



Servant, Dunbrack, McKenzie & MacDonald Ltd.

NOVA SCOTIA LAND SURVEYORS & CONSULTING ENGINEERS

36 Oland Crescent
Bayers Lake Business Park
Halifax, Nova Scotia B3S 1C6

Tel: (902) 455-1537
Fax: (902) 455-8479
sdmm.ca



RAYMOND A. LANDRY
MAsc., P.Eng., LEED Green Associate
CHRISTOPHER J. FORAN
P.Eng.
GEOFFREY K. MacLEAN
P.Eng.
RACHAEL W. KYTE
P.Eng., LEED Green Associate
ALEXANDER W. PULSIFER
P.Eng.
MICHAEL S. TANNER
NSLS (Ret)

DANIEL S. GERARD
P.Eng., P. Surv., NSLS
H. JAMES McINTOSH
P.Eng., NSLS, CLS
KEVIN A. ROBB
NSLS
BLAKE H. TRASK
P.Eng., NSLS
ADAM J. PATTERSON
P.Eng., NSLS

May 17, 2024

Halifax Water
450 Cowie Hill Rd
Halifax, NS B3P 2V3

Re: Mainland Common Development – Downstream Sanitary Sewer Review

Our client is proposing to develop the existing Mainland Commons Site in the Clayton Park West area of the Halifax Regional Municipality. The proposed development consists of approximately 43 hectares (ha) of land comprised of 1.45 ha of commercial space and 3,510 apartment units for a total population increase of 8,021 people. SDMM has reviewed the existing sanitary sewer capacity analysis for the wastewater systems immediately downstream of the development and the following report outlines our findings.

To calculate the sanitary sewer flows generated from the proposed development and to estimate the existing downstream sanitary flows, SDMM utilized section 4.2 of the Halifax Water Design and Construction Specifications (2023). Additionally, SDMM obtained the following information:

- The latest HRM GIS sewer record data for the Clayton Park West and Fairview areas.
- HRM sewer record drawings for Regency Park Drive, Washmill Lake Drive, Bently Drive, Saltzburg Place, Ramsbrook Court, Rosedale Avenue and Willett Street.
- Development Agreements for the multi-unit buildings on Regency Park Drive for unit counts.
- Proposed unit counts and commercial floor areas for the Mainland Common development.

The proposed Regency Park Drive section will contain a high point which divides the sanitary flows from the development into two routes. The north route will connect to the existing 250mm sanitary main on Regency Park Drive, which connects to MH11188 at the intersection of Regency Park & Lacewood Drive. This was the termination point for the Regency Park route as shown in Figure 1 of the appendix. The portion of the development to be added to this route will consist of 1486 residential units and 0.23 ha of commercial space, for a total population increase of 3,364 people. The south route will connect to the existing 250mm sanitary main on Washmill Lake Drive, which runs through Mount Royale, crosses Northwest Arm Drive, and runs through Fairview. The termination point for this route is at MH8004, on Willett Street at the

Convoy Avenue, as shown in Figure 2 of the appendix. This section of the development will consist of 2,024 residential units and 1.21 ha of commercial space, for a total population increase of 4,657 people.

Existing pipe capacities were calculated using Manning’s Equation for each reach of downstream sewer, utilizing pipe characteristics provided by Halifax Water GIS. A summary of existing capacities is presented in Tables 1a and 2a of the appendix.

Estimated wastewater flows were calculated based on the hydraulic formula outlined in section 4.2.2 of the HW Design and Construction Spec (2023). A summary of variables and densities used are presented below:

- Average Dry Weather Flow 300 L/person/day (HW, 2023)
- Multi-Unit Residential 2.25 people/unit (HW, 2023)
- Commercial (Flow Equivalent) 85 people/ha (Atlantic Canadian Wastewater Guidelines Manual, 2022)
- Inflow/Infiltration 24 m³/ha/day (HW, 2023)
- Safety Factor 1.25 (HW, 2023)
- Design Flow Equation $\frac{[1.25 \times (a+M)]+(b \times area)}{86.4}$ (HW, 2023)

Comparisons between the estimated flows and existing pipe capacities indicate that the downstream sewer systems have sufficient capacity to accommodate wastewater flows generated by the proposed development. Based on the proposed flow splitting shown in Figures 1 & 2 of the appendix, all pipes analyzed where found to be under their maximum capacity. Calculations for the pipe reaches reviewed can be found in Tables 1b and 2b of the appendix.

The following is a summary of the final reaches of downstream pipes reviewed prior to and after development:

	Pipe	Location	Pipe Description	Peak Sanitary Flow	Pipe Capacity	Percent Capacity (%)
Existing	MHPS1-MH11188	Regency Park Drive	250mm PVC @ 1.34%	0.021 m ³ /s	0.089 m ³ /s	23%
	MH11422-MH8004	Willett Street	600mm Concrete @ 0.28%	0.134 m ³ /s	0.327 m ³ /s	41%
Post-Development	MHPS1-MH11188	Regency Park Drive	250mm PVC @ 1.34%	0.068 m ³ /s	0.089 m ³ /s	76%
	MH11422-MH8004	Willett Street	600mm Concrete @ 0.28%	0.196 m ³ /s	0.327 m ³ /s	60%

For any additional discussion regarding the above, please contact the undersigned.

Regards,

Servant, Dunbrack, McKenzie & MacDonald Ltd.

Original Signed

Ray Landry
Project Engineer

Z:\SDMM\37000-37999\37800\37810\Design\Sanitary\2024.05.17 SF\37810 - Downstream Analysis Review (2024.05.17) .docx

APPENDIX

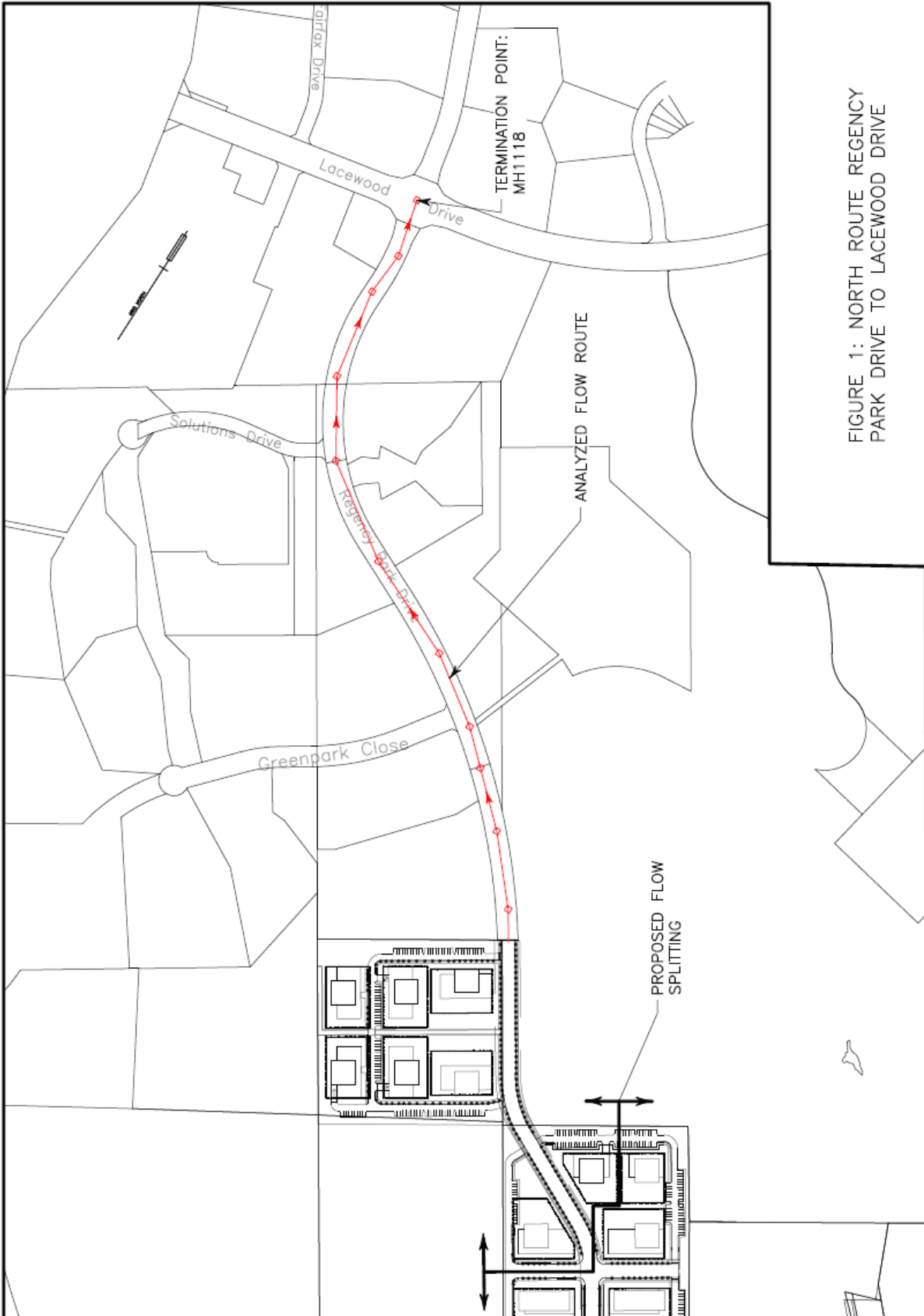


FIGURE 1: NORTH ROUTE REGENCY PARK DRIVE TO LACEWOOD DRIVE

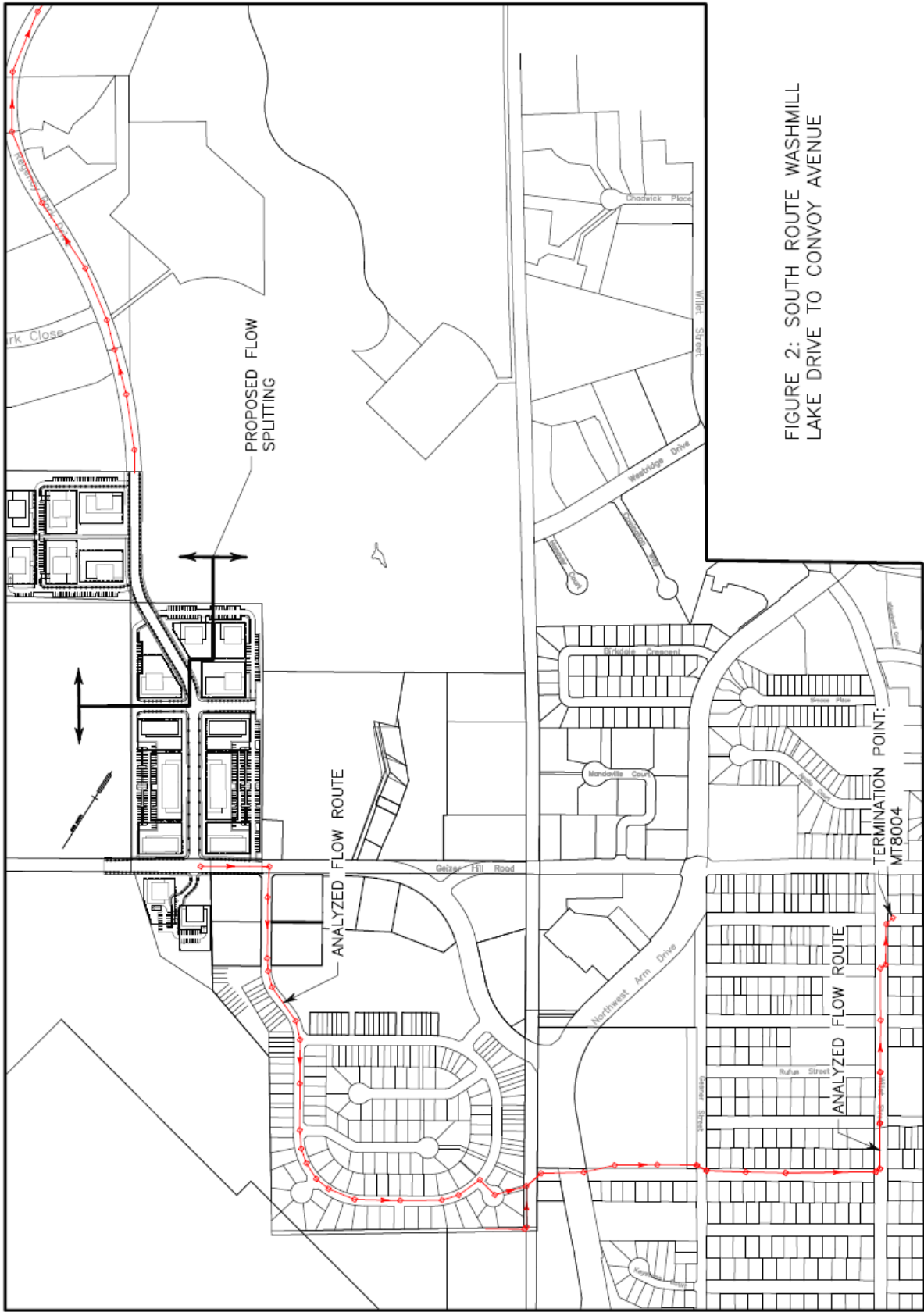


FIGURE 2: SOUTH ROUTE WASHMILL LAKE DRIVE TO CONVO AVENUE

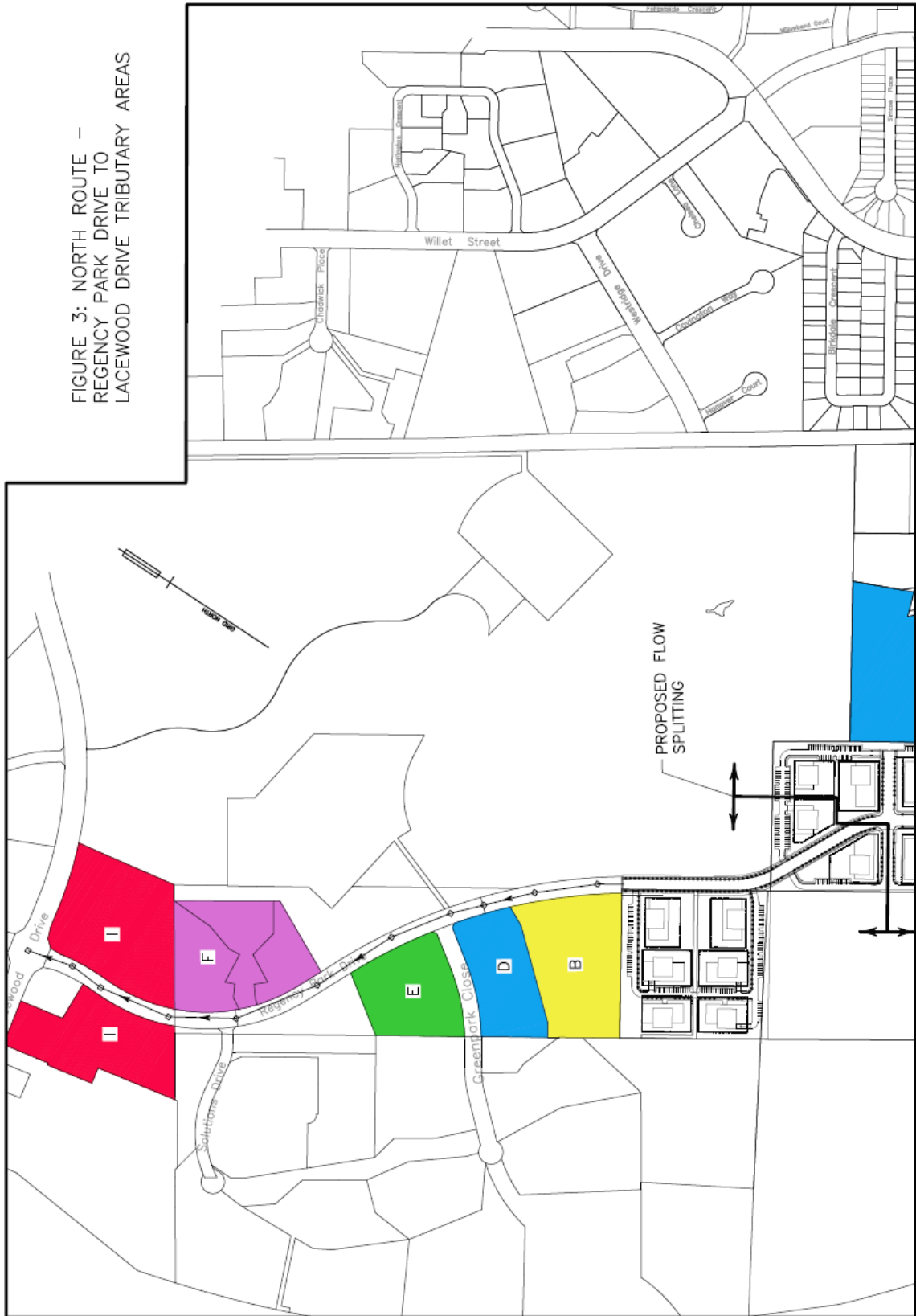
Design Flow Calculation																	
Average daily Domestic Flow (a) = 0.3 m ³ /cap*d					Infiltration Allowance = 24 m ³ /ha/day												
START MH	END MH	DIA (mm)	TYPE	Slope (%)	Manning's Capacity (Q _c) (m ³ /s)	Per Drainage Area		Total Persons	P, Poo/1000	Harmon Peaking Factor (M)	Area (ha)	Infiltration Allow. b (m ³ /day)	Q(t), Peak Dry Flow (m ³ /s)	Mannings Capacity (Q _c) (m ³ /s)	Comparison		
						People	0								Peak Dry Flow (m ³ /s)	Check	Sewer Shed Areas
	MHR510	250	PVC	3.30	0.140	0	0	0	0.00	4.500	0.20	4.7112	0.0001	0.140	0.000	Ok	A
	MHR59	250	PVC	2.67	0.126	326	326	326	0.33	4.063	0.36	8.5560	0.0059	0.126	0.006	Ok	B
	MHR58	250	PVC	3.57	0.146	0	0	0	0.33	4.063	0.47	11.1696	0.0059	0.146	0.006	Ok	C
	MHR57	250	PVC	0.90	0.073	225	225	551	0.55	3.952	0.66	15.7920	0.0096	0.073	0.010	Ok	D
	MHR56	250	PVC	1.60	0.098	180	180	731	0.73	3.884	0.92	22.1616	0.0126	0.098	0.013	Ok	E
	MHR55	250	PVC	5.60	0.183	338	338	1069	1.07	3.781	1.19	28.5744	0.0179	0.183	0.018	Ok	F
	MHR54	250	PVC	3.78	0.150	0	0	1069	1.07	3.781	1.40	33.5088	0.0179	0.150	0.018	Ok	G
	MHR53	250	PVC	4.25	0.159	0	0	1069	1.07	3.781	1.64	39.3864	0.0180	0.159	0.018	Ok	H
	MHR52	250	PVC	2.71	0.127	169	169	1238	1.24	3.738	1.75	41.9160	0.0206	0.127	0.021	Ok	I
	MHR51	250	PVC	1.34	0.089	0	0	1238	1.24	3.738	1.91	45.7704	0.0206	0.089	0.021	Ok	J

Design Flow Calculation																
Average daily Domestic Flow (a) = 0.3 m ³ /cap*d					Infiltration Allowance = 28 m ³ /ha/day											
START MH	END MH	DIA (mm)	TYPE	Slope (%)	Manning's Capacity (m ³ /s)	Per Drainage Area		Total Persons	P, Poo/1000	Harmon Peaking Factor (M)	Area (ha)	Infiltration Allow. b (m ³ /day)	Q(t), Peak Dry Flow (m ³ /s)	Mannings Capacity (m ³ /s)	Comparison	
						People	0								Peak Dry Flow (m ³ /s)	Check
Development	MHR510	250	PVC	3.30	0.140	0	0	336	3.40	3.923	125.1600	0.0511	0.051	0.051	Ok	A
	MHR59	250	PVC	2.67	0.126	326	326	369	3.40	3.923	130.6564	0.0511	0.055	0.055	Ok	B
	MHR58	250	PVC	3.57	0.146	0	0	369	3.64	3.851	135.1420	0.0555	0.055	0.055	Ok	C
	MHR57	250	PVC	0.90	0.073	225	225	392	3.342	3.806	143.5840	0.0584	0.058	0.058	Ok	D
	MHR56	250	PVC	1.60	0.098	180	180	405	3.324	3.771	151.0152	0.0608	0.061	0.061	Ok	E
	MHR55	250	PVC	5.60	0.183	338	338	443	3.293	3.712	158.4968	0.0652	0.065	0.065	Ok	F
	MHR54	250	PVC	3.78	0.150	0	0	443	3.293	3.712	164.2516	0.0653	0.065	0.065	Ok	G
	MHR53	250	PVC	4.25	0.159	0	0	443	3.293	3.712	171.1108	0.0653	0.065	0.065	Ok	H
	MHR52	250	PVC	2.71	0.127	169	169	460	3.278	3.685	174.0620	0.0675	0.067	0.067	Ok	I
	MHR51	250	PVC	1.34	0.089	0	0	460	3.278	3.685	178.5588	0.0675	0.068	0.068	Ok	J

Design Flow Calculation																
START MH	END MH	DIA (mm)	TYPE	Slope (%)	Mannings Capacity Qc (m ³ /s)	Average daily Domestic Flow (a) =			Infiltration Allowance =			Comparison				
						Per Drainage Area	Total Persons	P, Per/1000	Harmon Peaking factor (M)	Area (ha)	Infiltration Allow. b (m ³ /day)	Q(d), Peak Dry Flow (m ³ /s)	Mannings Capacity (m ³ /s)	Peak Dry Flow (m ³ /s)	Check	Sewer Shed Areas
Table 2a: Washmill Lake Drive to Convooy Avenue Existing Flows & Pipe Capacities						0.3	m ³ /cap*d		24	m ³ /day						
Washmill Drive	MHRS92	MRSMH-1B	250	PVC	1.35	0.090	0	0.00	4.500	0.12	2.8713	0.0000	0.090	0.000	Ok	A
MOUNT ROYALE	MRSMH-1B	MRSMH-1A	250	PVC	1.78	0.103	225	0.23	4.129	0.17	3.9849	0.0041	0.103	0.004	Ok	B
	MRSMH-2	MRSMH-3	250	PVC	1.70	0.101	225	0.23	4.129	0.24	5.8089	0.0041	0.101	0.004	Ok	C
	MRSMH-3	MRSMH-4	250	PVC	5.14	0.175	450	0.45	3.997	0.39	9.3609	0.0079	0.175	0.008	Ok	D
	MRSMH-4	MRSMH-5	250	PVC	5.42	0.180	900	0.90	3.829	0.42	10.0913	0.0151	0.180	0.015	Ok	E
	MRSMH-5	MRSMH-6	250	PVC	5.74	0.185	30	0.93	3.820	0.46	11.0705	0.0156	0.185	0.016	Ok	F
	MRSMH-6	MRSMH-7	250	PVC	4.99	0.173	7	0.94	3.818	0.56	13.4877	0.0157	0.173	0.016	Ok	G
	MRSMH-7	MRSMH-8	250	PVC	3.11	0.136	23	0.96	3.811	0.61	14.6099	0.0161	0.136	0.016	Ok	H
	MRSMH-8	MRSMH-9	250	PVC	5.41	0.180	3	0.96	3.810	0.72	17.1635	0.0161	0.180	0.016	Ok	I
	MRSMH-9	MRSMH-10	250	PVC	4.87	0.171	37	1.00	3.800	0.83	19.9182	0.0167	0.171	0.017	Ok	J
	MRSMH-10	MRSMH-11	250	PVC	1.43	0.092	27	1.03	3.792	0.88	21.0013	0.0172	0.092	0.017	Ok	K
	MRSMH-11	MRSMH-12	250	PVC	1.25	0.086	10	1.04	3.790	0.91	21.9229	0.0173	0.086	0.017	Ok	L
	MRSMH-12	MRSMH-13	250	PVC	1.92	0.107	3	1.04	3.789	0.96	23.0365	0.0174	0.107	0.017	Ok	M
	MRSMH-13	MRSMH-14	250	PVC	1.99	0.109	20	1.06	3.783	1.00	23.9457	0.0177	0.109	0.018	Ok	N
	MRSMH-14	MRSMH-15	250	PVC	1.70	0.101	3	1.06	3.782	1.07	25.5969	0.0178	0.101	0.018	Ok	O
	MRSMH-15	MRSMH-16	250	PVC	3.96	0.154	13	1.08	3.779	1.18	28.2657	0.0180	0.154	0.018	Ok	P
	MRSMH-16	MRSMH-17	250	PVC	6.14	0.192	23	1.10	3.773	1.28	30.6849	0.0184	0.192	0.018	Ok	Q
	MRSMH-17	MRSMH-18	250	PVC	5.05	0.174	17	1.12	3.768	1.32	31.7025	0.0186	0.174	0.019	Ok	R
MRSMH-18	MRSMH-19	250	PVC	5.56	0.182	10	1.13	3.766	1.39	33.2409	0.0188	0.182	0.019	Ok	S	
MRSMH-19	MRSMH-20	450	PVC	3.36	0.523	1280	2.41	3.522	4.20	100.8609	0.0380	0.523	0.038	Ok	T	
MRSMH-20	MH-S20	450	PVC	3.79	0.555	7	2.41	3.521	4.28	102.7809	0.0381	0.555	0.038	Ok	U	
Bayers Lake Park & Washmill Lake Drive Flows Added →						4359	4.36	3.300	27.32	655.6800	0.7000	0.700	0.070			
Rosedale Avenue	MH10091	MH10094	525	CONC	0.91	0.410	0	0.01	4.414	0.15	3.6031	0.1083	0.410	0.108	Ok	V
	MH10094	MH1032	525	CONC	6.92	1.131	0	0.01	4.414	0.23	5.6378	0.1084	1.131	0.108	Ok	W
	MH1032	MH1035	525	CONC	3.91	0.851	0	0.01	4.414	0.36	8.7187	0.1084	0.851	0.108	Ok	X
	MH1035	MH1036	525	CONC	0.93	0.415	0	0.01	4.414	0.49	11.6450	0.1084	0.415	0.108	Ok	Y
	MH1036	MH1403	525	CONC	1.13	0.458	500	0.51	3.970	0.52	12.3733	0.1170	0.458	0.117	Ok	Z
	MH1403	MH1413	525	CONC	1.83	0.581	520	0.52	3.965	0.63	15.0021	0.1172	0.581	0.117	Ok	AA
	MH1413	MH1405	525	CONC	2.59	0.693	557	0.56	3.950	0.75	18.0052	0.1179	0.693	0.118	Ok	BB
Willett Street	MH1405	MH1408	525	CONC	0.71	0.363	0	0.56	3.950	1.03	24.7529	0.1179	0.363	0.118	Ok	CC
	MH1408	MH1409	600	CONC	0.21	0.281	0	0.56	3.950	1.05	25.2361	0.1179	0.281	0.118	Ok	DD
	MH1409	MH1412	600	CONC	0.41	0.393	0	0.56	3.950	1.19	28.5392	0.1180	0.393	0.118	Ok	EE
	MH1412	MH7982	600	CONC	0.38	0.377	77.05	0.63	3.919	1.86	44.7474	0.1194	0.377	0.119	Ok	FF
	MH7982	MH7982	600	CONC	0.47	0.420	380.3	1.01	3.796	2.54	60.8974	0.1255	0.420	0.126	Ok	GG
	MH1415	MH1418	600	CONC	0.43	0.405	400	1.41	3.698	3.23	77.6238	0.1317	0.405	0.132	Ok	HH
	MH1418	MH1419	600	CONC	0.15	0.235	147.4	1.56	3.667	3.75	90.0628	0.1340	0.235	0.134	Ok	II
MH1419	MH1422	600	CONC	0.48	0.425	0	1.56	3.667	3.87	92.9880	0.1340	0.425	0.134	Ok	JJ	
MH1422	MH8004	600	CONC	0.28	0.327	0	1.56	3.667	3.92	94.1064	0.1340	0.327	0.134	Ok	KK	

Design Flow Calculation																				
Washmill Lake Drive	START MH	END MH	DIA (mm)	TYPE	Slope (%)	Qc (m³/s)	Velocity (m/s)	Average Daily Domestic Flow (a) =			Infiltration Allowance	Q(0), Peak Dry Flow (m³/s)	Comparison							
								Per Drainage Area		Total Persons			P, Per/1000	Harmon Peaking factor(M)	Area (ha)	Infiltration Allow. b (m³/day)	Capacity (m³/s)	Peak Dry Flow (m³/s)	Check	Sewer Shed Area
								People	4657											
	Development							0.3	m³/cap*d	m³/day	28	m³/day								
Washmill	MHI001	MRSMH-1B	250	PVC	1.35	0.090	1.83	4657	4657	3.273	9.55	267,4000	0.0693	0.069	OK	A				
	MHI002	MRSMH-1A	250	PVC	1.78	0.103	2.10	0	4657	3.273	9.67	270,7498	0.0693	0.090	OK	B				
	MHI003	MRSMH-2	250	PVC	1.70	0.101	2.05	225	4882	4.882	9.72	272,0490	0.0721	0.103	OK	C				
	MHI004	MRSMH-3	250	PVC	5.14	0.175	3.57	225	5107	5.107	3.236	274,1700	0.0721	0.072	OK	D				
	MHI005	MRSMH-4	250	PVC	5.42	0.180	3.67	450	5557	3.202	9.97	279,1731	0.0805	0.175	OK	E				
	MHI006	MRSMH-5	250	PVC	5.74	0.185	3.77	30	5587	5.587	3.200	10.01	280,3155	0.0808	0.080	OK	F			
	MHI007	MRSMH-6	250	PVC	4.99	0.173	3.52	7	5594	5.594	3.199	10.11	283,1357	0.0810	0.185	OK	G			
	MHI008	MRSMH-7	250	PVC	3.11	0.136	2.78	23	5617	5.617	3.198	10.16	284,4448	0.0813	0.173	OK	H			
	MHI009	MRSMH-8	250	PVC	5.41	0.180	3.66	3	5621	5.621	3.198	10.27	287,4240	0.0813	0.136	OK	I			
	MHI010	MRSMH-9	250	PVC	4.87	0.171	3.48	37	5658	5.658	3.195	10.38	290,6379	0.0818	0.180	OK	J			
	MHI011	MRSMH-10	250	PVC	1.43	0.092	1.88	27	5684	5.684	3.193	10.43	291,9016	0.0822	0.082	OK	K			
	MHI012	MRSMH-11	250	PVC	1.25	0.086	1.76	10	5694	5.694	3.192	10.46	292,9768	0.0823	0.092	OK	L			
MHI013	MRSMH-12	250	PVC	1.92	0.107	2.18	3	5698	5.698	3.192	10.51	294,2760	0.0823	0.082	OK	M				
MHI014	MRSMH-13	250	PVC	1.99	0.109	2.22	20	5718	5.718	3.191	10.55	295,3367	0.0826	0.107	OK	N				
MHI015	MRSMH-14	250	PVC	1.70	0.101	2.05	3	5721	5.721	3.190	10.62	297,2631	0.0827	0.109	OK	O				
MHI016	MRSMH-15	250	PVC	3.96	0.154	3.13	13	5735	5.735	3.189	10.73	300,3767	0.0829	0.083	OK	P				
MHI017	MRSMH-16	250	PVC	6.14	0.192	3.90	23	5758	5.758	3.188	10.83	303,1991	0.0832	0.154	OK	Q				
MHI018	MRSMH-17	250	PVC	5.05	0.174	3.54	17	5775	5.775	3.186	10.87	304,3863	0.0834	0.174	OK	R				
MHI019	MRSMH-18	250	PVC	5.56	0.182	3.71	10	5785	5.785	3.186	10.94	306,1810	0.0835	0.182	OK	S				
MHI020	MRSMH-36	450	PVC	3.36	0.323	3.29	1280	7065	7.065	3.103	13.75	385,0710	0.0996	0.523	OK	T				
MHI021	MRSMH-37	450	PVC	3.79	0.555	3.49	7	7072	7.072	3.102	13.83	387,3110	0.0997	0.100	OK	U				
Bayers Lake Park	Bayers Lake Park & Washmill Lake Drive Flows Added →																			
MHI022	MHI0091	525	CONC	0.91	0.410	1.89	0	4359	4.359	3.300	27.32	764,9600	0.0713	0.071	OK	V				
MHI023	MHI1032	525	CONC	6.92	1.131	5.22	0	0.010	4.414	4.414	0.23	4,2036	0.1712	0.410	OK	W				
MHI024	MHI1035	525	CONC	3.91	0.851	3.93	0	0.010	4.414	4.414	0.23	6,5774	0.1713	0.171	OK	X				
MHI025	MHI1036	525	CONC	0.93	0.415	1.92	0	0.010	4.414	4.414	0.23	10,1718	0.1713	0.171	OK	Y				
MHI026	MHI1036	525	CONC	1.13	0.458	2.12	500	0.510	3.970	3.970	0.52	14,4355	0.1713	0.415	OK	Z				
MHI027	MHI1413	525	CONC	1.83	0.581	2.69	10	520	5.200	3.965	0.63	17,5025	0.1801	0.180	OK	AA				
MHI028	MHI1413	525	CONC	2.59	0.693	3.20	37	557	5.557	3.950	0.75	21,0060	0.1808	0.581	OK	BB				
MHI029	MHI1405	525	CONC	0.71	0.363	1.68	0	557	5.557	3.950	1.03	28,8784	0.1809	0.181	OK	CC				
MHI030	MHI1408	525	CONC	0.21	0.281	0.99	0	557	5.557	3.950	1.05	29,4421	0.1809	0.181	OK	DD				
MHI031	MHI1409	600	CONC	0.41	0.393	1.39	0	557	5.557	3.950	1.19	33,2957	0.1809	0.181	OK	EE				
MHI032	MHI1412	600	CONC	0.38	0.377	1.33	77	654	6.634	3.919	1.86	52,2052	0.1824	0.377	OK	FF				
MHI033	MHI7982	600	CONC	0.47	0.420	1.49	380	1014	1.014	3.796	2.54	71,0470	0.1885	0.420	OK	GG				
MHI034	MHI1415	600	CONC	0.43	0.405	1.43	302	1316	1.316	3.720	3.23	90,5610	0.1933	0.405	OK	HH				
MHI035	MHI1418	600	CONC	0.15	0.235	0.83	147	1464	1.464	3.687	3.75	105,0733	0.1956	0.235	OK	II				
MHI036	MHI1419	600	CONC	0.48	0.425	1.50	147	1464	1.464	3.687	3.87	108,4859	0.1957	0.425	OK	JJ				
MHI037	MHI1422	600	CONC	0.28	0.327	1.16	0	1464	1.464	3.687	3.92	109,7907	0.1957	0.327	OK	KK				
MHI038	MHI8004	600	CONC	0.28	0.327	1.16	0	1464	1.464	3.687	3.92	109,7907	0.1957	0.327	OK	KK				

FIGURE 3: NORTH ROUTE –
REGENCY PARK DRIVE TO
LACEWOOD DRIVE TRIBUTARY AREAS



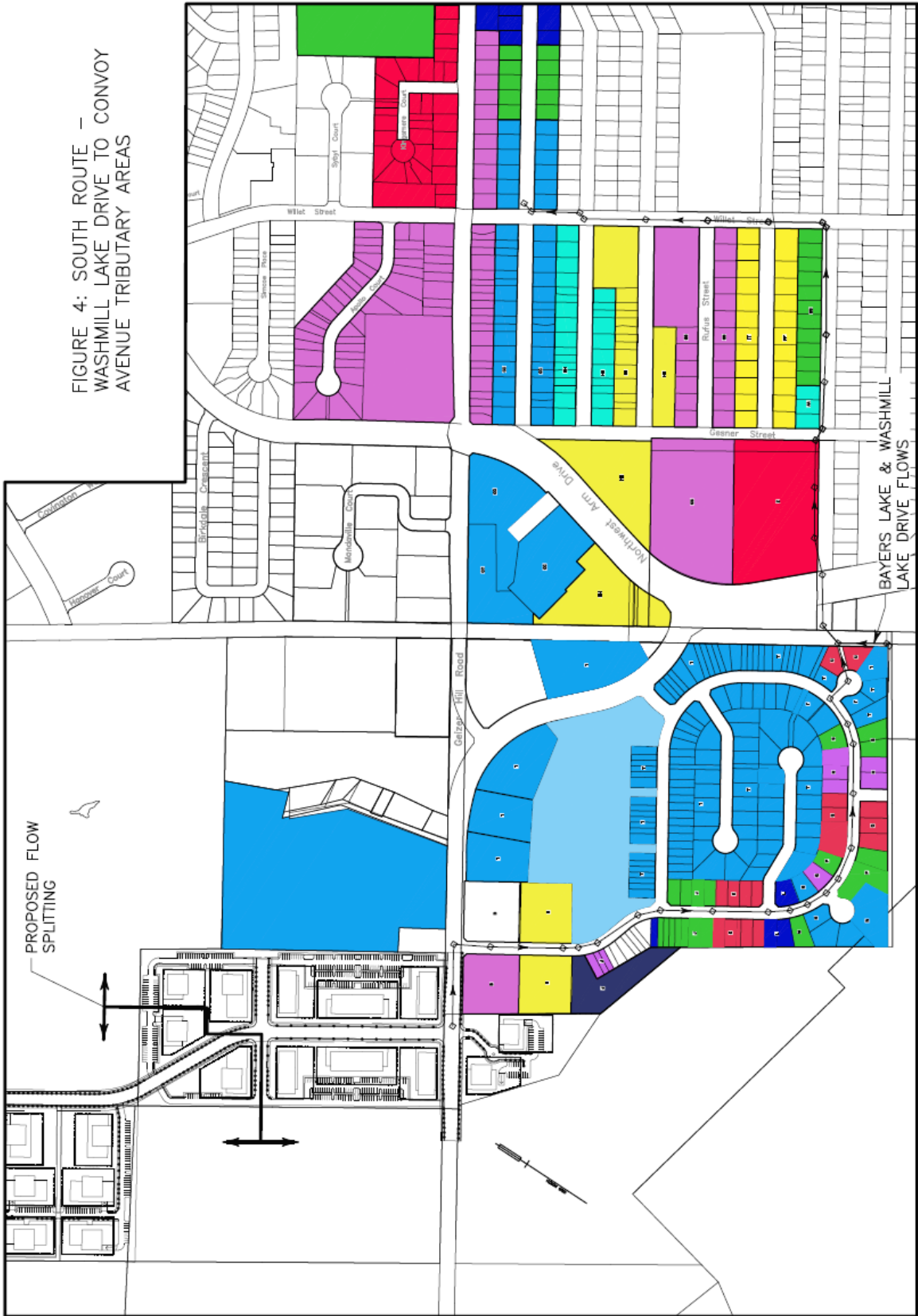


FIGURE 4: SOUTH ROUTE -
WASHMILL LAKE DRIVE TO CONVOY
AVENUE TRIBUTARY AREAS