UPPER CANADA CONSULTANTS
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File: 21116

FUNCTIONAL SERVICING REPORT

6104 Garner Road, Niagara Falls

November 2025

INTRODUCTION

This report addresses the servicing needs and requirements for the proposed development located at 6104 Garner Road in the City of Niagara Falls, in support of the Zoning By-Law Amendment application. The subject site is located south east of the intersection of Garner Road and Angie Drive. Historically, the property has been occupied by a single detached dwelling and a detached garage.

The development site is approximately 0.39 hectares in size, and the previous zoning By-law Amendment will permit a six storey apartment building containing 57 apartment units. The site will include an associated asphalt parking lot, concrete curbs, catch basins, storm sewers, sanitary service, and water service.

The objectives of this study are as follows:

1. Identify domestic and fire protection water service needs for the site;
2. Identify sanitary servicing needs for the site; and,
3. Identify stormwater management needs for the site.

WATER SERVICING

The subject site is surrounded by an existing municipal 300mm diameter watermain on Garner Road and a 200mm diameter municipal watermain on Angie Drive. It is proposed to connect a water service to the existing 300mm diameter watermain on Garner Road to provide water supply and fire protection to the proposed development.

Table 1 summarizes the projected water demand calculations for the proposed six storey residential building. The water demands were calculated based on the 2021 Niagara Water Master Servicing Plan Update (MSPU).

Table 1. Water Demand Calculations								
Number of Units	Density (ppu)	Population (persons)	Avg. Day Demand Rate (L/cap/day)	Avg. Day Demand (L/s)	Max Day Demand		Peak Hour Demand	
					Peak Factor	(L/s)	Peak Factor	(L/s)
57	1.55	88	240	0.25	1.65	0.40	3.00	0.74

As shown in Table 1, the proposed development is expected to require an average day demand of 0.25 L/s, based on a residential consumption rate of 240 L/capita/day, as per the 2021 MSPU guidelines. Applying a day peak factor of 1.65, the demand increases to 0.40 L/s, while the application of a peak hour factor of 3.0 results in a demand of 0.74 L/s.

Two existing municipal fire hydrants are located fronting the site and will provide fire protection. One hydrant is located on the south side of Angie Drive, approximately 6 metres north of the site, and the second is located on the east side of Garner Road, approximately 7 metres south of the southwest corner of the site.

Therefore, the existing 300 mm diameter watermain on Garner Road is expected to adequately provide domestic water supply, while the existing fire hydrants will provide sufficient fire protection coverage for the site.

SANITARY SERVICING

An existing 200mm diameter municipal sanitary sewer is located on Angie Drive and conveys flows westerly to the existing 300mm diameter sanitary sewer on Garner Road. It is proposed to connect the sanitary service from the subject site to the 200mm sanitary sewer on Angie Drive.

An analysis was completed to assess the impact of the proposed development on the existing sanitary sewer system along Angie Drive. Figure 1, included in Appendix A, illustrates the future sanitary drainage areas contributing to the system.

The 200mm diameter sanitary sewer has a full flow capacity of approximately 29.63 L/s. The subject lands will consist of an estimated population of 88 persons and is expected to generate a peak sanitary flow of approximately 1.15 L/s. When combined with upstream flows from the Garner Place Subdivision (A1) and the planned six storey residential building (A2), the 200mm sanitary sewer is projected to operate at approximately 20.7% of its full flow capacity. Detailed sanitary sewer calculations are provided in Appendix A.

Therefore, the existing 200mm sanitary sewer on Angie Drive has sufficient capacity to accommodate flows from the proposed development and the downstream 300mm diameter sanitary sewers are expected to have adequate capacity to receive future flows from the subject lands.

STORMWATER MANAGEMENT

The subject site was included in the Stormwater Management Plan for Deerfield Estates (Phase 9), as part of the Garner Place Subdivision, as drainage area EXT2A and EXT 2B with a Runoff Coefficient of 0.70, as shown in the Storm Drainage Area Plan ST1.1 prepared by MTE Engineering, attached in Appendix B.

There is an existing 675mm diameter municipal storm sewer that convey the flows south to the Deerfield Estates Stormwater Management Facility (SWMF). It is proposed to connect a new storm sewer to the existing 675mm diameter sewer to service the site and convey the stormwater flows to the existing SWMF.

The proposed drainage areas and their associated runoff coefficients are illustrated in Figure 2, provided in Appendix B. The site system will collect stormwater flows from a drainage area of 0.42 hectares, with an associated future runoff coefficient of 0.75 in accordance with City of Niagara Falls Standards.

A storm sewer analysis was completed for the 5 year storm event to assess whether the existing 675mm diameter storm sewer has adequate capacity to accommodate the proposed development. The analysis accounted for upstream stormwater contributions from the Garner Estates Subdivision as well as the future six storey residential building north of Angie Drive. Detailed storm sewer calculations are provided in Appendix B.

The 675 mm diameter storm sewer has a full flow capacity of 701.82 L/s. The proposed development is expected to generate a peak stormwater flow of 73.5 L/s. Including upstream contributions, the 675mm sewer is anticipated to operate at approximately 74.0% of its full flow capacity before discharging stormwater to the SWMF.

Therefore, the existing 675 mm diameter storm sewer is expected to have sufficient capacity to receive stormwater flows from the subject site. Major overland flows from the subject lands (in excess of the 5 year design storm) will be conveyed south east to the existing SWMF. As previously discussed, the subject site was allocated capacity within the existing SWMF at a runoff coefficient of 0.70, and is proposed at a coefficient of 0.75. This major change in coefficient within the relatively minor drainage area will have negligible impact on the overall function of the existing SWMF for storm events up to and including the 100 year design storm. Therefore, the Deerfield Estates SWMF can provide the required stormwater quantity and quality controls without modification.

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CONCLUSIONS AND RECOMMENDATIONS

Therefore, based on the above comments and design calculations provided for this site, the following summarizes the servicing for this site.

1. The existing municipal 300mm diameter watermain on Garner Road is expected to have sufficient capacity to provide both domestic water supply and fire protection.

2. The existing municipal fire hydrants on Garner Road and Angie Drive will provide adequate fire protection to proposed development.

3. The existing 200mm diameter sanitary sewer on Angie Drive will have adequate capacity to accommodate flows from the proposed residential development. The downstream 300mm sanitary sewer on Garner Road is expected to have adequate capacity to service the subject lands.

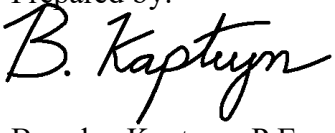
4. Stormwater from the subject site will be conveyed to the existing Deerfield Estates Stormwater Management Facility (SWMF), which is expected to have adequate capacity to receive the flows and provide the required quantity and quality controls.

5. Major overland flows will be conveyed to the existing Deerfield Estates SWMF.

In conclusion, there exists adequate municipal infrastructure to service the proposed development. We trust the above comments and enclosed calculations are satisfactory for approval. If you have any questions or require additional information, please do not hesitate to contact our office.

Respectfully Submitted,

Prepared by:



Brendan Kapteyn, P.Eng.
November 4th, 2025

Encl.

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APPENDICES

UPPER CANADA CONSULTANTS
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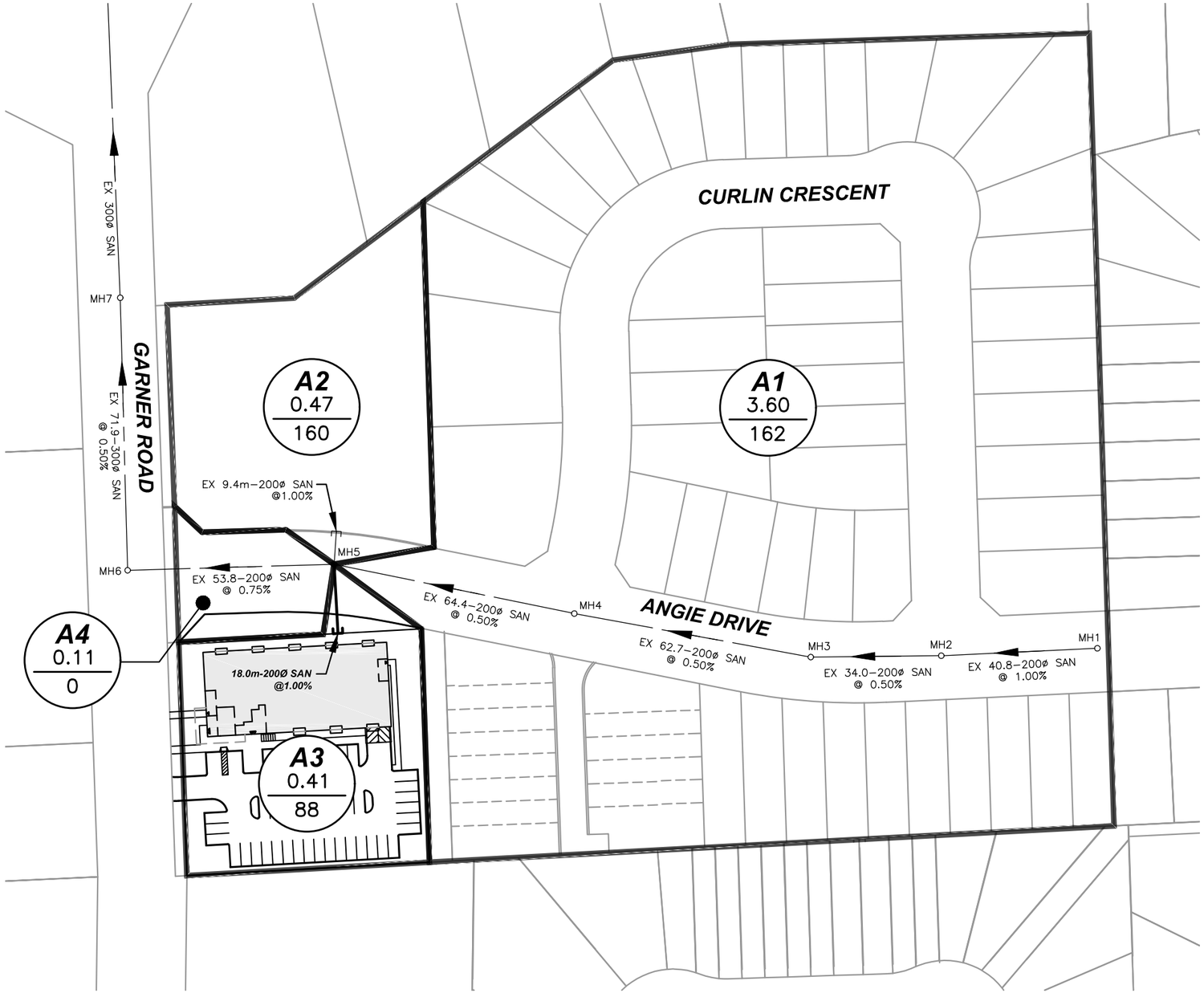
APPENDIX A

Figure 1 – Future Sanitary Drainage Area Plan
Sanitary Sewer Design Sheet



LEGEND

A0 0.00 / 00 — DRAINAGE AREA NUMBER / DRAINAGE AREA IN HECTARES / POPULATION

DRAINAGE AREA BOUNDARY

UPPER CANADA CONSULTANTS
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6104 GARNER ROAD
NIAGARA FALLS

FUTURE SANITARY DRAINAGE AREA PLAN

DATE	2025–08–20
SCALE	1:1250 m
REF No.	.
DWG No.	FIGURE 1

DRAWING FILE: F:\21116\SWM\21116–BASE_FSR.dwg PLOTTED: Aug 20, 2025 – 2:22pm PLOTTED BY: roberto

UPPER CANADA CONSULTANTS
3-30 HANNOVER DRIVE
ST.CATHARINES, ONTARIO
L2W 1A3

DATE: AUGUST 2025

DESIGN FLOWS

RESIDENTIAL:	255	LITRES/PERSON/DAY (AVERAGE DAILY FLOW)
INFILTRATION RATE:	0.286	L / s / ha (M.O.E FLOW ALLOWANCE IS BETWEEN 0.10 & 0.28 L / s / ha)
POPULATION DENSITY:	1.55	PERSONS /APARTMENT UNIT
	1.81	PERSONS /TOWNHOUSE UNIT
	2.59	PERSONS / SINGLE UNIT

SEWER DESIGN

PIPE ROUGHNESS:	0.013	FOR MANNING'S EQUATION
PIPE SIZES:	1.016	IMPERIAL EQUIVALENT FACTOR
PERCENT FULL:		TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY: CITY OF NIAGARA FALLS
PROJECT : 6401 GARNER ROAD
PROJECT NO: 21116

SANITARY SEWER DESIGN SHEET

Peaking Factor= $M = 1 + \frac{14}{4 + P^{0.5}}$ Where P = design population in thousands

LOCATION			AREA		POPULATION			ACCUMULATED PEAK FLOW				DESIGN FLOW					
Location and Description	From M.H	To M.H.	Increment (hectares)	Accum. (hectares)	Number of Units	Population Increment	Total Population Served	Peaking Factor	Flow (L/s)	Infiltration Flow L/s	Total Peak Flow (L/s)	Pipe Diameter (mm)	Pipe Length (m)	Pipe Slope (%)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Percent Full
A1 - ANGIE DRIVE	MH4	MH5	3.60	3.60	69	162	162	4.00	1.91	1.03	2.94	200	64.4	0.50	0.75	24.19	12.1%
A2 - ANGIE DRIVE	STUB	MH 5	0.47	0.47	103	160	160	4.00	1.88	0.13	2.02	200	9.4	1.00	1.06	34.22	5.9%
A3 - ANGIE DRIVE	SITE	MH 5	0.41	0.41	57	88	88	4.00	1.04	0.12	1.16	200	18.0	1.00	1.06	34.22	3.4%
A4 - ANGIE DRIVE	MH 5	MH 6	0.11	4.59	0	0	410	4.00	4.83	1.31	6.15	200	53.8	0.75	0.91	29.63	20.7%

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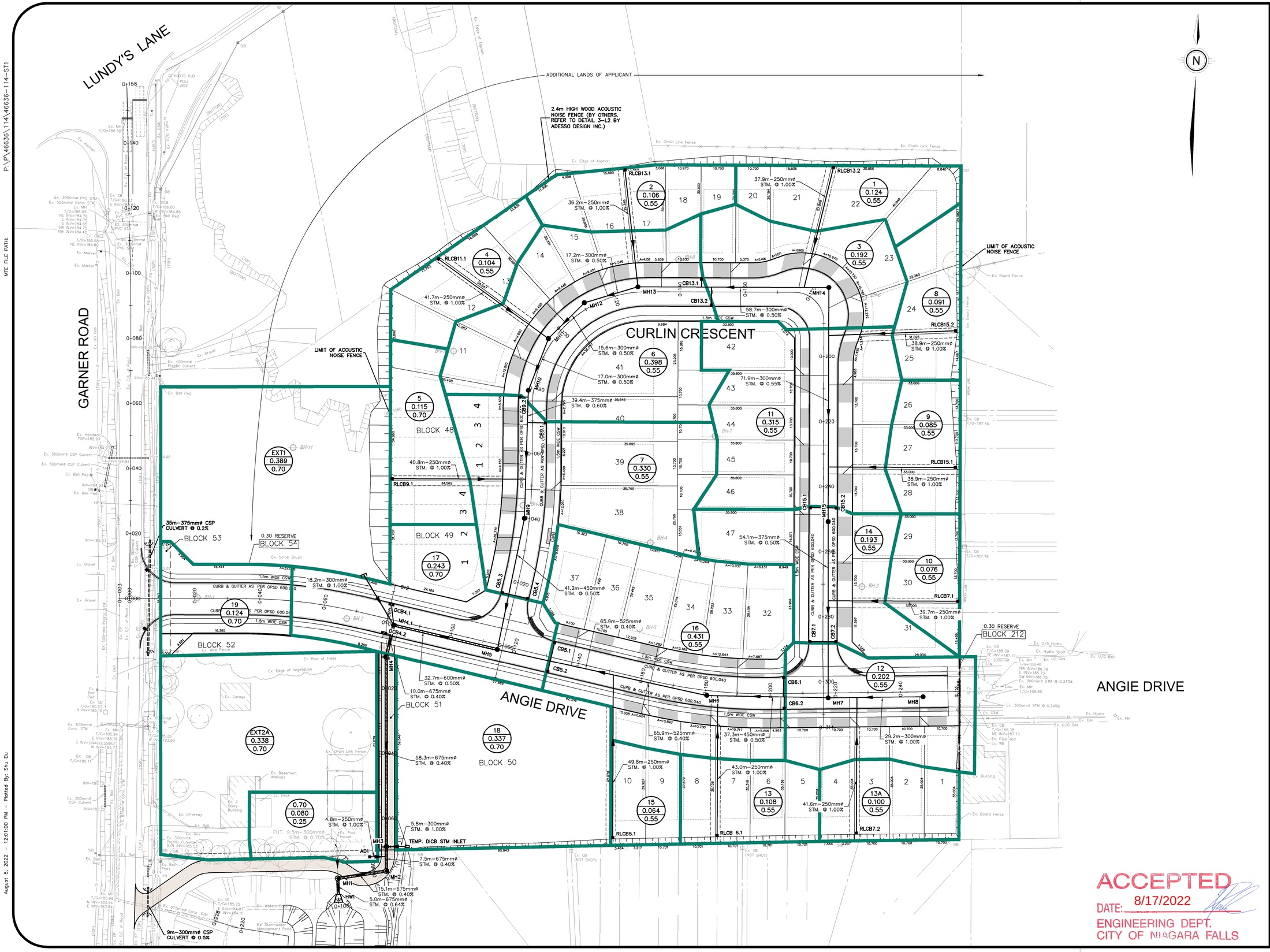
APPENDIX B

Garner Place Subdivision, Storm Drainage Area Plan (ST1.1) - MTE
Garner Place Subdivision, Storm Sewer Design Sheet – MTE
Figure 2 – Future Storm Drainage Area Plan
Storm Sewer Design Sheet


LUNDY'S LANE
GARNER ROAD
ANGIE DRIVE
CURLIN CRESCENT
ADDITIONAL LANDS OF APPLICANT
2.4m HIGH WOOD ACOUSTIC NOISE FENCE (BY OTHERS, REFER TO DETAIL 3-L2 BY ADESSO DESIGN INC.)
LIMIT OF ACOUSTIC NOISE FENCE
BLOCK 48
BLOCK 49
BLOCK 50
BLOCK 51
BLOCK 52
BLOCK 53
0.30 RESERVE BLOCK 54
0.30 RESERVE BLOCK 212
TEMP. DICB STM INLET
9m-300mmø CSP CULVERT @ 0.5%
35m-375mmø CSP CULVERT @ 0.2%
Ex. Stormwater Management Pond
Ex. Gravel
Ex. Asphalt
Ex. Bell Ped
Ex. Board Fence
Ex. Row of Trees
Ex. Edge of Vegetation
Ex. Chain Link Fence
Ex. Garage
Ex. Basement Walkout
Ex. Deck
Ex. 2 Story Building
Ex. Driveway
Ex. Pool
Ex. Pool House
Ex. Scrub Brush
Ex. Gravel Pad
Ex. Bell Pedestal
Ex. Headwall
Ex. 400mmø Plastic Culvert
Ex. 360mmø CSP Culvert
Ex. 500mmø CSP Culvert
Ex. 675mmø Conc. STM
Ex. 300mmø Plastic Culvert
Ex. 300mmø PVC STM
Ex. 525mmø Conc. STM
Ex. 650mmø Conc. STM
Ex. 300mmø Conc. STM
Ex. 375mmø STM
Ex. 600mmø STM
Ex. 300mmø STM
Ex. 450mmø STM
Ex. 500mmø STM
Ex. 1050mmø STM
Ex. 1200mmø STM
Ex. 1500mmø STM
Ex. 1800mmø STM
Ex. 2100mmø STM
Ex. 2400mmø STM
Ex. 2700mmø STM
Ex. 3000mmø STM
Ex. 3300mmø STM
Ex. 3600mmø STM
Ex. 3900mmø STM
Ex. 4200mmø STM
Ex. 4500mmø STM
Ex. 4800mmø STM
Ex.

GARNER PLACE SUBDIVISION

CITY OF NIAGARA FALLS

STORM SEWER DESIGN SHEET
THIRD SUBMISSION
ENGINEERING AND PUBLIC WORKS

Project Number:	46636-114
Date:	June 29, 2022
Design By:	RSM
Checked By:	RSM
File:	Q:\46636\114\STM\46636-114 Storm Sewer Design Sheet.xlsx
Drainage Area Plan No:	46636-114-ST1.1

Design Parameters

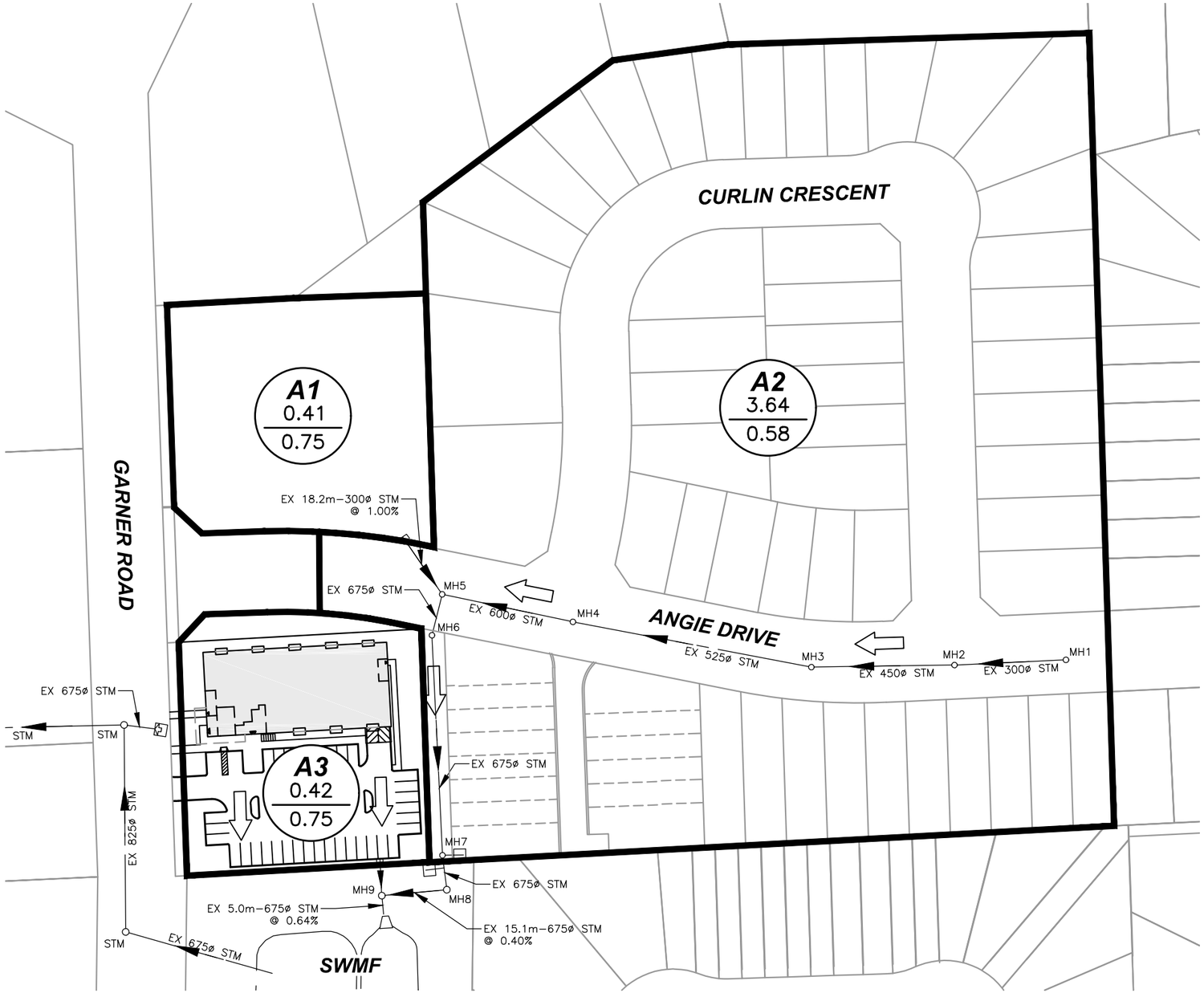
5 YEAR STORM

Q=kAIC, k=0.00278
Intensity (I) = a/(tc+b)^c
a = 719.5
b = 6.340
c = 0.769

Manning's "n" 0.013
Min. Velocity 0.800 m/s
Max. Velocity 6.000 m/s

LOCATION				STORMWATER FLOW								DESIGN					
STREET	AREA NUMBER	MANHOLE LOCATION FROM MH	MANHOLE LOCATION TO MH	AREA (A)	RUNOFF COEFF. (C)	A x C	CUMUL. A x C	CONCENTRATION TIME TOTAL	CONCENTRATION TIME IN PIPE	RAIN INTENSITY (I)	FLOW (Q)	PIPE SIZE	LENGTH	SLOPE	CAPACITY	FULL FLOW VELOCITY	PIPE FULL
				ha		*ha*	*ha*	*min*	*min*	*mm/hr*	*L/s*	*mm*	*m*	*%*	*L/s*	*m/s*	*%*
CURLIN CRESCENT	1	RLCB13.2	MH14	0.124	0.55	0.0680	0.0680	10.0000	0.6161	83.95372	15.87317	250	37.9	1.00	59.46753	1.2115	26.69
CURLIN CRESCENT	3	MH14	MH13	0.192	0.55	0.1056	0.1737	10.6161	0.9771	81.59800	39.39344	300	58.7	0.50	68.37776	0.9673	57.61
CURLIN CRESCENT	2	RLCB13.1	MH13	0.106	0.55	0.0582	0.0582	10.0000	0.6145	83.95372	13.58004	250	36.2	1.00	59.46753	1.2115	22.84
CURLIN CRESCENT	-	MH13	MH12	0.000	0.00	0.0000	0.2318	11.5931	0.2705	78.15721	50.37473	300	17.2	0.50	68.37776	0.9673	73.67
CURLIN CRESCENT	-	MH12	MH11	0.000	0.00	0.0000	0.2318	11.8636	0.2464	77.26255	49.79810	300	15.6	0.50	68.37776	0.9673	72.83
CURLIN CRESCENT	4	RLCB11.1	MH11	0.104	0.55	0.0570	0.0570	10.0000	0.7121	83.95372	13.30906	250	41.7	1.00	59.46753	1.2115	22.38
CURLIN CRESCENT	-	MH11	MH10	0.000	0.00	0.0000	0.2318	12.1100	0.2696	76.46784	49.28588	300	17.0	0.50	68.37776	0.9673	72.08
CURLIN CRESCENT	5	RLCB9.1	MH9	0.115	0.70	0.0802	0.0802	10.0000	0.6341	83.95372	18.70682	250	40.8	1.00	59.46753	1.2115	31.46
CURLIN CRESCENT	6	MH10	MH9	0.398	0.55	0.2190	0.5310	12.3796	0.4781	75.61956	111.61777	375	39.4	0.60	135.81014	1.2296	82.19
CURLIN CRESCENT	7	MH9	MH5	0.330	0.55	0.1815	0.7125	12.8577	0.4966	74.16719	146.89654	450	41.2	0.50	201.60049	1.2676	72.87
CURLIN CRESCENT	8	RLCB15.2	MH14	0.091	0.55	0.0501	0.0501	10.0000	0.6889	83.95372	11.68504	250	38.9	1.00	59.46753	1.2115	19.65
CURLIN CRESCENT	9	RLCB15.1	MH14	0.085	0.55	0.0468	0.0468	10.0000	0.7029	83.95372	10.91211	250	38.9	1.00	59.46753	1.2115	18.35
CURLIN CRESCENT	11	MH14	MH15	0.315	0.55	0.1733	0.2701	10.7029	1.0522	81.27814	61.02338	300	71.9	0.55	71.71520	1.0146	85.09
CURLIN CRESCENT	10	RLCB7.1	MH15	0.076	0.55	0.0418	0.0418	10.0000	0.7402	83.95372	9.75576	250	39.7	1.00	59.46753	1.2115	16.41
CURLIN CRESCENT	14	MH15	MH7	0.193	0.55	0.1062	0.4180	11.7551	0.7365	77.61868	90.20051	375	54.1	0.50	123.97713	1.1225	72.76
ANGIE DRIVE	13A	RLCB7.2	MH8	0.100	0.55	0.0550	0.0550	10.0000	0.7178	83.95372	12.83652	250	41.6	1.00	59.46753	1.2115	21.59
ANGIE DRIVE	-	MH8	MH7	0.000	0.55	0.0001	0.0551	10.7178	0.5176	81.22347	12.43149	300	29.2	1.00	96.70076	1.3680	12.86
ANGIE DRIVE	13	RLCB6.1	MH7	0.108	0.55	0.0594	0.0594	10.0000	0.7259	83.95372	13.86345	250	43.0	1.00	59.46753	1.2115	23.31
ANGIE DRIVE	12	MH7	MH6	0.202	0.55	0.1111	0.6436	12.4916	0.4579	75.27345	134.67481	450	37.3	0.50	201.60049	1.2676	66.80
ANGIE DRIVE	15	RLCB5.1	MH6	0.064	0.55	0.0352	0.0352	10.0000	0.9756	83.95372	8.21538	250	49.8	1.00	59.46753	1.2115	13.81
ANGIE DRIVE	16	MH6	MH5	0.431	0.55	0.2371	0.9158	12.9496	0.8101	73.89551	188.13767	525	65.9	0.40	271.99526	1.2565	69.17

LOCATION				STORMWATER FLOW								DESIGN					
STREET	AREA NUMBER	MANHOLE LOCATION FROM MH	MANHOLE LOCATION TO MH	AREA (A)	RUNOFF COEFF. (C)	A x C	CUMUL. A x C	CONCENTRATION TIME TOTAL	CONCENTRATION TIME IN PIPE	RAIN INTENSITY (I)	FLOW (Q)	PIPE SIZE	LENGTH	SLOPE	CAPACITY	FULL FLOW VELOCITY	PIPE FULL
				ha		*ha*	*ha*	*min*	*min*	*mm/hr*	*L/s*	*mm*	*m*	*%*	*L/s*	*m/s*	*%*
ANGIE DRIVE	17	MH5	MH4.1	0.243	0.70	0.1700	1.7983	13.7597	0.3178	71.59436	357.91745	600	32.7	0.50	434.17173	1.5356	82.44
FUTURE APARTMENT	EXT1	STUB	MH4.1	0.389	0.70	0.2721	0.2721	10.0000	0.2078	83.95372	63.50733	300	18.2	1.00	96.70076	1.3680	65.67
ANGIE DRIVE	-	MH4.1	MH4	0.000	0.70	0.0000	2.0704	14.0775	0.1018	70.73580	407.13387	675	10.0	0.40	531.63462	1.4856	76.58
BLOCK 51	-	MH4	MH3	0.000	0.00	0.0000	2.0704	14.1793	0.5940	70.46573	405.57945	675	58.3	0.40	531.63462	1.4856	76.29
FUTURE CONDOMINUM	18	STUB	MH3	0.337	0.70	0.2362	0.2362	10.0000	0.0684	83.95372	55.13484	300	5.8	1.00	96.70076	1.3680	57.02
EXISTING RESIDENCE	EXT 2B	AD1	MH3	0.080	0.70	0.0560	0.0560	10.0000	0.0824	83.95372	13.06992	250	4.8	1.00	59.46753	1.2115	21.98
SWM BLOCK	-	MH3	MH2	0.000	0.00	0.0000	2.3626	14.7733	0.0749	68.93616	452.78007	675	7.5	0.40	531.63462	1.4856	85.17
SWM BLOCK	-	MH2	MH1	0.000	0.00	0.0000	2.3626	14.8482	0.1509	68.74858	451.54801	675	15.1	0.40	531.63462	1.4856	84.94
FUTURE DEV BLOCK	EXT 2A	FUT STUB	MH1	0.338	0.70	0.2366	0.2366	10.0000	0.1286	83.95372	55.22039	300	9.5	0.70	80.90566	1.1446	68.25
SWM BLOCK	-	MH1	H/W	0.000	0.30	0.0000	2.5992	14.9992	0.0406	68.37430	494.06273	675	5.0	0.64	672.47052	1.8792	73.47



LEGEND

- A0 / 0.00 / 0.00 — DRAINAGE AREA NUMBER / DRAINAGE AREA IN HECTARES / RUN-OFF COEFFICIENT
- DRAINAGE AREA BOUNDARY
- OVERLAND FLOW ROUTE

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

6104 GARNER ROAD
NIAGARA FALLS

FUTURE STORM DRAINAGE AREA PLAN

DATE	2025–08–20
SCALE	1:1250 m
REF No.	.
DWG No.	FIGURE 2

DRAWING FILE: F:\21116\SWM\21116–BASE_FSR.dwg PLOTTED: Aug 21, 2025 – 11:27am PLOTTED BY: roberto

UPPER CANADA CONSULTANTS
3-30 HANNOVER DRIVE
ST. CATHARINES, ON L2W 1A3

STORM SEWER DESIGN

MUNICIPALITY: NIAGARA FALLS
PROJECT: 6401 GARNER ROAD
UCC PROJECT NO.: 21116

A = 719.50 mm/hr 5 YEAR DESIGN IDF
B = 6.34 minutes
C = 0.769

PIPE ROUGHNESS = 0.013
PIPE CONVERSION FACTOR = 1.016

DESCRIPTION			STORMWATER ANALYSIS										STORM SEWER DESIGN					
LOCATION	FROM MH	TO MH	AREA (ha)	ACCUMLTD AREA (ha)	RUNOFF COEFFICNT	A*R	ACCUMLTD A*R	T of C (min.)	PIPE TIME (min.)	T of C (sum)	INTENSITY (mm/hr)	FLOW (L/s)	LENGTH (m)	DIAMETER (mm)	SLOPE (%)	CAPACITY (L/s)	VELOCITY (m/s)	PERCENT FULL
EXISTING CONDITIONS																		
A1	STUB	MH5	0.41	0.41	0.75	0.308	0.308	10.00	0.22	10.22	84.0	71.7	18.2	300	1.00	100.92	1.4	71.1%
A2	MH 8	MH 9	3.64	4.05	0.58	2.111	2.419	14.84	0.17	15.01	68.8	462.0	15.1	675	0.40	554.84	1.5	83.3%
A3	SITE	MH 9	0.42	0.42	0.75	0.315	0.315	10.00	0.14	10.14	84.0	73.5	9.5	300	0.70	84.44	1.2	87.0%
	MH 9	POND		4.47			2.734	15.01	0.04	15.05	68.4	519.1	5.0	675	0.64	701.82	1.9	74.0%