20.44	51.33	69.29	81.09	118.30	831	1050	1050	CONC	0.15	9.5	1057.6053	1.2214	0.1296	0.786
	529	HW5			0.00	14.08			0.00	1.57			0.00	0.00			0.00	0.00	20.57	51.13	69.02	80.76	117.83	828	1050	1050	CONC	0.15	28.5	1057.6053	1.2214	0.3889	0.783
Block 773 (Park)																																
	6120	611			0.00	0.00	1.77	0.40	1.97	1.97			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	205	675	675	CONC	0.15	10.0	325.5584	0.9098	0.1832	0.630
To Storm Outlet 6, Pipe 611 - 612						0.00				1.97				0.00				0.00	10.18													
Pollination Place																																
	6080	609	0.43	0.69	0.82	0.82			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	63	450	450	CONC	0.20	117.5	127.5033	0.8017	2.4428	0.495
	609	610			0.00	0.82			0.00	0.00			0.00	0.00			0.00	0.00	12.44	68.55	92.85	108.78	158.94	56	525	525	CONC	0.18	11.5	182.4600	0.8429	0.2274	0.308
	610	6110	0.26	0.55	0.39	1.21			0.00	0.00			0.00	0.00			0.00	0.00	12.67	67.88	91.93	107.70	157.35	82	600	600	CONC	0.15	48.5	237.8056	0.8411	0.9611	0.346
To Storm Outlet 6, Pipe 6110 - 611						1.21				0.00				0.00				0.00	13.63													
Contribution From Conservancy Drive, Pipe 508 - 602						0.00				0.15				0.00				0.00	11.32													
Contribution From Conservancy Drive, Pipe 601 - 602						0.00				0.36				0.00				0.00	10.40													
					0.00	0.00	0.04	0.68	0.08	0.58			0.00	0.00			0.00	0.00														
			0.09	0.58	0.15	0.15			0.00	0.58			0.00	0.00			0.00	0.00														
	602	604	0.11	0.60	0.18	0.33			0.00	0.58			0.00	0.00			0.00	0.00	11.32	72.09	97.71	114.51	167.35	81	450	450	CONC	0.20	62.5	127.5033	0.8017	1.2993	0.633

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: R.B.	PROJECT: BARRHAVEN CONSERVANCY EAST, PHASE 3 AND 4		
Checked: W.L.	LOCATION: City of Ottawa		
Dwg. Reference: Stm Tributary Area Plan Dwg No. 4	File Ref: 20-1180	Date: 05 Apr 2024	Sheet No. SHEET 1 OF 6

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha)																FLOW						SEWER DATA								
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year											
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
Contribution From Peninsula Road, Pipe 511 - 604						0.35				0.00				0.00				0.00	11.40														
	604	606	0.12	0.58	0.19	0.87			0.00	0.58			0.00	0.00			0.00	0.00	12.62	68.03	92.14	107.95	157.71	113	600	600	CONC	0.15	60.0	237.8056	0.8411	1.1890	0.475
Contribution From Sapling Grove, Pipe 523 - 606						0.56				0.00				0.00				0.00	11.39														
Contribution From Sapling Grove, Pipe 6060 - 606						0.00				1.47				0.00				0.00	10.22														
	606	607	0.15	0.67	0.27	1.70			0.00	2.05			0.00	0.00			0.00	0.00	13.81	64.74	87.62	102.63	149.91	290	750	750	CONC	0.15	59.5	431.1703	0.9760	1.0161	0.672
	607	611	0.37	0.65	0.67	2.37			0.00	2.05			0.00	0.00			0.00	0.00	14.82	62.19	84.14	98.53	143.89	320	750	750	CONC	0.15	80.5	431.1703	0.9760	1.3747	0.742
To Storm Outlet 6, Pipe 611 - 612						2.37				2.05				0.00				0.00	16.20														
Storm Outlet 6																																	
Contribution From Pollination Place, Pipe 610 - 6110						1.21				0.00				0.00				0.00	13.63														
	6110	611			0.00	1.21			0.00	0.00			0.00	0.00			0.00	0.00	13.63	65.20	88.26	103.38	151.01	79	600	600	CONC	0.15	8.0	237.8056	0.8411	0.1585	0.332
Contribution From Pollination Place, Pipe 607 - 611						2.37				2.05				0.00				0.00	16.20														
Contribution From Block 773 (Park), Pipe 6120 - 611						0.00				1.97				0.00				0.00	10.18														
	611	612			0.00	3.58			0.00	4.02			0.00	0.00			0.00	0.00	16.20	59.08	79.88	93.53	136.55	533	900	900	CONC	0.15	8.0	701.1305	1.1021	0.1210	0.760
	612	HW6			0.00	3.58			0.00	4.02			0.00	0.00			0.00	0.00	16.32	58.82	79.53	93.11	135.94	530	900	900	CONC	0.15	24.5	701.1305	1.1021	0.3705	0.756
Crowfoot Lane (LANE 1)																																	
Contribution From Ambit Lane (LANE 2), Pipe 710 - 712						0.43				0.00				0.00				0.00	11.67														
Contribution From Conservancy Drive, Pipe 711 - 712						0.00				0.24				0.00				0.00	10.44														
	712	713	0.13	0.84	0.30	0.73			0.00	0.24			0.00	0.00			0.00	0.00	11.67	70.94	96.14	112.65	164.62	74	450	450	CONC	0.20	102.0	127.5033	0.8017	2.1205	0.584
			0.09	0.86	0.22	0.94			0.00	0.24			0.00	0.00			0.00	0.00															
	713	714	0.17	0.86	0.41	1.35			0.00	0.24			0.00	0.00			0.00	0.00	13.79	64.78	87.69	102.71	150.02	108	525	525	CONC	0.20	102.0	192.3297	0.8885	1.9134	0.563
	714	715			0.00	1.35			0.00	0.24			0.00	0.00			0.00	0.00	15.70	60.16	81.36	95.26	139.10	101	525	525	CONC	0.20	9.5	192.3297	0.8885	0.1782	0.523
	715	720	0.14	0.71	0.28	1.63			0.00	0.24			0.00	0.00			0.00	0.00	15.88	59.77	80.82	94.63	138.17	116	525	525	CONC	0.20	30.0	192.3297	0.8885	0.5628	0.605
To Ephemeral Crescent, Pipe 720 - 723						1.63				0.24				0.00				0.00	16.44														
Ephemeral Crescent																																	
Contribution From Deciduous Crescent, Pipe 716 - 717						0.50				0.14				0.00				0.00	11.33														
					0.00	0.50	0.03	0.68	0.06	0.20			0.00	0.00			0.00	0.00															
					0.00	0.50	0.03	0.81	0.07	0.27			0.00	0.00			0.00	0.00															
			0.14	0.78	0.30	0.80			0.00	0.27			0.00	0.00			0.00	0.00															
	717	718	0.31	0.60	0.52	1.32			0.00	0.27			0.00	0.00			0.00	0.00	11.33	72.04	97.64	114.42	167.22	121	525	525	CONC	0.20	105.0	192.3297	0.8885	1.9697	0.630
	718	719	0.62	0.78	1.34	2.66			0.00	0.27			0.00	0.00			0.00	0.00	13.30	66.09	89.47	104.81	153.11	200	600	600	CONC	0.15	107.0	237.8056	0.8411	2.1203	0.841
	719	720			0.00	2.66			0.00	0.27			0.00	0.00			0.00	0.00	15.42	60.79	82.21	96.27	140.57	184	600	600	CONC	0.35	9.0	363.2541	1.2847	0.1168	0.506
Contribution From Crowfoot Lane (LANE 1), Pipe 715 - 720						1.63				0.24				0.00				0.00	16.44														
	720	723	0.16	0.60	0.27	4.56			0.00	0.50			0.00	0.00			0.00	0.00	16.44	58.56	79.17	92.69	135.32	307	900	900	CONC	0.20	55.0	809.5958	1.2726	0.7203	0.379
To Storm Outlet 7, Pipe 723 - HW7						4.56				0.50				0.00				0.00	17.16														
Contribution From Conservancy Drive, Pipe 705 - 707						3.44				0.44				0.00				0.00	14.59														
Contribution From Deciduous Crescent, Pipe 706 - 707						0.66				0.08				0.00				0.00	11.26														
Contribution From Conservancy Drive, Pipe 7170 - 707						0.00				0.00				0.00				0.00	11.20														
					0.00	4.10	0.04	0.73	0.08	0.60			0.00	0.00			0.00	0.00															
	707	708	0.12	0.78	0.26	4.36			0.00	0.60			0.00	0.00			0.00	0.00	14.59	62.74	84.89	99.42	145.20	324	750	750	CONC	0.15	115.5	431.1703	0.9760	1.9724	0.752
			0.14	0.60	0.23	4.59			0.00	0.60			0.00	0.00			0.00	0.00															
	708	709	0.25	0.78	0.54	5.13			0.00	0.60			0.00	0.00			0.00	0.00	16.57	58.30	78.81	92.28	134.71	347	750	750	CONC	0.15	107.5	431.1703	0.9760	1.8358	0.804
To Storm Outlet 7, Pipe 709 - 723						5.13				0.60				0.00				0.00	18.40														
Storm Outlet 7																																	
Contribution From Ephemeral Crescent, Pipe 708 - 709						5.13				0.60				0.00				0.00	18.40														
	709	723	0.43	0.78	0.93	6.07			0.00	0.60			0.00	0.00			0.00	0.00	18.40	54.75	73.96	86.57	126.35	377	750	750	CONC	0.20	13.0	497.8726	1.1270	0.1923	0.756
Contribution From Ephemeral Crescent, Pipe 720 - 723						4.56				0.50				0.00				0.00	17.16														
	723	HW7			0.00	10.62			0.00	1.10			0.00	0.00			0.00	0.00	18.59	54.41	73.49	86.02	125.54	659	900	900	CONC	0.40	12.0	1144.9413	1.7997	0.1111	0.576
Peninsula Road																																	
	204	313	0.04	0.67	0.07	0.07			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	5	300	300	PVC	0.35	41.5	57.2089	0.8093	0.8546	0.088
To Anemone Mews, Pipe 313 - 320						0.07				0.00				0.00				0.00	10.85														

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: R.B.	PROJECT: BARRHAVEN CONSERVANCY EAST, PHASE 3 AND 4	
Checked: W.L.	LOCATION: City of Ottawa	
Dwg. Reference: Stm Tributary Area Plan Dwg No. 4	File Ref: 20-1180	Date: 05 Apr 2024
		Sheet No. SHEET 2 OF 6

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha)														FLOW						SEWER DATA								
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
	310	313	0.26	0.70	0.51	0.51			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	39	375	375	PVC	0.30	82.5	96.0323	0.8695	1.5814	0.409
To Anemone Mews, Pipe 313 - 320						0.51				0.00				0.00				0.00	11.58														
	310	513	0.29	0.70	0.56	0.56			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	43	375	375	PVC	0.30	89.5	96.0323	0.8695	1.7156	0.450
To Mineral Street, Pipe 513 - 520						0.56				0.00				0.00				0.00	11.72														
	511	604	0.16	0.78	0.35	0.35			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	27	450	450	CONC	0.20	67.5	127.5033	0.8017	1.4033	0.209
To Pollination Place, Pipe 604 - 606						0.35				0.00				0.00				0.00	11.40														
	511	513	0.42	0.78	0.91	0.91			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	70	375	375	PVC	0.30	112.5	96.0323	0.8695	2.1564	0.728
To Mineral Street, Pipe 513 - 520						0.91				0.00				0.00				0.00	12.16														
Conservancy Drive																																	
	200	309			0.00	0.00	0.11	0.70	0.22	0.22			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	23	300	300	PVC	0.35	36.0	57.2089	0.8093	0.7413	0.400
To Anemone Mews, Pipe 309 - 313						0.00				0.22				0.00				0.00	10.74														
					0.00	0.00	0.18	0.75	0.38	0.38			0.00	0.00			0.00	0.00															
	307	510	0.21	0.54	0.32	0.32			0.00	0.38			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	64	450	450	CONC	0.25	51.0	142.5531	0.8963	0.9483	0.450
To Mineral Street, Pipe 510 - 513						0.32				0.38				0.00				0.00	10.95														
	508	602			0.00	0.00	0.07	0.78	0.15	0.15			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	16	300	300	PVC	0.35	64.0	57.2089	0.8093	1.3179	0.276
To Pollination Place, Pipe 602 - 604						0.00				0.15				0.00				0.00	11.32														
					0.00	0.00	0.12	0.78	0.26	0.26			0.00	0.00			0.00	0.00															
					0.00	0.00	0.12	0.80	0.27	0.53			0.00	0.00			0.00	0.00															
					0.00	0.00	0.15	0.78	0.33	0.85			0.00	0.00			0.00	0.00															
	508	510			0.00	0.00	0.15	0.80	0.33	1.19			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	124	525	525	CONC	0.20	117.0	192.3297	0.8885	2.1948	0.642
To Mineral Street, Pipe 510 - 513						0.00				1.19				0.00				0.00	12.19														
	601	602			0.00	0.00	0.16	0.80	0.36	0.36			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	37	300	300	PVC	1.00	32.5	96.7008	1.3680	0.3959	0.383
To Pollination Place, Pipe 602 - 604						0.00				0.36				0.00				0.00	10.40														
	711	712			0.00	0.00	0.12	0.71	0.24	0.24			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	25	300	300	PVC	0.35	21.5	57.2089	0.8093	0.4427	0.431
To Crowfoot Lane (LANE 1), Pipe 712 - 713						0.00				0.24				0.00				0.00	10.44														
	7170	707			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	375	375	PVC	0.30	62.5	96.0323	0.8695	1.1980	0.000
To Ephemeral Crescent, Pipe 707 - 708						0.00				0.00				0.00				0.00	11.20														
	307	308			0.00	0.00	0.35	0.73	0.71	0.71			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	74	375	375	PVC	0.50	53.5	123.9771	1.1225	0.7944	0.597
					0.00	0.00	0.12	0.70	0.24	0.95			0.00	0.00			0.00	0.00															
	308	309	0.13	0.54	0.20	0.20			0.00	0.95			0.00	0.00			0.00	0.00	10.79	73.88	100.18	117.41	171.61	110	525	525	CONC	0.25	67.0	215.0311	0.9933	1.1242	0.510
To Anemone Mews, Pipe 309 - 313						0.20				0.95				0.00				0.00	11.92														
	601	705			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	300	300	PVC	0.45	40.0	64.8688	0.9177	0.7264	0.000
Contribution From Les Emmerson Drive (N), Pipe 704 - 705						3.44				0.10				0.00				0.00	13.52														
	705	707			0.00	3.44	0.18	0.67	0.34	0.44			0.00	0.00			0.00	0.00	13.52	65.49	88.66	103.85	151.70	264	675	675	CONC	0.15	58.5	325.5584	0.9098	1.0717	0.812
To Ephemeral Crescent, Pipe 707 - 708						3.44				0.44				0.00				0.00	14.59														
Les Emmerson Drive (S)																																	
			0.22	0.54	0.33	0.33			0.00	0.00			0.00	0.00			0.00	0.00															
	303	507	0.22	0.74	0.45	0.78			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	60	600	600	CONC	0.15	69.0	237.8056	0.8411	1.3673	0.253
To Mineral Street, Pipe 507 - 510						0.78				0.00				0.00				0.00	11.37														
			0.11	0.56	0.17	0.17			0.00	0.00			0.00	0.00			0.00	0.00															
	303	306	0.33	0.70	0.64	0.81			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	62	375	375	PVC	0.35	102.0	103.7267	0.9392	1.8101	0.602
To Anemone Mews, Pipe 306 - 3090						0.81				0.00				0.00				0.00	11.81														

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: R.B.	PROJECT: BARRHAVEN CONSERVANCY EAST, PHASE 3 AND 4	
Checked: W.L.	LOCATION: **City of Ottawa**	
Dwg. Reference: Stm Tributary Area Plan Dwg No. 4	File Ref: 20-1180	Date: 05 Apr 2024
		Sheet No. SHEET 3 OF 6

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha)																FLOW						SEWER DATA								
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
	305	306	0.29	0.72	0.58	0.58			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	45	450	450	CONC	0.25	91.5	142.5531	0.8963	1.7014	0.313
To Anemone Mews, Pipe 306 - 3090						0.58				0.00				0.00				0.00	11.70														
	504	704	0.70	0.80	1.56	1.56			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	120	675	675	CONC	0.15	20.0	325.5584	0.9098	0.3664	0.367
To Les Emmerson Drive (N), Pipe 704 - 705						1.56				0.00				0.00				0.00	10.37														
	505	507	0.49	0.80	1.09	1.09			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	84	675	675	PVC	0.15	20.0	325.5584	0.9098	0.3664	0.257
To Mineral Street, Pipe 507 - 510						1.09				0.00				0.00				0.00	10.37														
Les Emmerson Drive (N)																																	
	300	503			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	450	450	CONC	0.25	37.0	142.5531	0.8963	0.6880	0.000
To Mineral Street, Pipe 503 - 507						0.00				0.00				0.00				0.00	10.69														
	300	301	0.28	0.73	0.57	0.57			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	44	450	450	CONC	0.20	67.0	127.5033	0.8017	1.3929	0.342
	301	302	0.20	0.73	0.41	0.97			0.00	0.00			0.00	0.00			0.00	0.00	11.39	71.84	97.37	114.11	166.76	70	600	600	CONC	0.15	66.5	237.8056	0.8411	1.3178	0.294
To Anemone Mews, Pipe 302 - 306						0.97				0.00				0.00				0.00	12.71														
	500	501	0.41	0.78	0.89	0.89			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	68	450	450	CONC	0.20	109.0	127.5033	0.8017	2.2660	0.536
			0.09	0.71	0.18	1.07			0.00	0.00			0.00	0.00			0.00	0.00															
	501	503	0.17	0.78	0.37	1.44			0.00	0.00			0.00	0.00			0.00	0.00	12.27	69.08	93.57	109.64	160.20	99	525	525	CONC	0.17	65.0	177.3192	0.8191	1.3226	0.559
To Mineral Street, Pipe 503 - 507						1.44				0.00				0.00				0.00	13.59														
	500	701	0.30	0.78	0.65	0.65			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	50	375	375	PVC	0.30	52.5	96.0323	0.8695	1.0063	0.520
	701	702			0.00	0.65			0.00	0.00			0.00	0.00			0.00	0.00	11.01	73.15	99.16	116.22	169.85	48	375	375	PVC	0.30	17.5	96.0323	0.8695	0.3354	0.495
			0.15	0.60	0.25	0.90			0.00	0.00			0.00	0.00			0.00	0.00															
	702	704	0.16	0.80	0.36	1.26			0.00	0.00			0.00	0.00			0.00	0.00	11.34	72.01	97.60	114.38	167.16	90	450	450	CONC	0.20	52.0	127.5033	0.8017	1.0810	0.710
Contribution From Les Emmerson Drive (S), Pipe 504 - 704						1.56				0.00				0.00				0.00	10.37														
					0.00	2.81	0.05	0.75	0.10	0.10			0.00	0.00			0.00	0.00															
	704	705	0.29	0.78	0.63	3.44			0.00	0.10			0.00	0.00			0.00	0.00	12.42	68.61	92.93	108.88	159.08	246	675	675	CONC	0.14	58.0	314.5193	0.8789	1.0998	0.782
To Conservancy Drive, Pipe 705 - 707						3.44				0.10				0.00				0.00	13.52														
Anemone Mews																																	
Contribution From Les Emmerson Drive (N), Pipe 301 - 302						0.97				0.00				0.00				0.00	12.71														
	302	306	0.17	0.75	0.35	1.33			0.00	0.00			0.00	0.00			0.00	0.00	12.71	67.76	91.77	107.51	157.07	90	600	600	CONC	0.15	62.5	237.8056	0.8411	1.2385	0.379
Contribution From Les Emmerson Drive (S), Pipe 303 - 306						0.81				0.00				0.00				0.00	11.81														
Contribution From Les Emmerson Drive (S), Pipe 305 - 306						0.58				0.00				0.00				0.00	11.70														
	306	3090	0.16	0.74	0.33	3.05			0.00	0.00			0.00	0.00			0.00	0.00	13.95	64.36	87.11	102.03	149.03	196	600	600	CONC	0.15	48.0	237.8056	0.8411	0.9512	0.826
	3090	309			0.00	3.05			0.00	0.00			0.00	0.00			0.00	0.00	14.90	62.00	83.88	98.23	143.45	189	675	675	CONC	0.15	10.0	325.5584	0.9098	0.1832	0.581
Contribution From Conservancy Drive, Pipe 200 - 309						0.00				0.22				0.00				0.00	10.74														
Contribution From Conservancy Drive, Pipe 308 - 309						0.20				0.95				0.00				0.00	11.92														
			0.11	0.54	0.16	3.41			0.00	1.17			0.00	0.00			0.00	0.00															
			0.11	0.56	0.18	3.58			0.00	1.17			0.00	0.00			0.00	0.00															
	309	313	0.13	0.56	0.20	3.78			0.00	1.17			0.00	0.00			0.00	0.00	15.08	61.57	83.29	97.54	142.43	331	825	825	CONC	0.10	62.5	453.9246	0.8492	1.2267	0.728
Contribution From Peninsula Road, Pipe 204 - 313						0.07				0.00				0.00				0.00	10.85														
Contribution From Peninsula Road, Pipe 310 - 313						0.51				0.00				0.00				0.00	11.58														
			0.04	0.77	0.08	4.44			0.00	1.17			0.00	0.00			0.00	0.00															
			0.12	0.54	0.19	4.62			0.00	1.17			0.00	0.00			0.00	0.00															
	313	320	0.22	0.54	0.32	4.95			0.00	1.17			0.00	0.00			0.00	0.00	16.31	58.84	79.55	93.14	135.98	384	900	900	CONC	0.11	60.0	600.4123	0.9438	1.0596	0.640
To Sapling Grove, Pipe 320 - 325						4.95				1.17				0.00				0.00	17.37														
Syringa Court																																	
	315	515			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	375	375	PVC	0.30	48.5	96.0323	0.8695	0.9297	0.000
	515	516			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.93	73.41	99.53	116.65	170.48	0	450	450	CONC	0.20	10.0	127.5033	0.8017	0.2079	0.000
	516	519	0.58	0.68	1.09	1.09			0.00	0.00			0.00	0.00			0.00	0.00	11.14	72.70	98.55	115.49	168.79	79	600	600	CONC	0.15	138.5	237.8056	0.8411	2.7445	0.333
To Sapling Grove, Pipe 519 - 520						1.09				0.00				0.00				0.00	13.88														

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: R.B.	PROJECT: BARRHAVEN CONSERVANCY EAST, PHASE 3 AND 4		
Checked: W.L.	LOCATION: City of Ottawa		
Dwg. Reference: Stm Tributary Area Plan Dwg No. 4	File Ref: 20-1180	Date: 05 Apr 2024	Sheet No. SHEET 4 OF 6

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha)														FLOW						SEWER DATA								
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
	315	316			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	300	300	PVC	1.00	12.0	96.7008	1.3680	0.1462	0.000
	316	317	0.32	0.69	0.62	0.62			0.00	0.00			0.00	0.00			0.00	0.00	10.15	76.25	103.43	121.24	177.23	47	450	450	CONC	0.20	70.5	127.5033	0.8017	1.4657	0.368
	317	319	0.21	0.69	0.39	1.01			0.00	0.00			0.00	0.00			0.00	0.00	11.61	71.12	96.39	112.95	165.05	72	600	600	CONC	0.15	68.0	237.8056	0.8411	1.3475	0.302
To Sapling Grove, Pipe 319 - 320						1.01				0.00				0.00				0.00	12.96														
Sapling Grove																																	
	208	325	0.13	0.64	0.24	0.24			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	18	300	300	PVC	0.75	38.5	83.7453	1.1848	0.5416	0.219
To Ainsworth Crescent, Pipe 325 - 326						0.24				0.00				0.00				0.00	10.54														
			0.10	0.60	0.17	0.17			0.00	0.00			0.00	0.00			0.00	0.00															
	523	606	0.18	0.78	0.39	0.56			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	43	375	375	PVC	0.30	72.5	96.0323	0.8695	1.3897	0.446
To Pollination Place, Pipe 606 - 607						0.56				0.00				0.00				0.00	11.39														
	6060	606			0.00	0.00	1.32	0.40	1.47	1.47			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	153	600	600	CONC	0.15	11.0	237.8056	0.8411	0.2180	0.643
To Pollination Place, Pipe 606 - 607						0.00				1.47				0.00				0.00	10.22														
	523	524	0.19	0.78	0.41	0.41			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	32	300	300	PVC	0.35	45.0	57.2089	0.8093	0.9267	0.553
	524	520	0.27	0.60	0.45	0.86			0.00	0.00			0.00	0.00			0.00	0.00	10.93	73.42	99.54	116.66	170.51	63	525	525	CONC	0.30	62.5	235.5548	1.0881	0.9573	0.269
To Gallium Crescent, Pipe 520 - 521						0.86				0.00				0.00				0.00	11.88														
	5190	519	0.29	0.55	0.44	0.44			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	34	450	450	CONC	0.30	62.5	156.1591	0.9819	1.0609	0.218
Contribution From Syringa Court, Pipe 516 - 519						1.09				0.00				0.00				0.00	13.88														
	519	520	0.27	0.66	0.50	2.03			0.00	0.00			0.00	0.00			0.00	0.00	13.88	64.54	87.35	102.32	149.45	131	750	750	CONC	0.11	54.5	369.2322	0.8358	1.0868	0.355
To Gallium Crescent, Pipe 520 - 521						2.03				0.00				0.00				0.00	14.97														
Contribution From Syringa Court, Pipe 317 - 319						1.01				0.00				0.00				0.00	12.96														
	319	320	0.20	0.66	0.37	1.38			0.00	0.00			0.00	0.00			0.00	0.00	12.96	67.04	90.79	106.36	155.38	92	825	825	CONC	0.10	54.5	453.9246	0.8492	1.0697	0.203
Contribution From Anemone Mews, Pipe 313 - 320						4.95				1.17				0.00				0.00	17.37														
			0.15	0.65	0.26	6.59			0.00	1.17			0.00	0.00			0.00	0.00															
	320	325	0.16	0.55	0.24	6.83			0.00	1.17			0.00	0.00			0.00	0.00	17.37	56.69	76.61	89.68	130.91	477	975	975	CONC	0.11	64.0	743.2733	0.9955	1.0715	0.641
To Ainsworth Crescent, Pipe 325 - 326						6.83				1.17				0.00				0.00	18.44														
Ainsworth Crescent																																	
			0.12	0.54	0.18	0.18			0.00	0.00			0.00	0.00			0.00	0.00															
	3200	321	0.14	0.70	0.27	0.45			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	35	375	375	PVC	0.30	74.5	96.0323	0.8695	1.4280	0.360
			0.25	0.50	0.34	0.80			0.00	0.00			0.00	0.00			0.00	0.00															
	321	322	0.39	0.72	0.77	1.57			0.00	0.00			0.00	0.00			0.00	0.00	11.43	71.72	97.21	113.92	166.48	112	525	525	CONC	0.20	79.0	192.3297	0.8885	1.4820	0.585
	322	323			0.00	1.57			0.00	0.00			0.00	0.00			0.00	0.00	12.91	67.18	90.98	106.58	155.71	105	525	525	CONC	0.20	14.0	192.3297	0.8885	0.2626	0.548
	323	330	0.11	0.57	0.17	1.74			0.00	0.00			0.00	0.00			0.00	0.00	13.17	66.45	89.97	105.39	153.96	115	600	600	CONC	0.15	53.5	237.8056	0.8411	1.0602	0.485
To Storm Outlet 3, Pipe 330 - HW3						1.74				0.00				0.00				0.00	14.23														
Contribution From Sapling Grove, Pipe 208 - 325						0.24				0.00				0.00				0.00	10.54														
Contribution From Sapling Grove, Pipe 320 - 325						6.83				1.17				0.00				0.00	18.44														
	325	326	0.11	0.70	0.21	7.28			0.00	1.17			0.00	0.00			0.00	0.00	18.44	54.68	73.87	86.46	126.18	485	975	975	CONC	0.10	68.5	708.6833	0.9492	1.2028	0.684
			0.21	0.55	0.31	7.59			0.00	1.17			0.00	0.00			0.00	0.00															
			0.23	0.71	0.45	8.05			0.00	1.17			0.00	0.00			0.00	0.00															
	326	327	0.35	0.50	0.48	8.53			0.00	1.17			0.00	0.00			0.00	0.00	19.64	52.61	71.04	83.14	121.31	532	975	975	CONC	0.10	76.0	708.6833	0.9492	1.3345	0.751
To Storm Outlet 3, Pipe 327 - 330						8.53				1.17				0.00				0.00	20.98														
Storm Outlet 3																																	
Contribution From Ainsworth Crescent, Pipe 326 - 327						8.53				1.17				0.00				0.00	20.98														
	327	330	0.26	0.63	0.45	8.98			0.00	1.17			0.00	0.00			0.00	0.00	20.98	50.51	68.17	79.77	116.37	533	975	975	CONC	0.10	7.5	708.6833	0.9492	0.1317	0.753
Contribution From Ainsworth Crescent, Pipe 323 - 330						1.74				0.00				0.00				0.00	14.23														
	330	HW3			0.00	10.72			0.00	1.17			0.00	0.00			0.00	0.00	21.11	50.31	67.90	79.45	115.91	619	975	975	CONC	0.15	13.0	867.9562	1.1625	0.1864	0.713
Ambit Lane (LANE 2)																																	
	710	712	0.18	0.85	0.43	0.43			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	33	300	300	PVC	0.35	81.0	57.2089	0.8093	1.6680	0.571
To Crowfoot Lane (LANE 1), Pipe 712 - 713						0.43				0.00				0.00				0.00	11.67														

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: R.B.	PROJECT: BARRHAVEN CONSERVANCY EAST, PHASE 3 AND 4		
Checked: W.L.	LOCATION: City of Ottawa		
Dwg. Reference: Stm Tributary Area Plan Dwg No. 4	File Ref: 20-1180	Date: 05 Apr 2024	Sheet No. SHEET 5 OF 6

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha)														FLOW						SEWER DATA								
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
	710	1301			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	300	300	PVC	0.35	44.5	57.2089	0.8093	0.9164	0.000
	1301	1302			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.92	73.46	99.59	116.72	170.59	0	300	300	PVC	0.35	9.5	57.2089	0.8093	0.1956	0.000
	1302	1304	0.16	0.71	0.32	0.32			0.00	0.00			0.00	0.00			0.00	0.00	11.11	72.78	98.66	115.63	168.99	23	375	375	CONC	0.27	23.0	91.1042	0.8249	0.4647	0.252
To Deciduous Crescent, Pipe 1304 - 1309						0.32				0.00				0.00				0.00	11.58														
Deciduous Crescent																																	
			0.08	0.60	0.13	0.13			0.00	0.00			0.00	0.00			0.00	0.00															
			0.22	0.78	0.48	0.61			0.00	0.00			0.00	0.00			0.00	0.00															
	706	1306	0.24	0.60	0.40	1.01			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	78	375	375	PVC	0.30	69.0	96.0323	0.8695	1.3226	0.808
To Storm Outlet 13, Pipe 1306 - 1309						1.01				0.00				0.00				0.00	11.32														
					0.00	0.00	0.04	0.72	0.08	0.08			0.00	0.00			0.00	0.00															
			0.12	0.60	0.20	0.20			0.00	0.08			0.00	0.00			0.00	0.00															
	706	707	0.21	0.78	0.46	0.66			0.00	0.08			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	59	375	375	PVC	0.30	65.5	96.0323	0.8695	1.2555	0.611
To Ephemeral Crescent, Pipe 707 - 708						0.66				0.08				0.00				0.00	11.26														
					0.00	0.00	0.03	0.79	0.07	0.07			0.00	0.00			0.00	0.00															
					0.00	0.00	0.05	0.55	0.08	0.14			0.00	0.00			0.00	0.00															
	716	717	0.23	0.78	0.50	0.50			0.00	0.14			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	53	375	375	PVC	0.27	66.0	91.1042	0.8249	1.3335	0.583
To Ephemeral Crescent, Pipe 717 - 718						0.50				0.14				0.00				0.00	11.33														
	716	1304	0.26	0.78	0.56	0.56			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	43	300	300	PVC	0.35	69.5	57.2089	0.8093	1.4312	0.757
Contribution From Ambit Lane (LANE 2), Pipe 1302 - 1304						0.32				0.00				0.00				0.00	11.58														
	1304	1309	0.16	0.60	0.27	1.15			0.00	0.00			0.00	0.00			0.00	0.00	11.58	71.24	96.54	113.13	165.33	82	450	450	CONC	0.20	59.0	127.5033	0.8017	1.2266	0.641
To Storm Outlet 13, Pipe 1309 - HW13						1.15				0.00				0.00				0.00	12.80														
Storm Outlet 13																																	
Contribution From Deciduous Crescent, Pipe 706 - 1306						1.01				0.00				0.00				0.00	11.32														
	1306	1309	0.12	0.78	0.26	1.27			0.00	0.00			0.00	0.00			0.00	0.00	11.32	72.07	97.69	114.48	167.31	92	450	450	CONC	0.20	11.5	127.5033	0.8017	0.2391	0.718
Contribution From Deciduous Crescent, Pipe 1304 - 1309						1.15				0.00				0.00				0.00	12.80														
	1309	HW13			0.00	2.42			0.00	0.00			0.00	0.00			0.00	0.00	12.80	67.49	91.40	107.08	156.44	163	600	600	CONC	0.15	5.5	237.8056	0.8411	0.1090	0.686
Borrisokane Road																																	
	800	801			0.00	0.00			0.00	0.00	2.71	0.80	6.03	6.03			0.00	0.00	10.00	76.81	104.19	122.14	178.56	736	1200	1200	CONC	0.10	68.5	1232.8868	1.0901	1.0473	0.597
	801	802			0.00	0.00			0.00	0.00	0.54	0.77	1.16	7.18			0.00	0.00	11.05	73.00	98.97	115.99	169.52	833	1200	1200	CONC	0.10	70.0	1232.8868	1.0901	1.0702	0.676
	802	803			0.00	0.00			0.00	0.00	0.40	0.80	0.89	8.07			0.00	0.00	12.12	69.53	94.20	110.37	161.27	891	1200	1200	CONC	0.10	70.0	1232.8868	1.0901	1.0702	0.723
	803	804			0.00	0.00			0.00	0.00	0.62	0.80	1.38	9.45			0.00	0.00	13.19	66.40	89.91	105.32	153.86	995	1200	1200	CONC	0.10	70.0	1232.8868	1.0901	1.0702	0.807
	804	805			0.00	0.00			0.00	0.00			0.00	9.45			0.00	0.00	14.26	63.58	86.03	100.76	147.17	952	1200	1200	CONC	0.10	70.0	1232.8868	1.0901	1.0702	0.772
To Storm Outlet 8, Pipe 805 - 806						0.00				0.00				9.45				0.00	15.33														
Storm Outlet 8																																	
Contribution From Borrisokane Road, Pipe 804 - 805						0.00				0.00				9.45				0.00	15.33														
	805	806			0.00	0.00			0.00	0.00	0.21	0.80	0.47	9.92			0.00	0.00	15.33	61.00	82.51	96.62	141.09	958	1200	1200	CONC	0.10	27.5	1232.8868	1.0901	0.4204	0.777
	806	HW8			0.00	0.00			0.00	0.00			0.00	9.92			0.00	0.00	15.75	60.06	81.21	95.10	138.85	943	1200	1200	CONC	0.10	8.5	1232.8868	1.0901	0.1300	0.765

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: R.B.	PROJECT: BARRHAVEN CONSERVANCY EAST, PHASE 3 AND 4		
Checked: W.L.	LOCATION: **City of Ottawa**		
Dwg. Reference: Stm Tributary Area Plan Dwg No. 4	File Ref: 20-1180	Date: 05 Apr 2024	Sheet No. SHEET 6 OF 6