Elgin Park Redevelopment
287-327 Elgin Street East
Coburg, Ontario

FUNCTIONAL SERVICING & STORMWATER MANAGEMENT REPORT

Prepared for:

Barry Bryan Associates

Prepared by:

MGM Consulting Inc.
400 Bronte Street South
Suite 201
Milton, Ontario
L9T 0H7

File No. 2020-034

Date: March 29, 2021

Table of Contents

1. INTRODUCTION 2

2. EXISTING CONDITIONS AND DEVELOPMENT LIMITS 2

3. PROPOSED DEVELOPMENT SCENARIO 2

4. PROPOSED GRADING AND DRAINAGE 3

5. PROPOSED STORMWATER MANAGEMENT 3

5.1 Proposed Minor Storm System 3

5.2 Proposed Major Storm System 4

5.3 Proposed Stormwater Rate Controls and Site Storage 4

5.4 Proposed Storm Water Quality Controls 5

6. SEDIMENT AND EROSION CONTROLS DURING CONSTRUCTION 5

7. PROPOSED SANITARY SERVICING 6

8. PROPOSED WATER SERVICING 6

9. SUMMARY 7

Figures

Figure No 1 – Existing Drainage Areas

Figure No 2 – Proposed Drainage Areas

Appendices

Appendix A – Stormwater Management Calculations

Appendix B – Water Demand & Fire Calculations

Appendix C – Treatment Unit Sizing Report

Appendix D – Sanitary Design Calculations

Appendix E – Project Coordination

Plans

Drawing CV 1 – Erosion & Sediment Control Plan

Drawing CV 2 – Proposed Site Servicing Plan

Drawing CV-3 – Proposed Site Grading Plan

Drawing CV-4 – Details Plan 1

Drawing CV-5 – Details Plan 2

555 Industrial Drive, Suite 201, Milton, Ontario L5T 5E1
Tel: (905) 567-8678 email: mgm@mgm.on.ca Fax: (905) 875-1339

1. INTRODUCTION

MGM Consulting Inc. has been retained by Barry Bryan Associates to prepare a Functional Servicing and Stormwater Report to address the site-specific infrastructure required to support a proposed Site Plan Application for redevelopment of a property located at 287-327 Elgin Street East in the Town of Cobourg.

The legal description of the subject lands is Part of Lots 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94 & 95, Registered Plan No 227, Town of Cobourg, County of Northumberland.

2. EXISTING CONDITIONS AND DEVELOPMENT LIMITS

The subject site has a pre-development area in the order of 0.796 ha. The site abuts existing residential lots along its south and east limits, Elgin Street E. to the north and D'Arcy Street to the west. The site is currently developed with two storey semi-detached residential houses with independent entrances off of Elgin Street E. for each household unit. Storm runoff from the front yards of the houses currently sheet flows to the Elgin Street right of way. Storm runoff from the rear yards is divided with a portion convey to an existing catchbasin located at the south-west corner of the site which is currently connected to the municipal storm sewer on D'Arcy Street and the remaining drainage conveyed to the east to the south-east corner of the site.

The site is contributory to northwest of Midtown Creek watershed and under the jurisdiction of Ganaraska Region Conservation Authority (GRCA). Site topographic survey has been provided to GRCA staff for review and the site perimeter elevation is below the regulatory water surface elevation in this area. Coordination with GRCA staff is included in **Appendix E**.

The existing site drainage areas are indicated in Figure No. 1.

3. PROPOSED DEVELOPMENT SCENARIO

Following road widening of Elgin St. and D'arcy St, the proposed development has an area in the order of 0.668ha. The proposed development includes for the demolition of all existing houses and the construction of four 2-storey residential building along the north side and surface parking areas along the south side of the site with two vehicular accesses off of Elgin Street. Where roofs drain toward the rear of the buildings, rainwater leaders will be directed to small infiltration pit.

All existing sanitary lateral connection service the existing buildings shall be capped at the property line and all existing watermain service connection shall be capped the mainline as per regional standard.

4. PROPOSED GRADING AND DRAINAGE

The proposed site grading will take into account the existing topography, perimeter elevations, as required to accommodate the proposed building finish floor elevation, provide safe vehicular and pedestrian access and to provide minimum cover on storm servicing as required for frost protection. Slopes within the paved areas of the site will typically be set between 1% and 5%. Grading will also be completed such that majority of the storm drainage from the development area will be contained with storm runoff being conveyed to proposed on site catchbasins, swales, and an internal storm system, outletting to the existing storm sewer within the D'arcy Street right of way. Drainage off of building roofs will be conveyed to landscaped areas of the site via rainwater leaders.

As indicated in Section 3.0, a portion of the rear roofs will be directed to infiltration pits. Redirection of clean roof water will promote groundwater recharge. An overflow from the pits will redirect storm flows to the proposed private storm sewer in the event the pits are full.

Proposed site grading is indicated on the Site Grading Plan, Drawing No. CV-2.

Emergency overland during severe storm events, or when an outlet is blocked, will be to Elgin Street right of way at an elevation of 99.00 m through the east vehicular access.

5. PROPOSED STORMWATER MANAGEMENT

Proposed storm water management controls for the site have been completed based on the proposed redevelopment area of 0.668ha. The following summarizes the proposed minor and major storm drainage systems, and the stormwater management features proposed for the subject site. Detailed calculations supporting the selection of proposed storm servicing and stormwater management are included in **Appendix A**.

Water Quantity Storage Requirements

The stormwater management design has been based on reducing flows from the site to below the peak flows during the 2 to 100 year storm event based on a pre-development runoff coefficient of 0.48.

Pre and post development storm drainage areas for the site are included as **Figures 1 and 2**.

Water Quality Requirement

Stormwater quality controls are proposed as required to remove and estimated 80% of the total suspended solids, on an annual loading basis.

5.1 Proposed Minor Storm System

The proposed minor storm system for the site is to be designed based on rainfall intensities provided by the Ganaraska Region Conservation Authority with the internal storm sewers being designed to convey the flows during a 5-year storm event without surcharging. Proposed storm servicing is indicated on Site Servicing Plan, Drawing CV-3.

The detailed storm sewer design is included in Appendix A.

5.2 Proposed Major Storm System

Major storm flows from the site are to be conveyed to Elgin Street right of way through proposed east vehicular access at an elevation of 99.00m. This elevation is 400 mm below the lowest building floor elevation proposed within the site. Perimeter elevations surrounding attenuated areas of the site have been set at a minimum elevation of 99.15 m to ensure conveyance of overland flow to the municipal right of way and contain major site flow without impact adjacent properties.

5.3 Proposed Stormwater Rate Controls and Site Storage

Stormwater rate controls have been provided as required to control post development flows from the site to the peak flow during 2 to 100 year storm events based on the pre-development runoff coefficient. Based on a site area of 0.668 ha, the allowable storm flows from the site are as indicated below:

Storm Events	Allowable Flows (m^3)
2	0.0564
5	0.0706
10	0.0808
25	0.1046
50	0.1082
100	0.1154

Rate controls have been provided with the installation of a 125 mm diameter orifice tube, installed at the outlet of proposed MH No. 2, which will cause the post development flows during the 2 and 100 year storm events to be controlled to 0.053 cms and 0.074 cms respectively, which are both below the calculated allowable flow rates.

On-site storage has been provided as required, including 97.6 m^3 within the proposed storm system and 53.7 m^3 of surface storage within pavement areas which exceeds the calculated

required storage of 141.9 m^3 during the 100-year storm event.

Detailed Stormwater Management Calculations are included in **Appendix A**.

5.4 Proposed Storm Water Quality Controls

The current stormwater quality control objective is to provide an "enhanced" level of treatment which is equivalent to removing 80% of the total suspended solids from the site runoff on an annual loading basic. Quality treatment is proposed to be provided via a package JellyFish treatment unit.

A JellyFish Model JF6-5-1 is proposed to assist in achieving the water quality objectives. Based on the manufacturer's modeling software, the selected unit has been designed to provide the removal of an estimated 80% of the Total Suspended Solids.

In the effort of integrating LID measures under the post development condition, small infiltration pits are proposed to promote ground water infiltration. The exact location of infiltration pit will be determined by consultation with geotechnical engineer.

Output from the manufacturer's modelling software used to select the proposed package treatment unit is included in **Appendix C**.

6. SEDIMENT AND EROSION CONTROLS DURING CONSTRUCTION

In 2006, The Greater Golden Horseshoe Area Conservation Authorities prepared a guideline entitled "Erosion & Sediment Control Guideline for Urban Construction". Based on the guideline, all projects involving the removal of topsoil or site alteration requires an ESC (Erosion and Sediment Control) Plan in place prior to commencing construction. Failure to adhere to the plan could lead to the potential for prosecution under the various pieces of environmental legislation.

The following principles assist in creating an effective ESC Plan.

(Ref. Erosion and Sediment Control Guidelines for Urban Construction)

- Adopt a multi-barrier approach to provide erosion and sediment control through erosion controls first.
- Retain existing ground cover and stabilize exposed soils with vegetation where possible.
- Limit the duration of soil exposure and phase construction where possible.
- Limit the size of disturbed areas by minimizing nonessential clearing and grading.
- Minimize slope length and gradient of disturbed areas.
- Maintain overland sheet flow and avoid concentrated flows.
- Store/stockpile soil away (e.g. greater than 15 meters) from watercourses, drainage features and top of steep slopes.

- Ensure contractors and all involved in the ESC practices are trained in ESC Plan, implementation, inspections, maintenance, and repairs.
- Adjust ESC Plan at construction site to adapt to site features.
- Assess all ESC practices before and after all rainfall and significant snowmelt events.

The guideline stresses that prevention of erosion is the preferred mitigation measure for reducing the potential for sedimentation.

Erosion and sediment control measures can be categorized as Erosion prevention controls and Sediment controls.

Erosion controls include minimizing the reduction in vegetative ground cover or immediate stabilization of disturbed areas by top soiling, seeding, sodding, mulching, erosion control blankets, etc.

Sediment Controls are further broken down into Perimeter Controls, Settling Controls and Filtration Controls. Some major perimeter controls include silt fences, cut-off swales and mud-mats. Settling controls reduce run-off velocity allowing the soil particles to settle out. Settling controls include sediment traps, rock check dams, straw bales and sediment control ponds. Filtration controls are achieved by filtering silt laden water through the use of a filter media such as a geotextile or sand. Filtration controls include storm inlet filter cloths, sediment bags and filter rings.

7. PROPOSED SANITARY SERVICING

Sanitary servicing is proposed with a 200mm connection to the existing 375mm sanitary sewer located within D'Arcy Street right of way. Based on the available invert elevation of 94.85m a gravity sewer connection can be provided to drain fixtures at the ground floor level and above. Basement plumbing fixtures in Buildings 2, 3, & 4 will need to be pumped to the proposed sanitary connection. Gravity sanitary servicing is proposed beyond the building envelopes as indicated on the Site Servicing Plan, Drawing No. CV-3.

Due to the anticipated intensification associated with the development. a slight increase in flow of 0.79 L/s are anticipated. An existing and proposed sanitary flow calculation has been attached in **Appendix D**. The slight increase in flows do not warrant a downstream sewer analysis based on discussion with City staff.

Based on discussion with municipal staff, there are 18 existing services along Elgin Street that will require capping at the property line. A maintenance hole will also be required at the property line for the proposed development.

8. PROPOSED WATER SERVICING

A preliminary calculation for the required water demand for fire protection and domestic supply is included in **Appendix B**. The proposed water supply requirements are calculated

in accordance with the Fire Underwriter Survey and MOE Design Guidelines for Drinking Water Systems.

As indicated, the estimated domestic water consumption of 1.52 L/s is required to service the proposed development. The maximum daily demand plus fire flow is calculated as 100.0 L/sec which is the flow that is required to be available at a local hydrant at a minimum pressure of 140 KPa. Fire protection for the proposed buildings will be provided from two existing fire hydrants located north of Elgin Street and north-west corner intersection of Elgin St. and D'Arcy St. The final location of the domestic water service connections will be confirmed during the detailed design phase.

A pressure and flow test will be provided as required to confirm adequate flow are pressure for fire protection during the detailed design phase.

A new 100mm watermain is proposed to provide domestic water supply to the entire site

Preliminary fire flow calculations are included in **Appendix B**.

9. SUMMARY

The following summarizes the proposed site works as required to accommodate the proposed site redevelopment:

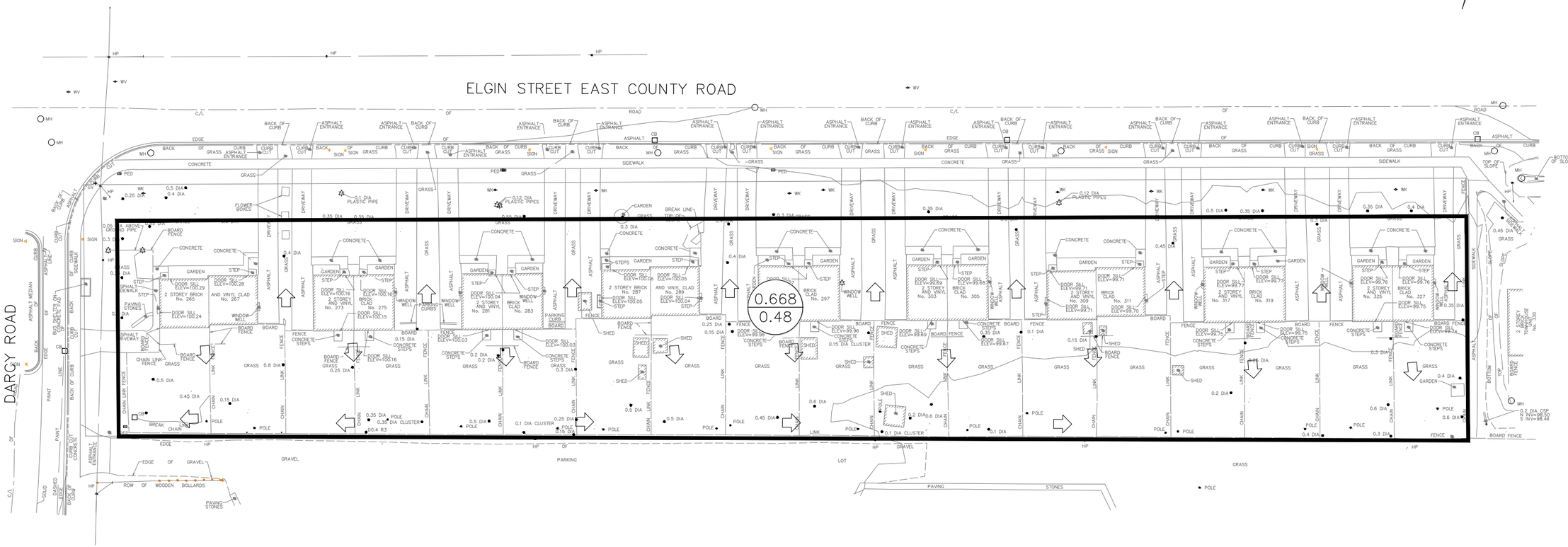
- Site grading can be completed taking into account perimeter elevations, and as required to accommodate the proposed building finish floor elevation, provide safe vehicular and pedestrian access and to provide minimum cover on storm servicing as required for frost protection, convey storm flows to proposed drainage features and to safely convey major storm flows to the adjacent municipal right of way,
- Storm drainage is provided to contain site drainage, convey minor storm flows to the existing municipal storm system, and as required to convey the 5 year storm flows without surcharging,
- Stormwater management peak flow objectives can be achieved with the installation of a control orifice that will control the post development flows to below the pre-development level calculated for 2-100 year flow based on the existing site runoff coefficient.
- Sufficient on-site storage can be provided in surface ponding areas, and below ground in the internal storm system and proposed underground storage chambers.
- Stormwater quality controls are proposed to be achieved using a package JellyFish treatment unit.
- Sediment and erosion controls as indicated on the Removals/Sediment and Erosion Control Plan are to be implemented prior to construction and maintained until the site is stabilized.

Prepared by:

MGM CONSULTING INC.

Calvin Dang, B.Eng

M.L. Stairs, P.Eng.



LEGENDS:

- EXISTING OVERLAND FLOW
- 0.796 / 0.44 — DRAINAGE AREA (ha) / RUN-OFF CO-EFFICIENT

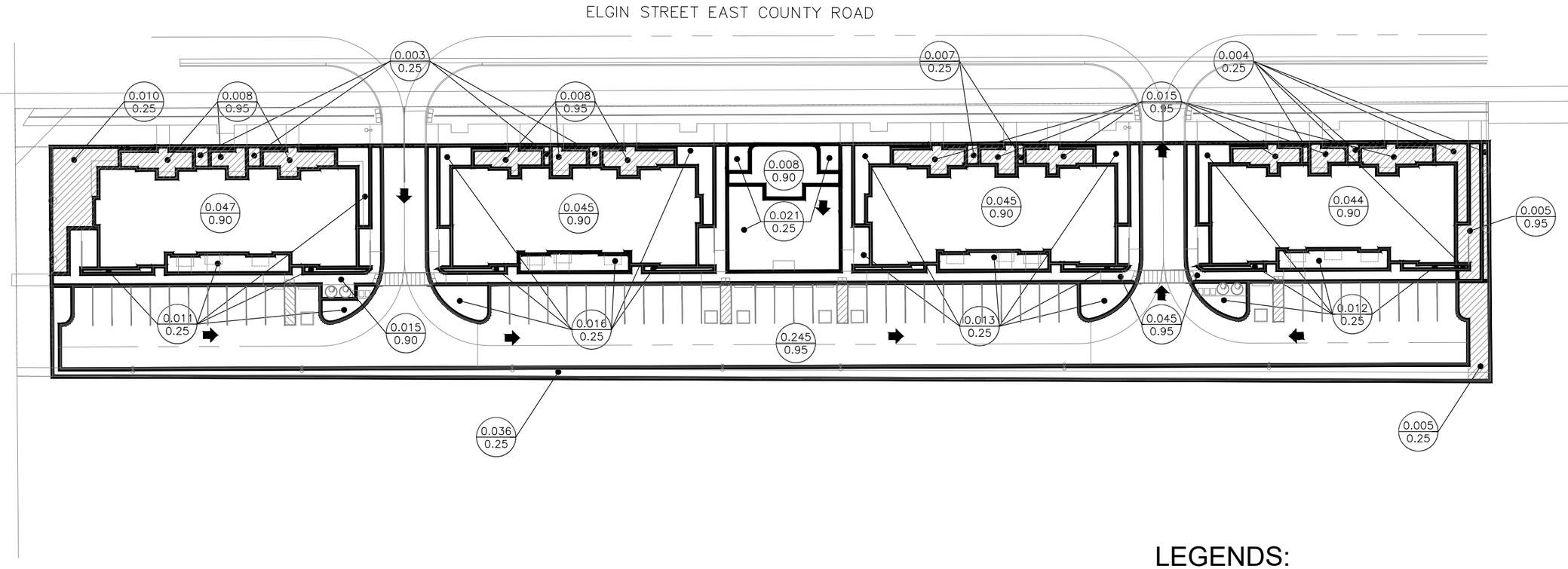
287-327 ELGIN STREET EAST
EGLIN PARK REDEVELOPMENT PROJECT

EXISTING DRAINAGE AREAS

MGM CONSULTING INC
Consulting Engineering & Project Management
555 Industrial Drive
Suite 201
Milton, Ontario
L9T 5E1
Tel: (905)567-8678
Fax: (905)875-1339
Email: mgm@mgm.on.ca
www.mgm.on.ca

FIGURE #1

DATE: AUG 2020
SCALE: NTS
DWG#: 2020-034 C4



LEGENDS:

- PROPOSED OVERLAND FLOW
- UNATTENUATED AREAS
- 0.376 / 0.95 — DRAINAGE AREA (ha) / RUN-OFF CO-EFFICIENT

287-327 ELGIN STREET EAST
EGLIN PARK REDEVELOPMENT PROJECT

PROPOSED DRAINAGE AREAS

MGM CONSULTING INC
Consulting Engineering & Project Management
555 Industrial Drive
Suite 201
Milton, Ontario
L9T 5E1
Tel: (905)567-8678
Fax: (905)875-1339
Email: mgm@mgm.on.ca
www.mgm.on.ca

FIGURE #2

DATE: AUG 2020
SCALE: NTS
DWG#: 2020-034 C4

APPENDIX A

STORMWATER MANAGEMENT CALCULATIONS

EGLIN PARK REDEVELOPMENT PROJECT
287-327 EGLIN STREET EAST
STORMWATER MANAGEMENT CALCULATIONS

1.0 Drainage Area Characteristics

1.1 Existing Drainage Areas (see Figure No. 4):

	"c"	Area (ha)
Attenuated Areas:		
Building	0.90	0.094
Paved Area	0.95	0.131
Landscaped Area	0.25	0.443
Sub Total	**0.48**	**0.668**
Total Area		**0.668**
Runoff Coefficient (Entire Site)		**0.48**

1.2 Proposed Drainage Areas (see Figure No. 5):

	"c"	Area (ha)
Attenuated Areas:		
Building	0.90	0.181
Paved Area	0.95	0.313
Landscaped Area	0.25	0.109
Sub Total	**0.81**	**0.603**
Unattenuated Areas:		
Paved Area	0.95	0.036
Landscaped Area	0.25	0.029
Sub Total	**0.64**	**0.065**
Total Area		**0.668**
Runoff Coefficient (Entire Site)		**0.79**

2.0 Allowable Post Development Flows

2.1 Allowable Flows from Area to be Redeveloped

Post development flows from the redevelopment area for the 2 and 100 year storm event are to be controlled to the pre-development flow rate for designed drainage area

Storm (years)	Td (min)	I (mm/hr)	C	A (ha)	Q (allow.) (cms)
2	15	63.5	0.48	0.668	0.0564
5	15	79.5	0.48	0.668	0.0706
10	15	90.9	0.48	0.668	0.0808
25	15	117.8	0.48	0.668	0.1046
50	15	121.8	0.48	0.668	0.1082
100	15	130.0	0.48	0.668	0.1154

3.0 Rooftop Controlled Flow Calculations

There is no roof control proposed to the development

4.0 Storage Calculations

4.1 Two Year Site Storage

Rainfall Duration min.	s	2 Year Rainfall Intensity (I) mm/h	Attenuated Flow cms	Unattenuated Flow cms	Controlled Flow cms	Aprox. Detention Volumes cu.m.
15	**900**	**63.5**	**0.0860**	**0.007**	**0.0454**	**43.1**
20	1200	53.9	0.0730	0.006	0.0454	40.5
25	1500	46.8	0.0634	0.005	0.0454	35.0
30	1800	41.3	0.0560	0.005	0.0454	27.6

4.1 Five Year Site Storage

Rainfall Duration min.	s	5 Year Rainfall Intensity (I) mm/h	Attenuated Flow cms	Unattenuated Flow cms	Controlled Flow cms	Aprox. Detention Volumes cu.m.
15	900	79.5	0.1076	0.009	0.0488	61.2
20	**1200**	**68.4**	**0.0927**	**0.008**	**0.0488**	**62.1**
25	1500	60.1	0.0814	0.007	0.0488	59.3
30	1800	53.6	0.0725	0.006	0.0488	53.9

4.1 Ten Year Site Storage

Rainfall Duration min.	s	10 Year Rainfall Intensity (I) mm/h	Attenuated Flow cms	Unattenuated Flow cms	Controlled Flow cms	Aprox. Detention Volumes cu.m.
15	**900**	**90.9**	**0.1231**	**0.010**	**0.0614**	**65.0**
20	1200	78.3	0.1060	0.009	0.0614	64.4
25	1500	68.8	0.0931	0.008	0.0614	59.4
30	1800	61.3	0.0830	0.007	0.0614	51.6

4.1 Twenty-five Year Site Storage

Rainfall Duration min.	s	25 Year Rainfall Intensity (I) mm/h	Attenuated Flow cms	Unattenuated Flow cms	Controlled Flow cms	Aprox. Detention Volumes cu.m.
15	900	117.8	0.1595	0.014	0.0622	99.7
20	1200	102.3	0.1385	0.012	0.0622	105.7
25	**1500**	**90.4**	**0.1224**	**0.010**	**0.0622**	**105.9**
30	1800	81.0	0.1096	0.009	0.0622	102.1

4.1 Fifty Year Site Storage

Rainfall Duration min.	s	50 Year Rainfall Intensity (I) mm/h	Attenuated Flow cms	Unattenuated Flow cms	Controlled Flow cms	Aprox. Detention Volumes cu.m.
15	900	121.8	0.1649	0.014	0.0627	104.6
20	1200	108.0	0.1462	0.012	0.0627	115.1
25	1500	96.9	0.1313	0.011	0.0627	119.6
30	**1800**	**88.0**	**0.1191**	**0.010**	**0.0627**	**119.8**
35	2100	80.5	0.1090	0.009	0.0627	116.8
40	2400	74.2	0.1005	0.009	0.0627	111.3

4.2 One Hundred Year Site Storage

Rainfall Duration min.	s	100 Year Rainfall Intensity (I) mm/h	Attenuated Flow cms	Unattenuated Flow cms	Controlled Flow cms	Aprox. Detention Volumes cu.m.
15	900	130.0	0.1760	0.015	0.0630	115.2
20	1200	116.4	0.1576	0.013	0.0630	129.7
25	1500	105.4	0.1428	0.012	0.0630	137.9
30	**1800**	**96.3**	**0.1305**	**0.011**	**0.0630**	**141.4**
35	2100	88.7	0.1201	0.010	0.0630	141.4
40	2400	82.2	0.1113	0.009	0.0630	138.6
45	2700	76.5	0.1037	0.009	0.0630	133.6
50	3000	71.6	0.0970	0.008	0.0630	126.8

5.0 Controlled Flow Calculations

Flows from the proposed storm system are to be controlled with the installation of an orifice over the outlet at manhole 1 as indicated on the site servicing plan.

2 year ponding elevation =	98.04	m.
5 year ponding elevation =	98.20	m.
10 year ponding elevation =	98.90	m.
25 year ponding elevation =	98.95	m.
50 year ponding elevation =	98.98	m.
100 year ponding elevation =	99.00	m.

Orifice equation: Q = CA(2hg)^0.5, where,

orifice invert elev. =	96.94	m.
c =	0.82	
g =	9.81	cu.m./sec
Orifice Diameter =	125	mm.
A =	0.0123	sq.m.
centreline orifice =	97.00	m.

	h (m)	Q (cms)	Attenuated Flow + Unattenuated Flow = Total Site Flow (cms)
2 year storm =	1.04	0.0454	0.053
5 year storm =	1.20	0.0488	0.057
10 year storm =	1.90	0.0614	0.072
25 year storm =	1.95	0.0622	0.073
50 year storm =	1.98	0.0627	0.073
100 year storm =	2.00	0.0630	0.074

6.0 On-Site Storage Provided

6.1 Pipe Storage

	Length (m)	Size (mm)	Area (m^2)	Volume (m^3)
CBMH11-CBMH9	26.6	250	0.049	1.31
CB10-CBMH9	21.0	250	0.049	1.03
CBMH9-CBMH8	34.7	300	0.071	2.45
CBMH8-CBMH5	39.8	375	0.110	4.40
CB7-CBMH5	24.0	250	0.049	1.18
CBMH5-CBMH4	32.0	450	0.159	5.09
CBMH4-CBMH3	25.0	525	0.216	5.41
CBMH3-MH2	23.8	600	0.283	6.73
TOTAL VOLUME				**27.6**

6.2 Surface Ponding

The detention volume available within the ponding areas at an assumed elev of 99.00 m. is as follows:

Structure	Grate Elev. Elevation	Ponding Elevation	Area	Depth	Volume
CBMH11	98.80	99.00	164	0.20	10.9
CB10	98.90	99.00	44	0.10	1.5
CBMH9	98.80	99.00	172	0.20	11.5
CBMH8	98.80	99.00	210	0.20	14.0
CBMH5	98.85	99.00	109	0.15	5.5
CBMH4	98.75	99.00	96	0.25	8.0
CBMH3	98.85	99.00	48	0.15	2.4

Total SurfaceStorage = **53.7** **cu.m.**

6.3 Underground Storm Chambers

Triton Storm Chamber-Model C-10
No of Chambers = 95
Dimension = 0.635x4.0x22.6(m)
Total Storage Volume = **70** m^3
Stone Base = 150 mm

6.3 Total Stormwater Storage Provided Onsite

2-5yr Storage **97.6** **cu.m.**
5-100 yr Storage **151.3** **cu.m.**

7.0 Water balance calculations:
Proposed 4 infiltration feature dimension = 2x8x1.0(m)
Storage volume inside each infiltration pit = 6.4 cu.m.
Total storage volume = 25.6 cu.m.
Equivalent depth of water over site area = 3.8 mm.

Estimated water balance achieved in soft landscaped and pavement areas are as follows:

Surface Construction	Area (ha)	Initial Abstraction (mm)	Prorated Depth over Site Area
Pavement	0.530	0.5	0.4
Soft Landscaping	0.138	5	1.0

Based on the above, the total water balance provided by the proposed features is **5.3 mm.**

MGM CONSULTING Inc.
STORM SEWER DESIGN SHEET

Elgin Park Redevelopment Project
287-327 Elgin Street East, Cobourg

By: Chenchen Shi
Rev March 29, 2021

Location		Areas		A * C			Rainfall		Flow	Sewer Design						
Manhole from	Manhole to	Area ha	Cumulative Area ha	Weighted Coefficent C	Incremental A * C	Cumulative A * C	Time min	Intensity I5 mm/hr.	Q cms	Pipe Size mm.	Slope %	Max. Flow Q max cms	Max Velocity V max m./sec.	Length m.	Time in Section min.	% Full
MH 12 (From Roof No.4)	CBMH11	0.044	0.044	0.90	0.040	0.040	15.0	79.5	0.009	200	0.5	0.023	0.74	3.5	0.08	37.83
CBMH 11	CBMH 9	0.053	0.097	0.79	0.042	0.081	15.1	79.3	0.018	250	0.5	0.042	0.86	26.5	0.51	42.63
CB 10	CBMH 9	0.022	0.119	0.77	0.017	0.098	15.0	79.5	0.004	250	0.5	0.042	0.86	21.0	0.41	8.76
MH 13 (From Roof No.3)	CBMH 8	0.045	0.163	0.90	0.040	0.138	15.0	79.5	0.009	200	1.0	0.033	1.05	8.6	0.14	27.05
CBMH 9	CBMH 8	0.043	0.206	0.72	0.031	0.170	15.6	78.0	0.037	300	0.5	0.068	0.97	32.5	0.56	53.66
CBMH 8	CBMH 5	0.064	0.270	0.82	0.053	0.222	16.2	76.6	0.047	375	0.5	0.124	1.12	39.8	0.59	38.12
CB7	CBMH 5	0.048	0.048	0.53	0.025	0.025	15.0	79.5	0.006	250	0.5	0.042	0.86	21.9	0.43	13.27
MH 14 (From Roof No.2)	CBMH 5	0.045	0.045	0.90	0.040	0.040	15.0	79.5	0.009	200	2.0	0.046	1.48	10.5	0.12	19.13
CBMH 5	CBMH 4	0.067	0.430	0.83	0.055	0.343	16.7	75.3	0.072	450	0.5	0.500	3.14	3.5	0.02	14.36
CBMH 4	CBMH 3	0.062	0.492	0.77	0.048	0.391	16.8	75.2	0.082	525	0.5	0.305	1.41	32.3	0.38	26.83
MH 6 (From Roof No.1)	CBMH 3	0.047	0.047	0.90	0.042	0.042	15.0	79.5	0.009	200	3.0	0.057	1.81	10.0	0.09	16.32
CBMH3	MH2	0.065	0.603	0.81	0.053	0.485	17.1	74.3	0.100	600	0.5	0.435	1.54	22.9	0.25	23.08
MH 2	JellyFish		0.603			0.485		Stormwater flow is conntrolled down to 0.049 cu.m/s by 1.0m-125mm orifice tube installed at downstream of MH 2								
JellyFish	MH 1 (Over ex. stm sewer)									300	1.0	0.097	1.37	11.40	0.14	0.00

n = 0.013
IDF Yarnell 5 Year I = A/(Tc + B)^C
A = 2464
B = 16
C = 1

APPENDIX B

WATER DEMAND & FIRE CALCULATIONS

Fire Flow Calculation

The FUS requires that a minimum water supply source 'F' be provided at 140 kPa
The min flow 'F' can be calculated as such:

$F=220C\sqrt{A}$
where:
F- Required fire flow in L/min
C- Coefficient related to construction
A- Total area in sq.m

C = 1 (Combusitble construction)

For combustible construction, the area shall be a total of all floors (excluding basements at least 50 percent below grade) in the building being considered.

A = 934 sq.m

Therefore,

F= 6723.5 L/min
= 7000 L/min (rounded to nearest 1000)

Reduction Factors:

F'=F*f1*f2

where:
f1- Occupancy factor
Low hazard occupancy, f1 = 25%

Therefore, the reduction due to low hazard occupancy = 1750 l/min.
and F = **5250** l/min

f2- Sprinkler protection factor

Based no fully automated sprinkler system, maximum reduction = 0%

Reduction = **0** L/min

Exposure Factors:
F'' = F'*f3
where:
f3- Exposure factor not to exceed 75%

Separation between subject building and other structures, and associated charges are as follows:

	Distance (m)	Charge
North Side	Road	0%
South Side	30-45	5%
East Side	15	15%

West Side	Road	0%
Total		**20%**

The total increase for exposures is 20%
and the increase due to exposures = 1050

The resulting required minimum flow, F = **6300** l/min

Therefore a minimum flow of approximately **6000** L/min must be available at the nearest hydrant with a minimum pressure of 140 kPa.

Note: This fireflow calculation has been prepared as a guide only. Confirmation should be obtained from a Fire Protection professional for confirmation

Appendix B
Elgin Park Redevelopment
Town Of Cobourg

Site Redevelopment
Water Demand Calculations

Date: December 08, 2020

According to the MOE Design Guildlines for Drinking Water System

Connection Point – Main Street			
	Residential		
Total equivalent population to be serviced	76	persons	
Residential Per Capital Demand (L/ha/Day)	191		
Total Lands to be Serviced	0.688	ha	
Hydrant Flow Test Location			
Hydrant Flow Test Location			
		Pressure (kPa)	Time
Minimum water pressure		N/A	
Maximum water pressure		N/A	

No.	Water Demands			
	Demand type	Demand (units)		
		Use 1	Use 2	Total
1	Average day flow (l/s)	0.242	0	0.242
2	Maximum day flow (l/s)	1.52	0	1.52
3	Peak hour flow (l/s)	2.27	0	2.27
4	Fire Flow (l/s)	100.00	0	100.00
Analysis				
5	Maximum day plus fire flow (l/s)			101.52
6	Peak hour flow (l/s)			2.27
7	Maximum demand flow (l/s)			101.52

Note: Fire flow calculated based on the largest proposed building on the site.

APPENDIX C

TREATMENT UNIT SIZING REPORT

STANDARD OFFLINE
Jellyfish Filter Sizing Report

Project Information

Date	Monday, December 07, 2020
Project Name	287-327 Elgin Street East, Cobourg
Project Number	
Location	Cobourg

Jellyfish Filter Design Overview

This report provides information for the sizing and specification of the Jellyfish Filter. When designed properly in accordance to the guidelines detailed in the Jellyfish Filter Technical Manual, the Jellyfish Filter will exceed the performance and longevity of conventional horizontal bed and granular media filters.

Please see ***www.ImbriumSystems.com*** *for more information.*

Jellyfish Filter System Recommendation

The Jellyfish Filter model JF6-5-1 is recommended to meet the water quality objective by treating a flow of 27.8 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 313 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF6-5-1	5	1	1.8	27.8	313

The Jellyfish Filter System

The patented Jellyfish Filter is an engineered stormwater quality treatment technology featuring unique membrane filtration in a compact stand-alone treatment system that removes a high level and wide variety of stormwater pollutants. Exceptional pollutant removal is achieved at high treatment flow rates with minimal head loss and low maintenance costs. Each lightweight Jellyfish Filter cartridge contains an extraordinarily large amount of membrane surface area, resulting in superior flow capacity and pollutant removal capacity.

Maintenance

Regular scheduled inspections and maintenance is necessary to assure proper functioning of the Jellyfish Filter. The maintenance interval is designed to be a minimum of 12 months, but this will vary depending on site loading conditions and upstream pretreatment measures. Quarterly inspections and inspections after all storms beyond the 5-year event are recommended until enough historical performance data has been logged to comfortably initiate an alternative inspection interval.

Please see ***www.ImbriumSystems.com*** *for more information.*

Thank you for the opportunity to present this information to you and your client.

Performance

Jellyfish efficiently captures a high level of Stormwater pollutants, including:

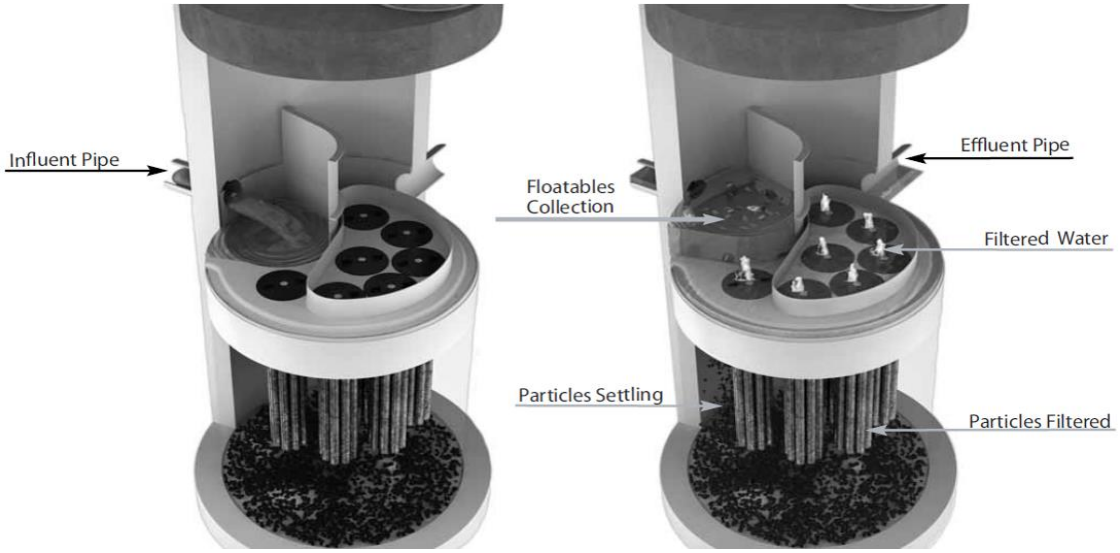
- ☑ 89% of the total suspended solids (TSS) load, including particles less than 5 microns
- ☑ 59% TP removal & 51% TN removal
- ☑ 90% Total Copper, 81% Total Lead, 70% Total Zinc
- ☑ Particulate-bound pollutants such as nutrients, toxic metals, hydrocarbons and bacteria
- ☑ Free oil, Floatable trash and debris

Field Proven Peformance

The Jellyfish filter has been field-tested on an urban site with 25 TARP qualifying rain events and field monitored according to the TARP field test protocol, demonstrating:

- A median TSS removal efficiency of 89%, and a median SSC removal of 99%;
- The ability to capture fine particles as indicated by an effluent d50 median of 3 microns for all monitotred storm events, and a median effluent turbidity of 5 NTUs;
- A median Total Phosphorus removal of 59%, and a median Total Nitrogen removal of 51%.

Jellyfish Filter Treatment Functions



Pre-treatment and Membrane Filtration

Jellyfish® Filter

Project Information

Date:	Monday, December 07, 2020
Project Name:	287-327 Elgin Street East, Cobourg
Project Number:	
Location:	Cobourg

Designer Information

Company:	MGM Consulting Inc.
Contact:	Chenchen Shi
Phone #:	

Notes

Rainfall

Name:	TORONTO CENTRAL
State:	ON
ID:	100
Record:	1982 to 1999
Co-ords:	45°30'N, 90°30'W

Drainage Area

Total Area:	0.8 ha
Runoff Coefficient:	80

Upstream Detention

Peak Release Rate:	n/a
Pretreatment Credit:	n/a

Design System Requirements

Flow Loading	90% of the Average Annual Runoff based on 18 years of TORONTO CENTRAL rainfall data:	**22.8 L/s**
Sediment Loading	Treating 90% of the average annual runoff volume, 5041 m³, with a suspended sediment concentration of 60 mg/L.	**302 kg**

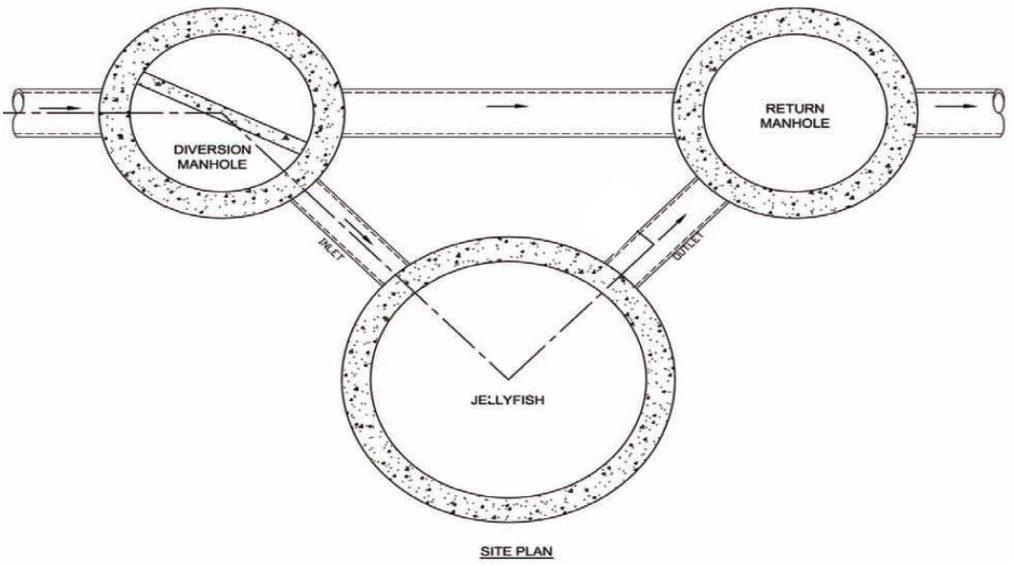
Recommendation

The Jellyfish Filter model JF6-5-1 is recommended to meet the water quality objective by treating a flow of 27.8 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 313 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Wet Vol Below Deck (L)	Sump Storage (m³)	Oil Capacity (L)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF4-1-1	1	1	1.2	2313	0.34	379	7.6	85
JF4-2-1	2	1	1.2	2313	0.34	379	12.6	142
JF6-3-1	3	1	1.8	5205	0.79	848	17.7	199
JF6-4-1	4	1	1.8	5205	0.79	848	22.7	256
JF6-5-1	**5**	**1**	**1.8**	**5205**	**0.79**	**848**	**27.8**	**313**
JF6-6-1	6	1	1.8	5205	0.79	848	28.6	370
JF8-6-2	6	2	2.4	9252	1.42	1469	35.3	398
JF8-7-2	7	2	2.4	9252	1.42	1469	40.4	455
JF8-8-2	8	2	2.4	9252	1.42	1469	45.4	512
JF8-9-2	9	2	2.4	9252	1.42	1469	50.5	569
JF8-10-2	10	2	2.4	9252	1.42	1469	50.5	626
JF10-11-3	11	3	3.0	14456	2.21	2302	63.1	711
JF10-12-3	12	3	3.0	14456	2.21	2302	68.2	768
JF10-12-4	12	4	3.0	14456	2.21	2302	70.7	796
JF10-13-4	13	4	3.0	14456	2.21	2302	75.7	853
JF10-14-4	14	4	3.0	14456	2.21	2302	78.9	910
JF10-15-4	15	4	3.0	14456	2.21	2302	78.9	967
JF10-16-4	16	4	3.0	14456	2.21	2302	78.9	1024
JF10-17-4	17	4	3.0	14456	2.21	2302	78.9	1081
JF10-18-4	18	4	3.0	14456	2.21	2302	78.9	1138
JF10-19-4	19	4	3.0	14456	2.21	2302	78.9	1195
JF12-20-5	20	5	3.6	20820	3.2	2771	113.6	1280
JF12-21-5	21	5	3.6	20820	3.2	2771	113.7	1337
JF12-22-5	22	5	3.6	20820	3.2	2771	113.7	1394
JF12-23-5	23	5	3.6	20820	3.2	2771	113.7	1451
JF12-24-5	24	5	3.6	20820	3.2	2771	113.7	1508
JF12-25-5	25	5	3.6	20820	3.2	2771	113.7	1565
JF12-26-5	26	5	3.6	20820	3.2	2771	113.7	1622
JF12-27-5	27	5	3.6	20820	3.2	2771	113.7	1679

Jellyfish Filter Design Notes

- Typically the Jellyfish Filter is designed in an offline configuration, as all stormwater filter systems will perform for a longer duration between required maintenance services when designed and applied in off-line configurations. Depending on the design parameters, an optional internal bypass may be incorporated into the Jellyfish Filter, however note the inspection and maintenance frequency should be expected to increase above that of an off-line system. Speak to your local representative for more information.



Jellyfish Filter Typical Layout

- Typically, 18 inches (457 mm) of driving head is designed into the system, calculated as the difference in elevation between the top of the diversion structure weir and the invert of the Jellyfish Filter outlet pipe. Alternative driving head values can be designed as 12 to 24 inches (305 to 610mm) depending on specific site requirements, requiring additional sizing and design assistance.
- Typically, the Jellyfish Filter is designed with the inlet pipe configured 6 inches (150 mm) above the outlet invert elevation. However, depending on site parameters this can vary to an optional configuration of the inlet pipe entering the unit below the outlet invert elevation.
- The Jellyfish Filter can accommodate multiple inlet pipes within certain restrictions.
- While the optional inlet below deck configuration offers 0 to 360 degree flexibility between the inlet and outlet pipe, typical systems conform to the following:

Model Diameter (m)	Minimum Angle Inlet / Outlet Pipes	Minimum Inlet Pipe Diameter (mm)	Minimum Outlet Pipe Diameter (mm)
1.2	62º	150	200
1.8	**59º**	**200**	**250**
2.4	52º	250	300
3.0	48º	300	450
3.6	40º	300	450

- The Jellyfish Filter can be built at all depths of cover generally associated with conventional stormwater conveyance systems. For sites that require minimal depth of cover for the stormwater infrastructure, the Jellyfish Filter can be applied in a shallow application using a hatch cover. The general minimum depth of cover is 36 inches (915 mm) from top of the underslab to outlet invert.
- If driving head caclulations account for water elevation during submerged conditions the Jellyfish Filter will function effectively under submerged condtions.
- Jellyfish Filter systems may incorporate grated inlets depending on system configuration.
- For sites with water quality treatment flow rates or mass loadings that exceed the design flow rate of the largest standard Jellyfish Filter manhole models, systems can be designed that hydraulically connect multiple Jellyfish Filters in series or alternatively Jellyfish Vault units can be designed.

STANDARD SPECIFICATION
STORMWATER QUALITY – MEMBRANE FILTRATION TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

Specifies requirements for construction and performance of an underground stormwater quality membrane filtration treatment device that removes pollutants from stormwater runoff through the unit operations of sedimentation, floatation, and membrane filtration.

1.2 REFERENCE STANDARDS

ASTM C 891: Specification for Installation of Underground Precast Concrete Utility Structures
ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM D 4101: Specification for Copolymer steps construction

CAN/CSA-A257.4-M92
Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections and Fittings Using Rubber Gaskets

CAN/CSA-A257.4-M92
Precast Reinforced Circular Concrete Manhole Sections, Catch Basins and Fittings

Canadian Highway Bridge Design Code

1.3 SHOP DRAWINGS

Shop drawings for the structure and performance are to be submitted with each order to the contractor. Contractor shall forward shop drawing submittal to the consulting engineer for approval. Shop drawings are to detail the structure's precast concrete and call out or note the fiberglass (FRP) internals/components.

1.4 PRODUCT SUBSTITUTIONS

No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the engineer of record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

1.5 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 The device shall be a cylindrical or rectangular, all concrete structure (including risers), constructed from precast concrete riser and slab components or monolithic precast structure(s), installed to conform to ASTM C 891 and to any required state highway, municipal or local specifications; whichever is more stringent. The device shall be watertight.

2.1.2 Cartridge Deck The cylindrical concrete device shall include a fiberglass deck. The rectangular concrete device shall include a coated aluminum deck. In either instance, the insert shall be bolted and sealed watertight inside the precast concrete chamber. The deck shall serve as: (a) a horizontal divider between the lower treatment zone and the upper treated effluent zone; (b) a deck for attachment of filter cartridges such that the membrane filter elements of each cartridge extend into the lower treatment zone; (c) a platform for maintenance workers to service the filter cartridges (maximum manned weight = 450 pounds (204 kg)); (d) a conduit for conveyance of treated water to the effluent pipe.

2.1.3 Membrane Filter Cartridges Filter cartridges shall be comprised of reusable cylindrical membrane filter elements connected to a perforated head plate. The number of membrane filter elements per cartridge shall be a minimum of eleven 2.75-inch (70-mm) diameter elements. The length of each filter element shall be a minimum 15 inches (381 mm). Each cartridge shall be fitted into the cartridge deck by insertion into a cartridge receptacle that is permanently mounted into the cartridge deck. Each cartridge shall be secured by a cartridge lid that is threaded onto the receptacle, or similar mechanism to secure the cartridge into the deck. The maximum treatment flow rate of a filter cartridge shall be controlled by an orifice in the cartridge lid, or on the individual cartridge itself, and based on a design flux rate (surface loading rate) determined by the maximum treatment flow rate per unit of filtration membrane surface area. The maximum design flux rate shall be 0.21 gpm/ft² (0.142 lps/m²).

Each membrane filter cartridge shall allow for manual installation and removal. Each filter cartridge shall have filtration membrane surface area and dry installation weight as follows (if length of filter cartridge is between those listed below, the surface area and weight shall be proportionate to the next length shorter and next length longer as shown below):

Filter Cartridge Length (in / mm)	Minimum Filtration Membrane Surface Area (ft2 / m2)	Maximum Filter Cartridge Dry Weight (lbs / kg)
15	106 / 9.8	10.5 / 4.8
27	190 / 17.7	15.0 / 6.8
40	282 / 26.2	20.5 / 9.3
54	381 / 35.4	25.5 / 11.6

2.1.4 Backwashing Cartridges The filter device shall have a weir extending above the cartridge deck, or other mechanism, that encloses the high flow rate filter cartridges when placed in their respective cartridge receptacles within the cartridge deck. The weir, or other mechanism, shall collect a pool of filtered water during inflow events that backwashes the high flow rate cartridges when the inflow

event subsides. All filter cartridges and membranes shall be reusable and allow for the use of filtration membrane rinsing procedures to restore flow capacity and sediment capacity; extending cartridge service life.

2.1.5 Maintenance Access to Captured Pollutants The filter device shall contain an opening(s) that provides maintenance access for removal of accumulated floatable pollutants and sediment, removal of and replacement of filter cartridges, cleaning of the sump, and rinsing of the deck. Access shall have a minimum clear vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

2.1.6 Bend Structure The device shall be able to be used as a bend structure with minimum angles between inlet and outlet pipes of 90-degrees or less in the stormwater conveyance system.

2.1.7 Double-Wall Containment of Hydrocarbons The cylindrical precast concrete device shall provide double-wall containment for hydrocarbon spill capture by a combined means of an inner wall of fiberglass, to a minimum depth of 12 inches (305 mm) below the cartridge deck, and the precast vessel wall.

2.1.8 Baffle The filter device shall provide a baffle that extends from the underside of the cartridge deck to a minimum length equal to the length of the membrane filter elements. The baffle shall serve to protect the membrane filter elements from contamination by floatables and coarse sediment. The baffle shall be flexible and continuous in cylindrical configurations, and shall be a straight concrete or aluminum wall in rectangular configurations.

2.1.9 Sump The device shall include a minimum 24 inches (610 mm) of sump below the bottom of the cartridges for sediment accumulation, unless otherwise specified by the design engineer. Depths less than 24 inches may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be manufactured to a minimum live load of HS-20 truck loading or greater based on local regulatory specifications, unless otherwise modified or specified by the design engineer, and shall be watertight.

2.3 JOINTS All precast concrete manhole configuration joints shall use nitrile rubber gaskets and shall meet the requirements of ASTM C443, Specification C1619, Class D or engineer approved equal to ensure oil resistance. Mastic sealants or butyl tape are not an acceptable alternative.

2.4 GASKETS Only profile neoprene or nitrile rubber gaskets in accordance to CSA A257.3-M92 will be accepted. Mastic sealants, butyl tape or Conseal CS-101 are not acceptable gasket materials.

2.5 FRAME AND COVER Frame and covers must be manufactured from cast-iron or other composite material tested to withstand H-20 or greater design loads, and as approved by the

local regulatory body. Frames and covers must be embossed with the name of the device manufacturer or the device brand name.

2.6 DOORS AND HATCHES If provided shall meet designated loading requirements or at a minimum for incidental vehicular traffic.

2.7 CONCRETE All concrete components shall be manufactured according to local specifications and shall meet the requirements of ASTM C 478.

2.8 FIBERGLASS The fiberglass portion of the filter device shall be constructed in accordance with the following standard: ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks.

2.9 STEPS Steps shall be constructed according to ASTM D4101 of copolymer polypropylene, and be driven into preformed or pre-drilled holes after the concrete has cured, installed to conform to applicable sections of state, provincial and municipal building codes, highway, municipal or local specifications for the construction of such devices.

2.10 INSPECTION All precast concrete sections shall be inspected to ensure that dimensions, appearance and quality of the product meet local municipal specifications and ASTM C 478.

PART 3 – PERFORMANCE

3.1 GENERAL

3.1.1 Verification – The stormwater quality filter must be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV).

3.1.2 Function - The stormwater quality filter treatment device shall function to remove pollutants by the following unit treatment processes; sedimentation, floatation, and membrane filtration.

3.1.3 Pollutants - The stormwater quality filter treatment device shall remove oil, debris, trash, coarse and fine particulates, particulate-bound pollutants, metals and nutrients from stormwater during runoff events.

3.1.4 Bypass - The stormwater quality filter treatment device shall typically utilize an external bypass to divert excessive flows. Internal bypass systems shall be equipped with a floatables baffle, and must avoid passage through the sump and/or cartridge filtration zone.

3.1.5 Treatment Flux Rate (Surface Loading Rate) – The stormwater quality filter treatment device shall treat 100% of the required water quality treatment flow based on a maximum design treatment flux rate (surface loading rate) across the membrane filter cartridges of 0.21 gpm/ft² (0.142 lps/m²).

3.2 FIELD TEST PERFORMANCE

At a minimum, the stormwater quality filter device shall have been field tested and verified with a minimum 25 TARP qualifying storm events and field monitoring shall have been conducted according to the TARP 2009 NJDEP TARP field test protocol, and have received NJCAT verification.

3.2.1 Suspended Solids Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median TSS removal efficiency of 85% and a minimum median SSC removal efficiency of 95%.

3.2.2 Runoff Volume – The stormwater quality filter treatment device shall be engineered, designed, and sized to treat a minimum of 90 percent of the annual runoff volume determined from use of a minimum 15-year rainfall data set.

3.2.3 Fine Particle Removal - The stormwater quality filter treatment device shall have demonstrated the ability to capture fine particles as indicated by a minimum median removal efficiency of 75% for the particle fraction less than 25 microns, an effluent d_{50} of 15 microns or lower for all monitored storm events.

3.2.4 Turbidity Reduction - The stormwater quality filter treatment device shall have demonstrated the ability to reduce the turbidity from influent from a range of 5 to 171 NTU to an effluent turbidity of 15 NTU or lower.

3.2.5 Nutrient (Total Phosphorus & Total Nitrogen) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Phosphorus removal of 55%, and a minimum median Total Nitrogen removal of 50%.

3.2.6 Metals (Total Zinc & Total Copper) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Zinc removal of 55%, and a minimum median Total Copper removal of 85%.

3.3 INSPECTION and MAINTENANCE

The stormwater quality filter device shall have the following features:

3.3.1 Durability of membranes are subject to good handling practices during inspection and maintenance (removal, rinsing, and reinsertion) events, and site specific conditions that may have heavier or lighter loading onto the cartridges, and pollutant variability that may impact the membrane structural integrity. Membrane maintenance and replacement shall be in accordance with manufacturer's recommendations.

3.3.2 Inspection which includes trash and floatables collection, sediment depth determination, and visible determination of backwash pool depth shall be easily conducted from grade (outside the structure).

3.3.3 Manual rinsing of the reusable filter cartridges shall promote restoration of the flow capacity and sediment capacity of the filter cartridges, extending cartridge service life.

3.3.4 The filter device shall have a minimum 12 inches (305 mm) of sediment storage depth, and a minimum of 12 inches between the top of the sediment storage and bottom of the filter cartridge tentacles, unless otherwise specified by the design engineer. Variances may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

3.3.5 Sediment removal from the filter treatment device shall be able to be conducted using a standard maintenance truck and vacuum apparatus, and a minimum one point of entry to the sump that is unobstructed by filter cartridges.

3.3.6 Maintenance access shall have a minimum clear height that provides suitable vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

3.3.7 Filter cartridges shall be able to be maintained without the requirement of additional lifting equipment.

PART 4 – EXECUTION

4.1 INSTALLATION

4.1.1 PRECAST DEVICE CONSTRUCTION SEQUENCE

The installation of a watertight precast concrete device should conform to ASTM C 891 and to any state highway, municipal or local specifications for the construction of manholes, whichever is more stringent. Selected sections of a general specification that are applicable are summarized below.

4.1.1.1 The watertight precast concrete device is installed in sections in the following sequence:

- aggregate base
- base slab
- treatment chamber and cartridge deck riser section(s)
- bypass section
- connect inlet and outlet pipes
- concrete riser section(s) and/or transition slab (if required)
- maintenance riser section(s) (if required)
- frame and access cover

4.1.2 The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the precast concrete manufacturer's recommendations.

4.1.3 Adjustment of the stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary to restore original condition and watertight seals. Once the stormwater quality treatment device has been constructed, any/all lift holes must be plugged watertight with mortar or non-shrink grout.

4.1.4 Inlet and Outlet Pipes Inlet and outlet pipes should be securely set into the device using approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight, and such that any pipe intrusion into the device does not impact the device functionality.

4.1.5 Frame and Cover Installation Adjustment units (e.g. grade rings) should be installed to set the frame and cover at the required elevation. The adjustment units should be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover should be set in a full bed of mortar at the elevation specified.

4.2 MAINTENANCE ACCESS WALL
In some instances the Maintenance Access Wall, if provided, shall require an extension attachment and sealing to the precast wall and cartridge deck at the job site, rather than at the precast facility. In this instance, installation of these components shall be performed according to instructions provided by the manufacturer.

4.3 FILTER CARTRIDGE INSTALLATION Filter cartridges shall be installed in the cartridge deck only after the construction site is fully stabilized and in accordance with the manufacturer's guidelines and recommendations. Contractor to contact the manufacturer to schedule cartridge delivery and review procedures/requirements to be completed to the device prior to installation of the cartridges and activation of the system.

PART 5 – QUALITY ASSURANCE

5.1 FILTER CARTRIDGE INSTALLATION Manufacturer shall coordinate delivery of filter cartridges and other internal components with contractor. Filter cartridges shall be delivered and installed complete after site is stabilized and unit is ready to accept cartridges. Unit is ready to accept cartridges after is has been cleaned out and any standing water, debris, and other materials have been removed. Contractor shall take appropriate action to protect the filter cartridge receptacles and filter cartridges from damage during construction, and in accordance with the manufacturer's recommendations and guidance. For systems with cartridges installed prior to full site stabilization and prior to system activation, the contractor can plug inlet and outlet pipes to prevent stormwater and other influent from entering the device. Plugs must be removed during the activation process.

5.2 INSPECTION AND MAINTENANCE

5.2.1 The manufacturer shall provide an Owner's Manual upon request.

5.2.2 After construction and installation, and during operation, the device shall be inspected and cleaned as necessary based on the manufacturer's recommended inspection and maintenance guidelines and the local regulatory agency/body.

5.3 REPLACEMENT FILTER CARTRIDGES When replacement membrane filter elements and/or other parts are required, only membrane filter elements and parts approved by the manufacturer for use with the stormwater quality filter device shall be installed.

END OF SECTION

APPENDIX D

SANITARY DESIGN CALCULATIONS

TOWN OF COBOURG
SANITARY SEWER DESIGN SHEET

Project No. 2020-034
Subdivision: Eglin Park Redevelopment Project
Date: 07-Dec-20
Des. By: DT Chk. By CD

1. Sanitary Design Flow for Proposed Development

	Tributary Area Hectare				Population Tributary				Average	Average					SEWER					PIPE			
	Increment			Total	Increment			Total	Increment	Total	Peaking	Max.	Infiltration	Max. Flow			Q	V m/S					
	Res.	Comm.	Ind.		Res.	Comm.	Ind.																
Street	ha	ha	ha	ha					L/s	L/s	Factor	m^3/s	L/s	L/s	mm.	%	L/s	Full Flow	Act. Flow	Type	n	Class	**REMARKS**
MHA2 TO MHA1	0.688			0.69	107.2			107	0.452	0.452	4.235	1.716	0.179	1.895	200	1.00	32.81	1.04	0.2	PVC	0.013	SDR35	

* Max peaking factor based on Town of Cobourg Design Guidelines = 3.8
* Population density for townhouse unit = 2.68
* Average Flow = 364 L/person.day
* Infiltration = 0.2604 L/s

2. Sanitary Design Flow for Existing Development

	Tributary Area Hectare				Population Tributary				Average	Average					SEWER					PIPE			
	Increment			Total	Increment			Total	Increment	Total	Peaking	Max.	Infiltration	Max. Flow			Q	V m/S					
	Res.	Comm.	Ind.		Res.	Comm.	Ind.																
Street	ha	ha	ha	ha					L/s	L/s	Factor	m^3/s	L/s	L/s	mm.	%	L/s	Full Flow	Act. Flow	Type	n	Class	**REMARKS**
Elgin Street	0.688			0.69	58.14			58	0.245	0.245	4.301	0.931	0.179	1.110									

* Max peaking factor based on Town of Cobourg Design Guidelines = 3.8
* Population density for semi-detached = 3.23
* Average Flow = 364 L/person.day
* Infiltration = 0.2604 L/s

APPENDIX D

PROJECT COORDINATION

From: Terry Hoekstra <thoekstra@cobourg.ca>
Sent: August 14, 2020 10:29 AM
To: John Bishop <jbishop@mgm.on.ca>
Cc: Neil Stewart <nstewart@cobourg.ca>; Joseph Chartrand <jchartrand@cobourg.ca>
Subject: RE: 19284-Elgin Park Redevelopment - Civil Services (Pre Con Follow Up Meeting-Zoom)

John,

I reviewed some of our CCTV footage and there are 18 services going to Elgin Street that will require capping with a concrete plug at the property line. Each semi has its own sanitary service. Concrete plugs to be min. 300mm in length and using 20MPa concrete. Plugging to be completed in presence of Town inspector and is the responsibility of the proponent.

It will be a requirement to install a maintenance hole at the existing sanitary sewer main and another near the property line, on the private side of the property line.
Regards,

Terry Hoekstra, C.E.T.
Manager of Engineering and Capital Projects
Town of Cobourg
740 Division Street, Building 7
Cobourg, ON K9A 0H6
www.cobourg.ca
(p) 905.372.9971 Ext. 4371
(f) 905.372.0009

****Due to the COVID-19 outbreak, please be advised that The Town of Cobourg has declared a State of Emergency and has closed public access to all Municipal Buildings. Municipal staff are now working reduced schedules in order to ensure the health and safety of the public and employees, as well as maintain business continuity. We encourage all business to be done through email, phone, video-conferencing or courier.*

*For deliveries and other activities requiring direct access to Public Works, the Town of Cobourg has established strict screening and sign-in protocols for all visitors in the name of health and safety. Please contact our office to determine if alternatives are possible. We will make this transition as seamless as possible to minimize any service disruptions.****

From: John Bishop [mailto:jbishop@mgm.on.ca]
Sent: Wednesday, August 12, 2020 10:54 AM
To: Nick Swerdfeger <nswerdfeger@bba-archeng.com>; sbolender@lusi.on.ca; lspyrka@lusi.on.ca; FHyder@lusi.on.ca; Jered Marshall <jmarshall@cobourg.ca>; Mike Vilneff <mvilneff@cobourg.ca>; johnstonek@northumberlandcounty.ca; Neil Stewart <nstewart@cobourg.ca>; Joseph Chartrand <jchartrand@cobourg.ca>; Terry Hoekstra <thoekstra@cobourg.ca>; lbenson@grca.on.ca; kthajer@grca.on.ca; Calvin Dang <cdang@mgm.on.ca>
Cc: Glenn McGlashon <gmcglashon@cobourg.ca>; Esseghaier, Kaela <esseghaierk@northumberlandcounty.ca>; McIntosh, Mark <mcintoshm@northumberlandcounty.ca>; Carman, Rebecca <carmanr@northumberlandcounty.ca>; Cameron Mitchelmore <cmitchelmore@bba-archeng.com>; Holly Smith <hsmith@bba-archeng.com>
Subject: RE: 19284-Elgin Park Redevelopment - Civil Services (Pre Con Follow Up Meeting-Zoom)

Hi all,

I want to thank everyone for the time they took to speak with us last Wednesday morning regarding the Elgin Park Redevelopment. I am summarizing our discussion and providing our input on what will be provided within the FSR which is required for the rezoning process. I have also included some general questions which we will need direction on before commencing our work. I want to make sure we capture all the requirements of each department in order to move the development forward.

Storm Servicing and SWM

SWM will be implemented on site to reduce post development flows to predevelopment flows for all

events between and 2 and 100 year return period. On site storage will be provided within the private onsite storm sewers and within the rear parking area up to a maximum ponding level of 300mm at cb's. An orifice located within an inspection mh located at the property line will control flows as required prior to outletting to the municipal sewer. Due to the constraints associated with the 1500mm storm sewer located within the Elgin Street right of way, we will be proposing a connection to the D'Arcy Street storm sewer. A portion of the roof drainage may be directed toward Elgin for area where gutters or downspouts cannot be directed to the rear of the units. This will be address by overcontrolling the rear portion of the site. Quality control will be addressed through the use of a package oil/grit separator. Where feasible, LID's will be employed depending on site constraints and opportunities. Infiltrating roof water to granular pits will be considered depending on geotechnical recommendations. Bioswales may be incorporated where the site grading is conducive.

In addition to the above, we will be reviewing the topo plan to confirm the elevations to verify we are outside of the conservation regulation area. Further discussion with Ganaraska may be required.

Sanitary Servicing

The sanitary discharge for the subject development will be conveyed from induvial units and directed to a private sanitary sewer located within the rear parking lot. The private sanitary sewer will be discharged to an inspection manhole at the property line prior to outletting to the municipal sanitary sewer within the D'Arcy Street right of way. A calculation will be completed based on population densities to determine the slight increase in flows due to the density intensification anticipated.

Please advise on what the municipality's preferred method is for the capping and abandonment of the existing sanitary laterals and whether municipal forces would carry out this work or the owner's contractor.

Water Servicing

Domestic
Depending on the municipality's preference, individual domestic water servicing can be provided to each unit via the 400mm watermain within the Elgin Street right of way. The new services will be 1 inch (size to be confirmed). This would require separate meters but further direction on this matter will be required from the municipality as the entire site will be under a single ownership and this approach may not be in accordance with local by-laws or standards.

As an alternative, a single watermain can be installed under the rear parking lot to feed the individual units with a feed from the D'Arcy street watermain. A water meter chamber could be installed at the property line which would meter the entire development. Private sub-meters could be installed in each unit if required for the owner to determine individual unit billing. We will require additional feedback from the municipality.

Fire
A review of the existing fire hydrants located within the Elgin and D'Arcy street right of ways will be

completed to ensure fire coverage is met (90m unobstructed from hydrant to every main entrance). In the event the coverage is found insufficient, a new hydrant will be proposed within the municipal right of way to bring the fire coverage up to code.

Please advise on what the municipality's preferred method is for the capping and abandonment of the existing water services and whether municipal forces would carry out this work or the owner's contractor.

Thanks in advance for everyone's assistance and I look forward to your responses.

Regards,

John

John Bishop, CET.
Principal
MGM Consulting Inc.
555 Industrial Drive, Suite 201 Milton, Ontario, L9T 5E1
Tel: 905-567-8678 | Fax: 905-875-1339
jbishop@mgm.on.ca | www.mgm.on.ca

From: Nick Swerdfeger <nswerdfeger@bba-archeng.com>
Sent: July 30, 2020 9:40 AM
To: sbolender@lusi.on.ca; lspyrka@lusi.on.ca; FHyder@lusi.on.ca; Jered Marshall <jmarshall@cobourg.ca>; mvilneff@cobourg.ca; johnstonek@northumberlandcounty.ca; nstewart@cobourg.ca; jchartrand@cobourg.ca; thoekstra@cobourg.ca; lbenson@grca.on.ca; kthajer@grca.on.ca
Cc: John Bishop <jbishop@mgm.on.ca>; Glenn McGlashon <gmcglashon@cobourg.ca>; Esseghaier, Kaela <esseghaierk@northumberlandcounty.ca>; McIntosh, Mark <mcintoshm@northumberlandcounty.ca>; Carman, Rebecca <carmanr@northumberlandcounty.ca>; Cameron Mitchelmore <cmitchelmore@bba-archeng.com>; Holly Smith <hsmith@bba-archeng.com>
Subject: 19284-Elgin Park Redevelopment - Civil Services (Pre Con Follow Up Meeting-Zoom)

All

I have been given your contacts through Terry Hoekstra at the Town to have a Civil Services Pre Con meeting for the proposed re development at Elgin Park (Elgin and D'Arcy) which some of you are aware

(I have attached a brief communications package) – simplicity and the pre con package is with Planning – from our previous meeting.

We like to request the meeting for August 5th at 9:30am or at the latest 10am (as our consultant- John Bishop from MGM) has another appointment at 10:30am- it was recommended from Terry that I select Wednesdays given the development meetings are around that time.

Please indicate if you are available otherwise if we need to re schedule an alternative is the following week (August 13) at the same time slots

The purpose of this meeting is to get an understanding of specific requirements for our civil team(as they relate to functional servicing) for the submission on re zoning and later SPA for the above noted project, which recently has received funding to proceed in late 2020.

Thanks and looking fwd to your responses

Nick Swerdfeger *OAA MRAIC M.Arch B.Arch Sci*
Principal

Barry Bryan Associates
Architects, Engineers, Project Managers
201 - 250 Water Street
Whitby, Ontario L1N 0G5
PH: (905) 666-5252
FX: (905) 666-5256
www.bba-archeng.com
nswerdfeger@bba-archeng.com

From:	Leslie Benson
To:	Calvin Dang
Cc:	"Nick Swerdfeger"; John Bishop; "Ken Thajer"; "Glenn McGlashon"; "Terry Hoekstra"
Subject:	RE: 19284-Elgin Park Redevelopment - Civil Services (Pre Con Follow Up Meeting-Zoom)
Date:	August 18, 2020 3:07:04 PM
Attachments:	image001.png

Hi Calvin,
Thank you for this confirmation. The regulatory water surface elevation in this area is 98.95 m from Midtown Creek to the northwest. This is well below the perimeter elevations that you have shown which is what we anticipated.
Thanks again for the survey which we will, of course, keep on file.
Leslie Benson

From: Calvin Dang [mailto:cdang@mgm.on.ca]
Sent: August-17-20 11:01 AM
To: Leslie Benson
Cc: Nick Swerdfeger; John Bishop
Subject: RE: 19284-Elgin Park Redevelopment - Civil Services (Pre Con Follow Up Meeting-Zoom)

Leslie,

Our topographic survey is currently cover the the perimeter grade of the site plus an additional 10m outside of the property. i have attached our current survey for your reference. Please review and advise whether the survey here is adequately provide the data that you are looking for. Please also highlight the area on the plan which requires additional survey information. I also would like to request the GRCA regulated mapping of the site for our record.

Thanks

Regards,

Calvin Dang, B.Eng
MGM Consulting Inc.
* 201 - 555 Industrial Drive, Milton, Ontario, L9T 5EI
Tel: 905-567-8678 | Fax: 905-875-1339
apalaganas@mgm.on.ca | www.mgm.on.ca

From: Leslie Benson <lbenson@grca.on.ca>
Sent: August 12, 2020 1:51 PM
To: John Bishop <jbishop@mgm.on.ca>; 'Nick Swerdfeger' <nswerdfeger@bba-archeng.com>; sbolender@lusi.on.ca; lspyrka@lusi.on.ca; FHyder@lusi.on.ca; 'Jered Marshall' <jmarshall@cobourg.ca>; mvilneff@cobourg.ca; johnstonek@northumberlandcounty.ca; nstewart@cobourg.ca; jchartrand@cobourg.ca; thoekstra@cobourg.ca; kthajer@grca.on.ca; Calvin Dang <cdang@mgm.on.ca>
Cc: 'Glenn McGlashon' <gmcglashon@cobourg.ca>; 'Esseghaier, Kaela' <esseghaierk@northumberlandcounty.ca>; 'McIntosh, Mark' <mcintoshm@northumberlandcounty.ca>; 'Carman, Rebecca'

<carmanr@northumberlandcounty.ca>; 'Cameron Mitchelmore' <cmitchelmore@bba-archeng.com>; 'Holly Smith' <hsmith@bba-archeng.com>
Subject: RE: 19284-Elgin Park Redevelopment - Civil Services (Pre Con Follow Up Meeting-Zoom)

Good afternoon John,
Thank you for your email. My role in this is only with respect to the storm servicing and SWM.
For clarity: the property is definitely (partially) within the GRCA regulated area. I permit will be required from the Authority for the redevelopment. What I had asked was for perimeter grades to be shot to confirm that the property is not within the floodplain. I do not anticipate that the County's lands will fall within the flood plain, but the area is very flat, and we are requesting a more site specific survey to confirm that.
I hope that helps. Feel free to contact me anytime. Thanks again.
Leslie Benson, P.Eng.
Water Resources Engineer

From: John Bishop [mailto:jbishop@mgm.on.ca]
Sent: August-12-20 10:54 AM
To: Nick Swerdfeger; sbolender@lusi.on.ca; lspyrka@lusi.on.ca; FHyder@lusi.on.ca; Jered Marshall; mvilneff@cobourg.ca; johnstonek@northumberlandcounty.ca; nstewart@cobourg.ca; jchartrand@cobourg.ca; thoekstra@cobourg.ca; lbenson@grca.on.ca; kthajer@grca.on.ca; Calvin Dang
Cc: Glenn McGlashon; Esseghaier, Kaela; McIntosh, Mark; Carman, Rebecca; Cameron Mitchelmore; Holly Smith
Subject: RE: 19284-Elgin Park Redevelopment - Civil Services (Pre Con Follow Up Meeting-Zoom)

Hi all,

I want to thank everyone for the time they took to speak with us last Wednesday morning regarding the Elgin Park Redevelopment. I am summarizing our discussion and providing our input on what will be provided within the FSR which is required for the rezoning process. I have also included some general questions which we will need direction on before commencing our work. I want to make sure we capture all the requirements of each department in order to move the development forward.

Storm Servicing and SWM

SWM will be implemented on site to reduce post development flows to predevelopment flows for all events between and 2 and 100 year return period. On site storage will be provided within the private onsite storm sewers and within the rear parking area up to a maximum ponding level of 300mm at cb's. An orifice located within an inspection mh located at the property line will control flows as required prior to outletting to the municipal sewer. Due to the constraints associated with the 1500mm storm sewer located within the Elgin Street right of way, we will be proposing a connection to the D'Arcy Street storm sewer. A portion of the roof drainage may be directed toward Elgin for area where gutters or downspouts cannot be directed to the rear of the units. This will be address by overcontrolling the rear portion of the site. Quality control will be addressed through the use of a package oil/grit separator. Where feasible, LID's will be employed depending on site constraints and opportunities. Infiltrating roof water to granular pits will be considered depending on geotechnical recommendations. Bioswales may be incorporated where the site grading is conducive.

In addition to the above, we will be reviewing the topo plan to confirm the elevations to verify we are outside of the conservation regulation area. Further discussion with Ganaraska may be required.

Sanitary Servicing

The sanitary discharge for the subject development will be conveyed from induvial units and directed to a private sanitary sewer located within the rear parking lot. The private sanitary sewer will be discharged to an inspection manhole at the property line prior to outletting to the municipal sanitary sewer within the D'Arcy Street right of way. A calculation will be completed based on population densities to determine the slight increase in flows due to the density intensification anticipated.

Please advise on what the municipality's preferred method is for the capping and abandonment of the existing sanitary laterals and whether municipal forces would carry out this work or the owner's contractor.

Water Servicing

Domestic
Depending on the municipality's preference, individual domestic water servicing can be provided to each unit via the 400mm watermain within the Elgin Street right of way. The new services will be 1 inch (size to be confirmed). This would require separate meters but further direction on this matter will be required from the municipality as the entire site will be under a single ownership and this approach may not be in accordance with local by-laws or standards.

As an alternative, a single watermain can be installed under the rear parking lot to feed the individual units with a feed from the D'Arcy street watermain. A water meter chamber could be installed at the property line which would meter the entire development. Private sub-meters could be installed in each unit if required for the owner to determine individual unit billing. We will require additional feedback from the municipality.

Fire
A review of the existing fire hydrants located within the Elgin and D'Arcy street right of ways will be completed to ensure fire coverage is met (90m unobstructed from hydrant to every main entrance). In the event the coverage is found insufficient, a new hydrant will be proposed within the municipal right of way to bring the fire coverage up to code.

Please advise on what the municipality's preferred method is for the capping and abandonment of the existing water services and whether municipal forces would carry out this work or the owner's contractor.

Thanks in advance for everyone's assistance and l look forward to your responses.

Regards,

John

John Bishop, CET.
Principal
MGM Consulting Inc.
555 Industrial Drive, Suite 201 Milton, Ontario, L9T 5E1
Tel: 905-567-8678 | Fax: 905-875-1339
jbishop@mgm.on.ca | www.mgm.on.ca

From: Nick Swerdfeger <nswerdfeger@bba-archeng.com>
Sent: July 30, 2020 9:40 AM
To: sbolender@lusi.on.ca; lspyrka@lusi.on.ca; FHyder@lusi.on.ca; Jered Marshall <jmarshall@cobourg.ca>; mvilneff@cobourg.ca; johnstonek@northumberlandcounty.ca; nstewart@cobourg.ca; jchartrand@cobourg.ca; thoekstra@cobourg.ca; lbenson@grca.on.ca; kthajer@grca.on.ca
Cc: John Bishop <jbishop@mgm.on.ca>; Glenn McGlashon <gmcglashon@cobourg.ca>; Esseghaier, Kaela <esseghaierk@northumberlandcounty.ca>; McIntosh, Mark <mcintoshm@northumberlandcounty.ca>; Carman, Rebecca <carmanr@northumberlandcounty.ca>; Cameron Mitchelmore <cmitchelmore@bba-archeng.com>; Holly Smith <hsmith@bba-archeng.com>
Subject: 19284-Elgin Park Redevelopment - Civil Services (Pre Con Follow Up Meeting-Zoom)

All

I have been given your contacts through Terry Hoekstra at the Town to have a Civil Services Pre Con meeting for the proposed re development at Elgin Park (Elgin and D'Arcy) which some of you are aware
(I have attached a brief communications package) – simplicity and the pre con package is with Planning – from our previous meeting.

We like to request the meeting for August 5th at 9:30am or at the latest 10am (as our consultant- John Bishop from MGM) has another appointment at 10:30am- it was recommended from Terry that I select Wednesdays given the development meetings are around that time.
Please indicate if you are available otherwise if we need to re schedule an alternative is the following week (August 13) at the same time slots
The purpose of this meeting is to get an understanding of specific requirements for our civil team(as they relate to functional servicing) for the submission on re zoning and later SPA for the above noted project, which recently has received funding to proceed in late 2020.

Thanks and looking fwd to your responses

Nick Swerdfeger *OAA MRAIC M.Arch B.Arch Sci*
Principal

Barry Bryan Associates
Architects, Engineers, Project Managers
201 - 250 Water Street
Whitby, Ontario L1N 0G5
PH: (905) 666-5252
FX: (905) 666-5256
www.bba-archeng.com
nswerdfeger@bba-archeng.com