D.B. Gray Engineering Inc.

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

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SITE SERVICING STUDY & STORMWATER MANAGEMENT REPORT

EXHALO SPA
3150 WOODROFFE AVENUE
OTTAWA, ONTARIO

REPORT NO. 22017

JUNE 2, 2022

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1.0 INTRODUCTION

This report has been prepared in support of the Site Plan Control application for the proposed commercial fit-up of an existing 1-storey single family dwelling located at 3150 Woodroffe Avenue in Ottawa, Ontario. Refer to Pre-Application Consultation meeting notes in Appendix A.

This report forms part of the servicing and stormwater management design for the proposed development. Also refer to drawings C-1 to C-7 prepared by D.B. Gray Engineering Inc.

2.0 WATER SERVICING

2.1 WATER SUPPLY FOR FIREFIGHTING

There is an existing municipal Class AA fire hydrant located in front of 15 Deerfox Drive. It is 85 m unobstructed distance to the far side of the north façade of the building, which is less than the maximum 90 m permitted by the Ontario Building Code; therefore, a private fire hydrant is not required.

As per City of Ottawa Technical Bulletin ISTB-2021-03, when calculating the required fire flow where pipe sizing is not affected, the Ontario Building Code Method is to be used. As per OBC A-3.2.5.7. Table 2, the required fire flow for the 1-storey, 400 sq.m building was determined to be 1,800 L/min (30 L/s).

The boundary conditions in the 200 mm Deefox Drive municipal watermain provided by the City of Ottawa for the 30 L/s fire flow at the subject property indicate a hydraulic grade line (HGL) of 141.9 m prior to the SUC zone reconfiguration and 147.0 m following the SUC zone reconfiguration. Refer to Appendix B. These HGLs calculate to 453 kPa (66 psi) prior to the SUC zone reconfiguration and 503 kPa (73 psi) following to the SUC zone reconfiguration. Since the pressures are above the Ontario Building Code's minimum required pressure of 140 kPa (20 psi), there is an adequate water supply for firefighting from the existing municipal water distribution system.

As per City of Ottawa Technical Bulletin ISTB-2018-02, the aggregate flow of all contributing fire hydrants within 150 m of the building shall not be less than the required fire flow. As per City of Ottawa Technical Bulletin ISTB-2018-02 Appendix I, Class AA fire hydrants within between 75 m and 150 m can contribute 3,800 L/min (63.3 L/s).

The existing municipal Class AA fire hydrant discussed above can contribute 3,800 L/min (63.3 L/s), which is greater than the required fire flow of 1,800 L/min (30 L/s).

2.2 DOMESTIC WATER SUPPLY

As per the City of Ottawa Water Design Guidelines for the consumption rate and peaking factors, the average daily demand was calculated to be 0.3 L/s, the maximum daily demand was calculated to be 0.5 L/s and the maximum hourly demand was calculated to be 0.8 L/s. Refer to calculations in Appendix B.

The boundary conditions in the 200 mm Deerfox Drive municipal watermain provided by the City of Ottawa at the subject property indicate a minimum HGL of 141.7 m and a maximum HGL of 157.4 m prior to the SUC zone reconfiguration and a minimum HGL of 145.6 m and a maximum HGL of 148.8 m following the SUC zone reconfiguration. Refer to Appendix B. Based on these boundary conditions the pressure at the water meter is calculated to vary between 461 kPa (67 psi) and 615 kPa (89 psi) prior to the SUC zone reconfiguration and 499 kPa (72 psi) and 530 kPa (77 psi) following the SUC zone reconfiguration. This is an acceptable range for the proposed development. Since the water pressure may be above 80 psi at times, it is recommended a pressure test be conducted at the completion of construction to determine if a pressure reducing valve is required. If required, the pressure reducing valve is to be installed immediately after the water meter.

A 38 mm water service connecting to the 200 mm Deerfox Drive municipal watermain is proposed to service the development.

3.0 SANITARY SERVICING

As per

i. the City of Ottawa Sewer Design Guidelines for the peaking factor, and
ii. City of Ottawa Technical Bulletin ISTB-2018-01 for the consumption rate and infiltration allowance,

the post-development sanitary flow rate was calculated to be 0.28 L/s. A 150 mm sanitary service at 1.5% slope (18.65 L/s capacity) is proposed to service the development. At the design flow rate the sanitary service will only be at 1% of its capacity. The proposed 150 mm sanitary service will connect to the future 250 mm Deerfox Drive municipal sanitary sewer, which at 0.60% slope has a capacity of 46.06 L/s. Refer to calculations in Appendix C.

4.0 STORMWATER MANAGEMENT

4.1 QUALITY CONTROL

The Rideau Valley Conservation Authority has stated: *"Based on the proposed site plan, the RVCA will require enhanced water quality protection (80% TSS removal) be provided on-site."* Refer to Appendix D. As such, an oil grit separator (OGS) manhole is proposed to be located downstream of the inlet control device. Calculations by the manufacturer indicate that the CDS PMSU2015-4 OGS will remove 89.4% of total suspended solids. Refer to calculations in Appendix D. The CDS PMSU2015-4 OGS has an oil capacity of 232 L and a grit capacity of 0.84 cu.m.

An Erosion & Sediment Control Plan has been developed to be implemented during construction. Refer to drawing C-4 and notes 2.1 to 2.8 on drawing C-5. Sediment capture filter sock inserts are to be installed in all existing and proposed catch-basins adjacent to and within the site, and any material deposited on the public road is to be removed.

4.2 QUANTITY CONTROL

It was calculated that the pre-development conditions reflect a 5-year runoff coefficient of 0.51. The individual runoff coefficients were each increased by 25% to a maximum of 1.00 to calculate the pre-development conditions during the 100-year event. Using the Bransby Williams Formula the pre-development time of concentration was calculated to be 1 minute. Using the Rational Method with a time of concentration of 10 minutes, the pre-development flow rates were calculated to be 69.40 L/s during the 100-year event and 34.80 L/s during the 5-year event.

The stormwater quantity control criterion is to control the post-development peak flows to 64 L/s/ha using only the area of the property being developed. The target release rate for the 2,345 sq.m of property being developed was calculated to be 15.01 L/s. The Rational and Modified Rational Methods were used to calculate the post-development flow rates and corresponding storage volumes. Refer to calculations in Appendix D.

Drainage Area I (Uncontrolled Flow Off Site – 385 sq.m)
The existing driveway at the NW corner of the property currently slopes down to Deerfox Drive at ±4.5%. The proposed barrier-free walkway at the SE corner of the property slopes down to Woodroffe Avenue at 2.5%. It is not practical to capture and control these areas of the property. The parking stalls and walkway will be constructed with permeable pavers to promote infiltration and reduce the uncontrolled flow off site. The flow rates are calculated at a time of concentration of 10 minutes.

	100-Year Event	5-Year Event
Maximum Flow Rate	15.39 L/s	9.34 L/s

Drainage Area II (1,960 sq.m)
An inlet control device (ICD) located in the outlet pipe of catch-basin / manhole CB/MH-7 will restrict the flow of stormwater and cause it to backup into the upstream infrastructure. The ICD will be a vortex style manufactured by Hydrovex or approved equal sized by the manufacturer for the City of Ottawa's minimum recommended release rate of 6.00 L/s. It was calculated that an orifice area of 4,418 sq.mm (75 mm dia) with a discharge coefficient of 0.20 will achieve the desired release rate of 6.00 L/s at 2.33 m. Since the restricted stormwater is proposed to be stored using underground infrastructure, an average release rate equal to 50% of the maximum release rate was used to calculate the required storage volumes. The underground infrastructure will consist of 11 – Soleno HydroStor HS180 chambers or approved equal surrounded by clear stone wrapped in geotextile fabric.

	100-Year Event	5-Year Event
Maximum Release Rate	6.00 L/s	3.87 L/s
Maximum Water Elevation	94.64 m	93.28 m
Maximum Volume Stored	75.29 cu.m	37.03 cu.m

Summary

The maximum post-development release rate during the 100-year event was calculated to be 21.38 L/s, which is 69% less than the pre-development flow rate during the 100-year event and 42% more than the target release rate. Based on the City of Ottawa's minimum recommended ICD release rate of 6.00 L/s, a maximum storage volume of 75.29 cu.m is required and provided. The maximum post-development release rate during the 5-year event was calculated to be 13.21 L/s, which is 62% less than the pre-development flow rate during the 5-year event and 12% less than the target release rate. The post-development reduction in flow is expected to have a positive impact on the 375 mm Deerfox Drive municipal storm sewer.

	100-Year Event	5-Year Event
Pre-Development Flow Rate	69.40 L/s	34.80 L/s
Target Release Rate	15.01 L/s	15.01 L/s
Maximum Release Rate	21.38 L/s	13.21 L/s
Maximum Volume Required	75.29 cu.m	37.03 cu.m
Maximum Volume Stored	75.29 cu.m	37.03 cu.m

4.3 STORM SERVICING

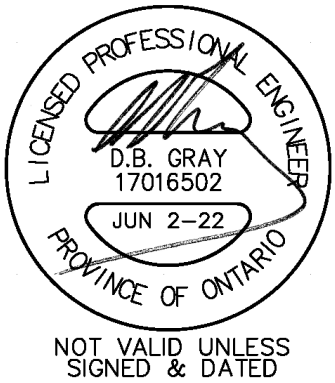
The peak unrestricted flow rate draining into the private storm sewer system during the 5-year event was calculated to be 34.79 L/s. A 250 mm storm sewer at 0.43% slope (39.00 L/s capacity) is proposed to connect to the existing 375 mm Deerfox Drive storm sewer, which at 1.3% slope has a capacity of 199.91 L/s. At the peak unrestricted 5-year flow rate the proposed 375 mm storm sewer would be at 89% of its capacity. The peak restricted flow rate draining into the private storm sewer system during the 5-year event was calculated to be 3.87 L/s. At the peak restricted 5-year flow rate the proposed 375 mm storm sewer will only be at 10% of its capacity. Refer to calculations in Appendix D.

5.0 CONCLUSIONS

1. A private fire hydrant is not required.
2. There is an adequate water supply for firefighting from the existing municipal water distribution system.
3. There is an acceptable range of water pressures in the existing municipal water distribution system.
4. Since the water pressure may be above 80 psi at times, it is recommended a pressure test be conducted at the completion of construction to determine if a pressure reducing valve is required. If required, the pressure reducing valve is to be installed immediately after the water meter.
5. The post-development sanitary flow rate will be adequately handled by the proposed sanitary service.
6. The post-development increase in sanitary flow is expected to have an acceptable impact on the existing municipal sanitary sewer.
7. The proposed OGS will achieve the Rideau Valley Conservation Authority's recommended water quality target.

8. An Erosion & Sediment Control Plan has been developed to be implemented during construction.
9. The post-development reduction in stormwater flow is expected to have a positive impact on the existing municipal storm sewer.
10. The unrestricted flow rate during the 5-year event will be adequately handled by the proposed private storm sewer system.

Prepared by D.B. Gray Engineering Inc.



APPENDIX A

PRE-APPLICATION CONSULTATION MEETING NOTES

D.B. Gray Engineering Inc.

Ryan Faith <r.faith@dbgrayengineering.com>

FW: 3150 Woodroffe - engineering questions

1 message

Mariana Palos <Marianapalos@arbaum.com> Tue, Apr 12, 2022 at 11:03 AM
To: Douglas Gray <d.gray@dbgrayengineering.com>, Ryan Faith <r.faith@dbgrayengineering.com>
Cc: Andrea Buchsbaum <andreabuchsbaum@arbaum.com>

Good morning Doug and Ryan,

I forward you bellow, the email that I just received with the engineering requirements and specific criteria with regards the 3150 Woodroffe property.

Please, let us know what you think about it…

Kindly,

Mariana Palos

Arbaum Architects Inc.

www.arbaum.com

102 - 535 Legget Drive

Ottawa, Ontario K2K 3B8

Tel. 613 435 7148

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: April-12-22 10:47 AM
To: Mariana Palos <Marianapalos@arbaum.com>
Cc: Andrea Buchsbaum <andreabuchsbaum@arbaum.com>; Scaramozzino, Tracey <Tracey.Scaramozzino@ottawa.ca>
Subject: RE: 3150 Woodroffe - engineering questions

Good Morning, Mariana,

Yes, I have received the SWM criteria yesterday. I have prepared some general engineering requirement as well as site specific criteria, please forward them to your engineering consultant.

Please note the following information regarding the engineering design submissions for the above noted site:

1. The Servicing Study Guidelines for Development Applications are available at the following address:

https://link.edgepilot.com/s/03fbd79d/07kBi3jIPEy9tfRkOLBLcA?u=https://ottawa.ca/en/city-hall/planning-and-development/how-develop-property/development-application-review-process-2/guide-preparing-studies-and-plans

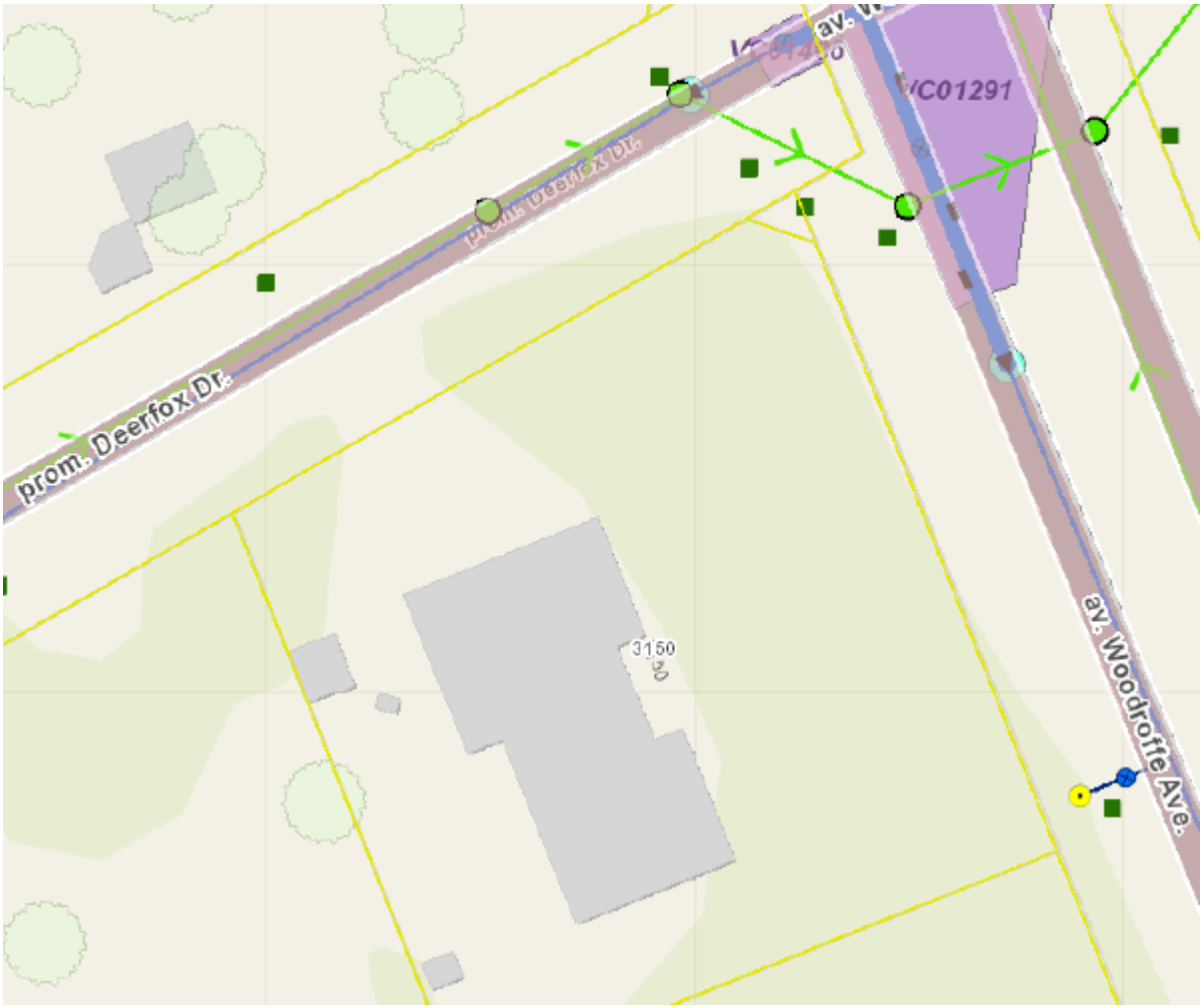
2. Servicing and site works shall be in accordance with the following documents:

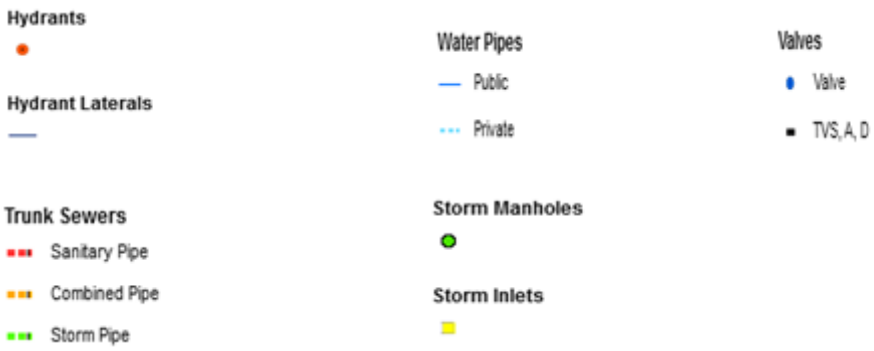
- Ottawa Sewer Design Guidelines (October 2012) and all the Technical Bulletins including, Technical Bulletin PIEDTB-2016-01 and ISTB-2018-01
- Ottawa Design Guidelines – Water Distribution (2010) and Technical Bulletins ISD-2010-2, ISDTB-2014-02 and ISTB-2018-02
- Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
- City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
- City of Ottawa Environmental Noise Control Guidelines (January, 2016)
- City of Ottawa Park and Pathway Development Manual (2012)
- City of Ottawa Accessibility Design Standards (2012)
- Ottawa Standard Tender Documents (latest version)
- Ontario Provincial Standards for Roads & Public Works (2013)

3. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x 44455
4. The Stormwater Management Criteria, for the subject site, is to be based on the following:

- Stormwater Management Criteria based on Clarke-Belanger Pond drainage area and must be controlled to 64 L/s/ha.
- The 2-yr storm or 5-yr storm event using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.
- For separated sewer system built pre-1970 the design of the storm sewers are based on a 2 year storm.
- The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3).
- A calculated time of concentration (Cannot be less than 10 minutes).
- Flows to the storm sewer in excess of the 5-year storm release rate, up to and including the 100-year storm event, must be detained on site.
- For a combined sewer system the maximum C= 0.4 or the pre-development C value, whichever is less. In the absence of other information the allowable release rate shall be based on a 2 year storm event.
- Please contact RVCA for specific water quality requirement.

5. Deep Services:





i. A plan view of the approximate services may be seen above. Services should ideally be grouped in a common trench to minimize the number of road cuts. The sizing of available future services is:

a. Connections (Deerfox Dr):

i. Existing 375 mm dia. STM (PVC)

ii. 200 mm dia. Watermain

iii. Need SAN extension from Stoneway Dr.

ii. Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.

iii. Connections to trunk sewers and easement sewers are typically not permitted.

iv. Provide information on the monitoring manhole requirements – should be located in an accessible location on private property near the property line (ie. Not in a parking area).

v. Review provision of a high-level sewer.

vi. Provide information on the type of connection permitted

Sewer connections to be made above the springline of the sewermain as per:

a. Std Dwg S11.1 for flexible main sewers – *connections made using approved tee or wye fittings.*

b. Std Dwg S11 (For rigid main sewers) – *lateral must be less that 50% the diameter of the sewermain,*

c. Std Dwg S11.2 (for rigid main sewers using bell end insert method) – *for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewermain,*

d. Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.

e. No submerged outlet connections.

6. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:

i. Location of service

ii. Type of development and the amount of fire flow required (as per FUS, 1999).

iii. Average daily demand: ___ l/s.

iv. Maximum daily demand: ___l/s.

v. Maximum hourly daily demand: ___ l/s.

vi. Hydrant location and spacing to meet City's Water Design guidelines.

vii. Water supply redundancy will be required for more than 50 m3/day water demand.

7. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.
8. MECP ECA Requirements –

All development applications should be considered for an Environmental Compliance Approval (ECA) by the Ministry of the Environment, Conservation, and Parks (MECP);

a. Consultant determines if an approval for sewage works under Section 53 of OWRA is required. Consultant then determines what type of application is required and the City's project manager confirms. (If the consultant is not clear if an ECA is required, they will work with the City to determine what is required. If the consultant it is still unclear or there is a difference of opinion only then will the City PM approach the MECP.

b. The project will be either transfer of review (standard), transfer of review (additional), direct submission, or exempt as per O. Reg. 525/98.

c. Pre-consultation is not required. d. Standard Works ToR Draft ECA's are sent to the local MECP office (moeccottawasewage@ontario.ca).for information only

d. Additional ToR draft ECAs require a project summary/design brief and require a response from the local MECP (10 business day window)

9. Water supply redundancy will be required for more than 50 m3/day water demand. Provide watermain looped connection or with isolation valve to meet this requirement. Looping from Deerfox Dr. to Woodroffe Ave. is not permitted because of the two different pressure zone.
10. Connection to backbone watermain is not permitted.

Thanks.

Sharif

From: Mariana Palos <Marianapalos@arbaum.com>
Sent: April 11, 2022 5:03 PM
To: Sharif, Golam <sharif.sharif@ottawa.ca>
Cc: Andrea Buchsbaum <andreabuchsbaum@arbaum.com>; Scaramozzino, Tracey <Tracey.Scaramozzino@ottawa.ca>
Subject: RE: 3150 Woodroffe - engineering questions

I was wondering if you had the chance to check the SWM requirement for the 3150 Woodroffe property as you mentioned.

We appreciate if you could confirm the information so we can give feedback to our civil engineers.

Thank so much you for your time.

Kindly,

Mariana Palos

Arbaum Architects Inc.

https://link.edgepilot.com/s/16288e4b/UmI2yHgQ1k2_4aRuZT_ggg?u=http://www.arbaum.com/

102 - 535 Legget Drive

Ottawa, Ontario K2K 3B8

Tel. 613 435 7148

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: April-07-22 4:34 PM
To: Scaramozzino, Tracey <Tracey.Scaramozzino@ottawa.ca>; Mariana Palos <Marianapalos@arbaum.com>
Cc: Andrea Buchsbaum <andreabuchsbaum@arbaum.com>
Subject: RE: 3150 Woodroffe - engineering questions

Hi Mariana,

I have the general servicing criteria for this area. However, there is a specific SWM requirement for this are as this area drain to South Nepean Park Pond and Champan Mills Sotrmwater Management Pond. I will double check those criteria and send you the information. I believe, Tracey already sent you the list of plans and reports. Thanks.

Sharif

From: Scaramozzino, Tracey <Tracey.Scaramozzino@ottawa.ca>
Sent: April 06, 2022 2:37 PM
To: Mariana Palos <Marianapalos@arbaum.com>; Sharif, Golam <sharif.sharif@ottawa.ca>
Cc: Andrea Buchsbaum <andreabuchsbaum@arbaum.com>
Subject: 3150 Woodroffe - engineering questions

Hi Mariana,

I will let Sharif respond to the engineering questions.

Regards,

Tracey

Get Outlook for Android

From: Mariana Palos <Marianapalos@arbaum.com>
Sent: Wednesday, April 6, 2022, 1:47 p.m.

To: Scaramozzino, Tracey <Tracey.Scaramozzino@ottawa.ca>
Cc: Andrea Buchsbaum <andreabuchsbaum@arbaum.com>; Sharif, Golam <sharif.sharif@ottawa.ca>
Subject: RE: 3150 Woodroffe - Site Plan Control application documents.

I hope this email finds you well.

With regards the 3150 Woodroffe Site application documents, the civil engineers are asking if there's any project specific criteria to follow with regards the project.

I was wondering if there's any meeting notes or observations from the City that you could share with us?

We would appreciate if we could have this kind of information so we can proceed in the correct direction.

Thank you.

Best Regards,

Mariana Palos

Arbaum Architects Inc.

https://link.edgepilot.com/s/36594bb8/2gabWREGoEi3s7mN_HbBqA?u=http://www.arbaum.com/

102 - 535 Legget Drive

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APPENDIX B

WATER SERVICING

D.B. Gray Engineering Inc.

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

700 Long Point Circle
Ottawa, Ontario K1T 4E9

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d.gray@dbgrayengineering.com

March 18, 2022

3150 Woodroffe Avenue

1-Storey Commercial Building

Ottawa, Ontario

FIRE FLOW CALCULATIONS

OBC Method

Q = 1,800 L/min as per OBC A-3.2.5.7. Table 2
= 30 L/s

Existing Conditions:						
30 L/s Fire Flow:	141.9	m				
Elevation at Fire Hydrant:	95.7	m				
Static Pressure at Fire Hydrant:	46.2	m	453	kPa	66	psi

SUC Zone Reconfiguration:						
30 L/s Fire Flow:	147.0	m				
Elevation at Fire Hydrant:	95.7	m				
Static Pressure at Fire Hydrant:	51.3	m	503	kPa	73	psi

D.B. Gray Engineering Inc.

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

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
d.gray@dbgrayengineering.com

March 18, 2022

3150 Woodroffe Avenue

1-Storey Commercial Building

Ottawa, Ontario

WATER DEMAND CALCULATIONS

Average Daily Demand:	0.3390	ha				
	28,000	L/ha/day				
	9,492	L/day				
	8	hour day				
	19.8	L/min	0.3	L/s	5.2	USgpm
Maximum Daily Demand:	1.5	(Peaking factor as per City of Ottawa Water Design Guidelines)				
	29.7	L/min	0.5	L/s	7.8	USgpm
Maximum Hourly Demand:	1.8	(Peaking factor as per City of Ottawa Water Design Guidelines)				
	53.4	L/min	0.9	L/s	14.1	USgpm

Existing Conditions:						
Elevation of Water Meter:	94.70	m				
Basement Floor Elevation:	93.80	m				
Minimum HGL:	141.7	m				
Static Pressure at Water Meter:	47.0	m	461	kPa	67	psi
Maximum HGL:	157.4	m				
Static Pressure at Water Meter:	62.7	m	615	kPa	89	psi

SUC Zone Reconfiguration:						
Elevation of Water Meter:	94.70	m				
Basement Floor Elevation:	93.80	m				
Minimum HGL:	145.6	m				
Static Pressure at Water Meter:	50.9	m	499	kPa	72	psi
Maximum HGL:	148.8	m				
Static Pressure at Water Meter:	54.1	m	530	kPa	77	psi

D.B. Gray Engineering Inc.

Ryan Faith <r.faith@dbgrayengineering.com>

RE: Request for Boundary Conditions - 3150 Woodroffe Avenue

1 message

Sharif, Golam <sharif.sharif@ottawa.ca> Fri, Mar 18, 2022 at 11:53 AM
To: Ryan Faith <r.faith@dbgrayengineering.com>

Hi Ryan,

Here is the requested boundary condition. Thanks.

Sharif

From: Ryan Faith <r.faith@dbgrayengineering.com>
Sent: March 17, 2022 1:46 PM
To: Sharif, Golam <sharif.sharif@ottawa.ca>
Cc: Douglas Gray <d.gray@dbgrayengineering.com>
Subject: Re: Request for Boundary Conditions - 3150 Woodroffe Avenue

Just wondering if this request is in the queue?

Regards,

On Fri, Feb 25, 2022 at 11:31 AM Ryan Faith <r.faith@dbgrayengineering.com> wrote:

> Hi Sharif,
>
> It is 3150 Woodroffe Avenue on the other side of Deerfox Drive.
>
> Regards,

On Fri, Feb 25, 2022 at 11:28 AM Sharif, Golam <sharif.sharif@ottawa.ca> wrote:

> Hi Ryan,
>
> Is this for the 3130 Woodroffe? Dentist? Or other side of the Deerfox Dr, 3150 Woodroffe?
>
> Sharif

From: Ryan Faith <r.faith@dbgrayengineering.com>
Sent: February 25, 2022 9:46 AM
To: Sharif, Golam <sharif.sharif@ottawa.ca>
Cc: Douglas Gray <d.gray@dbgrayengineering.com>
Subject: Request for Boundary Conditions - 3150 Woodroffe Avenue

Please provide the boundary conditions for the 200 mm Deerfox Drive watermain at 3150 Woodroffe Avenue. We have calculated the following expected demands:

Average daily demand: 0.3 L/s

Maximum daily demand: 0.5 L/s

Maximum hourly demand: 0.9 L/s

Water demand calculations are attached.

Fire flow demand: 30 L/s (OBC)

Fire flow + maximum daily demand: 30.5 L/s

As per OBC A-3.2.5.7. Table 2, the required fire flow for the 1-storey, 400 sq.m building was determined to be 1,800 L/min (30 L/s).

Thanks,

'

'

'

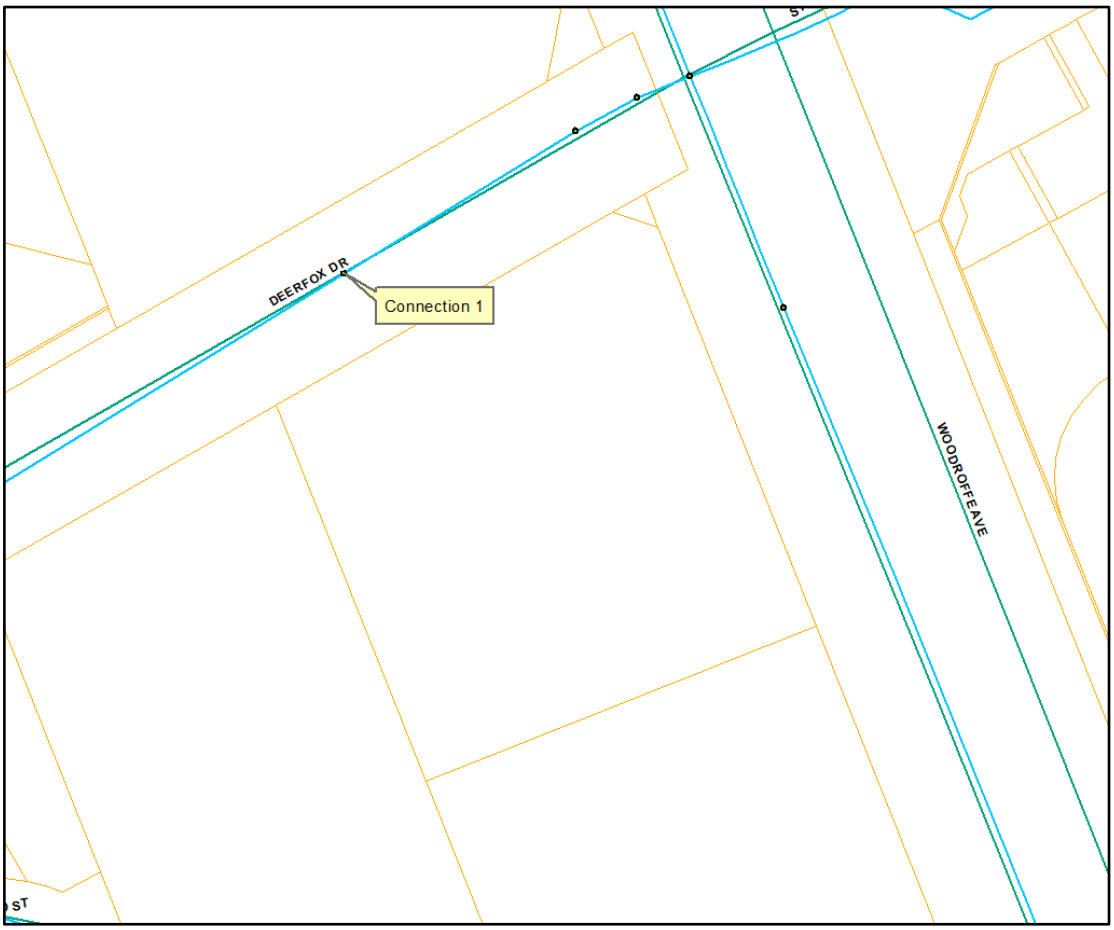
3150 Woodroffe Avenue_17Mar2022.docx
62K

Boundary Conditions
3150 Woodroffe Avenue

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	18	0.30
Maximum Daily Demand	30	0.50
Peak Hour	54	0.90
Fire Flow Demand #1	1,800	30.00

Location



Results – Existing Conditions

Connection 1 – Deerfox Dr.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	157.4	89.8
Peak Hour	141.7	67.5
Max Day plus Fire 1	141.9	67.8

Ground Elevation = 94.2 m

Results – SUC Zone Reconfiguration

Connection 1 – Deerfox Dr.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	148.8	77.6
Peak Hour	145.6	73.2
Max Day plus Fire 1	147.0	75.0

Ground Elevation = 94.2 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.

APPENDIX C

SANITARY SERVICING

D.B. Gray Engineering Inc.

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

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
d.gray@dbgrayengineering.com

SANITARY SEWER CALCULATIONS

Project: 3150 Woodroffe Avenue
1-Storey Commercial Building
Ottawa, Ontario

Date: June 2, 2022

Residential Average Daily Flow:	280	L/capita/day	Residential Peaking Factor:	Harmon Formula
Commercial Average Daily Flow:	28,000	L/ha/day	Harmon Formula Correction Factor:	0.8
Institutional Average Daily Flow:	28,000	L/ha/day	Commercial Peaking Factor:	1.5
Light Industrial Average Daily Flow:	35,000	L/ha/day	Institutional Peaking Factor:	1.5
Heavy Industrial Average Daily Flow:	55,000	L/ha/day	Industrial Peaking Factor:	Ministry of the Environment
Infiltration Allowance:	0.33	L/s/ha	Manning's Roughness Coefficient:	0.013

		Residential													Commercial				Infiltration			Q	Sewer Data						
		Individual									Cumulative				Individual	Cumulative			Individual	Cumulative		Total							
Location		Single	Semi		Apartment	Apartment	Apartment	Apartment	Area	Population	Area	Population	Peaking	Flow Rate	Area	Area	Peaking	Flow Rate	Area	Area	Flow Rate	Flow Rate	Length	Nominal Diameter	Actual Diameter	Slope	Velocity	Q_{Full} Capacity	
From	To	Family	Detached	Duplex	(1 Bed)	(2 Bed)	(3 Bed)	(Average)	(ha)		(ha)		Factor	(L/s)	(ha)	(ha)	Factor	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(m)	(mm)	(mm)	(%)	(m/s)	(L/s)	Q / Q_{Full}
		ppu = 3.4	ppu = 2.7	ppu = 2.3	ppu = 1.4	ppu = 2.1	ppu = 3.1	ppu = 1.8																					
Proposed Building	Future 250 SAN														0.3390	0.3390	1.5	0.16	0.3390	0.3390	0.11	0.28	26.5	150	150	1.5	1.06	18.65	0.01
																							Future 250 mm Deerfox Drive Sanitary Sewer:	250	250	0.60	0.94	46.06	

APPENDIX D

STORMWATER MANAGEMENT

D.B. Gray Engineering Inc.

Ryan Faith <r.faith@dbgrayengineering.com>

RE: RVCA Stormwater Management Comments - 3150 Woodroffe Avenue

1 message

Eric Lalande <eric.lalande@rvca.ca> Tue, Apr 19, 2022 at 5:01 PM
To: Ryan Faith <r.faith@dbgrayengineering.com>

Hi Ryan,

Based on the proposed site plan, the RVCA will require enhanced water quality protection (80% TSS removal) be provided on-site.

Thank you,

Eric Lalande, MCIP, RPP

Planner, RVCA

613-692-3571 x1137

From: Ryan Faith <r.faith@dbgrayengineering.com>
Sent: Tuesday, April 19, 2022 4:51 PM
To: Eric Lalande <eric.lalande@rvca.ca>
Cc: Douglas Gray <d.gray@dbgrayengineering.com>
Subject: RVCA Stormwater Management Comments - 3150 Woodroffe Avenue

Hi Eric,

We are working on a proposed 1 storey commercial building on 3390 sq.m of land at 3150 Woodroffe Avenue in Ottawa.

Please comment on the stormwater management for the site.

I have attached a site plan for your reference.

Thanks,

Ryan Faith

D.B. Gray Engineering Inc.

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

700 Long Point Circle 613-425-8044
Ottawa, Ontario r.faith@dbgrayengineering.com

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

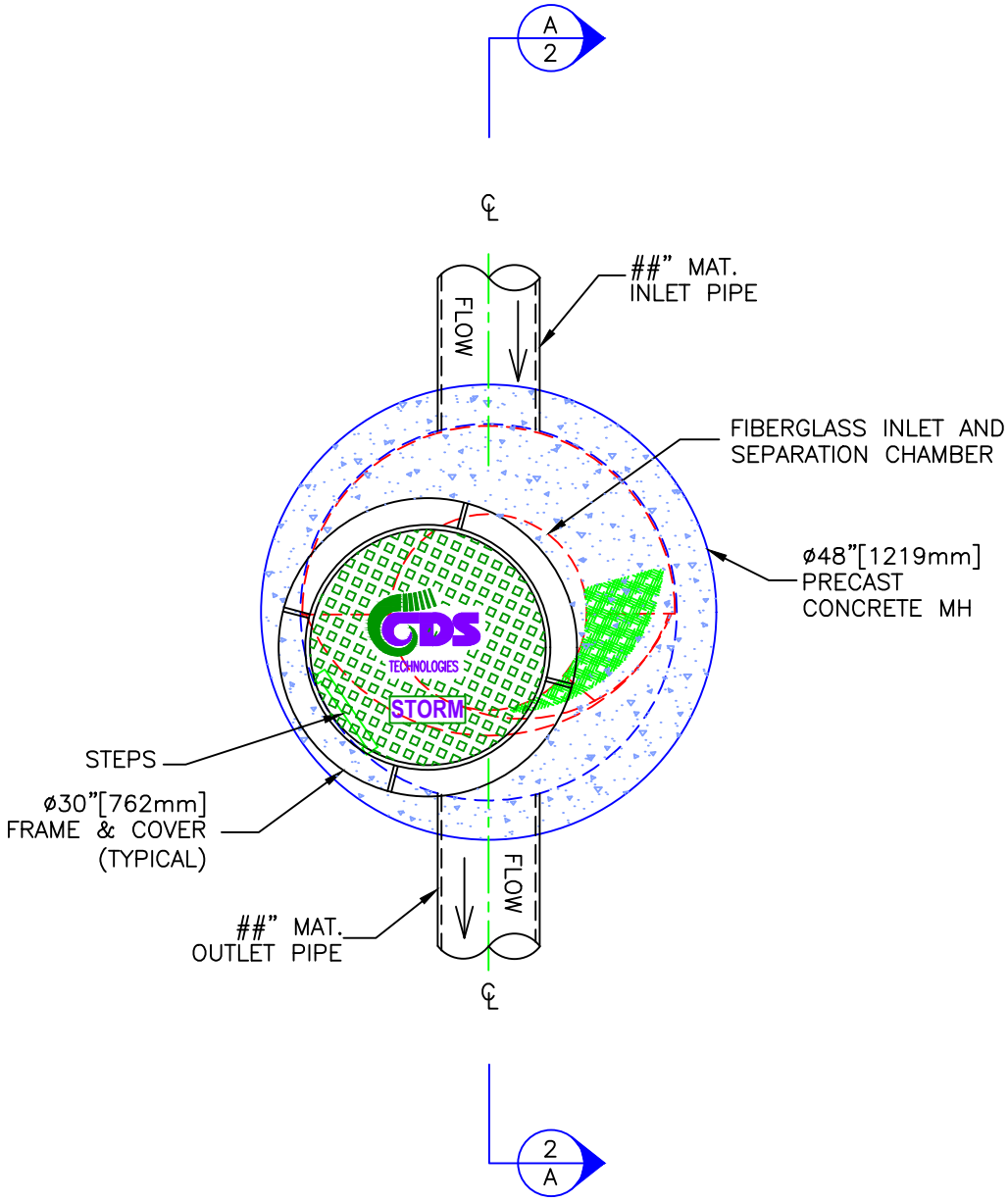
Project Name:	3150 Woodroffe Ave	**Engineer:**	**D.B. Gray Engineering Inc.**
Location:	Ottawa, ON	**Contact:**	R. Faith
OGS #:	OGS	**Report Date:**	11-May-22

Area	0.196	ha	**Rainfall Station #**	215	
Weighted C	0.66		**Particle Size Distribution**	FINE	
CDS Model	2015-4		**CDS Treatment Capacity**	20	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.5	9.2%	9.2%	0.2	0.2	0.9	98.6	9.0
1.0	10.6%	19.8%	0.4	0.4	1.8	98.3	10.4
1.5	9.9%	29.7%	0.5	0.5	2.7	98.1	9.7
2.0	8.4%	38.1%	0.7	0.7	3.6	97.8	8.2
2.5	7.7%	45.8%	0.9	0.9	4.5	97.6	7.5
3.0	5.9%	51.7%	1.1	1.1	5.4	97.3	5.8
3.5	4.4%	56.1%	1.3	1.3	6.3	97.0	4.2
4.0	4.7%	60.7%	1.4	1.4	7.3	96.8	4.5
4.5	3.3%	64.0%	1.6	1.6	8.2	96.5	3.2
5.0	3.0%	67.1%	1.8	1.8	9.1	96.3	2.9
6.0	5.4%	72.4%	2.2	2.2	10.9	95.7	5.2
7.0	4.4%	76.8%	2.5	2.5	12.7	95.2	4.1
8.0	3.5%	80.3%	2.9	2.9	14.5	94.7	3.4
9.0	2.8%	83.2%	3.2	3.2	16.3	94.2	2.7
10.0	2.2%	85.3%	3.6	3.6	18.1	93.7	2.0
15.0	7.0%	92.3%	5.4	5.4	27.2	91.1	6.4
20.0	4.5%	96.9%	7.2	7.2	36.3	88.5	4.0
25.0	1.4%	98.3%	9.0	9.0	45.4	85.9	1.2
30.0	0.7%	99.0%	10.8	10.8	54.4	83.3	0.6
35.0	0.5%	99.5%	12.6	12.6	63.5	80.7	0.4
40.0	0.5%	100.0%	14.4	14.4	72.6	78.1	0.4
45.0	0.0%	100.0%	16.2	16.2	81.6	75.5	0.0
50.0	0.0%	100.0%	18.0	18.0	90.7	72.9	0.0
							95.9
						Removal Efficiency Adjustment[2] =	6.5%
						Predicted Net Annual Load Removal Efficiency =	**89.4%**
						Predicted % Annual Rainfall Treated =	**100.0%**

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

PLAN VIEW

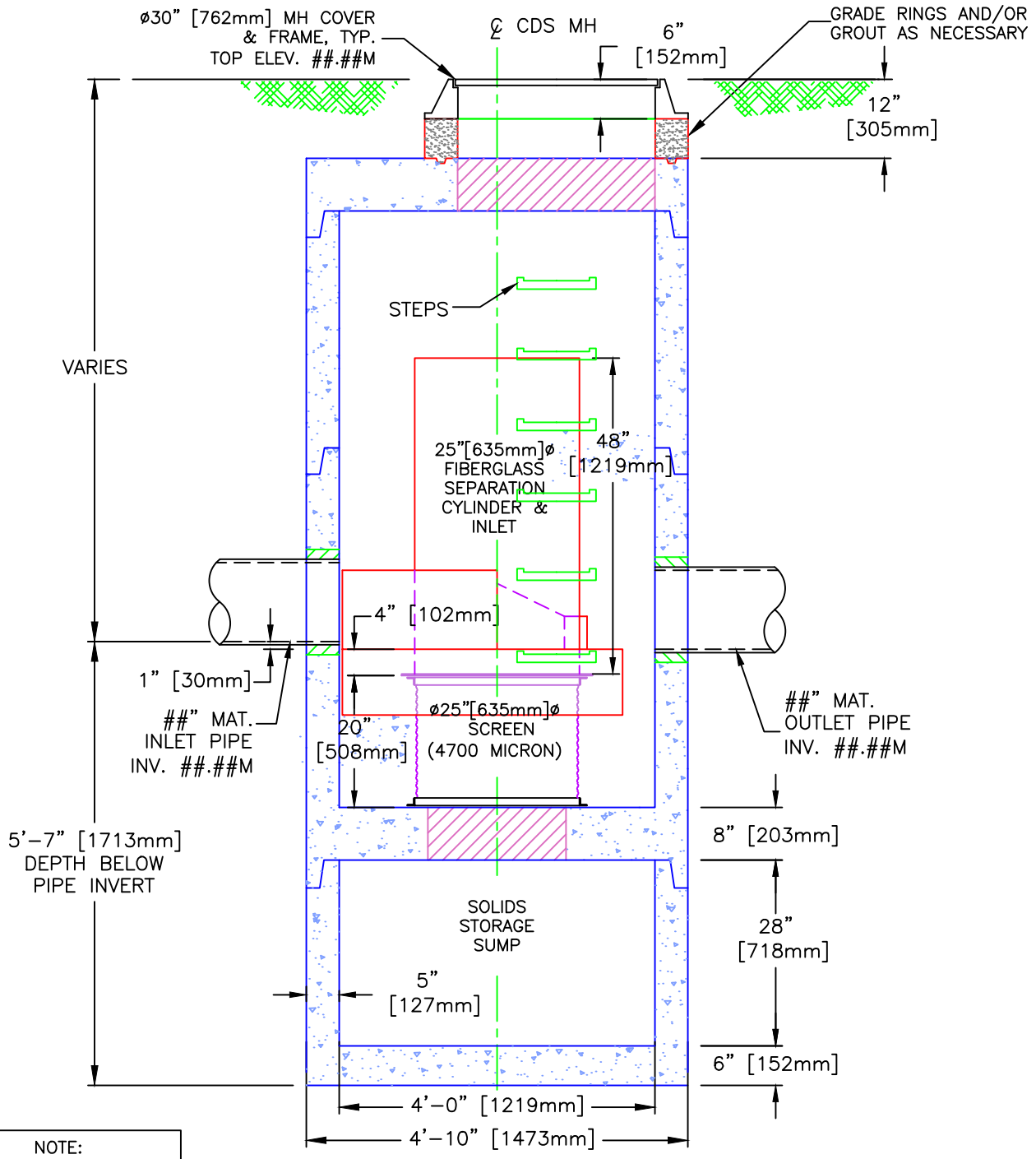


CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, PROVINCE	JOB# XX-##-###	SCALE 1" = 2'
		DATE ##/##/##	SHEET 1
		DRAWN INITIALS	
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

SECTION A–A
ELEVATION VIEW



NOTE:
CONTRACTOR TO FIELD VERIFY DIMENSIONS OF OR CONCRETE SECTIONS

CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS

PROJECT NAME
CITY, PROVINCE

JOB#	XX–##–###	SCALE 1" = 2'
DATE	##/##/##	SHEET 2
DRAWN	INITIALS	
APPROV.		

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

SUMMARY TABLES

ONE HUNDRED YEAR EVENT

Drainage Area	Pre-Development Flow Rate (L/s)	Target Release Rate (L/s)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	-	15.39	-	-
AREA II	-	-	6.00	75.29	75.29
TOTAL	69.40	15.01	21.38	75.29	75.29

FIVE YEAR EVENT

Drainage Area	Pre-Development Flow Rate (L/s)	Target Release Rate (L/s)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	-	9.34	-	-
AREA II	-	-	3.87	37.03	37.03
TOTAL	34.80	15.01	13.21	37.03	37.03

June 2, 2022

3150 Woodroffe Avenue

Ottawa, Ontario

STORMWATER MANAGEMENT CALCULATIONS

Modified Rational Method

PRE-DEVELOPMENT CONDITIONS

ONE HUNDRED YEAR EVENT

			C
Roof Area:	430	sq.m	1.00
Asphalt/Concrete Area:	400	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Flat Woodland Area:	1,515	sq.m	0.375
Total Catchment Area:	2,345	sq.m	0.60

Bransby Williams Formula

$$Tc = \frac{0.057 \bullet L}{Sw^{0.2} \bullet A^{0.1}} \text{ min}$$

Sheet Flow Distance (L):	30	m
Slope of Land (Sw):	5	%
Area (A):	0.2345	ha
Time of Concentration (Sheet Flow):	1	min
Area (A):	2,345	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	179	mm/hr
Runoff Coeficient (C):	0.60	
100 Year Pre-Development Flow Rate (2.78AiC):	69.40	L/s

FIVE YEAR EVENT

			C
Roof Area:	430	sq.m	0.90
Asphalt/Concrete Area:	400	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Flat Woodland Area:	1,515	sq.m	0.30
Total Catchment Area:	2,345	sq.m	0.51

Area (A):	2,345	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	104	mm/hr
Runoff Coeficient (C):	0.51	
5 Year Pre-Development Flow Rate (2.78AiC):	34.80	L/s

TARGET RELEASE RATE

Area (A):	2,345	sq.m
Release Rate:	64	L/s/ha
Target Release Rate:	15.01	L/s

ONE HUNDRED YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	40	sq.m	1.00
Asphalt/Concrete Area:	225	sq.m	1.00
Permeable Pavers Area:	120	sq.m	0.375
Landscaped Area:	0	sq.m	0.25
Total Catchment Area:	385	sq.m	0.81
Area (A):	385	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coeficient (C):	0.81		
Flow Rate (2.78AiC):	15.39	L/s	

DRAINAGE AREA II

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	390	sq.m	1.00
Asphalt/Concrete Area:	855	sq.m	1.00
Permeable Pavers Area:	380	sq.m	0.375
Landscaped Area:	335	sq.m	0.25
Total Catchment Area:	1,960	sq.m	0.75

Water Elevation:	94.64	m
Head:	2.33	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-7)	92.31	m
Invert of Outlet Pipe of CB/MH-7:	92.27	m
Orifice Diameter:	75	mm
Orifice Area:	4,418	sq.mm
Discharge Coefficient:	0.20	
Maximum Release Rate:	6.00	L/s

DRAINAGE AREA II (Continued)

(ONE HUNDRED YEAR EVENT)

Chamber Storage

# Chambers	Volume Per Chamber	# End Caps	Volume Per End Cap	Rows	Chamber & End Cap Length	Chamber & End Cap Volume
11	3.22	2	0.43	1	24.913	36.28

Clear Stone Storage

Clear Stone Length	Clear Stone Width	Clear Stone Storage Depth	Clear Stone Volume	40% Voids
25.513	2.576	1.460	59.673	23.87

CB/MH Storage

CB/MH	Invert	Size	Volume
CB-1	93.60	0.61	0.39
DI-2	93.42	0.61	0.45
CB/MH-3	93.49	1.219	1.34
CB/MH-4	93.24	1.219	1.63
CB-5	92.58	0.61	0.77
CB/MH-6	92.37	1.219	2.65
CB/MH-7	92.27	1.219	2.77

Pipe Storage

From	Invert	To	Invert	Length	Dia.	Volume
CB-1	93.60	CB/MH-3	93.55	10.6	0.25	0.52
DI-2	93.42	Tee	93.37	10.6	0.25	0.52
CB/MH-3	93.49	CB/MH-4	93.30	43.7	0.25	2.15
CB/MH-4	93.24	CB/MH-7	93.13	25.1	0.25	1.23
CB-5	92.58	CB/MH-6	92.38	5.5	0.25	0.27
CB/MH-6	92.37	CB/MH-7	92.33	9.3	0.25	0.46

Maximum Volume Stored: 75.29 cu.m

Maximum Volume Required: 75.29 cu.m

DRAINAGE AREA II (Continued)

(ONE HUNDRED YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	50% Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	179	73.03	3.00	70.03	42.02
15	143	58.44	3.00	55.45	49.90
20	120	49.06	3.00	46.06	55.28
25	104	42.47	3.00	39.48	59.21
30	92	37.57	3.00	34.58	62.24
35	83	33.78	3.00	30.78	64.63
40	75	30.73	3.00	27.74	66.57
45	69	28.24	3.00	25.24	68.16
50	64	26.16	3.00	23.16	69.48
55	60	24.39	3.00	21.39	70.58
60	56	22.86	3.00	19.86	71.51
65	53	21.53	3.00	18.54	72.29
70	50	20.36	3.00	17.37	72.94
75	47	19.33	3.00	16.33	73.49
80	45	18.40	3.00	15.40	73.94
85	43	17.57	3.00	14.57	74.31
90	41	16.81	3.00	13.82	74.61
95	39	16.13	3.00	13.13	74.85
100	38	15.50	3.00	12.51	75.03
105	36	14.93	3.00	11.93	75.16
110	35	14.40	3.00	11.40	75.24
115	34	13.91	3.00	10.91	75.28
120	33	13.45	3.00	10.46	75.29
125	32	13.03	3.00	10.03	75.26
130	31	12.64	3.00	9.64	75.19
135	30	12.27	3.00	9.27	75.10
140	29	11.92	3.00	8.93	74.98
145	28	11.60	3.00	8.60	74.83
150	28	11.29	3.00	8.30	74.66
180	24	9.78	3.00	6.78	73.21
210	21	8.65	3.00	5.65	71.20
240	19	7.77	3.00	4.78	68.77
270	17	7.07	3.00	4.08	66.03
300	16	6.50	3.00	3.50	63.04

FIVE YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(FIVE YEAR EVENT)

			C
Roof Area:	40	sq.m	0.90
Asphalt/Concrete Area:	225	sq.m	0.90
Gravel Area:	120	sq.m	0.70
Landscaped Area:	0	sq.m	0.20
Total Catchment Area:	385	sq.m	0.84
Area (A):	385	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	104	mm/hr	
Runoff Coeficient (C):	0.84		
Flow Rate (2.78AiC):	9.34	L/s	

DRAINAGE AREA II

(FIVE YEAR EVENT)

			C
Roof Area:	390	sq.m	0.90
Asphalt/Concrete Area:	855	sq.m	0.90
Permeable Pavers Area:	380	sq.m	0.30
Landscaped Area:	335	sq.m	0.20
Total Catchment Area:	1,960	sq.m	0.66

Water Elevation:	93.28	m
Head:	0.97	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-7)	92.31	m
Invert of Outlet Pipe of CB/MH-7:	92.27	m
Orifice Diameter:	75	mm
Orifice Area:	4,418	sq.mm
Discharge Coefficient:	0.20	
Maximum Release Rate:	3.87	L/s

DRAINAGE AREA II (Continued)

(FIVE YEAR EVENT)

Chamber Storage

AutoCAD Chamber Area	Chamber & End Cap Length	Chamber & End Cap Volume
1.07	24.913	26.66

Clear Stone Storage

Clear Stone Length	Clear Stone Width	Clear Stone Storage Depth	Clear Stone Volume	40% Voids
25.513	2.576	0.659	16.680	6.67

CB/MH Storage

CB/MH	Invert	Size	Volume
CB-1	93.60	0.61	0.00
DI-2	93.42	0.61	0.00
CB/MH-3	93.49	1.219	0.00
CB/MH-4	93.24	1.219	0.05
CB-5	92.58	0.61	0.26
CB/MH-6	92.37	1.219	1.06
CB/MH-7	92.27	1.219	1.18

Pipe Storage

From	Invert	To	Invert	Length	Dia.	Volume
CB-1	93.60	CB/MH-3	93.55	10.6	0.25	0.00
DI-2	93.42	Tee	93.37	10.6	0.25	0.00
CB/MH-3	93.49	CB/MH-4	93.30	43.7	0.25	0.00
CB/MH-4	93.24	CB/MH-7	93.13	25.1	0.25	0.43
CB-5	92.58	CB/MH-6	92.38	5.5	0.25	0.27
CB/MH-6	92.37	CB/MH-7	92.33	9.3	0.25	0.46

Maximum Volume Stored: 37.03 cu.m

Maximum Volume Required: 37.03 cu.m

DRAINAGE AREA II (Continued)

(FIVE YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	50% Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	104	37.70	1.93	35.76	21.46
15	84	30.23	1.93	28.30	25.47
20	70	25.42	1.93	23.48	28.18
25	61	22.03	1.93	20.10	30.15
30	54	19.51	1.93	17.58	31.64
35	49	17.55	1.93	15.62	32.80
40	44	15.99	1.93	14.05	33.72
45	41	14.70	1.93	12.77	34.47
50	38	13.62	1.93	11.69	35.07
55	35	12.71	1.93	10.77	35.55
60	33	11.92	1.93	9.98	35.94
65	31	11.23	1.93	9.30	36.26
70	29	10.63	1.93	8.69	36.51
75	28	10.09	1.93	8.16	36.70
80	27	9.61	1.93	7.68	36.84
85	25	9.18	1.93	7.24	36.94
90	24	8.79	1.93	6.85	37.01
95	23	8.43	1.93	6.50	37.03
100	22	8.11	1.93	6.17	37.03
105	22	7.81	1.93	5.87	37.01
110	21	7.53	1.93	5.60	36.95
115	20	7.28	1.93	5.34	36.88
120	19	7.04	1.93	5.11	36.78
125	19	6.82	1.93	4.89	36.67
130	18	6.62	1.93	4.68	36.54
135	18	6.43	1.93	4.49	36.39
140	17	6.25	1.93	4.31	36.23
145	17	6.08	1.93	4.14	36.05
150	16	5.92	1.93	3.99	35.87
180	14	5.13	1.93	3.20	34.51
210	13	4.54	1.93	2.61	32.86
240	11	4.09	1.93	2.15	30.98
270	10	3.72	1.93	1.79	28.94
300	9	3.42	1.93	1.49	26.76

D.B. Gray Engineering Inc.

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

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
d.gray@dbgrayengineering.com

STORM SEWER CALCULATIONS

Rational Method

FIVE YEAR EVENT

Project: 3150 Woodroffe Avenue
1-Storey Commercial Building
Ottawa, Ontario

Date: June 2, 2022

Manning's Roughness Coefficient: 0.013

Location		Individual					Cumulative				Sewer Data							
		Roof C = 0.90	Hard C = 0.90	Permeable C = 0.30	Soft C = 0.20			Time	Rainfall Intensity	Flow Rate	Length	Nominal Diameter	Actual Diameter	Slope	Velocity	Q_{Full} Capacity	Time	
From	To	(ha)	(ha)	(ha)	(ha)	2.78AC	2.78AC	(min)	(mm/hr)	(L/s)	(m)	(mm)	(mm)	(%)	(m/s)	(L/s)	(min)	Q / Q_{Full}
CB-1	CB/MH-3	0.0100	0.0205		0.0195	0.0872	0.0872	10.00	104	9.08	10.6	250	250	0.43	0.79	39.00	0.22	0.23
DI-2	CB/MH-3	0.0090	0.0065		0.0065	0.0424	0.0424	10.00	104	4.42	10.6	250	250	0.43	0.79	39.00	0.22	0.11
CB/MH-3	CB/MH-4						0.1295	10.22	103	13.35	43.7	250	250	0.43	0.79	39.00	0.92	0.34
CB/MH-4	CB/MH-7						0.1295	11.14	99	12.77	25.1	250	250	0.43	0.79	39.00	0.53	0.33
CB-5	CB/MH-6	0.0200	0.0585	0.0380	0.0075	0.2323	0.2323	10.00	104	24.20	5.5	250	250	3.5	2.27	111.25	0.04	0.22
CB/MH-6	CB/MH-7						0.2323	10.04	104	24.15	9.3	250	250	0.43	0.79	39.00	0.20	0.62
CB/MH-7	MH-8						0.3618	11.67	96	34.79	4.5	250	250	0.43	0.79	39.00	0.09	0.89
							Flow through inlet control device:			3.87	4.5	250	250	0.43	0.79	39.00	0.09	0.10
MH-8	MH-A						0.3618	11.76	96	34.64	17.8	250	250	0.43	0.79	39.00	0.37	0.89
								Restricted upstream flow:		3.87	17.8	250	250	0.43	0.79	39.00	0.37	0.10
											Existing 375 mm Deerfox Drive Storm Sewer:	375	375	1.3	1.81	199.91		

APPENDIX E

DEVELOPMENT SERVICING STUDY CHECKLIST

GENERAL

Executive Summary: **N/A**

Date and revision number of report: **Included**

Location map and plan showing municipal address, boundary and layout of proposed development: **Included**

Plan showing site and location of all existing services: **Included**

Development statistics, land use, density, adherence to zoning and Official Plan and reference to applicable watershed and subwatershed plans: **N/A**

Summary of Pre-Application Consultation meetings with City of Ottawa and other approval agencies: **Included**

Confirmation of conformance with higher level studies: **N/A**

Statement of objectives and servicing criteria: **Included**

Identification of existing and proposed infrastructure available in the immediate area: **Included**

Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development: **N/A**

Concept level master grading plan to confirm existing and proposed grades in the proposed development: **Included**

Identification of potential impacts of proposed piped services on private services on adjacent lands: **N/A**

Proposed phasing of proposed development: **N/A**

Reference to geotechnical studies: **Included**

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

- Metric scale: **Included**
- North arrow: **Included**
- Key plan: **Included**
- Property limits: **Included**
- Existing and proposed structures and parking areas: **Included**
- Easements, road widenings and right-of-ways: **Included**
- Street names: **Included**

WATER SERVICING

Confirmation of conformance with Master Servicing Study: **N/A**

Availability of public infrastructure to service proposed development: **Included**

Identification of system constraints: **Included**

Identification of boundary conditions: **Included**

Confirmation of adequate domestic supply: **Included**

Confirmation of adequate fire flow: **Included**

Check of high pressures: **Included**

Definition of phasing constraints: **N/A**

Address reliability requirements: **N/A**

Check on necessity of a pressure zone boundary modification: **N/A**

Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for proposed development: **Included**

Description of proposed water distribution network: **Included**

Description of required off-site infrastructure to service proposed development: **N/A**

Confirmation that water demands are calculated based on the City of Ottawa Water Design Guidelines: **Included**

Provision of a model schematic showing the boundary conditions locations, streets, parcels and building locations: **Included**

SANITARY SERVICING

Summary of proposed design criteria: **Included**

Confirmation of conformance with Master Servicing Study: **N/A**

Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the City of Ottawa Sewer Design Guidelines: **N/A**

Description of existing sanitary sewer available for discharge of wastewater from proposed development: **Included**

Verification of available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service proposed development: **N/A**

Calculations related to dry-weather and wet-weather flow rates: **Included**

Description of proposed sewer network: **Included**

Discussion of previously identified environmental constraints and impact on servicing: **N/A**

Impacts of proposed development on existing pumping stations or requirements for new pumping station: **N/A**

Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity: **N/A**

Identification and implementation of emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding: **N/A**

Special considerations (e.g. contamination, corrosive environment): **N/A**

STORMWATER MANAGEMENT & STORM SERVICING

Description of drainage outlets and downstream constraints: **Included**

Analysis of available capacity in existing public infrastructure: **N/A**

Plan showing subject lands, its surroundings, receiving watercourse, existing drainage pattern and proposed drainage pattern: **Included**

Water quantity control objective: **Included**

Water quality control objective: **Included**

Description of the stormwater management concept: **Included**

Setback from private sewage disposal systems: **N/A**

Watercourse and hazard lands setbacks: **N/A**

Record of pre-consultation with the Ministry of the Environment, Conservation and Parks and the Conservation Authority having jurisdiction on the affected watershed: **Included**

Confirmation of conformance with Master Servicing Study: **N/A**

Storage requirements and conveyance capacity for minor events (5-year return period) and major events (100-year return period): **Included**

Identification of watercourses within the proposed development and how watercourses will be protected or if necessary altered by the proposed development: **N/A**

Calculation of pre-development and post-development peak flow rates: **Included**

Any proposed diversion of drainage catchment areas from one outlet to another: **N/A**

Proposed minor and major systems: **Included**

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: **N/A**

Identification of potential impacts to receiving watercourses: **N/A**

Identification of municipal drains: **N/A**

Description of how the conveyance and storage capacity will be achieved for the proposed development: **Included**

100-year flood levels and major flow routing: **Included**

Inclusion of hydraulic analysis including hydraulic grade line elevations: **N/A**

Description of erosion and sediment control during construction: **Included**

Obtain relevant floodplain information from Conservation Authority: **N/A**

Identification of fill constraints related to floodplain and geotechnical investigation: **N/A**

APPROVAL AND PERMIT REQUIREMENTS

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 the 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: **N/A**

Application for Certificate of Approval (CofA) under the Ontario Water Resources Act: **N/A**

Changes to Municipal Drains: **N/A**

Other permits (e.g. National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation): **N/A**

CONCLUSIONS

Clearly stated conclusions and recommendations: **Included**

Comments received from review agencies: **N/A**

Signed and stamped by a professional Engineer registered in Ontario: **Included**