Stantec

Memo

To:	Eric Surprenant 110 Laurier Ave W Ottawa ON, K1P 1J1	From:	Warren Johnson 300-1331 Clyde Avenue Ottawa, ON K2C 3G4
File:	160401706	Date:	September 9, 2022

Reference: Cavanagh Trails West: Akerson Road Blocks 76, 77 & 78 – Adequacy of Services Memo

Dear Mr. Surprenant,

BACKGROUND

Stantec Consulting Ltd. has been commissioned to prepare an Adequacy of Services Memo in support of a Zoning By-law Amendment Application for Akerson Road Blocks 76, 77 and 78 within the Cavanagh Trails West development. The proposed development will consist of 48 residential units and associated access roads and servicing infrastructure. The zoning amendment application seeks to add back-to-back townhouse units as an additional permitted land use for the subject properties. The current site is zoned as "R3C[1054]": Residential Third Density Zone. The site is within Phase 3 of the SOHO West subdivision which previously received approval through the Plan of Subdivision process under City file number D07-16-07-0011, during which, multi-storey apartment buildings with parking lots were assumed. The site is currently undeveloped.

The intent of this letter is to provide an engineering rationale for the modifications with respect to any proposed changes in local infrastructure demands or loading, while adhering to City of Ottawa design guidelines and recommendations and utilizing the existing local infrastructure in accordance with any known servicing restrictions.

POTABLE WATER SERVICING

The subject site lies within the City of Ottawa's 3W water pressure zone. The proposed blocks will be serviced from the existing 300 mm diameter PVC watermain along Akerson Road. No looping is required due to each segment of watermain servicing less than 50 units as per the City of Ottawa design guidelines. The daily demands were calculated using the City of Ottawa's Water Design Guidelines, a residential consumption rate of **280 L/cap/day,** and a density of 2.7 persons per unit (PPU) for traditional townhomes and back-to-back townhomes. Revised boundary conditions were provided by the City of Ottawa and are included in **Appendix A**.

The average day demand (AVDY) for the site was determined to be 0.42 L/s. The maximum day demand rate (MXDY) is 2.5 times the AVDY for residential areas, which results in 1.05 L/s. The peak hour demand rate (PKHR) is 2.2 times the AVDY which was determined to be 2.31 L/s.

The Fire Underwriter Survey (FUS) method was used to determine the fire flow required for the proposed site. The buildings were considered to be of combustible construction, and as residential buildings fall under occupancy class C. Based on calculations per the FUS guidelines (see Appendix A), the minimum required fire flows for this development are 216.7 L/s (13,000 L/min).

Domestic water supply pressures are required to range within the guidelines of 50-80 psi specified in the City of Ottawa Design Guidelines for Water Distribution. Maximum day demand rates in addition to fire flow demands must result in a residual pressure at the main above the required minimum 140 kPa (20 psi).

Based on boundary conditions provided by the City of Ottawa and an approximate site elevation of 96.5m adequate domestic water supply is available for the subject site with pressures ranging from 60.0m (85.3psi) to 64.6m (91.8psi). The pressures are greater than 552 kPa (80 psi) and as per the OBC, pressure reducing measures will be required to service all the proposed buildings.

Since the proposed buildings are three storeys in height, an additional 34 kPa (5 psi) for every additional storey (above 2 storeys) is required to account for the change in elevation head and additional head loss when determining available pressure at upper building floors. Given that the minimum available pressure is expected to be 588.1 kPa (85.3psi) at ground level, the resultant equivalent pressure at the third floor will be approximately 554.1 kPa (80.3 psi) which is within the City's minimum objective pressure value. As a result, building booster pump(s) will not be required.

The boundary conditions provided for the proposed development under maximum day demands and fire flow conditions demonstrate that a fire flow rate of 216.7 L/s is available while maintaining a residual pressure above the required minimum 20 psi. The minimum residual pressure in the system while providing maximum day demand plus a fire flow of 216.7 L/s is anticipated to be 55.0m (78.2 psi). This demonstrates that sufficient fire flow is available for the proposed development for the fire flow requirement of 216.7 L/s.

Refer to **Appendix B** for the functional water servicing plan.

SANITARY WATER SERVICING

The proposed development will consist of 48 residential units and associated access roads and servicing infrastructure. As illustrated on **Figure 3.0 in Appendix B**, sanitary servicing for the proposed blocks will be provided through existing sanitary sewers on Akerson Road.

As outlined in the City of Ottawa Sewer Design Guidelines and the Ministry of the Environment, Conservation and Parks (MECP) Design Guidelines for Sewage Works, the following criteria were used to calculate the estimated wastewater flow rates:

- Minimum Velocity – 0.6 m/s (0.8 m/s for upstream sections)
- Maximum Velocity – 3.0 m/s
- Manning roughness coefficient for all smooth wall pipes – 0.013
- 2.7 persons/unit for townhomes
- Harmon's Formula for Peaking Factor – Max = 4.0
- Extraneous Flow Allowance – 0.33 L/s/ha (conservative value)
- Average residential flow based on 280 L/p/day

The anticipated wastewater peak flows generated from the proposed Akerson Road blocks are summarized and compared to the previously approved 2011 SOHO West Phase 3 report in the table below:

Table 2.1: Estimated Wastewater Peak Flows

Residential Units					Infiltration Flow (L/s)	Proposed Total Peak Flow (L/s)	Previous Total Peak Flow (L/s) (Stantec, 2011)
Block Number	# of Units	Population	Peak Factor	Peak Flow (L/s)			
Block 76	18	49	3.65	0.58	0.09	0.67	-
Block 77	12	32	3.68	0.39	0.07	0.46	-
Block 78	18	49	3.65	0.58	0.09	0.67	-
Total Estimated Wastewater Peak Flow (L/s):						**1.80**	**2.33**

This indicates a 0.53 L/s reduction in the total peak flows when compared to the previously approved 2011 SOHO West Phase 3 report, so no negative impacts are anticipated on the downstream sanitary sewer infrastructure based on the proposed additional permitted use.

STORMWATER SERVICING/MANAGEMENT

The proposed development will consist of 48 residential units and associated access roads and servicing infrastructure. The proposed buildings are located within Akerson Road Blocks 76, 77 and 78.

Block 76 will be serviced through an existing 900mm x 1800mm storm sewer on Akerson Road. Block 77 will be serviced through an existing 900mm x 1800mm storm sewer in Block 77. Block 78 will be serviced through an existing 600mm storm sewer on Akerson Road (see **Appendix B**).

The proposed Blocks 76, 77 and 78 are located within the existing Phase 3 of the Trail West development which is located north of the Monahan Drain between Cope Drive and Eagleson Road (see **Appendix B**). The major flow from Phase 3 is generally safely conveyed to Cell 3 of the Monahan Drain. The minor system from Phase 3 outlets to Cell 3 of the Monahan Drain, through Block 77 via a 900mm x 1800mm concrete box sewer complete with an armour stone headwall and rip-rap outfall structure.

The following criteria were established based on background resources for the Trail West development, supplemented with current design practices outlined by the City of Ottawa.

- Use of the dual drainage principle
- Size storm sewers to convey 5-year storm event under free-flow conditions using 2011 City of Ottawa I-D-F parameters
- Maximum 100-year flow depth (static plus dynamic) of 0.30 m in road sags
- Assess major system adequacy during the climate change event (100-year storm increased by 20%)
- Standing water depths at road sags not to cause surface flooding on any building or structure
- Minor system peak flows from Block 76 to be restricted to 17.0 L/s
- Minor system peak flows from Block 77 to be restricted to 8.4 L/s
- Minor system peak flows from Block 78 to be restricted to 17.0 L/s
- Runoff from Block 77 to be directed directly to the Monahan Drain through sheet drainage

- 100-year HGL to be a minimum of 0.30 m below building foundation footing
- Major flow is to be stored on the surface in road sags or conveyed by surface routing to Cell 3 of the Monahan Drain
- Provide adequate emergency overflow conveyance off-site
- Water quality control will be provided in the existing Vortech oil/grit separator units at the storm outlets for Phase 3
- Surface ponding may occur during the 2-year event as indicated in the previously approved 2011 SOHO West (Phase 3) Stormwater Management Report

The anticipated stormwater discharge generated from the proposed Akerson Road blocks is summarized and compared to the targets set in the previously approved 2011 SOHO West (Phase 3) Stormwater Management Report in the table below. The target release rates have been extracted from **Table 4.1** of the 2011 report (**Appendix A**), and adjusted based on the revised drainage boundaries. The conceptual required storage volume has been calculated using the Modified Rational Method (**Appendix A**) to ensure the proposed development meets the total target release rates set out in the 2011 report. The storage will be provided using a combination of surface and underground storage which will be determined during detailed design.

Block Number	Area	Runoff Coefficient	5-Year Storm			100-Year Storm			Previous Minor System Target (L/s) (Adjusted, Stantec 2011)	Previous Major System Target (L/s) (Adjusted, Stantec 2011)
			Volume Required (m3)	Minor System Release Rate (L/s)	Major System Release Rate (L/s)	Volume Required (m3)	Minor System Release Rate (L/s)	Major System Release Rate (L/s)		
Block 76	0.28	0.72	22.4	17.0	4.1	22.4	17.0	70.8	17.0	91.9
Block 77	0.22	0.72	17.6	8.4	8.2	17.6	8.4	60.6	8.4	22.0
Block 78	0.28	0.72	22.4	17.0	4.1	22.4	17.0	70.8	17.0	91.9
Total	0.78	-	62.4	42.4	16.3	62.4	42.4	202.1	42.4	205.7

Table 3.1: Estimated Stormwater Discharge

Water quality control for the proposed development will be provided in the existing Vortech systems located upstream of the Phase 3 outlets from the Trails West development. The Vortech units were sized for a minimum of 80% total net annual TSS removal based on the previously assumed imperviousness of the development blocks. A minor increase in impervious area is noted based on the anticipated development plan versus that assumed in the previously approved servicing report. The sizing calculations for the existing Vortech Model 16000 will be reassessed at detailed design to ensure the Vortech unit is appropriately sized to handle any additional flow volume from the proposed development.

UTILITIES

As the subject site lies within a developed residential community, Hydro, Bell, Gas and Cable servicing for the proposed buildings should be readily available. It is anticipated that existing infrastructure will be sufficient to

provide a means of distribution for the proposed site. No off-site works are anticipated to be required for redevelopment of the subject site.

GRADING

The proposed development site measures approximately 0.78ha in area and is comprised of residential units and associated access roads. The site currently sits within an undeveloped low area with overland flow generally being directed to the Monahan Drain to the south. A functional grading plan has been provided in **Appendix B** and will be refined during detailed design to satisfy the stormwater management requirements, adhere to any permissible grade raise restrictions for the site, and provide for minimum cover requirements for sanitary/storm sewers where possible. Site grading is to be established to provide emergency overland flow routes required for stormwater management in accordance with MOECC requirements.

The subject site is to maintain an emergency overland flow route for the subdivision to the Monahan Drain through Block 77 for flows deriving from storm events in excess of the 5-year design event as indicated in the previously approved 2011 SOHO West Phase 3 report.

RECOMMENDATIONS

Based on the above findings, it is anticipated that the current servicing infrastructure for Akerson Road Blocks 76, 77 and 78 within the Cavanagh Trails West development will be adequate for rezoning purposes and to permit the construction of the proposed dwellings.

Stantec Consulting Ltd.

Warren Johnson C.E.T.
Civil Engineering Technologist, Community Development
Phone: 613 784-2272
Warren.Johnson@stantec.com

Dustin Thiffault, P.Eng.
Project Engineer, Community Development
Phone: 343-996-2211
dustin.thiffault@stantec.com

Reference: Cavanagh Trails West: Akerson Road Blocks 76, 77 & 78 – Adequacy of Services Memo

Attachments: Appendix A

- A.1 – SOHO West Phase 3 Sanitary Sewer Design Sheet
- A.2 - Sanitary Sewer Design Sheet
- A.3 – Domestic Water Demand Calculations
- A.4 – FUS Calculations
- A.5 – Boundary Conditions
- A.6 – Storm Sewer Design Sheet
- A.7 – SOHO West Phase 3 Major and Minor System 100 Year Storm Results
- A.8 – Modified Rational Method Calculations

Appendix B

- B.1 – Site Plan
- B.2 – Proposed Development Location Plan
- B.3 – Functional Water Servicing Plan
- B.4 – Functional Sanitary Servicing Plan
- B.5 – Functional Storm Servicing Plan
- B.6 – Functional Grading Plan

APPENDIX A – SERVICING CALCULATIONS AND CORRESPONDENCE

A.1 SOHO WEST PHASE 3 SANITARY SERVICE DESIGN SHEET

Stantec

Cavanagh Construction

SOHO Development Phase 3 and 4

DATE: September 2007
REVISION: May 2011
DESIGNED BY: MJS
CHECKED BY: KK

SANITARY SEWER DESIGN SHEET

(City of Ottawa)

FILE NUMBER: 1604-00574

DESIGN PARAMETERS

AVG. DAILY FLOW / PERSON =	350 l/p/day	COMMERCIAL	50,000.00 l/Ha/day
MINIMUM VELOCITY =	0.60 m/s	LIGHT INDUSTRIAL	35,000.00 l/Ha/day
n =	0.013	INSTITUTIONAL	0.60 l/s/Ha
MAX PEAK FACTOR =	4.0	INFILTRATION	0.28 l/s/Ha
MIN PEAK FACTOR =	2.4	RESIDENTIAL HARMON PEAKING FACTOR PERSONS/UNIT =	4.0
		KANATA WEST REPORT PERSONS/UNIT =	3.0
Peaking Factor Industrial:	1.5	POPULATION DENSITY PER UNIT = Single Family =	3.4
Peaking Factor Comm. / Inst.:	1.5	Townhouse =	2.7

LOCATION			RESIDENTIAL AREA AND POPULATION								COMM		INDUST.		INSTIT.		INFILTRATION				PIPE					
STREET	FROM MH	TO MH	AREA (ha)	UNITS Singles	UNITS Towns	UNITS (KWS)	POP	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACTOR	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST. (m)	DIA. (mm)	SLOPE (%)	CAP. (FULL) (l/s)	Qdes (l/s)	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
Phase 3																													
BARRICK HILL ROAD	301	302	0.84	29	0	78		0.84	78	4.00	1.26							0.00	0.84	0.84	0.235	1.50	101.0	200	0.45	22.40	0.07	0.70	0.36
BARRICK HILL ROAD	302	303	0.85	30	0	81		1.69	159	4.00	2.49							0.00	0.85	1.69	0.474	3.05	103.0	200	0.45	22.40	0.14	0.70	0.46
BARRICK HILL ROAD	303	304	0.78	24	0	65		2.47	224	4.00	3.63							0.00	0.78	2.47	0.692	4.32	106.8	200	0.45	22.40	0.19	0.70	0.52
BARRICK HILL ROAD	301	313	0.18	3	0	8		0.18	8	4.00	0.13							0.00	0.18	0.18	0.050	0.18	10.5	200	0.65	26.88	0.01	0.84	0.00
BARRICK HILL ROAD	313	314	0.35	9	0	24		0.53	32	4.00	0.50							0.00	0.35	0.53	0.148	0.67	69.4	200	0.65	26.88	0.02	0.84	0.34
BARRICK HILL ROAD	314	307	0.37	8	0	22		0.90	54	4.00	0.85							0.00	0.37	0.90	0.252	1.13	76.6	200	0.45	22.40	0.05	0.70	0.33
BARRICK HILL ROAD	315	316	0.17	3	0	8		0.17	8	4.00	0.13							0.00	0.17	0.17	0.048	0.18	24.5	200	0.65	26.88	0.01	0.84	0.00
BARRICK HILL ROAD	316	317	0.37	9	0	24		0.54	32	4.00	0.50							0.00	0.37	0.54	0.151	0.67	53.5	200	0.97	32.96	0.02	1.03	0.41
BARRICK HILL ROAD	315	318	0.09	2	0	5		0.09	5	4.00	0.08							0.00	0.09	0.09	0.025	0.11	14.9	200	0.87	31.36	0.00	0.98	0.00
BARRICK HILL ROAD	318	319	0.17	4	0	11		0.26	16	4.00	0.25							0.00	0.17	0.26	0.073	0.33	20.5	200	0.65	26.88	0.01	0.84	0.00
BARRICK HILL ROAD	319	320	0.17	2	0	5		0.43	21	4.00	0.34							0.00	0.17	0.43	0.120	0.46	10.5	200	0.65	26.88	0.02	0.84	0.00
BARRICK HILL ROAD	320	321	0.77	18	0	49		1.20	70	4.00	1.13							0.00	0.77	1.20	0.336	1.47	115.9	200	0.65	26.88	0.05	0.84	0.39
BARRICK HILL ROAD	321	322	0.03	0	0	0		1.23	70	4.00	1.13							0.00	0.03	1.23	0.344	1.47	24.5	200	0.45	22.40	0.07	0.70	0.36
Street 1	307	308	0.67	18	0	49		0.67	49	4.00	0.79							0.00	0.67	0.67	0.188	0.98	80.0	200	0.45	22.40	0.04	0.70	0.33
Street 1	308	309	0.61	16	0	43		1.28	92	4.00	1.49							0.00	0.61	1.28	0.358	1.85	60.0	200	0.45	22.40	0.08	0.70	0.41
Street 1	309	310	0.57	16	0	43		1.85	135	4.00	2.19							0.00	0.57	1.85	0.518	2.71	78.2	200	0.45	22.40	0.12	0.70	0.46
Street 1	310	311	0.17	2	0	5		2.02	140	4.00	2.27							0.00	0.17	2.02	0.566	2.84	30.0	200	0.45	22.40	0.13	0.70	0.46
SEVENOAK AVENUE	321	322	0.29	7	0	19		1.73	105	4.00	1.70							0.00	0.29	1.73	0.484	2.18	57.1	200	0.45	22.40	0.10	0.70	0.41
SEVENOAK AVENUE	322	323	0.43	12	0	32		2.16	137	4.00	2.22							0.00	0.43	2.16	0.605	2.83	62.1	200	0.45	22.40	0.13	0.70	0.46
SEVENOAK AVENUE	323	324	0.35	8	0	22		3.74	229	4.00	3.71							0.00	0.35	3.74	1.047	4.76	47.2	200	0.45	22.40	0.21	0.70	0.53
SEVENOAK AVENUE	324	325	0.13	4	0	11		3.87	240	4.00	3.82							0.00	0.13	3.87	1.084	4.97	17.1	200	0.45	22.40	0.22	0.70	0.55
SEVENOAK AVENUE	325	330	0.17	0	0	0		4.04	240	4.00	3.82							0.00	0.17	4.04	1.131	5.02	22.4	200	0.45	22.40	0.22	0.70	0.55
AKERSON ROAD	CAP	304A	0.11		0	0		0.11	1	4.00	0.02	0.00	0.00					0.00	0.11	0.11	0.031	0.05	13.8	200	0.45	22.40	0.00	0.70	0.00
AKERSON ROAD	304A	304	0.11		0	0		0.11	1	4.00	0.02	0.00	0.00					0.00	0.11	0.11	0.031	0.05	40.5	200	0.45	22.40	0.00	0.70	0.00
AKERSON ROAD	112	305	0.17	4	0	11		2.75	236	4.00	3.82		0.00					0.00	0.17	2.75	0.770	4.59	39.3	200	0.45	22.40	0.20	0.70	0.53
AKERSON ROAD	305	306	0.25	7	0	19		3.00	255	4.00	4.13		0.00					0.00	0.25	3.00	0.840	4.97	44.1	200	0.45	22.40	0.22	0.70	0.55
AKERSON ROAD	306	311	0.10	3	0	8		3.10	263	4.00	4.26		0.00					0.00	0.10	3.10	0.868	5.13	16.6	200	0.45	22.40	0.23	0.70	0.55
AKERSON ROAD	311	312	0.26	6	0	16		5.38	419	4.00	6.78		0.00					0.00	0.26	5.38	1.506	8.30	51.7	200	0.45	22.40	0.37	0.70	0.64
AKERSON ROAD	312	312A	0.10	0	0	0		5.48	419	4.00	6.78		0.00					0.00	0.10	5.48	1.534	8.32	42.8	200	0.45	22.40	0.37	0.70	0.64
AKERSON ROAD	328	329	0.57	14	0	38		0.57	38	4.00	0.63							0.00	0.57	0.57	0.159	0.78	115.0	200	0.45	22.40	0.03	0.70	0.28
AKERSON ROAD	329	330	0.13	0	0	0		0.70	38	4.00	0.63							0.00	0.13	0.70	0.195	0.82	60.0	200	2.23	49.92	0.02	1.56	0.00
AKERSON ROAD	CAP	330	0.79	48	0	130		0.79	130	4.00	2.16							0.00	0.79	0.79	0.221	2.33	13.2	200	0.65	26.88	0.09	0.84	0.49
AKERSON ROAD	330	312A	0.05	0	0	0		5.58	408	4.00	6.61							0.00	0.05	5.58	1.562	8.17	27.4	200	0.45	22.40	0.36	0.70	0.64
AKERSON ROAD	312A	trunk	0.01	0	0	0		5.70	827	3.85	12.90		0.00					0.00	0.01	11.07	3.100	16.00	2.2	200	3.00	57.92	0.28	1.81	1.48

Reference: Cavanagh Trails West: Akerson Road Blocks 76, 77 & 78 – Adequacy of Services Memo

A.2 SANITARY SERVICE DESIGN SHEET

Stantec

SUBDIVISION:
Cavanagh Trails West
Blocks 76, 77 & 78

DATE: 8/30/2022
REVISION: 1
DESIGNED BY: WAJ
CHECKED BY: DCT

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160401706

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	280	l/p/day	MINIMUM VELOCITY	0.60	m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	28,000	l/ha/day	MAXIMUM VELOCITY	3.00	m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000	l/ha/day	MANNINGS n	0.013	
PEAKING FACTOR (ICI >20%):	1.5	INDUSTRIAL (LIGHT)	35,000	l/ha/day	BEDDING CLASS	B	
PERSONS / SINGLE	3.4	INSTITUTIONAL	28,000	l/ha/day	MINIMUM COVER	2.50	m
PERSONS / TOWNHOME	2.7	INFILTRATION	0.33	l/s/Ha	HARMON CORRECTION FACTOR	0.8	
PERSONS / APARTMENT	1.8						

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE								
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	SINGLE	UNITS TOWN	APT	POP.	CUMULATIVE AREA	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)	VEL. (ACT.)
			(ha)					(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)	(m/s)
BLOCK 76	BLK 76	MAIN	0.28	0	18	0	49	0.28	49	3.65	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.28	0.28	0.09	0.67	55.0	200	PVC	SDR 35	0.50	23.6	**2.82%**	0.74	0.27
																												200							
BLOCK 77	BLK 77	MAIN	0.22	0	12	0	32	0.22	32	3.68	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.22	0.22	0.07	0.46	45.0	200	PVC	SDR 35	0.50	23.6	**1.94%**	0.74	0.24
																												525							
BLOCK 78	BLK 78	MAIN	0.28	0	18	0	49	0.28	49	3.65	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.28	0.28	0.09	0.67	55.0	200	PVC	SDR 35	0.50	23.6	**2.82%**	0.74	0.27
																												200							

A.3 DOMESTIC WATER DEMAND CALCULATIONS

150 & 170 Akerson Road - Domestic Water Demand Estimates

Based on Site Plan from M. David Blakely Architect Inc. Dated April, 2022.

Densities as per City Guidelines:		
Townhomes (Row)	2.7	ppu
Back-to-Back Townhomes	2.7	ppu

Building ID	No. of Units	Population	Daily Rate of Demand (L/cap/day)	Avg Day Demand		Max Day Demand [1]		Peak Hour Demand [2]	
				(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
Block 76 (170 Akerson Road)									
Back-to-Back Townhomes									
Block 1	6	16	280	3.2	0.05	7.9	0.13	17.3	0.29
Block 2	6	16	280	3.2	0.05	7.9	0.13	17.3	0.29
Block 3	6	16	280	3.2	0.05	7.9	0.13	17.3	0.29
Block 4	6	16	280	3.2	0.05	7.9	0.13	17.3	0.29
Block 78 (150 Akerson Road)									
Back-to-Back Townhomes									
Block 5	6	16	280	3.2	0.05	7.9	0.13	17.3	0.29
Block 6	6	16	280	3.2	0.05	7.9	0.13	17.3	0.29
Block 7	6	16	280	3.2	0.05	7.9	0.13	17.3	0.29
Block 8	6	16	280	3.2	0.05	7.9	0.13	17.3	0.29
Total Site :	**48.0**	**130**		**25.2**	**0.42**	**63.0**	**1.05**	**138.6**	**2.31**

1 Average day water demand for residential areas: 280L/cap/day per ISTB 2021-03

2 The City of Ottawa water demand criteria used to estimate peak demand rates for residential areas are as follows:

maximum day demand rate = 2.5 x average day demand rate for residential

peak hour demand rate = 2.2 x maximum day demand rate for residential

Reference: Cavanagh Trails West: Akerson Road Blocks 76, 77 & 78 – Adequacy of Services Memo

A.4 FUS CALCULATIONS

Stantec

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 160401718
Project Name: 150 & 170 Akerson Road
Date: 8/5/2022
Fire Flow Calculation #: 1
Description: 3-Storey 6 Unit Wood Frame Back to Back - Block 1

Notes: 353.3m2 total floorplate

Step	Task	Notes								Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction								1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas								-	-
		353.3	353.3	353.3						1059.9	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min								-	11000
4	Determine Occupancy Charge	Limited Combustible								-15%	9350
5	Determine Sprinkler Reduction	None								0%	0
		Non-Standard Water Supply or N/A								0%	
		Not Fully Supervised or N/A								0%	
		% Coverage of Sprinkler System								0%	
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?		-	-
		North	> 30	17.6	2	21-49	Type V	NO		0%	3740
		East	10.1 to 20	18.7	3	41-60	Type V	NO		12%	
		South	3.1 to 10	17.6	3	41-60	Type V	NO		17%	
		West	10.1 to 20	18.7	2	21-49	Type V	NO		11%	
7	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min									13000
		Total Required Fire Flow in L/s									216.7
		Required Duration of Fire Flow (hrs)									2.50
		Required Volume of Fire Flow (m^3)									1950

Reference: Cavanagh Trails West: Akerson Road Blocks 76, 77 & 78 – Adequacy of Services Memo

A.5 HYDRAULIC BOUNDARY CONDITIONS

Boundary Conditions
150 & 170 Akerson Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	25	0.42
Maximum Daily Demand	63	1.05
Peak Hour	139	2.31
Fire Flow Demand #1	10,000	166.67
Fire Flow Demand #2	13,000	216.67

Location

Results

Connection 1 – Akerson Rd.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	161.1	91.8
Peak Hour	156.5	85.3
Max Day plus Fire 1	153.6	81.3
Max Day plus Fire 2	151.5	78.2

Ground Elevation = 96.5 m

Connection 2 – Akerson Rd.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	161.1	92.0
Peak Hour	156.5	85.5
Max Day plus Fire 1	153.9	81.8
Max Day plus Fire 2	151.9	79.0

Ground Elevation = 96.3 m

Connection 3 – Akerson Rd.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	161.1	92.1
Peak Hour	156.5	85.6
Max Day plus Fire 1	154.1	82.2
Max Day plus Fire 2	152.3	79.6

Ground Elevation = 96.3 m

Notes

1. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
    a. If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
    b. Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

A.6 STORM SEWER DESIGN SHEET

Stantec

Cavanagh Trails West
Blocks 76, 77, & 78

DATE: 2022-08-30
REVISION: 1
DESIGNED BY: WAJ
CHECKED BY: DCT

STORM SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160401706

DESIGN PARAMETERS

$i = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr
a =	732.951	998.071	1174.184	1735.688
b =	6.199	6.053	6.014	6.014
c =	0.810	0.814	0.816	0.820

MANNING'S n = 0.013
MINIMUM COVER: 2.00 m
TIME OF ENTRY 10 min
BEDDING CLASS = B

LOCATION			DRAINAGE AREA																				PIPE SELECTION									
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM A x C (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM A x C (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM A x C (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM A x C (100YR) (ha)	T of C (min)	I_{2-YEAR} (mm/h)	I_{5-YEAR} (mm/h)	$I_{10-YEAR}$ (mm/h)	$I_{100-YEAR}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETER (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
BLOCK 76	BLK 76	EX 3012	0.00	0.28	0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.000	0.000	0.202	0.202	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	58.3	60.0	375	375	CIRCULAR	PVC	SDR 35	0.50	116.6	**50.06%**	1.11	0.95	1.06
	EX 3012	EX3029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.202	0.000	0.000	0.000	0.000	22.41	48.45	65.37	76.48	111.54	0.0	0.0	647.6	119.0	900	1800	RECTANGULAR	CONCRETE	100-D	0.13	2013.5	**32.16%**	1.24	0.93	2.13
																				23.47									900	1800									
BLOCK 77	EX 3029	EX 3030	0.00	0.22	0.00	0.00	0.00	0.72	0.00	0.00	0.00	0.000	0.000	0.158	0.158	0.000	0.000	0.000	0.000	24.44	45.83	61.80	72.29	105.41	0.0	0.0	1168.2	75.0	900	1800	RECTANGULAR	CONCRETE	100-D	0.17	2302.6	**50.73%**	1.42	1.22	1.03
																				25.47									900	1800									
BLOCK 78	BLK 78	EX 3026	0.00	0.28	0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.000	0.000	0.202	0.202	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	58.3	60.0	375	375	CIRCULAR	PVC	SDR 35	0.50	116.6	**50.06%**	1.11	0.95	1.06
	EX 3028	EX3029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.202	0.000	0.000	0.000	0.000	18.62	54.36	73.43	85.95	125.43	0.0	0.0	153.4	53.5	600	600	CIRCULAR	CONCRETE	100-D	0.11	212.4	**72.22%**	0.73	0.70	1.28
																				19.68									600	600									

A.7 SOHO WEST PHASE 3 MAJOR AND MINOR SYSTEM 100 YEAR STORM RESULTS

- Surface ponding in sag storage calculated using the cone equation (V = Area*Depth/3)
- Rear yards were assumed to provide no surface storage
- Different segment cross-section types defined, accounting for 8.5 m and 11.0 m wide roads of constant cross-slope of 3%, rear yard swales of constant side slopes of 3:1, parking lots, and access road to the Vortechs® unit (see **Appendix A2**)

Drawings SD-1 summarizes the discretized subcatchments used in the analysis of Phase 3 of the Soho West – Kanata South Development, and outlines the major overland flow paths. The grading plans are also enclosed for review.

There were ten design storms used in the hydrologic modeling as requested by the City (see **Appendix E**). These storms are as follows:

- 3-hour 5-year Chicago Storm distribution
- 3-hour 100-year Chicago Storm distribution
- 6-hour 100-year Chicago Storm distribution
- 1-hour 100-year AES Storm distribution
- 6-hour 100-year SCS Storm distribution
- 12-hour 100-year SCS Storm distribution
- 24-hour 100-year SCS Storm distribution
- July 1st, 1979 historical storm
- August 8th, 1996 historical storm
- August 4th, 1988 historical storm

Table 4.1 summarizes the minor system inflow, the major system sag storage and the overflow peak for Phase 3 of the Soho West– Kanata South Development during the 100 year, 3 hr Chicago storm since this storm has the maximum output values. **Appendices A2 and A3** contain the DDSWMM modeling results for the subject area for the 5 year 3 hour Chicago design storm and the100 year 3 hour Chicago design storm. The additional storms are not displayed in the appendices, but modeling results for all the storms are located on the CD. The modeling results for all the storms are summarized in a table in **Appendix A1**.

Table 4.1: Phase 3 - Major and Minor System 100 Year Storm Results

Segment	Max. Storage (cu.m.)	Max. Ponding (m)	Max. Depth (cm)	Max. Capture (L/s)	Overflow (L/s)
3-1	62.6	0.26	8.04	42.4	170
3-1A	-	-	25.89	21.2	41
3-2	-	-	22.49	21.2	42
3-3	72.3	0.26	9.8	42.4	308

Segment	Max. Storage (cu.m.)	Max. Ponding (m)	Max. Depth (cm)	Max. Capture (L/s)	Overflow (L/s)
3-5	22.6	0.20	2.12	21.2	59
3-4A	-	-	25.17	21.2	57
3-3A	2.1	0.13	4	21.2	19
3-6	64.8	0.28	12.02	42.4	539
3-6A	-	-	29.95	21.2	96
3-12	57.2	0.25	13.63	21.2	814
3-11	1.4	0.07	4.62	21.2	35
3-10	19.5	0.17	7.89	42.4	162
3-9	72.2	0.27	7.8	42.4	114
3-8	-	-	25.72	21.2	50
3-9A	-	-	27.3	21.2	72
3-14	5.2	0.13	7.63	21.2	167
3-14A	-	-	24.81	21.2	37
3-15S	23.3	0.16	6.35	21.2	91
3-15N	-	-	20.85	21.2	32
3COPE	-	-	17.81	0	38
3-20	7.8	0.12	9.29	42.4	258
3-26A	-	-	17.27	21.2	14
3-20A	-	-	26.45	21.2	64
3-20B	-	-	16.71	21.2	12
3-21	7.5	0.11	9.23	21.2	272
3-14B	-	-	3.41	21.2	4
3-17	0.2	0.02	7.73	21.2	174
3-22	16	0.15	9.5	21.2	301
3-22A	-	-	28.56	21.2	73
3-23	3	0.11	12.36	21.2	616
3-20C	-	-	18.74	21.2	20
3-24	-	-	32.64	21.2	116
3-12A	-	-	31.88	21.2	110
3-29	9.9	0.17	16.88	21.2	1450
3-12B	2.6	0.08	12.45	21.2	630
3-28	3.8	0.17	12.48	21.2	637
3-27	31.4	0.22	6.98	21.2	128
3-26	22.7	0.19	6.64	21.2	108
3-29B	20	0.25	6.02	21.2	72
3-29A	20	0.25	6.02	21.2	72
DRAIN	-	-	69.67	0	762
ACCESS	-	-	16.02	0	1528

Segment	Max. Storage (cu.m.)	Max. Ponding (m)	Max. Depth (cm)	Max. Capture (L/s)	Overflow (L/s)
Max ICD Flow				**975**	**L/s**
Total Major Flow from Phase 3 into Cell 1				**2287**	**L/s**

1. Major system overflow from segment
2. Total major flow from Phase 3 is equal to the "inflow" from DUM-CELL1 and COPE-1
3. Lumped areas sheet flowing directly into the Monahan Drain, thus the depth does not represent the actual ponding depth
4. Flow to Minor System is the sum of ICD inflows, not including areas '3-UNC', 'DUM-CELL1', and 'COPE-1'

* The grassed swale segment in DDSWMM was defined conservatively assuming a constant cross shoulder slope of 3.5% with a Manning's n of 0.25

The overall resulting minor system inflow from Phase 3 of the Soho West development is approximately 92.3 L/s/ha (site area to sewer = 10.56 ha). Major flows from the subject site have been directed to Cell 1 of the Monahan Drain via engineered channels such as roadways and walkways.

4.4 HYDRAULICS

To assess the 100 year hydraulic grade line (HGL) in the subdivision, the proposed storm sewers and detailed DDSWMM hydrology were incorporated into a dynamic hydraulic model (XPSWMM - EXTRAN). The 100 year HGL elevation in Cell 1 of the Monahan Drain was obtained through conversations with Novatech Engineering staff. Previous reports for the Monahan Drain Constructed Wetland estimated the 100 year water level in Cell 1 to be approximately 94.94 m. However, a set of twin culverts has been proposed to cross Fernbank Road, as well as Cope Drive, which will decrease the water level in Cell 1 to 94.55 m. In addition, the latest revision to the Monahan Drain Constructed Wetlands EPA SWMM model by Novatech Engineering resulted in a lower 100 year water elevation in Cell 1 equal to 94.38 m.

Appendix C presents the proposed storm sewer design sheet.

4.4.1 HGL Modeling Results

The detailed DDSWMM hydrology was interfaced with the XP-SWMM model to determine the resulting HGL in the subdivision. The configuration and number of ICDs were iterated between DDSWMM and XP-SWMM to meet the HGL requirements for the 100 year storm. **Table 4.2** summarizes the HGL modeling results.

Table 4.2: Phase 3 - 100 Year Hydraulic Grade Line Results

Node (CB/MH)	Ground Elevation (m)	Lowest Underside of Footing (m)	Worst-case HGL (m)	Separation (m)
3001	97.50	95.85	94.64	1.21
3001W	97.50	95.18	94.71	0.47
3002	97.18	94.95	94.60	0.35
3003	96.87	94.95	94.56	0.39
3004	96.87	N/A	94.51	-
3005	96.88	94.86	94.50	0.36

Reference: Cavanagh Trails West: Akerson Road Blocks 76, 77 & 78 – Adequacy of Services Memo

A.8 MODIFIED RATIONAL METHOD CALCULATIONS

Stormwater Management Calculations

File No: **160401706**
Project: **Cavanagh Trails West Blocks 76, 77 & 78**
Date: **09-Sep-22**

SWM Approach:

Target release rate as outlined in Soho West (Phase 3) Stormwater Management Report prepared by Stantec Consulting dated December 6, 2011

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table

Catchment Type	Sub-catchment Area ID / Description		Area (ha) "A"		Runoff Coefficient "C"	"A x C"		Overall Runoff Coefficient
Controlled - Tributary	BLK78	Hard	0.208		0.9	0.187		
		Soft	0.072		0.2	0.014		
		Subtotal		0.28			0.2016	0.720
Controlled - Tributary	BLK77	Hard	0.163		0.9	0.147		
		Soft	0.057		0.2	0.011		
		Subtotal		0.22			0.1584	0.720
Controlled - Tributary	BLK76	Hard	0.208		0.9	0.187		
		Soft	0.072		0.2	0.014		
		Subtotal		0.28			0.2016	0.720
Total			**0.780**			**0.562**		
Overall Runoff Coefficient= C:								**0.72**

Total Roof Areas	**0.000 ha**
Total Tributary Surface Areas (Controlled and Uncontrolled)	**0.780 ha**
Total Tributary Area to Outlet	**0.780 ha**
Total Uncontrolled Areas (Non-Tributary)	**0.000 ha**
Total Site	**0.780 ha**

Stormwater Management Calculations

Project #160401706, Cavanagh Trails West Blocks 76, 77 & 78
Modified Rational Method Calculatons for Storage

5 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	998.071
b =	6.053
c =	0.814

t (min)	I (mm/hr)
10	104.19
20	70.25
30	53.93
40	44.18
50	37.65
60	32.94
70	29.37
80	26.56
90	24.29
100	22.41
110	20.82
120	19.47

Major System Release Rate as per Soho West (Phase 3) Stormwater Management Report

Area	Major System Release rate as per Stantec 2012, Table 4.1	Portion of release rate from area DRAIN as per Stantac 2012, drawing SD-1	Total
Block 76	72.0	19.9	91.9
Block 77	16.6	5.3	22.0
Block 78	72.0	19.9	91.9
Total			205.7

5 YEAR Modified Rational Method for Entire Site

Subdrainage Area: BLK78 — Controlled - Tributary
Area (ha): 0.28
C: 0.72

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill L/s
10	104.19	58.39	17.01	37.33	22.40	4.05
20	70.25	39.37	17.01	18.67	22.40	3.70
30	53.93	30.22	17.01	12.44	22.40	0.77
40	44.18	24.76	17.01	7.75	18.61	0.00
50	37.65	21.10	17.01	4.09	12.28	0.00
60	32.94	18.46	17.01	1.45	5.24	0.00
70	29.37	16.46	16.46	0.00	0.00	0.00
80	26.56	14.89	14.89	0.00	0.00	0.00
90	24.29	13.61	13.61	0.00	0.00	0.00
100	22.41	12.56	12.56	0.00	0.00	0.00
110	20.82	11.67	11.67	0.00	0.00	0.00
120	19.47	10.91	10.91	0.00	0.00	0.00

Storage (m3): 22.40 Surface Storage Above CB (80m3/ha assumed)

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	100.00	1.38	17.01	22.40	22.40	OK

Subdrainage Area: BLK77 — Controlled - Tributary
Area (ha): 0.22
C: 0.72

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill L/s
10	104.19	45.88	8.38	29.33	17.60	8.17
20	70.25	30.94	8.38	14.67	17.60	7.89
30	53.93	23.75	8.38	9.78	17.60	5.59
40	44.18	19.46	8.38	7.33	17.60	3.74
50	37.65	16.58	8.38	5.87	17.60	2.33
60	32.94	14.51	8.38	4.89	17.60	1.24
70	29.37	12.93	8.38	4.19	17.60	0.36
80	26.56	11.70	8.38	3.31	15.91	0.00
90	24.29	10.70	8.38	2.31	12.49	0.00
100	22.41	9.87	8.38	1.48	8.91	0.00
110	20.82	9.17	8.38	0.79	5.19	0.00
120	19.47	8.57	8.38	0.19	1.37	0.00

Storage (m3): 17.60 Surface Storage Above CB (80m3/ha assumed)

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	100.00	1.38	8.38	17.60	17.60	OK

Subdrainage Area: BLK76 — Controlled - Tributary
Area (ha): 0.28
C: 0.72

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill L/s
10	104.19	58.39	17.01	37.33	22.40	4.05
20	70.25	39.37	17.01	18.67	22.40	3.70
30	53.93	30.22	17.01	12.44	22.40	0.77
40	44.18	24.76	17.01	7.75	18.61	0.00
50	37.65	21.10	17.01	4.09	12.28	0.00
60	32.94	18.46	17.01	1.45	5.24	0.00
70	29.37	16.46	16.46	0.00	0.00	0.00
80	26.56	14.89	14.89	0.00	0.00	0.00
90	24.29	13.61	13.61	0.00	0.00	0.00
100	22.41	12.56	12.56	0.00	0.00	0.00
110	20.82	11.67	11.67	0.00	0.00	0.00
120	19.47	10.91	10.91	0.00	0.00	0.00

Storage (m3): 22.40 Surface Storage Above CB (95m3/ha assumed)

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	100.00	1.38	17.01	22.40	22.40	OK

SUMMARY TO OUTLET

		Vrequired	Vavailable*	
Minor System				
Tributary Area	0.780 ha			
Total 5yr Flow to Sewer	34.02 L/s	62	62 m^3	Ok
Non-Tributary Area	0.000 ha			
Total 5yr Flow Uncontrolled	0.00 L/s			
Total Area	0.780 ha	**Major System**		
Total 5yr Flow	34.02 L/s	**Total 5yr Flow**	16.27 L/s	

Project #160401706, Cavanagh Trails West Blocks 76, 77 & 78
Modified Rational Method Calculatons for Storage

100 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	1735.688
b =	6.014
c =	0.820

t (min)	I (mm/hr)
10	178.56
20	119.95
30	91.87
40	75.15
50	63.95
60	55.89
70	49.79
80	44.99
90	41.11
100	37.90
110	35.20
120	32.89

Minor System Release Rate as per Soho West (Phase 3) Stormwater Management Report

Area	Total Area	Minor System Release rate as per Stantec 2012, Table 4.1	Weighted Minor System Release based on Revised Drainage Areas
Block 76	0.35	21.2	17.0
Block 77	0.08	0.0	8.4
Block 78	0.35	21.2	17.0
Total	0.78	42.4	42.4

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: BLK78 — Controlled - Tributary
Area (ha): 0.28
C: 0.90

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (Major) (L/s)
10	178.56	125.09	17.01	37.33	22.40	70.75
20	119.95	84.03	17.01	18.67	22.40	48.36
30	91.87	64.36	17.01	12.44	22.40	34.91
40	75.15	52.64	17.01	9.33	22.40	26.30
50	63.95	44.80	17.01	7.47	22.40	20.33
60	55.89	39.16	17.01	6.22	22.40	15.93
70	49.79	34.88	17.01	5.33	22.40	12.54
80	44.99	31.52	17.01	4.67	22.40	9.84
90	41.11	28.80	17.01	4.15	22.40	7.64
100	37.90	26.55	17.01	3.73	22.40	5.81
110	35.20	24.66	17.01	3.39	22.40	4.26
120	32.89	23.04	17.01	3.11	22.40	2.93

Storage (m3): 22.40 Surface Storage Above CB (80m3/ha assumed)

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	100.20	1.58	17.01	22.40	22.40	OK
					0.00	

Subdrainage Area: BLK77 — Controlled - Tributary
Area (ha): 0.22
C: 0.90

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (Major) (L/s)
10	178.56	98.29	8.38	29.33	17.60	60.57
20	119.95	66.03	8.38	14.67	17.60	42.98
30	91.87	50.57	8.38	9.78	17.60	32.41
40	75.15	41.36	8.38	7.33	17.60	25.65
50	63.95	35.20	8.38	5.87	17.60	20.95
60	55.89	30.77	8.38	4.89	17.60	17.49
70	49.79	27.41	8.38	4.19	17.60	14.83
80	44.99	24.76	8.38	3.67	17.60	12.72
90	41.11	22.63	8.38	3.26	17.60	10.99
100	37.90	20.86	8.38	2.93	17.60	9.55
110	35.20	19.38	8.38	2.67	17.60	8.33
120	32.89	18.11	8.38	2.44	17.60	7.28

Storage (m3): 17.60 Surface Storage Above CB (80m3/ha assumed)

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	100.20	1.58	8.38	17.60	17.60	OK
					0.00	

Subdrainage Area: BLK76 — Controlled - Tributary
Area (ha): 0.28
C: 0.90

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (Major) (L/s)
10	178.56	125.09	17.01	37.33	22.40	70.75
20	119.95	84.03	17.01	18.67	22.40	48.36
30	91.87	64.36	17.01	12.44	22.40	34.91
40	75.15	52.64	17.01	9.33	22.40	26.30
50	63.95	44.80	17.01	7.47	22.40	20.33
60	55.89	39.16	17.01	6.22	22.40	15.93
70	49.79	34.88	17.01	5.33	22.40	12.54
80	44.99	31.52	17.01	4.67	22.40	9.84
90	41.11	28.80	17.01	4.15	22.40	7.64
100	37.90	26.55	17.01	3.73	22.40	5.81
110	35.20	24.66	17.01	3.39	22.40	4.26
120	32.89	23.04	17.01	3.11	22.40	2.93

Storage (m3): 22.40 Surface Storage Above CB (95m3/ha assumed)

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	100.20	1.58	17.01	22.40	22.40	OK
					0.00	

SUMMARY TO OUTLET

		Vrequired	Vavailable*	
Tributary Area	0.780 ha			
Total 100yr Flow to Sewer	42.40 L/s	62	62 m^3	Ok
Non-Tributary Area	0.000 ha			
Total 100yr Flow Uncontrolled	0.00 L/s			
Total Area	0.780 ha	**Major System**		
Total 100yr Flow	42.40 L/s	**Total 100yr Flow**	202.07 L/s	

Stormwater Management Calculations

Project #160401706, Cavanagh Trails West Blocks 76, 77 & 78
Modified Rational Method Calculatons for Storage

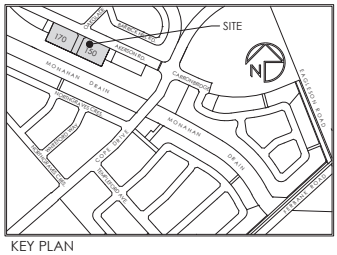
	Target	42.40 L/s	**Target**	205.68 L/s

Project #160401706, Cavanagh Trails West Blocks 76, 77 & 78
Modified Rational Method Calculatons for Storage

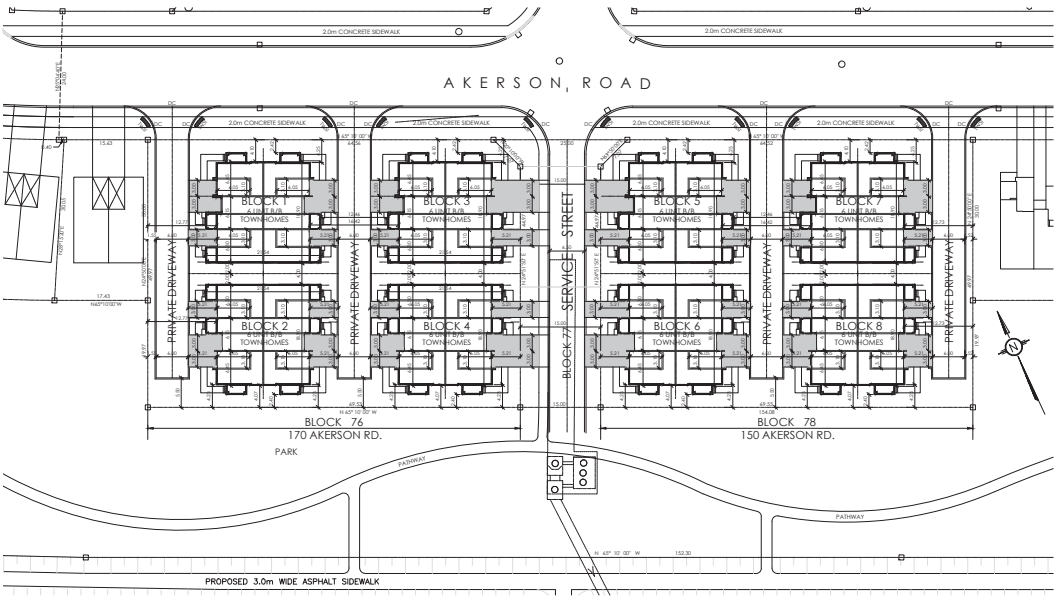
	Target	42.40 L/s	**Target**	205.68 L/s

APPENDIX B – DRAWINGS

B.1 SITE PLAN



KEY PLAN
NOT TO SCALE



SITE INFORMATION - BLOCK 76, 170 AKERSON ROAD :
PROPOSED ZONING : R3X - PERMITTED USES : - PLANNED UNIT DEVELOPMENT
- TOWNHOUSE DWELLING

SITE AREA : 3,461.4 m²
TOTAL BUILDING AREA : 1,413.2 m²

ZONING:	EXISTING R3X[1054]	PROPOSED: R3X[____]
LOT AREA (MIN.):	1,400.0 m²	3,461.4 m²
LOT WIDTH (MIN.):	18.0 m	69.55 m
LOT WIDTH TOWNHOME (MIN.):	5.5 m	6.15 m
LOT AREA - BACK to BACK UNIT (MIN.):	150.0 m² [1054]	86.06 m²
FRONT YARD (MIN.) :	3.0 m [1054]	4.10 m
CORNER SIDE YARD (MIN.) :	2.5 m [1054]	5.21 m
INTERIOR SIDE YARD (MIN.) :	1.2 m [1054]	12.77 m
REAR YARD (MIN.) :	6.0 m [1054]	4.07 m
BUILDING SPACING :		
BETWEEN BUILDING & PRIVATE WAY :	1.8 m	5.21 m
BETWEEN GARAGE & PRIVATE WAY :	5.2 m	5.21 m
BETWEEN BUILDINGS :	1.2 m	4.00 m
MINIMUM LANDSCAPED AREA :	0.0%	
LOT COVERAGE (MAX.) :	55 %	40.8%
BUILDING HEIGHT (MAX.) :	11.0 m	10.6 m
PORCH STAIR TO LOT LINE (SECTION 65)	0.6 m	2.40 m
PARKING SPACES :	2 Spaces / UNIT	2 - 1 Driveway / 1 Garage Driveway - 2.72m x 5.21m Garage - 3.10m x 6.05m
PRIVATE DRIVEWAY :	3.0 m - 9.0 m	6.00 m
DENSITY :	TO BE CALCULATED USING ALL OF LAND IN ZONE	

BACK to BACK TOWNHOMES :

BLOCK No. :		BUILDING AREA:	GROSS FLOOR AREA:	No. UNITS:
BLOCK 1 =	BACK to BACK TOWNHOMES	353.3 m²	864.0 m²	6 UNITS
BLOCK 2 =	BACK to BACK TOWNHOMES	353.3 m²	864.0 m²	6 UNITS
BLOCK 3 =	BACK to BACK TOWNHOMES	353.3 m²	864.0 m²	6 UNITS
BLOCK 4 =	BACK to BACK TOWNHOMES	353.3 m²	864.0 m²	6 UNITS
TOTAL =		1,413.2 m²	3,456.0 m²	24 UNITS

NOTE:
SITE PLAN TO BE READ IN CONJUNCTION WITH :
- SITE SERVICING PLAN PREPARED BY _____.
- LANDSCAPING PLAN PREPARED BY _____.
- BOUNDARIES DERIVED FROM : PLAN 4M-1383 DATED APRIL 27,2009.
BY ANNIS, O'SULLIVAN VOLLEBEKK LTD.

SITE INFORMATION - BLOCK 78, 150 AKERSON ROAD :
PROPOSED ZONING : R3X - PERMITTED USES : - PLANNED UNIT DEVELOPMENT
- TOWNHOUSE DWELLING

SITE AREA : 3,462.5 m²
TOTAL BUILDING AREA : 1,413.2 m²

ZONING:	EXISTING R3X[1054]	PROPOSED: R3X[____]
LOT AREA (MIN.):	1,400.0 m²	3,462.5 m²
LOT WIDTH (MIN.):	18.0 m	69.52 m
LOT WIDTH TOWNHOME (MIN.):	5.5 m	6.15 m
LOT AREA - BACK to BACK UNIT (MIN.):	150.0 m² [1054]	86.06 m²
FRONT YARD (MIN.) :	3.0 m [1054]	4.10 m
CORNER SIDE YARD (MIN.) :	2.5 m [1054]	5.21 m
INTERIOR SIDE YARD (MIN.) :	1.2 m [1054]	12.73 m
REAR YARD (MIN.) :	6.0 m [1054]	4.07 m
BUILDING SPACING :		
BETWEEN BUILDING & PRIVATE WAY :	1.8 m	5.21 m
BETWEEN GARAGE & PRIVATE WAY :	5.2 m	5.21 m
BETWEEN BUILDINGS :	1.2 m	4.00 m
MINIMUM LANDSCAPED AREA :	0.0%	
LOT COVERAGE (MAX.) :	55 %	40.1%
BUILDING HEIGHT (MAX.) :	11.0 m	10.6 m
PORCH STAIR TO LOT LINE (SECTION 65)	0.6 m	2.40 m
PARKING SPACES :	2 Spaces / UNIT	2 - 1 Driveway / 1 Garage Driveway - 2.72m x 5.21m Garage - 3.10m x 6.05m
PRIVATE DRIVEWAY :	3.0 m - 9.0 m	6.00 m
DENSITY :	TO BE CALCULATED USING ALL OF LAND IN ZONE	

BACK to BACK TOWNHOMES :

BLOCK No. :		BUILDING AREA:	GROSS FLOOR AREA:	No. UNITS:
BLOCK 5 =	BACK to BACK TOWNHOMES	353.3 m²	864.0 m²	6 UNITS
BLOCK 6 =	BACK to BACK TOWNHOMES	353.3 m²	864.0 m²	6 UNITS
BLOCK 7 =	BACK to BACK TOWNHOMES	353.3 m²	864.0 m²	6 UNITS
BLOCK 8 =	BACK to BACK TOWNHOMES	353.3 m²	864.0 m²	6 UNITS
TOTAL =		1,413.2 m²	3,456.0 m²	24 UNITS

NOTE:
SITE PLAN TO BE READ IN CONJUNCTION WITH :
- SITE SERVICING PLAN PREPARED BY _____.
- LANDSCAPING PLAN PREPARED BY _____.
- BOUNDARIES DERIVED FROM : PLAN 4M-1383 DATED APRIL 27,2009.
BY ANNIS, O'SULLIVAN VOLLEBEKK LTD.

SCALE: 0 5 10 15 30m

M. David Blakely
Architect Inc.
2255 Prince of Wales Dr., Suite 101
Ottawa, Ontario K2B 8Z9
Phone (613) 226-8877 Fax (613) 226-7942

GENERAL NOTES:
1. THE CONTRACTOR IS RESPONSIBLE FOR CHECKING AND VERIFYING ALL DIMENSIONS, ANY DISCREPANCY MUST BE REPORTED TO M. DAVID BLAKELY ARCHITECT INC.
2. ALL WORK AND MATERIALS TO BE IN COMPLIANCE WITH ALL CODES, REGULATIONS, AND BY-LAWS.
3. ADDITIONAL DRAWINGS MAY BE ISSUED FOR CLARIFICATION TO ASSIST THE PROPER EXECUTION OF THE WORK. ALL DRAWINGS WILL HAVE THE SAME MEANING AND INTENT AS IF THEY WERE INCLUDED WITH THE PLANS IN CONTRACT DOCUMENTS.
4. DO NOT SCALE DRAWINGS.
5. THIS DRAWING SHALL NOT BE USED FOR PERMIT OR CONSTRUCTION UNLESS THE DRAWING BEARS THE ARCHITECT'S SEAL AND SIGNATURE.
6. THIS REPRODUCTION SHALL NOT BE ALTERED

CONSTRUCTION NORTH

SEAL

No.	DATE	DESCRIPTION	INIT.
10.			
9.			
8.			
7.			
6.			
5.			
4.	29/04/22	REVISED BLOCKS TO 6 UNITS	SM
3.	05/10/21	ZONING INFO ADDED	SM
2.	28/07/21	FOR REVIEW	SM
1.	05/05/21	FOR REVIEW	SM

REVISIONS

No.	DATE	DESCRIPTION	INIT.
20.			
19.			
18.			
17.			
16.			
15.			
14.			
13.			
12.			
11.			

REVISIONS

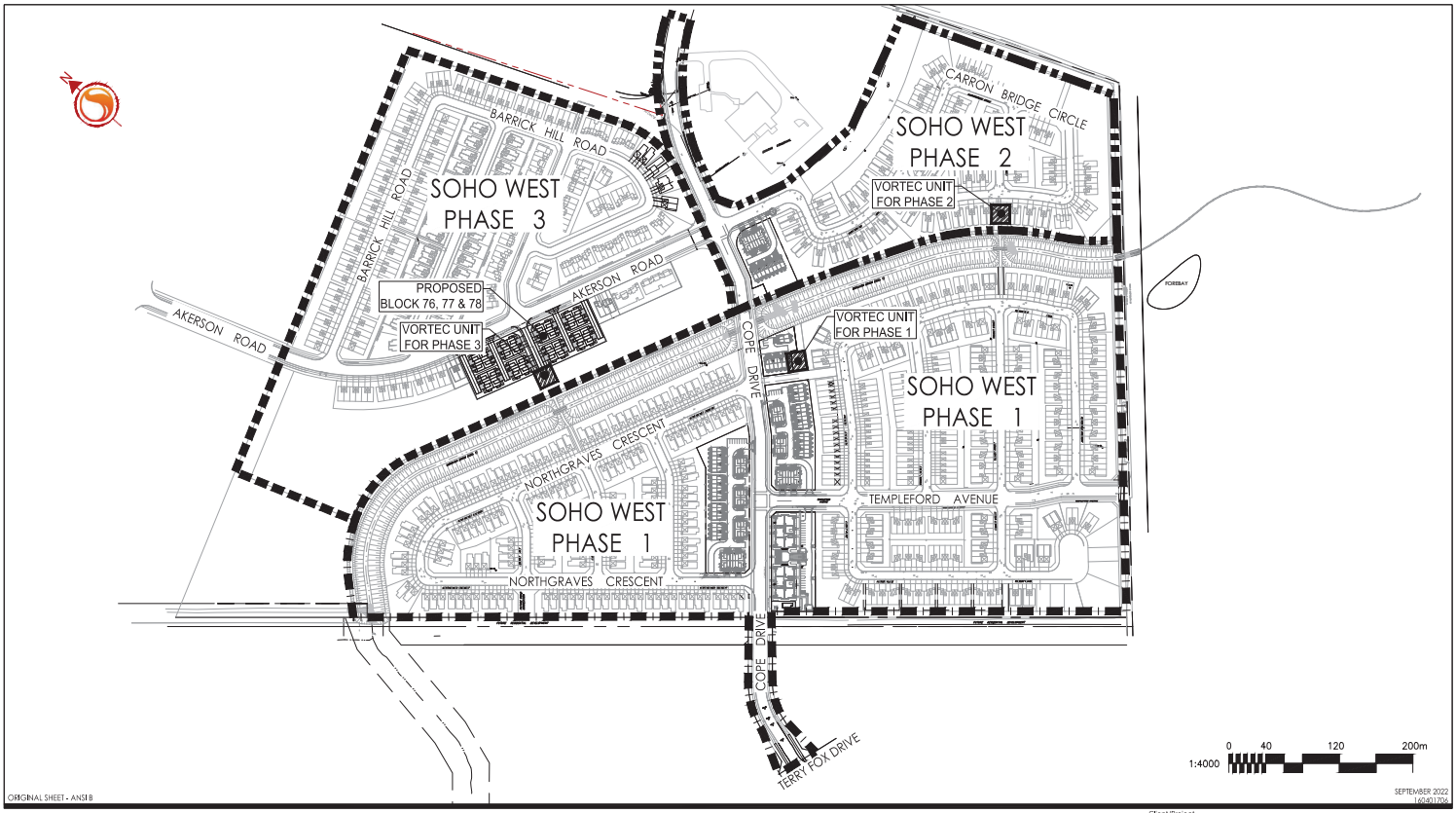
PROJECT: 56 UNIT
BACK to BACK TOWNHOMES
150 & 170 AKERSON ROAD
OTTAWA, ONT.

CLIENT: PATTEN HOMES 2000

DRAWING TITLE: SITE PLAN

DATE: SEPT., 2021.
SCALE: 1:100
SHEET No.: SP-1
DRAWN BY: SBM
CHECKED: MDB

B.2 PROPOSED DEVELOPMENT LOCATION PLAN



V:\01-504\active\160401706\design\drawing\160401706-FIG 1.dwg
2022/08/30 8:39 AM By: Johnson, Marlen

ORIGINAL SHEET - ANSI B

SEPTEMBER 2022
160401706

Legend

Notes

Stantec

400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613 722-4420
www.stantec.com

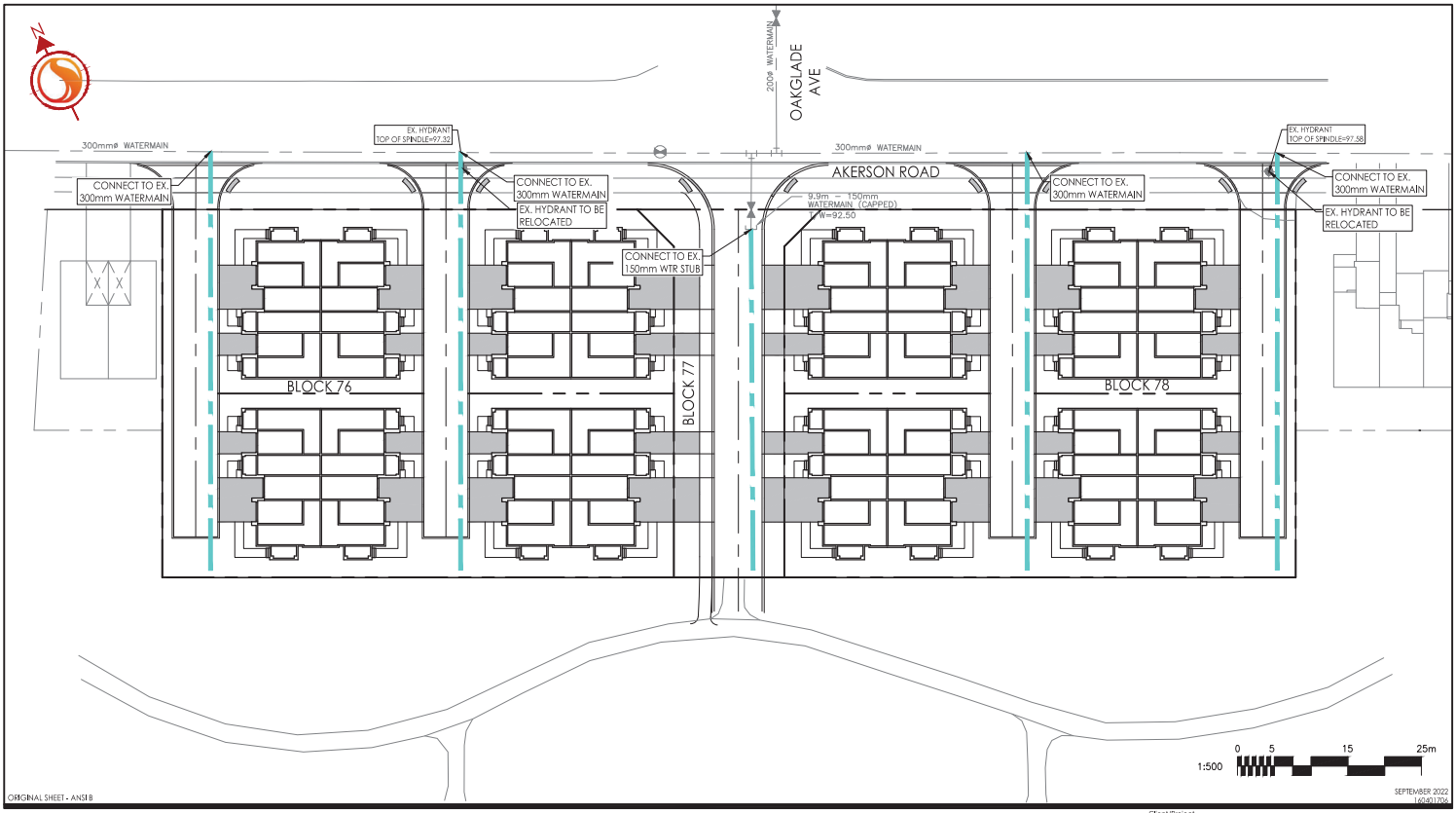
Client/Project
CAVANAGH CONSTRUCTION LTD.
TRAILS WEST
AKERSON ROAD UNITS

Figure No.
1.0

Title
PROPOSED DEVELOPMENT LOCATION

Reference: Cavanagh Trails West: Akerson Road Blocks 76, 77 & 78 – Adequacy of Services Memo

B.3 FUNCTIONAL WATER SERVICING PLAN



V:\01-504\active\160401706\design\drawing\160401706-D8.dwg
2022/09/30 3:21 PM By: Johnson, Warren

Legend

Notes

Stantec
Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

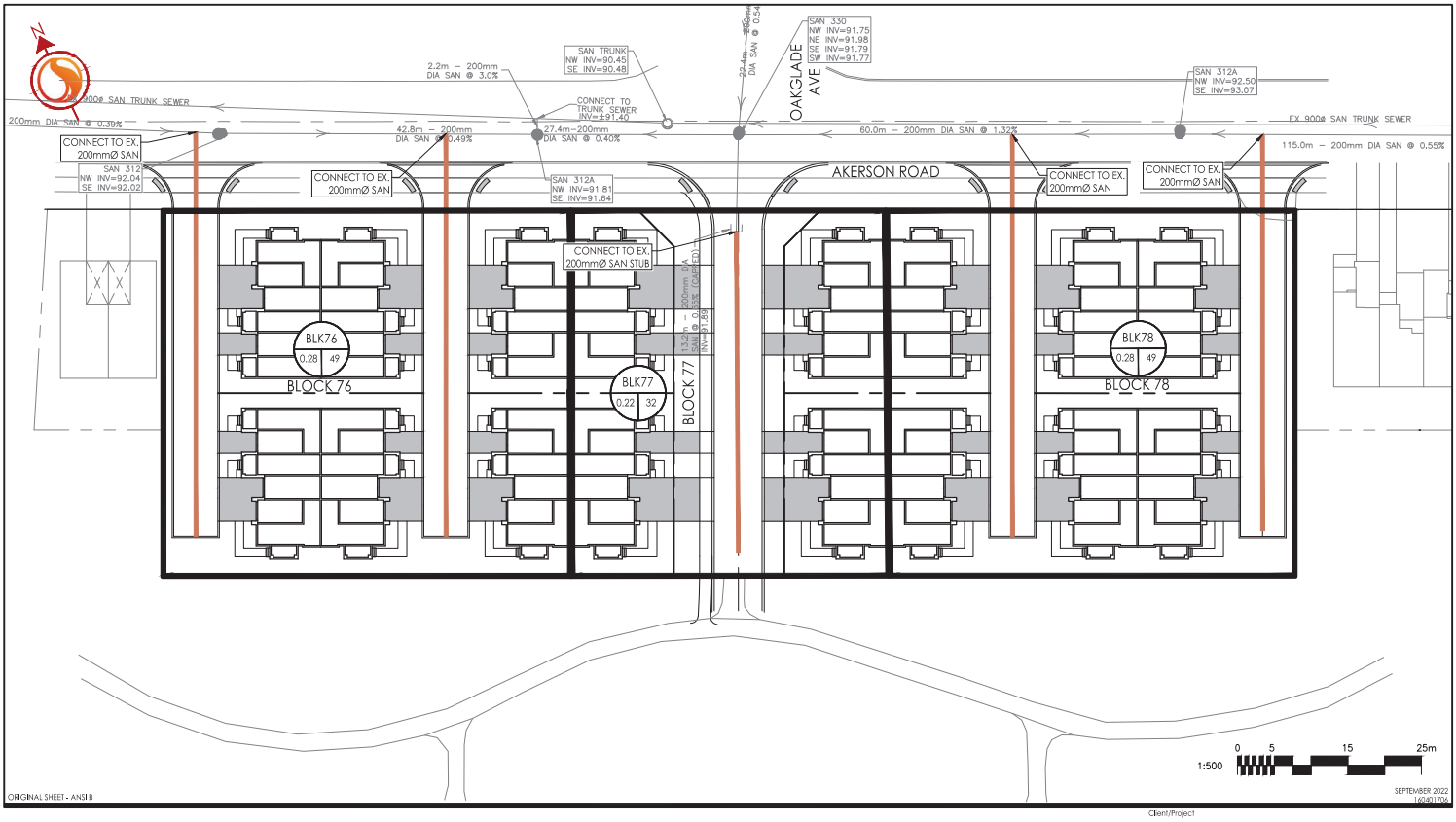
Client/Project
CAVANAGH CONSTRUCTION LTD.
TRAILS WEST
OTTAWA, ON

Figure No.
2.0

Title
FUNCTIONAL WATER SERVICING FIGURE

Reference: Cavanagh Trails West: Akerson Road Blocks 76, 77 & 78 – Adequacy of Services Memo

B.4 FUNCTIONAL SANITARY SERVICING PLAN



V:\01-504\active\160401706\design\drawing\160401706-D8.dwg
2022/09/30 3:21 PM By: Johnson, Warren

ORIGINAL SHEET - ANSI B

SEPTEMBER 2022
160401706

Legend

Notes

Stantec
Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

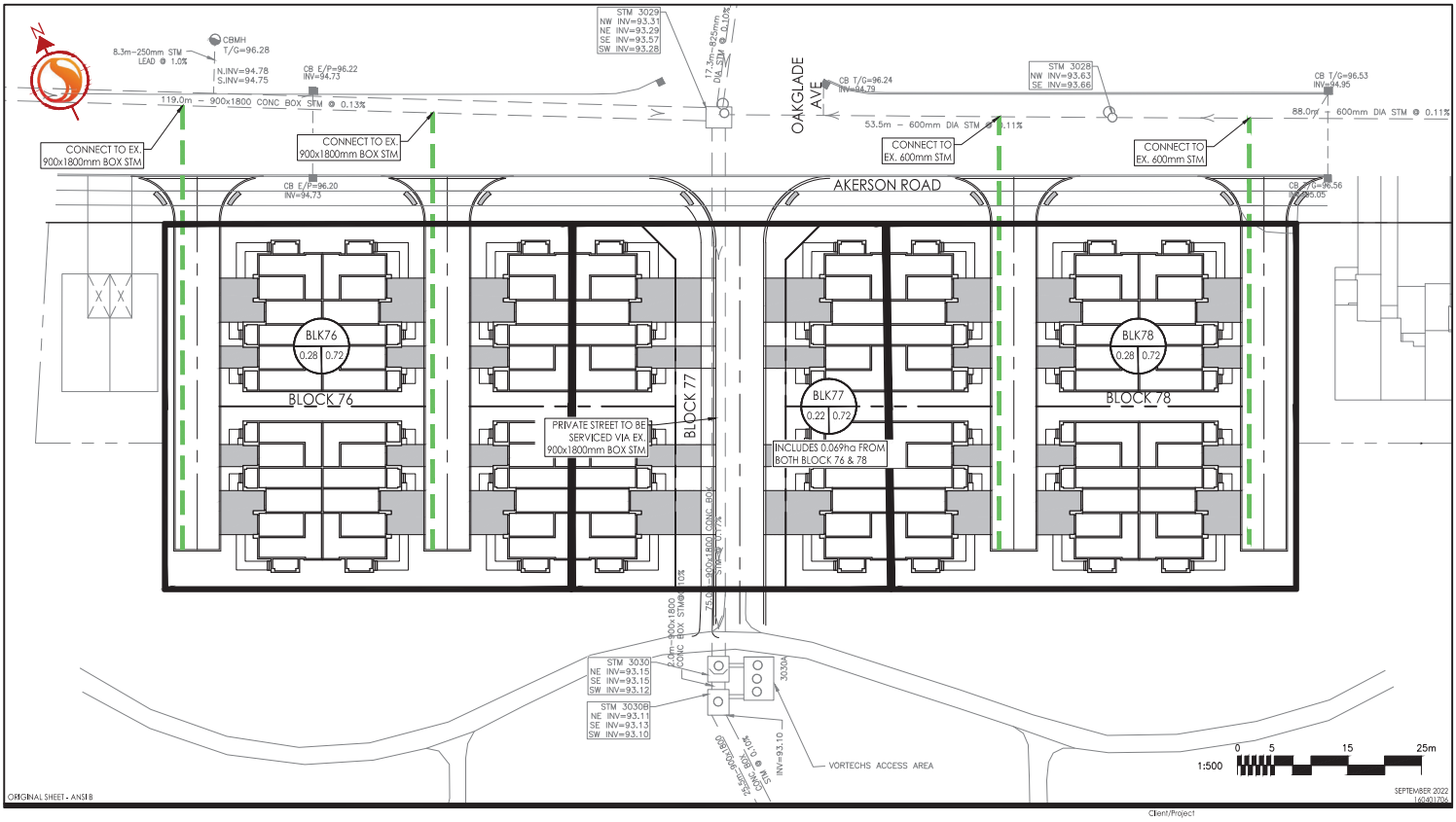
Client/Project
CAVANAGH CONSTRUCTION LTD.
TRAILS WEST
OTTAWA, ON

Figure No.
3.0

Title
FUNCTIONAL SANITARY SERVICING FIGURE

Reference: Cavanagh Trails West: Akerson Road Blocks 76, 77 & 78 – Adequacy of Services Memo

B.5 FUNCTIONAL STORMWATER SERVICING PLAN



V:\01-504\active\160401706\design\drawing\160401706-D8.dwg
2022/09/31 2:56 PM By: Johnson, Warren

ORIGINAL SHEET - ANSI B

SEPTEMBER 2022
160401706

Legend

Notes

Stantec
Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

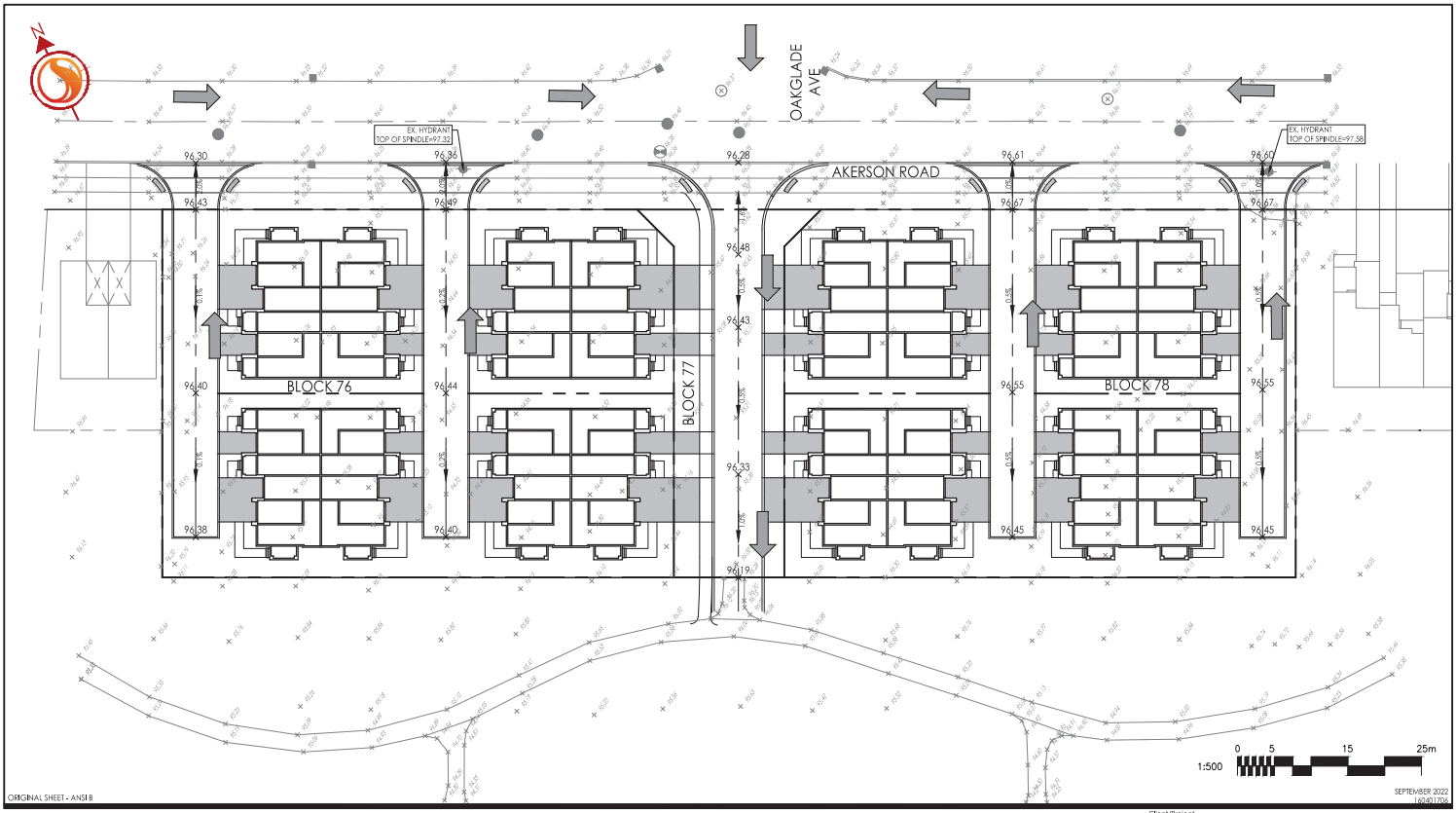
Client/Project
CAVANAGH CONSTRUCTION LTD.
TRAILS WEST
OTTAWA, ON

Figure No.
4.0

Title
FUNCTIONAL STORMWATER SERVICING FIGURE

Reference: Cavanagh Trails West: Akerson Road Blocks 76, 77 & 78 – Adequacy of Services Memo

B.6 FUNCTIONAL GRADING PLAN



V:\01-504\active\160401706\design\drawing\160401706-D8.dwg
2022/09/30 3:21 PM By: Johnson, Warren

ORIGINAL SHEET - ANSI B

SEPTEMBER 2022
160401706

Legend

Notes

Stantec
Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

Client/Project
CAVANAGH CONSTRUCTION LTD.
TRAILS WEST
OTTAWA, ON

Figure No.
5.0

Title
FUNCTIONAL GRADING FIGURE