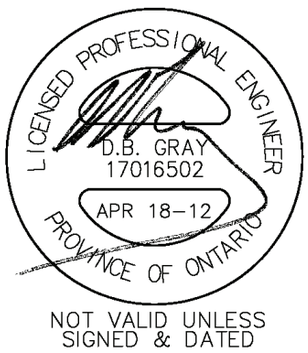
SERVICING BRIEF

Cummings Avenue & Ogilvie Road
Townhouses
Ottawa, Ontario

Report No. 11041-SB

April 18, 2012



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Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

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SERVICING BRIEF

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The following Servicing Brief is a description of the services of a proposed of an 85 unit townhouse development located on 13,250 sq.m. of land located at the south-west corner of the Cummings Avenue / Ogilvie Road intersection in Ottawa. The buildings in the proposed development are slab-on-grade construction.

Refer to drawings SG-1 to SG-3 and SS-1 to SS-6 (Revision 1: Apr 12-12), prepared by D. B. Gray Engineering Inc.

Water Supply for Fire Fighting:

A fire flow requirement of 4,000 L/min is required, as calculated as per the Fire Undewriter Survey "Water Supply For Fire Protection".

Three fire hydrants are proposed in the development providing an average coverage of 4417 sq.m. per hydrant exceeding the Fire Undewriter Survey recommendation of 15,000 sq.m. per hydrant for a required flow of 4,000 L/min. The maximum distance from a hydrant ant one unit is about 70m.

To determine if an adequate water supply for firefighting is available the following is required: The boundary conditions, based on the City of Ottawa computer simulation of the water distribution system in this area, and a hydraulic analysis.

Once the boundary conditions are received a hydraulic analysis will be calculated.

Water Service:

The proposed water service will connect to an existing 600mm municipal watermain in Ogilvie Road.

Based on the City of Ottawa Design Guidelines (the daily average consumption rate of 350 litres per day per capita) the daily average flow is calculated to be 54.5 L/min. Based on this flowrate and the MOE Design Guidelines, a maximum daily demand of 231.9 L/min and maximum hourly demand 349.3 L/min can be expected.

To determine water pressure under these demands the following is required: The boundary conditions, based on the City of Ottawa computer simulation of the water distribution system in this area and a hydraulic analysis.

In summary, we request the boundary conditions for the Ogilvie Road / Cummings Avenue area based on the following:

Average daily demand:	0.91 l/s	(54.5 L/min)
Maximum daily demand:	3.87 l/s	(231.9 L/min)
Maximum hourly daily demand:	5.82 l/s	(349.3 L/min)
Fire Flow demand:	67.7 l/s	(4,000 l/min)

Once the boundary conditions are received a hydraulic analysis will be calculated.

Sanitary Service:

Based on the City of Ottawa Sewer Design Guidelines for a residential development (85 townhouse units one bedroom apartment units – 2.7 persons per unit – 350 l/person/day – 4.0 peaking factor); and a 0.24 l/s infiltration flow) the post development flow is calculated to be 4.09 l/s.

This flow will be adequately handled by the proposed sanitary sewers (200mm @ 0.32% - 19.4 l/s capacity). The proposed sanitary service will connect to an existing 300mm municipal sanitary sewer in Ogilvie Road (300mm @ 0.5% - 71.3 l/s capacity).

The 4.09 l/s increase in sanitary flows contributing to the existing 300mm sanitary sewer is expected to have a negligible impact given its capacity of 71.3 l/s.

Stormwater:

The stormwater quantity control measures are based on the criteria that the release rate for post-development storm events is equal to or less than the flow produced by a five year storm using a runoff coefficient of 0.50 and a 20 minute time of concentration. (See Stormwater Management Report No. 11041-SWM, prepared by D. B. Gray Engineering Inc.)

The proposed storm sewer system will connect to an existing 450mm stub, located at the south-east corner of the site. The stub connects to the existing 1980m diameter Cummings Creek Storm Sewer.

The unrestricted flowrate resulting from one in five year storm event will produce a peak flow of 225.1 l/s which would cause surcharging the proposed storm sewer (450mm @ 0.20% - 133.0 l/s capacity). However an inlet control device (ICD) located at the outlet pipe of a on-site manhole will restrict the flow and force the stormwater to back up into the upstream sewer pipes, catch basin and manholes into an on-site underground storage facility (concrete box culverts). Stormwater released through the (ICD) will be restricted to the maximum flow of 85.89 l/s during the one in five year storm event which will be adequately handled by a proposed 450mm storm sewer.

Conclusions:

1. Boundary conditions and a hydraulic analysis are required to determine if there is an adequate water supply for fire fighting.
2. Boundary conditions and a hydraulic analysis are required to determine if the existing water pressure is adequate for the proposed development.
3. Boundary conditions and a hydraulic analysis are required to determine if the water pressure can be above 80 psi and if a pressure reducing valve is required.
4. Through this document we are requesting the boundary conditions. Once received the analysis will be calculated.
5. The expected sanitary sewage flow will be adequately handled by the proposed sanitary sewers.
6. The increase in sanitary flows contributing to the existing 300mm municipal sanitary sewer is expected to have a negligible impact .
7. The stormwater quantity control is based on the release rate for post-development storm events is equal to or less than the flow produced by a five year storm using a runoff coefficient of 0.50 and a 20 minute time of concentration.
8. The restricted flowrate produced by a one in five year storm even will be adequately handled by the proposed storm sewers.
9. It is expected that a Ministry of Environment Certificate of Approval will be required.

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Fire Flow Requirements

A fire flow requirement of 4,000 L/min is required as calculated as per the Fire Underwriter Survey "Water Supply For Fire Protection".

Fire Protection Water Supply

$F = 220\ C\ A^{0.5}$

F = the required fire flow in litres per minute

C = coefficient related to the type of construction
= 1.5 for wood frame construction (combustible construction)
= 1.0 for ordinary construction (masonary wall, combustible floor and interior)
= 0.8 for non-combustible construction (unprotected structural components)
= 0.6 for non-combustible construction (protected structural components, floor and roof)

= 1.5

A = total floor area (all storeys excluding basements at least 50% below grade)

Ground Floor Area:	50	sq.m.
Number of Storeys:	2	
Total area:	100	sq.m.

F =	3,300	L/min
=	3,000	L/min (rounded off to the nearest 1,000 L/min)
	-25%	Change for Low Contents Fire hazard
=	2,250	L/min
	0%	Reduction to above for No Sprinkler Protection
=	2,250	L/min

Added to above Contents Fire Hazard for Separation Exposed Buildings

25%	Side 1	0 to 3m
25%	Side 2	0 to 3m
20%	Side 3	3.1 to 10m
15%	Side 5	10.1 to 20m
85%	Total Increase for Exposure	
75%	(maximum)	

=	3,938	L/min
F =	4,000	L/min (rounded off to the nearest 1,000 L/min)
=	66.67	L/s

18-Apr-12

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Water Demand

	Number of Units	Persons Per Unit	Population
UNIT TYPE:			
Single Family:	0	3.4	0
Semi- detached:	0	2.7	0
Duplex:	0	2.3	0
Townhouse:	83	2.7	224
APARTMENTS:			
Bachelor	0	1.4	0
1 Bedroom:	0	1.4	0
2 Bedroom:	0	2.1	0
3 Bedroom:	0	3.1	0
Average Aptarment:	0	1.8	0
		TOTAL:	224

DAILY AVERAGE

350 litres / person / day

54.5	l / min	0.91	l / sec	14.4 Usgpm

MAXIMUM DAILY DEMAND 4.3 (Peaking Factor for a equivalent population of 224: Table 3-3 MOE Design Guidelines for Drinking-Water Systems)

231.9	l / min	3.87	l / sec	61.3 Usgpm

MAXIMUM HOURLY DEMAND 6.4 (Peaking Factor for a equivalent population of 224: Table 3-3 MOE Design Guidelines for Drinking-Water Systems)

349.3	l / min	5.82	l / sec	92.3 Usgpm

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SANITARY SEWER DESIGN FORM

Average Daily Flows:
Residential: 350 l / capita / day
Commercial: 50,000 l / ha / day
Instituational: 50,000 l / ha / day
Light Industrial: 35,000 l / ha / day
Heavy Industrial: 55,000 l / ha / day

Peaking Factor:
Residential (Harmon Equation): $P.F. = 1 + \frac{14}{4 + P^{0.5}}$
P = Population / 1000

Infiltration Allowance: 0.28 l / s / ha

PROJECT: Francis Street, Carleton Place

Designed By: DBG

18-Apr-07

LOCATION			Section								Cumulative Residential		Section Non-Residential			Cumulative				SEWER DATA								COMMENTS
			Single Family	Semi / Townhouse	Duplex / Triplex	Apartments (average)	Apartments (1 Bed.)	Apartments (2 Bed.)	Apartments (3 Bed.)	Residential Area						Area	Sewage Flow	Infiltration Flow	Total Flow	n = 0.013								
STREET	FROM	TO	ppu = 3.4	ppu = 2.7	ppu = 2.3	ppu = 1.8	ppu = 1.4	ppu = 2.1	ppu = 3.1		Pop.	Peaking Factor	Area	Flow	Peaking Factor					Type of Pipe	Dia. Actual (mm)	Dia. Nom. (mm)	Slope (%)	Length (m)	Capacity (l/s)	Velocity (m/s)	Ratio Q/Qfull	
			No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	ha			ha	l/ha/day		ha	l/s	l/s	l/s								
	MH-5	MH-4		3						0.0455	8	4.0				0.046	0.13	0.01	0.14	PVC SDR 35	203.2	200	0.900	20.9	32.5	1.00	0.00	
	MH-6	MH-4		25						0.3119	68	4.0				0.312	1.09	0.09	1.18	PVC SDR 35	203.2	200	0.320	82.1	19.4	0.60	0.06	
	MH-4	MH-3		10						0.1499	103	4.0				0.507	1.66	0.14	1.80	PVC SDR 35	203.2	200	0.320	42.9	19.4	0.60	0.09	
	MH-6	MH-7		11						0.1557	30	4.0				0.156	0.48	0.04	0.52	PVC SDR 35	203.2	200	0.320	36.0	19.4	0.60	0.03	
	MH-7	MH-8		2						0.0443	35	4.0				0.200	0.57	0.06	0.62	PVC SDR 35	203.2	200	0.320	8.7	19.4	0.60	0.03	
	MH-8	MH-9		8						0.1005	57	4.0				0.301	0.92	0.08	1.00	PVC SDR 35	203.2	200	0.320	22.3	19.4	0.60	0.05	
	MH-10	MH-9		2						0.0797	5	4.0				0.080	0.09	0.02	0.11	PVC SDR 35	203.2	200	0.320	24.9	19.4	0.60	0.01	
	MH-9	MH-3		7						0.1542	81	4.0				0.534	1.31	0.15	1.46	PVC SDR 35	203.2	200	0.320	50.6	19.4	0.60	0.08	
	MH-3	MH-1		13						0.1703	219	4.0				1.212	3.54	0.34	3.88	PVC SDR 35	203.2	200	0.320	48.7	19.4	0.60	0.20	
	MH-2	MH-1		3						0.0813	8	4.0				0.081	0.13	0.02	0.15	PVC SDR 35	203.2	200	0.900	34.0	32.5	1.00	0.00	
	MH-1	exist. Sewer		1						0.0316	230	4.0				1.325	3.72	0.37	4.09	PVC SDR 35	203.2	200	0.320	34.1	19.4	0.60	0.21	
																					EXISTING SANITARY SEWER IN OGILVIE ROAD							
																					304.8	300	0.500		71.3	0.98		

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STORM SEWER COMPUTATION FORM

RATIONAL METHOD Q = 2.78 A I R FIVE YEAR EVENT

n = 0.013

PROJECT: Ogilvie & Cummings, Ottawa

Designed By: DBG

Date: 18-Apr-12

LOCATION			AREA (ha)				Individual 2.78 A R	Accum. 2.78 A R	Time of Conc. (min)	Rainfall Intensity I (mm/hr)	Peak Flow Q (l/s)	SEWER DATA									COMMENTS
STREET	FROM	TO	R = 0.9	R = 0.70	R = 0.2	R = 0.9						Type of Pipe	Dia. Actual (mm)	Dia. Nom. (mm)	Slope (%)	Length (m)	Capacity (l/s)	Velocity (m/s)	Time of Flow (min)	Ratio Q/Qfull	
	CB- 37A	CB/MH-37	0.0076		0.0036	0.0141	0.056	0.056	10.0	104	5.8	PVC SDR 35	457.2	450	0.200	20.5	133.0	0.81	0.4	0.04	
	CB/MH-37	CB/MH-34	0.0054		0.0071	0.0082	0.038	0.094	10.4	102	9.6	PVC SDR 35	457.2	450	0.200	10.9	133.0	0.81	0.2	0.07	
												PVC SDR 35									
	CB-36	CB/MH-34	0.0106		0.0218	0.0082	0.059	0.059	10.0	104	6.2	PVC SDR 35	457.2	450	0.200	26.1	133.0	0.81	0.5	0.05	
	CB/MH-34	CB/MH-33	0.1104		0.0036	0.0163	0.319	0.472	10.6	101	47.7	PVC SDR 35	609.6	600	0.340	22.9	373.5	1.28	0.3	0.13	
	CB/MH-33	CB/MH-31	0.0196		0.0110	0.0264	0.121	0.594	10.9	99	59.0	PVC SDR 35	609.6	600	0.340	22.9	373.5	1.28	0.3	0.16	
	CB-39	CB/MH-31	0.0301		0.0138	0.0137	0.117	0.117	10.0	104	12.2	PVC SDR 35	254.0	250	0.430	20.9	40.7	0.80	0.4	0.30	
	CB/MH-31	CB/MH-23	0.0120		0.0084	0.0342	0.120	0.831	11.2	98	81.5	PVC SDR 35	609.6	600	0.340	50.8	373.5	1.28	0.7	0.22	
	CB/MH-23	CB-MH-21	0.0197		0.0189	0.0551	0.198	1.029	11.9	95	97.9	PVC SDR 35	609.6	600	0.340	25.1	373.5	1.28	0.3	0.26	
	CB-MH-21	CB-MH-19	0.0222		0.0111	0.0337	0.146	1.175	12.2	94	110.1	PVC SDR 35	609.6	600	0.340	8.3	373.5	1.28	0.1	0.29	
	CB-41	CB-MH-12			0.0039	0.0003	0.003	0.003	10.0	104	0.3	PVC SDR 35	254.0	250	0.430	15.1	40.7	0.80	0.3	0.01	
	CB-MH-19	CB-MH-12	0.0276		0.0167	0.0330	0.161	1.336	12.3	93	124.6	PVC SDR 35	609.6	600	0.340	38.7	373.5	1.28	0.5	0.33	
	CB/MH-31	CB/MH-30					0.000	0.000	10.0	104	0.0	PVC SDR 35	609.6	600	0.340	21.9	373.5	1.28	0.3	0.00	
7	CB/MH-30	CB/MH-14	0.0195		0.0143	0.0283	0.127	0.127	10.3	103	13.1	PVC SDR 35	609.6	600	0.340	23.7	373.5	1.28	0.3	0.04	
	CB-17	CB/MH-14	0.0023		0.0069	0.0087	0.031	0.031	10.0	104	3.3	PVC SDR 35	457.2	450	0.340	20.6	173.4	1.06	0.3	0.02	
	CB/MH-14	CB/MH-13	0.0091		0.0073	0.0232	0.085	0.244	10.6	101	24.7	PVC SDR 35	609.6	600	0.340	41.1	373.5	1.28	0.5	0.07	
	BOX CULVERT	BOX CULVERT	0.0277		0.0361	0.0178	0.134	0.134	10.0	104	14.0	PVC SDR 35	609.6	600	0.370	10.9	389.6	1.33	0.1	0.04	
	BOX CULVERT	CB-MH-29					0.000	0.134	10.1	103	13.9	PVC SDR 35	609.6	600	0.110	8.7	212.4	0.73	0.2	0.07	
	CB-MH-29	CB/MH-13	0.0089		0.0065	0.0103	0.052	0.186	10.3	102	19.0	PVC SDR 35	609.6	600	0.140	14.0	239.7	0.82	0.3	0.08	
	CB/MH-13	CB-MH-12	0.0348		0.0151	0.0542	0.231	0.661	11.1	99	65.1	PVC SDR 35	609.6	600	0.340	43.8	373.5	1.28	0.6	0.17	
	CB/MH-27	CB/MH-26	0.0211		0.0258		0.067	0.067	10.0	104	7.0	PVC SDR 35	254.0	250	0.430	25.6	40.7	0.80	0.5	0.17	
	CB/MH-26	CB/MH-24	0.0107		0.0282	0.0004	0.043	0.111	10.5	101	11.2	PVC SDR 35	254.0	250	0.430	10.5	40.7	0.80	0.2	0.28	
	CB-25	CB/MH-24	0.0080		0.0206	0.0009	0.034	0.034	10.0	104	3.5	PVC SDR 35	254.0	250	0.430	34.3	40.7	0.80	0.7	0.09	
	CB/MH-24	MH-22	0.0079		0.0172	0.0007	0.031	0.175	10.7	100	17.6	PVC SDR 35	304.8	300	0.340	22.1	58.8	0.81	0.5	0.30	
	MH-22	MH-20					0.000	0.175	11.2	98	17.2	PVC SDR 35	304.8	300	0.340	28.5	58.8	0.81	0.6	0.29	
	MH-20	MH-18					0.000	0.175	11.8	96	16.8	PVC SDR 35	304.8	300	0.340	8.1	58.8	0.81	0.2	0.29	
	MH-18	MH-11					0.000	0.175	12.0	95	16.6	PVC SDR 35	304.8	300	0.340	41.8	58.8	0.81	0.9	0.28	
	CB-MH-12	MH-11	0.0939		0.0224	0.0649	0.410	2.409	12.8	91	219.8	PVC SDR 35	457.2	450	0.340	3.0	173.4	1.06	0.0	1.27	
	MH-11	CB-MH-10					0.000	2.409	12.9	91	219.4	PVC SDR 35	457.2	450	0.200	26.8	133.0	0.81	0.6	1.65	
	CB-40	CB-MH-10	0.0159		0.0064	0.0010	0.046	0.046	10.0	104	4.8	PVC SDR 35	254.0	250	0.430	19.7	40.7	0.80	0.4	0.12	
	CB-MH-10	EXISTING	0.0053		0.0095	0.0226	0.075	2.530	13.4	89	225.1	PVC SDR 35	457.2	450	0.200	30.2	133.0	0.81	0.6	1.69	

City of Ottawa Servicing Study Checklist

General Content

Executive Summary (for large reports only): not applicable

Date and revision number of the report: see page 1 of Servicing Brief

Location map and plan showing municipal address, boundary, and layout of proposed development: see drawings SG-1, SG-2 and SG-3

Plan showing the site and location of all existing services: see drawings SG-1, SG-2 and SG-3

Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere: not applicable

Summary of Pre-consultation Meetings with City and other approval agencies: n/a

Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria: not applicable

Statement of objectives and servicing criteria: see page 1 of Servicing Brief

Identification of existing and proposed infrastructure available in the immediate area: see drawings SG-1, SG-2 and SG-3

Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available). see drawings SG-1, SG-2 and SG-3

Concept level master grading plan to confirm existing and proposed grades in the development and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths: not applicable

Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts: not applicable

Proposed phasing of the development, if applicable: not applicable

Reference to geotechnical studies and recommendations concerning servicing: not available

All preliminary and formal site plan submissions should have the following information:

- **Metric scale:** included
- **North arrow:** included
    - **(including construction North):** not included
- **Key Plan:** included
- **Name and contact information of applicant and property owner:** not available
- **Property limits**: included
    - **including bearings and dimensions:** included
- **Existing and proposed structures and parking areas:** included
- **Easements, road widening and rights-of-way:** included
- **Adjacent street names:** included

Development Servicing Report: Water

Confirm consistency with Master Servicing Study, if available: not applicable

Availability of public infrastructure to service proposed development: see page 2 of Servicing Brief

Identification of system constraints: see page 2 of Servicing Brief

Confirmation of adequate domestic supply and pressure: see page 2 of Servicing Brief

Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow locations throughout the development: see page 2 & 4 of Servicing Brief

Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves: see page 2 of Servicing Brief

Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design: not completed

Address reliability requirements such as appropriate location of shut-off valves: not completed

Check on the necessity of a pressure zone boundary modification:. not applicable

Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range: not completed

Description of the proposed water distribution network, including locations of proposed connections to the existing systems, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions: see drawings

Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation: not applicable

Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines: see page 2 of Servicing Brief

Provision of a model schematic showing the boundary conditions locations, streets , parcels, and building locations for reference: not applicable

Development Servicing Report: Wastewater

Summary of proposed design criteria: see page 2 of Servicing Brief

(Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure): not applicable

Confirm consistency with Master Servicing Study and /or justification for deviations: not applicable

Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and conditions of sewers: not applicable

Descriptions of existing sanitary sewer available for discharge of wastewater from proposed development: see page 2 of Servicing Brief

Verify available capacity in downstream sanitary sewer and / or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable): not applicable

Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix C) format. see page 7 of Servicing Brief

Description of proposed sewer network including sewers, pumping stations, and forcemains: see page 3 of Servicing Brief

Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality): not applicable

Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development: not applicable

Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity: not applicable

Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding: not applicable

Special considerations such as contamination, corrosive environment etc: not applicable

Development Servicing Report: Stormwater Checklist

Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property): see page 3 of Servicing Brief

Analysis of available capacity in existing public infrastructure. not applicable

A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern: see drawing SG-1

Water quality control objective (e/g/ controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects: see Stormwater Management Report

Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements: see Stormwater Management Report

Descriptions of the references and supporting information.
Set-back from private sewage disposal systems. not applicable

Watercourse and hazard lands setbacks: not applicable

Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed: not avaiuable

Confirm consistency with sub-waterched and Master Servicing Study, if applicable study exists: not applicable

Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period). see drawing SG-1 and Stormwater Management

Identification of watercourses within the proposed development and how watercourses will be protected, or , if necessary, altered by the proposed development with applicable approvals. not applicable

Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions: see Stormwater Management Report

Any proposed diversion of drainage catchment areas from one outlet to another. : not applicable

Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities. : not applicable

If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event: not applicable

Identification of potential impacts to receiving watercourses: not applicable

Identification of municipal drains and related approval requirements. : not applicable

Descriptions of how the conveyance and storage capacity will be achieved for the development: see page 3

100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading:

Inclusion of hydraulic analysis including hydraulic grade line elevations. : not applicable

Description of approach to erosion and sediment control during construction for the protection of receiving watercourses of drainage corridors: see notes 2.1 to 2.5 on drawing SG-3

Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplains elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current: not applicable

Identification of fill constraints related to floodplain and geotechnical investigation. : not applicable

Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act: the Rideau Conservation Authority has been contacted but no comments have been received

Application for Certificate of Approval (CofA) under the Ontario Water Resources Act:

Changes to Municipal Drains. : not applicable

Other permits (National Capital commission, Parks Canada, public Works and Government Services Canada, Ministry of transportation etc.) : not applicable

Conclusion Checklist

Clearly stated conclusions and recommendations: see page 3 of Servicing Brief

Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.

All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario: included