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# SITE SERVICING STUDY & STORMWATER MANAGEMENT REPORT

## 2026 CARP ROAD
OTTAWA, ONTARIO

REPORT NO. 21021

MARCH 24, 2023
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## 1.0 INTRODUCTION

This Site Servicing Study & Stormwater Management Report describes the servicing and stormwater management design for a proposed automobile sales building, with a display lot and parking, located at 2026 Carp in Ottawa, Ontario. An existing 57 $m^2$ building, currently used as a single family dwelling, will be retained and used as a sales office.

This report forms part of the stormwater management design for the proposed development. Also refer to drawings C-1 to C-5 prepared by D. B. Gray Engineering Inc.

Refer to Pre-Application Consultation one-storey building meeting notes in Appendix A.

## 2.0 WATER SERVICE

### 2.1 WATER SUPPLY FOR FIREFIGHTING

The closest existing municipal fire hydrant is Class AA and is located in the Carp Road right-of-way between 2016 and 2022 Carp Road. It is located an unobstructed distance of approximately 62 m to the far side of the front façade of the existing building, which is less than the maximum 90 m required by the Ontario Building Code (OBC); therefore, a private fire hydrant is not required.

In accordance with City of Ottawa Technical Bulletin ISTB-2021-03, when calculating the required fire flow where pipe sizing is not affected, the Ontario Building Code method is to be used. As per OBC A-3.2.5.7. Table 2, the required water supply flow rate for firefighting for a one-storey building not exceeding 600 $m^2$ is 1,800 L/min; therefore, required fire flow for the existing subject building is 1,800 L/min (30 L/s).

In accordance with City of Ottawa Technical Bulletin ISTB-2018-02, the aggregate flow of all contributing fire hydrants within 150 m of the building shall not be less than the required fire flow, and as per Appendix I of ISTB-2018-02, Class AA fire hydrants within 75 m can contribute 5,700 L/min (95 L/s). Therefore, the closest existing municipal fire hydrant discussed above can contribute 5,700 L/min (95 L/s), which is greater than the required fire flow of 1,800 L/min (30 L/s); and therefore, there is an adequate water supply for firefighting from the existing municipal fire hydrant.

### 2.2 DOMESTIC WATER SUPPLY

The existing 19 mm water service is proposed to remain. No new plumbing fixtures are proposed; and, with the change of use from a single family dwelling to a sales office, it is expected the demand to decrease. Therefore, the existing water service is adequate for the proposed use.

## 3.0 ON-SITE SEPTIC SYSTEM

The existing on-site septic system is proposed to remain.

As stated in the Hydrogeological Brief and Assessment of an Existing Sewage System Proposed Change of Use, prepared by Paterson Group Inc:

- *"Our cursory inspection of the property found no surficial evidence of any operational problems (i.e., "break-out") with the leaching bed of the sewage system."*
- *"Paterson personnel confirmed that the existing septic tank has an estimated working capacity of 3,600 L, as per the sewage system documentation. The location of the tank with respect to the existing building conforms to the present regulations, the Ontario Building Code, 2012 (OBC)."*
- *"Based on a visual assessment of the exposed portions of the tank, the tank appears to be structurally sound and watertight."*

- *"The concrete centre wall was noted to have significant deterioration above the working level of the tank."*
- *"… the leaching bed appears to consist of a conventional bed comprised of approximately 44 linear metres of PVC distribution pipe (4 runs of 11 m L) as per the sewage system documentation."*
- *"The original sewage system design was designed to support a TDDSSF* [total daily design sanitary sewage flow] *of up to 1,100 L/day, as per the sewage system documentation."*
- *"For commercial applications, the septic tank should have a minimum working capacity of at least three (3) times the TDDSSF. As such, the existing septic tank, which has an estimated working capacity of 3,600 L, is considered to be adequate to support a flow rate of up to 1,200 L/day."*
- *Based upon the approximate percolation rate of 8 min/cm, the approximate total length of distribution pipe of 44 m is considered to be adequate to support up to 1,100 L/day."*
- *"The existing residential building will be converted over to an office building for three (3) to five (5) employees working a standard 8 hour shift per day. Public access to the washrooms will not be provided. In accordance with the OBC, the septic flow volume calculations would be the greater of the following two calculations:*

  ❑ *Office Area / 9.3 * 75 L/day*

  *81 m2 / 9.3 x 75 L/day = 653 L/day*

  *OR*

  ❑ *Number of employees x 75 L/day*

  *5 employees * 75 L/day = 375 L/day*

  *As the septic flow rate calculation based on the office area is the higher of the two calculations, the proposed total daily design sanitary sewage flow (TDDSSF) to be used for design purposes is 653 L/day. As the existing septic bed is designed for a TDDSSF of 1,100 L/day, the existing system is considered adequately sized for the proposed change in use."*

Findings/Recommendations stated in the Hydrogeological Brief and Assessment of an Existing Sewage System Proposed Change of Use, include:

- *"It is our opinion that the existing sewage system is functioning adequately and showing signs of age with the formation of a light biomat within the clear stone layer. The formation of a biomat is not unexpected for a bed of this age."*
- *"The client should be aware that the age of the existing leaching bed is approximately 22 years and the average life expectancy of a bed of this type, when properly designed and constructed, is in the order of 30 years. Usage and maintenance will greatly affect the life expectancy."*
- *"The location of the existing sewage system components with respect to the existing buildings and drilled wells conform to the OBC regulated separation distances."*
- *"Due to the deterioration of the concrete centre wall of the tank, it is recommended that the centre wall be repaired.*
- *"The existing system is considered adequate for the proposed commercial use in terms of sizing."*

## 4.0 STORMWATER MANAGEMENT

### 4.1 QUALITY CONTROL

The Mississippi Valley Conservation Authority (MVCA) advises that: *"The property is within the Feedmill Creek Subwatershed. Water quality requirement for Feedmill Creek is an enhanced level of protection, 80% TSS* [total suspended solids] *Removal."* Rainfall runoff from about 89% of the property, including all the hard surfaces will drain to a stormwater detention area with an infiltration trench located at the bottom of the detention area. As per the MOE Stormwater Management Planning and Design Manual, if an infiltration trench is being used to treat stormwater runoff from roads and parking lots a pre-treatment is necessary to minimize the potential for suspended sediments to clog the trench. Sand filters, vegetated filter strips, grassed swales and/or oil grit separators (OGS) may be used. However, there is insufficient space and insufficient elevation difference (in the case of an OGS) in the subject property to implement any of these pretreatment measures. Normally, for an infiltration trench to function adequately, it requires regular maintenance: Annually, in the spring (and more

frequently if necessary), any accumulated sediment should be removed; and, about once every five years, the top 50 mm of clear stone (above the geotextile fabric) should be removed and replaced. However, in the absence of a pre-treatment measure it is recommended that, in addition to the periodic removal of any accumulated sediment, rather than once every five years, that the top 50 mm of clear stone (above the geotextile fabric) be removed on an annual basis; and any geotextile material that has been damaged also be replaced. As per the MOE Design Manual an infiltration trench with a storage volume of 5.5 $m^3$ is required to remove 80% TSS (refer to calculations in Appendix B); however, a 6.7 $m^3$ infiltration trench is proposed, which is 123% of the required volume (refer to Quantity Control for the sizing of the infiltration trench).

As per Geotechnical Investigation, prepared by Paterson Group Inc. soil percolation rates were determined based on in-situ infiltration testing located in the area of the proposed stormwater detention area and infiltration trench. Table 2 - Summary of Field Saturated Hydraulic Conductivity Testing Results and Estimated Unfactored Infiltration Rates (Paterson Group Report PG6271-1, Revision 1 dated June 18, 2024) indicates that the underlying soil is glacial till with an estimated infiltration rate of 81 to 102 mm/hr. Based on Table C2: Safety correction factors for calculating design infiltration rates (Appendix C – Site Evaluation And Soil Testing Protocol For Stormwater Infiltration, Credit Valley Conservation - Low Impact Development Stormwater Management Planning and Design Guide), after applying a safety factor of 2.5 to the estimated infiltration rates, the design infiltration rate is calculated to be 32 mm/hr (refer to calculations in Appendix B). Therefore, with the trench having a depth of 0.20 m (and a ponding depth of 0.45 m above the trench), it will have a drawdown time of 8.1 hours (the MOE Design Manual recommends a maximum drawdown time of 24 to 48 hours). As per Geotechnical Investigation, prepared by Paterson Group Inc. a groundwater monitoring program was carried out at the subject site from January to June 2024 which consisted of advancing a borehole to a depth of 6.1 m below the existing ground surface and installing a data logger at a depth of 5.5 m. Since the bottom of the infiltration trench will be constructed at the existing grade elevation, the bottom of the infiltration trench will be expected to be 5.5 m above groundwater, which is significantly greater than the minimum of 1 m recommended by the MOE Design Manual. Also, as per the Geotechnical Investigation bedrock is 5 to 15 m below the existing grade (and the bottom of the infiltration trench) which is also significantly greater than the minimum of 1 m recommended by the MOE Design Manual.

The MVCA also advises that: *"The property is within the Carp River Watershed Subwatershed Study area, and has an annual infiltration target of 262 mm/yr for high ground water recharge areas. The site should demonstrate that the existing infiltration rate is maintained or exceeded and where possible the infiltration target is achieved."* However, based on water balance and infiltration calculations, the pre-development (existing) condition of the property only has an annual infiltration of 221 mm/year; and only 239 mm/year prior to the existing dwelling being built (which, based on aerial photography, was prior to 1976). Regardless, the proposed infiltration trench will promote water infiltration into the ground and improve the annual infiltration. In eastern Ontario, on hard surfaces, approximately 150 mm of the 943 mm annual precipitation (or 16%) is lost to evapotranspiration (Eastern Ontario Water Resources Management Study (2001) & Carp River Watershed / Subwatershed Study). Therefore, 84% of the precipitation on hard surfaces is available for infiltration. As per Environment Canada's records at the Ottawa International Airport (1981-2010), there are on average 58.4 days per year where the precipitation is greater than 5 mm. Conservatively assuming only 5 mm of precipitation on each of the 58.4 days (and assuming 84%), 266 $m^3$ is available for infiltration from the runoff from the 1,082 $m^2$ of hard surfaces draining to the detention area above the infiltration trench. Therefore, about 4.5 $m^3$ is available for infiltration for each of the 58.4 days. The infiltration trench, having a storage volume of 6.7 $m^3$ (refer to Quantity Control for the sizing), has 148% of the required capacity to capture and infiltrate into the ground 100% of this volume or 266 $m^3$ annually. Inserting the 266 $m^3$ into the water balance calculations, the post development annual infiltration for the property is 243 mm/year; greater than the pre-development and existing infiltration; and within 7% of the 262 mm/year target. Refer to calculations in Appendix B.

An erosion and sediment control plan has been developed to be implemented during construction, (see drawing C-1 and notes 2.1 to 2.5 on drawing C-3). In summary: to filter out construction sediment a silt fence barrier will be installed around the perimeter of the site where runoff will drain off the site; and any material deposited on a public road will be removed.

## 4.2 QUANTITY CONTROL

In the pre-consultation meeting and the subsequent meeting notes City stated that the stormwater management design needs *"to control the 100-year post to 5-year pre."* However, the City has since revised this requirement, and now the stormwater management design needs to control the 100-year post to 2-year pre. Specifically, the stormwater management criteria for quantity control are to control the post development peak release rates for the 5-year and 100-year storm events to peak pre-development flows during the 2-year storm event using a pre-development runoff coefficient; and a calculated time of concentration (but not less than 10 minutes). It is calculated that the pre-development conditions reflect a 2 & 5-year runoff coefficient of 0.25; and, using the Airport Formula, a time of concentration of 9.9 minutes. Therefore, based on runoff coefficient of 0.25, a 10-minute time of concentration; and using the Rational Method; the 2-year pre-development flow rate and maximum allowable release rate for all storm events is 9.51 L/s. (The 5-year and 100-year pre-development flow rate is calculated to be 12.90 L/s and 27.17 L/s, respectively.) The Rational and Modified Rational Methods are used to calculate the post-development flow rates; release rates; and the required storage volumes to achieve the post development release rates. The runoff coefficients are each increased by 25% to a maximum of 1.00 during the 100-year event. Refer to calculations in Appendix B.

Stormwater will be stored on-site in a stormwater detention area and in an infiltration trench. Stormwater runoff currently drains off the site to the adjacent properties to the east. The stormwater overflowing from stormwater detention area will continue to drain to the adjacent properties to the east, at significantly reduced flow rate (refer to calculations in Appendix B and see below).

**Drainage Area I** (Uncontrolled Flow Rate North – 198 $m^2$)
The runoff from small areas around the perimeter of the site will be allowed to flow uncontrolled off the site. The flow rates are calculated at a time of concentration of 10 minutes.

| | 100-Year Event | 5-Year Event |
|---|---|---|
| Maximum Flow Rate | 2.46 L/s | 1.15 L/s |

**Drainage Area II** (1,610 $m^2$)
Runoff from this drainage area will drain to a stormwater detention area with an infiltration trench located at the bottom. The available storage in the infiltration trench is also included in the calculations. A broad-crested weir, (42 m retaining wall, with a top of wall elevation of 124.88 – the maximum ponding elevation required) will control the release of stormwater from the property.

| | 100-Year Event | 5-Year Event |
|---|---|---|
| Maximum Release Rate | 7.05 L/s | 3.55 L/s |
| Maximum Ponding Elevation | 124.88 m | 124.88 m |
| Maximum Depth Above Weir | 2 mm | 1 mm |
| Maximum Ponding Depth | 0.45 m | 0.45 m |
| Maximum Volume Stored | 44.71 $m^3$ | 44.71 $m^3$ |

**Entire Site:**

| | 100-Year Event | 5-Year Event |
|---|---|---|
| Pre-Development Flow Rate | 27.17 L/s | 12.90 L/s |
| Maximum Allowable Release Rate | 9.51 L/s | 9.51 L/s |
| Maximum Release Rate | 9.51 L/s | 4.70 L/s |

The maximum post-development release during the 100-year event is calculated to be equal to the maximum allowable; and 65% less than the pre-development flow rate. During the 5-year event it is 51% less than maximum allowable; and 64% less than the pre-development flow rate. Therefore, the post-development reduction in flow rates is expected to have a positive impact on the adjacent properties.

## 5.0 CONCLUSIONS

1. A private fire hydrant is not required.

2. There is an adequate water supply for firefighting from the existing municipal fire hydrant.

3. The existing 19 mm water service is proposed to remain and is adequate for the proposed use.

4. The existing on-site septic system is proposed to remain; and as per the Hydrogeological Brief and Assessment it *"is considered adequately sized for the proposed change in use"*.

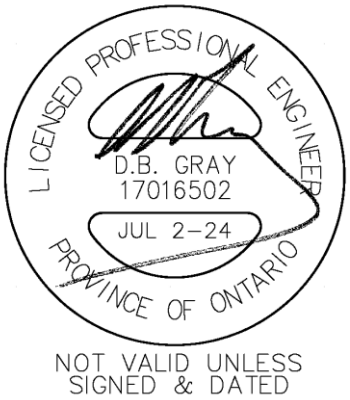
5. To meet the water quality target of 80% total suspended solids (TSS) removal an infiltration trench with a storage volume of 5.5 $m^3$ is required; however, a 6.7 $m^3$ infiltration trench is proposed.

6. The infiltration trench has 148% of the required the capacity to capture and infiltrate into the ground to achieve a post development annual infiltration for the property of 243 mm/year; greater than the pre-development and existing infiltration; and within 7% of the 262 mm/year target.

7. The maximum post-development release during the 100-year event is calculated to be equal to the maximum allowable; and 65% less than the pre-development flow rate. During the 5-year event it is 51% less than maximum allowable; and 64% less than the pre-development flow rate.

8. The post-development reduction in flow rates is expected to have a positive impact on the adjacent properties.

Prepared by D.B. Gray Engineering Inc.



# APPENDIX A

## PRE-APPLICATION CONSULTATION MEETING NOTES

# Pre-Application Consultation Meeting Notes

**Property Address:** 2026 Carp Road
**Application No.:** PC2021-0133
**Meeting Date:** June 1, 2021

**Attendees:**

**Sarah McCormick**, Planner, City of Ottawa
**Brian Morgan**, Project Manager, City of Ottawa
**Tessa Di Iorio**, Risk Offical and HydroGeologist, City of Ottawa
**Mark Richardson**, Forester, City of Ottawa
**Josiane Gervais**, Transportation Engineer, City of Ottawa
**Reid Shepherd**, Parks Planner, City of Ottawa
**Erica Ogden**, Planner, Mississippi Valley Conservation Authority

**Jessica D'Aoust,** JD Plan, jessica@jdplan.ca
**Neil,** owner, 417cars@gmail.com
**Jim Bell,** architect, jim@jbell.ca
**Doug Gray,** DB Gray Engineering, d.gray@dbgrayengineering.com

**Subject: 2026 Carp Road**

**Meeting notes:**

Development Proposal

- Site plan and minor re-zoning and/or variance
- Proposal for auto sales in existing building with display lot with staff and visitor parking.
- Small accessory building for storage and cleaning.
- Adjacent to urban area.
- Municipal water with septic.

Preliminary comments and questions from staff and agencies, including follow-up actions:

Planning

- Property is designated General Rural on Schedule A of the Official Plan
- The property is zoned Rural Commercial Zone, rural special exception 773r (RC[773r])
  - Uses proposed:
    - Automotive dealership (no automotive repair, no gas station)
    - Accessory storage structure (67 sq metres)
    - Automotive display (considered outdoor storage in the ZBL)
- The proposed accessory structure at the rear of the property requires a minimum interior side yard setback of 3m
- Accessory structure not to exceed the greater of 5% of the total lot area or 150 sq. metres.
- Section 107 of the Zoning By-law required a minimum aisle width of 6.7m; the concept shows only a maximum of 6m with pinch points close to the existing building which are less then 6m.

- 3 m landscaping strip is required between the street and the parking lot (Section 110 of the Zoning By-law)
- From a preliminary look at the concept the following relief is required for the proposal as designed; and will need to be addressed in the Site Plan application, or a minor variance would be required:
    - Landscape buffer between the parking lot and the street;
    - Drive aisle width accessing parking lot;
    - Parking (potentially, need more accurate area measurements.);
    - Outdoor storage (vehicle display), in the front yard
        - It is unlikely staff would support a variance to permit outdoor storage in the front yard.
- The vehicle display area is considered outdoor storage in the Zoning By-law. As per Table 217 (RC Zone provisions), outdoor storage is only permitted within an interior or rear yard and must be screened and concealed from view from the street and any non-commercial or non-industrial zones.
    - Outdoor vehicle display cannot be located within the required and provided front yard.
    - Notwithstanding the above, a few display spaces may be permitted closer to the street. The location of these spaces and how there are accessed would be determined through the site plan process. The intent to maintain a vegetated front yard would still need to be maintained.
    - Additional details are required with a site plan application in relation to the 'raised display' within the front yard and in front of the dealership building.
- Additional buffering should be provided with the residential properties to the rear. Additional year round foiliage cover should be considered by incorporating more coniferous trees, and providing miz with the deciduous trees.
- Propane storage is noted on the plan; Please see Section 66 of the Zoning By-law.
    - Section 66(1) – facilities relating to the handling and transfer of propane and natural gas, including tanks and associated compressors, pumps and other similar facilities must not be located in any required front, side, corner side or rear yard, nor closer than 30 metes to any lot line abutting a residential zone.
    - Section 66(2) – Despite subsection (1), the minimum 30 metres may be reduced to a minimum of 6 metres where it can be demonstrated that appropriate noise abatement measures have been undertaken to ensure that noise levels at the boundary of the residential zone do not create a nuisance for uses in that abutting residential zone.
    - The propane tank is currently located within the interior side yard (minimum setback of 3m) and likely within 30m of the residential zone to the north.
- GeoOttawa identifies these lands as having archaeological potential, therefore an archaeological study will be required.
- Site plan will need to include:
    - Bollards surrounding the septic system (tank and field)
    - Parking chart with uses listed with parking rates, required and provided parking.
    - Areas for the following must be identified on the plan: snow storage, refuse collection area, site lighting
- This development triggers a Rural Small Site Plan application
- The applicant inquired to whether a change of use to the existing house would trigger any relief requirements from the zoning provisions. Please refer to Section 3(2) of the zoning by-law which states that:

*A permitted principal use, in a building or on a lot that does not comply with the regulatory provisions of this by-law, may change to another permitted use without the need for a minor variance from the Committee of Adjustment provided that the regulatory provisions are no more restrictive for the new use.*

Engineering

- As there will be a connection to municipal water, the mains under the street and the service laterals must be shown on the Site Servicing Plan.
- The Hydrogeological Report and terrain Analysis is to focus more on the terrain analysis.
- A septic Assessment Report is required for the re-use of the existing septic system.
- The site may have thin soils, which may affect the septic design; this information must be provided in the Geotechnical Report.
- the entrance width is shown as 6.1 metres, while the minimum is 6.7 metres.
- Standard stormwater management requirements is to control the 100-year post to 5-year pre.

Hydrogeology

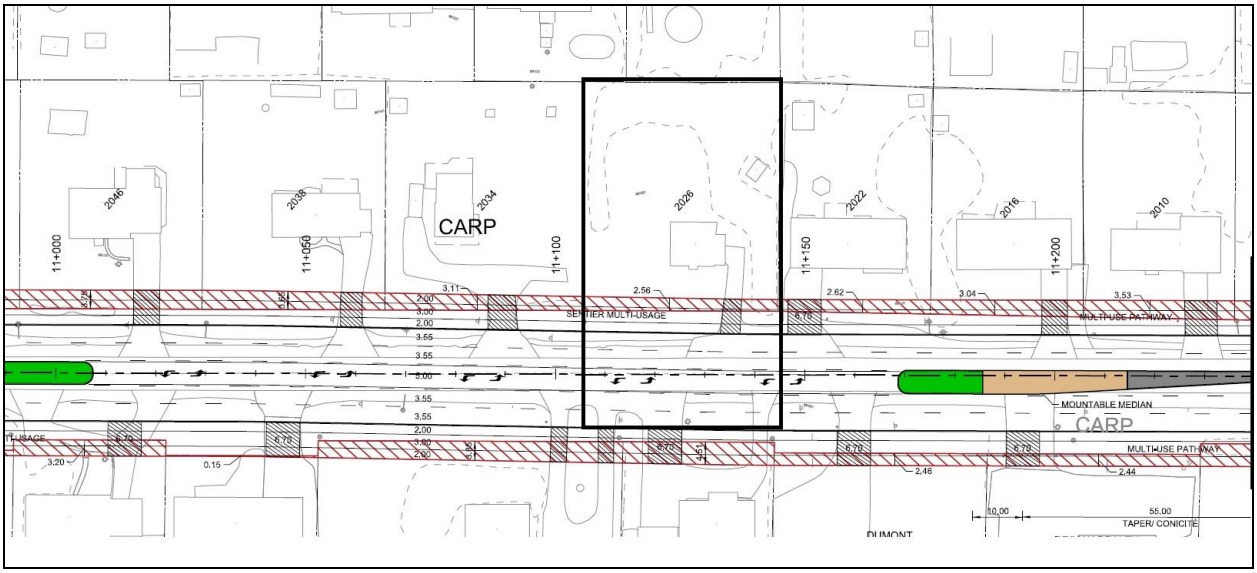
A Hydrogeological and Septic System Impact Assessment is required since the site will require a septic system for wastewater:

- Note that the City of Ottawa's Hydrogeological and Terrain Analysis Guidelines (March 2021) are in full effect and provides the basis for the required submission of the Hydrogeological and Terrain Analysis Report (includes septic impact assessment). https://documents.ottawa.ca/sites/documents/files/hydrogeo_terrain_analysis_guide_en.pdf
- Septic Impact Assessment:
  - If the septic flow is greater than 10,000 L/day, then an ECA will be required from the MECP for the septic system.
  - If the septic flow is less than 10,000 L/day, then a septic impact assessment must be provided in the hydrogeological report to ensure the system meets dilution targets and is not contaminating the drinking water aquifer offsite (at the downgradient property boundary). The City can provide a map indicating lots that are not connected to municipal water and rely on private wells to assess downgradient risk (see contact below).
  - The predictive septic impact assessment should follow MECP D-5-4 requirements (see Section 5.6.3 for Industrial/Commercial Developments), which will predict a maximum allowable septic flow.
  - If portions of the site will include gravel or permeable pavement, then clear support must be provided for the amount of infiltration accounted on the gravel or permeable pavement area.
  - Please note that sufficient area for recharge of clean dilution water may be an issue on this site since there appears to be a lack of permeable area for dilution. However, since this is a site plan application (and not lot creation or re-zoning), advanced septic treatment (nitrate reduction system) may be used in the calculation; certified system must be referenced if it is needed to meet the septic impact assessment.
- General: sandy soils are present on the site (esker) and it is an area of local groundwater recharge. The MVC identified the need to meet annual infiltration targets or maintain existing infiltration rates (groundwater recharge). This information can be included in the hydrogeological report or my be referenced from the stormwater report (i.e. water budget).

- The report should also assess the proposed onsite use to determine if there is any risk of contamination to downgradient groundwater users (i.e. potential auto repairs).
- The developer's consultant can contact Tessa Di Iorio directly if there are any questions about requirements prior to commencing work onsite. (tessa.diiorio@ottawa.ca).

Transportation

- Follow Traffic Impact Assessment Guidelines.
  - Screening form to start, full Traffic Impact Assessment if any of the triggers on the screening form are satisfied.
  - Start this process asap. The application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
  - Request base mapping asap if RMA is required. Contact Engineering Services (https://ottawa.ca/en/city-hall/planning-and-development/engineering-services)
  - An update to the *TRANS Trip Generation Manual* has been completed (October 2020). If applicable, this manual is to be utilized for this TIA. A copy of this document can be provided upon request.
- Transportation Master Plan includes widening of Carp Road between Highway 417 to Hazeldean (2031 Affordable Network). An EA was completed for this work. Although the 2013 TMP identifies its construction in Phase 2, future TMP update to review implementation time for this project based on available funding and priority for other competing roadway projects across the city.
- The EA identifies the additional ROW protection required for the 2026 Carp Road property (see image below). It is extracted from the functional design established as part of the approved Carp Road Widening EA study (Highway 417 to Hazeldean Road). Note that ROW requirement along the corridor is subject to confirmation by detail design (which will be undertaken when funding is available for the widening project.




- Clear throat requirements on an arterial is 15m. As per TAC (2017), the clear throat length is measured from the ends of the driveway curb return radii at the roadway and the point of first conflict on-site.
- Show more details in terms of number of vehicles accommodated/how they will be parked within the gravel area.

- Access must meet Private Approach Bylaw.
- On Site Plan:
  - Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
  - Turning movement diagrams required for all accesses showing the largest vehicle to access/egress the site.
  - Turning movement diagrams required for internal movements (loading areas, garbage).
  - Show all curb radii measurements; ensure that all curb radii are reduced as much as possible.
  - Show lane/aisle widths
  - Grey out any area that will not be impacted by this application.
- As the proposed site is commercial and for general public use, AODA legislation applies. Consider using the City's Accessibility Design Standards.
- Stationary Noise Impact Study required if there will be any exposed mechanical equipment due to the proximity to neighboring noise sensitive land uses.

Environmental / Forestry

- No trigger for an EIS on this site, this being said, the property is subject to the Urban Tree Conservation By-law.
- If you have any questions, or wish to discuss the comments below, please contact Mark Richardson at mark.richardson@ottawa.ca

**A Tree Conservation Report will be required.**

- As of January 1 2021, any removal of privately-owned trees 10cm or larger in diameter, or publicly (City) owned trees of any diameter requires a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.
- The Planning Forester from Planning and Growth Management as well as foresters from Forestry Services will review the submitted TCR.
  - If tree removal is required, both municipal and privately-owned trees will be addressed in a single permit issued through the Planning Forester.
  - Compensation may be required for city owned trees – if so, it will need to be paid prior to the release of the tree permit.
- The Tree Conservation report must list all trees on site by species, diameter and health condition.
- Please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line).
- The Tree Conservation Report must list all trees on adjacent sites if they have a critical root zone that extends onto the development site
- If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained.
- All retained trees must be shown and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca
  - The location of tree protection fencing must be shown on a plan.
  - Show the critical root zone of the retained trees.
  - If excavation will occur within the critical root zone, please show the limits of excavation.

- The City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
- For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca or on City of Ottawa

**Landscape Plan – tree planting requirements:**

- For additional information on the following, please contact adam.palmer@ottawa.ca
- Minimum setbacks:
  - Maintain 1.5m from sidewalk or MUP/cycle track.
  - Maintain 2.5m from curb.
  - Coniferous species require a minimum 4.5m setback from curb, sidewalk or MUP/cycle track/pathway.
  - Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

- Tree specifications:
  - Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.
  - Maximum the use of large deciduous species wherever possible to maximize future canopy coverage.
  - Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and include watering and warranty as described in the specification (can be provided by Forestry Services).
  - Plant native trees whenever possible.
  - No root barriers, dead-man anchor systems, or planters are permitted.
  - No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree).

- Hard surface planting:
  - Curb style planter is highly recommended.
  - No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.
  - Trees are to be planted at grade.

- Soil Volume:
  - Please ensure adequate soil voulmes are met:

| Tree Type/Size | Single Tree Soil Volume (m3) | Multiple Tree Soil Volume (m3/tree) |
|---|---|---|
| Ornamental | 15 | 9 |
| Columnar | 15 | 9 |
| Small | 20 | 12 |
| Medium | 25 | 15 |
| Large | 30 | 18 |

| | | |
|---|---|---|
| Conifer | 25 | 15 |

- Please note that these soil volumes are not applicable in cases with Sensitive Marine Clay.

- Sensitive Marine Clay:
  - Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines.

Parks

- Cash in lieu of Parkland will be required to an amount of 2% of gross area of the site; this comes to approximately 36 square metres.

Mississippi Valley Conservation Authority

- The property is not regulated by MVCA under Ontario Regulation 153/06. Permits from MVCA will not be required.
- The property is within the Carp River Watershed Subwatershed Study area, and has an annual infiltration target of 262 mm/yr for high ground water recharge areas. The site should demonstrate that the existing infiltration rate is maintained or exceeded and where possible the infiltration target is achieved.
- The property is within the Feedmill Creek Subwatershed. Water quality requirement for Feedmill Creek is an enhanced level of protection, 80% TSS Removal.

**Submission requirements and fees**

- The development proposal triggers Site Plan Control. As per the new Site Plan Control By-law, this proposal is considered a Rural Small Site Plan application.
- Required fees for the Site plan control application can be found of the application form and include; planning fees, engineering review fees and preliminary Conservation Authority fees.
- The submission requirements for this application can be found on the accompanying required Plans and Studies list.

**Next steps**

- It is encourage that you discuss the proposal with the Ward Councillor, local community groups and neighbours
- Staff are open to reviewing any modifications in site design which result from the comments provided herein.

# APPENDIX B

## STORMWATER MANAGEMENT

25-Jun-24

# 2026 Carp Road
## Ottawa, Ontario
## DESIGN INFILTRATION RATE CALCULATIONS

Based on
Table 2 - Summary of Field Saturated Hydraulic Conductivity Testing Results
and Estimated Unfactored Infiltration Rates
Paterson Group Report PG6271-01 Revision 1 dated June 18, 2024

| Testing Location ID | Ground Surface Elelvation (m) | Infiltration Testing Elelvation (m) | $K_{fs}$ (m/s) | Unfactored Infiltraion Rate (mm/hr) | Material | Depth Below Surface (m) | Ratio of Mean Measured Infiltration Rates | Safety Correction Factor * | Design Infiltration Rate (mm/hr) |
|---|---|---|---|---|---|---|---|---|---|
| PT1-23 | 123.39 | 123.09 | 8.0E-06 | 81 | Glacial Till | 0.30 | 0.85 | 2.5 | 32 |
| | | 122.79 | 1.5E-05 | 96 | Glacial Till | 0.60 | | | |
| PT2-23 | 123.30 | 123.00 | 1.2E-05 | 90 | Glacial Till | 0.30 | 0.88 | 2.5 | 36 |
| | | 122.70 | 1.9E-05 | 102 | Glacial Till | 0.60 | | | |
| PT3-23 | 123.32 | 123.02 | 1.1E-05 | 88 | Glacial Till | 0.30 | 0.98 | 2.5 | 35 |
| | | 122.82 | 1.2E-05 | 90 | Glacial Till | 0.50 | | | |

| Design Infiltration Rate (lowest) | 32 |
|---|---|

* Based on Table C2: Safety correction factors for calculating design infiltration rates
APPENDIX C – SITE EVALUATION AND SOIL TESTING PROTOCOL FOR STORMWATER INFILTRATION
Credit Valley Conservation - Low Impact Development Stormwater Management Planning and Design Guide

31-Jul-23

REVISED 27-Jun-24

# 2026 Carp Road

## Ottawa, Ontario

# INFILTRATION CALCULATIONS

## DRAINAGE AREA II

| | | |
|---|---|---|
| Roof Area: | 73 | sq.m |
| Asphalt/Concrete Area: | 239 | sq.m |
| Stormwater Detention Area | 109 | sq.m. |
| Gravel Area: | 770 | sq.m |
| Turfstone Area: | 119 | sq.m |
| Landscaped Area: | 300 | sq.m |
| Total Catchment Area | 1610 | sq.m. |
| Pervious(Landscaped + Detention + Turfstone) Area: | 528 | sq.m. |
| Total Catchment Area: | 1610 | sq.m. |
| Percentage Pervious: | 33% | |
| Percentage Impervious: | 67% | |

Require Storage Volume *: 67% Impervious Level 34.1 cu.m./ha (extrapolated from Table 3.2 *)
(for 80% TSS removal) 5.5 cu.m. ( 1610 ) sq.m.

* As per MOE Stormwater Management Planning and Design Manual, March 2003

Infiltration Trench

| Water Depth m | Depth m | Width m | Length m | Total Volume cu.m. | Void Volume 40% cu.m. |
|---|---|---|---|---|---|
| 0.45 | 0.20 | 2.3 | 36.5 | 16.9 | 6.7 |

Design Infiltation Rate: 32 mm/hr
Time to Draw Down: 8.1 Hours

18-Nov-22
REVISED 31-Jul-23
REVISED 27-Jun-24

# 2026 Carp Road
## Ottawa, Ontario
## INFILTRATION CALCULATIONS

### DRAINAGE AREA II

| | | | C |
|---|---|---|---|
| Roof Area: | 73 | sq.m. | 0.90 |
| Asphalt/Concrete Area: | 239 | sq.m. | 0.90 |
| Stormwater Detention Area | 109 | sq.m. | 1.00 |
| Gravel Area: | 770 | sq.m. | 0.70 |
| Turfstone Area: | 119 | sq.m | 0.40 |
| Landscaped: | 300 | sq.m. | 0.20 |
| Total Catchment Area | 1610 | sq.m. | 0.64 |

Required Volume Required to Capture: 5 mm rain event: 5.2 cu.m.

64% of days with preciptation are less than 5mm *

* Ottawa International Airport (1981-2010)

Infiltration Trench

| Water Depth m | Depth m | Width m | Length m | Total Volume cu.m. | Void Volume 40% cu.m. |
|---|---|---|---|---|---|
| 0.45 | 0.20 | 2.3 | 36.5 | 16.9 | 6.7 |

Design Infiltation Rate: 32 mm/hr
Time to Draw Down: 8.1 Hours

22-Nov-22
REVISED 31-Jul-23
REVISED 27-Jun-24

# 2026 Carp Road
Ottawa, Ontario

## Water Balance and Infiltration Calculations

Water Balance is based on the equation: Mean Annual Precipitation - Change in Groundwater Storage - Evapotranspiration = Runoff + Infiltration

Where: Long term changes to groundwater storage are assumed to be negligible
and
Short term or seasonal changes to groundwater are assumed to balance out over the year.

Therefore: Mean Annual Precipitation - Evapotranspiration = Runoff + Infiltration

Infiltration is based on the equations: Surplus (available for infiltration) = Mean Annual Precipitation - Evapotranspiration
and
Infiltration = Surplus x Infiltration Coefficient
and
Infiltration Coefficient = Topography Factor + Soil Factor + Vegetation Factor
(as per the MOE SWM Planning & Design Manual, 2003 - see below)

### Pre-Development

| Area (sq.m.) | Precipitation + (mm/yr) | Evapo-transpiration ++ (mm/yr) | Surplus (mm/yr) | Topography Factor * | Soil Factor ** | Vegetation Factor *** | Infiltration Coefficient | Infiltration (mm/yr) |
|---|---|---|---|---|---|---|---|---|
| 1808 | 943 | 575 | 368 | 0.1 | 0.4 | 0.15 | 0.65 | 239 |

### (Existing) Development

| | Area (sq.m.) | Precipitation + (mm/yr) | Evapo-transpiration ++ (mm/yr) | Surplus (mm/yr) | Topography Factor * | Soil Factor ** | Vegetation Factor *** | Infiltration Coefficient | Infiltration (mm/yr) |
|---|---|---|---|---|---|---|---|---|---|
| Landscape | 1670 | 943 | 575 | 368 | 0.1 | 0.4 | 0.15 | 0.65 | 239 |
| Hard Surfaces | 138 | 943 | 150 | 793 | | | | 0.00 | 0 |
| Total: | 1808 | | | | | | | Weighted Average: | 221 |

### Post Development

| Landscape (inc. Detention Area & Turfstone): | Area (sq.m.) | Precipitation + (mm/yr) | Evapo-transpiration ++ (mm/yr) | Surplus (mm/yr) | Topography Factor * | Soil Factor ** | Vegetation Factor *** | Infiltration Coefficient | Infiltration (mm/yr) | Volume Including Infiltration Trench (cu.m.) | Infiltration (mm/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 726 | 943 | 575 | 368 | 0.1 | 0.4 | 0.15 | 0.65 | 239 | 174 | 239 |
| Hard Surfaces | 1082 | 943 | 150 | 793 | | | | 0.00 | 0 | 266 | 246 |
| Total: | 1808 | | | | | | | | | 439 | |
| | | | | | | | | Weighted Average: | 96 | | 243 |

| | mm | Days with Precipitation + | Hard Surfaces Surplus / Precipitation | Hard Surfaces Area (sq.m.) | Hard Surfaces Available Annual Volume (cu.m.) | Hard Surfaces Annual Percentage Captured | Hard Surfaces Annual Volume Captured (cu.m.) | Required Volume of Infiltration Trench (cu.m.) |
|---|---|---|---|---|---|---|---|---|
| >= | 0.2 | 163.6 | 0.84 | 1082 | 30 | 100% | 30 | 0.2 |
| >= | 5 | 58.4 | 0.84 | 1082 | 266 | 100% | 266 | 4.5 |
| >= | 10 | 30.0 | 0.84 | 1082 | 273 | 100% | 273 | 9.1 |
| >= | 25 | 5.5 | 0.84 | 1082 | 125 | 100% | 125 | 22.7 |

+ Ottawa International Airport (1981-2010)
++ Eastern Ontario Water Resources Management Study (2001) & Carp River Watershed / Subwatershed Study

| | | Factor | Subject Property |
|---|---|---|---|
| * Topography: | Flat Land, average slope < 0.6m/km (<.06%) | 0.3 | |
| | Rolling Land, average slope 2.8 to 3.8m/km (0.28% to 0.38%) | 0.2 | |
| | Hilly Land, average slope 28 to 47m/km (2.8 to 4.7%) | 0.1 | ±5% slope |
| ** Soil: | Tight impervious clay | 0.1 | |
| | Medium combination of clay and loam | 0.2 | |
| | Open sandy loam | 0.4 | = 0.4 - glacial till - silty sand with gravel, cobbles and boulders |
| *** Cover: | Cultivated Lands | 0.1 | = 0.15 (soft landscaping) |
| | Woodland | 0.2 | |

As per MOE SWM Planning & Design Manual, 2003

# Summary Tables

## ONE HUNDRED YEAR EVENT

| Drainage Area | Pre Development Flow Rate (L/s) | Maximum Allowable Release Rate (L/s) | Maximum Release Rate (L/s) | Maximum Volume Required (cu.m) | Maximum Volume Stored (cu.m) |
|---|---|---|---|---|---|
| AREA I (Uncontrolled Flow Off Site) | - | - | 2.46 | - | - |
| AREA II | - | - | 7.05 | 44.71 | 44.71 |
| TOTAL | 27.17 | 9.51 | 9.51 | 44.71 | 44.71 |

## FIVE YEAR EVENT

| Drainage Area | Pre Development Flow Rate (L/s) | Maximum Allowable Release Rate (L/s) | Maximum Release Rate (L/s) | Maximum Volume Required (cu.m) | Maximum Volume Stored (cu.m) |
|---|---|---|---|---|---|
| AREA I (Uncontrolled Flow Off Site) | - | - | 1.15 | - | - |
| AREA II | - | - | 3.55 | 44.71 | 44.71 |
| TOTAL | 12.90 | 9.51 | 4.70 | 44.71 | 44.71 |

November 17, 2022
REVISED July 31, 2023
REVISED June 27, 2024

# 2026 Carp Road

Ottawa, Ontario

# STORMWATER MANAGEMENT CALCULATIONS
# Rational & Modified Rational Method

## 100-Year Pre-Development Conditions

| | | | C |
|---|---|---|---|
| Roof Area: | 73 | sq.m | 1.00 |
| Asphalt/Concrete Area: | 0 | sq.m | 1.00 |
| Gravel Area: | 65 | sq.m | 0.875 |
| Landscaped Area: | 1670 | sq.m | 0.25 |
| Total Catchment Area: | 1808 | sq.m | 0.30 |

Airport Formula (Used when C < 0.40)

$$Tc = \frac{3.26 \cdot (1.1 - C) \cdot L^{1/2}}{Sw^{0.33}} \text{ min}$$

| | | |
|---|---|---|
| Runoff Coefficient (C): | 0.30 | |
| Sheet Flow Distance (L): | 50 | m |
| Slope of Land (Sw): | 8 | % |
| Time of Concentration (Sheet Flow): | 9.3 | min |
| Time of Concentration: | 10 | min |
| Rainfall Intensity (i): | 179 | mm/hr (100-year event) |
| 100-Year Pre-Development Flow Rate (2.78AiC): | 27.17 | L/s |

## 5-Year Pre-Development Conditions

| | | | C |
|---|---|---|---|
| Roof Area: | 73 | sq.m | 0.90 |
| Asphalt/Concrete Area: | 0 | sq.m | 0.90 |
| Gravel Area: | 65 | sq.m | 0.70 |
| Landscaped Area: | 1670 | sq.m | 0.20 |
| Total Catchment Area: | 1808 | sq.m | 0.25 |

Airport Formula (Used when C < 0.40)

$$Tc = \frac{3.26 \cdot (1.1 - C) \cdot L^{1/2}}{Sw^{0.33}} \text{ min}$$

| | | |
|---|---|---|
| Runoff Coefficient (C): | 0.25 | |
| Sheet Flow Distance (L): | 50 | m |
| Slope of Land (Sw): | 8 | % |
| Time of Concentration (Sheet Flow): | 9.9 | min |
| Time of Concentration: | 10 | min |
| Rainfall Intensity (i): | 104 | mm/hr (5-year event) |
| 5-Year Pre-Development Flow Rate (2.78AiC): | 12.90 | L/s |

## 2-Year Pre-Development Conditions
## (Maximum Allowable Release Rate)

| | | |
|---|---|---|
| Area (A): | 1,808 | sq.m |
| Time of Concentration: | 10 | min |
| Rainfall Intensity (i): | 77 | mm/hr (2-Year Event) |
| Runoff Coeficient (C): | 0.25 | |
| Maximum Allowable Release Rate (2.78AiC): (Maximum Allowable Release Rate) | 9.51 | L/s |

# 100-YEAR EVENT

## DRAINAGE AREA I (Uncontrolled Flow Off Site)

(ONE-HUNDRED-YEAR EVENT)

| | | | C |
|---|---|---|---|
| Roof Area: | 0 | sq.m | 1.00 |
| Asphalt/Concrete Area: | 0 | sq.m | 1.00 |
| Detention Area | 0 | sq.m | 1.00 |
| Gravel Area: | 0 | sq.m | 0.875 |
| Landscaped Area: | 198 | sq.m | 0.25 |
| Total Catchment Area: | 198 | sq.m | 0.25 |
| Area (A): | 198 | sq.m | |
| Time of Concentration: | 10 | min | |
| Rainfall Intensity (i): | 179 | mm/hr (100-year event) | |
| Runoff Coeficient (C): | 0.25 | | |
| Release Rate (2.78AiC): | 2.46 | L/s | |

# DRAINAGE AREA II

(ONE-HUNDRED-YEAR EVENT)

| | | | C |
|---|---|---|---|
| Roof Area: | 73 | sq.m | 1.00 |
| Asphalt/Concrete Area: | 239 | sq.m | 1.00 |
| Detention Area | 109 | sq.m | 1.00 |
| Gravel Area: | 770 | sq.m | 0.875 |
| Turfstone Area: | 119 | sq.m | 0.50 |
| Landscaped Area: | 300 | sq.m | 0.25 |
| Total Catchment Area: | 1610 | sq.m | 0.76 |

| | Volume | |
|---|---|---|
| Volume of Infiltration Trench: | 6.75 | cu.m |

| | | | Ponding above Infiltration Trench | | | | |
|---|---|---|---|---|---|---|---|
| | | | Width m | Length m | Water Depth | | |
| Water Elevation: | 124.88 | m | 2.3 | 36.5 | 0.45 | 37.96 | cu.m |

| | | | | | |
|---|---|---|---|---|---|
| Maximum Weir Release Rate: | 7.05 | L/s | Achieved Volume: | 44.71 | cu.m |
| | | | Maximum Volume Required: | 44.71 | cu.m |

| Time (min) | i (mm/hr) | 2.78AiC (L/s) | Maximum Weir Release Rate (L/s) | Stored Rate (L/s) | Stored Volume (cu.m) |
|---|---|---|---|---|---|
| 5 | 243 | 82.94 | 7.05 | 75.89 | 22.77 |
| 10 | 179 | 61.02 | 7.05 | 53.97 | 32.38 |
| 15 | 143 | 48.83 | 7.05 | 41.78 | 37.60 |
| 20 | 120 | 40.99 | 7.05 | 33.94 | 40.73 |
| 25 | 104 | 35.49 | 7.05 | 28.44 | 42.66 |
| 30 | 92 | 31.39 | 7.05 | 24.34 | 43.82 |
| 35 | 83 | 28.22 | 7.05 | 21.17 | 44.46 |
| 40 | 75 | 25.68 | 7.05 | 18.63 | 44.71 |
| 45 | 69 | 23.60 | 7.05 | 16.55 | 44.68 |
| 50 | 64 | 21.86 | 7.05 | 14.81 | 44.42 |
| 55 | 60 | 20.38 | 7.05 | 13.33 | 43.97 |
| 60 | 56 | 19.10 | 7.05 | 12.05 | 43.38 |
| 70 | 50 | 17.01 | 7.05 | 9.96 | 41.85 |
| 80 | 45 | 15.37 | 7.05 | 8.32 | 39.96 |
| 90 | 41 | 14.05 | 7.05 | 7.00 | 37.79 |
| 100 | 38 | 12.95 | 7.05 | 5.90 | 35.42 |
| 110 | 35 | 12.03 | 7.05 | 4.98 | 32.87 |
| 120 | 33 | 11.24 | 7.05 | 4.19 | 30.18 |
| 150 | 28 | 9.44 | 7.05 | 2.39 | 21.47 |
| 180 | 24 | 8.17 | 7.05 | 1.12 | 12.08 |
| 210 | 21 | 7.23 | 7.05 | 0.18 | 2.21 |
| 240 | 19 | 6.49 | 6.49 | 0.00 | 0.00 |
| 270 | 17 | 5.91 | 5.91 | 0.00 | 0.00 |
| 300 | 16 | 5.43 | 5.43 | 0.00 | 0.00 |

# FIVE-YEAR EVENT

## DRAINAGE AREA I (Uncontrolled Flow Off Site)

(FIVE-YEAR EVENT)

| | | | C |
|---|---|---|---|
| Roof Area: | 0 | sq.m | 0.90 |
| Asphalt/Concrete Area: | 0 | sq.m | 0.90 |
| Detention Area | 0 | sq.m | 0.90 |
| Gravel Area: | 0 | sq.m | 0.70 |
| Landscaped Area: | 198 | sq.m | 0.20 |
| Total Catchment Area: | 198 | sq.m | 0.20 |
| Area (A): | 198 | sq.m | |
| Time of Concentration: | 10 | min | |
| Rainfall Intensity (i): | 104 | mm/hr (5-year event) | |
| Runoff Coeficient (C): | 0.20 | | |
| Release Rate (2.78AiC): | 1.15 | L/s | |

# DRAINAGE AREA II

(FIVE-YEAR EVENT)

| | | | C |
|---|---|---|---|
| Roof Area: | 73 | sq.m | 0.90 |
| Asphalt/Concrete Area: | 239 | sq.m | 0.90 |
| Detention Area | 109 | sq.m | 0.90 |
| Gravel Area: | 770 | sq.m | 0.70 |
| Turfstone Area: | 119 | sq.m | 0.40 |
| Landscaped Area: | 300 | sq.m | 0.20 |
| Total Catchment Area: | 1610 | sq.m | 0.64 |

| | | | | | | Volume | |
|---|---|---|---|---|---|---|---|
| | | | | | Volume of Infiltration Trench: | 6.75 | cu.m |
| | | | Ponding above Infiltration Trench | | | | |
| | | | Width m | Length m | Water Depth | | |
| Water Elevation: | 124.88 | m | 2.3 | 36.5 | 0.45 | 37.96 | cu.m |
| Weir Release Rate: | 3.55 | L/s | | | Achieved Volume: | 44.71 | cu.m |
| | | | | | Maximum Volume Required: | 44.71 | cu.m |

| Time (min) | i (mm/hr) | 2.78AiC (L/s) | Maximum Weir Release Rate (L/s) | Stored Rate (L/s) | Stored Volume (cu.m) |
|---|---|---|---|---|---|
| 5 | 243 | 69.19 | 3.55 | 65.64 | 19.69 |
| 10 | 179 | 50.91 | 3.55 | 47.36 | 28.41 |
| 15 | 143 | 40.74 | 3.55 | 37.19 | 33.47 |
| 20 | 120 | 34.20 | 3.55 | 30.65 | 36.78 |
| 25 | 104 | 29.61 | 3.55 | 26.06 | 39.08 |
| 30 | 92 | 26.19 | 3.55 | 22.64 | 40.75 |
| 35 | 83 | 23.54 | 3.55 | 19.99 | 41.98 |
| 40 | 75 | 21.42 | 3.55 | 17.87 | 42.90 |
| 45 | 69 | 19.69 | 3.55 | 16.14 | 43.57 |
| 50 | 64 | 18.23 | 3.55 | 14.68 | 44.05 |
| 55 | 60 | 17.00 | 3.55 | 13.45 | 44.38 |
| 60 | 56 | 15.93 | 3.55 | 12.38 | 44.59 |
| 70 | 50 | 14.19 | 3.55 | 10.64 | 44.71 |
| 80 | 45 | 12.83 | 3.55 | 9.28 | 44.53 |
| 90 | 41 | 11.72 | 3.55 | 8.17 | 44.12 |
| 100 | 38 | 10.81 | 3.55 | 7.26 | 43.53 |
| 110 | 35 | 10.04 | 3.55 | 6.49 | 42.81 |
| 120 | 33 | 9.38 | 3.55 | 5.83 | 41.96 |
| 150 | 28 | 7.87 | 3.55 | 4.32 | 38.89 |
| 180 | 24 | 6.81 | 3.55 | 3.26 | 35.26 |
| 210 | 21 | 6.03 | 3.55 | 2.48 | 31.22 |
| 240 | 19 | 5.42 | 3.55 | 1.87 | 26.90 |
| 270 | 17 | 4.93 | 3.55 | 1.38 | 22.36 |
| 300 | 16 | 4.53 | 3.55 | 0.98 | 17.65 |

18-Nov-22
REVISED 31-Jul-23
REVISED 27-Jun-24

# 2026 Carp Road
# Ottawa, Ontario

## BROAD CRESTED WEIR CALCULATIONS
## DRAINAGE AREA II

## 100-YEAR EVENT

Length of Weir based on an assumed coefficient of discharge (Cd):

| | | | |
|---|---|---|---|
| if Q= | 7.05 | l/s (maximum permited flow) | assumes Cd= 0.577 |
| = | 0.00705 | cu.m./s | |
| & H= | 2 | mm (max. depth of water above top of weir) | (assumes P/H is large) |
| then L= | 42.0 | m (length of weir) L = ( Q / ((1.705 x H^(3/2)) | |

Length of Weir based on a calculate coefficient of discharge (Cd):

| | | |
|---|---|---|
| if P= | 0.30 | m (depth of pond) |
| & Lp= | 39.0 | m (width of pond: perpendicular to direction of flow) |
| then Vp= | 0.0006 | m/s (velocity in pond: Vp = Q / (P+H) / Lp ) |
| & E= | 0.002133 | m (energy: E = H + 2V^2/2g) |
| & Cd= | 0.577 | ( Cd = 0.577 x (E/H)^(3/2) ) |

| | | |
|---|---|---|
| if Q= | 7.05 | l/s (maximum permited flow) |
| = | 0.00705 | cu.m./s |
| & H= | 2 | mm (depth of water above top of weir) |
| then L= | 42.0 | m (length of weir) L = ( Q / ((Cd x (2/3) x (2x9.81)^(1/2) x H^(3/2)) |

## 5-YEAR EVENT

Length of Weir based on an assumed coefficient of discharge (Cd):

| | | | |
|---|---|---|---|
| if Q= | 3.55 | l/s (maximum permited flow) | assumes Cd= 0.577 |
| = | 0.00355 | cu.m./s | |
| & H= | 1 | mm (max. depth of water above top of weir) | (assumes P/H is large) |
| then L= | 40.0 | m (length of weir) L = ( Q / ((1.705 x H^(3/2)) | |

Length of Weir based on a calculate coefficient of discharge (Cd):

| | | |
|---|---|---|
| if P= | 0.30 | m (depth of pond) |
| & Lp= | 39.0 | m (width of pond: perpendicular to direction of flow) |
| then Vp= | 0.0003 | m/s (velocity in pond: Vp = Q / (P+H) / Lp ) |
| & E= | 0.001395 | m (energy: E = H + 2V^2/2g) |
| & Cd= | 0.577 | ( Cd = 0.577 x (E/H)^(3/2) ) |

| | | |
|---|---|---|
| if Q= | 3.55 | l/s (maximum permited flow) |
| = | 0.00355 | cu.m./s |
| & H= | 1 | mm (depth of water above top of weir) |
| then L= | 40.0 | m (length of weir) L = ( Q / ((Cd x (2/3) x (2x9.81)^(1/2) x H^(3/2)) |

# APPENDIX E

## DEVELOPMENT SERVICING STUDY CHECKLIST

## GENERAL

Executive Summary: **N/A**

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

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

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

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

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

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

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

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

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

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

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

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

Reference to geotechnical studies: **Included**

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

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

## WATER SERVICING

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

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

Identification of system constraints: **Included**

Identification of boundary conditions: **Included**

Confirmation of adequate domestic supply: **Included**

Confirmation of adequate fire flow: **Included**

Check of high pressures: **Included**

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

Address reliability requirements: **N/A**

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

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

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

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

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

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

## SANITARY SERVICING

Summary of proposed design criteria: **Included**

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

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

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

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

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

Description of proposed sewer network: **Included**

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

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

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

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

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

## STORMWATER MANAGEMENT & STORM SERVICING

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

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

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

Water quantity control objective: **Included**

Water quality control objective: **Included**

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

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

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

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

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

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

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

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

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

Proposed minor and major systems: **Included**

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

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

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

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

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

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

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

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

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

## APPROVAL AND PERMIT REQUIREMENTS

Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act: **N/A**

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

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

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

## CONCLUSIONS

Clearly stated conclusions and recommendations: **Included**

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

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