Stormwater Management Report
Eagleson Road KDR Redevelopment

SHELL CANADA LIMITED

JUNE 26, 2026

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Revision History

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Authors

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1 Project Information

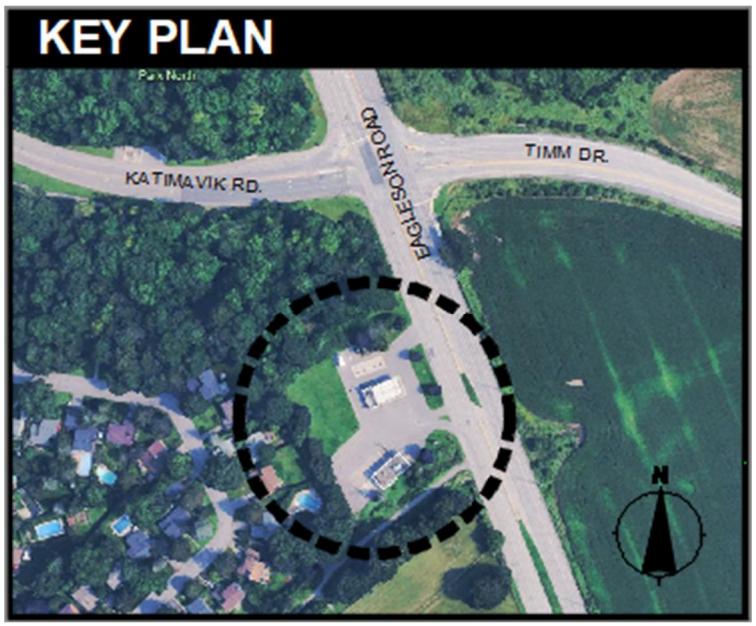
Client:	Shell Canada Products
Contact:	Kerry Morrison, EPCM Advisor
Project Name:	Eagleson Road KDR
Description:	Redevelopment (Knockdown Rebuild) Gas Bar with Canopy, C-store
Location:	106 Eagleson Road, Kanata, Ontario
Consultant:	CTM Design Services Ltd.
Contact:	Yvonne Faas, P.Eng. Civil Engineer

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

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 1: 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	4.3	8.7	L/s
FREE FLOW OFFSITE, UNMITIGATED A5 TO THE RIGHT SIDE MEANDER BELT	28.1	56.3	L/s
CONTROLLED IN PIPE A1 TO CONC 1200 STORM MAIN	30	48	L/s
CONTROLLED IN PIPE A2&A3 TO CONC 1200 STORM MAIN	54	86	L/s
TOTAL PEAK FLOW GENERATED	116	199	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

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 an average depth of 0.200 m.

Areas of unmitigated flow are limited to the perimeter landscaped areas that match the existing conditions. No increase of stormwater runoff to the Meander Belt or existing ditch.

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 average 0.200m. 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 matches 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 rater 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 rater 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 EF06 will sized to meet local guidelines. A signed report from supplier will be provided in the Appendix upon receipt.

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 stress test c-value increase by 25%.

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 C1 TO THE LEFT SIDE DITCH	4.7	9.3	9.3	L/s
FREE FLOW OFFSITE, UNMITIGATED A5 TO THE RIGHT SIDE MEANDER BELT	17.6	35.4	35.4	L/s
CONTROLLED FLOW TO PIPE TO CONC 1200 STORM MAIN	36.2	36.4	36.5	L/s
TOTAL PEAK FLOW GENERATED	58.5	81.2	81.3	L/s
STORAGE VOLUME REQUIRED	48.6	100.6	133.7	m^3
STORAGE VOLUME PROVIDED	252	252	252	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
- 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.

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	101	162

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 4: Surface Storage

Pond	Area (sq.m)	Depth (m)	Volume (cu.m)
1	245	0.200	16.33
2	102	0.200	6.80
3	83	0.200	5.53
4	412	0.300	41.20
5	1018	0.470	159.49
6	334	0.210	23.38
TOTAL			252.73

4.6 Table 5: Underground Storage

Excluded.

4.7 Table 6: Total Storage

Total Storage	Volume (cu.m)
Surface Storage	252.7
Underground Storage	Excl.
Total Storage	252.7

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/EFO 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 A – Existing Conditions SWM Calculations

STORMWATER MANAGEMENT CALCULATIONS

Rainfall Intensity = 100.9 mm/hr (1:5 Year)
161.9 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	
$Q_{ALLOWABLE}$ =	103.9	166.7	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

	1:5 Year	1:100 Year
Q_{A4} =	4.3	8.7

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

	1:5 Year	1:100 Year
Q_{A5} =	28.1	56.3

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} =	30	47.8

STORAGE VOLUME REQUIRED (RATIONAL METHOD MODEL)

	1:5 Year	1:100 Year
VOLUME $_{REQ}$ =	3.0	11.5
ELEVATION REACHED =	102.00	102.20

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} =	54	86.3

STORAGE VOLUME REQUIRED (RATIONAL METHOD MODEL)

	1:5 Year	1:100 Year
VOLUME $_{REQ}$ =	5.4	22.0
ELEVATION REACHED =	102.00	102.20

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
$Q_{A1} + Q_{A23} + Q_{A4} + Q_{A5}$ =	115.9	199.0

$Q_{PR} > Q_{ALL}$
$VOL_{REQ} < VOL_{AVL}$

Appendix B – Proposed Redevelopment SWM Calculations

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} =	4.7	9.3

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

SURFACE	AREA (m^2)	C FACTOR	
BUILDING	0	1.00	
PAVEMENT	0	0.90	
LANDSCAPE	2097	0.30	add 25% to c value for 100 year
TOTAL	2097	0.30	

Q_{C2} = 2.78 C i A

	1:5 Year	1:100 Year
Q_{C2} =	17.6	35.4

CATCHMENTS B1-B6 - CONTROLLED

SURFACE	AREA (m^2)	C FACTOR	
BUILDING/ROOF	822	1.00	
PAVEMENT	3207	0.90	
GRAVEL	0	0.65	
LANDSCAPE	728	0.38	add 25% to c value for 100 year
TOTAL	4757	0.84	

Q_B = 2.78 C i A

	1:5 Year	1:100 Year	Stress Test (20%)	
Q_B =	112	179.2	215.1	L/s

ORIFICE CONTROL IN PR. CBMH#4

	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 =	102.070	102.130	102.150	m
Pipe Invert =	100.250	100.250	100.250	m
Water depth in outgoing pipe (if orifice submerged) =	0.110	0.145	0.155	m
H_0 =	1.710	1.735	1.745	m/m
Q_{B2} =	36.2	36.4	36.5	L/s

STORAGE VOLUME REQUIRED (RATIONAL METHOD MODEL)

	1:5 Year	1:100 Year	Stress Test (20%)	
VOLUME $_{REQ}$ =	48.6	100.6	133.7	m^3
ELEVATION REACHED =	102.07	102.13	102.15	m

STORAGE VOLUME PROVIDED

Surface Storage Volume at Max Full Supply Level (Elevation 102.20) =	252.7	m^3
~~Underground Pipe & Barrel Storage~~	Excluded	
Total Storage	252.7	m^3

TOTAL FREE FLOW + CONTROLLED FLOW =

	1:5 Year	1:100 Year	Stress Test (20%)	
$Q_{C1} + Q_{C2} + Q_{B2}$ =	58.5	81.2	81.3	L/s

$Q_{PR} < Q_{ALL}$

$VOL_{REQ} < VOL_{AVL}$

Appendix C – Oil Grit Separator Product Supporting Documents

WAITING ON REPORT FROM FORTERRA