Stormwater Management Report
Eagleson Road KDR Redevelopment

SHELL CANADA LIMITED

NOVEMBER 13, 2026

225-340 MIDPARK WAY SE
CALGARY, AB
P: 403 640 0990
F: 403 259 6506

Distribution List

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Revision History

Revision #	Date	Revised By	Revision Description
0	JUNE 26 2026	YVONNE	ORGINAL
1	November 13, 2026	YVONNE	REVISED PER CITY COMMENTS. REVISED PER SITE PLAN REVISIONS.

Authors

Report Prepared By:	Inna Nikiforov T.T Civil Technologist | CTM Design Services Ltd. Yvonne Faas, P. Eng., Project Engineer | CTM Design Services Ltd.
Report Reviewed By:	Yvonne Faas, P. Eng., Project Engineer | CTM Design Services Ltd.



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1 Project Information

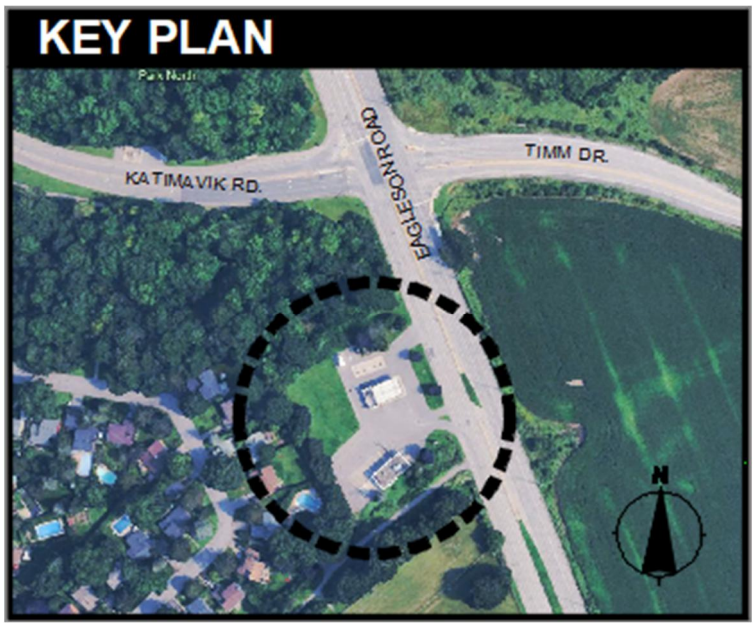
Client:	Shell Canada Products
Contact:	Kerry Morrison, EPCM Advisor
Project Name:	Eagleson Road KDR
Description:	Redevelopment (Knockdown Rebuild) Gas Bar with Canopy, C-store
Location:	106 Eagleson Road, Kanata, Ontario
Consultant:	CTM Design Services Ltd.
Contact:	Yvonne Faas, P.Eng. Civil Engineer

2 Introduction

CTM Design Services Ltd. (CTM) has been retained by Shell Canada Products to provide consulting engineering services for the proposed redevelopment of the property is located on the southwest corner of the intersection of Eagleson Road and intersection of Katimavik Road and Timm Drive. The site is bounded by undeveloped forested lands to the north, with Katimavik Road beyond; by Eagleson Road and agricultural lands to the east; by commercial and residential development to the south; and by residential development to the west. The address is 106 Eagleson Road, Kanata, Ontario. The location map is shown in Figure 1.

2.1 Location Map

The site is located southwest of intersection Katimavik Road and Timm Drive and Eagleson Road.



SCALE: N.T.S.

2.2 Existing Conditions

The subject site is 0.70 hectares in size. The site is currently occupied by one c-store and attached canopy over the gas bar which includes 4 dispensers, car wash, and a fenced in garbage enclosure. There are two commercial accesses from Eagleson Road. The existing site cover consists of paved parking and drive areas, and perimeter grassed landscaping with some mature trees.

The site is located adjacent to a significant woodland (Katimavic Woods) and watercourse (Watts Creek or tributary thereof).

The Mississippi Valley Conservation Authority (MVCA) notes minor encroachment of the Meander Belt on the subject property. The erosion hazard (Meander Belt) is identified by a dashed green line on all drawings. This is due to the bank-full width of the watercourse and no apparent river valley, as mapped. New development and lot grading generally is not permitted in this area.

The Mississippi Valley Conservation Authority (MVCA) confirms that a portion of the above noted property is regulated under Ontario Regulation 41/24, Prohibited Activities, Exemptions and Permits. Under Ontario Regulation 41/24, written permission is required from the MVCA prior to the initiation of development (which includes construction, site grading and the placement or removal of fill) within an area regulated by the Conservation Authority (regulation limit delineated in yellow on the regulation mapping) as well as straightening, changing, diverting or interfering in any way with the existing channel or the shoreline of a watercourse.

2.3 Proposed Conditions

The proposed site will consist of a new C-store, a new 6-dispenser gas bar covered by a canopy, new underground tanks will be installed, new waste enclosure, and new EV (4) charging stations. The existing car wash will remain in place. The existing two commercial accesses from Eagleson Road will remain in place. There will be an increase to the site cover consisting of paved parking and drive areas. The perimeter landscaping frontage will remain in place; existing mature trees will be protected where possible (see Arborist Report). No encroachment to the Meander Belt or the MVCA regulation limit is expected.

2.4 Purpose of Report

This Stormwater Management Report outlines the engineering design elements for the proposed development, including site grading and driveway access, storm sewers and stormwater management. This report has been prepared in support of the Site Plan Control Application (SPCA).

2.5 Supporting Drawings

This report has been prepared based on the Site Plan, Site Grading, Servicing and Stormwater Management Plans, both Existing and Proposed Conditions, and Erosion and Sediment Control. Supporting drawings will accompany the Site Plan Control Application.

2.6 Supporting Reports

Referencing the Geotechnical Investigation Report, by Gemtec, July 28, 2025, groundwater depth below existing ground surface ranges from 2.7 to 3.1m. Groundwater levels will fluctuate seasonally and may be higher during wet periods of the year such as the early spring or fall or following periods of heavy precipitation. Hydraulic response testing results in conductivity for sandy silt deposits. The groundwater quality results are presented in the report. Groundwater management during construction may experience inflow and can be controlled with sumps during excavation when required. Suitable detention and filtration will be required before discharging the water to a sewer. The rate of groundwater inflow from the overburden deposits is not expected to exceed 50,000

liters per day, as such the water takings for this project will likely not be subject to an EASR. Although to prevent potential construction delays, a provisional EASR may be considered depending on duration of excavation, trench size and to account for contingencies related to stormwater infiltration. To minimize groundwater management requirements, it is recommended that construction be undertaken during the dry period of the year (i.e. June to September).

3 Stormwater Management – Existing Conditions vs Pre-development Conditions

3.1 Existing Conditions

Currently, the site is partially covered with asphalt, concrete surfaces, including two buildings and a canopy roof. The hard surface makes up roughly half of the site. The other half is landscaping that flows uncontrolled offsite. The grading of the hard surface developed portion has slopes ranging from 1% to 5%. The landscaped grass and forested areas have slopes ranging from 1% to 25%.

The hard surface developed portion of the site contains the stormwater runoff by directing flow into four (4) catch basins. The stormwater is collected and directed into two (2) separate storm sewer services that each discharge to the 1200 concrete sewer main in the Eagleson Road easement.

The existing building, canopy and car wash have roof leaders connected directly to the storm system.

The landscaped areas are mostly grass, with slopes ranging from 1% to 25%, and runoff currently flows offsite unmitigated.

Runoff Coefficient:

The overall total site has an existing combined runoff coefficient of 0.60.

On-site Ponding Storage:

The Stormwater Management Plan – Existing Conditions Drawing C103 shows the extent of ponding. There are three ponds, each 0.200 depth, which help in temporarily storing runoff and reducing peak flow rates. The on-site ponding storage capacity is 70 cu.m.

Controlled Discharge:

The stormwater runoff is mitigated using pipe controlled discharge methods. The outgoing pipes are sized for the 1:5 year release rate for the respective contributing areas. However, as we know, this will increase with increasing head as the pond starts to fill up. Discharge rates are likely increased during extreme storm events due to the hydraulic gradient.

Overland Escape Flows:

Under existing conditions, stormwater capture and containment up to a 1:100 year storm event is occurring. No escape flows occur during 1:100 year storm events. There is a single point of escape from the existing developed site to Eagleson Road. Full calculations are provided in Appendix A.

3.3 Table 1A: Existing Stormwater Peak Flows and Runoff Volume

EXISTING STORMWATER PEAK FLOWS AND RUNOFF VOLUMES			
CONDITION	5 YEAR	100 YEAR	UNITS
FREE FLOW OFFSITE, UNMITIGATED A4 TO THE LEFT SIDE DITCH TO THE CREEK	4.5	9.6	L/s
FREE FLOW OFFSITE, UNMITIGATED A5 TO THE RIGHT SIDE MEANDER BELT TO CREEK	29.0	62.9	L/s
CONTROLLED IN PIPE A1 TO CONC 1200 STORM MAIN	31	53	L/s
CONTROLLED IN PIPE A2&A3 TO CONC 1200 STORM MAIN	56	95	L/s
TOTAL PEAK FLOW GENERATED	120	220	L/s
STORAGE VOLUME PROVIDED A1	19	19	m^3
STORAGE VOLUME PROVIDED A2&A3	51	51	m^3
STORAGE VOLUME PROVIDED TOTAL	70	70	m^3

3.4 Target Pre-development Conditions

The target design guidelines were provided in the Pre-con comments. Refer to Appendix D, applicable summary below.

Allowable peak flows are required to meet pre-development conditions, regardless of the existing conditions. 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. If the existing conditions drain by overland to the creek, the applicant can continue drainage to the creek as long as there are no increase in flows to the creek. Any excess flow will need to be controlled on site. The quantity control criteria is 100-year post-development to 5-year pre-development with a maximum c value of 0.5. Quality control criteria: An enhanced level of treatment is required to 80% TSS removal.

3.5 Table 1B: Target Pre-development Peak Flows

PRE-DEVELOPMENT STORMWATER PEAK FLOWS			
CONDITION	5 YEAR	100 YEAR	UNITS
TOTAL SITE AREA	107.3	183.8	L/s

Detailed Calculations are provided in Appendix A.

4 Stormwater Management – Proposed Conditions

4.1 Proposed Conditions

The proposed redevelopment site will see an increase to asphalt and concrete surfaces, including roof and canopy size, and a corresponding decrease to the landscaped surface area. Therefore, an increase in the overall runoff coefficient. No development in the MVCA regulation zone is proposed. No increase to runoff to the Meander Belt as a result of the redevelopment.

Refer to the Stormwater Management Plan – Proposed Redevelopment C104, for detailed design and calculation tables.

Site Grading and Drainage:

Slopes will range from 1% to 5% for asphalt and concrete surfaces, and 2% to 25% for landscaped areas. Note that some areas have a steeper slope adjacent to the Meander Belt in order to avoid backsloping and disturbance in the Regulation Zone, and to avoid proximity to existing trees.

The site will be graded towards capture of stormwater runoff into new and existing catch basins. Significant ponding onsite is available as shown, with a maximum depth of 0.300 m.

Areas of unmitigated flow are limited to the perimeter landscaped areas that match the existing conditions. Unmitigated flows to the left side to the existing ditch will see an insignificant increase due to a small increase in landscaped area that was asphalt. Unmitigated flows to the right side to the Meander Belt will see a decrease due to less area overall.

Roof Leaders:

The proposed building and canopy will have roof leaders that connect directly to the stormwater system, ensuring that runoff from these structures is managed effectively.

Ponding Conditions:

Both new and existing catch basins collect the runoff and create ponding conditions, maximizing on-site storage and reducing peak runoff. Ponding depth will be a maximum 0.300m. The extent of maximum full supply level is shown on the Stormwater Management Plan – Proposed Redevelopment. The ponding will not reach the buildings. There is 0.300 m of freeboard between the spill elevation and the building opening for assurance.

Flow Control:

An orifice plate will be installed on the outlet pipe to control the release rate of stormwater, ensuring it does not exceed the allowable release rate for a runoff coefficient of 0.50, matching a 1:5 year storm event. At this site, the controlled allowable release rate is 59 L/s; after accounting for a 20% stress test and a design factors, a design release rate of 40L/s is proposed. The minimum orifice diameter allowable is 83mm; the design orifice diameter is 110mm. When the 1:100 year ponding elevation is reached, the head acting on the orifice will limit the flow to a maximum release rate of 36 L/s.

Oil Grit Separator (OGS):

A new OGS unit will be installed to treat runoff, removing oil and grit before discharge. A Stormceptor Model EF/EF04 will sized to meet local guidelines. A signed report from supplier is provided in Appendix C.

Overland Escape Flows:

The proposed redevelopment conditions contain the developed site runoff. No overland escape flows up to the 1:100 year design storm event, including the 25% increase to runoff coefficient in landscape areas and including the stress test increase by 20%.

Full calculations are provided in Appendix B.

4.2 Table 2: Proposed Redevelopment Stormwater Peak Flows and Runoff Volume

PROPOSED STORMWATER PEAK FLOWS AND RUNOFF VOLUMES				
CONDITION	5 YEAR	100 YEAR	STRESS TEST (+20%)	UNITS
FREE FLOW OFFSITE, UNMITIGATED CATCHMENT C1 TO THE LEFT SIDE EXISTING DITCH	4.8	10.3	12.5	L/s
FREE FLOW OFFSITE, UNMITIGATED CATCHMENT C2 TO THE RIGHT SIDE MEANDER BELT	18.0	38.4	46.1	L/s
CONTROLLED CATCHMENTS B1-6 CONTAINED ONSITE TO FLOW TO PIPE TO EX CONC 1200 STORM MAIN	34.9	35.7	36.0	L/s
TOTAL PEAK FLOW GENERATED	57.9	84.6	84.9	L/s
STORAGE VOLUME REQUIRED	52.9	120.7	157.7	m^3
STORAGE VOLUME PROVIDED	208	208	208	m^3

4.3 Quantity Control

Peak flow calculations are based on rainfall intensity duration frequency (IDF) curves in accordance with the municipal standards. The rainfall intensity values, i, for the 5 and 100 year return periods are sourced from the following compilation:

- Ottawa Sewer Design Guidelines (2019, and Technical Bulletins 2025)*
- nearby gauged data provided by Environment Canada
- compiled through Simonovic, S.P., A. Schardong, R. Srivastav, and D. Sandink (2015), IDF_CC Web-based Tool for Updating Intensity-Duration-Frequency Curves to Changing Climate – ver 6.0, Western

University Facility for Intelligent Decision Support and Institute for Catastrophic Loss Reduction, open access https://www.idf-cc-uwo.ca. 1967-2016 (*removed with revision 1*)

The c value for landscaping in the 100 year event is increased by 25%.

The additional Stress Test adds 20% to the IDF curve.

4.4 Table 3: IDF data

Duration (min)	5 Year (mm/hr)	100 Year (mm/hr)
10	104.19	178.56

*1967-1997

For detailed calculations refer to Appendices A & B. Using the Modified Rational Method, the maximum storage volume requirement and the peak escape flow were predicted for the 1:5 and 1:100 year storm events.

The time of concentration is the minimum 10 minutes across the site.

4.5 Table 4A: Surface Storage

Pond #	1			
Depth (m)	Elevation (m)	Area (m^2)	Incremental Volume (m^3)	Volume (m^3)
0.000	101.950	0		0
0.050	102.000	0	-	0
0.100	102.050	37	1	0.9
0.150	102.100	78	3	3.8
0.200	102.150	133	5	9.1
0.250	102.200	203	8	17.5
Pond #	2			
Depth (m)	Elevation (m)	Area (m^2)	Incremental Volume (m^3)	Volume (m^3)
0.000	101.950	0		0
0.050	102.000	0	-	0
0.100	102.050	5	0	0.1
0.150	102.100	26	1	0.9
0.200	102.150	59	2	3.0
0.250	102.200	102	4	7.1
Pond #	3			
Depth (m)	Elevation (m)	Area (m^2)	Incremental Volume (m^3)	Volume (m^3)
0.000	101.950	0		0

0.050	102.000	0	-	0
0.100	102.050	5	0	0.1
0.150	102.100	15	0	0.6
0.200	102.150	40	1	2.0
0.250	102.200	83	3	5.1
Pond #	4			
Depth (m)	Elevation (m)	Area (m^2)	Incremental Volume (m^3)	Volume (m^3)
0.000	101.900	0	-	0
0.050	101.950	15	0	0.4
0.100	102.000	58	2	2.2
0.150	102.050	128	5	6.8
0.200	102.100	221	9	15.6
0.250	102.150	331	14	29.4
0.300	102.200	460	20	49.2
Pond #	5			
Depth (m)	Elevation (m)	Area (m^2)	Incremental Volume (m^3)	Volume (m^3)
0.000	101.900	0	-	0
0.050	101.950	50	1	1.2
0.100	102.000	188	6	7.2
0.150	102.050	366	14	21.0
0.200	102.100	581	24	44.7
0.250	102.150	714	32	77.1
0.300	102.200	940	41	118.5
Pond #	6			
Depth (m)	Elevation (m)	Area (m^2)	Incremental Volume (m^3)	Volume (m^3)
0.000	101.990	0		0
0.010	102.000	1	0	0.005
0.060	102.050	10	0	0.3
0.110	102.100	70	2	2.3
0.160	102.150	200	7	9.0
0.210	102.200	334	13	22.4

Table 4B: Combined Surface Storage

Pond	Area (sq.m)	Depth (m)	Volume (cu.m)
1	203	0.200	17.48

2	102	0.200	7.05
3	83	0.200	5.08
4	460	0.300	49.15
5	940	0.300	118.45
6	334	0.210	22.38
TOTAL			219.58

4.6 Table 5: Underground Storage

Item	Rim or Water Level	Outlet Inv.	Radius	Volume
PR.CB1	101.90	100.93	0.60	1.10
PR.CB2	101.90	100.76	0.60	1.29
PR CBMH1	102.00	100.64	0.60	1.54
PR CBMH2	102.00	100.53	0.60	1.66
PR CBMH3	102.00	100.31	0.60	1.91
EX CB2	101.95	100.83	0.60	1.27
EX CB3	101.99	100.74	0.60	1.41
TOTAL				10.17

Item	Length	Radius	Volume
PIPE	11.342	0.150	0.80
PIPE	37.555	0.150	2.65
PIPE	16.149	0.150	1.14
PIPE	12.501	0.150	0.88
PIPE	19.147	0.150	1.35
PIPE	36.603	0.100	1.15
PIPE	51.448	0.075	0.91
TOTAL			8.89

4.7 Table 6: Combined Total Stage–Storage Curve

Depth (m)	Elevation (m)	Incremental Volume (m^3)	Volume (m^3)
0.000	101.700	15	15.3
0.000	101.800	16	15.5
0.000	101.900	19	18.6
0.000	101.950	20	21.8
0.050	102.000	20	29.6
0.350	102.050	20	49.5
0.400	102.100	20	88.1
0.450	102.150	20	149.8
0.500	102.200	20	239.7

Chart 1: Stage-Storage Curve

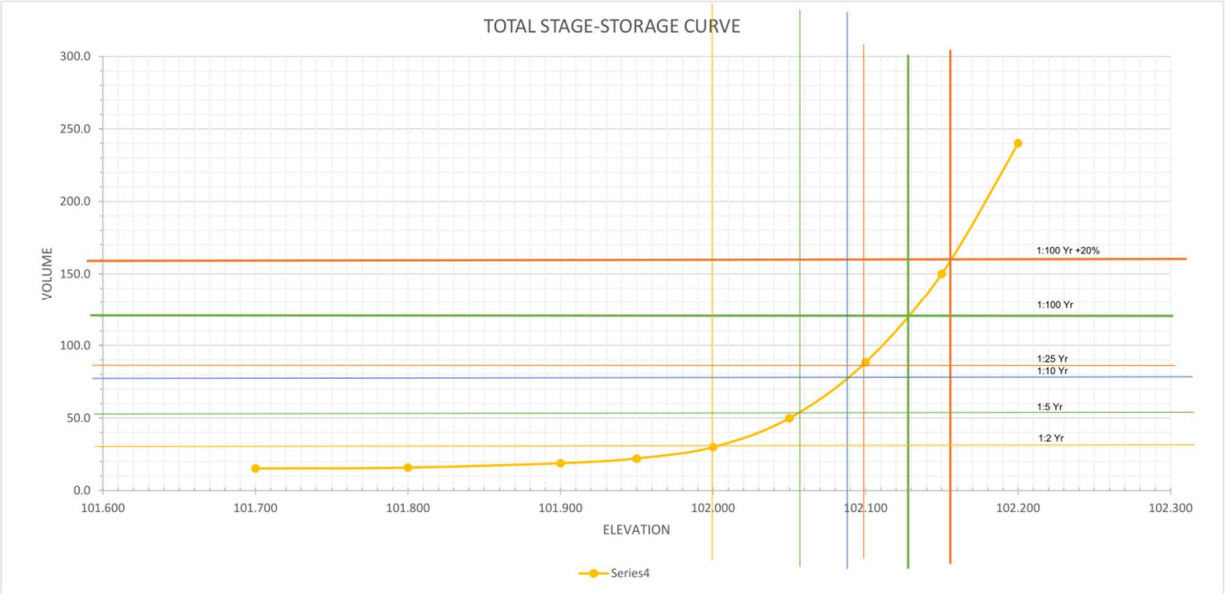


Table 7: Storage Required and Pond Elevation Reached

Storm Event	2-year	5-year	10-year	25-year	100-year	100-year + 20%
Top of Pond Elevation	102.000	102.055	102.090	102.100	102.130	102.155
Storage Volume Required (cu.m)	31.6	52.9	68.2	88.5	120.7	157.7

Storage Volume required was calculated using the Modified Rational Method Tables as described in the City of Ottawa guidelines.

4.8 Quality Control

The landscape areas are generally considered clean runoff and thus permitted to infiltrate and runoff.

The driving surfaces on the redevelopment site will be prone to oil, grit, and sediment collection. These areas will be collected into the on-site storm sewer and transported to an Oil Grit Separator Unit sized to achieve Enhanced Protection Level (Level 1 treatment) which provides a minimum 80% TSS removal. This specification was provided by Ontario Provincial Regulations, Stormwater Management Planning and Design Manual.

For this application a Stormceptor® EF/EFO4 type oil and grit separator will be selected in accordance with the manufacturer's recommendations. Refer to Appendix C for supporting product documentation, verification of the target 80% TSS removal, Standard Specification, Owner's Manual including Operations & Maintenance Manual.

To ensure the target of 80% TSS is reached, the OGS unit works with a treatment train. The treatment train consists of on-site storage and catchbasin sumps.

5 Summary

The proposed redevelopment of this site aims to significantly improve the current stormwater management system. This plan meets guidelines and Stormwater Management Criteria set out for the subject site. The discharge rate will be controlled by an orifice plate under ponding conditions. Onsite storage capacity will be utilized. A new Oil Grit Separator will be installed to enhance stormwater quality management.

Appendices

Appendix A – Existing Conditions SWM Calculations

Appendix B – Proposed Redevelopment SWM Calculations

Appendix C – Oil Grit Separator Product Supporting Documents

Appendix D – Pre-con comments May 22 2026.

Appendix A – Pre-development and Existing Conditions SWM Calculations

STORMWATER MANAGEMENT CALCULATIONS

Rainfall Intensity = 104.2 mm/hr (1:5 Year)
178.6 mm/hr (1:100 Year)

PRE-DEVELOPMENT SITE CONDITIONS
CATCHMENT A

SURFACE	AREA (m^2)	C FACTOR
BUILDING		1.00
PAVEMENT		0.90
LANDSCAPE	7407	0.50
TOTAL	7407	0.50

$Q_{ALLOWABLE}$ = 2.78 C i A

$Q_{ALLOWABLE}$ =	1:5 Year	1:100 Year	
$Q_{ALLOWABLE}$ =	107.3	183.8	L/s

EXISTING DEVELOPMENT SITE CONDITIONS

CATCHMENT A4 - UNCONTROLLED TO LEFT SIDE TO DITCH (EXISTING)

SURFACE	AREA (m^2)	C FACTOR	
BUILDING	0	1.00	
PAVEMENT	0	0.90	
LANDSCAPE	514	0.30	add 25% to c value for 100 year
TOTAL	514	0.30	

Q_{A4} = 2.78 C i A

Q_{A4} =	1:5 Year	1:100 Year
	4.5	9.6

CATCHMENT A5 - UNCONTROLLED TO RIGHT SIDE TO MEANDER BELT (EXISTING)

SURFACE	AREA (m^2)	C FACTOR	
BUILDING	0	1.00	
PAVEMENT	0	0.90	
LANDSCAPE	3336	0.30	add 25% to c value for 100 year
TOTAL	3336	0.30	

Q_{A5} = 2.78 C i A

Q_{A5} =	1:5 Year	1:100 Year
	29.0	62.1

CATCHMENTS A1 - PIPE CONTROLLED

SURFACE	AREA (m^2)	C FACTOR	
BUILDING/ROOF	177	1.00	
PAVEMENT	889	0.90	
LANDSCAPE	223	0.38	add 25% to c value for 100 year
TOTAL	1289	0.82	

Q_{A1} = 2.78 C i A

	1:5 Year	1:100 Year
Q_{A1} =	31	52.7

STORAGE VOLUME REQUIRED (RATIONAL METHOD MODEL)

	1:5 Year	1:100 Year
$VOLUME_{REQ}$ =	2.7	4.7
ELEVATION REACHED =	102.00	102.10

STORAGE VOLUME PROVIDED

Surface Storage Volume at Max Full
Supply Level (Elevation 102.20) = 19 m^3

CATCHMENTS A2&A3 - PIPE CONTROLLED

SURFACE	AREA (m^2)	C FACTOR	
BUILDING/ROOF	215	1.00	
PAVEMENT	1771	0.90	
LANDSCAPE	287	0.38	add 25% to c value for 100 year
TOTAL	2273	0.84	

Q_{A23} = 2.78 C i A

	1:5 Year	1:100 Year
Q_{A23} =	56	95.1

STORAGE VOLUME REQUIRED (RATIONAL METHOD MODEL)

	1:5 Year	1:100 Year
$VOLUME_{REQ}$ =	4.9	8.4
ELEVATION REACHED =	102.00	102.10

STORAGE VOLUME PROVIDED

Surface Storage Volume at Max Full
Supply Level (Elevation 102.20) = 51 m^3

TOTAL FREE FLOW + CONTROLLED FLOW =

	1:5 Year	1:100 Year
$Q_{A1} + Q_{A23} + Q_{A4} + Q_{A5}$ =	119.7	219.5

$Q_{PR} > Q_{ALL}$

$VOL_{REQ} < VOL_{AVL}$

Appendix B – Proposed Redevelopment SWM Calculations

STORMWATER MANAGEMENT CALCULATIONS

Rainfall Intensity = 104.2 mm/hr (1:5 Year)
178.6 mm/hr (1:100 Year)

PRE-DEVELOPMENT SITE CONDITIONS
CATCHMENT A

SURFACE	AREA (m^2)	C FACTOR
BUILDING		1.00
PAVEMENT		0.90
LANDSCAPE	7407	0.50
TOTAL	7407	0.50

$Q_{ALLOWABLE}$ = 2.78 C i A

$Q_{ALLOWABLE}$ =	1:5 Year	1:100 Year	
$Q_{ALLOWABLE}$ =	107.3	183.8	L/s

POST-DEVELOPMENT SITE CONDITIONS

CATCHMENT C1 - UNCONTROLLED TO LEFT SIDE TO DITCH (EXISTING)

SURFACE	AREA (m^2)	C FACTOR	
BUILDING	0	1.00	
PAVEMENT	0	0.90	
LANDSCAPE	553	0.30	add 25% to c value for 100 year
TOTAL	553	0.30	

Q_{C1} = 2.78 C i A

	1:5 Year	1:100 Year
Q_{C1} =	4.8	10.3

CATCHMENT C2 - UNCONTROLLED TO RIGHT SIDE TO MEANDER BELT (EXISTING)

SURFACE	AREA (m^2)	C FACTOR	
BUILDING	0	1.00	
PAVEMENT	55	0.90	
LANDSCAPE	1906	0.30	add 25% to c value for 100 year
TOTAL	1961	0.32	

Q_{C2} = 2.78 C i A

	1:5 Year	1:100 Year
Q_{C2} =	18.0	38.4

CATCHMENTS B1-B6 - CONTROLLED

SURFACE	AREA (m^2)	C FACTOR	
BUILDING/ROOF	816	1.00	
PAVEMENT	3213	0.90	
GRAVEL	0	0.65	
LANDSCAPE	864	0.38	add 25% to c value for 100 year
TOTAL	4893	0.82	

Q_B = 2.78 C i A

	1:5 Year	1:100 Year	Stress Test (20%)	
Q_B =	117	200.1	240.2	L/s

ORIFICE CONTROL IN PR. CBMH#3

	1:5 Year	1:100 Year	Stress Test (20%)	
R =	55.0	55.0	55.0	mm
A_0 =	0.01040	0.01040	0.01040	m^2
Head Calculation				
Top of Pond =	102.055	102.130	102.155	m
Pipe Invert =	100.310	100.310	100.310	m
pipe (if orifice submerged) =	0.150	0.153	0.154	m
H_0 =	1.595	1.667	1.691	m/m
Q_{B2} =	34.9	35.7	36.0	L/s

STORAGE VOLUME REQUIRED (RATIONAL METHOD MODEL)

	1:5 Year	1:100 Year	Stress Test (20%)	
VOLUME $_{REQ}$ =	52.9	120.7	157.7	m^3
ELEVATION REACHED =	102.055	102.130	102.155	m

STORAGE VOLUME PROVIDED

Surface Storage Volume at Max Full Supply Level (Elevation 102.20) =	219.6	m^3
Underground Pipe & Barrel Storage	19.1	m^3
Total Storage	238.6	m^3

TOTAL FREE FLOW + CONTROLLED FLOW =

	1:5 Year	1:100 Year	Stress Test (20%)	
$Q_{C1} + Q_{C2} + Q_{B2}$ =	57.7	84.4	84.7	L/s

$Q_{PR} < Q_{ALL}$

$VOL_{REQ} < VOL_{AVL}$

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Appendix C – Oil Grit Separator Product Supporting Documents

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

07/03/2026

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20

Site Name:	106 Eagleson Rd. Shell

Drainage Area (ha):	0.4800
Runoff Coefficient 'c':	0.84

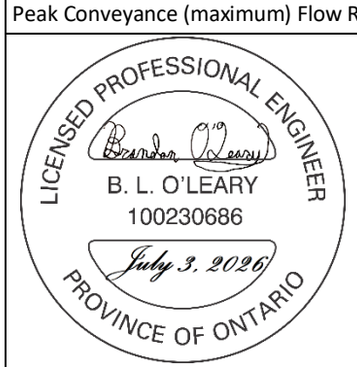
Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	90.0

Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	36
Peak Conveyance (maximum) Flow Rate (L/s):	36

Project Name:	106 Eagleson Rd. Shell
Project Number:	2025071
Designer Name:	Brandon O'Leary
Designer Company:	Rinker Pipe
Designer Email:	brandon.oleary@RinkerPipe.com
Designer Phone:	905-630-0359
EOR Name:	John Tieu
EOR Company:	CTM Design Services Ltd.
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	85
EFO5	90
EFO6	93
EFO8	97
EFO10	98
EFO12	99



Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 85

Water Quality Runoff Volume Capture (%): > 90

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THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

► The **Canadian ETV PSD** shown in the table below on the left was used in part for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff. Given that the standard OGS sizing methodology for this municipality, based on current understanding, is for the use of a historical coarse PSD derived by the manufacturer, the **FINE PSD** has been used for this sizing. The FINE PSD used for calculations has been provided below on the right. The third-party ISO 14034/ETV test data for TSS removal, which was determined through the use of a test sediment resembling the ETV PSD, was converted to the FINE PSD through the assumption that for each surface loading rate, the TSS removal provided captured this portion of the ETV PSD from largest to smallest particle size. The smallest particle size captured can be determined from the ETV PSD and then converted to the FINE PSD based on the aforementioned particle size limit. The expected TSS removal of the FINE PSD is then determined by the percentage of the PSD composed of the calculated captured particle size and larger. For example, for a measured TSS removal of 41.7% of the ETV PSD, it is expected that particles sizes of 95.75 microns and larger were captured through linear interpolation. This corresponds to 64.2% of the larger sized particles of the FINE PSD provided below. Imbrium has confirmed this methodology through laboratory testing results.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

FINE PSD
Specific Gravity

Particle Size (microns)	Percent Less Than	Particle Size Fraction (microns)	Percent
1000	100.0	500 - 1000	7.7
500	92.3	250 - 500	7.7
250	84.6	150 - 250	23.1
150	61.5	100 - 150	23.1
100	38.5	75 - 100	15.4
75	23.1	50 - 75	7.7
50	15.4	20 - 50	15.4

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Upstream Flow Controlled Results

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	0.56	33.63	28.80	100.0	8.6	8.6
1.00	20.3	28.9	1.12	67.25	57.61	99.2	20.1	28.7
2.00	16.2	45.1	2.24	134.51	115.21	93.7	15.2	43.9
3.00	12.0	57.1	3.36	201.76	172.82	86.4	10.4	54.3
4.00	8.4	65.5	4.48	269.02	230.43	81.4	6.8	61.1
5.00	5.9	71.4	5.60	336.27	288.04	78.6	4.6	65.8
6.00	4.6	76.0	6.73	403.52	345.64	75.8	3.5	69.2
7.00	3.1	79.1	7.85	470.78	403.25	73.0	2.3	71.5
8.00	2.7	81.8	8.97	538.03	460.86	70.4	1.9	73.4
9.00	3.3	85.1	10.09	605.28	518.46	67.8	2.2	75.6
10.00	2.3	87.4	11.21	672.54	576.07	65.3	1.5	77.1
11.00	1.6	89.0	12.33	739.79	633.68	63.9	1.0	78.2
12.00	1.3	90.3	13.45	807.05	691.29	63.5	0.8	79.0
13.00	1.7	92.0	14.57	874.30	748.89	63.0	1.1	80.1
14.00	1.2	93.2	15.69	941.55	806.50	62.6	0.8	80.8
15.00	1.2	94.4	16.81	1008.81	864.11	62.2	0.7	81.6
16.00	0.7	95.1	17.93	1076.06	921.72	61.7	0.4	82.0
17.00	0.7	95.8	19.06	1143.31	979.32	61.3	0.4	82.4
18.00	0.4	96.2	20.18	1210.57	1036.93	60.3	0.2	82.7
19.00	0.4	96.6	21.30	1277.82	1094.54	59.1	0.2	82.9
20.00	0.2	96.8	22.42	1345.08	1152.14	57.9	0.1	83.0
21.00	0.5	97.3	23.54	1412.33	1209.75	56.6	0.3	83.3
22.00	0.2	97.5	24.66	1479.58	1267.36	55.4	0.1	83.4
23.00	1.0	98.5	25.78	1546.84	1324.97	54.2	0.5	84.0
24.00	0.3	98.8	26.90	1614.09	1382.57	53.0	0.2	84.1
25.00	0.0	98.8	28.02	1681.34	1440.18	51.1	0.0	84.1
30.00	0.9	99.7	33.63	2017.61	1728.22	42.6	0.4	84.5
35.00	0.3	100.0	36.00	2160.00	1850.18	39.8	0.1	84.6
40.00	0.0	100.0	36.00	2160.00	1850.18	39.8	0.0	84.6
45.00	0.0	100.0	36.00	2160.00	1850.18	39.8	0.0	84.6
Estimated Net Annual Sediment (TSS) Load Reduction =								**85 %**

Climate Station ID: 6105978 *Years of Rainfall Data*: 20

STANDARD SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREAMENT DEVICE WITH THIRD-PARTY VERIFIED LIGHT LIQUID RE-ENTRAINMENT SIMULATION PERFORMANCE TESTING RESULTS

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, designing, maintaining, and constructing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, **specifically an OGS device that has been third-party tested for oil and fuel retention capability using a protocol for light liquid re-entrainment simulation testing, with testing results and a Statement of Verification in accordance with all the provisions of ISO 14034 Environmental Management – Environmental Technology Verification (ETV)**. Work includes supply and installation of concrete bases, precast sections, and the appropriate precast section with OGS internal components correctly installed within the system, watertight sealed to the precast concrete prior to arrival to the project site.

1.2 REFERENCE STANDARDS

1.2.1 For Canadian projects only, the following reference standards apply:

CAN/CSA-A257.4-14: Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections, and Fittings Using Rubber Gaskets
CAN/CSA-A257.4-14: Precast Reinforced Circular Concrete Manhole Sections, Catch Basins, and Fittings
CAN/CSA-S6-00: Canadian Highway Bridge Design Code

1.2.2 For ALL projects, the following reference standards apply:

ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks
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 C 891: Standard Practice for Installation of Underground Precast Concrete Utility Structures
ASTM D2563: Standard Practice for Classification of Visual Defects in Reinforced Plastics

1.3 SHOP DRAWINGS

1.3.1 Shop drawings shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail the precast concrete components and OGS internal components prior to shipment, including the sequence for installation.

1.3.2 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record. Any and all changes to project cost estimates, bonding amounts, plan check fees for revision of approved documents, or design impacts due to regulatory requirements as a result of a product substitution shall be coordinated by the Contractor with the Engineer of Record.

1.4 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

1.4.1 OGS internal components supplied by the Manufacturer for attachment to the precast concrete vessel shall be pre-fabricated, bolted to the precast and watertight sealed to the precast vessel surface prior to site delivery to ensure Manufacturer's internal assembly process and quality control processes are fully adhered to, and to prevent materials damage on site.

1.4.2 Follow all instructions including the sequence for installation in the shop drawings during installation.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 The OGS vessel shall be cylindrical and constructed from precast concrete riser and slab components.

2.1.2 The precast concrete OGS internal components shall include a fiberglass insert bolted and watertight sealed inside the precast concrete vessel, prior to site delivery. Primary internal components that are to be anchored and watertight sealed to the precast concrete vessel shall be done so only by the Manufacturer prior to arrival at the job site to ensure product quality.

2.1.3 The OGS shall be allowed to be specified and have the ability to function as a 240-degree bend structure in the stormwater drainage system, or as a junction structure.

2.1.4 The OGS to be specified shall have the capability to accept influent flow from an inlet grate and an inlet pipe.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be designed and manufactured to meet highway loading conditions per State/Provincial or local requirements.

2.3 GASKETS

Only profile neoprene or nitrile rubber gaskets that are oil resistant shall be accepted. For Canadian projects only, gaskets shall be in accordance to CSA A257.4-14. Mastic sealants, butyl tape/rope or Conseal CS-101 alone are not acceptable gasket materials.

2.4 JOINTS

The concrete joints shall be watertight and meet the design criteria according to ASTM C-990. For projects where joints require gaskets, the concrete joints shall be watertight and oil resistant and meet the design criteria according to ASTM C-443. Mastic sealants or butyl tape/rope alone are not an acceptable alternative.

2.5 FRAMES AND COVERS

Frames and covers shall be manufactured in accordance with State/Provincial or local requirements for inspection and maintenance access purposes. A minimum of one cover, at least 22-inch (560 mm) in diameter, shall be clearly embossed with the OGS manufacturer's product name to properly identify this asset's purpose is for stormwater quality treatment.

2.6 PRECAST CONCRETE

All precast concrete components shall conform to the appropriate CSA or ASTM specifications.

2.7 FIBERGLASS

The fiberglass portion of the OGS device shall be constructed in accordance with ASTM D2563, and in accordance with the PS15-69 manufacturing standard, and shall only be installed, bolted and watertight sealed to the precast concrete by the Manufacturer prior to arrival at the project site to ensure product quality.

2.8 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a fiberglass insert for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The total sediment storage capacity shall be a minimum 40 ft^3 (1.1 m^3). The total petroleum hydrocarbon storage capacity shall be a minimum 50 gallons (189 liters). The access opening to the sump of the OGS device for periodic inspection and maintenance purposes shall be a minimum 16 inches (406 mm) in diameter.

2.9 LADDERS

Ladder rungs shall be provided upon request or to comply with State/Provincial or local requirements.

2.10 INSPECTION

All precast concrete sections shall be level and inspected to ensure dimensions, appearance, integrity of internal components, and quality of the product meets State/Provincial or local specifications and associated standards.

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 HYDROLOGY AND RUNOFF VOLUME

The OGS device shall be engineered, designed and sized to treat a minimum of 90 percent of the average annual runoff volume, unless otherwise stated by the Engineer of Record, using historical rainfall data. Rainfall data sets should be comprised of a minimum 15-years of rainfall data or a longer continuous period if available for a given location, but in all cases a minimum 5-year period of rainfall data.

3.3 ANNUAL (TSS) SEDIMIMENT LOAD AND STORAGE CAPACITY

The OGS device shall be capable of removing and have sufficient storage capacity for the calculated annual total suspended solids (TSS) mass load and volume without scouring previously captured pollutants prior to maintenance being required. The annual (TSS) sediment load and volume transported from the drainage area should be calculated and compared to the OGS device's available storage capacity by the specifying Engineer to ensure adequate capacity between maintenance cycles. Sediment loadings shall be determined by land use and defined as a minimum of 450 kg (992 lb) of sediment (TSS) per impervious hectare of drainage area per year, or greater based on land use, as noted in Table 1 below.

Annual sediment volume calculations shall be performed using the projected average annual treated runoff volume, a typical sediment bulk density of 1602 kg/m^3 (100 lbs/ft^3) and an assumed Event Mean Concentration (EMC) of 125 mg/L TSS in the runoff, or as otherwise determined by the Engineer of Record.

Example calculation for a 1.3-hectares parking lot site:

- 1.28 meters of rainfall depth, per year
- 1.3 hectares of 100% impervious drainage area
- EMC of 125 mg/L TSS in runoff
- Treatment of 90% of the average annual runoff volume
- Target average annual TSS removal rate of 60% by OGS

Annual Runoff Volume:

- 1.28 m rain depth x 1.3 ha x 10,000 m^2/ha= 16,640 m^3 of runoff volume
- 16,640 m^3 x 1000 L/m^3 = 16,640,000 L of runoff volume
- 16,640,000 L x 0.90 = 14,976,000 L to be treated by OGS unit

Annual Sediment Mass and Sediment Volume Load Calculation:

- 14,976,000 L x 125 mg/L x kg/1,000,000 mg = 1,872 kg annual sediment mass
- 1,872 kg x m^3/1602 kg = 1.17 m^3 annual sediment volume
- 1.17 m^3 x 60% TSS removal rate by OGS = 0.70 m^3 minimum expected annual storage requirement in OGS

As a guideline, the U.S. EPA has determined typical annual sediment loads per drainage area for various sites by land use (see Table 1). Certain States, Provinces and local jurisdictions have also established such guidelines.

Table 1 – Annual Mass Sediment Loading by Land Use

	Commercial	Parking Lot	Residential			Highways	Industrial	Shopping Center
			High	Med.	Low			
(lbs/acre/yr)	1,000	400	420	250	10	880	500	440
(kg/hectare/yr)	1,124	450	472	281	11	989	562	494

Source: U.S. EPA Stormwater Best Management Practice Design Guide Volume 1, Appendix D, Table D-1, Burton and Pitt 2002

3.4 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in Table 2, Section 3.5, and based on third-party performance testing conducted in accordance with the Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol *Procedure for Laboratory Testing of Oil-Grit Separators*, as follows:

3.4.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.4.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.4.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.4.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 3.3.

3.4.5 The Peclet Number is not an approved method or model for calculating TSS removal, sizing, or scaling OGS devices.

3.4.6 If an alternate OGS device is proposed, supporting documentation shall be submitted that demonstrates:

- Canadian ETV or ISO 14034 ETV Verification Statement which verifies third-party performance testing conducted in accordance with the **Procedure for Laboratory Testing of Oil-Grit Separators,** including the Light Liquid Re-entrainment Simulation Testing.
- Equal or better sediment (TSS) removal of the PSD specified in Table 2 at equivalent surface loading rates, as compared to the OGS device specified herein.
- Equal or better Light Liquid Re-entrainment Simulation Test results (using low-density polyethylene beads as a surrogate for light liquids such as oil and fuel) at equivalent surface loading rates, as compared to the OGS device specified herein. However, an alternative OGS device shall not be allowed as a substitute if the Light Liquid Re-entrainment Simulation Test was performed with screening components within the OGS device that are effective at retaining the low-density polyethylene beads, but would not be expected to retain light liquids such as oil and fuel.
- Equal or greater sediment storage capacity, as compared to the OGS device specified herein.
- Supporting documentation shall be signed and sealed by a local registered Professional Engineer. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

3.5 PARTICLE SIZE DISTRIBUTION (PSD) FOR SIZING

The OGS device shall be sized to achieve the Engineer-specified average annual percent sediment (TSS) removal based solely on the test sediment used in the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** This test sediment is comprised of inorganic ground silica with a specific gravity of 2.65, uniformly mixed, and containing a broad range of particle sizes as specified in Table 2. No alternative PSDs or deviations from Table 2 shall be accepted.

Table 2
Canadian ETV Program Procedure for Laboratory Testing of Oil-Grit Separators
Particle Size Distribution (PSD) of Test Sediment

Particle Diameter (Microns)	% by Mass of All Particles	Specific Gravity
1000	5%	2.65
500	5%	2.65
250	15%	2.65
150	15%	2.65
100	10%	2.65
75	5%	2.65
50	10%	2.65
20	15%	2.65
8	10%	2.65
5	5%	2.65
2	5%	2.65

3.6 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party scour testing conducted and have in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. This scour testing is conducted with the device pre-loaded with test sediment comprised of the particle size distribution (PSD) illustrated in Table 2.

3.6.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

Data generated from laboratory scour testing performed with an OGS device pre-loaded with a coarser PSD than in Table 2 (i.e. the coarser PSD has no particles in the 1-micron to 50-micron size range, or the D_{50} of the test sediment exceeds 75 microns) shall not be acceptable for the determination of the device's suitability for on-line installation.

3.7 DESIGN ACCOUNTING FOR BYPASS

3.7.1 The OGS device shall be specified to achieve the TSS removal performance and water quality objectives without washout of previously captured pollutants. The OGS device shall also have sufficient hydraulic conveyance capacity to convey the peak storm event, in accordance with hydraulic conditions per the Engineer of Record. To ensure this is achieved, there are two design options with associated requirements:

3.7.1.1 The OGS device shall be placed **off-line** with an upstream diversion structure (typically in an upstream manhole) that only allows the water quality volume to be diverted to the OGS device, and excessive flows diverted downstream around the OGS device to prevent high flow washout of pollutants previously captured. This design typically incorporates a triangular layout including an upstream bypass manhole with an appropriately engineered weir wall, the OGS device, and a downstream junction manhole, which is connected to both the OGS device and bypass structure. In this case with an external bypass required, the OGS device manufacturer must provide calculations and designs for all structures, piping and any other required material applicable to the proper functioning of the system, stamped by a Professional Engineer.

3.7.1.2 Alternatively, OGS devices in compliance with Section 3.6 shall be acceptable for an **on-line** design configuration, thereby eliminating the requirement for an upstream bypass manhole and downstream junction manhole.

3.7.2 The OGS device shall also have sufficient hydraulic conveyance capacity to convey the peak storm event, in accordance with hydraulic conditions per the Engineer of Record. If an alternate OGS device is proposed, supporting documentation shall be submitted that demonstrates equal or better hydraulic conveyance capacity as compared to the OGS device specified herein. This documentation shall be signed and sealed by a local registered Professional Engineer. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

3.8 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**, with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.8.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

3.9 PETROLEUM HYDROCARBONS AND FLOATABLES STORAGE CAPACITY

Petroleum hydrocarbons and floatables storage capacity in the OGS device shall be a minimum 50 gallons (189 Liters), or more as specified.

3.9.1 The OGS device shall have gasketed precast concrete joints that are watertight, and oil resistant and meet the design criteria according to ASTM C-443 to provide safe oil and other hydrocarbon materials storage and ground water protection. Mastic sealants or butyl tape/rope alone are not an acceptable alternative.

3.10 SURFACE LOADING RATE SCALING OF DIFFERENT MODEL SIZES

The reference device for scaling shall be an OGS device that has been third-party tested in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. Other model sizes of the tested device shall only be scaled such that the claimed TSS removal efficiency of the scaled device shall be no greater than the TSS removal efficiency of the tested device at identical **surface loading rates** (flow rate divided by settling surface area). The depth of other model sizes of the tested device shall be scaled in accordance with the depth scaling provisions within Section 6.0 of the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

3.10.1 The Peclet Number and volumetric scaling are not approved methods for scaling OGS devices.

PART 4 – INSPECTION & MAINTENANCE

The OGS manufacturer shall provide an Owner's Manual upon request.
Maintenance shall be performed by a professional service provider who has experience in cleaning OGS devices and has been trained and certified in applicable health and safety practices, including confined space entry procedures.

4.1 A Quality Assurance Plan that provides inspection for a minimum of 5 years shall be included with the OGS stormwater quality device, and written into the Environmental Compliance Approval (ECA) or the appropriate State/Provincial or local approval document.

4.2 OGS device inspection shall include determination of sediment depth and presence of petroleum hydrocarbons below the insert. Inspection shall be easily conducted from finished grade through a frame and cover of at least 22 inch (560 mm) in diameter.

4.3 Inspection and pollutant removal shall be conducted periodically. For routine maintenance cleaning activities, pollutant removal shall typically utilize a truck equipped with vacuum apparatus, and shall be easily conducted from finished grade through a frame and cover of at least 22-inches (560 mm) in diameter.

4.4 Diameter of the maintenance access opening to the lower chamber and sump shall be scaled consistently across all model sizes, and shall be 1/3 the inside diameter of the OGS structure, or larger.

4.5 No confined space entry shall be required for routine inspection and maintenance cleaning activities.

4.6 For OGS model sizes of diameter 72 inches (1828 mm) and greater, the access opening to the OGS device's lower chamber and sump shall be large enough to allow a maintenance worker to enter the lower chamber to facilitate non-routine maintenance cleaning activities and repairs, as needed.

4.7 The orifice-containing component (i.e. drop pipe, duct, chute, etc.) of the OGS device used to control flow rate into the lower chamber shall be removable from the insert to facilitate cleaning, repair, or replacement of the orifice-containing component, as needed.

PART 5 – EXECUTION

5.1 PRECAST CONCRETE INSTALLATION

The installation of the precast concrete OGS stormwater quality treatment device shall conform to ASTM C 891, ASTM C 478, ASTM C 443, CAN/CSA-A257.4-14, CAN/CSA-A257.4-14, CAN/CSA-S6-00 and all highway, State/Provincial, or local specifications for the construction of manholes. Selected sections of a general specification that are applicable are summarized below. The Contractor shall furnish all labor, equipment and materials necessary to offload, assemble as needed the OGS internal components as specified in the Shop Drawings.

5.2 EXCAVATION

5.2.1 Excavation for the installation of the OGS stormwater quality treatment device shall conform to highway, State/Provincial or local specifications. Topsoil that is removed during the excavation for the OGS stormwater quality treatment device shall be stockpiled in designated areas and not be mixed with subsoil or other materials. Topsoil stockpiles and the general site preparation for the installation of the OGS stormwater quality device shall conform to highway, State/Provincial or local specifications.

5.2.2 The OGS device shall not be installed on frozen ground. Excavation shall extend a minimum of 12 inch (300 mm) from the precast concrete surfaces plus an allowance for shoring and bracing where required. If the bottom of the excavation provides an unsuitable foundation additional excavation may be required.

5.2.3 In areas with a high water table, continuous dewatering shall be provided to ensure that the excavation is stable and free of water.

5.3 BACKFILLING

Backfill material shall conform to highway, State/Provincial or local specifications. Backfill material shall be placed in uniform layers not exceeding 12 inches (300 mm) in depth and compacted to highway, State/Provincial or local specifications.

5.4 OGS WATER QUALITY DEVICE CONSTRUCTION SEQUENCE

5.4.1 The precast concrete OGS stormwater quality treatment device is installed and leveled in sections in the following sequence:

- aggregate base
- base slab, or base
- riser section(s) (if required)
- riser section w/ pre-installed fiberglass insert
- upper riser section(s)
- internal OGS device components
- connect inlet and outlet pipes
- riser section, top slab and/or transition (if required)
- frame and access cover

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

5.4.3 Adjustment of the OGS 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 shall be repaired or replaced as necessary. Once the OGS stormwater quality treatment device has been constructed, any lift holes must be plugged with mortar.

5.5 DROP PIPE AND OIL INSPECTION PIPE

Once the upper precast concrete riser has been attached to the lower precast concrete riser section, the OGS device Drop Pipe and Oil Inspection Pipe must be attached, and watertight sealed to the fiberglass insert using Sikaflex 1a. Installation instructions and required materials shall be provided by the OGS manufacturer.

5.6 INLET AND OUTLET PIPES

Inlet and outlet pipes shall be securely set using grout or approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight. Non-secure inlets and outlets will result in improper performance.

5.7 FRAME AND COVER OR FRAME AND GRATE INSTALLATION

Precast concrete adjustment units shall be installed to set the frame and cover/grate at the required elevation. The adjustment units shall be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover/grate should be set in a full bed of mortar at the elevation specified.

5.7.1 A minimum of one cover, at least 22-inch (560 mm) in diameter, shall be clearly embossed with the OGS device brand or product name to properly identify this asset's purpose is for stormwater quality treatment.

Appendix D – Pre-con Comments

Application Type: - Site Plan Control application Owner: Shell Canada Limited Tenant: Applicant: CTM Design Services Ltd. / Amina Oyakhilome DATE: May 22, 2026	City of Ottawa Phase #3 Comments Pre-con Reference No. PC2023-0172 Proposal: Redevelop existing site includes a Shell gas bar with canopy and convenience store.

Comment #	Method Received	Agency - Department	Reviewer Contact Information	Comment Date	Comments	Responses
ENGINEERING						
21	Preconsultation - Meeting Feedback	Ottawa - Engineering	Mohammed Fawzi Mohammed.Fawzi@ottawa.ca	24-Apr-25	The Stormwater Management Criteria, for the subject site, is to be based on the following: a. Application of the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997. b. A calculated time of concentration (cannot be less than 10 minutes). c. 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. If this is difficult to achive, please send an email to the Infrastructure Project Manager and indicate how much storage can be achived on site and how the proposed minor system flow compares to the existing minor system flows. This is being considered on a special case scenario and will be evaluated if required. d. If the existing conditions drain by overland to the creek, the applicant can continue draining to the creek as long as there are no increase in flows to the creek. Any excess flow will need to be controlled on site. e. The quantity control criteria is 100-year post-development to 5-year pre development with a maximum c value of 0.5 f. Quality control criteria: An enhanced level of treatment is required: i.e. 80% TSS removal.	Noted. A stormwater management report will be provided. Refer to drawings SWM-0 and SWM-1 for Stormwater Management Pre and Post Re-development data and calculations. An OGS and report will be provided in the appendix.
22	Preconsultation - Meeting Feedback	Ottawa - Engineering	Mohammed Fawzi Mohammed.Fawzi@ottawa.ca	24-Apr-25	Sewer (Storm) a. 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). b. Please note that the minimum orifice dia. for a plug style ICD is 83mm and the minimum flow rate from a vortex ICD is 6 L/s in order to reduce the likelihood of plugging. c. Please provide a Pre and Post-Development Drainage Area Plan to define the pre and post-development drainage areas/patterns. Existing drainage patterns shall be maintained and discussed as part of the proposed SWM solution. d. Post-development site grading shall match existing property line grades in order to minimize disruption to the adjacent residential properties. A topographical plan of survey shall be provided as part of the submission and a note provided on the plans.	Noted. A stormwater management report will be provided. Refer to drawings SWM-0 and SWM-1 for Stormwater Management Pre and Post Re-development data, drainage areas and calculations. Refer to drawings SM-series for the Storm Sewer design and ICD details. Refer to the SG drawing and survey topo for grading.
				24-Apr-25	e. There must be at least 15cm of vertical clearance between the spill elevation and the ground elevation at the building envelope that is in proximity of the flow route or ponding area. The exception in this case would be at reverse sloped loading dock locations. At these locations, a minimum of 15cm of vertical clearance must be provided below loading dock openings. Ensure to provide discussion in report and ensure grading plan matches if applicable. f. Underground Storage: Please note that the Modified Rational Method for storage computation in the Sewer Design Guidelines was originally intended to be used for above ground storage (i.e., parking lot) where the change in head over the orifice varied from 1.5 m to 1.2 m (assuming a 1.2 m deep CB and a max ponding depth of 0.3 m). This change in head was small and hence the release rate fluctuated little, therefore there was no need to use an average release rate. g. When underground storage is used, the release rate fluctuates from a maximum peak flow based on maximum head down to a release rate of zero. This difference is large and has a significant impact on storage requirements. We therefore require that an average release rate equal to 50% of the peak allowable rate shall be applied to estimate the required volume. Alternatively, the consultant may choose to use a submersible pump in the design to ensure a constant release rate. h. If there is a disagreement from the designer regarding the required storage, the City will require that the designer demonstrate their rationale utilizing dynamic modelling, that will then be reviewed by City modellers in the Water Resources Group.	Noted. A stormwater management report will be provided. Refer to drawings SWM-0 and SWM-1 for Stormwater Management Pre and Post Re-development data, drainage areas and calculations. Refer to the SG drawing. We have considered only surface storage, not underground storage. Sufficient storage is provided. Refer to SWM calculations using the Modified Rational Method.
				24-Apr-25	i. Provide information on type of underground storage system including product name and model, number of chambers, chamber configuration, confirm invert of chamber system, top of chamber system, required cover over system and details, interior bottom slope (for self-cleansing), chart of storage values, length, width and height, capacity, entry ports (maintenance) etc. UG storage to provide actual 2- and 100-year event storage requirements j. In regard to all proposed UG storage, ground water levels (and in particular HGW levels) will need to be reviewed to ensure that the proposed system does not become surcharged and thereby ineffective. k. If rooftop control and storage is proposed as part of the SWM solutions sufficient details (Cl. 8.3.8.4) shall be discussed and document in the report and on the plans. Roof drains are to be connected downstream of any incorporated ICDs within the SWM system and not to the foundation drain system. Provide a Roof Drain Plan as part of the submission. l. Sewer connections to be made above the springline of the sewermain as per: i. Std Dwg S11.1 for flexible main sewers – connections made using approved tee or wye fittings. Page 7 of 18 ii. Std Dwg S11 (For rigid main sewers) – lateral must be less that 50% the diameter of the sewermain, iii. 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, iv. 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.	Noted. A site servicing report will be provided. No underground storage is proposed. No rooftop storage or control is proposed. Downspouts will be connected upstream of the ICD. A Roof Drain Plan will be prepared during the Detailed Design Phase and submitted during the Building Permit Stage. Lateral is <50% of the main.
23	Preconsultation - Meeting Feedback	Ottawa - Engineering	Mohammed Fawzi Mohammed.Fawzi@ottawa.ca	24-Apr-25	Water a. New connections to the backbone watermain are not permitted. Proposed water servicing will need to utilize the existing 406mm connection to the 1067mm backbone watermain. The 50mm service can be utilized depending on water demand needs. An easement may be need to be estalished as the 50mm water service and 406mm connection is located on City property. b. Water Boundary condition requests must include the location of the service (map or plan with connection location(s) indicated) and the expected loads required by the proposed development, including calculations. Please provide the following information: i. Location of service ii. Type of development iii. The amount of fire flow required (per OBC or FUS). iv. Average daily demand: ___ l/s. v. Maximum daily demand: ___ l/s. vi. Maximum hourly daily demand: ___ l/s.	Noted. A site servicing report will be provided. No new service or increase in demand expected. Exisitng fire hydrant to remain.
24	Preconsultation - Meeting Feedback	Ottawa - Engineering	Mohammed Fawzi Mohammed.Fawzi@ottawa.ca	24-Apr-25	Sewer (sanitary) a. Assuming the existing sanitary manhole MHSA46502 and outlet will be reused (the 200mm and 150mm dia. sewers will need to be relocated as they would be located under the proposed buildings), the appplicant must demonstrate that the downstream 200mm dia. sewer has adequate capacity.	Noted. A site servicing report will be provided
25	Preconsultation - Meeting Feedback	Ottawa - Engineering	Mohammed Fawzi Mohammed.Fawzi@ottawa.ca	24-Apr-25	Grading Post-development site grading shall match existing property line grades to minimize disruption to the adjacent residential properties. A topographical plan of survey shall be provided as part of the submission and a note provided on the plans	Refer to attached Grading Plan

Application Type: - Site Plan Control application Owner: Shell Canada Limited Tenant: Applicant: CTM Design Services Ltd. / Amina Oyakhilome DATE: May 22, 2026	City of Ottawa Phase #3 Comments Pre-con Reference No. PC2023-0172 Proposal: Redevelop existing site includes a Shell gas bar with canopy and convenience store.

Comment #	Method Received	Agency - Department	Reviewer Contact Information	Comment Date	Comments	Responses
28	Preconsultation - Meeting Feedback	Ottawa - Engineering	Mohammed Fawzi Mohammed.Fawzi@ottawa.ca	24-Apr-25	Geotechnical (including, where applicable, detailed sensitive marine clay investigation) Geotechnical Study shall be consistent with the Geotechnical Investigation and Reporting Guidelines for Development Applications. https://documents.ottawa.ca/sites/documents/files/geotech_report_en.pdf	Refer to attached geotech report
27	Preconsultation - Meeting Feedback	Ottawa - Engineering	Mohammed Fawzi Mohammed.Fawzi@ottawa.ca	24-Apr-25	Snow Storage Any portion of the subject property which is intended to be used for permanent or temporary snow storage shall be as shown on the approved site plan and grading plan. Snow storage shall not interfere with approved grading and drainage patters or servicing. Snow storage areas shall be setback from the property lines, foundations, fencing or landscaping a minimum of 1.5m. Snow storage areas shall not occupy driveways, aisles, required parking spaces or any portion of a road allowance. If snow is to be removed from the site please indicate this on the plan(s)	Refer to attached site plan for location of snow storage
28	Preconsultation - Meeting Feedback	Ottawa - Engineering	Mohammed Fawzi Mohammed.Fawzi@ottawa.ca	24-Apr-25	Road Reinstatement Where servicing involves three or more service trenches, either a full road width or full lane width 40 mm asphalt overlay will be required, as per amended Road Activity By-Law 2003-445 and City Standard Detail Drawing R10. The amount of overlay will depend on condition of roadway and width of roadway(s).	Noted
29	Preconsultation - Meeting Feedback	Ottawa - Engineering	Mohammed Fawzi Mohammed.Fawzi@ottawa.ca	24-Apr-25	Phase One Environmental Site Assessment a. A Phase I ESA is required to be completed in accordance with Ontario Regulation 153/04 in support of this development proposal to determine the potential for site contamination. Depending on the Phase I recommendations a Phase II ESA may be required. b. The Phase I ESA shall provide all the required Environmental Source Information as required by O. Reg. 153/04. ERIS records are available to public at a reasonable cost and need to be included in the ESA report to comply with O.Reg. 153/04 and the Official Plan. The City will not be in a position to approve the Phase I ESA without the inclusion of the ERIS reports. c. Official Plan Section 10.1.6 d. Record of Site Condition (RSC) will not be required.	Refer to attached ESA report
30	Preconsultation - Meeting Feedback	Ottawa - Engineering	Mohammed Fawzi Mohammed.Fawzi@ottawa.ca	24-Apr-25	General a. It is the sole responsibility of the consultant to investigate the location of existing underground utilities in the proposed servicing area and submit a request for locates to avoid conflict(s). The location of existing utilities and services shall be documented on an Existing Conditions Plan. b. Any easements on the subject site shall be identified and respected by any development proposal and shall adhere to the conditions identified in the easement agreement. A legal survey plan shall be provided, and all easements shall be shown on the engineering plans. c. All underground and above ground building footprints and permanent walls need to be shown on the plans to confirm that any permanent structure does not extend either above or below into the existing property lines and sight triangles. d. Construction approach – Please contact the Right-of-Ways Permit Office TMconstruction@ottawa.ca early in the Site Plan process to determine the ability to construct site and copy File Lead on this request.	Refer to attached existing conditions plan