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Memorandum

To/Attention	John Bernier, City of Ottawa Shawn Wessel, City of Ottawa	**Date**	April 26, 2022
From	Meghan Black Jim Moffatt	**Project No**	118863-5.3.1.5
cc	Mary Jarvis, Canada Lands Company		
Subject	Assessment of Revised Block 11 and 12 Storm and Sanitary Servicing		

1. Background

Blocks 11 and 12 are located within Phase 2B of the Wateridge development and are indicated in **Figure 1**. The municipal servicing of the two blocks was addressed in, "Design Brief, Wateridge Village at Rockcliffe Phase 2B," prepared by IBI Group in April 2019. Subsequent to the approval of the Phase 2B detailed design, Canada Lands Company has sub-divided the subject blocks into five parcels for development. The parcels, identified as Parcels 1-5, are being considered for purchase by various parties. IBI has been engaged to assess the impact of this change on adjacent existing storm and sanitary sewers. Enclosed **Figure 1** depicts Blocks 11 and 12 and the respective five parcels.

2. Stormwater Management

2.1 Objective

The objective of the evaluation is to assess the impact on the dual drainage system of discretizing Blocks 11 and 12 into Parcels 1-5 and the associated impacts to the storm servicing. The detailed design of Parcels 1-5 will be carried out by others.

2.2 Dual Drainage Design

Per the Phase 2B design brief, minor storm runoff from Block 11 (identified as drainage area B309) drains to Bareille-Snow Street, with major flow tipping to Bareille-Snow Street at Hemlock Road. Minor flow from Block 12 (identified as drainage area B340) drains to Codd's Road with major flow draining to Hemlock Road. The minor system restriction for the two development blocks corresponds to between the 5 and 100 year storm event, and no on-site storage was proposed. The storm drainage area plan (Drawing 750) from the Phase 2B submission is enclosed in **Appendix A** for reference. With the proposed adjustments to the storm servicing for the sub-divided or discretized parcels, minor system capture and on-site storage has been re-assessed.

2.3 Hydrological Analysis

Hydrological analysis of the dual drainage system of the subject site has been conducted using DDSWMM, consistent with the simulations completed for the Phase 2B design brief.

2.3.1 Storm and Design Parameters

The following storms and design parameters have been used in the evaluation. The main hydrological parameters are summarized in **Table 2.1**, with a comparison of what was included in the Phase 2B evaluation.

- **Design Storms:** The subject site has been evaluated with the following storms, consistent with the Phase 2B evaluation:
    - 5 and 100 year 3 hour Chicago storm events, and associated stress test; applied for the evaluation of the trunk storm sewers;
    - 100 year 24 hour SCS Type II storm event, applied for the evaluation of the trunk storm sewers;
    - July 1979, August 1988, August 1996 historical storms per the OSDG.

- **Area and Imperviousness:** Block 11 (identified as drainage area B309) and Block 12 (identified as drainage area B340) have been discretized into Parcels 1 through 5. An imperviousness value of 86% has been applied to the parcels, consistent with the values applied for B309 and B340 in the Phase 2B design brief.

- **Infiltration:** Infiltration losses were selected to be consistent with the OSDG. The Horton values are as follows: f_o = 76.2 mm/h, f_c = 13.2 mm/h, k = 0.00115 s^{-1}.

- **Subcatchment Width:** The catchment width for the parcels was based on 225 m/ha.

- **Slope:** The ground slope was based upon the average slope for both impervious and pervious area. Generally, the slope is approximately 2% (0.02 m/m). This assumes a slope of approximately 1% for impervious or road surfaces and 3% for pervious surfaces (lot grading).

- **Initial Abstraction (Detention Storage):** Detention storage depths of 1.5 mm and 4.67 mm were used for impervious and pervious areas, respectively. These values are consistent with the OSDG.

- **Manning's roughness:** Manning's roughness coefficients of 0.013 and 0.25 were used for impervious and pervious areas, respectively.

- **Baseflow:** No baseflow components were assumed for any of the areas contributing runoff to the minor system within the DDSWMM model.

- **Minor System Capture:** The minor system capture for the parcels ranges from the 5 year to the 100 year, with three parcels capturing between the 5 and 100 year simulated flow.

- **Major System Storage and Routing:** In order to continue to satisfy City design guidelines, on-site storage has been introduced on four of the parcels, as noted below.

A summary of parameters and minor system and on-site storage is presented in the following tables. A summary from the Phase 2B detailed design is included to facilitate review. Refer to

Figure 2 for the overall storm sewer network and to **Figure 3** for a depiction of the minor and major system connectivity for the five parcels.

Table 2.1 Hydrological Parameters

Block	Phase 2B Design Brief							Current Evaluation							
	Drainage Area ID	Area (ha)	Major System: D/S Segment ID	Minor System: MH ID	IMP Ratio	Segment Length (m)	Sub-catchment Width (m)	Parcel	Drainage Area ID	Area (ha)	Major System: D/S Segment ID	Minor System: MH ID	IMP Ratio	Segment Length (m)	Sub-catchment Width (m)
11	B309	1.24	S308A on Bareille-Snow	MH309 on Bareille-Snow	0.86	135.1	270.2	1	B309_1	0.72	S308 on Bareille-Snow	MH309 on Bareille-Snow	0.86	81	162
								2	B309_2	0.52	S308A on Bareille-Snow	MH310 on Michael Stoqua	0.86	58.5	117
12	B340	1.24	S207 on Hemlock	MH305 on Codd's Road	0.86	173.1	346.3	3	B340_3	0.34	S308A on Bareille-Snow	MH308 on Bareille-Snow	0.86	38.25	76.5
								4	B340_4	0.53	S308 on Bareille-Snow	MH309 on Bareille-Snow	0.86	59.63	119.25
								5	B340_5	0.37	S340 on Codd's	MH305 on Codd's Road	0.86	41.63	83.25

Table 2.2 Minor System Restriction and On-site Storage

Block	Phase 2B Design Brief				Current Evaluation					
	Drainage Area ID	Minor System Capture		Required On-Site Storage (cu-m)	Parcel	Drainage Area ID	Minor System Capture		Major System	
		Simulated Flow (l/s)	Corresponding Design Storm				Simulated Flow (l/s)	Corresponding Design Storm	Required On-Site Storage (cu-m)	Comment
11	B309	370	Between 5 and 100	None	1	B309_1	195	Between 5 and 100 year	43	Control up to the 100 year event
					2	B309_2	105	5 year	64	Control up to the 100 year event
12	B340	366	Between 5 and 100	None	3	B340_3	95	Between 5 and 100 year	18	Control up to the 100 year event
					4	B340_4	150	Between 5 and 100 year	21	Control up to the 100 year event
					5	B340_5	139	100 year	None	N/A

2.4 Results of Hydrological Modeling

2.4.1 Minor System

The minor system hydrographs generated by the hydrological model were exported to the hydraulic model for analysis, discussed in **Section 2.5**.

2.4.2 Major System

Due to the adjustment in major system connectivity, the major system has been reassessed. Refer to drainage areas on Drawing 750 from the Phase 2B submission in **Appendix A**.

2.4.2.1 Street Segment Storage

The available and utilized street sag storage is summarized in the below table for street segments in affected by the revised storm servicing of Parcels 1-5.

Table 2.3 Summary of On-site Street Storage (Available and Utilized) During Target Minor System Design Storm in Vicinity of Parcels 1-5

Street	Drainage Area ID	Minor System Design Storm	Available Static Storage (cu-m)	Total Storage Utilized During Minor System Design Storm (cu-m)	Overflow During Minor System Design Storm (l/s)
Michael Stocqua	S310A	5	61.39	0	0
Bareille-Snow	S308A	5	40.38	0	0
Hemlock	S176C	5	1.14	0	0

The results indicate that there is no ponding on the street segments during the minor system design storm.

2.4.2.2 Velocity x Depth

According to the City of Ottawa Sewer Design Guidelines (October 2012), the maximum depth of flow should not exceed 350 mm and the product of velocity and depth on all the street segments should not exceed 0.6 m^2/s during the 100 year storm event.

The cascading overflow is the flow exiting a drainage area when maximum minor system inflow and maximum available ponding has been utilized. To determine velocity of the cascading overflow, a SWMHYMO file was created (118863VD.dat).

To determine velocity of the cascading overflow at critical locations, SWMHYMO was used. The ROW sections were entered into the model with the appropriate longitudinal slopes to obtain the maximum velocity of flow using the Route Channel routine. The overflow is obtained from the respective DDSWMM output file and is noted in the footnotes of the below tables.

To determine depth of the cascading overflow, the *Calculation Sheet: Overflow From Typical Road Ponding Area* provided at the February 2014 Technical Bulletin ISDTB-2014-01 was used. The

exception to this is where the road is on grade in which case the depths were obtained from the SWMHYMO model.

The results are presented in **Table 2.4** and **Table 2.5** and the supporting calculations are included in **Appendix A**.

Table 2.4 Summary of Cascading Flow during the 100 year 3 hour Chicago storm

Street	Drainage Area ID	Dummy Segment ID	Overflow (l/s)[1]	Velocity (m/s)[2]	Max. Static Ponding Depth (m)	Depth of Dynamic Flow (m)[3]	Max. Depth (Static + Dynamic) (m)	Velocity x Depth (m^2/s)
Michael Stoqua	S311A	N/A	49	0.73	N/A	0.04	0.04	0.03
Michael Stoqua	S310A	D14	0	0	0.29	0	0.29	0
Bareille-Snow	S309	N/A	43	0.50	N/A	0.05	0.05	0.03
Bareille-Snow	S308	N/A	65	0.84	N/A	0.05	0.05	0.04
Bareille-Snow	S308A	D18	26	0.47	0.26	0.05	0.31	0.03
Codd's	S340	N/A	50	0.88	N/A	0.04	0.04	0.04
Codd's	S231	N/A	100	0.62	N/A	0.07	0.07	0.04
Hemlock	S205C	N/A	37	0.48	N/A	0.05	0.05	0.02
Hemlock	S207	N/A	61	0.55	N/A	0.06	0.06	0.03

(1) Overflow from DDSWMM output 118863-3CHI100.out
(2) Velocity from SWMHYMO output 118863VD.out
(3) Depth of the cascading overflow was determined from the Calculation Sheet: Overflow From Typical Road Ponding Area provided in the February 2014 Technical Bulletin ISDTB-2014-01. For those areas which have a continuous road grade (or no dummy segment), the depth was taken from SWMHYMO VxD simulation.

Table 2.5 Summary of Cascading Flow during the 100 year 3 hour Chicago storm + 20%

Street	Drainage Area ID	Dummy Segment ID	Overflow (l/s)[1]	Velocity (m/s)[2]	Max. Static Ponding Depth (m)	Depth of Dynamic Flow (m)[3]	Max. Depth (Static + Dynamic) (m)	Velocity x Depth (m^2/s)
Michael Stoqua	S311A	N/A	66	0.79	N/A	0.05	0.05	0.04
Michael Stoqua	S310A	D14	33	0.61	0.29	0.06	0.35	0.04
Bareille-Snow	S309	N/A	71	0.57	N/A	0.06	0.06	0.03
Bareille-Snow	S308	N/A	216	1.15	N/A	0.08	0.08	0.09
Bareille-Snow	S308A	D18	268	1.29	0.26	0.13	**0.39**	0.17
Codd's	S340	N/A	98	1.04	N/A	0.05	0.05	0.06
Codd's	S231	N/A	165	0.71	N/A	0.08	0.08	0.06
Hemlock	S205C	N/A	46	0.51	N/A	0.05	0.05	0.03

Street	Drainage Area ID	Dummy Segment ID	Overflow (l/s)[1]	Velocity (m/s)[2]	Max. Static Ponding Depth (m)	Depth of Dynamic Flow (m)[3]	Max. Depth (Static + Dynamic) (m)	Velocity x Depth (m^2/s)
Hemlock	S207	N/A	89	0.60	N/A	0.07	0.07	0.04

(1) Overflow from DDSWMM output 118863-3CHI120.out
(2) Velocity from SWMHYMO output 118863VD.out
(3) Depth of the cascading overflow was determined from the Calculation Sheet: Overflow From Typical Road Ponding Area provided in the February 2014 Technical Bulletin ISDTB-2014-01. For those areas which have a continuous road grade (or no dummy segment), the depth was taken from SWMHYMO VxD simulation.

During the 100 year 3 hour Chicago storm, the summation of depth of ponding and depth of cascading flow for all street segments is less than the City guideline of 0.35 m. The product of depth and velocity is also less than the City guideline of 0.6 m^2/s.

During the sensitivity analysis applying the 100 year 3 hour Chicago storm increased by 20%, the summation of depth of ponding and depth of cascading flow for all street segments is less than the City guideline of 0.35 m, with the exception of S308A, noted in the above table in bold red type. At all locations, the product of depth and velocity is less than the City guideline of 0.6 m^2/s.

These results are consistent with those of the Phase 2B detailed design. It should be noted that major flow from the above-noted affected areas is at or below that accounted for in the Phase 2B model.

The area at which total depth of ponding and cascading flow exceeds 0.35 m during the stress test is noted in the below table with the critical adjacent property elevation.

Table 2.6 Critical Ponding Locations during the Stress Test and Adjacent Property Elevations

Drainage Area ID	Low Point Elevation (m)	Max. Depth (Static + Dynamic) (m)	(1) Corresponding Elevation (m)	(2) Adjacent Property Line (m)	Difference (2) – (1)
S308A	88.74	0.39	89.13	89.01	-0.12

The corresponding stress test ponding elevation is greater than the adjacent block grading at the boulevard. At the detailed design stage of the blocks, house openings must be greater than the ponding elevation.

2.5 Storm Hydraulic Grade Line Analysis

The hydraulic grade line (HGL) was evaluated using the XPSWMM hydraulic model. The existing overall model for the Wateridge site, most recently revised as part of the Phase 4 submission (December 2021), was revised to include the revised servicing of Parcels 1-5.

XPSWMM simulations were conducted for the 100 year 3 hour Chicago storm to ensure that the HGL is at least 0.3 m below the underside of footing elevations. A sensitivity analysis was also performed using the 100 year Chicago storm with a 20% increase in intensity to ensure that there is no severe flooding to properties. Hydraulic grade line elevations along the existing downstream Phase 1A trunk storm sewer and relevant Phase 2B storm sewers are presented in the below table for these storms, along with a comparison of underside of footing (USF) elevations. Results

for the overall development area are presented in the enclosed **Appendix A**, including for the three historical storms per OSDG. Refer to **Figure 1** for the location of storm maintenance holes.

Table 2.7 Storm Hydraulic Grade Line – Phase 1A Trunk and Relevant Phase 2B Storm Sewers

MH ID	Street	Proposed Ground Elev. (m)	USF (m)	100 year 3 hour Chicago		100 year 3 hour Chicago + 20%	
				HGL (m)	USF – HGL (m)	HGL (m)	USF – HGL (m)
MH194	*Top of the escarpment*	82.05	N/A	80.47	N/A	80.55	N/A
MH193	OSHEDINAA	84.68	82.68	81.12	1.56	81.28	1.40
MH192	OSHEDINAA	84.99	82.99	81.46	1.53	81.64	1.35
MH191	OSHEDINAA	85.76	83.76	81.72	2.04	81.93	1.83
MH190	OSHEDINAA	86.36	84.36	81.96	2.40	82.19	2.17
MH180	OSHEDINAA	86.96	84.96	82.27	2.69	82.77	2.19
MH178	HEMLOCK	89.00	86.60	83.41	3.19	83.47	3.13
MH176	HEMLOCK	88.03	85.63	83.77	1.86	83.85	1.78
MH231	CODD'S	89.81	87.41	85.61	1.79	85.64	1.77
MH305	CODD'S	91.00	88.60	86.54	2.06	86.56	2.04
MH207	HEMLOCK	88.53	86.13	84.65	1.48	84.65	1.48
MH206	HEMLOCK	89.10	86.70	85.65	1.05	85.65	1.05
MH308	BAREILLE-SNOW	89.68	87.28	86.88	0.40	86.69	0.59
MH309	BAREILLE-SNOW	90.15	87.75	87.44	0.31	87.08	0.67
MH205	HEMLOCK	89.35	86.95	85.86	1.09	85.88	1.07
MH310	MICHAEL STOCQUA	90.04	87.64	87.28	0.36	87.42	0.22
MH311	MICHAEL STOCQUA	90.69	88.29	87.44	0.85	87.56	0.73

Along the Phase 1A trunk and Phase 2B storm sewers presented above, a minimum 0.3 m clearance between the USF and HGL is maintained during the 100 year 3 hour Chicago storm and the HGL elevations remain below USF elevations during the sensitivity analysis. This is also true for the results for the remainder of the development area for additional storm simulations (enclosed in **Appendix A**).

2.6 Conclusion

The storm servicing of Blocks 11 and 12 was addressed during the detailed design of Phase 2B. The purpose of this evaluation is to assess the impact on the dual drainage system of discretizing Blocks 11 and 12 into Parcels 1-5 and the associated revisions to the storm servicing. The proposed minor and major connectivity of the five parcels is presented on **Figure 3** and minor system capture and required on-site storage is summarized in **Table 2.2**.

In terms of major flow, the depth and velocity of flow on streets adjacent to the five parcels was evaluated. City guidelines with respect to ponding during the minor system design storm, as well as maximum depth and velocity of flow are maintained. Major flow from the adjacent street segments is at or below that accounted for in the Phase 2B model.

With respect to minor flow, the hydraulic grade line evaluation was updated with the revised inflow hydrographs from the five parcels. Results indicate that a minimum 0.3 m clearance between the USF and HGL is maintained during the 100 year 3 hour Chicago storm and the HGL elevations remain below USF elevations during the sensitivity analysis.

It is therefore concluded that the proposed storm servicing to support Parcels 1-5 can be accommodated by the existing storm infrastructure.

3. Wastewater Outlet

3.1 Objective

The objective of this evaluation is to assess the impact on the existing wastewater system by the sub-division of Blocks 11 and 12 into five parcels. **Figure 4** shows the location of the subject site and the existing sanitary sewers which will be impacted by this change.

3.2 Existing Conditions

Development of Phase 2B included the construction of sanitary sewers in Codd's Road from MH231A to the MH340A and Bareille-Snow Street from BLK308A to MH304A. The sanitary sewer on Codd's Road was designed to capture wastewater flows from Block 12 and the sanitary sewer on Bareille-Snow Street was designed to capture wastewater flows from Block 11. The Bareille-Snow sewer outlets to a sanitary sewer in Hemlock Road. The latter sewer was designed in 2017, using the City's wastewater flow criteria in effect at that time and predicted a flow of 28.49 l/s tributary from the Bareille-Snow sewer. The Bareille-Snow sanitary sewer was designed in 2019 based on flow calculation criteria in effect at that time and predicted a slightly less flow of 25.17 l/s. A highlighted copy of the Phase 2B sanitary sewer design sheet is included in **Appendix B**. The spreadsheet has been highlighted to indicate the immediate downstream sewers on Codd's Road and Bareille-Snow Street. The flow calculations in the Phase 2B spreadsheet were based on the City of Ottawa's wastewater criteria in effect of that time (2019) and the block population densities noted in the Master Servicing Study.

3.3 Proposed Condition

Because of the sub-division of Blocks 11 and 12 into five parcels, less wastewater flow is now proposed to outlet to the Codd's Road sanitary sewer. The Phase 2B sewer designed assumed all Block 12 would outlet to that sewer but now only parcel 5 is proposed to outlet in that direction. No further analysis is therefore needed for the Codd's Road sewer.

Parcels 3 and 4, which represent the balance of Block 12, are now proposed to outlet to the existing sanitary sewer in Bareille-Snow Street and not the Codd's Road sewer. There is no

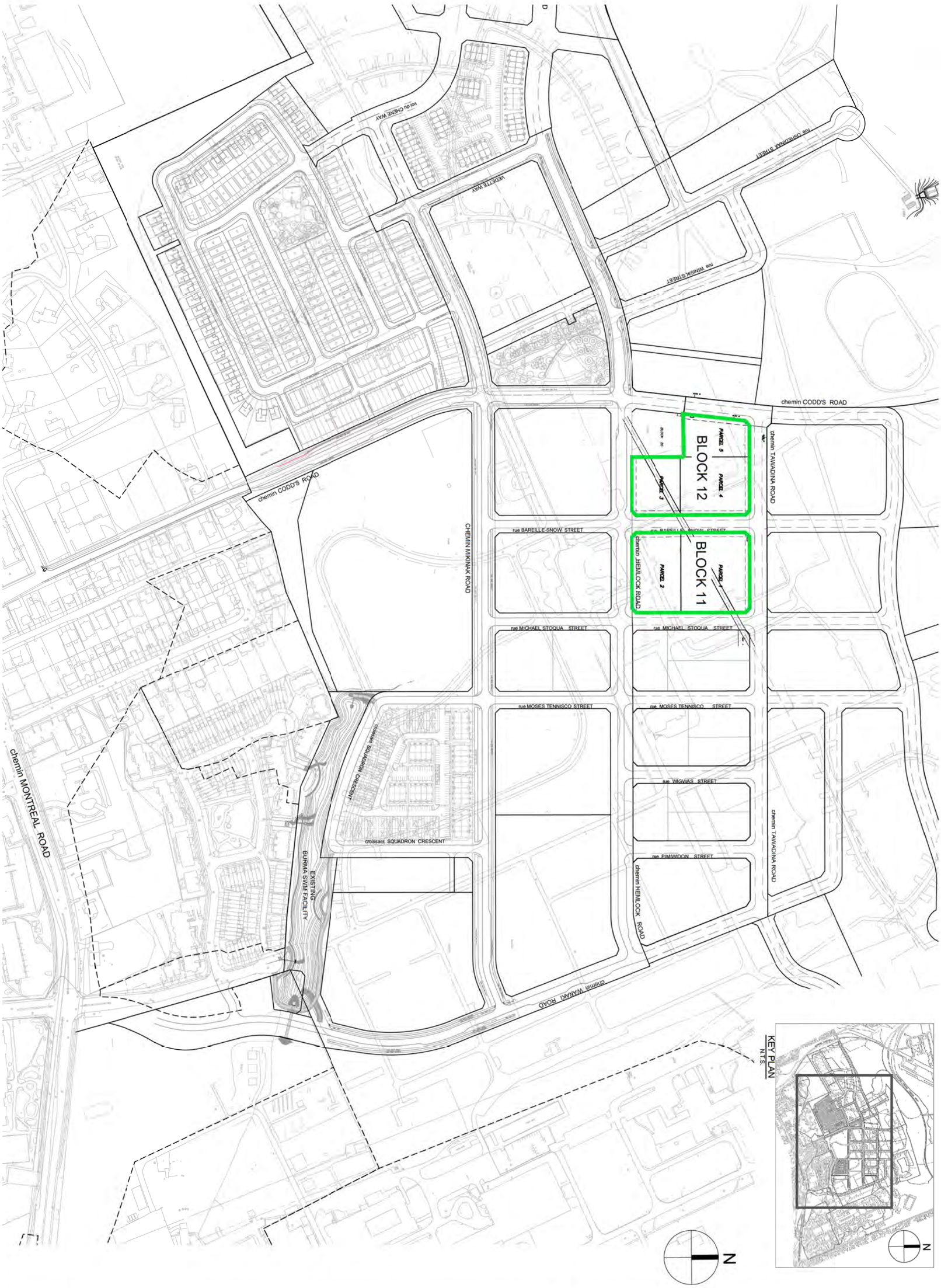
proposed change to the wastewater outlet for parcels 1 and 2. The Phase 2B design assumed all Block 11 would outlet to the Bareille-Snow sewer. Consequently, the expected wastewater flows to the latter pipe will likely increase.

An analysis of the ability of the existing sanitary sewer system in Bareille-Snow Street to accommodate the flows from both Block 11 and 12 was completed. This analysis is included on the updated sanitary sewer spreadsheet included in **Appendix B**. The updated spreadsheet was based not only on the current City of Ottawa wastewater criteria, which came into effect in 2018 but also on the most current concept plans for the various parcels which are also included in **Appendix B**. The updated analysis includes the existing sewer system highlighted on the Phase 2B design sheet.

Based on the updated analysis, the calculated wastewater flows tributary to the Hemlock Road sewer from Bareille-Snow Street is 30.31 l/s. This shows a wastewater flow increase of 1.82 l/s as a result of re-directing wastewater flows from parcels 3 and 4 in Block 12. The capacity of that sewer is 88.83 l/s. The Phase 1B design of the sanitary sewer in Hemlock Road between Bareille-Snow Street and Codd's Road indicated a spare capacity in that sewer of about 58 l/s. For reference, a highlighted copy of the Phase 1B sanitary sewer design sheet is included in **Appendix B**.

3.4 Conclusion

The impact of re-directing wastewater flows from Block 12 to the Bareille-Snow Street sanitary sewer has been completed. Based on the analysis noted above, the existing wastewater system in Wateridge Village Phase 1B and 2B has sufficient available capacity to carry the re-directed flows from Block 12. It is therefore concluded that the existing sanitary sewers in Bareille-Snow Street, Codd's Road and Hemlock Road adjacent to the subject property can accommodate the re-direction of flows from Block 12.



Sheet No.	Drawing Title	Project Title	Scale
FIGURE 1	LOCATION PLAN	STORM AND SANITARY SERVICING ASSESSMENT OF BLOCK 11 AND 12 WATERIDGE VILLAGE PHASE 2B	N.T.S.

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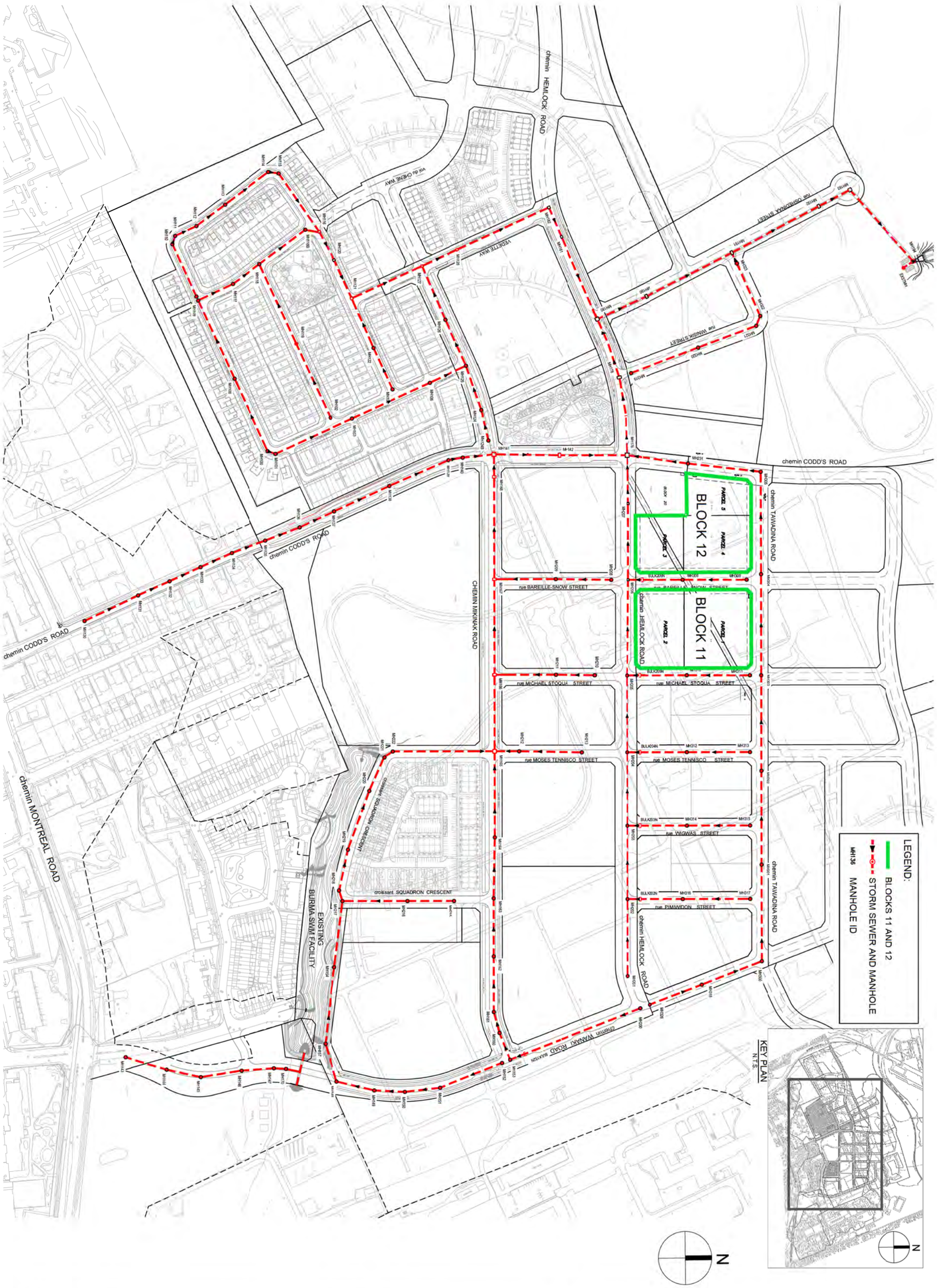
J:\38298-CFBRockcliffe\5.9 Drawings\59civil\SWM\FIGURES\BLOCK 11,12\FIGURE 2.dwg Layout Name: FIG2 Plot Style: AIA STANDARD COLOR-HALF.CTB Plotted At: 4/25/2022 5:45 PM Last Saved By: swukic, Apr. 25, 22



Sheet No.

FIGURE 2

Drawing Title

LOCATION PLAN AND STORM SEWER NETWORK

Project Title

STORM AND SANITARY SERVICING ASSESSMENT OF BLOCK 11 AND 12 WATERIDGE VILLAGE PHASE 2B

Scale

N.T.S.

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LEGEND:

- BLOCK 11 AND 12 DRAINAGE AREA BOUNDARY
- B340-5 / 0.37 | 86 — DRAINAGE AREA ID / IMPERVIOUSNESS (%) / AREA IN HECTARES
- EMERGENCY FLOW ROUTING
- MINOR FLOW
- STORM SEWER AND MANHOLE
- MH136 — MANHOLE ID

KEY PLAN
N.T.S.

N

chemin CODD'S ROAD

chemin TAWADINA ROAD

chemin HEMLOCK ROAD

rue BAREILLE - SNOW STREET

rue MICHAEL STOQUA STREET

rue MOSES TENNISCO STREET

MH305 MH304 MH303 MH302 MH309 MH311 MH313 MH231 MH308 MH310 MH312 MH176 MH207 MH206 MH205 MH204 MH208 MH210 MH213 MH142

BULK206N BULK205N BULK204N

BLOCK 13 BLOCK 15 BLOCK 14 BLOCK 20 BLOCK 12 BLOCK 11 BLOCK 8

PARCEL 5 PARCEL 4 PARCEL 1 PARCEL 3 PARCEL 2

B340_5 | 0.37 | 86
B340_4 | 0.53 | 86
B309_1 | 0.72 | 86
B340_3 | 0.34 | 86
B309_2 | 0.52 | 86

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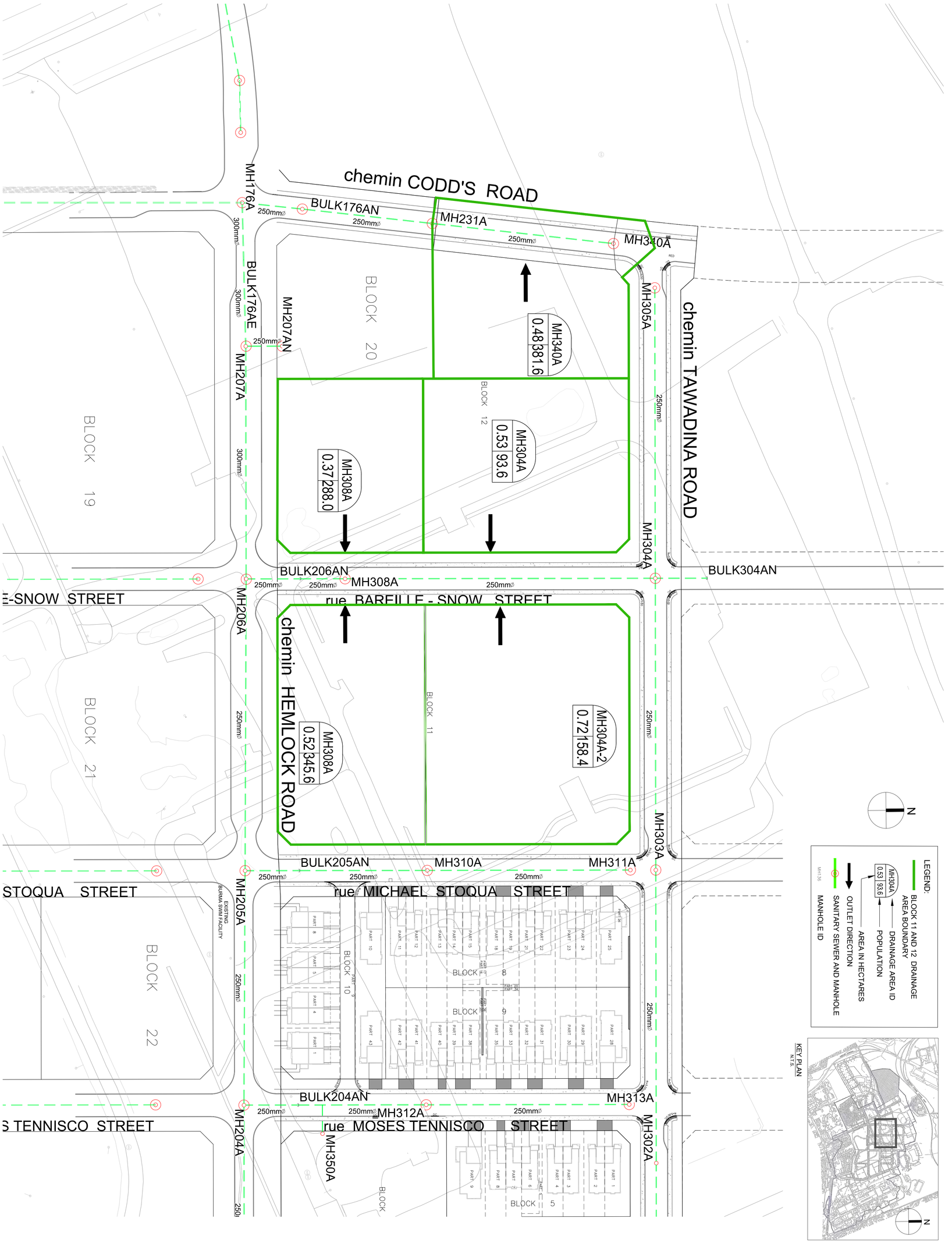
Scale N.T.S.

Project Title
STORM AND SANITARY SERVICING
ASSESSMENT OF BLOCK 11 AND 12
WATERIDGE VILLAGE PHASE 2B

Drawing Title
MINOR AND MAJOR SYSTEM
CONNECTIVITY

Sheet No.
FIGURE 3



Sheet No.	Drawing Title	Project Title	Scale
FIGURE 4	LOCATION PLAN AND SANITARY SEWER NETWORK	STORM AND SANITARY SERVICING ASSESSMENT OF BLOCK 11 AND 12 WATERIDGE VILLAGE PHASE 2B	N.T.S.

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Appendix A

Supporting Storm Information

Summary of Model Files

DDSWMM:

5 year 3 hour Chicago: 118863-3CHI5.DAT
100 year 3 hour Chicago: 118863-3CHI100.DAT
100 year 3 hour Chicago + 20%: 118863-3CHI120.DAT

100 year 24 hour SCS Type II: 118863-24SCS100.DAT
100 year 24 hour SCS Type II + 20%: 118863-24SCS120.DAT

July 1979: 118863-JUL79.DAT
August 1988: 118863-AUG88.DAT
August 1996: 118863-Aug96.DAT

SWMHYMO VxD:

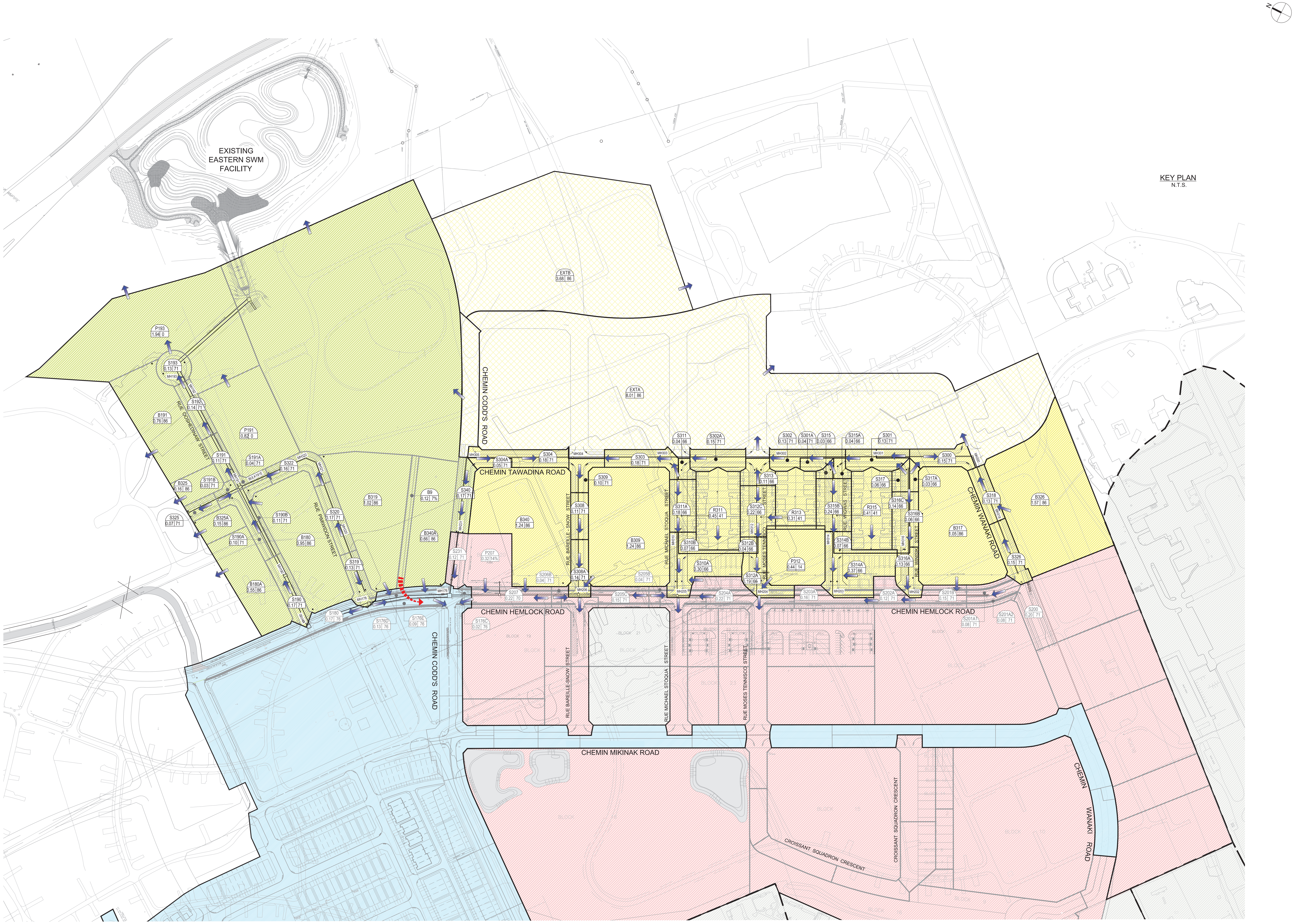
118863VD.dat

XPSWMM:

5 year 3 hour Chicago: 118863-3CHI5_BLK1112_V08_2022-03-15.XP
100 year 3 hour Chicago: 118863-3CHI100_BLK1112_V08_2022-02-28.XP
100 year 3 hour Chicago + 20%: 118863-3CHI120_BLK1112_V08_2022-02-28.XP

100 year 24 hour SCS Type II: 118863-24SCS100_BLK1112_V08_2022-03-15.XP
100 year 24 hour SCS Type II + 20%: 118863-24SCS120_BLK1112_V08_2022-03-15.XP

July 1979: 118863-JUL1979_BLK1112_V08_2022-03-15.XP
August 1988: 118863-AUG1988_BLK1112_V08_2022-03-15.XP
August 1996: 118863-AUG1996_BLK1112_V08_2022-03-15.XP



LEGEND:

- PHASE 2B DRAINAGE AREA
- PHASE 2A DRAINAGE AREA (FUTURE)
- PHASE 2C 2D DRAINAGE AREA (FUTURE)
- PHASE 1B DRAINAGE AREA (EXISTING)
- PHASE 1A DRAINAGE AREA (EXISTING)
- EXTERNAL DRAINAGE AREA

S318 — AREA ID
0.13 | 71 — Imp.(%) / AREA (ha)

- MAJOR FLOW
- TOTAL FLOW
- MH136 MANHOLE ID

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1	SUBMISSION No.1 FOR CITY REVIEW	P.S.	2018:12:20

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Project Title

WATERIDGE VILLAGE AT ROCKCLIFFE

PHASE 2B

M.S.BLACK 100101736 2019/04/17

Drawing Title

DDSWMM MODEL SCHEMATIC

Scale	1:2000
Design: M.B	Date: DEC. 2018
Drawn: S.V.	Checked: P.S.
Project No.: 118863	Drawing No.: 750

D07-16-15-0003

#17063

Velocity x Depth Calculation

Iteration equation:

Velocity:

$$v_x = v_{min} + \frac{Q_x - Q_{min}}{Q_{max} - Q_{min}} (v_{max} - v_{min})$$

Depth:

$$d_x = d_{min} + \frac{Q_x - Q_{min}}{Q_{max} - Q_{min}} (d_{max} - d_{min})$$

100 Year 3 Hour Chicago Storm																					
					SWMHYMO (118863VD.OUT)					Calculation Sheet: Overflow for Typical Road Ponding Area					SWMHYMO (118863VD.OUT)			Velocity x Depth	Maximum Static Ponding Depth	Total Depth (Static + Dynamic)
Area ID (Dummy Segment, if applicable)	Road ROW Section	Longitudinal Slope (%)	Overflow Flowrate		Flowrate (cms)		Velocity (m/s)			Flowrate (cms)		Depth (m)			Depth (m)					
			Qx (l/s)	Qx (cms)	Qmin	Qmax	vmin	vmax	vx	Qmin	Qmax	dmin	dmax	dx	dmin	dmax	dx	(m^2/s)	(m)	(m)
S311A	20	1.52	**49**	0.049	0.039	0.084	0.699	0.847	**0.73**	N/A	N/A	N/A	N/A	**N/A**	0.041	0.055	**0.044**	**0.03**	0.00	0.04
S310A	20	1.22	**0**	0.000	0.000	0.002	0.000	0.301	**0.00**	0.000	0.001	0.000	0.001	**0.000**	N/A	N/A	**N/A**	**0.00**	0.29	0.29
S309	20	0.60	**43**	0.043	0.024	0.053	0.439	0.532	**0.50**	N/A	N/A	N/A	N/A	**N/A**	0.041	0.055	**0.050**	**0.03**	0.00	0.05
S308	20	1.84	**65**	0.065	0.043	0.092	0.769	0.932	**0.84**	N/A	N/A	N/A	N/A	**N/A**	0.041	0.055	**0.047**	**0.04**	0.00	0.05
S308A	20	0.71	**26**	0.026	0.009	0.027	0.365	0.478	**0.47**	0.021	0.027	0.050	0.055	**0.054**	N/A	N/A	**N/A**	**0.03**	0.26	0.31
S340	20	2.40	**50**	0.050	0.049	0.105	0.878	1.064	**0.88**	N/A	N/A	N/A	N/A	**N/A**	0.041	0.055	**0.041**	**0.04**	0.00	0.04
S205C	24	0.71	**37**	0.037	0.024	0.053	0.439	0.532	**0.48**	N/A	N/A	N/A	N/A	**N/A**	0.041	0.055	**0.047**	**0.02**	0.00	0.05
S231	20	0.53	**100**	0.100	0.096	0.155	0.617	0.697	**0.62**	N/A	N/A	N/A	N/A	**N/A**	0.068	0.082	**0.069**	**0.04**	0.00	0.07
S207	24	0.51	**61**	0.061	0.053	0.096	0.532	0.617	**0.55**	N/A	N/A	N/A	N/A	**N/A**	0.055	0.068	**0.057**	**0.03**	0.00	0.06

Velocity x Depth Calculation

Iteration equation:

Velocity:

$$v_x = v_{min} + \frac{Q_x - Q_{min}}{Q_{max} - Q_{min}} (v_{max} - v_{min})$$

Depth:

$$d_x = d_{min} + \frac{Q_x - Q_{min}}{Q_{max} - Q_{min}} (d_{max} - d_{min})$$

100 Year 3 Hour Chicago Storm + 20%																					
					SWMHYMO (118863VD.OUT)					Calculation Sheet: Overflow for Typical Road Ponding Area					SWMHYMO (118863VD.OUT)			Velocity x Depth	Maximum Static Ponding Depth	Total Depth (Static + Dynamic)
Area ID (Dummy Segment, if applicable)	Road ROW Section	Longitudinal Slope (%)	Overflow Flowrate		Flowrate (cms)		Velocity (m/s)			Flowrate (cms)		Depth (m)			Depth (m)					
			Qx (l/s)	Qx (cms)	Qmin	Qmax	vmin	vmax	vx	Qmin	Qmax	dmin	dmax	dx	dmin	dmax	dx	(m^2/s)	(m)	(m)
S311A	20	1.52	**66**	0.066	0.039	0.084	0.699	0.847	**0.79**	N/A	N/A	N/A	N/A	**N/A**	0.041	0.055	**0.049**	**0.04**	0.00	0.05
S310A	20	1.22	**33**	0.033	0.012	0.035	0.478	0.626	**0.61**	0.028	0.035	0.055	0.060	**0.059**	N/A	N/A	**N/A**	**0.04**	0.29	0.35
S309	20	0.60	**71**	0.071	0.053	0.096	0.532	0.617	**0.57**	N/A	N/A	N/A	N/A	**N/A**	0.055	0.068	**0.060**	**0.03**	0.00	0.06
S308	20	1.84	**216**	0.216	0.167	0.272	1.081	1.221	**1.15**	N/A	N/A	N/A	N/A	**N/A**	0.068	0.082	**0.075**	**0.09**	0.00	0.07
S308A	20	0.71	**268**	0.268	0.255	0.364	0.841	0.919	**1.29**	0.240	0.269	0.125	0.130	**0.130**	N/A	N/A	**N/A**	**0.17**	0.26	0.39
S340	20	2.40	**98**	0.098	0.049	0.105	0.878	1.064	**1.04**	N/A	N/A	N/A	N/A	**N/A**	0.041	0.055	**0.053**	**0.06**	0.00	0.05
S205C	24	0.71	**46**	0.046	0.024	0.053	0.439	0.532	**0.51**	N/A	N/A	N/A	N/A	**N/A**	0.041	0.055	**0.052**	**0.03**	0.00	0.05
S231	20	0.53	**165**	0.165	0.155	0.234	0.697	0.773	**0.71**	N/A	N/A	N/A	N/A	**N/A**	0.082	0.095	**0.084**	**0.06**	0.00	0.08
S207	24	0.51	**89**	0.089	0.053	0.096	0.532	0.617	**0.60**	N/A	N/A	N/A	N/A	**N/A**	0.055	0.068	**0.066**	**0.04**	0.00	0.07

Storm Hydraulic Grade Line Elevations

XPSWMM NODE ID	MH NO.	PROPOSED GROUND ELEVATION (M)	USF (M)	100 YEAR 3 HOUR CHICAGO		100 YEAR 3 HOUR CHICAGO INCREASED BY 20%		100 YEAR 24 HOUR SCS TYPE II		100 YEAR 24 HOUR SCS TYPE II + 20%		JULY 1 1979		AUGUST 1988		AUGUST 1996	
				HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)
Phase 1B																	
S143	143	102.40	100.00	98.16	1.84	98.16	1.84	98.16	1.84	98.16	1.84	98.16	1.84	98.16	1.84	98.16	1.84
S144	144	99.41	97.01	95.79	1.22	95.79	1.22	95.78	1.23	95.79	1.22	95.78	1.23	95.79	1.22	95.78	1.23
S145	145	97.64	95.24	93.01	2.23	93.01	2.23	93.01	2.23	93.01	2.23	93.00	2.24	93.01	2.23	93.00	2.24
S146	146	95.28	92.88	90.96	1.92	91.82	1.06	90.77	2.11	91.26	1.62	90.91	1.97	91.01	1.87	90.63	2.25
S147	147	93.27	N/A	90.93	N/A	91.78	N/A	90.72	N/A	91.23	N/A	90.88	N/A	90.98	N/A	90.60	N/A
USBRM	N/A	N/A	N/A	90.88	N/A	91.72	N/A	90.67	N/A	91.17	N/A	90.83	N/A	90.93	N/A	90.56	N/A
BURMA	N/A	N/A	N/A	89.41	N/A	89.87	N/A	89.24	N/A	89.53	N/A	89.43	N/A	89.31	N/A	89.04	N/A
OUTLET	N/A	N/A	N/A	89.26	N/A	89.75	N/A	89.07	N/A	89.39	N/A	89.29	N/A	89.15	N/A	88.65	N/A
S152	152	92.73	90.33	89.71	0.62	89.71	0.62	89.71	0.62	89.71	0.62	89.71	0.62	89.71	0.62	89.71	0.62
S151	151	92.50	90.10	89.58	0.52	89.57	0.53	89.58	0.52	89.58	0.52	89.58	0.52	89.58	0.52	89.57	0.53
S150	150	92.32	89.92	89.49	0.43	89.48	0.44	89.49	0.43	89.49	0.43	89.49	0.43	89.49	0.43	89.49	0.43
S149	149	92.34	89.94	89.42	0.52	89.42	0.52	89.42	0.52	89.42	0.52	89.42	0.52	89.42	0.52	89.42	0.52
S148	148	92.14	89.74	89.30	0.44	89.29	0.45	89.30	0.44	89.30	0.44	89.30	0.44	89.30	0.44	89.30	0.44
S157	157	91.24	N/A	89.21	N/A	89.20	N/A	89.21	N/A	89.21	N/A	89.21	N/A	89.21	N/A	89.21	N/A
S154	154	91.02	N/A	87.68	N/A	87.68	N/A	87.68	N/A	87.68	N/A	87.68	N/A	87.68	N/A	87.68	N/A
S215	215	90.77	88.37	87.58	0.79	87.58	0.79	87.58	0.79	87.58	0.79	87.58	0.79	87.58	0.79	87.58	0.79
S216	216	90.85	88.45	87.30	1.15	87.30	1.15	87.30	1.15	87.30	1.15	87.30	1.15	87.31	1.14	87.30	1.15
S217	217	90.66	88.26	87.13	1.13	87.18	1.08	87.12	1.14	87.15	1.11	87.14	1.12	87.13	1.13	87.12	1.14
S218	218	90.40	88.00	87.04	0.96	87.10	0.90	87.02	0.98	87.06	0.94	87.05	0.95	87.04	0.96	87.02	0.98
S219	219	90.08	87.68	86.85	0.83	86.94	0.74	86.82	0.86	86.88	0.80	86.86	0.82	86.84	0.84	86.81	0.87
S220	220	89.86	87.46	86.74	0.72	86.84	0.62	86.70	0.76	86.78	0.68	86.75	0.71	86.72	0.74	86.68	0.78
S221	221	89.88	87.48	86.57	0.91	86.72	0.76	86.51	0.97	86.63	0.85	86.59	0.89	86.54	0.94	86.36	1.12
S222	222	89.86	87.46	86.38	1.08	86.51	0.95	86.32	1.14	86.43	1.03	86.39	1.07	86.35	1.11	86.19	1.27
S200	200	94.71	92.31	90.73	1.58	90.74	1.57	90.73	1.58	90.72	1.59	90.73	1.58	90.72	1.59	90.73	1.58
S214	214	93.52	91.12	90.26	0.86	90.28	0.84	90.26	0.86	90.27	0.85	90.26	0.86	90.26	0.86	90.26	0.86
MH201	201	94.29	91.89	90.72	1.17	90.73	1.16	90.72	1.17	90.72	1.17	90.72	1.17	90.72	1.17	90.71	1.18
MH202	202	93.91	91.51	90.42	1.09	90.43	1.08	90.41	1.10	90.42	1.09	90.41	1.10	90.41	1.10	90.40	1.11
MH203	203	92.38	89.98	88.66	1.32	88.68	1.30	88.63	1.35	88.66	1.32	88.63	1.35	88.64	1.34	88.61	1.37
MH204	204	90.40	88.00	87.08	0.92	87.10	0.90	87.06	0.94	87.08	0.92	87.06	0.94	87.07	0.93	87.02	0.98
MH205	205	89.35	86.95	85.86	1.09	85.88	1.07	85.83	1.12	85.86	1.09	85.84	1.11	85.84	1.11	85.77	1.18
MH206	206	89.10	86.70	85.65	1.05	85.65	1.05	85.62	1.08	85.65	1.05	85.63	1.07	85.63	1.07	85.57	1.13
MH207	207	88.53	86.13	84.65	1.48	84.65	1.48	84.62	1.51	84.65	1.48	84.63	1.50	84.64	1.49	84.58	1.55
S212	212	90.25	87.85	86.86	0.99	86.87	0.98	86.83	1.02	86.85	1.00	86.83	1.02	86.84	1.01	86.82	1.03
S213	213	89.74	87.34	86.45	0.89	86.45	0.89	86.43	0.91	86.45	0.89	86.44	0.90	86.44	0.90	86.42	0.92
S210	210	89.14	86.74	86.43	0.31	86.43	0.31	86.42	0.32	86.43	0.31	86.42	0.32	86.43	0.31	86.41	0.33
S211	211	89.15	86.75	85.94	0.81	85.93	0.82	85.93	0.82	85.94	0.81	85.93	0.82	85.93	0.82	85.92	0.83
S208	208	88.77	86.37	85.92	0.45	85.91	0.46	85.78	0.59	85.91	0.46	85.81	0.56	85.88	0.49	85.70	0.67
S209	209	88.75	86.35	85.46	0.89	85.45	0.90	85.41	0.94	85.46	0.89	85.42	0.93	85.45	0.90	85.38	0.97
MH231	231	89.81	87.41	85.61	1.79	85.64	1.77	85.73	1.67	85.78	1.63	85.84	1.57	85.77	1.63	85.71	1.69

Storm Hydraulic Grade Line Elevations

XPSWMM NODE ID	MH NO.	PROPOSED GROUND ELEVATION (M)	USF (M)	100 YEAR 3 HOUR CHICAGO		100 YEAR 3 HOUR CHICAGO INCREASED BY 20%		100 YEAR 24 HOUR SCS TYPE II		100 YEAR 24 HOUR SCS TYPE II + 20%		JULY 1 1979		AUGUST 1988		AUGUST 1996	
				HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)
Wateridge Village Phase 1A																	
S153	153	92.78	90.38	89.45	0.93	89.46	0.92	89.44	0.94	89.45	0.93	89.44	0.94	89.45	0.93	89.44	0.94
S160	160	92.27	89.87	89.01	0.86	89.02	0.85	89.01	0.86	89.01	0.86	89.01	0.86	89.01	0.86	89.00	0.87
S161	161	91.94	89.54	88.57	0.97	88.58	0.96	88.57	0.97	88.57	0.97	88.57	0.97	88.57	0.97	88.57	0.97
S162	162	91.34	88.94	88.26	0.68	88.26	0.68	88.25	0.69	88.26	0.68	88.25	0.69	88.26	0.68	88.25	0.69
S163	163	90.94	88.54	87.68	0.86	87.68	0.86	87.68	0.86	87.68	0.86	87.68	0.86	87.68	0.86	87.68	0.86
S164	164	90.22	87.82	87.00	0.82	87.01	0.81	86.99	0.83	87.00	0.82	87.00	0.82	87.00	0.82	86.99	0.83
S165B	165	89.61	87.21	86.45	0.76	86.45	0.76	86.44	0.77	86.44	0.77	86.44	0.77	86.44	0.77	86.44	0.77
S165	165	89.30	86.90	85.98	0.92	86.05	0.85	85.93	0.97	86.01	0.89	85.99	0.91	85.96	0.94	85.83	1.07
S166	166	88.90	86.50	84.88	1.62	85.03	1.47	84.78	1.72	84.93	1.57	84.88	1.62	84.85	1.65	84.59	1.91
S167	167	88.40	86.00	84.71	1.29	84.86	1.14	84.60	1.40	84.76	1.24	84.71	1.29	84.67	1.33	84.39	1.61
S168	168	87.70	85.30	84.54	0.76	84.66	0.64	84.43	0.87	84.58	0.72	84.54	0.76	84.50	0.80	84.22	1.08
S141	141	87.32	84.92	84.28	0.64	84.39	0.53	84.18	0.74	84.32	0.60	84.28	0.64	84.25	0.67	83.97	0.95
S142	142	87.52	85.12	84.02	1.10	84.12	1.00	83.94	1.18	84.06	1.06	84.03	1.09	84.00	1.12	83.74	1.38
MH176	176	88.03	85.63	83.77	1.86	83.85	1.78	83.69	1.94	83.80	1.83	83.77	1.86	83.75	1.88	83.49	2.14
MH178	178	89.00	86.60	83.41	3.19	83.47	3.13	83.34	3.26	83.44	3.16	83.41	3.19	83.39	3.21	83.18	3.42
MH180	180	88.23	85.83	82.20	3.62	82.44	3.38	81.98	3.84	82.27	3.56	82.21	3.62	82.10	3.73	81.49	4.34
MH190	190	88.10	85.70	81.90	3.80	82.12	3.58	81.65	4.05	81.97	3.73	81.91	3.79	81.80	3.90	81.23	4.47
MH191	191	86.36	83.96	81.66	2.30	81.86	2.10	81.44	2.52	81.73	2.23	81.67	2.29	81.56	2.40	81.06	2.91
MH192	192	85.92	83.52	81.41	2.11	81.59	1.93	81.21	2.31	81.47	2.05	81.41	2.11	81.31	2.21	80.89	2.63
MH193	193	84.85	82.45	81.09	1.36	81.24	1.21	80.92	1.53	81.14	1.31	81.09	1.36	81.00	1.45	80.60	1.85
MH194	194	82.44	N/A	80.45	N/A	80.53	N/A	80.35	N/A	80.48	N/A	80.46	N/A	80.40	N/A	80.13	N/A
S130	130		N/A	101.25	N/A	101.25	N/A	101.24	N/A	101.25	N/A	101.24	N/A	101.24	N/A	101.23	N/A
S131	131		N/A	101.05	N/A	101.05	N/A	101.04	N/A	101.05	N/A	101.04	N/A	101.04	N/A	101.03	N/A
S132	132		N/A	99.64	N/A	99.64	N/A	99.64	N/A	99.64	N/A	99.64	N/A	99.64	N/A	99.63	N/A
S133	133		N/A	96.52	N/A	96.52	N/A	96.51	N/A	96.52	N/A	96.51	N/A	96.51	N/A	96.50	N/A
S134	134		N/A	93.01	N/A	93.01	N/A	93.00	N/A	93.01	N/A	93.00	N/A	93.00	N/A	92.99	N/A
S135	135		N/A	90.11	N/A	90.11	N/A	90.10	N/A	90.11	N/A	90.10	N/A	90.10	N/A	90.09	N/A
S136	136		N/A	87.38	N/A	87.38	N/A	87.37	N/A	87.38	N/A	87.37	N/A	87.37	N/A	87.37	N/A
S137	137		86.91	85.77	1.14	85.77	1.14	85.76	1.15	85.77	1.14	85.76	1.15	85.77	1.14	85.76	1.15
S138	138		86.31	84.96	1.35	84.96	1.35	84.95	1.36	84.96	1.35	84.95	1.36	84.95	1.36	84.94	1.37
S139	139		85.66	84.46	1.20	84.48	1.18	84.46	1.20	84.46	1.20	84.46	1.20	84.46	1.20	84.45	1.21
S140	140		N/A	84.35	N/A	84.42	N/A	84.34	N/A	84.37	N/A	84.35	N/A	84.34	N/A	84.34	N/A
S100	100		87.16	85.70	1.46	85.69	1.47	85.70	1.46	85.70	1.46	85.70	1.46	85.70	1.46	85.70	1.46
S108	108		86.66	85.24	1.43	85.23	1.43	85.23	1.43	85.24	1.42	85.23	1.43	85.23	1.43	85.23	1.43
S109	109		85.36	84.05	1.31	84.05	1.31	84.05	1.31	84.05	1.31	84.05	1.31	84.05	1.31	84.05	1.31
S117	117		85.06	83.54	1.52	83.58	1.48	83.53	1.53	83.54	1.52	83.53	1.53	83.54	1.52	83.53	1.53
S118	118		84.71	83.21	1.50	83.48	1.23	83.20	1.51	83.25	1.46	83.22	1.49	83.21	1.50	83.20	1.51
S101	101		87.16	85.55	1.61	85.55	1.61	85.54	1.62	85.55	1.61	85.54	1.62	85.54	1.62	85.54	1.62
S102	102		86.46	84.72	1.74	84.72	1.74	84.71	1.75	84.72	1.74	84.71	1.75	84.71	1.75	84.70	1.76
S119	119		85.46	83.95	1.51	83.95	1.51	83.95	1.51	83.95	1.51	83.94	1.52	83.95	1.51	83.95	1.51
S104	104		N/A	85.90	N/A	85.89	N/A	85.89	N/A	85.90	N/A	85.89	N/A	85.89	N/A	85.88	N/A

Storm Hydraulic Grade Line Elevations

XPSWMM NODE ID	MH NO.	PROPOSED GROUND ELEVATION (M)	USF (M)	100 YEAR 3 HOUR CHICAGO		100 YEAR 3 HOUR CHICAGO INCREASED BY 20%		100 YEAR 24 HOUR SCS TYPE II		100 YEAR 24 HOUR SCS TYPE II + 20%		JULY 1 1979		AUGUST 1988		AUGUST 1996	
				HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)
S103	103		86.46	84.36	2.10	84.36	2.10	84.34	2.12	84.36	2.10	84.35	2.11	84.35	2.11	84.34	2.12
S105	105		85.71	83.90	1.81	83.91	1.80	83.89	1.82	83.90	1.81	83.89	1.82	83.90	1.81	83.89	1.82
S122	122		84.86	83.53	1.33	83.53	1.33	83.53	1.33	83.53	1.33	83.53	1.33	83.53	1.33	83.53	1.33
S121	121		84.26	82.80	1.46	83.03	1.23	82.43	1.83	82.82	1.44	82.77	1.49	82.61	1.65	81.98	2.28
S127	127		84.36	82.67	1.69	82.92	1.44	82.34	2.02	82.71	1.65	82.66	1.70	82.51	1.85	81.85	2.51
S128	128		N/A	82.61	N/A	82.86	N/A	82.30	N/A	82.67	N/A	82.61	N/A	82.47	N/A	81.81	N/A
S107	107		N/A	85.29	N/A	85.29	N/A	85.28	N/A	85.29	N/A	85.28	N/A	85.28	N/A	85.27	N/A
S106	106		85.61	83.76	1.85	83.75	1.86	83.73	1.88	83.76	1.85	83.74	1.87	83.75	1.86	83.73	1.88
S124	124		85.69	83.94	1.75	83.94	1.75	83.93	1.76	83.94	1.75	83.93	1.76	83.93	1.76	83.92	1.77
S125	125		85.34	83.37	1.97	83.38	1.96	83.35	1.99	83.37	1.97	83.36	1.98	83.36	1.98	83.35	1.99
S126	126		84.96	82.87	2.09	83.14	1.82	82.85	2.11	82.89	2.07	82.85	2.11	82.86	2.10	82.84	2.12
S182	182		N/A	82.46	N/A	82.70	N/A	82.18	N/A	82.52	N/A	82.46	N/A	82.32	N/A	81.68	N/A
S181	181		N/A	82.36	N/A	82.61	N/A	82.11	N/A	82.43	N/A	82.37	N/A	82.24	N/A	81.61	N/A
S110	110		85.56	83.59	1.97	83.80	1.76	83.59	1.97	83.59	1.97	83.59	1.97	83.59	1.97	83.59	1.97
S111	111		84.96	83.59	1.37	83.80	1.16	83.58	1.38	83.59	1.37	83.58	1.38	83.59	1.37	83.58	1.38
S112	112		84.91	83.40	1.52	83.77	1.14	83.18	1.73	83.50	1.41	83.42	1.49	83.22	1.69	83.22	1.69
S113	113		84.51	83.41	1.10	83.74	0.77	83.06	1.45	83.48	1.03	83.40	1.11	83.08	1.43	83.05	1.46
S114	114		83.91	83.06	0.85	83.31	0.60	82.66	1.25	83.11	0.80	83.04	0.87	82.85	1.06	82.49	1.42
S115	115		83.56	83.04	0.52	83.33	0.23	82.64	0.92	83.13	0.43	83.01	0.55	82.83	0.73	82.45	1.11
S116	116		83.71	82.88	0.83	83.16	0.55	82.51	1.20	82.92	0.79	82.85	0.86	82.70	1.01	82.10	1.61
S120	120		83.96	82.86	1.10	83.08	0.88	82.48	1.48	82.88	1.08	82.83	1.13	82.67	1.29	82.06	1.90

Storm Hydraulic Grade Line Elevations

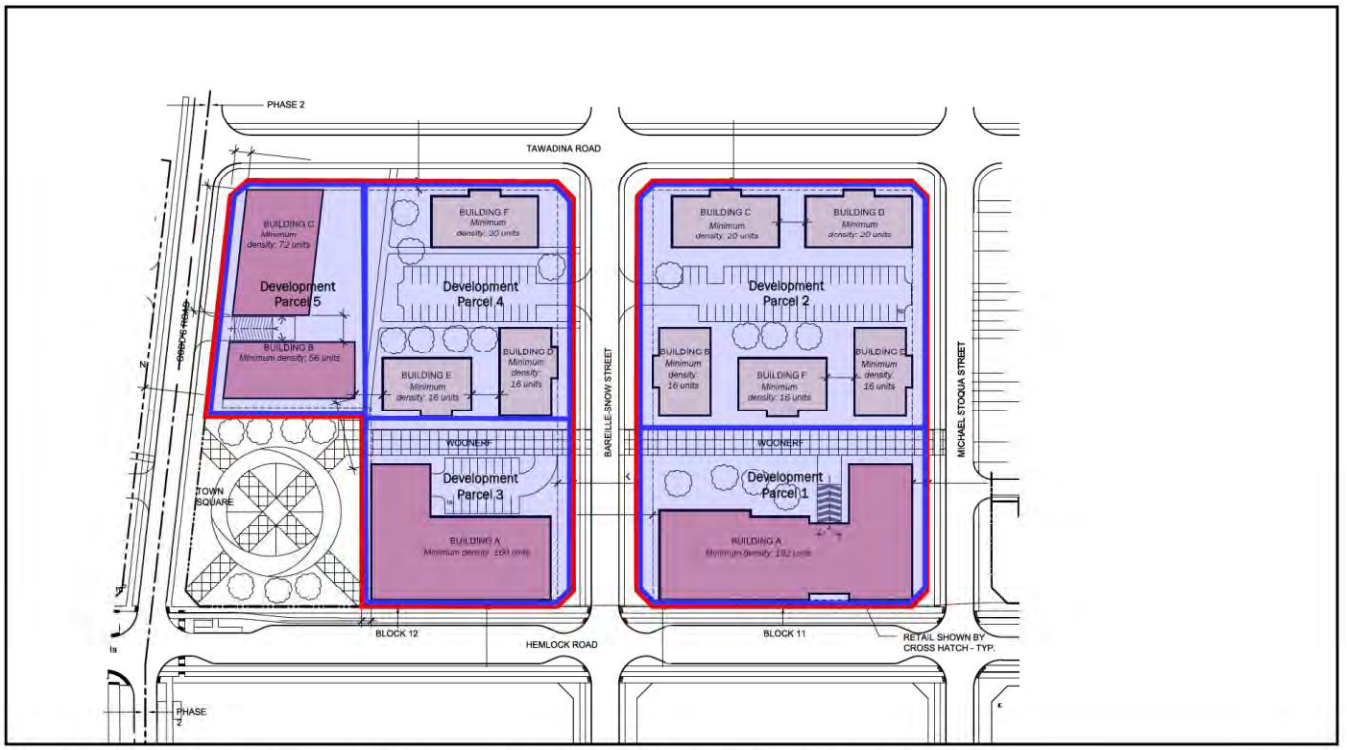
XPSWMM NODE ID	MH NO.	PROPOSED GROUND ELEVATION (M)	USF (M)	100 YEAR 3 HOUR CHICAGO		100 YEAR 3 HOUR CHICAGO INCREASED BY 20%		100 YEAR 24 HOUR SCS TYPE II		100 YEAR 24 HOUR SCS TYPE II + 20%		JULY 1 1979		AUGUST 1988		AUGUST 1996	
				HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)	HGL (M)	USF - HGL (M)
Phase 2B, 4																	
MH317	317	94.08	91.68	91.17	0.51	91.18	0.50	91.14	0.54	91.15	0.53	91.15	0.53	91.14	0.54	91.11	0.57
MH316	316	94.09	91.69	90.96	0.73	90.96	0.73	90.95	0.74	90.95	0.74	90.95	0.74	90.95	0.74	90.92	0.77
MH315	315	93.39	91.36	90.28	1.08	90.29	1.07	90.25	1.11	90.26	1.10	90.27	1.09	90.27	1.09	90.26	1.10
MH314	314	93.00	91.16	89.91	1.25	89.91	1.25	89.91	1.25	89.91	1.25	89.91	1.25	89.91	1.25	89.89	1.27
MH313	313	92.62	90.71	89.35	1.36	89.34	1.37	89.35	1.36	89.35	1.36	89.35	1.36	89.35	1.36	89.34	1.37
MH312	312	91.36	89.68	88.42	1.26	88.42	1.26	88.41	1.27	88.42	1.26	88.42	1.26	88.42	1.26	88.38	1.30
MH311	311	90.69	88.29	87.44	0.85	87.56	0.73	87.40	0.89	87.48	0.81	87.45	0.84	87.47	0.82	87.38	0.91
MH310	310	90.04	87.64	87.28	0.36	87.42	0.22	87.25	0.39	87.35	0.29	87.30	0.34	87.33	0.31	87.06	0.58
MH309	309	90.15	87.75	87.44	0.31	87.08	0.67	87.33	0.42	87.44	0.31	87.41	0.34	87.43	0.32	87.22	0.53
MH308	308	89.68	87.28	86.88	0.40	86.69	0.59	86.81	0.47	86.88	0.40	86.87	0.41	86.88	0.40	86.76	0.52
MH326	326	94.76	92.36	91.33	1.03	91.33	1.03	91.32	1.04	91.32	1.04	91.32	1.04	91.32	1.04	91.33	1.03
MH318	318	94.40	92.00	91.03	0.97	91.03	0.97	91.00	1.00	91.03	0.97	91.00	1.00	91.00	1.00	91.00	1.00
MH300	300	94.00	91.60	90.71	0.89	90.70	0.90	90.67	0.93	90.70	0.90	90.68	0.92	90.68	0.92	90.68	0.92
MH301	301	93.73	91.33	90.21	1.12	90.21	1.12	90.20	1.13	90.20	1.13	90.21	1.12	90.20	1.13	90.20	1.13
MH302	302	92.80	90.40	88.64	1.76	88.64	1.76	88.63	1.77	88.63	1.77	88.64	1.76	88.63	1.77	88.63	1.77
MH303	303	90.67	88.27	87.80	0.47	87.81	0.46	87.63	0.64	87.65	0.62	87.79	0.48	87.72	0.55	87.64	0.63
MH304	304	90.30	87.90	87.39	0.51	87.38	0.52	87.30	0.60	87.31	0.59	87.38	0.52	87.34	0.56	87.30	0.60
MH305	305	91.00	88.60	86.54	2.06	86.56	2.04	86.61	1.99	86.64	1.96	86.69	1.91	86.65	1.95	86.60	2.00
MH319	319	88.81	86.61	86.13	0.48	86.12	0.49	86.12	0.49	86.13	0.48	86.12	0.49	86.12	0.49	86.12	0.49
MH320	320	89.12	86.92	85.49	1.43	85.49	1.43	85.49	1.43	85.49	1.43	85.49	1.43	85.49	1.43	85.49	1.43
MH321	321	87.67	85.47	84.18	1.29	84.39	1.08	84.10	1.37	84.15	1.32	84.11	1.36	84.13	1.34	84.09	1.38
MH322	322	87.50	85.30	84.18	1.12	84.39	0.91	84.10	1.20	84.15	1.15	84.10	1.20	84.12	1.18	84.09	1.21
MH323	323	86.57	84.37	83.40	0.97	83.48	0.89	83.31	1.06	83.37	1.00	83.32	1.05	83.34	1.03	83.30	1.07

Appendix B

Supporting Sanitary Information

SCHEDULE "A"

PARCEL IDENTIFICATION, DESCRIPTION, AND MINIMUM DENSITY[1]



**Boundaries of the development parcels are estimated. Purchasers to provide dimensioned sketch or electronic survey to confirm these boundaries

[1] This image if provided for demonstration purposes only

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Block 11&12 Proposed Conditions
Old Criteria being used

AS-BUILT SANITARY SEWER DESIGN SHEET

Former CFB Rockcliffe
City of Ottawa
Canada Lands Company

LOCATION				RESIDENTIAL										ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA	UNIT TYPES				AREA	POPULATION		PEAK	PEAK	AREA (Ha)						PEAK	AREA (Ha)		FLOW			CAPACITY	LENGTH	DIA	SLOPE	VELOCITY	AVAILABLE CAPACITY	
														INSTITUTIONAL		COMMERCIAL		INDUSTRIAL													
STREET	AREA ID	FROM MH	TO MH	Phase 1B (Ha)	SF	SD	TH	APT	EXTERNAL (Ha)	IND	CUM	FACTOR	FLOW (L/s)	IND	CUM	IND	CUM	IND	CUM	FLOW (L/s)	IND	CUM	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(full) (m/s)	L/s	(%)
Phase 1B																																
rue Michael Stoqua Street	EX205A	BULK205AN	MH205A						0.66	33.1	33.1	4.00	0.54		0.00		0.00		0.00	0.00	0.66	0.66	0.18	0.00	0.72	66.24	*21.00*	250	*1.14*	1.307	65.52	98.91%
Hemlock Road	205A	MH205A	MH206A	0.25						0.0	186.6	4.00	3.02		0.00		0.00		0.00	0.00	0.25	2.51	0.70	0.00	3.73	31.02	*111.90*	250	*0.25*	0.612	27.29	87.99%
rue Bareille-Snow Street	EX206A-B	BULK206AN	MH206A						9.79	2598.3	2598.3	3.49	36.78		0.00		0.00		0.00	0.00	9.79	9.79	2.74	0.00	39.52	88.83	*21.00*	250	*2.05*	1.753	49.30	55.50%
Hemlock Road	206A	MH206A	MH207A	0.20						0.0	2784.9	3.47	39.14		0.00		0.00		0.00	0.00	0.20	12.50	3.50	0.00	42.64	100.88	*89.30*	300	*1.00*	1.383	58.24	57.73%
Block 20	PARK1	MH207AN	MH207A	0.32						0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.32	0.32	0.09	0.00	0.09	50.02	*13.80*	250	*0.65*	0.987	49.93	99.82%
Hemlock Road	PARK1, 207A	MH207A	*BULK176AE*	0.12						0.0	2784.9	3.47	39.14		0.00		0.00		0.00	0.00	0.12	12.94	3.62	0.00	42.77	134.59	*33.10*	300	*1.78*	1.845	91.83	68.23%
Phase 1A																																
Hemlock Road		*BULK176AE*	*MH176A*							0.0	2784.9	3.47	39.14		0.00		0.00		0.00	0.00	0.00	12.94	3.62	0.00	42.77	65.38	*21.97*	*300*	*0.42*	0.896	22.61	34.59%
Phase 1B																																
chemin Wanaki Road	200A, COM1	MH200A	MH214A	0.25						0.0	0.0	4.00	0.00		0.00	0.90	0.90		0.00	0.78	1.15	1.15	0.32	0.00	1.10	71.01	*98.50*	250	*1.31*	1.401	69.90	98.45%
chemin Wanaki Road	214A, COM2	MH214A	*BULK153AN*	0.16						0.0	0.0	4.00	0.00		0.00	0.65	1.55		0.00	1.35	0.81	1.96	0.55	0.00	1.89	57.20	*44.60*	250	*0.85*	1.129	55.30	96.69%
Phase 1A																																
chemin Wanaki Road	COM2	*BULK153AN*	*MH153A*							0.0	0.0	4.00	0.00		0.00		1.55		0.00	1.35	0.00	1.96	0.55	0.00	1.89	51.91	*20.13*	*250*	*0.70*	1.024	50.01	96.35%
chemin Wanaki Road	153A, COM3	*MH153A*	*MH151A*	0.21						0.0	0.0	4.00	0.00		0.00	0.88	2.43		0.00	2.11	1.09	3.05	0.85	0.00	2.96	36.70	*85.04*	*250*	*0.35*	0.724	33.74	91.93%
chemin Wanaki Road	151A, COM4	*MH151A*	*MH150A*	0.11						0.0	0.0	4.00	0.00		0.00	0.45	2.88		0.00	2.50	0.56	3.61	1.01	0.00	3.51	36.70	*40.97*	*250*	*0.35*	0.724	33.19	90.43%
chemin Wanaki Road	150A, COM5	*MH150A*	*MH149A*	0.11						0.0	0.0	4.00	0.00		0.00	0.95	3.83		0.00	3.32	1.06	4.67	1.31	0.00	4.63	36.70	*41.34*	*250*	*0.35*	0.724	32.07	87.38%
chemin Wanaki Road	149A	*MH149A*	*MH148A*	0.10						0.0	0.0	4.00	0.00		0.00		3.83		0.00	3.32	0.10	4.77	1.34	0.00	4.66	36.70	*40.04*	*250*	*0.35*	0.724	32.04	87.30%
chemin Wanaki Road	148A	*MH148A*	*MH157A*	0.04						0.0	0.0	4.00	0.00		0.00		3.83		0.00	3.32	0.04	4.81	1.35	0.00	4.67	36.70	*20.58*	*250*	*0.35*	0.724	32.03	87.27%
Phase 1B																																
chemin Wanaki Road	143B	BULK143AE	MH143A	0.31						104.0	104.0	4.00	1.69		0.00		0.00		0.00	0.00	0.31	0.31	0.09	0.00	1.77	43.87	21.50	250	0.50	0.866	42.10	95.96%
chemin Wanaki Road	143A	MH143A	MH144A	0.27						0.0	104.0	4.00	1.69		0.00		0.00		0.00	0.00	0.27	0.58	0.16	0.00	1.85	83.69	*34.70*	250	*1.82*	1.652	81.85	97.79%
chemin Wanaki Road	144A, 144B	MH144A	MH145A	0.72						0.0	104.0	4.00	1.69		0.00		0.00		0.00	0.00	0.72	1.30	0.36	0.00	2.05	88.61	*41.10*	250	*2.04*	1.749	86.56	97.69%
chemin Wanaki Road	145A, 145B, 145C	MH145A	MH146A	2.77						835.6	939.6	3.82	14.53		0.00		0.00		0.00	0.00	2.77	4.07	1.14	0.00	15.67	105.83	*53.30*	250	*2.91*	2.089	90.16	85.19%
chemin Wanaki Road	146A	MH146A	MH147A	0.14						0.0	939.6	3.82	14.53		0.00		0.00		0.00	0.00	0.14	4.21	1.18	0.00	15.71	43.54	*37.30*	250	*0.97*	1.206	27.83	63.92%
chemin Wanaki Road	PARK2	BLK147AE	MH147A	0.55						0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.55	0.55	0.15	0.00	0.15	39.24	*17.70*	250	*0.40*	0.774	39.08	99.61%
chemin Wanaki Road	147C	BLK147AW	MH147A	0.10						33.6	33.6	4.00	0.54		0.00		0.00		0.00	0.00	0.10	0.10	0.03	0.00	0.57	41.62	*17.70*	250	*0.45*	0.821	41.04	98.62%
chemin Wanaki Road	147A	MH147A	MH170A	0.03						0.0	973.2	3.81	15.01		0.00		0.00		0.00	0.00	0.03	4.89	1.37	0.00	16.38	38.74	*10.30*	250	*0.39*	0.765	22.36	57.72%
chemin Wanaki Road	147B	MH170A	MH147C	0.16						0.0	973.2	3.81	15.01		0.00		0.00		0.00	0.00	0.16	5.05	1.41	0.00	16.42	31.63	*38.20*	250	*0.26*	0.624	15.21	48.08%
chemin Wanaki Road		MH147C	*BLK148AW*							0.0	973.2	3.81	15.01		0.00		0.00		0.00	0.00	0.00	5.05	1.41	0.00	16.42	46.01	*11.80*	250	*0.55*	0.908	29.58	64.30%
Phase 1A																																
chemin Wanaki Road		*BULK148AW*	*MH157A*							0.0	973.2	3.81	15.01		0.00		0.00		0.00	0.00	0.00	5.05	1.41	0.00	16.42	62.04	*8.00*	*250*	*1.00*	1.224	45.61	73.52%
chemin Wanaki Road	157A	*MH157A*	*MH158A*	0.05						0.0	973.2	3.81	15.01		0.00		3.83		0.00	3.32	0.05	9.91	2.77	0.00	21.11	31.02	*25.68*	*250*	*0.25*	0.612	9.91	31.94%
Street No. 2	INST1	*BULK158AN*	*MH158A*							0.0	0.0	4.00	0.00	2.62	2.62		0.00		0.00	2.27	2.62	2.62	0.73	0.00	3.01	39.24	*15.10*	*250*	*0.40*	0.774	36.23	92.33%
chemin Wanaki Road	158A	*MH158A*	*MH154A*	0.22						0.0	973.2	3.81	15.01		2.62		3.83		0.00	5.60	0.22	12.75	3.57	0.00	24.18	31.02	*68.91*	*250*	*0.25*	0.612	6.84	22.05%

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Block 11&12 Proposed Conditions
Old Criteria being used

AS-BUILT SANITARY SEWER DESIGN SHEET

Former CFB Rockcliffe
City of Ottawa
Canada Lands Company

LOCATION				RESIDENTIAL										ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA	UNIT TYPES				AREA	POPULATION		PEAK	PEAK	AREA (Ha)						PEAK	AREA (Ha)		FLOW			CAPACITY	LENGTH	DIA	SLOPE	VELOCITY	AVAILABLE CAPACITY	
														INSTITUTIONAL		COMMERCIAL		INDUSTRIAL												
STREET	AREA ID	FROM MH	TO MH	Phase 1B (Ha)	SF	SD	TH	APT	EXTERNAL (Ha)	IND	CUM	FACTOR	FLOW (L/s)	IND	CUM	IND	CUM	IND	CUM	FLOW (L/s)	IND	CUM	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(full) (m/s)	L/s	(%)
Phase 1B																																
Block 9	154A	*Ex. BULK*	MH217Aa	0.19						0.0	973.2	3.81	15.01		2.62		3.83		0.00	5.60	0.19	12.94	3.62	0.00	24.23	104.37	*24.40*	250	*2.83*	2.060	80.13	76.78%
Block 9		MH217Aa	MH217A							0.0	973.2	3.81	15.01		2.62		3.83		0.00	5.60	0.00	12.94	3.62	0.00	24.23	62.66	*78.50*	250	*1.02*	1.237	38.42	61.32%
croissant Squadron Crescent	215Aa-b	MH215A	MH216A	0.79	3	4				117.8	117.8	4.00	1.91		0.00		0.00		0.00	0.00	0.79	0.79	0.22	0.00	2.13	55.49	*56.10*	250	*0.80*	1.095	53.36	96.16%
croissant Squadron Crescent	216Aa-b	MH216A	MH217A	0.67	2	6				94.5	212.3	4.00	3.44		0.00		0.00		0.00	0.00	0.67	1.46	0.41	0.00	3.85	46.01	*70.80*	250	*0.55*	0.908	42.16	91.63%
croissant Squadron Crescent	217A	MH217A	MH218A	0.02						0.0	1185.5	3.75	18.01		2.62		3.83		0.00	5.60	0.02	14.42	4.04	0.00	27.65	39.72	*9.70*	250	*0.41*	0.784	12.07	30.39%
croissant Squadron Crescent	218A	MH218A	MH218B	0.02						0.0	1185.5	3.75	18.01		2.62		3.83		0.00	5.60	0.02	14.44	4.04	0.00	27.66	39.24	*9.90*	250	*0.40*	0.774	11.58	29.51%
Thorncliffe Village	THORN1	MH600A	MH601A						5.55	1574.0	1574.0	3.66	23.36		0.00		0.00		0.00	0.00	5.55	19.99	5.60	0.00	28.96	69.16	*21.40*	300	*0.47*	0.948	40.20	58.12%
Thorncliffe Village		MH601A	MH218B							0.0	1574.0	3.66	23.36		0.00		0.00		0.00	0.00	0.00	19.99	5.60	0.00	28.96	108.18	*46.90*	300	*1.15*	1.483	79.22	73.23%
croissant Squadron Crescent	218B	MH218B	MH219A	0.07						0.0	2759.5	3.47	38.82		2.62		3.83		0.00	5.60	0.07	34.50	9.66	0.00	54.08	96.76	*40.20*	300	*0.92*	1.326	42.68	44.11%
croissant Squadron Crescent	219A	MH219A	MH220A	0.15						0.0	2759.5	3.47	38.82		2.62		3.83		0.00	5.60	0.15	34.65	9.70	0.00	54.12	66.92	*72.40*	300	*0.44*	0.917	12.79	19.12%
croissant Squadron Crescent	220A, 220B	MH220A	MH221A	1.46						319.0	3078.5	3.43	42.81		2.62		3.83		0.00	5.60	1.46	36.11	10.11	0.00	58.52	74.82	*43.30*	300	*0.55*	1.025	16.30	21.78%
croissant Squadron Crescent	221A	MH221A	MH222A	0.02						0.0	3078.5	3.43	42.81		2.62		3.83		0.00	5.60	0.02	36.13	10.12	0.00	58.53	64.60	*7.40*	300	*0.41*	0.885	6.07	9.40%
croissant Squadron Crescent		MH222A	MH223A							0.0	3078.5	3.43	42.81		2.62		3.83		0.00	5.60	0.00	36.13	10.12	0.00	58.53	58.82	*81.60*	300	*0.34*	0.806	0.30	0.51%
croissant Squadron Crescent	BLOCK 15	BLK223AE	MH223A	Design by Others																						109.23	*10.00*	250	*3.10*	2.156	109.23	100.00%
croissant Squadron Crescent	222A	MH223A	*MH165A*	0.22						0.0	3078.5	3.43	42.81		2.62		3.83		0.00	5.60	0.22	36.35	10.18	0.00	58.59	96.24	*36.10*	300	*0.91*	1.319	37.65	39.12%

Design Parameters:

Residential			ICI Areas			
						Peak Factor
SF	3.4	p/p/u	INST	50,000	L/Ha/day	1.5
TH/SD	2.7	p/p/u	COM	50,000	L/Ha/day	1.5
APT	1.8	p/p/u	IND	35,000	L/Ha/day	MOE Chart
Other	60	p/p/Ha		17000	L/Ha/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 350 L/day 300 L/day
3. Infiltration allowance: 0.28 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+P^0.5))
where P = population in thousands

Designed: WY

Checked: JIM

Dwg. Reference: 38298-501

No.	Revision	Date
1.	City submission No. 1	2016-07-08
2.	City submission No. 2	2016-11-04
3.	City submission No. 3	2017-01-25
4.	Revised as per Mattamy's Design	2017-12-08
5.	As-Built Submission	2018-01-29
6.	Block 11 & 12 Study	2022-03-15

File Reference: 38298.5.7.1
Date: 2016-07-08
Sheet No: 1 of 2

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LEGEND

MH231A	Existing infrastructure (shown for information only)
	Block 11, 12 Existing Conditions

SANITARY SEWER DESIGN SHEET

Wateridge at Rockcliffe - Phase 2B
City of Ottawa
Canada Lands Company

LOCATION				RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		RES PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		SF	SD / TH/F	TH/S	APT		IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL				IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
														IND	CUM	IND	CUM	IND	CUM														
Pimiwidon Street	MH317-1, MH317-2	MH317A	MH316A	1.50	1	104				284.2	284.2	3.47	3.20	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.50	1.50	0.50	0.00	0.00	3.69	40.68	*83.00*	*250*	*0.43*	0.803	36.99	90.93%
Pimiwidon Street	MH316A	MH316A	BULK202AN	0.16		1				2.7	286.9	3.47	3.23	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.16	1.66	0.55	0.00	0.00	3.77	37.74	*43.10*	*250*	*0.37*	0.745	33.96	90.00%
Pimiwidon Street	-	*BULK202AN*	*MH202A*							*0.0*	*286.9*	*3.47*	*3.23*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.00*	*0.00*	*0.00*	*1.66*	*0.55*	*0.00*	*0.00*	*3.77*	*40.68*	*21.00*	*250*	*0.43*	*0.803*	*36.91*	*90.72%*
Wigwas Street	MH315A	MH315A	MH314A	0.79	2	18				55.4	55.4	3.64	0.65	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.79	0.79	0.26	0.00	0.00	0.92	49.63	*111.64*	*250*	*0.64*	0.979	48.72	98.16%
Wigwas Street	MH314A	MH314A	BULK203AN	0.06						0.0	55.4	3.64	0.65	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.06	0.85	0.28	0.00	0.00	0.93	83.46	*14.37*	*250*	*1.81*	1.647	82.53	98.88%
Wigwas Street	-	*BULK203AN*	*MH203A*							*0.0*	*55.4*	*3.64*	*0.65*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.00*	*0.00*	*0.00*	*0.85*	*0.28*	*0.00*	*0.00*	*0.93*	*80.17*	*21.00*	*250*	*1.67*	*1.582*	*79.24*	*98.83%*
Moses Tennisco Street	MH313A	MH313A	MH312A	0.66	2	16				50.0	50.0	3.65	0.59	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.66	0.66	0.22	0.00	0.00	0.81	*75.73*	*77.20*	*250*	*1.49*	1.495	74.92	98.93%
Moses Tennisco Street	MH312A, PARK	MH312A	BULK204AN	0.21		2				5.4	55.4	3.64	0.65	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.21	0.87	0.29	0.00	0.00	0.94	94.29	*49.70*	*250*	*2.31*	1.861	93.35	99.00%
Park	PARK	MH350A	pipe	0.42						0.0	0.0	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.42	0.42	0.14	0.00	0.00	0.14	48.39	*11.00*	*200*	*2.00*	1.492	48.25	99.71%
Moses Tennisco Street	-	*BULK204AN*	*MH204A*							*0.0*	*55.4*	*3.64*	*0.65*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.00*	*0.00*	*0.00*	*0.87*	*0.29*	*0.00*	*0.00*	*0.94*	*89.90*	*21.00*	*250*	*2.10*	*1.774*	*88.96*	*98.95%*
Michael Stoqua Street	MH311A	MH311A	MH310A	0.44	1	9				27.7	27.7	3.69	0.33	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.44	0.44	0.15	0.00	0.00	0.48	72.35	77.82	250	1.36	1.428	71.87	99.34%
Michael Stoqua Street	MH310A	MH310A	BULK205AN	0.21		2				5.4	33.1	3.68	0.39	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.21	0.65	0.21	0.00	0.00	0.61	65.66	49.19	250	1.12	1.296	65.05	99.07%
Michael Stoqua Street	-	*BULK205AN*	*MH205A*							*0.0*	*33.1*	*3.68*	*0.39*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.00*	*0.00*	*0.00*	*0.65*	*0.21*	*0.00*	*0.00*	*0.61*	*66.24*	*21.00*	*250*	*1.14*	*1.307*	*65.63*	*99.08%*
Wanaki Road	MH200A	MH200A	MH318A							0.0	0.0	3.80	0.00	0.00	0.00	1.01	1.01	0.00	0.00	1.50	0.49	1.01	1.01	0.33	0.00	0.00	0.82	42.53	*63.35*	*250*	*0.47*	0.839	41.71	98.06%
Wanaki Road	MH318A	MH318A	MH300A							0.0	0.0	3.80	0.00	0.00	0.00	0.95	1.96	0.00	0.00	1.50	0.95	0.95	1.96	0.65	0.00	0.00	1.60	42.53	*77.11*	*250*	*0.47*	0.839	40.93	96.24%
Tawadina Road	MH300A	MH300A	MH301A	0.47		15				40.5	40.5	3.67	0.48	0.00	0.00	0.00	1.96	0.00	0.00	1.50	0.95	0.47	2.43	0.80	0.00	0.00	2.24	*31.02*	*109.85*	*250*	*0.25*	0.612	28.78	92.79%
Tawadina Road	MH301A	MH301A	MH302A	0.54		14				37.8	78.3	3.62	0.92	0.00	0.00	0.00	1.96	0.00	0.00	1.50	0.95	0.54	2.97	0.98	0.00	0.00	2.85	*59.18*	*110.39*	*250*	*0.91*	1.168	56.33	95.18%
Tawadina Road	MH302A	MH302A	MH303A	0.26		2				5.4	83.7	3.61	0.98	0.00	0.00	0.00	1.96	0.00	0.00	1.50	0.95	0.26	3.23	1.07	0.00	0.00	3.00	72.61	*111.69*	*250*	*1.37*	1.433	69.62	95.87%
Tawadina Road	MH303A	MH303A	MH304A	0.21						0.0	83.7	3.61	0.98	0.00	0.00	0.00	1.96	0.00	0.00	1.50	0.95	0.21	3.44	1.14	0.00	0.00	3.07	31.02	112.10	250	0.25	0.612	27.95	90.11%
Tawadina Road	MH305A	MH305A	MH304A	0.24						0.0	0.0	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.24	0.24	0.08	0.00	0.00	0.08	49.63	111.61	250	0.64	0.979	49.55	99.84%
Bareille-Snow Street	EXT-1	BULK304AN	MH304A	7.35				905		1629.0	1629.0	3.12	16.49	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	7.35	7.35	2.43	0.00	0.00	18.91	31.02	20.00	250	0.25	0.612	12.11	39.04%
Bareille-Snow Street	MH304A-1, MH304A-2	MH304A	MH308A	1.47				190		342.0	2054.7	3.06	20.38	0.00	0.00	0.00	1.96	0.00	0.00	1.00	0.64	1.47	12.50	4.13	0.00	0.00	25.14	39.72	119.21	250	0.41	0.784	14.58	36.70%
Bareille-Snow Street	MH308A	MH308A	BULK206AN	0.07						0.0	2054.7	3.06	20.38	0.00	0.00	0.00	1.96	0.00	0.00	1.00	0.64	0.07	12.57	4.15	0.00	0.00	25.17	84.15	16.82	250	1.84	1.661	58.99	70.09%
Bareille-Snow Street		BULK206AN	MH206A							0.0	2054.7	3.06	20.38	0.00	0.00	0.00	1.96	0.00	0.00	1.00	0.64	0.00	12.57	4.15	0.00	0.00	25.17	88.83	21.00	250	2.05	1.753	63.66	71.67%
Codd's Road	MH340A	MH340A	BLK231AN	1.78				278		500.4	500.4	3.38	5.48	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.78	1.78	0.59	0.00	0.00	6.07	75.98	70.00	250	1.50	1.500	69.91	92.01%
Codd's Road	*MH231A*	*MH231A*	*BULK176AN*							*0.0*	*500.4*	*3.38*	*5.48*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.00*	*0.00*	*0.00*	*1.78*	*0.59*	*0.00*	*0.00*	*6.07*	*83.92*	*50.22*	*250*	*1.83*	*1.656*	*77.86*	*92.77%*

Design Parameters:

Residential		
SF	3.4	p/p/u
TH/F/SD	2.7	p/p/u
TH/S	2.3	p/p/u
APT	1.8	p/p/u
Other	60	p/p/Ha

ICI Areas		
INST	28,000	L/Ha/day
COM	28,000	L/Ha/day
IND	35,000	L/Ha/day
	17000	L/Ha/day

MOE Chart

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 200 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area,
1.5 if greater than 20%, otherwise 1.0

Designed: KH

Checked: JIM

Dwg. Reference: 118863-400

No.	Revision	Date
1	Submission No. 1 for City Review	2018-12-20
2	Submission No. 2 for City Review	2019-03-15
3	MECP Submission	2019-04-17
4	Record information Added (No.1)	2020-10-08
5	Record information Added (No.2)	2021-03-23
6	Block 11 & 12 Study	2022-03-15

File Reference:		Date:	Sheet No:
118863.5.7.1		2021-03-31	1 of 1

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LEGEND

MH231A Existing infrastructure (shown for information only)
Block 11&12 Proposed Conditions

SANITARY SEWER DESIGN SHEET

Wateridge at Rockcliffe - Phase 2B
City of Ottawa
Canada Lands Company

LOCATION				RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		RES PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		SF	SD / TH/F	TH/S	APT		IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL				IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
														IND	CUM	IND	CUM	IND	CUM														
Pimiwidon Street	MH317-1, MH317-2	MH317A	MH316A	1.50	1	104				284.2	284.2	3.47	3.20	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.50	1.50	0.50	0.00	0.00	3.69	40.68	*83.00*	*250*	*0.43*	0.803	36.99	90.93%
Pimiwidon Street	MH316A	MH316A	BULK202AN	0.16		1				2.7	286.9	3.47	3.23	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.16	1.66	0.55	0.00	0.00	3.77	37.74	*43.10*	*250*	*0.37*	0.745	33.96	90.00%
Pimiwidon Street	-	*BULK202AN*	*MH202A*							*0.0*	*286.9*	*3.47*	*3.23*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.00*	*0.00*	*0.00*	*1.66*	*0.55*	*0.00*	*0.00*	*3.77*	*40.68*	*21.00*	*250*	*0.43*	*0.803*	*36.91*	*90.72%*
Wigwas Street	MH315A	MH315A	MH314A	0.79	2	18				55.4	55.4	3.64	0.65	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.79	0.79	0.26	0.00	0.00	0.92	49.63	*111.64*	*250*	*0.64*	0.979	48.72	98.16%
Wigwas Street	MH314A	MH314A	BULK203AN	0.06						0.0	55.4	3.64	0.65	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.06	0.85	0.28	0.00	0.00	0.93	83.46	*14.37*	*250*	*1.81*	1.647	82.53	98.88%
Wigwas Street	-	*BULK203AN*	*MH203A*							*0.0*	*55.4*	*3.64*	*0.65*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.00*	*0.00*	*0.00*	*0.85*	*0.28*	*0.00*	*0.00*	*0.93*	*80.17*	*21.00*	*250*	*1.67*	*1.582*	*79.24*	*98.83%*
Moses Tennisco Street	MH313A	MH313A	MH312A	0.66	2	16				50.0	50.0	3.65	0.59	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.66	0.66	0.22	0.00	0.00	0.81	75.73	*77.20*	*250*	*1.49*	1.495	74.92	98.93%
Moses Tennisco Street	MH312A, PARK	MH312A	BULK204AN	0.21		2				5.4	55.4	3.64	0.65	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.21	0.87	0.29	0.00	0.00	0.94	94.29	*49.70*	*250*	*2.31*	1.861	93.35	99.00%
Park	PARK	MH350A	pipe	0.42						0.0	0.0	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.42	0.42	0.14	0.00	0.00	0.14	48.39	*11.00*	*200*	*2.00*	1.492	48.25	99.71%
Moses Tennisco Street	-	*BULK204AN*	*MH204A*							*0.0*	*55.4*	*3.64*	*0.65*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.00*	*0.00*	*0.00*	*0.87*	*0.29*	*0.00*	*0.00*	*0.94*	*89.90*	*21.00*	*250*	*2.10*	*1.774*	*88.96*	*98.95%*
Michael Stoqua Street	MH311A	MH311A	MH310A	0.44	1	9				27.7	27.7	3.69	0.33	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.44	0.44	0.15	0.00	0.00	0.48	72.35	77.82	250	1.36	1.428	71.87	99.34%
Michael Stoqua Street	MH310A	MH310A	BULK205AN	0.21		2				5.4	33.1	3.68	0.39	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.21	0.65	0.21	0.00	0.00	0.61	65.66	49.19	250	1.12	1.296	65.05	99.07%
Michael Stoqua Street	-	*BULK205AN*	*MH205A*							*0.0*	*33.1*	*3.68*	*0.39*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.00*	*0.00*	*0.00*	*0.65*	*0.21*	*0.00*	*0.00*	*0.61*	*66.24*	*21.00*	*250*	*1.14*	*1.307*	*65.63*	*99.08%*
Wanaki Road	MH200A	MH200A	MH318A							0.0	0.0	3.80	0.00	0.00	0.00	1.01	1.01	0.00	0.00	1.50	0.49	1.01	1.01	0.33	0.00	0.00	0.82	42.53	*63.35*	*250*	*0.47*	0.839	41.71	98.06%
Tawadina Road	MH300A	MH300A	MH301A	0.47		15				40.5	40.5	3.67	0.48	0.00	0.00	0.00	1.96	0.00	0.00	1.50	0.95	0.47	2.43	0.80	0.00	0.00	2.24	*31.02*	*109.85*	*250*	*0.25*	0.612	28.78	92.79%
Tawadina Road	MH301A	MH301A	MH302A	0.54		14				37.8	78.3	3.62	0.92	0.00	0.00	0.00	1.96	0.00	0.00	1.50	0.95	0.54	2.97	0.98	0.00	0.00	2.85	*59.18*	*110.39*	*250*	*0.91*	1.168	56.33	95.18%
Tawadina Road	MH302A	MH302A	MH303A	0.26		2				5.4	83.7	3.61	0.98	0.00	0.00	0.00	1.96	0.00	0.00	1.50	0.95	0.26	3.23	1.07	0.00	0.00	3.00	72.61	*111.69*	*250*	*1.37*	1.433	69.62	95.87%
Tawadina Road	MH303A	MH303A	MH304A	0.21						0.0	83.7	3.61	0.98	0.00	0.00	0.00	1.96	0.00	0.00	1.50	0.95	0.21	3.44	1.14	0.00	0.00	3.07	31.02	112.10	250	0.25	0.612	27.95	90.11%
Tawadina Road	MH305A	MH305A	MH304A	0.24						0.0	0.0	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.24	0.24	0.08	0.00	0.00	0.08	49.63	111.61	250	0.64	0.979	49.55	99.84%
Bareille-Snow Street	EXT-1	BULK304AN	MH304A	7.35				905		1629.0	1629.0	3.12	16.49	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00 0.00	7.35	7.35	2.43	0.00	0.00	18.91	31.02	20.00	250	0.25	0.612	12.11	39.04%
Bareille-Snow Street	MH304A-1, MH304A-2	MH304A	MH308A	1.48				140		252.0	1964.7	3.07	19.57	0.00	0.00	0.00	1.96	0.00	0.00	1.00	0.64	1.48	12.51	4.13	0.00	0.00	24.33	39.72	119.21	250	0.41	0.784	15.39	38.75%
Bareille-Snow Street	MH308A	MH308A	BULK206AN	0.96				352		633.6	2598.3	3.00	25.23	0.00	0.00	0.00	1.96	0.00	0.00	1.00	0.64	0.96	13.47	4.45	0.00	0.00	30.31	84.15	16.82	250	1.84	1.661	53.85	63.99%
Bareille-Snow Street		BULK206AN	MH206A							0.0	2598.3	3.00	25.23	0.00	0.00	0.00	1.96	0.00	0.00	1.00	0.64	0.00	13.47	4.45	0.00	0.00	30.31	88.83	21.00	250	2.05	1.753	58.52	65.88%
Codd's Road	MH340A	MH340A	BLK231AN	0.88				212		381.6	381.6	3.43	4.24	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.88	0.88	0.29	0.00	0.00	4.53	75.98	70.00	250	1.50	1.500	71.46	94.04%
Codd's Road		*MH231A*	*BULK176AN*							*0.0*	*381.6*	*3.43*	*4.24*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.00*	*0.00*	*0.00*	*0.88*	*0.29*	*0.00*	*0.00*	*4.53*	*83.92*	*50.22*	*250*	*1.83*	*1.656*	*79.40*	*94.61%*

Design Parameters:

Residential			ICI Areas		
SF	3.4	p/p/u	INST	28,000	L/Ha/day
TH/F/SD	2.7	p/p/u	COM	28,000	L/Ha/day
TH/S	2.3	p/p/u	IND	35,000	L/Ha/day
APT	1.8	p/p/u			MOE Chart
Other	60	p/p/Ha		17000	L/Ha/day

Notes:

1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 200 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
   where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area,
   1.5 if greater than 20%, otherwise 1.0

Designed: KH

Checked: JIM

Dwg. Reference: 118863-400

No.	Revision	Date
1	Submission No. 1 for City Review	2018-12-20
2	Submission No. 2 for City Review	2019-03-15
3	MECP Submission	2019-04-17
4	Record information Added (No.1)	2020-10-08
5	Record information Added (No.2)	2021-03-23
6	Block 11 & 12 Study	2022-03-15

File Reference: 118863.5.7.1 | **Date:** 2021-03-31 | **Sheet No:** 1 of 1