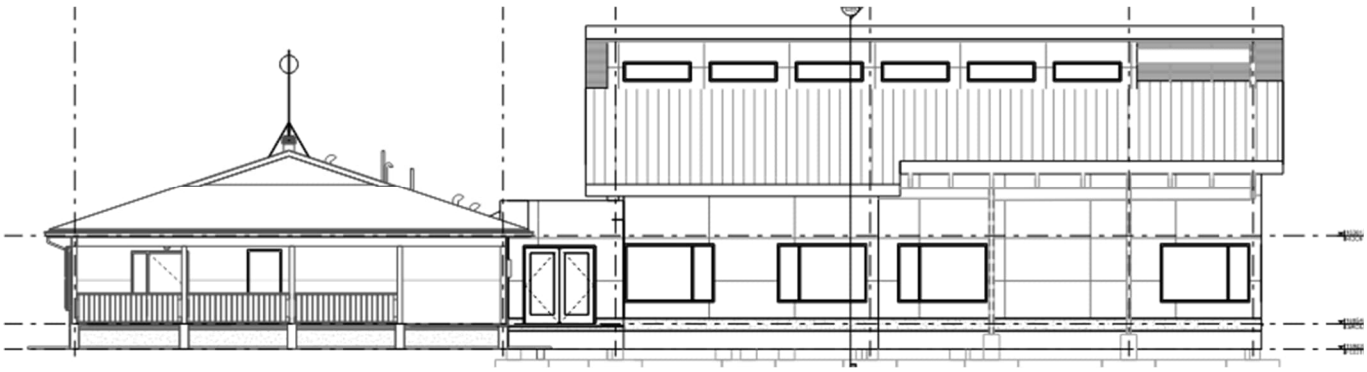
SERVICING & STORMWATER MANAGEMENT REPORT CORKERY COMMUNITY CENTRE – 3449 OLD ALMONTE ROAD



Project No.: CCO-21-3339

City File No.: D07-12-22-0048

Prepared for:

190 O'Connor Street, Suite 100
Ottawa, ON K2P 2R3

Prepared by:

McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Road
Carp, ON K0A 1L0

November 8, 2022

McINTOSH PERRY

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1.0 PROJECT DESCRIPTION

1.1 Purpose

McIntosh Perry (MP) has been retained by CSV Architects to prepare this Servicing and Stormwater Management Report in support of the Site Plan Control process for the proposed development located at 3449 Old Almonte Road within the Carp, ON.

The main purpose of this report is to present a servicing and stormwater management design for the development in accordance with the recommendations and guidelines provided by the City of Ottawa (City), the Mississippi Valley Conservation Authority (MVCA), and the Ministry of the Environment, Conservation and Parks (MECP). This report will address the water, sanitary and storm sewer servicing for the development, ensuring that existing and available services will adequately service the proposed development.

This report should be read in conjunction with the following drawings:

- CCO-21-3339, C101 – Grading, Drainage, Site Servicing & Sediment and Erosion Control Plan
- CCO-21-3339, PRE – Pre-Development Drainage Area Plan (*Appendix 'E'*)
- CCO-21-3339, POST – Post Development Drainage Area Plan (*Appendix 'F'*)

1.2 Site Description

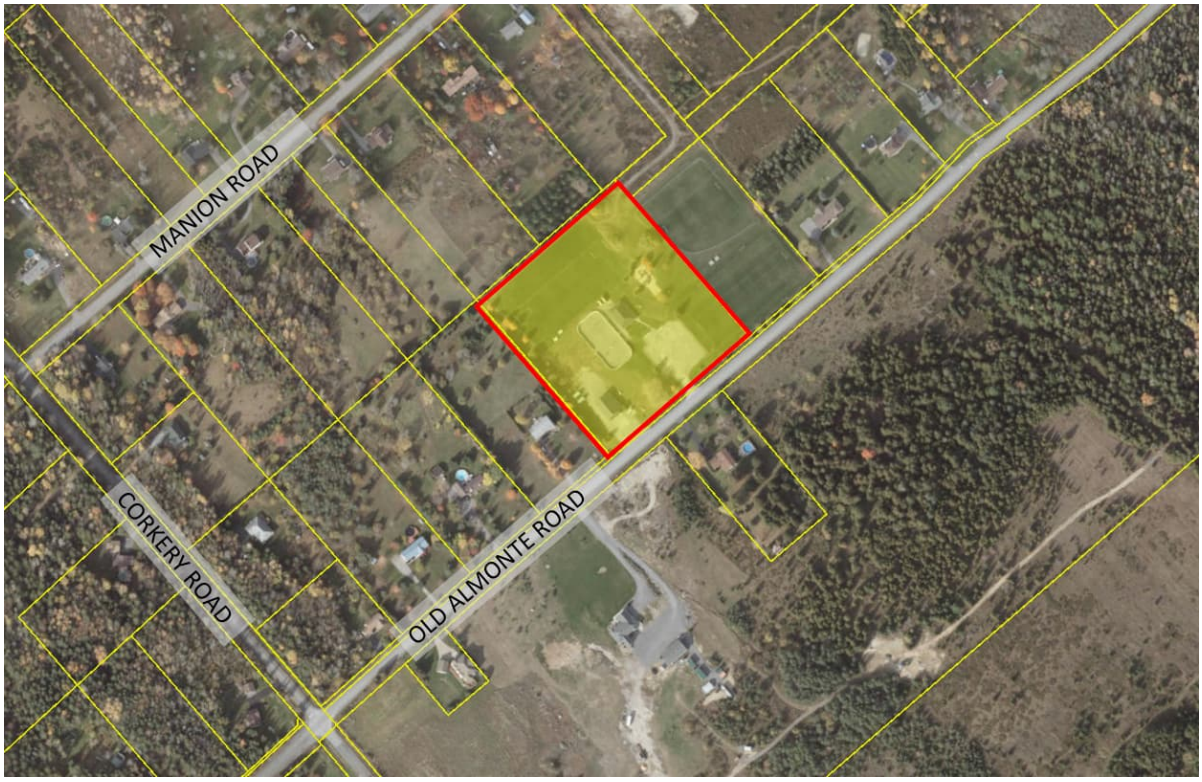


Figure 1: Site Map

The subject property, herein referred to as the site, is located at 3447 Old Almonte Road within the West Carleton – March Ward. The site covers approximately *2.60 ha* and is located along Old Almonte Road, east of Corkery Road. The site is zoned for Rural Institutional use (RI3). See Site Location Plan in *Appendix A* for more details.

1.3 Proposed Development and Statistics

The proposed development incorporates a building addition to the existing community centre building. The proposed building addition is *388 m^2* with access from Old Almonte Road and will contain approximately *38 seats* within the common area. The total area of the proposed building, including the existing building, is 507.6 m^2. Street access and parking from Old Almonte Road will remain. The development is proposed within *0.191 ha* of the site. The remaining *2.60 ha* of land will remain undisturbed. Refer to *Site Plan* prepared by CSV Architects and included in *Appendix B* for further details.

1.4 Existing Conditions and Infrastructures

There is an existing *120 m^2* community centre, sports rink, soccer field(s), and parking lot are proposed to be retained as part of the development. In addition, City of Ottawa Fire Station 84 is located within the south west corner of the site. The existing buildings are serviced via wells, septic systems, and stormwater swale systems.

1.5 Approvals

The proposed development is subject to the City of Ottawa site plan control approval process. Site plan control requires the City to review, provided concurrence and approve the engineering design package. Permits to construct can be requested once the City has issued a site plan agreement.

An Environmental Compliance Approval (*ECA*) through the Ministry of Environment, Conservation and Parks (*MECP*) is anticipated to be required for the development since the site is serviced by a septic system with design flows greater than 10,000 L/day.

In accordance with the pre-consultation notes included in *Appendix B*, the property is not regulated by the Mississippi Valley Conservation Authority under Ontario Regulation 153/06. Therefore, a permit with the MVCA is not required.

2.0 BACKROUND STUDIES, STANDARDS, AND REFERENCES

2.1 Background Reports / Reference Information

A survey (A-4074) of the site was provided by the City of Ottawa and is dated September 2022. The survey has been included in *Appendix B*.

The Site Plan (A100) was prepared by CSV Architects and dated October 19, 2022 (*Site Plan*).

A geotechnical investigation was prepared by EXP Services Inc (OTT-21010977-A0) and dated July 20th, 2021 (*Geotech Report*).

A hydrogeological investigation was prepared by McIntosh Perry Consulting Engineers Ltd (CCO-21-3339-01) and dated August 2nd, 2022 (*Hydrogeological Assessment and Terrain Analysis*).

2.2 Applicable Guidelines and Standards

City of Ottawa:

- Ottawa Sewer Design Guidelines, City of Ottawa, SDG002, October 2012. (*Ottawa Sewer Guidelines*)
  - Technical Bulletin ISTB-2014-01 City of Ottawa, February 2014. *(ISTB-2014-01)*
  - Technical Bulletin PIEDTB-2016-01 City of Ottawa, September 2016. *(PIEDTB-2016-01)*
  - Technical Bulletin ISTB-2018-01 City of Ottawa, January 2018. *(ISTB-2018-01)*
  - Technical Bulletin ISTB-2018-03 City of Ottawa, March 2018. *(ISTB-2018-03)*
  - Technical Bulletin ISTB-2019-01 City of Ottawa, January 2019. *(ISTB-2019-01)*
  - Technical Bulletin ISTB-2019-02 City of Ottawa, February 2019. *(ISTB-2019-02)*
- Ottawa Design Guidelines – Water Distribution City of Ottawa, July 2010. (*Ottawa Water Guidelines*)
  - Technical Bulletin ISD-2010-2 City of Ottawa, December 15, 2010. *(ISD-2010-2)*
  - Technical Bulletin ISDTB-2014-02 City of Ottawa, May 2014. (ISDTB-2014-02)
  - Technical Bulletin ISTB-2018-03 City of Ottawa, March 2018. *(ISTB-2018-03)*

Ministry of Environment, Conservation and Parks:

- Stormwater Planning and Design Manual, Ministry of the Environment, March 2003. *(MECP Stormwater Design Manual)*
- Design Guidelines for Sewage Works, Ministry of the Environment, 2008. (*MECP Sewer Design Guidelines*)

Other:

- Low Impact Development Stormwater Management Planning and Design Guide, Credit Valley Conservation Authority and the Toronto and Region Conservation Authority, 2010.

3.0 PRE-CONSULTATION SUMMARY

A pre-consultation meeting between City staff and the MVCA was held on June 30th, 2021, to discuss the site servicing requirements for the development. Refer to pre-consultation notes in *Appendix B* for further details. Specific design parameters to be incorporated within this design include the following:

- Pre-development and post-development flows shall be estimated using a calculated time of concentration (Tc).
- Control 5 through 100-year post-development flows to the 5-year through 100-year pre-development flows.
- Incorporate low-impact development (LID) measures where possible, in accordance with the Carp River Watershed/Subwatershed Study.
- Quality control to a normal level of protection (70% TSS removal) are required for this site, as per MVCA requirements.

4.0 WATERMAIN

4.1 Existing Watermain

There are no municipal watermains in the vicinity of the site. The existing community centre is serviced by a well, located at the northeast corner of the building. Based on the *Hydrogeological Assessment and Terrain Analysis* the existing well yields a flow of *32 L/min* (0.53 L/s).

Local City of Ottawa Fire Station 84 is located at the southwest corner of the site. Based on coordination with fire services, a 10,000-gallon underground fire tank that is located along the east wall of the fire station building.

4.2 Proposed Watermain

The building addition is proposed to be serviced via the existing well since there are no municipal watermains available.

The water demands for the proposed building have been calculated to adhere to the *Ottawa Water Guidelines* and can be found in *Appendix C*. The results have been summarized below:

Table 1: Water Supply Design Criteria and Water Demands

Development Area	0.191
Community Centre – Dance Hall	15 L/m^2/day
Community Centre – Dance Hall Kitchen	125 L/seat/day
Maximum Daily Peaking Factor	1.5 x avg day
Maximum Hour Peaking Factor	1.8 x max day
Average Day Demand (L/s)	0.14
Maximum Daily Demand (L/s)	0.21
Peak Hourly Demand (L/s)	0.38
OBC Ontario Building Code Requirement (L/s)	30 (1,800 L/min)
FUS Fire Flow Requirement (L/s)	50 (3,000 L/min)

Based on the *Hydrogeological Assessment and Terrain Analysis* the 0.53 L/s provided by the existing well will provide sufficient supply for the proposed water demands. Refer to *Appendix C.*

The Ontario Building Code method was utilized to determine the required fire flow for the development. The building is classified as Group A-3. The total building volume for the OBC calculation was determined to be *2,882 m^3*, including the existing building. The results of the calculations yielded a required fire flow of *2,700 L/min* (45 L/s). The building is only a single storey

and is less than 600 m^2 in floor area, therefore, the minimum OBC water supply flow rate requirement is *1,800 L/min* (30 L/s). The detailed calculations can be found in *Appendix C*.

The Fire Underwriters Survey 2020 (FUS) method was utilized to determine the required fire flow for the site. The 'C' factor (type of construction) for the FUS calculation was determined to be *1.0* (ordinary construction type). The total floor area ('A' value) for the FUS calculation was determined to be *507.6 m^2*. The results of the calculations yielded a required fire flow of *3,000 L/min* existing building and proposed addition. The detailed calculations for the FUS can be found in *Appendix C*.

Two fire tanks complete with fire service connections (10,000-gallon and 5,000-gallon) are proposed to provide fire flow for the development Based on communication with City staff, the development does not meet the City of Ottawa Fire Services threshold needed to require fire tanks, therefore, the OBC requirement was used to size the proposed tanks. The tanks will provide *30.00 L/s* and be located 73.0 m from principal entrance in the landscaped area adjacent to the fire route per coordination with the City Fire Services department. Refer to *Appendix C* for correspondence.

5.0 SANITARY DESIGN

5.1 Existing Sanitary Sewer

There are no municipal sanitary sewers in the vicinity of the site. The existing community centre is serviced by a septic field, located south of the proposed building addition.

5.2 Proposed Sanitary Sewer

The community centre and addition are proposed to be serviced by the existing septic sewer system which was assessed by McIntosh Perry. The assessment memorandum, dated May 3rd, 2022, is included in *Appendix D*. Based on the assessment, the capacity of the existing sewage system is approximately 3,600 L/day which is equivalent to occupancy limits of the facility of 450 people in an assembly hall with no food service, 180 people in public parks with access to toilets only, or 100 people in an assembly hall with food service provided. The existing sewage system was determined to be sufficient to service the existing community centre and proposed addition.

6.0 STORM SEWER DESIGN

6.1 Existing Storm Sewers

There are no municipal storm sewers in the vicinity of the site. The existing community centre is serviced by a series of on-site ditches tributary to the roadside ditch along Old Almonte Road. The site lies within the Carp River Subwatershed area.

6.2 Sewers

The proposed building addition and existing building have peaked rooves. Stormwater runoff falling on the rooves will be collected by eavestroughs and conveyed to the surface, consistent with the existing stormwater strategy. Stormwater is ultimately tributary to the Carp River.

Stormwater running north of the building is proposed to be collected by a depressed surface storage area with a culvert and inlet control device. Water will be flow controlled and will discharge to the re-defined swale north of the existing building. Based on available mapping, drainage from the site flows overland towards the Old Almonte Road ditch system.

Stormwater running south of the building is also proposed to be collected by a depressed surface storage area with a culvert and inlet control device. Water will be flow controlled and will discharge to the re-defined swale along the west edge of the existing parking lot. Based on available mapping, drainage from the site flows overland along the fence line towards the Old Almonte Road ditch system.

See CCO-21-3339 - *POST* include in *Appendix F* of this report for more details. The Stormwater Management design for the subject property will be outlined in *Section 7.0* of this report.

7.0 PROPOSED STORMWATER MANAGEMENT

7.1 Design Criteria and Methodology

Stormwater management for the proposed site will be maintained through surface storage and flow attenuation. Stormwater runoff will continue to flow to existing outlets, tributary to the Carp River Subwatershed.

In summary, the following design criteria have been employed in developing the stormwater management design for the site as directed by the MVCA and City:

Quality Control

- Quality controls up to a normal level of protection (70% TSS removal) are required for the subject site, in accordance with the pre-consultation meeting with the MVCA.

Quantity Control

- Pre-development and post-development flows shall be estimated using a calculated time of concentration (Tc).
- Control 5 through 100-year post-development flows to the 5-year through 100-year pre-development flows.
- Incorporate low-impact development (LID) measures where possible, in accordance with the Carp River Watershed/Subwatershed Study.

7.2 Runoff Calculations

Runoff calculations presented in this report are derived using the Rational Method, given as:

$$Q = 2.78CIA \text{ (L/s)}$$

Where: C = Runoff coefficient
I = Rainfall intensity in mm/hr (City of Ottawa IDF curves)
A = Drainage area in hectares

It is recognized that the Rational Method tends to overestimate runoff rates. As a result, the conservative calculation of runoff ensures that any SWM facility sized using this method is expected to function as intended. The following coefficients were used to develop an average C for each area:

Roofs/Concrete/Asphalt	0.90
Undeveloped and Grass	0.20

As per the *City of Ottawa - Sewer Design Guidelines*, the 5-year balanced 'C' value must be increased by 25% for a 100-year storm event to a maximum of 1.0.

7.3 Pre-Development Drainage

Stormwater runoff is currently collected by an on-site ditch system. Based on available mapping, stormwater is collected and conveyed to the Old Almonte Road roadside ditch.

It has been assumed that the existing development contained no stormwater management controls for flow attenuation. The estimated pre-development peak flows for the 5 and 100-year events are summarized below in *Table 2*. See CCO-21-3339 - *PRE* in *Appendix E* and *Appendix G* for calculations.

Table 2: Pre-Development Runoff Summary

Drainage Area	Area (ha)	Q (L/s)	
		5-Year	100-Year
A1	0.115	10.69	21.55
A2	0.066	5.82	11.79
Total	0.180	16.51	33.34

7.4 Post-Development Drainage

Based on the criteria listed in *Section 7.2.1*, the development will be required to restrict flow to pre-development conditions. It is estimated that the target release rate during the 5-year and 100-year events will be *16.51 L/s* and *33.34 L/s*, respectively. See *Appendix G* for calculations.

The proposed site drainage limits are demonstrated on the Post-Development Drainage Area Plan. See CCO-21-3339 - *POST* in *Appendix F* of this report for more details. A summary of the post-development runoff calculations can be found below.

Table 3: Post-Development Runoff Summary

Drainage Area	Area (ha)	5-year Peak Flow (L/s)	100-year Peak Flow (L/s)	100-year Storage Required (m^3)	100-year Storage Available (m^3)
B1	0.073	7.06	10.13	13.5	13.5
B2	0.052	2.69	4.43	3.3	4.9
B3	0.024	3.86	7.51		
B4	0.032	5.96	11.98		
Total	0.180	19.56	34.04	16.8	18.4

Runoff for area B1 will be restricted by a 97 mm orifice installed within a corrugated steel pie to a maximum release rate of *10.13 L/s*. *13.5 m^3* of surface storage is proposed in this area.

Runoff for area B2 will be restricted by a 75 mm orifice installed within a corrugated steel pipe to a maximum release rate of *4.43 L/s*. *4.9 m^3* of surface storage is proposed in this area.

Runoff for area B3 and B4 will continue to flow to the existing outlets, north and south of the building. Areas without attenuation will be compensated in areas with flow attenuation.

As noted above, the target release rate during the 5-year and 100-year events will be *16.51 L/s* and *33.34 L/s*, respectively. Per *Table 3*, above, the proposed flow rate during the 5-year and 100-year storm events is *19.56 L/s* and *34.04 L/s*. A *3.05 L/s* increase is proposed during the 5-year storm event and a *0.70 L/s* increase is proposed for the 100- storm event.

7.5 Low Impact Development Measures & Quality Controls

Runoff within the development area will be collected on rooftops, landscaped areas, and small asphalt walkways and is considered clean, therefore runoff from the development area has already met the water quality treatment target.

In accordance with the *Carp River Watershed/Subwatershed Study*, Low Impact Development (LID) measures and infiltration are to be implemented. Due to the high seasonal groundwater level and bedrock elevations, infiltration is not feasible for the development.

It is proposed to include enhanced grass swales, with shallow slopes and velocities less then 0.5 m/s, to add LID measures on-site. Enhanced grass swales will need to be installed in accordance with the Low Impact Development Stormwater Management Planning and Design Guide prepared by the Credit Valley Conservation Authority and the Toronto and Region Conservation Authority. Relevant excerpts are included in *Appendix G*.

As discussed above, drainage from the development runs overland and will be controlled within the new depressed areas. The depressed areas will be planted by the landscape architect to provide a level of quality control. In addition, it is expected that the quality control requirements will be met by the treatment train of on-site and roadside ditches before ultimately discharging to the Carp River.

8.0 EROSION AND SEDIMENT CONTROL

8.1 Temporary Measures

Before construction begins, temporary silt fence, straw bale or rock flow check dams will be installed at all-natural runoff outlets from the property. It is crucial that these controls be maintained throughout construction and inspection of sediment and erosion control will be facilitated by the Contractor or Contract Administration staff throughout the construction period.

Silt fences will be installed where shown on the final engineering plans, specifically along the downstream property limits. The Contractor, at their discretion or at the instruction of the City, Conservation Authority or the Contract Administrator shall increase the quantity of sediment and erosion controls on-site to ensure that the site is operating as intended and no additional sediment finds its way off site. The rock flow, straw bale & silt fence check dams and barriers shall be inspected weekly and after rainfall events. Care shall be taken to properly remove sediment from the fences and check dams as required. Fibre roll barriers are to be installed at all existing curb inlet catch basins and filter fabric is to be placed under the grates of all existing catch basins and manholes along the frontage of the site and any new structures immediately upon installation. The measures for the existing/proposed structures is to be removed only after all areas have been paved. Care shall be taken at the removal stage to ensure that any silt that has accumulated is properly handled and disposed of. Removal of silt fences without prior removal of the sediments shall not be permitted.

The existing water well supply is to be protected during construction per the *Hydrogeological Assessment and Terrain Analysis*. Prior to construction, the Contractor is to clearly mark the well and surround it with a section of large diameter concrete pipe to prevent accidental collision by construction equipment.

The existing septic system is to be protected during construction. Prior to construction, the Contractor is to identify the existing septic tank and leaching bed locations and install perimeter fencing (or similar exclusionary measures) around the area.

Although not anticipated, work through winter months shall be closely monitored for erosion along sloped areas. Should erosion be noted, the Contractor shall be alerted and shall take all necessary steps to rectify the situation. Should the Contractor's efforts fail at remediating the eroded areas, the Contractor shall contact the City and/or Conservation Authority to review the site conditions and determine the appropriate course of action. As the ground begins to thaw, the Contractor shall place silt fencing at all required locations as soon as ground conditions warrant. Please see the *Site Grading, Drainage and* Sediment *& Erosion Control Plan* for additional details regarding the temporary measures to be installed and their appropriate OPSD references.

8.2 Permanent Measures

It is expected that the Contractor will promptly ensure that all disturbed areas receive topsoil and seed/sod and that grass be established as soon as possible. Any areas of excess fill shall be removed or levelled as soon as possible and must be located a sufficient distance from any watercourse to ensure that no sediment is washed out into the watercourse. As the vegetation growth within the site provides a key component to the control of sediment for the site, it must be properly maintained once established. Once the construction is complete, it will be up to the landowner to maintain the vegetation and ensure that the vegetation is not overgrown or impeded by foreign objects.

9.0 SUMMARY

- A *388* m^2 building addition to the existing community centre is proposed within 3449 Old Almonte Road.
- The building addition is proposed to be serviced via the existing well since there are no municipal watermains available. Based on the analysis in the Hydrogeological Assessment, the well has sufficient capacity to accommodate the additional demands from the building extension.
- Septic system details are included in Appendix D for reference. Based on analysis in the Sewage System Assessment Update, the existing septic system will have sufficient capacity for the additional sanitary flows generated by the building addition.
- The existing ditch outlets are proposed to be retained as part of the development, tributary to the roadside ditch along Old Almonte Road.
- Storage for the 5- through 100-year storm events will be provided through surface storage and flow restriction devices.

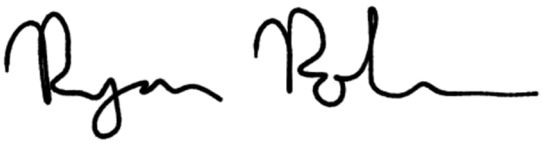
10.0 RECOMMENDATION

Based on the information presented in this report, we recommend that City of Ottawa approve this Servicing and Stormwater Management report in support of the proposed development at 3349 Old Almonte Road.

This report is respectfully being submitted for approval.

Regards,

McIntosh Perry Consulting Engineers Ltd.



Alison Gosling, P.Eng.
Project Engineer, Land Development
T: 613.714.4629
E: a.gosling@mcintoshperry.com

Ryan R. Robineau, E.I.T.
Civil Engineering Technologist, Land Development
T: 613.714.6611
E: r.robineau@mcintoshperry.com

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11.0 STATEMENT OF LIMITATIONS

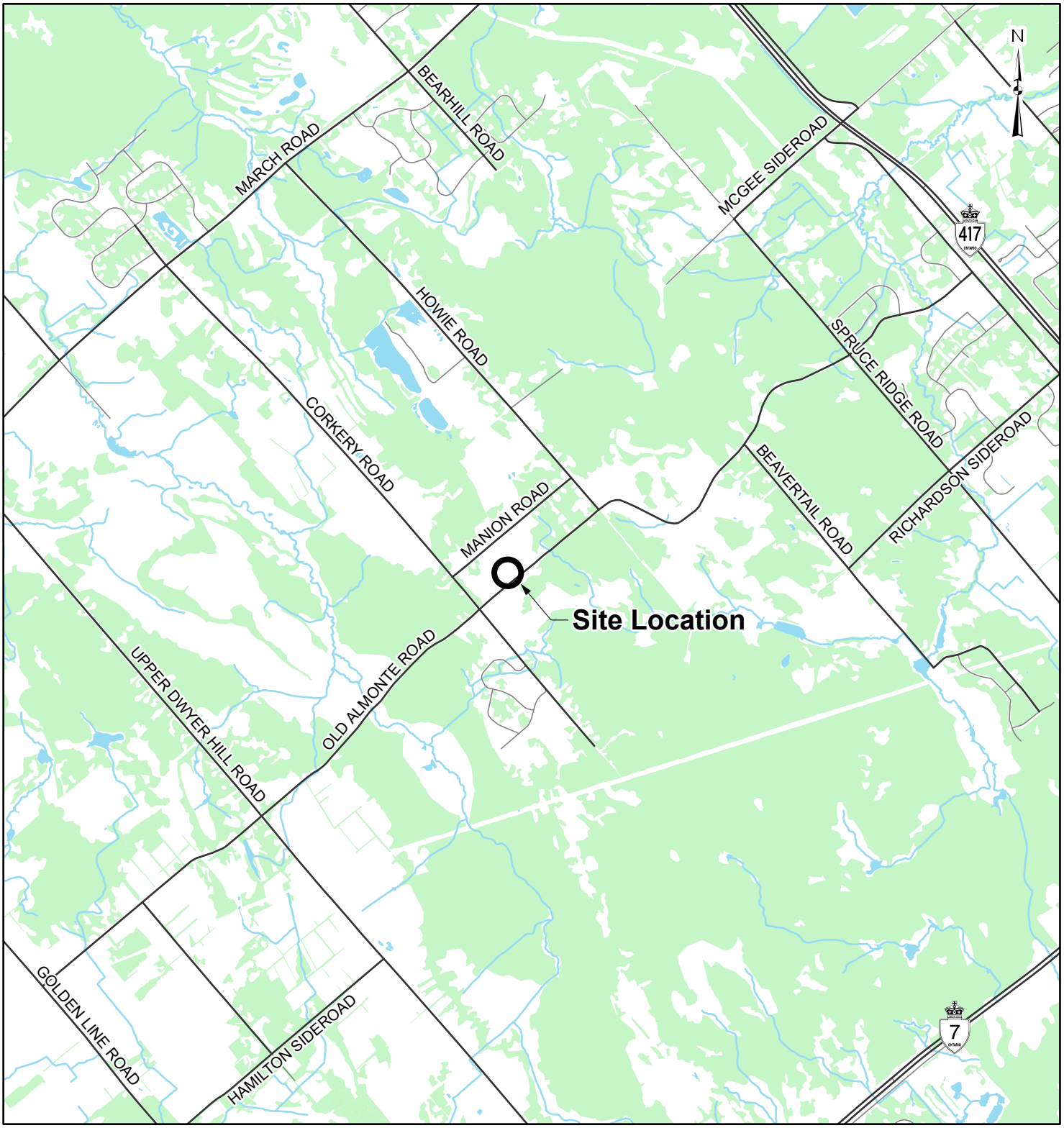
This report was produced for the exclusive use of CSV Architects. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry of the Environment, Parks and Climate Change, City of Ottawa and local approval agencies. McIntosh Perry reviewed the site information and background documents listed in Section 2.0 of this report. While the previous data was reviewed by McIntosh Perry and site visits were performed, no field verification/measures of any information were conducted.

Any use of this review by a third party, or any reliance on decisions made based on it, without a reliance report is the responsibility of such third parties. McIntosh Perry accepts no responsibility for damages, if any, suffered by any third party as a result of decisions or actions made based on this review.

The findings, conclusions and/or recommendations of this report are only valid as of the date of this report. No assurance is made regarding any changes in conditions subsequent to this date. If additional information is discovered or becomes available at a future date, McIntosh Perry should be requested to re-evaluate the conclusions presented in this report, and provide amendments, if required.

APPENDIX A
KEY PLAN

McINTOSH PERRY



LEGEND

- Site Location
- Local Road
- Major Road
- Watercourse
- Waterbody
- Wooded Area

1 0.5 0 1

Scale 1:50,000 Metres

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2021.

CLIENT:

PROJECT:
CORKERY COMMUNITY CENTRE

TITLE:
KEY MAP

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

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APPENDIX B
BACKGROUND DOCUMENTS

McINTOSH PERRY

Pre-Application Consultation Meeting Notes

Property Address: 3447, 3449 Old Almonte Road
PC2021-0186

Attendees:

Sarah McCormick, Planner, City of Ottawa
Christine Reist, Project Manager, City of Ottawa
Sami Rehman, Environmental Planner, City of Ottawa
Mike Giampa, Transportation Engineer, City of Ottawa
Erica Ogden, Environmental Planner, Mississippi Valley Conservation Authority

Subject: 3447, 3449 Old Almonte Road

Meeting notes:

Development Proposal

- 500 sq metre addition to existing 290 sq metre (approximately) community centre.

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

Planning

- Property is designated General Rural on Shcedule A of the Official Plan.
- The property is zoned Rural Institutional Zone, subzone 3 (RI3).
- All uses, existing and proposed, are permitted under current zoning.
- Old Almonte Road is considered a collector road as per Schedule G of the Official Plan. The protected ROW width is 26m (13m from the dentreline of the road). The site plan must demonstrate whether a road widening is required.
- Please ensure the zoning chart includes a parking breakdown per use; park, emergency services, and community, and required and provided parking.
- Please refenrence the City Guides to preparing plans and studies to ensure all required information is provided in the plans/reports. These can be accessed here.
- The site plan must incorporate the entirety of the site. Given the scale of the site, you can consider an overall site plan as well as a more detailed site plan showing the proposed area of development.
- The following plans and studies will be required from a planning perspective:
    - Survey
    - Site Plan
    - Landscape Plan – including tree conservation plan, if any trees will be impacts and removed.
    - Elevations
    - Planning Brief – discussion how the proposal meets the requirements of the Official Plan and Zoning By-law.
- Based on the parking requirements for the new 500 sq metre community centre addition (rate of 4 spaces/100sq metres = 20 spaces), the proposed addition would trigger a Standard Site Plan application.

Engineering

Survey

- Survey monument (beyond the local benchmark) to be shown and annotated, and sufficient information provided to enable a layperson to locate it.

Water servicing

- There are no existing municipal watermains in the direct area. If it is proposed to service the proposed development with the existing well, it must be demonstrated that the existing well can adequately service the proposed development. Information on the existing and proposed water servicing is to be provided.
- Information held by the City notes that the groundwater supply in the vicinity of the subject site may be variable in quality.
- It is is the responsibility of the owner to ensure that adequate water supply for fire fighting is provided. The applicant must contact Allan Evans (Allan.Evans@ottawa.ca) with Ottawa Fire Services to determine the water supply requirements for fire fighting at the site.

Sanitary Sewers

- There are no existing municipal sanitary sewers in the direct area. A sewage disposal system (septic system) design will be required, including investigation of the greatest groundwater elevation and percolation test results. Alternatively, if it is proposed to service the proposed development with the existing septic system, it must be demonstrated that the existing septic system has sufficient capacity. Information on the existing and proposed sanitary servicing is to be provided.
- Note that there are suspected thin soils in the area. If confirmed that the overburden is less than 2m thick, enhanced discussion and mitigation of the thin soils is required in the Terrain Analysis.
- If the the site-wide sanitary daily design flow is greater than 10,000 L/d, the septic system(s) is regulated by the Ministry of the Environment, Conservation and Parks (MECP) and requires a direct submission Environmental Compliance Approval (ECA) application. Additionally, a Groundwater Impact Assessment will be required if the site-wide daily design flow is greater than 10,000 L/d. Note that the site-wide daily design flow refers to the total design flow produced on one lot or parcel of land.

Storm Sewers

- There are no municipal storm sewers in the ROW. If it is proposed to discharge storm water to the existing ditches in the ROW, the ditches will need to be shown to provide continuous flow to an outlet. Information on the existing and proposed storm servicing is to be provided.

Geotechnical

- Please note that it is anticipated that the surficial geology varies in the vicinity of the subject site and may include organic deposits.

Hydrogeological

- A Hydrogeological Report and Terrain Analysis is required for the private servicing (i.e. well and septic). Please note that the City now has Hydrogeological and Terrain Analysis Guidelines available, which can be provided.
- The Hydrogeological Report and Terrain Analysis shall discuss how the new demands will be accommodated with the existing well and septic system.

- Note that there are suspected thin soils in the area. If confirmed that the overburden is less than 2m thick, enhanced discussion and mitigation of the thin soils is required in the Hydrogeological Report and Terrain Analysis. Note that there is potential for karst topography in the area.
- Information held by the City notes that the groundwater supply in the vicinity of the subject site may be variable in quality. Mapping of the area indicates that there may be a bedrock water divide going through the site.

Storm Water Management

- Stormwater management quality criteria shall be set by Mississippi Valley Conservation Authority (MVCA) and is anticipated to be 80% TSS removal. Reporting of TSS removal shall be extensive and if peer reviewed and published papers are relied on for conclusions, the conclusions shall be patently clear and the report shall show overwhelming agreement.
- The stormwater management quantity criteria for the development is that the 100-year post-development stormwater runoff must be controlled to the 5-year pre-development runoff as per section 8.3.7.3 of the Ottawa Sewer Design Guidelines (SDG). As per SDG 8.3.7.3, the pre-development condition is to be determined using the smaller of a runoff coefficient of 0.5 (0.4 in combined areas) or the actual existing site runoff coefficient.
- The location is within the area covered by the Carp River Watershed/Subwatershed Study, project no. 00056, December 2004, prepared by Robinson Consultants Inc., Aquafor Beech Ltd., Lloyd Phillips and Associates, and Daniel Brunton Consulting Services. The report suggests (following sufficient/satisfactory treatment) methods promoting infiltration. The Stormwater Management Brief must address the requirements of the Carp River Watershed/Subwatershed Study.
- All stormwater management determinations shall have supporting rationale.

Roads

- Schedule G of the current Official Plan, shows that in the location under review, Old Almonte Road is designated as (rural) collector. As per Annex 1 of the Official Plan, a ROW of 26 m is required for Old Almonte Road at this location. It will need to be confirmed that the required ROW width has been provided.
- Fire routes are to be designated by By-law for Fire Services to establish them as a legal fire route. If not already established, an ‘Application for a Fire Route Designation’ form will need to be completed and submitted to the City to add the fire route to the By-law. The form must be filled out by the applicant/agent of the property as well as the property owner. This form will be provided after the application is received, or can be provided in advance upon request.

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 Lot Grading and Drainage Plan. Snow storage shall not interfere with approved grading and drainage patterns 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 nor be adjacent any well or septic areas.

Exterior Site Lighting

- Any exterior lighting proposed for the site is requires certification by a qualified professional engineer confirming the design complies with the following criteria:

- Lighting must be designed using only fixtures that meet the criteria for Full-Cut-Off (Sharp cut-off) Classification, as recognized by the Illuminating Engineering Society of North America (IESNA or IES).
- It must result in minimal light spillage onto adjacent properties. As a guide, 0.5 foot-candle is normally the maximum allowable spillage.
- The location of the fixtures, fixture types (make, model, and part number), and the mounting heights must be provided.

Accessibility

- Please refer to the City of Ottawa Accessibility Design Standards, Second Edition, dated November 2015. In addition to all other applicable accessibility regulations and standards, the Accessibility Design Standards apply to both new construction and rehabilitation projects involving City owned and operated spaces and facilities. Additional information is available on the City's accessibility design standards and features webpage.
- Please also refer to the Illustrated Technical Guide to the Accessibility Standard for the Design of Public Spaces, prepared by the Global Alliance on Accessible Technologies & Environments.
- The City of Ottawa's Built Environment accessibility checklists are attached to these notes as a separate document.
- A brief report outlining compliance with applicable accessibility requirements, prepared by an appropriately skilled professional is to be provided (herein referred to as a "brief Accessibility Compliance Report"). The purpose of the brief Accessibility Compliance Report is to discuss the accessibility upgrades to the existing building and the accessibility design components of the proposed addition. The report should reference the relevant design drawings.

Permits and Approvals

- Please provide the existing Site Plan approval, if available.
- Please contact the Mississippi Valley Conservation Authority (MVCA), amongst other federal and provincial departments/agencies, to identify all the necessary permits and approvals required to facilitate the development. Responsibility rests with the developer and their consultant for obtaining all external agency approvals. The address shall be in good standing with all approval agencies. Copies of confirmation of correspondence will be required by the City of Ottawa from all approval agencies that a form of assent is given.

Site Plan Control Engineering Plans:

- Site Servicing Plan
- Grade Control and Drainage Plan
- Erosion and Sediment Control Plan

Please note note that the plans must include the entire property, where applicable. For example, the Grade Control and Drainage Plan must include the whole property.

All identified required plans are to be submitted on standard A1 size sheets as per City of Ottawa Servicing and Grading Plan Requirements and shall note the survey monument used to establish datum on the plans with sufficient information to enable a layperson to locate the monument.

Site Plan Control engineering Reports:

- Site Servicing Brief
- Geotechnical Investigation Report
- Stormwater Management Report
- Hydrogeological Report and terrain Analysis
- Brief Accessibility Compliance Report (see 'Accessibility' comments above).

Please note

Guide to preparing City of Ottawa Studies and Plans:
http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans

To request City of Ottawa plan(s) or report information please contact the ISD Information Centre:
Information Centre

(613) 580-2424 ext. 44455

Transportation

- Please complete the attached TIA screening form, and send it to the file leads attention. The screening form will determine the need for a Transportation Study.

Environmental

- An Environmental Impact Assessment is not required.
- It is recommended that new trees are proposed adjacent to the parking lot (as per the image below).
- It is recommended that new trees are proposed between the northern soccer field and the existing/proposed community centre (as per the image below).

Conservation Authority

- The property is not regulated by Mississippi Valley Conservation Authority under Ontario Regulation 153/06. A prmit from the Conservation Authority will not be required.
- Stormwater quality requirements is a normal level of protection, 70% 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 Standard 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

APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Legend: **S** indicates that the study or plan is required with application submission.
M indicates that the study or plan may be required with application submission.

For information and guidance on preparing required studies and plans refer to:

http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans

S/A	Number of copies	ENGINEERING		S/A	Number of copies
S	15	1. Site Servicing Plan	2. Site Servicing Brief	S	3
S	15	3. Grade Control and Drainage Plan	4. Geotechnical Study	S	3
	2	5. Composite Utility Plan	6. Groundwater Impact Study (if > 10,000 L/d)	S	3
	3	7. Servicing Options Report	8. Wellhead Protection Study		3
	9	9. Community Transportation Study and / or Transportation Impact Study / Brief	10.Erosion and Sediment Control Plan	S	3
S	3	11.Storm water Management Report	12.Hydro geological and Terrain Analysis	S	3
	3	13.Hydraulic Water main Analysis	14.Noise / Vibration Study		3
	PDF only	15.Roadway Modification Functional Design	16.Confederation Line Proximity Study		3

S/A	Number of copies	PLANNING / DESIGN / SURVEY		S/A	Number of copies
	15	17.Draft Plan of Subdivision	18.Plan Showing Layout of Parking Garage		2
	15	19.Draft Plan of Condominium	20.Planning Rationale	S	3
S	15	21.Site Plan	22.Minimum Distance Separation (MDS)		3
	15	23. Site Plan – Ground Floor	24.Agrology and Soil Capability Study		3
	15	25.Concept Plan Showing Proposed Land Uses and Landscaping	26.Cultural Heritage Impact Statement		3
	3	27.Concept Plan Showing Ultimate Use of Land	28.Archaeological Resource Assessment Requirements: **S** (site plan) **A** (subdivision, condo)		3
S	15	29.Landscape Plan	30.Shadow Analysis		3
S	2	31.Survey Plan	32.Design Brief (includes the Design Review Panel Submission Requirements)		Available online
S	3	33.Architectural Building Elevation Drawings (dimensioned)	34. Urban Design Review Panel (must be approved prior to Site Plan approval)		
	3	35.Wind Analysis			

S/A	Number of copies	ENVIRONMENTAL		S/A	Number of copies
	3	36.Phase 1 Environmental Site Assessment	37.Impact Assessment of Adjacent Waste Disposal/Former Landfill Site		3
	3	38.Phase 2 Environmental Site Assessment (depends on the outcome of Phase 1)	39.Assessment of Landform Features		3
	3	40.Record of Site Condition	41.Mineral Resource Impact Assessment		3
	3	42.Tree Conservation Report	43.Environmental Impact Statement / Impact Assessment of Endangered Species		3
	3	44.Mine Hazard Study / Abandoned Pit or Quarry Study	45.Integrated Environmental Review (Draft, as part of Planning Rationale)		3

S/A	Number of copies	ADDITIONAL REQUIREMENTS		S/A	Number of copies
S	1	46. Applicant's Public Consultation Strategy (may be provided as part of the Planning Rationale)	47. CD/DVD/USB with PDFs of all required plans and studies		
S	5	48. Brief Accessibility Compliance Report	49.		

Meeting Date: N/A

Application Type: *Site Plan Control - Standard*

File Lead (Assigned Planner): Sarah McCormick

Infrastructure Approvals Project Manager: Christine Reist

Site Address (Municipal Address):

*Preliminary Assessment: 1☐ 2☐ 3☐ 4☐ 5

3447, 3449 Old Almonte Road

*One (1) indicates that considerable major revisions are required before a planning application is submitted, while five (5) suggests that proposal appears to meet the City's key land use policies and guidelines. **This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.**

It is important to note that the need for additional studies and plans may result during application review. If following the submission of your application, it is determined that material that is not identified in this checklist is required to achieve complete application status, in accordance with the Planning Act and Official Plan requirements, the **Planning, Infrastructure and Economic Development Department** ***will notify you of outstanding material required within the required 30 day period. Mandatory pre-application consultation will not shorten the City's standard processing timelines, or guarantee that an application will be approved. It is intended to help educate and inform the applicant about submission requirements as well as municipal processes, policies, and key issues in advance of submitting a formal development application. This list is valid for one year following the meeting date. If the application is not submitted within this timeframe the applicant must again pre-consult with the Planning, Infrastructure and Economic Development Department.***

Notes:

2. The City requires sufficient information (water, stormwater, sanitary) - required as per Official Plan section 4.4.2. for proposals. May be a brief at submission stage.

4. Geotechnical Study / Slope Stability Study – required as per Official Plan section 4.8.3. All site plan applications need to demonstrate the soils are suitable for development. A Slope Stability Study may be required with unique circumstances (Schedule K or topography may define slope stability concerns).

6. Groundwater Impact Assessment required as per Official Plan sections 4.4.2, 4.7.5 & 4.8.2. When reviewing development applications, the City will consider the potential impact on groundwater.

8. Wellhead Protection Plan required as per Official Plan sections 4.4.2, 4.4.2.4, 4.7.5 & 4.8.2. When reviewing development applications, the City will consider the potential impact on wellhead protection areas (municipal wells and wells with an MRA).

10. Erosion and Sediment Control Plan – required with all site plan applications as per Official Plan section 4.7.3.

11. Stormwater Management Report/Brief - required with all site plan applications as per Official Plan section 4.7.6.

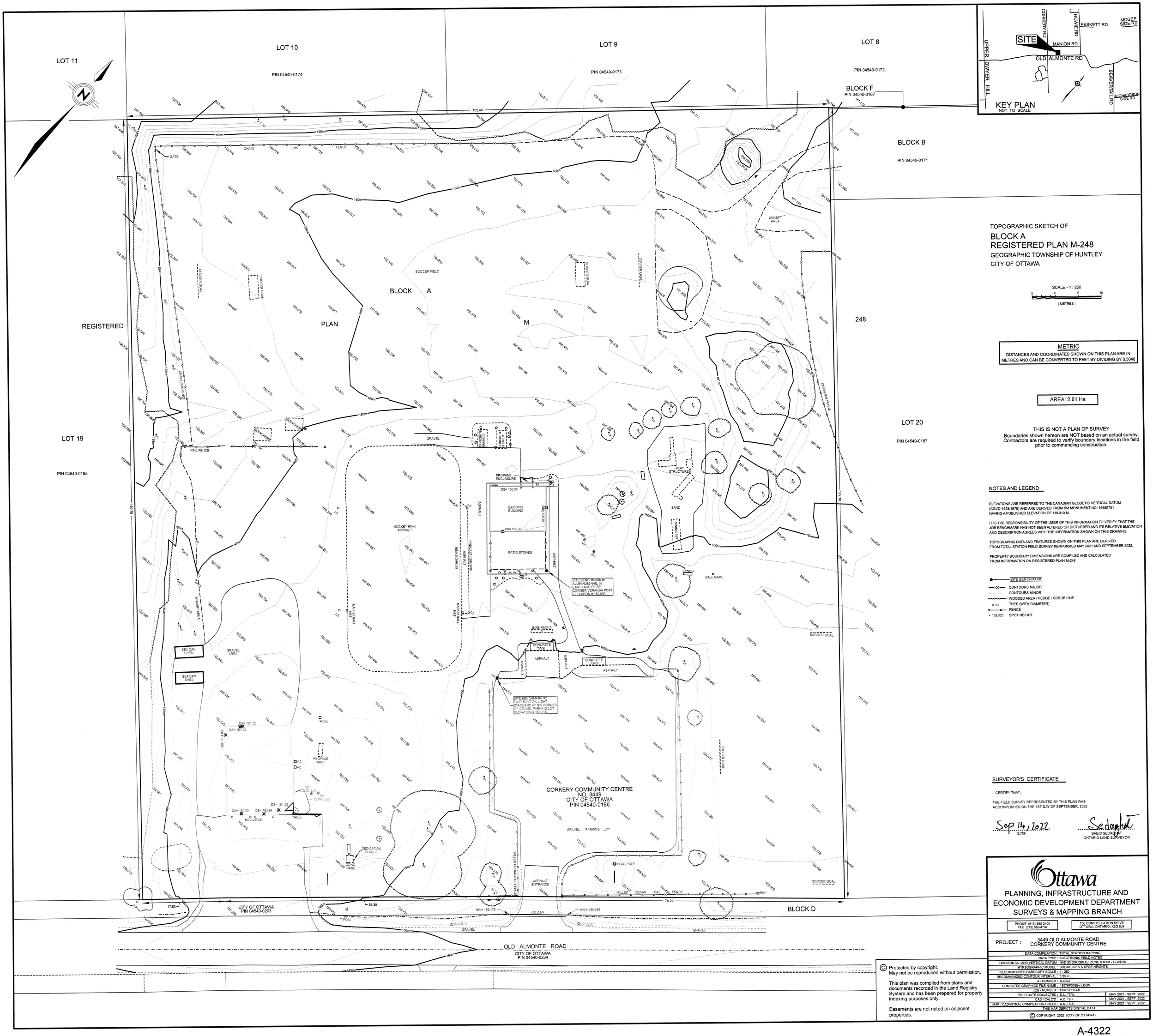
12. Hydrogeological and Terrain Analysis Study – required as per Official Plan 4.4.2.1, 4.4.2.4 & 4.7.5. Will be required for a proposed change in land use that would allow residential development or institutional uses (such as schools or seniors homes) on private water and wastewater servicing.

14. Noise and Vibration Study – a Noise Study will be required if noise sensitive development is proposed within 250 metres of an existing or proposed highway or a railway right-of-way, or 100 metres of an arterial or collector roadway or rapid-transit corridor. A Vibration Study will be required if the proposed development is within 75 metres of either an existing or proposed railway ROW. A Noise Study may also be required if the proposed development is adjacent to an existing or proposed stationary noise source.

35. An Impact Assessment of an Adjacent Waste Disposal/Former Landfill Site study is required for development proposals within 500 metres of a solid waste disposal site or other appropriate influence area or former landfill site. For contaminated sites a Record of Site Condition or letter of continued use is required.

39.A Mineral Resource Impact Assessment study is required, as per Official Plan section 3.7.4 adjacent to a licensed Limestone Resource or Sand and Gravel Resource Area (very limited uses considered within 500 metres of Limestone Resource Area or 300 metres of Sand and Gravel Resource Area). A study is required

- adjacent to, or within 300 metres of, a licensed pit
- adjacent to, or within 500 metres of, a licensed quarry



TOPOGRAPHIC SKETCH OF

BLOCK A
REGISTERED PLAN M-248

GEOGRAPHIC TOWNSHIP OF HUNTLEY
CITY OF OTTAWA

SCALE - 1 : 250
5 0 5 10
(METRES)

METRIC
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

AREA: 2.61 Ha

THIS IS NOT A PLAN OF SURVEY
Boundaries shown hereon are NOT based on an actual survey. Contractors are required to verify boundary locations in the field prior to commencing construction.

NOTES AND LEGEND

ELEVATIONS ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD-1928:1978) AND ARE DERIVED FROM BM MONUMENT NO. 19680751 HAVING A PUBLISHED ELEVATION OF 118.310 M.

IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE JOB BENCHMARK HAS NOT BEEN ALTERED OR DISTURBED AND ITS RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION SHOWN ON THIS DRAWING.

TOPOGRAPHIC DATA AND FEATURES SHOWN ON THIS PLAN ARE DERIVED FROM TOTAL STATION FIELD SURVEY PERFORMED MAY 2021 AND SEPTEMBER 2022.

PROPERTY BOUNDARY DIMENSIONS ARE COMPILED AND CALCULATED FROM INFORMATION ON REGISTERED PLAN M-248

- SITE BENCHMARK
- 160 CONTOURS MAJOR
- CONTOURS MINOR
- WOODED AREA / HEDGE / SCRUB LINE
- • 20 TREE (WITH DIAMETER)
- FENCE
- • 159.525 SPOT HEIGHT

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

THE FIELD SURVEY REPRESENTED BY THIS PLAN WAS ACCOMPLISHED ON THE 1ST DAY OF SEPTEMBER, 2022

Sep 14, 2022
DATE

Sedaghat
SAEID SEDAGHAT
ONTARIO LAND SURVEYOR

Ottawa
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT
SURVEYS & MAPPING BRANCH

PHONE (613) 580-2400
FAX (613) 580-4764

100 CONSTELLATION DRIVE
OTTAWA, ONTARIO, K2G 6J8

PROJECT : 3449 OLD ALMONTE ROAD
CORKERY COMMUNITY CENTRE

DATA COMPILATION : TOTAL STATION MAPPING	
DATA TYPE : ELECTRONIC FIELD NOTES	
HORIZONTAL AND VERTICAL DATUM : NAD 83 (ORIGINAL) ZONE 9 MTM - CGVD28	
HYPSOGRAPHIC MODEL : BREAKLINES & SPOT HEIGHTS	
RECOMMENDED HARDCOPY SCALE : 1 : 250	
RECOMMENDED CONTOUR INTERVAL : 0.25 m	
A - NUMBER : A-4322	
COMPUTER GRAPHICS FILE NAME : 13076P003B-m.DGN	
JOB - NUMBER : 13076 P003-B	
FIELD DATE COLLECTED : D.L. / T.W.	MAY 2021 / SEPT. 2022
CAD / CALC'D : A.Z. / S.F.	MAY 2021 / SEPT. 2022
MAP / CADASTRAL COMPILATION CHECK : A.K. / S.S.	MAY 2021 / SEPT. 2022
THIS MAP DEPICTS DIGITAL DATA	

A-4322

ZONING PROVISION	REQUIRED	PROVIDED
MIN. LOT WIDTH	75 m	228.93 m
MIN. LOT AREA	10000 m^2	37582 m^2
MIN. FRONT YARD SETBACK	9 m	9 m
MIN. CORNER YARD SETBACK	9 m	N/A
MIN. REAR YARD SETBACK	10 m	10 m
MIN. INTERIOR YARD SETBACK	9 m	9 m
MAX. HEIGHT	10 m	6.67 m
LOT COVERAGE	30% MAX. 11275 m^2	2.4% 917 m^2
LANDSCAPED AREA	20% MIN. 7516 m^2	97.6% 36665 m^2

PARKING QUEING + LOADING	REQUIRED	PROVIDED
REGULAR SPACES	17	42
ACCESSIBLE SPACES	0	2
TOTAL PARKING SPACES	17	44
BICYLCLE PARKING	1	12

LEGAL DESCRIPTION
CITY OF OTTAWA
PIN 04540-0186
PIN 04540-0187

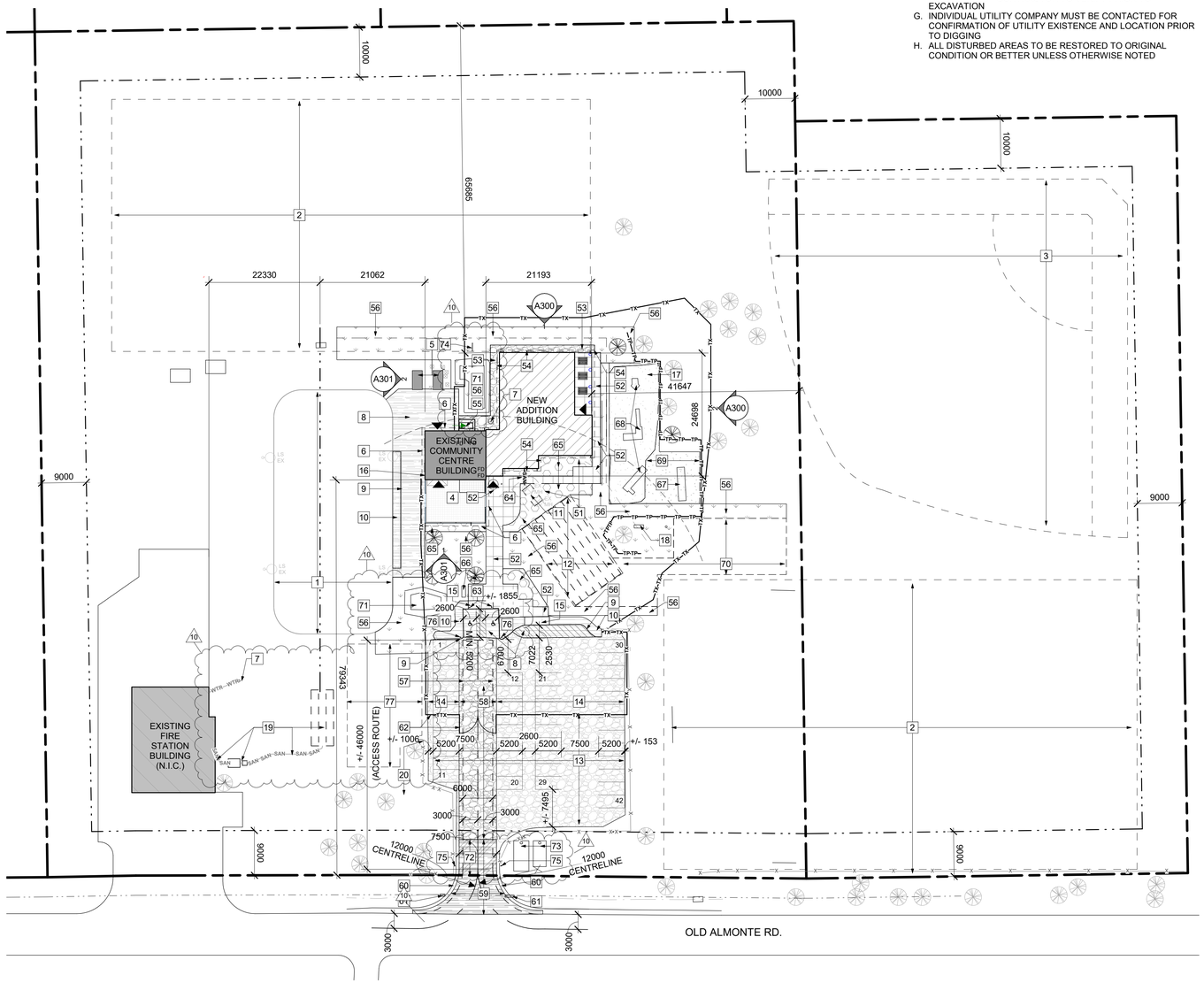
REFERENCE SURVEY
N/A

MUNICIPAL ADDRESS
3347 & 3349 OLD ALMONTE RD.
CARP, ON, CANADA

SITE AREA	37582m^2
BUILDING AREA	507.6 m^2
GROSS FLOOR AREA PER ZONING	400.2 m^2
BUILDING HEIGHT	6.67 m / 1 STOREY
ZONE	RI3

SITE PLAN GENERAL NOTES:

A. DO NOT SCALE THIS DRAWING
B. REPORT ANY DISCREPANCIES PRIOR TO COMMENCING WORK. NO RESPONSIBILITY IS BORN BY THE CONSULTANT FOR UNKNOWN SUBSURFACE CONDITIONS
C. CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE AND REPORT ANY ERRORS AND/OR OMISSIONS TO THE CONSULTANT
D. REINSTATE ALL AREAS AND ITEMS DAMAGED AS A RESULT OF CONSTRUCTION ACTIVITIES TO THE SATISFACTION OF THE CONSULTANT
E. CONTRACTOR TO LAYOUT PLANTING BEDS, PATHWAYS ETC. TO APPROVAL OF CONSULTANT PRIOR TO ANY JOB EXCAVATION
F. THE ACCURACY OF THE POSITION OF UTILITIES IS NOT GUARANTEED - CONTRACTOR TO VERIFY PRIOR TO EXCAVATION
G. INDIVIDUAL UTILITY COMPANY MUST BE CONTACTED FOR CONFIRMATION OF UTILITY EXISTENCE AND LOCATION PRIOR TO DIGGING
H. ALL DISTURBED AREAS TO BE RESTORED TO ORIGINAL CONDITION OR BETTER UNLESS OTHERWISE NOTED



1 OVERALL SITE PLAN - NEW
A100 | 1 : 500

NEW SITE PLAN LEGEND

- EXISTING BUILDING TO REMAIN
- DEMOLISH EXISTING BUILDING AND OBJECTS
- EXISTING BUILDING NOT IN CONTRACT
- NEW ADDITION BUILDING
- EXISTING ASPHALT TO REMAIN
- NEW ASPHALT
- EXISTING CONCRETE SIDEWALK TO REMAIN
- NEW CONCRETE SIDEWALK
- EXISTING CRUSHED STONE PARCKING TO REMAIN
- NEW GRANULAR PER LANDSCAPING
- EXISTING PLANTING TO REMAIN
- NEW PLANTING
- NEW GRASS
- EXISTING SAND PLAYGROUND TO REMAIN
- NEW SAND PLAYGROUND
- MUD SLAB PER CIVIL. (TEMPORARY CONSTRUCTION)
- PROPERTY LINE
- SETBACK LINE
- ROAD SETBACK
- OVERHEAD
- EXISTING FENCE TO REMAIN
- NEW FENCE
- TEMPORARY FENCE FOR PERIOD OF CONSTRUCTION
- TREE PROTECTION PER LANDSCAPING
- EXISTING WATER SUPPLY TO REMAIN
- NEW WATER SUPPLY
- EXISTING SANITARY TO REMAIN
- NEW SANITARY
- NEW STORM
- EXISTING ELECTRICAL SERVICE TO REMAIN (BELOW GRADE)
- NEW ELECTRICAL SERVICE (BELOW GRADE)
- BUILDING ENTRANCE / EXIT
- LIGHT STAND - EXISTING
- LIGHT STAND - NEW
- MANHOLE - EXISTING
- MANHOLE - NEW
- UTILITY POLE - EXISTING
- UTILITY POLE - NEW
- TREE - EXISTING
- TREE - NEW

SITE PLAN KEYNOTES:

1 EXISTING SKATING RING TO REMAIN
2 EXISTING SOCCER FIELD TO REMAIN
3 EXISTING BASEBALL DIAMOND TO REMAIN
4 EXISTING COVERED DECK TO REMAIN
5 EXISTING STORAGE UNIT TO REMAIN
6 EXISTING ROOF OVERHANG ABOVE TO REMAIN
7 EXISTING DRILLED WELL TO REMAIN. VERIFY LOCATION ON SITE.
8 EXISTING ASPHALT PAVING TO REMAIN
9 EXISTING CURB TO REMAIN
10 EXISTING ASPHALT SIDEWALK TO REMAIN
11 EXISTING SEPTIC TANK TO REMAIN
12 EXISTING SEPTIC DRAIN FIELD TO REMAIN. ELIMINATE AUTOMOBILE AND EQUIPMENT MOVEMENT OVER THIS AREA
13 PARKING SPACES RESERVED FOR SOCCER TEAMS DURING CONSTRUCTION
14 EXISTING GRAVEL PARKING TO REMAIN
15 EXISTING ACCESSIBLE CONCRETE CURB RAMP AND DEPRESSED CURB TO REMAIN
16 EXISTING HOSE BIB TO REMAIN. ENSURE RUNNING WATER FOR HOCKEY RING DURING CONSTRUCTION.
17 EXISTING PLAYGROUND TO REMAIN
18 EXISTING BENCH TO REMAIN
19 EXISTING SEPTIC FIELD AND SANITARY SERVICE. SHOWN LOCATIONS ARE APPROXIMATE. VERIFY LOCATIONS ON SITE.
20 PORTION OF EXISTING LUMBER FENCE TO REMAIN. COORDINATE EXTENT ON SITE.

51 REQUIRED STRUCTURE SETBACK
52 NEW CONCRETE PAVING PER LANDSCAPING
53 NEW GRANULAR PER LANDSCAPING
54 NEW ROOF OVERHANG ABOVE
55 NEW HEAT PUMP AND CONDENSING UNITS PER MECHANICAL ON CONCRETE PAD. SURROUND BY LINK FENCE WITH LOCKABLE ACCESS GATE.
56 NEW TOP SOIL AND GRASS AT AREA AFFECTED BY CONSTRUCTION AND PER LANDSCAPING
57 NEW ACCESS ROUTE FOR FIRE DEPARTMENT (SHOWN DASHED). CLEAR WIDTH 6000mm MIN., CENTERLINE RADIUS 12000mm MIN.
58 NEW HEAVY DUTY GRAVEL PAVEMENT STRUCTURE DESIGNED TO SUPPORT FIREFIGHTING EQUIPMENT AND PERMIT ACCESSIBILITY UNDER ALL CLIMATIC CONDITIONS PER CIVIL
59 NEW ASPHALT HEAVY DUTY PAVEMENT STRUCTURE DESIGNED TO SUPPORT FIRE FIGHTING EQUIPMENT PER CIVIL .
60 EXTEND DRIVEWAY PER CIVIL AS REQUIRED. VERIFY EXTENT OF EXISTING DRIVEWAY ON SITE.
61 EXTEND CULVERT PER CIVIL AS REQUIRED. VERIFY EXTENT OF EXISTING CULVERT ON SITE.
62 TEMPORARY FENCING COMPLETED WITH ACCESS GATES FOR PERIOD OF CONSTRUCTION
63 NEW POST AND ACCESSIBLE PARKING SIGN.
64 NEW SANITARY SEWAGE PER CIVIL
65 NEW PLANTING PER LANDSCAPING
66 INSTALL SALVAGED BICYCLE RACKS. ADJUST AS REQUIRED.
67 INSTALL SALVAGED SWINGS PER LANDSCAPING
68 INSTALL SALVAGED PLAY STRUCTURES PER LANDSCAPING
69 NEW PLAY GROUND EXTENSION PER LANDSCAPING
70 AREA FOR FUTURE SEPTIC FIELD EXPANSION PER LANDSCAPING
71 POND PER CIVIL
72 TEMPORARY CONSTRUCTION. MUD MAT PER CIVIL ON TOP OF EXISTING ASPHALT SITE ENTRANCE.
73 NEW HOLDING TANKS FOR FIRE PROTECTION PER CIVIL C/W FIRE SERVICE CONNECTIONS AND ROUND ACCESS OPENINGS.
74 COVERED DRAINAGE PIPE PER CIVIL
75 NEW POST AND SIGN C/W WORDING: " 6 METER WIDE FIRE ROUTE WITHIN PARKING AISLE. NO PARKING ON FIRE ROUTE."
76 NEW POST AND SIGN C/W WORDING: " END OF FIRE ROUTE."
77 SNOW STORAGE AREA

CSV ARCHITECTS
sustainable design · conception écologique
613.564.8118 www.csv.ca
190 O'Connor Street, Suite 100 Ottawa, Ontario,K2P 2R3

STRUCTURAL ENGINEER
WSP
2611 Queensview Dr, Suite 300
Ottawa, Ontario, K2B 8K2 Canada
613-690-3752
wsp.com

MECHANICAL ENGINEER
Chorley + Bisset Consulting Engineers
403-250 City Centre Ave,
Ottawa ON K1R 6K7
613-241-0030
chorley.com

ELECTRICAL ENGINEER
Chorley + Bisset Consulting Engineers
403-250 City Centre Ave,
Ottawa ON K1R 6K7
613-241-0030
chorley.com

CIVIL ENGINEER
McIntosh Perry
115 Walgreen Road, RR3,
Carp, ON K0A 1L0
613-836-2184
mcintoshperry.com

LANDSCAPE ARCHITECT
GJA InC.
110 Didsbury Road Unit # 9
Ottawa Ontario, K2T 0C2
613-286-5130
Gino@GJALA.com

STAMP

REV	DATE	ISSUE
10	2022/10/19	ISSUED FOR SITE PLAN CONTROL REVIEW
6	2022/04/22	ISSUED FOR TENDER
3	2022/02/23	ISSUED FOR SITE PLAN CONTROL

NOTES
1. OWNERSHIP OF THE COPYRIGHT OF THE DESIGN AND THE WORKS EXECUTED FROM THE DESIGN REMAINS WITH CSV ARCHITECTS, AND MAY NOT BE REPRODUCED IN ANY FORM WITHOUT THE WRITTEN CONSENT OF CSV ARCHITECTS.
2. THE DRAWINGS, PRESENTATIONS AND SPECIFICATIONS AS INSTRUMENTS OF SERVICE ARE AND SHALL REMAIN THE PROPERTY OF CSV ARCHITECTS. THEY ARE NOT TO BE USED BY THE CLIENT ON OTHER PROJECTS OR ON EXTENSIONS TO THIS PROJECT WITHOUT THE WRITTEN CONSENT OF CSV ARCHITECTS.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER PROJECT DRAWINGS AND SPECIFICATIONS.
4. DO NOT SCALE DRAWINGS. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY DIMENSIONS ON SITE.
5. ALL WORK SHALL BE IN ACCORDANCE WITH THE ONTARIO BUILDING CODE AND ALL SUPPLEMENTS AND APPLICABLE MUNICIPAL REGULATIONS.

CLIENT

CITY OF OTTAWA

OTTAWA
ONTARIO, CANADA

PROJECT

CORKERY COMMUNITY HALL EXPANSION

3447 OLD ALMONTE RD., CARP, ON K0A 1L0

TITLE

SITE PLAN

PROJECT NO: 2020-0640
DRAWN: JS
APPROVED: IK
SCALE: As indicated
DATE PRINTED: 10/19/2022 11:30:34 AM

REV 10
DRAWING NO. A100

APPENDIX C
WATERMAIN CALCULATIONS

McINTOSH PERRY

Calculations for the predictive nitrate attenuation are presented in Appendix F.

6.0 RECOMMENDATIONS

6.1 Water Supply

Well Yield

- Well yields in the order of 32 L/min appear to be sustainable based on the pumping test data and calculations performed.

Water Quality and Treatment

- No maximum acceptable concentration (MAC) was exceeded in TW1. All applicable health related standards at the present time.
- If water softening is desired, the use of potassium salts (i.e. KCl) is recommended.
- It is noted that the warning level for sodium (20 mg/L) was exceeded in all samples collected as part of this investigation. As such, it is recommended that the Client notify the local Medical Officer of Health of the sodium exceeding the health-related warning limit.
- It is expected that this facility's drinking water system is regulated under Ontario's Small Drinking Water Regulation 319/08 (O.Reg. 319/08) as a small municipal non-residential drinking water system serving a "public facility". Should the local Public Health inspector (PHI) have issued a directive with respect to treatment requirements that include the requirement to provide disinfection, the organic nitrogen operation guideline exceedance should be reviewed and discussed by both the PHI and the system's operator to ensure it does not interfere with chlorination should it be required or already used as part of the existing drinking water system on-site.

6.2 Wastewater Servicing

Private Sewage Systems

- The capacity of the existing sewage system servicing the community centre is approximately 3,600 L/day. This was determined to be sufficient for the proposed expansion of the community centre and would translate to equivalent occupancy limits of the facility of 450 people in an assembly hall with no food service, 180 people in public parks with access to toilets only, or 100 people in an assembly hall with food service provided.
- The existing on-site sewage system components appear to be constructed in conformance with applicable stipulations as per applicable Ontario Regulations and sufficiently sized to accommodate the expanded community centre.
- The result of the impact assessment related to the on-site sewage systems indicate that the proposed community centre expansion will not cause unacceptable off-site impacts.

Ryan Robineau

From: Alison Gosling
Sent: September 21, 2022 10:28 AM
To: Ryan Robineau
Subject: FW: Corkery Expansion:

Hey Ryan,

Can you save this email from the City on the tank sizing?

Thanks!

Alison Gosling, P.Eng.
Project Engineer, Land Development
T. 613.714.4629
a.gosling@mcintoshperry.com | www.mcintoshperry.com
McINTOSH PERRY
Turning Possibilities Into Reality

From: Kulyk, Derek <derek.kulyk@ottawa.ca>
Sent: September 21, 2022 8:25 AM
To: Alison Gosling <a.gosling@mcintoshperry.com>; Curtis Melanson <c.melanson@mcintoshperry.com>
Cc: Whittaker, Damien <Damien.Whittaker@ottawa.ca>
Subject: RE: Corkery Expansion:

Hello Alison,

Thank you for providing the information that we requested.
It appears that, in this case, the NFPA 1142 direction suggested by the FUS would have been acceptable with a minor adjustment. While reviewing the submitted calculations, by the Senior Engineer, it was noticed that the OHC classification should be changed to a 4 (Exhibition hall, Auditorium).

That being said, it appears that the concept of firefighting protection and the requirement of FUS approach for all rural site plan applications caused a somewhat exaggerated focus on the need for tanks, over time, and loss of the bigger picture that was already addressed, to some degree, in the Servicing & Stormwater Management report; Corkery Community Centre – 3449 & 34478 Old Almonte Road (prepared by McIntosh Perry Consulting Engineers, dated; March 15, 20220). The report stated that the overall building area (existing and new) is 507.6 sqm and therefore it does not require the fire tanks, as it did not meet the required threshold.

Our understanding is, at this time, that since the overall building area (existing and proposed) does not meet the City of Ottawa Fire services threshold needed to apply fire tanks, we will not be requiring the water storage tanks, however there might be OBC or other specific firefighting requirements outside Development Review that might have to be complied with, including those of Ottawa Fire Services.

Sincerely,
Derek Kulyk.

McINTOSH PERRY

CCO-21-3339 - 3447 Old Almonte Road - Water Demands

Project:	3447 Old Almonte Road
Project No.:	CCO-21-3339
Designed By:	AJG
Checked By:	AJG
Date:	July 28, 2022
Site Area:	3.76 gross ha

Community Centre/Dance Hall	508 m2	*Includes existing and proposed building addition
Community Centre/Dance Hall Kitchen	38 seats	

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Community Centre/Dance Hall	15	L/m2/day
Community Centre/Dance Hall Kitchen	125	L/(Seat/d)
AVERAGE DAILY DEMAND	8.59	L/min
	0.14	L/s

MAXIMUM DAILY DEMAND

DEMAND TYPE	AMOUNT		UNITS
Residential	9.5	x avg. day	L/c/d
Industrial	1.5	x avg. day	L/gross ha/d
Commercial	1.5	x avg. day	L/gross ha/d
Institutional	1.5	x avg. day	L/gross ha/d
MAXIMUM DAILY DEMAND	12.88	L/min	
	0.21	L/s	

MAXIMUM HOUR DEMAND

DEMAND TYPE	AMOUNT		UNITS
Residential	14.3	x avg. day	L/c/d
Industrial	1.8	x max. day	L/gross ha/d
Commercial	1.8	x max. day	L/gross ha/d
Institutional	1.8	x max. day	L/gross ha/d
MAXIMUM HOUR DEMAND	23.18	L/min	
	0.39	L/s	

WATER DEMAND DESIGN FLOWS PER UNIT COUNT
CITY OF OTTAWA - WATER DISTRIBUTION GUIDELINES, JULY 2010

AVERAGE DAILY DEMAND	0.14	L/s
MAXIMUM DAILY DEMAND	0.21	L/s
MAXIMUM HOUR DEMAND	0.39	L/s

McINTOSH PERRY

CCO-21-3339 - 3447 Old Almonte Road - OBC Fire Calculations

Project:	3447 Old Almonte Road
Project No.:	CCO-21-3339
Designed By:	AJG
Checked By:	AJG
Date:	July 28, 2022

Ontario 2006 Building Code Compendium (Div. B - Part 3)

Water Supply for Fire-Fighting - Community Centre Addition

Building is classified as Group : A-3 (from table 3.2.2.55)

Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance ratings. Roof assemblies, mezzanies, loadbearing walls, columns and arches do not have a fire-resistance rating.

From Div. B A-3.2.5.7. of the Ontario Building Code - 3. Building On-Site Water Supply:

(a) Q = K x V x Stot

where:

Q = minimum supply of water in litres

K = water supply coefficient from Table 1

V = total building volume in cubic metres

Stot = total of spatial coefficient values from the property line exposures on all sides as obtained from the formula:

Stot = 1.0 + [Sside1+Sside2+Sside3+...etc.]

K	32	(from Table 1 pg A-31) (Worst case occupancy {E / F2} 'K' value used)
V	2,882	(Total building volume in m³.)
Stot	1.0	(From figure 1 pg A-32)
Q =	92,214.14 L	

From Figure 1 (A-32)

Snorth	62.5	m	0.0
Seast	116.8	m	0.0
Ssouth	72.5	m	0.0
Swest	77.0	m	0.0

*approximate distances

From Table 2: Required Minimum Water Supply Flow Rate (L/s)

2700 L/min if Q < 108,000 L

713 gpm*

*NOTE: The building is under 600m2 and is a single storey building, therefore the minimum Water Supply Flow Rate is:

1800 L/min

This flow equates to a volume of 54,000 L or 14,265 gal required for 30min. Fire Station #84 is located on the site and has a fire tank of 10,000 gal. The trucks already have water within them which provide more available water. In addition, while the first tank is being pumped transportable water supply can be brought to the site.

McINTOSH PERRY

CCO-21-3339 - 3447 Old Almonte Road - Fire Underwriters Survey

Project:	3447 Old Almonte Road
Project No.:	CCO-21-3339
Designed By:	AJG
Checked By:	AJG
Date:	September 16, 2022

From the Fire Underwriters Survey (2020)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:
City of Ottawa Technical Bulletin ISTB-2018-02 Applied Where Applicable

A. BASE REQUIREMENT (Rounded to the nearest 1000 L/min)

F = 220 x C x √A Where:

F = Required fire flow in liters per minute
C = Coefficient related to the type of construction.
A = The total floor area in square meters (including all storey's, but excluding basements at least 50 percent below grade) in the building being considered.

Construction Type Ordinary Construction

C	1	**A**	**507.6**	**m^2**
	Total Floor Area (per the 2020 FUS Page 20 - Total Effective Area)		**507.6**	**m^2** **Unprotected Vertical Openings*

Calculated Fire Flow	**4,956.6 L/min**
	5,000.0 L/min

B. REDUCTION FOR OCCUPANCY TYPE (No Rounding)

From Page 24 of the Fire Underwriters Survey:

Combustible	0%

Fire Flow	**5,000.0 L/min**

C. REDUCTION FOR SPRINKLER TYPE (No Rounding)

Standard Water Supply Sprinklered	-40%

Reduction	**-2,000.0 L/min**

D. INCREASE FOR EXPOSURE (No Rounding)

	Separation Distance (m)	Cons.of Exposed Wall	Length Exposed Adjacent Wall (m)	Height (Stories)	Length-Height Factor	
Exposure 1	Over 30 m	Ordinary - Mass Timber (Unprotected)	20	1	20.0	0%
Exposure 2	Over 30 m	Ordinary - Mass Timber (Unprotected)	20	1	20.0	0%
Exposure 3	Over 30 m	Ordinary - Mass Timber (Unprotected)	20	1	20.0	0%
Exposure 4	Over 30 m	Ordinary - Mass Timber (Unprotected)	20	1	20.0	0%
					% Increase*	**0%**

Increase*	**0.0 L/min**

E. Total Fire Flow (Rounded to the Nearest 1000 L/min)

Fire Flow	**3,000.0 L/min**
Fire Flow Required**	**3,000.0 L/min**

*In accordance with Part II, Section 4, the Increase for separation distance is not to exceed 75%
**In accordance with Section 4 the Fire flow is not to exceed 45,000 L/min or be less than 2,000 L/min

McINTOSH PERRY

CCO-21-3339 - 3447 Old Almonte Road - Rural Fire Protection Tank Calculations

Project:	3447 Old Almonte Road
Project No.:	CCO-21-3339
Designed By:	RRR
Checked By:	RRR
Date:	September 27, 2022

1.0 BUILDING OCCUPANCY

From Table 3.1.2.1. Volume 1 of the National Building Code – Major Occupancy Classification:

Group A Division 3

2.0 BUILDINGS REQUIRING ON-SITE WATER SUPPLY

From Div. B A-3.2.5.7. Volume 2 of the National Building Code – 3."Buildings Requiring On-Site Water Supply"
(a) Q = K x V x Stot
where:
Q = minimum supply of water in litres
K = water supply coefficient from Table 1
V = total building volume in cubic metres
Stot = total of spatial coefficient values from the property line exposures on all sides as obtained from the formula:
Stot = 1.0 + [Sside1+Sside2+Sside3+...etc.]

K	32	(from Table 1 pg A-31)
V	2,882	(Total building volume in m³.)
Stot	1.0	(From figure 1 pg A-32)
Q =	92,224 L	
Q =	24,363 us gal	

Snorth	62.5	m	0.0
Seast	116.8	m	0.0
Ssouth	72.5	m	0.0
Swest	77	m	0.0

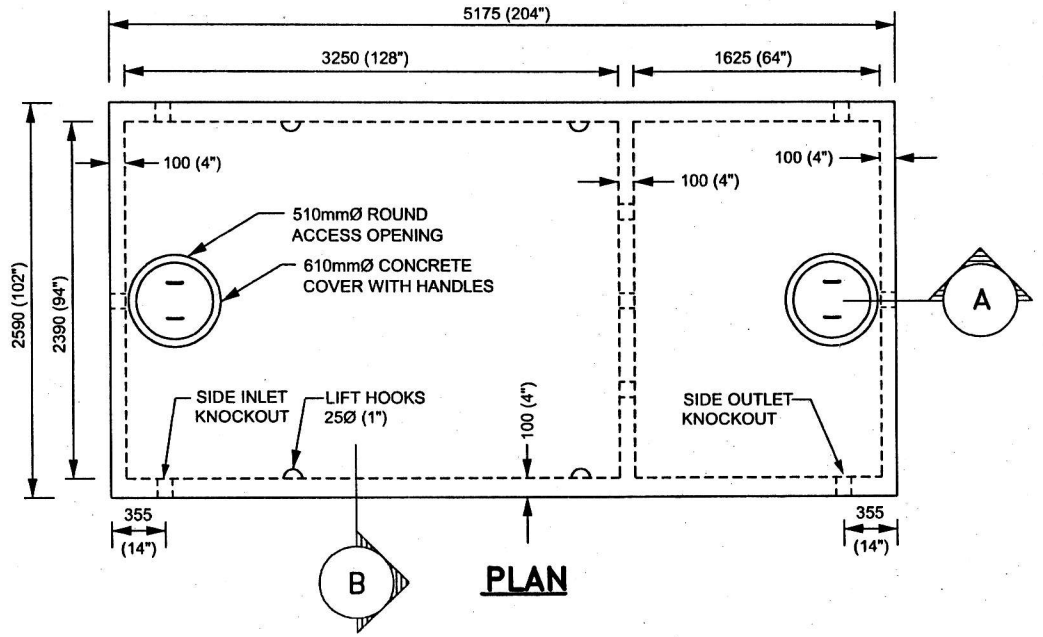
*approximate distances

3.0 MINIMUM REQUIRED WATER SUPPLY

From Div. B A-3.2.5.7., Table 2, Volume 2 of the National Building Code – Required Minimum Water Supply Flow Rate (L/min)

2,700 L/min (if Q ≤ 108,000 L)

*NOTE: The building is under 600m2 and is a single storey building, therefore the minimum Water Supply Flow Rate is:
1800 L/min
This flow equates to a volume of 54,000 L or 14,265 gal required for 30min.
Therefore, the number of proposed underground fire protection tanks will be 1 – 37,854 L (10,000 us gal) tank and 1- 18,927 L (5,000 us gal) tank.



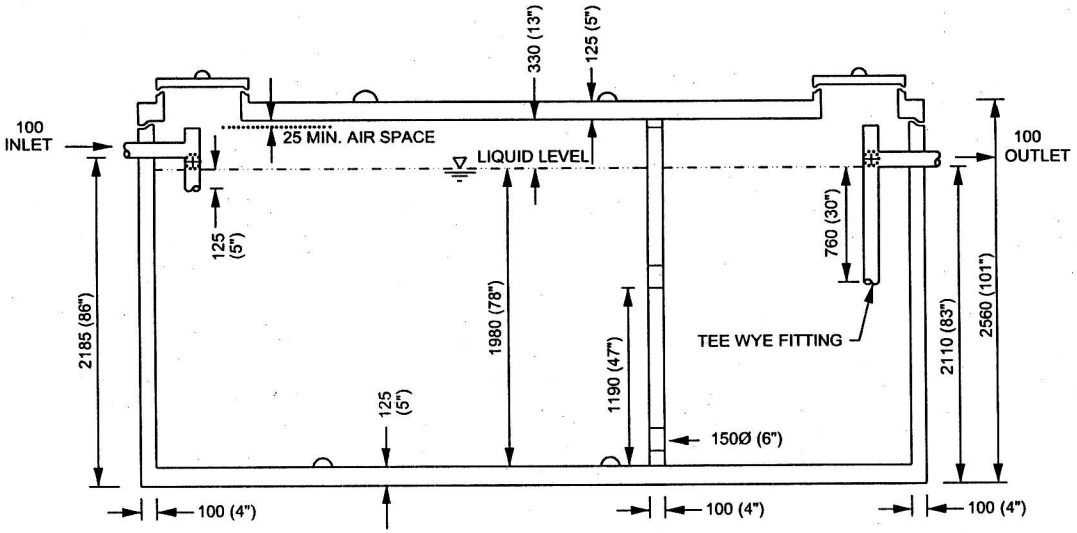
PLAN

SPECIFICATIONS:

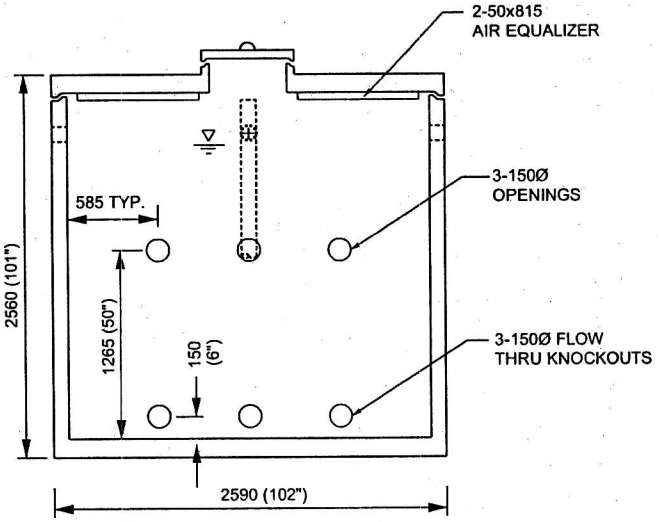
NOMINAL TANK SIZE	**23000 LITRES (5081 GAL) SEPTIC TANK OR HOLDING TANK OR WATER CISTERN**	
CAPACITY	23070 LITRES (5075 GAL.) TO OUTLET 26957 LITRES (5930 GAL.) TO UNDERSIDE OF LID 11651 LITRES (2563 GAL.) PER VERTICAL METRE	
WEIGHT	TOP SECTION	= 4550 Kg (10031 lbs.)
	TANK SECTION	= 15455 Kg (34072 lbs.)
	ASSEMBLED WEIGHT	= 20005 Kg (44103 lbs.)

NOTES:

1) CONCRETE TO BE 35 MPa WITH 5-8% AIR ENTRAINMENT
2) CONCRETE MIX IS NON-SULPHATE RESISTANT.
3) REINFORCEMENT (TO CONFORM TO CAN/CSA G30.18):
   TOP AND BOTTOM SLABS:
   15M @ 200mm O/C UPPER LAYER LONG SPAN
   15M @ 200mm O/C LOWER LAYER SHORT SPAN
   15M - 600x600 CORNER BARS @ 200mm O/C
   WALL REINFORCEMENT:
   15M @ 200mm O/C HORIZONTAL INSIDE FACE OF WALL
   15M @ 200mm O/C VERTICAL OUTSIDE FACE OF WALL
4) MINIMUM CONCRETE COVER OVER REINFORCEMENT IS 25mm (1")
5) CERTIFIED MAXIMUM BURIAL DEPTH = 1.0m (3.3')
6) EFFLUENT FILTER OR TEE WYE SYSTEM OPTIONAL.
7) CHAMBER DIVIDER IS MONOLITHIC TO TOP AND BOTTOM SECTIONS.
8) 100mm (4") PVC COUPLINGS WITH OUTSIDE RING ARE CAST-IN AT INLET AND OUTLET FOR WATER TIGHT CONNECTION.
9) STANDARD ACCESS OPENINGS ARE 510mm.
   OPTIONAL 600mm ACCESS OPENINGS AVAILABLE.



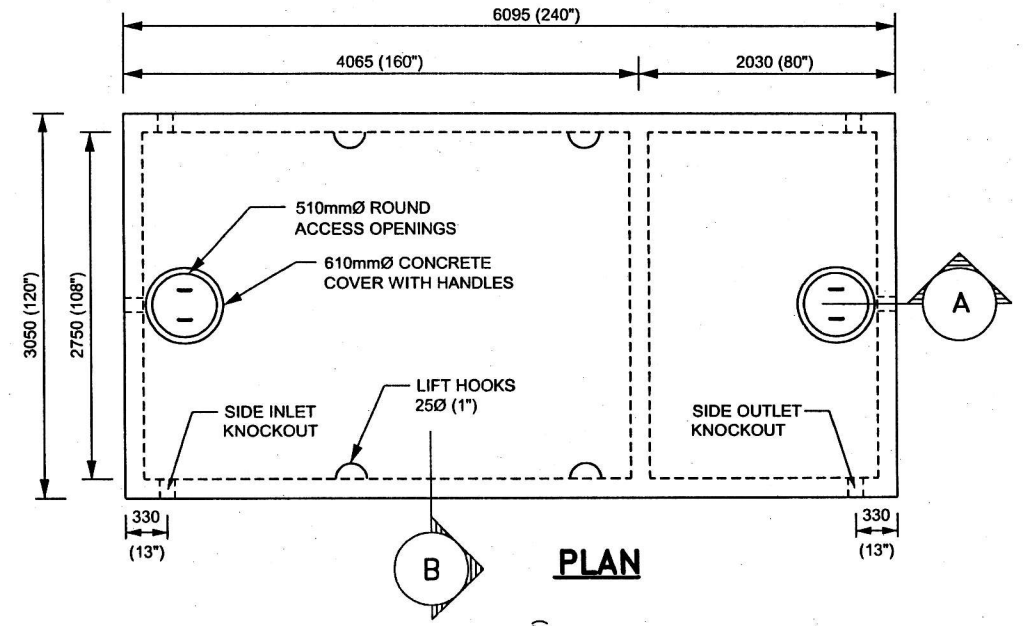
SECTION A



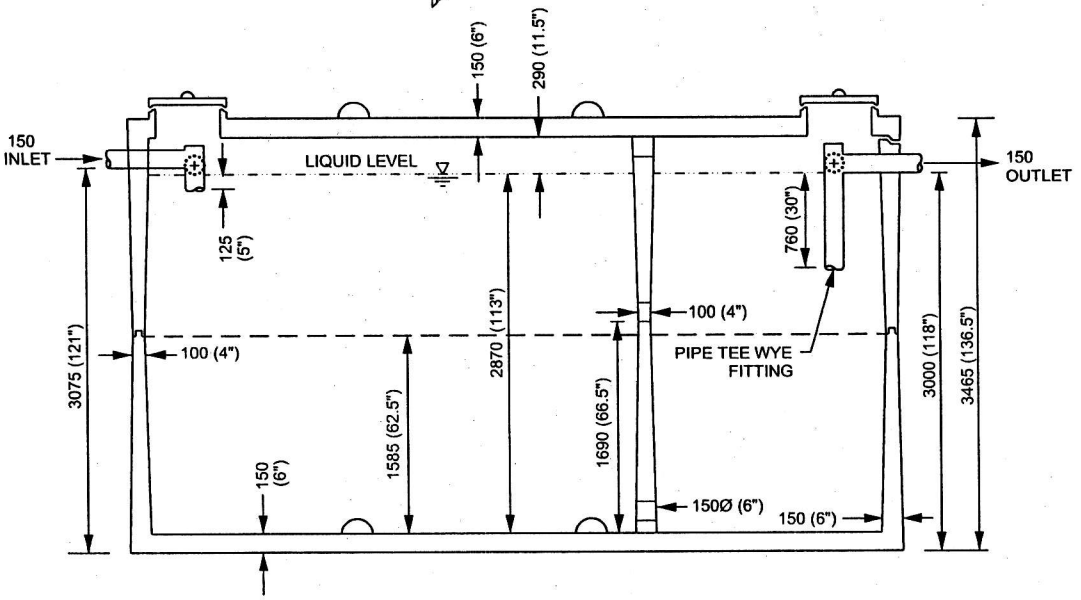
SECTION B

ALL DIMENSIONS IN mm UNLESS OTHERWISE STATED

Product No.:	MacGREGOR CONCRETE PRODUCTS LIMITED	Scale: Not to scale	Date: JUNE 2009
MAC-23000-1P	CONCRETE SEPTIC TANK 23,000 LITRE (5075 GAL.) WORKING CAPACITY		SERIES F-5



PLAN



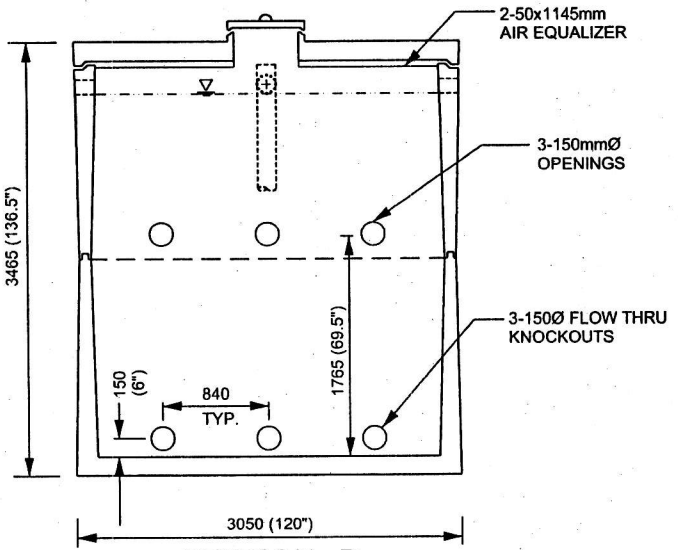
SECTION A

SPECIFICATIONS:

NOMINAL TANK SIZE	**41300 LITRES (9000 GAL) SEPTIC TANK OR HOLDING TANK OR WATER CISTERN**
CAPACITY	45765 LITRES (10067 GAL.) TO OUTLET 50499 LITRES (11097 GAL.) TO U/S OF LID 15946 LITRES (3508 GAL.) PER VERTICAL METRE
WEIGHT	TOP SECTION = 18180 kg (40079 lbs.) BOTTOM SECTION = 18180 Kg (40079 lbs.) ASSEMBLED WEIGHT = 36360 Kg (80158 lbs.)

NOTES:

1) CONCRETE TO BE 35 MPa WITH 5-8% AIR ENTRAINMENT
2) CONCRETE MIX IS NON-SULPHATE RESISTANT.
3) REINFORCEMENT (TO CONFORM TO CAN/CSA G30.18):
   TOP AND BOTTOM SLABS:
   15M @ 200mm O/C UPPER LAYER LONG SPAN
   15M @ 200mm O/C LOWER LAYER SHORT SPAN
   15M - 600x600 CORNER BARS @ 200mm O/C
   WALL REINFORCEMENT:
   15M @ 200mm O/C HORIZONTAL INSIDE FACE OF WALL
   15M @ 200mm O/C VERTICAL OUTSIDE FACE OF WALL
4) MINIMUM CONCRETE COVER OVER REINFORCEMENT IS 25mm (1")
5) CERTIFIED MAXIMUM BURIAL DEPTH = 1.0m (3.3')
6) OUTLET BAFFLE EXTENDS TO AT LEAST TOP OF THE CHAMBER.
7) CHAMBER DIVIDER IS MONOLITHIC TO TOP AND BOTTOM SECTIONS.
8) 150mm (6") PVC COUPLINGS WITH OUTSIDE RING ARE CAST-IN AT INLET AND OUTLET FOR WATER TIGHT CONNECTION.
9) EFFLUENT FILTER OR TEE WYE SYSTEM OPTIONAL.
9) PRODUCT IS ASSEMBLED ON SITE.
10) STANDARD ACCESS OPENINGS ARE 510mm. OPTIONAL 600mm OPENINGS AVAILABLE.



SECTION B

ALL DIMENSIONS IN mm UNLESS OTHERWISE STATED

Product No.:	MacGREGOR CONCRETE PRODUCTS LIMITED	Scale:	Date:
MAC-45500A-2P	CONCRETE SEPTIC TANK 45,700 LITRE (10,067 GAL.) WORKING CAPACITY	Not to scale	JUNE 2009
			SERIES G-3

APPENDIX D
SEPTIC DESIGN

McINTOSH PERRY

McINTOSH PERRY

January 09, 2020

City of Ottawa c/o Sergio Carraro
100 Constellation Dr. 5th Floor East
Ottawa, ON K2G 6J8
Ph: (613) 580-2424 ext 43746
Via email: Sergio.carraro@ottawa.ca

Attention: Sergio Carraro

Re: Engineering Services – Corkery Community Centre Sewage System Assessment (0CM-19-0590)
3447 Old Almonte Road, Carp, ON

The firm of McIntosh Perry Consulting Engineers Ltd. (McIntosh Perry) was retained to complete an on-site sewage system assessment at the above-noted property. The purpose of the inspection was to assess the physical condition of the existing sewage system and determine the size and location of the components. A capacity assessment of the existing system was also conducted to the determine the maximum capacity of the system in the event there are future expansions associated with the existing building.

Based on our field investigation, the existing building is serviced by a Class IV sewage system consisting of a two compartment 10,870 L (+/-) concrete septic tank and associated absorption trench leaching bed. Using hand operated equipment, our probe holes and test holes revealed a leaching bed comprised of approximately 8 runs each with a length of 19 m, for a total of 152 linear metres of distribution piping.

1.0 SITE ASSESSMENT

McIntosh Perry completed a site inspection of the above-noted property on November 29, 2019 to assess the existing on-site sewage system, along with a secondary visit on January 9, 2020 to confirm previous elevations collected on the initial site visit.

SEPTIC TANK

The observed existing concrete septic tank appeared to have a working capacity of approximately 10,870 L, based on internal and external measurements. The areas of the concrete tank that were visible (i.e. above the water level) generally appeared to be in good condition. The original concrete lids have been replaced with steel manholes risers and lids which have been extended to the ground surface. No root intrusion or ground water infiltration were evident within the visible areas of the septic tank. Rigid insulation boards have been placed within the riser openings. The interior concrete centre wall was in place and appeared to be functioning as per design; solids and floatables in the first compartment, and liquid effluent in the second compartment. The interior PVC inlet and outlet baffles were in place and appeared to be functioning.

The applicable minimum horizontal clearances from the septic tank are as follows (Ontario Building Code (OBC) Table 8.2.1.6.A.):

- 1.5 m from a structure;
- 15 m from a drilled well;
- 30 m from a dug well;
- 15 m from a Lake, and
- 3 m from a property line.

The minimum setbacks for the septic tank were met, however, it should ne noted that the septic tank was measured to be at the minimum separation distance of 15m.

LEACHING BED

The location of the leaching bed was located through probe holes and hand dug test pits, and the extent was estimated based on the local topography and the known location of the septic tank and other site features. Three test pits were dug within the leaching bed area and exposed the distribution pipe, stone surrounding the pipe, and native soil. No ponded water was observed around the distribution pipe in any of the test hole locations.

The leaching bed is comprised of 8 runs of approximately 19 m each in length, spaced at 1.6 m, centre to centre. The absorption trenches consisted of a stone layer averaging in 0.35 m in thickness, overlain by approximately 0.3 m to 0.6 m of cover material, based on the observations made at both test hole locations advanced in the leaching bed. The stone layer is underlain by sand material which was observed to a depth of 0.9 m below the stone layer. The absorption trenches appeared to meet the requirements of OBC 8.7.3.2.(1). The clear stone trenches were clearly defined and overlain with a non-woven geotextile. OBC Clause 8.7.3.3(5) states that the stone layer must be comprised of washed septic stone, free of fine material, with gradation conforming to OBC Table 8.7.3.3, be not less than 0.5 m in width, extend not less than 0.15 m below the distribution pipe, and extend not less than 0.05 m above the distribution pipe. Therefore, the stone around the distribution pipes located in test pits met the OBC requirements for the stone layer. OBC Clause 8.7.3.3(2) states that the stone layer must be protected to prevent soil from entering the stone by covering it with untreated building paper or a permeable geo-textile fabric. The stone layer was protected as per OBC requirements.

A percolation rate of approximately 8 min/cm was determined for the sand material below the clear stone layer using OBC's Supplementary Standard SB-6 for Percolation Time and Soil Descriptions. Please note that the soils information provided is for information purposes only and should not be relied upon by others for the purpose of design.

No anaerobic biomat or ponded effluent was observed within the clear stone layer or the sand in both test hole locations which presents itself as a black sludge coating the sand and the clear stone. TP1 was put down towards the header (nearest the building), on the south west side of the leaching bed. TP2 was put down towards the footer and north east side of the leaching bed. Typically, as the leaching bed starts aging, the anaerobic biomat will start forming towards the header and centre of the leaching bed, since this is where the effluent travels first.

No visible signs of failure were observed at the time of this inspection. Visible signs of sewage disposal system failure can include strong odours, spongy soil, excessive grass growth, effluent breakout, and excessive algae growth in downstream water bodies. Visual observation of the ground surface near the leaching bed did not uncover signs of strong odours, unusual vegetation growth, or effluent breakout. No spongy soil was observed on the surface of the leaching bed.

The applicable minimum horizontal clearances from the distribution piping are as follows (OBC Table 8.2.1.6.B.):

- 5 m from a structure;
- 15 m from a well with a watertight casing to a depth of at least 6 m;
- 30 m from any other well;
- 15 m from a Lake, and
- 3 m from a property line.

However, as per OBC 8.7.4.2.(11), the horizontal clearance distances from the distribution piping shall be increased by twice the height that the leaching bed is raised above the original grade. Based on our field observations, this system was most likely installed as a fully raised leaching bed, as such, an increased separation distance of up to 3 m could have been required. The applicable minimum horizontal clearances from the distribution piping are as follows:

- 8 m from a structure;
- 18 m from a well with a watertight casing to a depth of at least 6 m;
- 18 m from a Lake; and,
- 6 m from a property line.

The distribution piping meets all applicable minimum horizontal clearances.

2.0 CAPACITY ASSESSMENT

No existing documentation was available to us prior to our site visit, as such, the information gathered during the field investigation was relied upon to calculate the existing capacity of the existing system based on the Ontario Building Code (OBC) guidelines. Two file searches were submitted to the Ottawa Septic System Office (OSSO). The file search for 3449 Old Almonte Road provided sewage system information related to the Fire Station 84 but not for the community centre, as such, a secondary file search was submitted for 3447 Old Almonte Road but there were not results from the search.

The following information was reviewed as part of this capacity assessment:

- Findings from the Sewage System Assessment by McIntosh Perry;
- Email correspondence with Mr. Sergio Carraro outlining current building information (e.g. size and fixtures), and
- Google Earth imagery (aerial photography and street view).

2.1 Existing Conditions

As no permit was available for review, there was no record of the existing daily sewage system design flow used for design. Based on information provided to us, the building was originally serviced by a holding tank and a leaching bed was added around 2001. As indicated in the physical assessment of the sewage system, the property is currently serviced by a conventional Class IV septic system. The system consists of a 10,870 L +/- concrete tank and the associated leaching bed.

The existing building is approximately 1,200 ft² and has a kitchen with a double sink. The building also has a male and female washroom each with two water closet fixtures and a sink. It is our understanding that there are no washing machines or dishwashers located in the building. To determine the maximum capacity of the system, three components shall be looked at with regards to sizing. The total contact area, septic tank sizing, and total length of distribution piping. Using these restrictions, we can come up with a few different scenarios to justify a design flow. These theoretical design flows have been tabulated and attached as Table 1.

Using the current OBC guidelines for minimum contact area required for the current building use (OBC Clause 8.7.4.1), the expected contact area that has been provided is approximately 13m wide by 20m long, as such, a total area of 260m² is suspected to have been provided. As such, the associated maximum total daily design flow would be 1,560/day.

Using the current OBC guidelines for minimum septic tank size for the current building use (OBC Clause 8.2.2.3.(1)), the minimum required tank size is 3 times the design flow for commercial/institutional use, therefore, a 10,870L septic tank would permit a maximum total daily design flow of 3,600L/day.

Using the current OBC guidelines for calculating the required length of distribution pipe (OBC Clause 8.7.3.1.(2)), and using a native T-time between 35 min/cm to 50 min/cm, the total provided length of distribution pipe of 152m would provide up to 3,800L/day, as long as a minimum contact area of 634m² was provided.

2.2 Proposed Conditions

Part of this review includes establishing a flow associated with a new 1,600 ft² building and the associated increase in occupancy of 100 people. By using current OBC guidelines, the flow associated with this occupancy can vary depending on the intended use of the building and has been broken down below into three options.

1. Assembly Hall, No food Service (8L/day/person) = 100 people x 8L/day = 800L/day
2. Public Parks, With Toilets Only (20L/day/person) = 100 people x 20L/day = 2,000L/day
3. Assembly Hall, Food Service Provided (36L/day/person) = 100 people x 36L/day = 3,600L/day

Table 1 can also be referenced to determine the impacts of this proposed building on the sewage system as it outlines the maximum occupancy based on the intended use of these buildings.

3.0 CONCLUSIONS

In summary, the existing sewage appears to be hydraulically functioning and is not showing signs of significant impacts on the performance of the system at this time. The existing absorption trench leaching bed appears to have met the OBC installation requirements, but it is unknown what design daily flow was used for the original building. As a result, the sizing of the sewage system components has been assessed individually and the limiting design flow of 1,560L/day based on suspected contact area should be considered to be the minimum. Should an expanding contact area be provided, and the septic tank upgraded, the existing sewage system based on the existing length of distribution pipes could be expected to support up to 3,800L/day.

Following a review of the available information, as well as an assessment of the physical condition of the sewage system, the subsequent conclusions were determined:

- It appears the OSSO has no records of the original holding tank and later addition of the distribution pipes. The sewage system appears to be functioning hydraulically and distribution piping appears to have been installed to support up to 3,800L/day, however, it does not appear sufficient contact area as required by the OBC was provided to use this design flow as the actual capacity of the system;
- Based on observations at the time of inspection, the leaching bed did not show any signs of physical failure that would warrant immediate remediation measures be implemented.
- Upgrades to the system to comply with the requirements of the OBC should be considered regardless of a possible expansion of the facility, and
- The proposed addition of a secondary building may impact the capacity of the existing system and would likely trigger an OBC Part 8 review the regulator. It is likely that such a review result in the requirement to upgrade the existing sewage systems to be in compliance with the current OBC. Due to the variations of use for the existing building and proposed building, Table 1 has been attached as a guide in determining possible uses/occupancy of the space and associated daily design flows.

If you have any questions regarding the above, please do not hesitate to contact the undersigned.

Regards,

Brandon Aubin, Technologist
(613) 903-5827

Patrick Leblanc, P.Eng.
(613) 714-4586

CP-19-0590 City of Ottawa_3447 Corkery Road_Corkery Community Centre_Assessment Report_10.Jan.docx

TABLE 1

Table 1: Design Flow Variations				
		Occupancy Variations		
Design Flow Variations		Assembly Hall, No Food Service	Public Parks, With Toilets Only	Assembly Hall, Food Service Provided
(L/day)		**8**	**20**	**36**
1,560	If Contact Area Governs	195	78	43
3,600	If Septic Tank Governs	450	180	100
3,800	If Leaching Bed Governs	475	190	106

** Results within Table 1 is showing the maximum number of people the sewage system can service based on the governing design flow divided by the flow associated with the respective Occupancy Use

TBM: TOP OF EXISTING DRILLED WELL
ASSUMED ELEVATION = 100.00m

0	ISSUED FOR REVIEW	JAN/08/20
No.	Revision/Issue	Date

McINTOSH PERRY
115 Walgreen Road, RR 3
Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Stamp:

Stamp:

Client:
CITY OF OTTAWA
100 CONSTELLATION DRIVE

Project:
CORKERY COMMUNITY CENTRE
SEWAGE SYSTEM ASSESSMENT
3447 OLD ALMONTE ROAD

Drawing Title:
EXISTING SEWAGE
SYSTEM PLAN

Scale:	1:250
Drawn by:	BA
Checked By:	PL
Designed By:	
Date:	DEC/20/19

Project Number:
CM-19-0590

Drawing Number:
FIG.1

McINTOSH PERRY

MEMORANDUM

To:	Ottawa Septic System Office
From:	Patrick Leblanc, P.Eng., Senior Environmental Engineer
Date:	May 3, 2022
Re:	City of Ottawa - Corkery Community Centre Expansion - Sewage System Assessment Update 3447 Old Almonte Road, Carp, ON

The firm of McIntosh Perry Consulting Engineers Ltd. (McIntosh Perry) was originally retained by the City of Ottawa to complete an on-site sewage system assessment at the above-noted property in 2019. The purpose of the inspection was to assess the physical condition of the existing sewage system and determine the size and location of the components. A capacity assessment of the existing system was also conducted to the determine the maximum capacity of the system in the event there are future expansions associated with the existing building.

Based on our field investigation, the existing building is serviced by a Class IV sewage system consisting of a two compartment 10,870 L (+/-) concrete septic tank and associated absorption trench leaching bed. Using hand operated equipment, our probe holes and test holes revealed a leaching bed comprised of approximately 8 runs each with a length of 18.5 m, for a total of 148 linear metres of distribution piping.

It should be noted that the findings of the initial assessment regarding the existing underlying native soils in the vicinity of the Class 4 leaching bed have been updated based on a supplementary field investigation conducted by McIntosh Perry in 2021, along with the review of the Geotechnical Investigation (exp., July 2021) conducted to support of the proposed Corkery Community Centre expansion.

1.0 SITE ASSESSMENT

As part of the initial assessment, McIntosh Perry completed two site inspections of the above-noted property on November 29, 2019 and again on January 9, 2020 to assess the existing on-site sewage system. As part of the 2021 assessment update, McIntosh Perry completed an additional site visit on December 22, 2021 after identifying discrepancies between the findings of the initial native soils assessment (2019) and the newly available Geotechnical Investigation (exp., July 2021).

1.1 SEPTIC TANK

The observed existing concrete septic tank appeared to have a working capacity of approximately 10,870 L, based on internal and external measurements. The areas of the concrete tank that were visible (i.e. above the water level) generally appeared to be in good condition. The original concrete lids have been replaced with steel manholes risers and lids which have been extended to the ground surface. No root intrusion or ground water infiltration were evident within the visible areas of the septic tank. Rigid insulation boards have been placed within the riser openings. The interior concrete centre wall was in place and appeared to be functioning

as per design; solids and floatables in the first compartment, and liquid effluent in the second compartment. The interior PVC inlet and outlet baffles were in place and appeared to be functioning. It should noted that although the septic tank was installed with outlet baffle, it was not outfitted with an effluent filter as is currently required by the OBC.

The applicable minimum horizontal clearances from the septic tank are as follows (Ontario Building Code (OBC) Table 8.2.1.6.A.):

- 1.5 m from a structure;
- 15 m from a drilled well;
- 30 m from a dug well;
- 15 m from a Lake, and
- 3 m from a property line.

The minimum setbacks for the septic tank were met, however, it should ne noted that the septic tank was measured to be at the minimum separation distance of 15m.

1.2 LEACHING BED

The location of the leaching bed was located through probe holes and hand dug test pits, and the extent was estimated based on the local topography and the known location of the septic tank and other site features. Two test pits (TP1 and TP2) were advanced as part of the initial assessment within the leaching bed area and exposed the distribution pipe, stone surrounding the pipe, and native soil. An additional test pit (TP3) was advanced beyond the partially raised portion of the sewage system in the expected direction of subsurface flow as part of the 2021 assessment update to confirm the native soil description (see Figure 1). No ponded water was observed around the distribution pipe in any of the test hole locations.

The leaching bed is comprised of 8 runs of approximately 18.5 m each in length, spaced at 1.6 m, centre to centre. The absorption trenches consisted of a stone layer averaging in 0.35 m in thickness, overlain by approximately 0.3 m to 0.6 m of cover material, based on the observations made at both test hole locations advanced in the leaching bed. The stone layer is underlain by sand material which was observed to a depth of 0.9 m below the stone layer. The absorption trenches appeared to meet the requirements of OBC 8.7.3.2.(1). The clear stone trenches were clearly defined and overlain with a non-woven geotextile. OBC Clause 8.7.3.3(5) states that the stone layer must be comprised of washed septic stone, free of fine material, with gradation conforming to OBC Table 8.7.3.3, be not less than 0.5 m in width, extend not less than 0.15 m below the distribution pipe, and extend not less than 0.05 m above the distribution pipe. Therefore, the stone around the distribution pipes located in test pits met the OBC requirements for the stone layer. OBC Clause 8.7.3.3(2) states that the stone layer must be protected to prevent soil from entering the stone by covering it with untreated building paper or a permeable geo-textile fabric. The stone layer was protected by permeable geo-textile as per OBC requirements.

A percolation rate of approximately 8 min/cm was determined to be appropriate for the imported sand material present below the clear stone layer using OBC's Supplementary Standard SB-6 for Percolation Time and Soil Descriptions.

No anaerobic biomat or ponded effluent was observed within the clear stone layer or the sand in both test hole locations which presents itself as a black sludge coating the sand and the clear stone. TP1 was put down towards the header (nearest the building), on the south west side of the leaching bed. TP2 was put down towards the footer and north east side of the leaching bed. Typically, as the leaching bed starts aging, the anaerobic biomat will start forming towards the header and centre of the leaching bed, since this is where the effluent travels first.

No visible signs of failure were observed at the time of this inspection. Visible signs of sewage disposal system failure can include strong odours, spongy soil, excessive grass growth, effluent breakout, and excessive algae growth in downstream water bodies. Visual observation of the ground surface near the leaching bed did not uncover signs of strong odours, unusual vegetation growth, or effluent breakout. No spongy soil was observed on the surface of the leaching bed.

The applicable minimum horizontal clearances from the distribution piping are as follows (OBC Table 8.2.1.6.B.):

- 5 m from a structure;
- 15 m from a well with a watertight casing to a depth of at least 6 m;
- 30 m from any other well;
- 15 m from a Lake, and
- 3 m from a property line.

However, as per OBC 8.7.4.2.(11), the horizontal clearance distances from the distribution piping shall be increased by twice the height that the leaching bed is raised above the original grade. Based on our field observations, this system was most likely installed as a partially raised leaching bed, as such, an increased separation distance of up to 1.5 m should be required given that the system appears raised approximately 0.75m above surrounding grade. The applicable minimum horizontal clearances from the distribution piping are as follows:

- 6.5 m from a structure;
- 16.5 m from a well with a watertight casing to a depth of at least 6 m;
- 16.5 m from a Lake; and,
- 4.5 m from a property line.

The distribution piping meets all applicable minimum horizontal clearances.

2.0 CAPACITY ASSESSMENT

No existing documentation was available to us prior to our site visit, as such, the information gathered during the field investigation was relied upon to calculate the existing capacity of the existing system based on the

Ontario Building Code (OBC) guidelines. Two file searches were submitted to the Ottawa Septic System Office (OSSO). The file search was originally performed by the OSSO for the property at civic address 3449 Old Almonte Road provided sewage system information related to the Fire Station 84, as such, a secondary file search was submitted for 3447 Old Almonte Road; there were not results from either of the searches.

The following information was reviewed as part of this capacity assessment:

- Findings from the Sewage System Assessment by McIntosh Perry;
- Email correspondence with City of Ottawa project team outlining current and proposed building information (e.g. size and fixtures) and occupancy, and
- Google Earth imagery (aerial photography and street view).
- Geotechnical Investigation – Corkery Community Centre Expansion (exp., July 2021)

2.1 Existing Conditions

As no permit was available for review, there was no record of the existing daily sewage system design flow used for design. Based on information provided to McIntosh Perry, the building was originally serviced by a holding tank and a leaching bed was added around 2001. As indicated in the physical assessment of the sewage system, the property is currently serviced by a conventional Class IV septic system. The system consists of a 10,870 L +/- concrete tank and the associated leaching bed.

The existing building is approximately 120 m² and has a kitchen with a double sink. The building also has a male and female washroom each with two water closet fixtures and a sink. It is our understanding that there are no washing machines or dishwashers located in the existing building. As part of the proposed building expansion, the existing kitchen will be relocated to the proposed expansion and will include an additional sink, a utility sink/pan will be installed within the new janitor's room, and a new single additional universal washroom will installed within the existing building in addition to the male and female washrooms. To determine the maximum capacity of the system, three components were examined with regards to sizing. The total contact area, septic tank sizing, and total length of distribution piping. Using these restrictions, it is possible to review different scenarios to justify a design flow. These theoretical design flows are discussed further in section 2.2 of this memorandum.

Using the current OBC guidelines for minimum contact area required for the current building use (OBC Clause 8.7.4.1), the contact area has been provided using native soils (dense silty gravel with sand (GM)/silt sand with gravel (SM)) with an estimated T-time between 12 min/cm to 20 min/cm as per OBC's Supplementary Standard SB-6 for Percolation Time and Soil Descriptions. Please refer to the attached Geotechnical Investigation (exp., July 2021) for a copy of soil sieve analysis for the overburden material encountered immediately north of the existing sewage system and that is in accordance with findings of TP3 advanced by McIntosh Perry immediately beyond the raise portion of the sewage system. As such, the associated maximum total daily design flow would not be restricted by the available contact area as the native SM/GM soils are expected to extend significantly beyond the edge of the raised portion of the leaching bed and provide more than the minimum contact area of 370 m^2 (10 L/m^2/day for soil with T-time ≤ 20 min/cm) for the theoretical leaching bed capacity of 3,700 L/day.

Using the current OBC guidelines for minimum septic tank size for the current building use (OBC Clause 8.2.2.3.(1)), the minimum required tank size is 3 times the design flow for commercial/institutional use, therefore, a 10,870L septic tank would permit a maximum total daily design flow of 3,600L/day.

Using the current OBC guidelines for calculating the required length of distribution pipe (OBC Clause 8.7.3.1.(2)), and using the T-time of 8 min/cm for the imported 900mm of sand below the absorption trenches, the total provided length of distribution pipe of 148m would be suitable to service up to 3,700L/day.

2.2 Proposed Conditions

Part of this review includes establishing a flow associated with a new 387.7 m^2 building expansion and the associated increase in occupancy. Ontario Building Code Part 11 Data Matrix completed by the project's architect lists the total assembly occupancy for the entire facility at 150 persons. By using current OBC guidelines, the flow associated with this occupancy can vary depending on the intended use of the building and has been broken down below into three options.

1. Assembly Hall, No food Service (8L/day/person) = 150 people x 8L/day = 1,200 L/day
2. Public Parks, With Toilets Only (20L/day/person) = 150 people x 20L/day = 3,000 L/day
3. Assembly Hall, Food Service Provided (36L/day/person) = 100 people x 36L/day = 3,600L/day

As per the options presented above to calculate the daily sanitary design flow, it is proposed that the capacity of the existing sewage system be rated at 3,600 L/day. This would be associated with an occupant load of 450 people for assembly hall with no food service, 180 people for public parks with toilets only, or 100 people for assembly hall occupancy with food service provided.

Please note that in consultation with the City of Ottawa's project manager for the proposed expansion project it was established that typical maximum daily occupancy for the building would be 75 people, with a peak of 125 people expected to only occur approximately once or twice a year. It was also clarified that for larger external events (such as soccer tournaments), portable toilets would be brought to site specifically for the event.

3.0 CONCLUSIONS

In summary, the existing sewage system appears to be hydraulically functioning and is not showing signs of significant impacts with would affect its performance at this time. The existing absorption trench leaching bed appears to have met the OBC installation requirements, but it is unknown what design daily flow was used for the original building. As a result, the sizing of the sewage system components has been assessed individually and the limiting design flow of 3,600L/day based on existing septic tanks sizing should be considered to be the minimum. Should a larger septic tank be installed, the existing sewage system based on the existing length of distribution pipes could be expected to support up to 3,700L/day.

Following a review of the available information, as well as an assessment of the physical condition of the sewage system, the subsequent conclusions were determined:

- It appears the OSSO has no records of the original holding tank and later addition of the distribution pipes that converted the sewage system from a Class 5 to a Class 4. The sewage system appears to be functioning hydraulically and distribution piping appears to have been installed to support up to 3,700L/day, however, it does appear that based on OBC requirements, the existing septic tank capacity is the limiting factor in establishing the system's actual daily design flow;
- Based on observations at the time of inspection, the leaching bed did not show any signs of physical failure that would warrant immediate remediation measures be implemented.
- Installation of an effluent filter on the outlet of the septic tank to comply with the requirements of the OBC should be considered regardless of a possible expansion of the facility, and
- The proposed building addition would likely trigger an OBC Part 8 review the regulator. It is recommended that a Part 10/11 renovation permit be obtained from the local Part OBC Part regulator (OSSO) to formalize the findings of this assessment and to ensure a permit is obtained for future reference. As part of the OSSO application, the only recommended change/upgrade to the sewage system will be to install an effluent filter as a retrofit on the septic tank's outlet.

If you have any questions regarding the above, please do not hesitate to contact the undersigned.

Regards,

Patrick Leblanc, P.Eng.
Senior Environmental Engineer
(613) 714-4586
p.leblanc@mcintoshperry.com

Memorandum - Corkery Community Centre - Sewage System Assessment Update.May.3.2022.docx

Attach.: Fig. 1 -Existing Sewage System Plan – Corkery Community Centre Sewage System Assessment (McIntosh Perry, Rev.1, May.3.2022)
Geotechnical Investigation – Corkery Community Centre Expansion (exp., July 2021)

TBM: TOP OF EXISTING DRILLED WELL
ASSUMED ELEVATION = 100.00m

No.	Revision/Issue	Date
1	REVISED/FOR OSSO SUBMISSION	MAY/3/2022
0	ISSUED FOR REVIEW	JAN/08/20

McINTOSH PERRY
115 Walgreen Road, RR 3
Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Stamp:

Stamp:

Client:
CITY OF OTTAWA
100 CONSTELLATION DRIVE

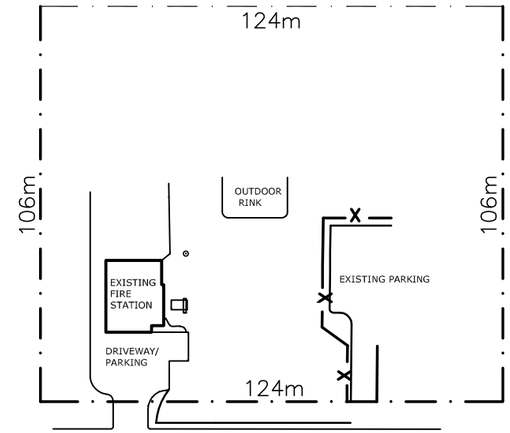
Project:
CORKERY COMMUNITY CENTRE SEWAGE SYSTEM ASSESSMENT
3447 OLD ALMONTE ROAD

Drawing Title:
EXISTING SEWAGE SYSTEM PLAN

Scale:	1:250
Drawn by:	BA
Checked By:	PL
Designed By:	
Date:	DEC/20/19

Project Number:
CM-19-0590/ CCO-21-3339

Drawing Number:
FIG.1



KEY PLAN

OUTDOOR RINK

EXISTING WOOD FENCE

GRAVEL DRIVE

PROPOSED LOCATION OF PROPANE TANK

EXISTING DRILLED WELL (TBM)

16m MIN.

15m MIN. 16.4 ACTUAL

CONTROL PANEL AND PUMP LOCKOUT (MOUNT AT A MIN. HEIGHT OF 1.5m ABOVE FINISHED GRADE)

EXISTING HOLDING TANK (TO BE DECOMMISSIONED)

EXISTING HYDRO SERVICE (ON WALL)

EXISTING PROPANE TANK (TO BE PERMANENTLY MOVED TO NEW AREA)

EXISTING FIRE STATION

EXISTING BUILDING SEWER LINE INV. = 99.56m

EXISTING HOLDING TANK. (TOP OF TANK = 99.37m)

INV. 99.75m

4 RUNS OF 12m EACH @ 1.6m O/C

INV. 99.70m

SLOPE SUBGRADE 2% MIN.

TH1 98.50 (97.9)

TH2 99.57 (98.5)

TH3 99.43 (98.4)

2.0 4.8 15m MIN.

2.0 12.0 2.0

EXISTING PARKING

3600L "LOW BOY" SEPTIC TANK OUTLET INV= 99.30m

PUMP CHAMBER C/W EFFLUENT PUMP AND HIGH WATER ALARM

GRAVEL AREA

PRESSURIZED FLOW DIVIDER

38mmø PE FORCEMAIN INSTALL TO GRAVITY DRAIN TO PUMPING CHAMBER

FLAG POLE

ASPHALT DRIVEWAY/ PARKING

H.P

H.P.(TYP.)

EDGE OF GRAVEL SHOULDER

CORKERY ROAD

LEGEND:

- TEST HOLE LOCATION
- 98.54 EXISTING GROUND SURFACE ELEV. (m)
- 99.00 PROPOSED GROUND SURFACE ELEV. (m)
- (98.5) INFERRED BEDROCK ELEVATION (m)

BENCHMARK INFORMATION:

TBM – TOP OF EXISTING DRILLED WELL
ASSUMED ELEVATION = 100.00m

Date	Description	Rev.

Client:

CITY OF OTTAWA

Consultant:

paterson group
consulting engineers

Project:

CORKERY FIRE STATION NO. 84
3449 OLD ALMONTE ROAD
OTTAWA, ONTARIO

Drawing:

SEWAGE SYSTEM LAYOUT PLAN

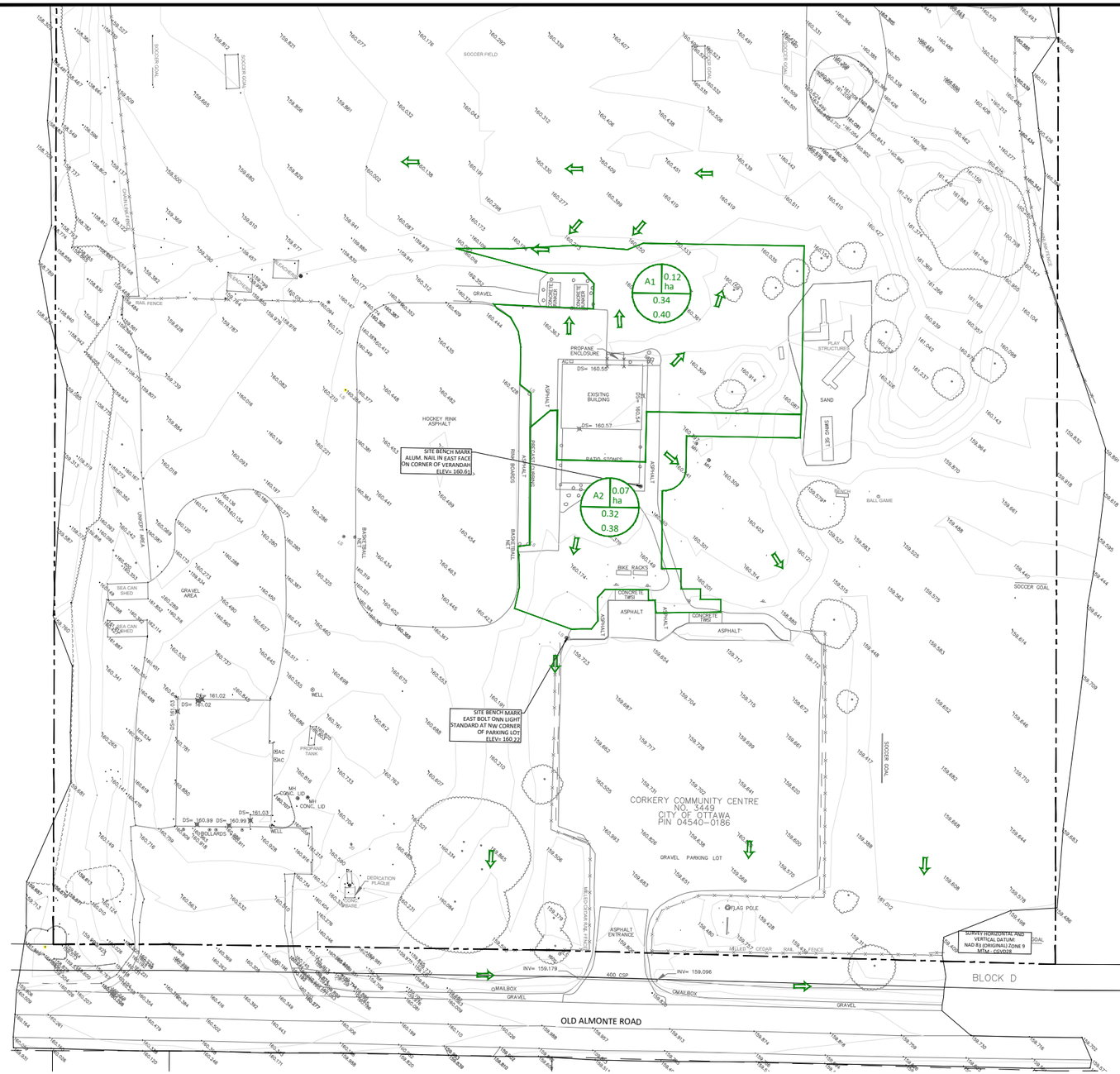
Scale: 1:300	Seal:
Date: 09/2009	
Drawn by: BAA	
Checked by: RAP	
File: PH1211	

Drawing No.:

PH1211-1

APPENDIX E
PRE-DEVELOPMENT DRAINAGE PLAN

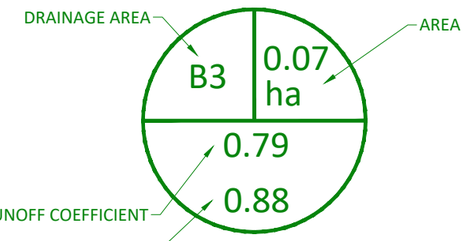
McINTOSH PERRY



Legend:

- CONCRETE BARRIER CURB
- GRAVEL
- ASPHALT
- PROPOSED LANDSCAPED AREA
- PROPOSED LANDSCAPE WALL
- PROPOSED PAVERS
- MH# T/G — STORM SEWER MANHOLE
- CBMH# T/G — CATCHBASIN MANHOLE
- CB# T/G — CATCHBASIN
- MH#A T/G — SANITARY SEWER MANHOLE
- HYD B/F — FIRE HYDRANT
- WATER VALVE
- WATER METER
- REMOTE WATER METER
- LIMIT OF CONSTRUCTION
- DRAINAGE SWALE
- SLOPING AT 3:1 UNLESS SPECIFIED
- 95.50 x — SURFACE ELEVATION
- 95.50 x (S) — SWALE ELEVATION
- T/W95.50 x B/W94.25 — TOP OF WALL ELEVATION BOTTOM OF WALL ELEVATION
- OVERLAND FLOW ROUTE
- SILT FENCE BARRIER
- STRAW BALE CHECK DAM
- DS — DOWNSPOUT LOCATION
- POST DEVELOPMENT DRAINAGE DIRECTION
- PRE DEVELOPMENT DRAINAGE PATTERN

Legend:



SCALE 1 : 750

0 25 50 75 Metres

LICENSED PROFESSIONAL ENGINEER
A. J. GOSLING
100226726
PROVINCE OF ONTARIO
2022 11 08

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Client: CSV ARCHITECTS
190 O'CONNOR STREET OTTAWA, ON K2P 2R3

Project: CORKERY COMMUNITY CENTRE
3447 OLD ALMONTE ROAD

Drawing Title: PRE-DEVELOPMENT DRAINAGE AREA PLAN

Drawn by:	Checked By:
R.R.R.	A.J.G.
Scale: 1:750	Project Number: CCO-21-3339

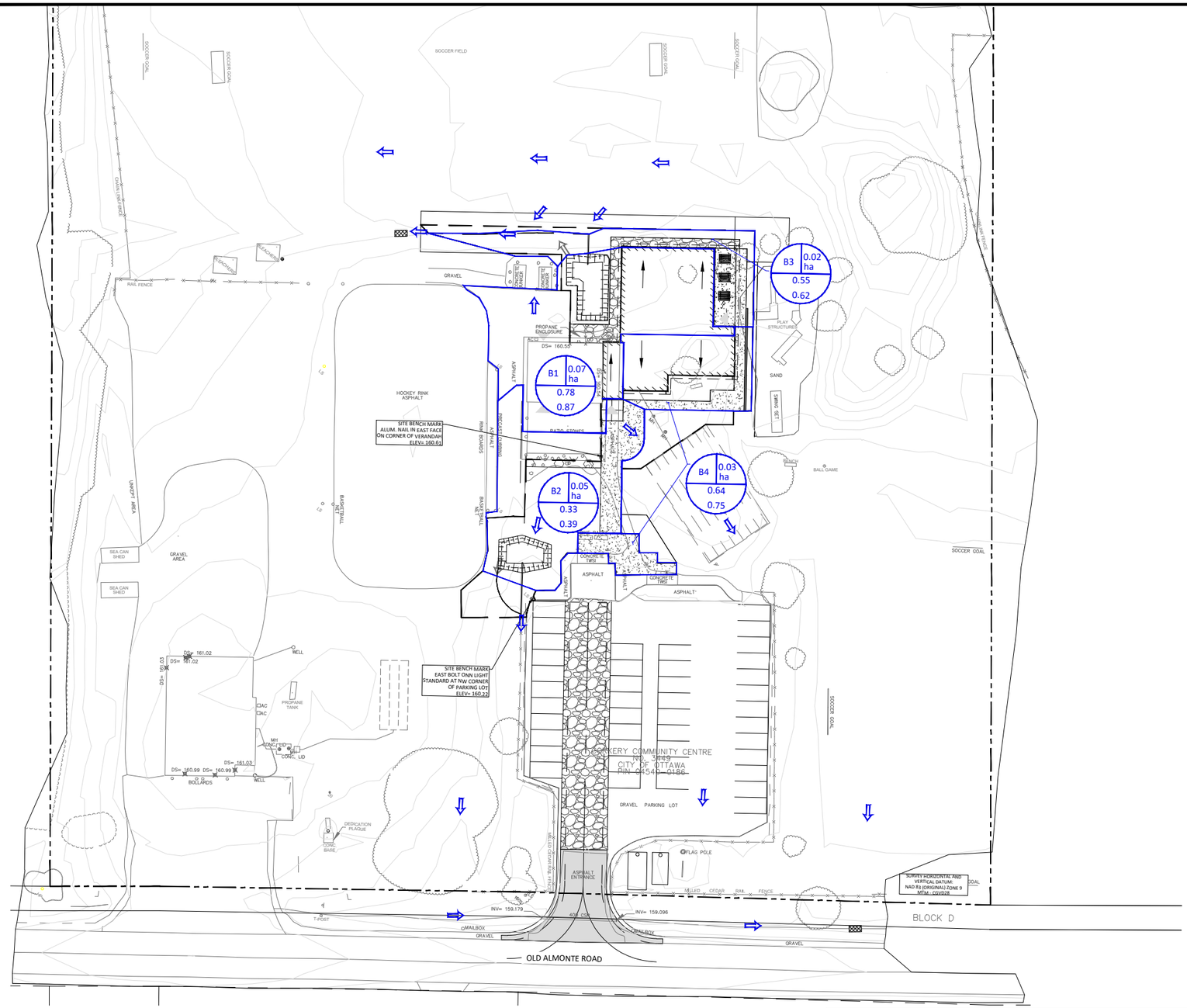
No.	Revisions	Date
3	ISSUED FOR REVIEW	NOV 08, 2022
2	ISSUED FOR REVIEW	MAR 15, 2022
1	ISSUED FOR REVIEW	OCT 25, 2021

Drawing Number: PRE

FILENAME: U:\Ottawa\00 Project - Proposals\2021 Jobs\CCO\CCO-21-3339 - CSV Corkery Hall - 3447 Old Almonte Road\12 - Drawings\MCO-21-3339_Presentation.dwg
LAST SAVED: Tuesday, November 08, 2022 LAST SAVED BY: r.robineau
LAST PLOTTED: Tuesday, November 08, 2022 CTB FILE USED: ----

APPENDIX F
POST-DEVELOPMENT DRAINAGE PLAN

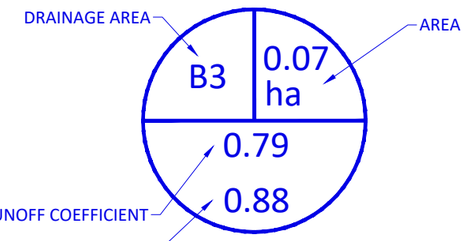
McINTOSH PERRY



Legend:

- CONCRETE BARRIER CURB
- GRAVEL
- ASPHALT
- PROPOSED LANDSCAPED AREA
- PROPOSED LANDSCAPE WALL
- PROPOSED PAVERS
- MH# T/G — STORM SEWER MANHOLE
- CBMH# T/G — CATCHBASIN MANHOLE
- CB# T/G — CATCHBASIN
- MH#A T/G — SANITARY SEWER MANHOLE
- HYD B/F — FIRE HYDRANT
- WATER VALVE
- WATER METER
- REMOTE WATER METER
- LIMIT OF CONSTRUCTION
- DRAINAGE SWALE
- SLOPING AT 3:1 UNLESS SPECIFIED
- 95.50 — SURFACE ELEVATION
- 95.50 (S) — SWALE ELEVATION
- T/W95.50 B/W94.25 — TOP OF WALL ELEVATION BOTTOM OF WALL ELEVATION
- OVERLAND FLOW ROUTE
- SILT FENCE BARRIER
- STRAW BALE CHECK DAM
- DS — DOWNSPOUT LOCATION
- POST DEVELOPMENT DRAINAGE DIRECTION
- PRE DEVELOPMENT DRAINAGE PATTERN

Legend:



SCALE 1 : 750

0 25 50 75 Metres

LICENSED PROFESSIONAL ENGINEER
A. J. GOSLING
100226726
PROVINCE OF ONTARIO
2022 11 08

N

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Client: CSV ARCHITECTS
190 O'CONNOR STREET OTTAWA, ON K2P 2R3

Project: CORKERY COMMUNITY CENTRE
3447 OLD ALMONTE ROAD

Drawing Title: POST-DEVELOPMENT DRAINAGE AREA PLAN

Drawn by:	Checked By:
R.R.R.	A.J.G.
Scale: 1:750	Project Number: CCO-21-3339

No.	Revisions	Date
3	ISSUED FOR REVIEW	NOV 08, 2022
2	ISSUED FOR REVIEW	MAR 15, 2022
1	ISSUED FOR REVIEW	OCT 25, 2021

Drawing Number: POST

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LAST SAVED: Tuesday, November 08, 2022 LAST SAVED BY: r.robineau
LAST PLOTTED: Tuesday, November 08, 2022 CTB FILE USED: ----

APPENDIX G
STORMWATER MANAGEMENT CALCULATIONS

McINTOSH PERRY

Pre-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m^2)	C	Gravel Area (m^2)	C	Pervious Area (m^2)	C	C_{AVG} 5-Year	C_{AVG} 100-Year
A1	0.115	225.43	0.90	0.00	0.60	923.11	0.20	0.34	0.40
A2	0.066	114.10	0.90	0.00	0.60	541.75	0.20	0.32	0.38

Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	I (mm/hr)		Q (L/s)	
					5-Year	100-Year	5-Year	100-Year
A1	0.115	0.34	0.40	11	99.2	169.9	10.69	21.55
A2	0.066	0.32	0.38	11	99.2	169.9	5.82	11.79
Total	0.180						16.51	33.34

Post-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m^2)	C	Gravel Area (m^2)	C	Pervious Area (m^2)	C	C_{AVG} 5-Year	C_{AVG} 100-Year
B1	0.073	600.28	0.90	0.00	0.60	126.94	0.20	0.78	0.87
B2	0.052	96.41	0.90	0.00	0.60	418.95	0.20	0.33	0.39
B3	0.024	120.85	0.90	0.00	0.60	121.62	0.20	0.55	0.62
B4	0.032	126.74	0.90	132.46	0.60	60.64	0.20	0.64	0.75

Post-Development Runoff Calculations

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	I (mm/hr)		Q (L/s)	
					5-Year	100-Year	5-Year	100-Year
B1	0.073	0.78	0.87	10	104.2	178.6	16.38	31.37
B2	0.052	0.33	0.39	10	104.2	178.6	4.94	9.98
B3	0.024	0.55	0.62	10	104.2	178.6	3.86	7.51
B4	0.032	0.64	0.75	10	104.2	178.6	5.96	11.98
Total	0.180						31.14	60.84

Required Restricted Flow

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	I (mm/hr)		Q (L/s)	
					5-Year	100-Year	5-Year	100-Year
A1	0.115	0.34	0.40	11	99.2	169.9	10.69	21.55
A2	0.066	0.32	0.38	11	99.2	169.9	5.82	11.79
Total	0.180						16.51	33.34

Post-Development Restricted Runoff Calculations

Drainage Area	Unrestricted Flow (L/s)		Restricted Flow (L/s)		Storage Required (m^3)		Storage Provided (m^3)		
	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year	
B1	16.38	31.37	7.06	10.13	5.6	13.5	6.1	13.5	*Restricted*
B2	4.94	9.98	2.69	4.43	1.4	3.3	2.4	4.9	*Restricted*
B3	3.86	7.51	3.86	7.51					
B4	5.96	11.98	5.96	11.98					
Total	21.32	41.36	19.56	34.04	7.0	16.8	8.5	18.4	

Storage Requirements for Area B3

5-Year Storm Event

Tc (min)	I (mm/hr)	B1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	16.38	7.06	9.32	5.6
12	94.7	14.89	7.06	7.83	5.6
14	86.9	13.67	7.06	6.61	5.6
16	80.5	12.65	7.06	5.59	5.4
18	75.0	11.79	7.06	4.73	5.1
20	70.3	11.05	7.06	3.99	4.8
22	66.1	10.40	7.06	3.34	4.4

Maximum Storage Required 5-Year (m^3) =	5.6

100-Year Storm Event

Tc (min)	I (mm/hr)	B1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	31.37	10.13	21.24	12.7
12	162.1	28.49	10.13	18.36	13.2
14	148.7	26.13	10.13	16.00	13.4
16	137.5	24.17	10.13	14.04	13.5
18	128.1	22.50	10.13	12.37	13.4
20	120.0	21.08	10.13	10.95	13.1
22	112.9	19.83	10.13	9.70	12.8

Maximum Storage Required 100-Year (m^3) =	13.5

5 Year Storage Summary

	Water Elev. (m) =			160.22
Location	INV. (out)	Depth (m)	Head (m)	Volume (m^3)
North Pond	160.04	0.18	0.11	6.1

Storage Available (m^3) =	6.1	*
Storage Required (m^3) =	5.6	

100 Year Storage Summary

	Water Elev. (m) =			160.36
Location	INV. (out)	Depth (m)	Head (m)	Volume (m^3)
North Pond	160.04	0.32	0.25	13.5

Storage Available (m^3) =	13.5	*
Storage Required (m^3) =	13.5	

*Available Storage Volume calculated from AutoCad

For Orifice Flow, C= 0.6
For Weir Flow, C= 3.33

	Orifice 1	Orifice 2	Weir 1	Weir 2
invert elevation	160.04			
center of crest elevation	160.09			
orifice width / weir length	97 mm			
orifice height				
orifice area (m^2)	0.007	0.000		

Elevation Discharge Table - Storm Routing

Elevation (m)	Orifice 1 H [m]	Orifice 1 Q [m^3]	Orifice 2 H [m]	Orifice 2 Q [m^3]	Weir 1 H [m]	Weir 1 Q [m^3]	Weir 2 H [m]	Weir 2 Q [m^3]	Total Q [l/s]
160.04	x	x							0.00
160.09	0.00	0.001							0.81
160.10	0.01	0.002							2.11
160.11	0.02	0.003							2.87
160.12	0.03	0.003							3.46
160.13	0.04	0.004							3.97
160.14	0.05	0.004							4.42
160.15	0.06	0.005							4.83
160.16	0.07	0.005							5.21
160.17	0.08	0.006							5.56
160.18	0.09	0.006							5.89
160.19	0.10	0.006							6.20
160.20	0.11	0.006							6.50
160.21	0.12	0.007							6.78
160.22	0.13	0.007							7.06
160.23	0.14	0.007							7.32
160.24	0.15	0.008							7.57
160.25	0.16	0.008							7.82
160.26	0.17	0.008							8.06
160.27	0.18	0.008							8.29
160.28	0.19	0.009							8.51
160.29	0.20	0.009							8.73
160.30	0.21	0.009							8.94
160.31	0.22	0.009							9.15
160.32	0.23	0.009							9.36
160.33	0.24	0.010							9.56
160.34	0.25	0.010							9.75
160.35	0.26	0.010							9.94
160.36	0.27	0.010							10.13

Notes: 1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.
2. Orifice Equation: $Q = cA(2gh)^{1/2}$
3. Weir flow calculated in Bentley's FlowMaster - Trapezoidal Channel at 0.1%, 3:1 side slopes, roughness coeff. Of 0.035
4. These Computations Do Not Account for Submergence Effects Within the Pond Riser.
5. H for orifice equations is depth of water above the centroide of the orifice.
6. H for weir equations is depth of water above the weir crest.

Storage Requirements for Area B2

5-Year Storm Event

Tc (min)	I (mm/hr)	B2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	4.94	2.69	2.25	1.4
12	94.7	4.49	2.69	1.80	1.3
14	86.9	4.12	2.69	1.43	1.2
16	80.5	3.82	2.69	1.13	1.1
18	75.0	3.55	2.69	0.86	0.9
20	70.3	3.33	2.69	0.64	0.8
22	66.1	3.14	2.69	0.45	0.6

Maximum Storage Required 5-Year (m^3) =	1.4

100-Year Storm Event

Tc (min)	I (mm/hr)	B2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	9.98	4.43	5.55	3.3
12	162.1	9.07	4.43	4.64	3.3
13	155.1	8.67	4.43	4.24	3.3
14	148.7	8.32	4.43	3.89	3.3
15	142.9	7.99	4.43	3.56	3.2
16	137.5	7.69	4.43	3.26	3.1
17	132.6	7.42	4.43	2.99	3.0

Maximum Storage Required 100-Year (m^3) =	3.3

5 Year Storage Summary

	Water Elev. (m) =			159.25
Location	INV. (out)	Depth (m)	Head (m)	Volume (m^3)
CB2	159.12	0.13	0.05	2.4

Storage Available (m^3) =	2.4	*
Storage Required (m^3) =	1.4	

100 Year Storage Summary

	Water Elev. (m) =			159.35
Location	INV. (out)	Depth (m)	Head (m)	Volume (m^3)
CB2	159.12	0.23	0.15	4.9

Storage Available (m^3) =	4.9	*
Storage Required (m^3) =	3.3	

*Available Storage Volume calculated from AutoCad

For Orifice Flow, C= 0.6
For Weir Flow, C= 3.33

	Orifice 1	Orifice 2	Weir 1	Weir 2
invert elevation	159.15			
center of crest elevation	159.19			
orifice width / weir length	75 mm			
orifice height				
orifice area (m^2)	0.004	0.000		

Elevation Discharge Table - Storm Routing

Elevation (m)	Orifice 1 H [m]	Orifice 1 Q [m^3]	Orifice 2 H [m]	Orifice 2 Q [m^3]	Weir 1 H [m]	Weir 1 Q [m^3]	Weir 2 H [m]	Weir 2 Q [m^3]	Total Q [l/s]
159.15	x	x							0.00
159.20	0.01	0.001							1.31
159.21	0.02	0.002							1.76
159.22	0.03	0.002							2.12
159.23	0.04	0.002							2.42
159.24	0.05	0.003							2.69
159.25	0.06	0.003							2.94
159.26	0.07	0.003							3.16
159.27	0.08	0.003							3.37
159.28	0.09	0.004							3.57
159.29	0.10	0.004							3.76
159.30	0.11	0.004							3.94
159.31	0.12	0.004							4.11
159.32	0.13	0.004							4.27
159.33	0.14	0.004							4.43
159.34	0.15	0.005							4.59
159.35	0.16	0.005							4.73
159.36	0.17	0.005							4.88
159.37	0.18	0.005							5.02
159.38	0.19	0.005							5.15
159.39	0.20	0.005							5.28
159.40	0.21	0.005							5.41
159.41	0.22	0.006							5.54
159.42	0.23	0.006							5.66
159.43	0.24	0.006							5.78
159.44	0.25	0.006							5.90
159.45	0.26	0.006							6.02
159.46	0.27	0.006							6.13
159.47	0.28	0.006							6.24
159.48	0.29	0.006							6.35
159.49	0.30	0.006							6.46
159.50	0.31	0.007							6.56
159.51	0.32	0.007							6.67

Notes: 1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.
2. Orifice Equation: $Q = cA(2gh)^{1/2}$
3. Weir flow calculated in Bentley's FlowMaster - Trapezoidal Channel at 0.1%, 3:1 side slopes, roughness coeff. Of 0.035
4. These Computations Do Not Account for Submergence Effects Within the Pond Riser.
5. H for orifice equations is depth of water above the centroide of the orifice.
6. H for weir equations is depth of water above the weir crest.

Time of Concentration Pre-Development

Drainage Area ID	Sheet Flow Distance (m)	Slope of Land (%)	Tc (min) (5-Year)	Tc (min) (100-Year)
A1	23	1.41	11	10
A2	25	1.52	11	10

Therefore, a Tc of 11 can be used

Tc= (3.26(1.1-c)L^0.5/S^0.33)

c= Balanced Runoff Coefficient

L= Length of Drainage Area

S= Average Slope of Watershed

4.8 Enhanced Grass Swale

4.8.1 Overview

Description

Enhanced grass swales are vegetated open channels designed to convey, treat and attenuate stormwater runoff (also referred to as enhanced vegetated swales). Check dams and vegetation in the swale slows the water to allow sedimentation, filtration through the root zone and soil matrix, evapotranspiration, and infiltration into the underlying native soil. Simple grass channels or ditches have long been used for stormwater conveyance, particularly for roadway drainage. Enhanced grass swales incorporate design features such as modified geometry and check dams that improve the contaminant removal and runoff reduction functions of simple grass channel and roadside ditch designs (Figure 4.8.1). A dry swale is a design variation that incorporates an engineered soil media bed and optional perforated pipe underdrain system (see Section 4.9 – Dry Swale). Enhanced grass swales are not capable of providing the same water balance and water quality benefits as dry swales, as they lack the engineered soil media and storage capacity of that best management practice.

Where development density, topography and depth to water table permit, enhanced grass swales are a preferred alternative to both curb and gutter and storm drains as a stormwater conveyance system. When incorporated into a site design, they can reduce impervious cover, accent the natural landscape, and provide aesthetic benefits.

Figure 4.8.1 Enhanced grass swales can be applied in road rights-of-way or along parking lots

Source: Seattle Public Utilities (left); Sue Donaldson (right)

Figure 4.8.2 Enhanced grass swales feature check dams that temporarily pond runoff to increase pollutant retention and infiltration and decrease flow velocity

Source: Delaware Department of Transportation (left); Center for Watershed Protection (right)

Common Concerns

If they are properly designed and maintained, enhanced grass swales can provide stormwater treatment and improved site aesthetics. However, there are some common concerns associated with their use:

- *Risk of Groundwater Contamination*: Most pollutants in urban runoff are well retained by infiltration practices and soils and therefore, have a low to moderate potential for groundwater contamination (Pitt *et al.*, 1999). Chloride and sodium from de-icing salts applied to roads and parking areas during winter are not well attenuated in soil and can easily travel to shallow groundwater. Infiltration of de-icing salt constituents is also known to increase the mobility of certain heavy metals in soil (*e.g.*, lead, copper and cadmium), thereby raising the potential for elevated concentrations in underlying groundwater (Amrhein *et al.*, 1992; Bauske and Goetz, 1993). However, very few studies that have sampled groundwater below infiltration facilities or roadside ditches receiving de-icing salt laden runoff have found concentrations of heavy metals that exceed drinking water standards (*e.g.*, Howard and Beck, 1993; Granato *et al.*, 1995). To minimize risk of groundwater contamination the following management approaches are recommended (Pitt *et al.*, 1999; TRCA, 2009b):
    - stormwater infiltration practices should not receive runoff from high traffic areas where large amounts of de-icing salts are applied (*e.g.*, busy highways), nor from pollution hot spots (*e.g.*, source areas where land uses or activities have the potential to generate highly contaminated runoff such as vehicle fuelling, servicing or demolition areas, outdoor storage or handling areas for hazardous materials and some heavy industry sites);
    - prioritize infiltration of runoff from source areas that are comparatively less contaminated such as roofs, low traffic roads and parking areas; and,
    - apply sedimentation pretreatment practices (*e.g.*, oil and grit separators) before infiltration of road or parking area runoff.

- *Risk of Soil Contamination:* Available evidence from monitoring studies indicates that small distributed stormwater infiltration practices do not contaminate underlying soils, even after more than 10 years of operation (TRCA, 2008).

- *On Private Property*: If enhanced grass swales are installed on private lots, property owners or managers will need to be educated on their routine maintenance needs, understand the long-term maintenance plan, and may be subject to a legally binding maintenance agreement. An incentive program such as a storm sewer user fee based on the area of impervious cover on a property that is directly connected to a storm sewer (*i.e.*, does not first drain to a pervious area or LID practice) could be used to encourage property owners or managers to maintain existing practices. Alternatively, swales could be located in an expanded road right-of-way or "stormwater easement" so that municipal staff can access the facility in the event it fails to function properly.

- *Maintenance*: The major maintenance requirement associated with grass swales is mowing. Occasionally, sediment will need to be removed, although this can be minimized by ensuring that upstream areas are stabilized and incorporating pretreatment devices (*e.g.*, vegetated filter strips, sedimentation forebays, gravel diaphragms). If grass swales are installed on private lots, homeowners need to be educated on routine maintenance requirements.

- *Erosion:* Erosion can be prevented by limiting the allowable longitudinal slope and incorporating check dams. Additionally, designers can use permanent reinforcement matting on swales designed for high velocity flows and temporary matting during the vegetation establishment period.

- *Standing Water and Mosquitoes:* Properly designed grass swales will not pond water for longer than 24 hours following a storm event. However, poor design, installation, or maintenance can lead to nuisance conditions.

Physical Suitability and Constraints

Enhanced grass swales are suitable on sites where development density, topography and water table depth permit their implementation. Some key constraints to their application include:

- *Available Space:* Grass swales usually consume about 5 to 15 percent of their contributing drainage area. A width of at least 2 metres is needed.

- *Site Topography:* Site topography constrains the application of grass swales. Longitudinal slopes between 0.5 and 6% are allowable. This prevents ponding while providing residence time and preventing erosion. On slopes steeper than 3%, check dams should be used.

- *Water Table*: Designers should ensure that the bottom of the swale is separated from the seasonally high water table or top of bedrock elevation by at least one (1) metre.

- *Soils:* Grass swales can be applied on sites with any type of soils.

- *Drainage Area and Runoff Volume:* The conveyance capacity should match the drainage area. Sheet flow to the grass swale is preferable. If drainage areas are greater than 2 hectares, high discharge through the swale may not allow for filtering and infiltration, and may create erosive conditions. Typical ratios of impervious drainage area to swale area range from 5:1 to 10:1.

- *Pollution Hot Spot Runoff:* To protect groundwater from possible contamination, source areas where land uses or human activities have the potential to generate highly contaminated runoff (*e.g.*, vehicle fueling, servicing and demolition areas, outdoor storage and handling areas for hazardous materials and some heavy industry sites) should not be treated by grass swales.

- *Setbacks from Buildings:* Enhanced grass swales should be located a minimum of four (4) metres from building foundations to prevent water damage.

- *Proximity to Underground Utilities:* Utilities running parallel to the grass swale should be offset from the centerline of the swale. Underground utilities below the bottom of the swale are not a problem.

Typical Performance

The ability of enhanced grass swales to help meet stormwater management objectives is summarized in Table 4.8.1.

Table 4.8.1 Ability of enhanced grass swales to meet SWM objectives

BMP	Water Balance Benefit	Water Quality Improvement	Stream Channel Erosion Control Benefit
Enhanced Grass Swale	Partial – depends on soil infiltration rate	Yes, if design velocity is 0.5 m/s or less for a 4 hour, 25 mm Chicago storm	Partial – depends on soil infiltration rate

Water Balance

Runoff reduction by grass swales is generally low, but is strongly influenced by soil type, slope, vegetative cover and the length of the swale. Recent research indicates that a conservative runoff reduction rate of 20 to 10% can be used depending on whether soils fall in hydrologic soil groups A/B or C/D, respectively. The runoff reduction rates can be doubled if the native soils on which the swale is located have been tilled to a depth of 300 mm and amended with compost to achieve an organic content of between 8 and 15% by weight or 30 to 40% by volume.

Table 4.8.2 Volumetric runoff reduction achieved by enhanced grass swales

LID Practice	Location	% Runoff Reduction	Reference
Grass Swale	Virginia	0%	Schueler (1983)
Grass Swale	Various	40%	Strecker *et al.*(2004)
Grass Swale	California	27 to 41%	Barrett *et al.* (2004)
Runoff Reduction Estimate[1]		**20% on HSG A or B soils; 10% on HSG C or D soils**	

Notes:
1. This estimate is provided only for the purpose of initial screening of LID practices suitable for achieving stormwater management objectives and targets. Performance of individual facilities will vary depending on site specific contexts and facility design parameters and should be estimated as part of the design process and submitted with other documentation for review by the approval authority.

Water Quality – Pollutant Removal Capacity

Research has shown the pollutant mass removal rates of grass swales are variable, depending on influent pollutant concentrations (Bäckström *et al.*, 2006), but generally moderate for most pollutants (Barrett *et al.*, 1998; Deletic and Fletcher, 2006). Median pollutant mass removal rates of swales from available performance studies are 76% for total suspended solids, 55% for total phosphorus, and 50% for total nitrogen (Deletic and Fletcher, 2006). Significant reductions in total zinc and copper event mean concentrations have been observed in performance studies with a median value of 60%, but results have varied widely (Barrett, 2008). Site specific factors such as slope, soil type, infiltration rate, swale length and vegetative cover also affect pollutant mass removal rates. In general, the dominant pollutant removal mechanism operating in grass swales is infiltration, rather than filtration, because pollutants trapped on the surface of the swale by vegetation or check dams are not permanently bound (Bäckström *et al.*, 2006). Designers should maximize the degree of infiltration achieved within a grass swale by incorporating check dams and ensuring the native soils have infiltration rates of 15 mm/hr or greater or specifying that the soils be tilled and amended with compost prior to planting.

Several of the factors that can significantly increase or decrease the pollutant removal capacity of grass channels are provided in Table 4.8.3.

Table 4.8.3 Factors that influence the pollutant removal capacity of grass swales

Factors that Reduce Removal Rates	Factors that Enhance Removal Rates
Longitudinal slope > 1%	Longitudinal slope < 1%
Measured soil infiltration rate < 15 mm/hr	Measured soil infiltration rate is 15 mm/hr or greater
Flow velocity within channel > 0.5 m/s during a 4 hour, 25 mm Chicago storm event	Flow velocity within channel is 0.5 m/s or less during a 4 hour, 25 mm Chicago storm event
No pretreatment	Pretreatment with vegetated filter strips, gravel diaphragms and/or sedimentation forebays
Side slopes steeper than 3:1 (H:V)	Side slopes 3:1 (H:V) or less

4.8.2 Design Template

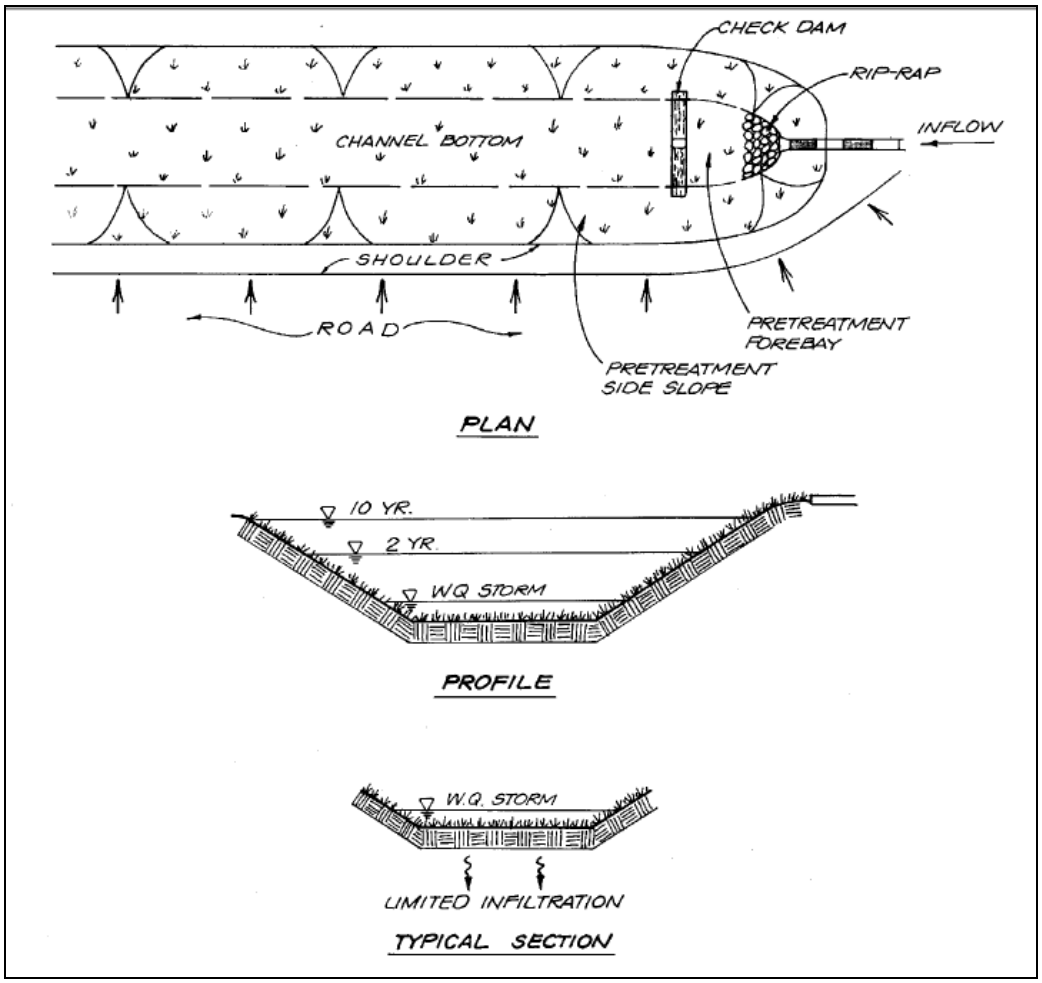
Applications

Enhanced grass swales are well suited for conveying and treating runoff from highways and other roads because they are a linear practice and easily incorporated into road rights-of-way. They are also a suitable practice for managing runoff from parking lots, roofs and pervious surfaces, such as yards, parks and landscaped areas. Grass swales can be used as snow storage areas.

Grass swales can also provide pretreatment for other stormwater best management practices, such as bioretention areas, soakaways and perforated pipe systems or be designed in series with other practices as part of a treatment train approach. They are often impractical in densely developed urban areas because they consume a large amount of space. Where development density and topograph permit, grass swales can be used in place of conventional curb and gutter and storm drain systems.

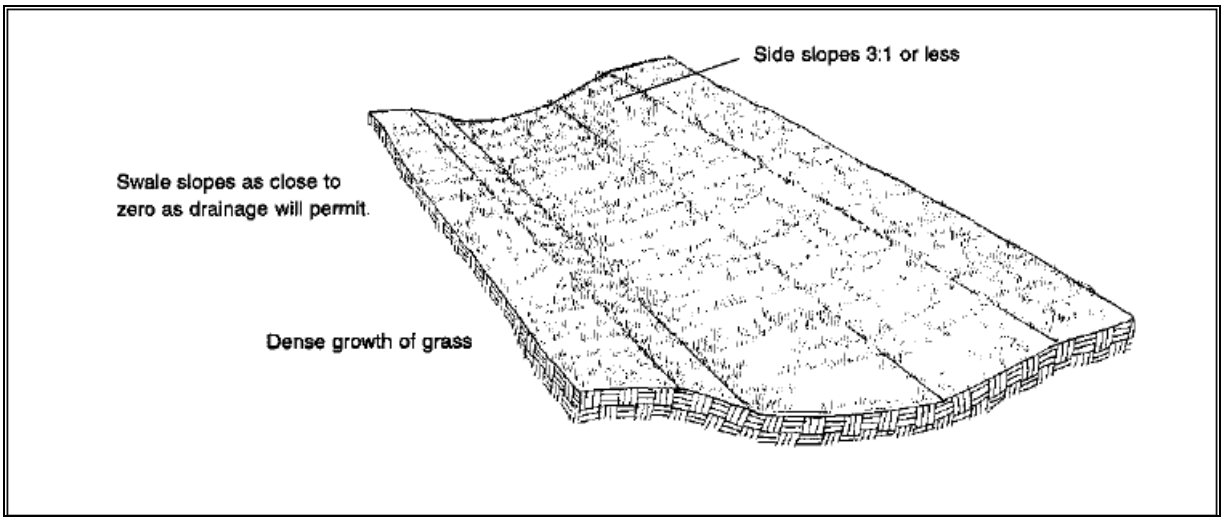
Typical Details

Figure 4.8.3 Plan, profile, and section views of a grass swale



Source: ARC, 2001

Figure 4.8.4 Plan view of a grass swale



Source: ARC, 2001

Design Guidance

Geometry and Site Layout

Design guidance regarding the geometry and layout of grass swales is provided below.

- *Shape:* Grass swales should be designed with a trapezoidal or parabolic cross section. Trapezoidal swales will generally evolve into parabolic swales over time, so the initial trapezoidal cross section design should be checked for capacity and conveyance assuming it is a parabolic cross section. Swale length between culverts should be 5 metres or greater.

- *Bottom Width:* Grass swales should be designed with a bottom width between 0.75 and 3.0 metres. The design width should allow for shallow flows and adequate water quality treatment, while preventing flows from concentrating and creating gullies.

- *Longitudinal Slope:* Slopes should be between 0.5% and 4%. Check dams should be incorporated on slopes greater than 3% (PDEP, 2006).

- *Length*: When used to convey and treat road runoff, the length simply parallels the road, and therefore should be equal to, or greater than the contributing roadway length.

- *Flow Depth:* The maximum flow depth should correspond to two-thirds the height of the vegetation. Vegetation in some grass swales may reach heights of 150 millimetres; therefore a maximum flow depth of 100 millimetres is recommended during a 4 hour, 25 mm Chicago storm event.

- *Side Slopes:* The side slopes should be as flat as possible to aid in providing pretreatment for lateral incoming flows and to maximize the swale filtering surface. Steeper side slopes are likely to have erosion gullying from incoming lateral flows. A maximum slope of 2.5:1 (H:V) is recommended and a 4:1 slope is preferred where space permits.

Pretreatment

A pea gravel diaphragm located along the top of each bank can be used to provide pretreatment of any stormwater runoff that may be entering the swale laterally along its length. Vegetated filter strips or mild side slopes (3:1) also provide pretreatment for any lateral sheet flow entering the swale. Sedimentation forebays at inlets to the swale are also a pretreatment option.

Conveyance and Overflow

Grass swales must be designed for a maximum velocity of 0.5 m/s or less for the 4 hour 25 mm Chicago storm. The swale should also convey the locally required design storm (usually the 10 year storm) at non-erosive velocities.

Soil Amendments

If soils along the location of the swale are highly compacted, or of such low fertility that vegetation cannot become established, they should be tilled to a depth of 300 mm and amended with compost to achieve an organic content of 8 to 15% by weight or 30 to 40% by volume.

Landscaping

Designers should choose grasses that can withstand both wet and dry periods as well as relatively high velocity flows within the swale. For applications along roads and parking lots, where snow will be plowed and stored, non woody and salt tolerant species should be chosen. Taller and denser grasses are preferable, though the species of grass is less important than percent coverage (Barrett *et al.*, 2004). Appendix B provides further guidance regarding suitable species and planting.

Other Design Resources

Section 4.9.8 of the OMOE *Stormwater Management Planning and Design Manual* (2003) provides further guidance regarding design and modelling performance of enhanced grass swales. Several other stormwater manuals that provide useful design guidance for grass swales include:

Minnesota Stormwater Manual
http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html

Virginia Stormwater Management Handbook
http://www.dcr.virginia.gov/soil_&_water/stormwat.shtml

Georgia Stormwater Management Manual
http://www.georgiastormwater.com/

BMP Sizing

Enhanced grass swale designs are flow rate based. The swale should be designed for a maximum flow velocity of 0.5 m/s and flow depth of 100 mm during a 4 hour 25 mm Chicago storm event. The suggested Manning's n for use in Manning's equation is 0.027 (grass swale) to 0.050 (shrub vegetated or cobble lined swale). Given typical urban swale dimensions (0.75 m bottom width, 2.5:1 side slopes and 0.5 m depth), the contributing drainage area is generally limited to ≤ 2 hectares to maintain flow ≤ 0.15 m^3/s and velocity ≤ 0.5 m/s. Table 4.8.4 describes the relationship between imperviousness of the development and maximum drainage area that can be treated by a grass swale.

Table 4.8.4 Grassed swale drainage area guidelines

Percent Imperviousness	Maximum Drainage Area (hectares)
35	2.0
75	1.5
90	1.0

Source: OMOE, 2003.

For further guidance regarding BMP sizing, refer to the OMOE *Stormwater Management Planning and Design Manual* (OMOE, 2003).

Design Specifications

Recommended design specifications for enhanced grass swales are provided in Table 4.8.5

Table 4.8.5 Design specifications for enhanced grass swales

Component	Specification	Quantity
Check Dams	Check dams should be constructed of a non-erosive material such as suitably sized aggregate, wood, gabions, riprap, or concrete. All check dams should be underlain with filter fabric conforming to local design standards. Wood used for check dams should consist of pressure treated logs or timbers, or water-resistant tree species such as cedar, hemlock, swamp oak or locust.	Spacing should be based on the longitudinal slope and desired ponding volume
Pea Gravel Diaphragm	Washed stone between 3 and 10 mm in diameter.	Minimum of 300 mm wide and 600 mm deep

Construction Considerations

Grass swales should be clearly marked before site work begins to avoid disturbance during construction. No vehicular traffic, except that specifically used to construct the facility, should be allowed within the swale site. Any accumulation of sediment that does occur within the swale must be removed during the final stages of grading to achieve the design cross section. Final grading and planting should not occur until the adjoining

areas draining into the swale are stabilized. Flow should not be diverted into the swale until the banks are stabilized.

Preferably, the swale should be planted in the spring so that the vegetation can become established with minimal irrigation. Installation of erosion control matting or blanketing to stabilize soil during establishment of vegetation is highly recommended. If sod is used, it should be placed with staggered ends and secured by rolling the sod. This helps to prevent gullies.

4.8.3 Maintenance and Construction Costs

Inspection and Maintenance

Maintenance requirements for enhanced grass swales is similar to vegetated filter strips and typically involve a low level of activity after vegetation becomes established. Grass channel maintenance procedures are already in place at many municipal public works and transportation departments. These procedures should be compared to the recommendations below (Table 4.8.6) to assure that the infiltration and water quality benefits of enhanced grass swales are preserved. Routine roadside ditch maintenance practices such as scraping and re-grading should be avoided at swale locations. Vehicles should not be parked or driven on grass swales. For routine mowing, the lightest possible mowing equipment should be used to prevent soil compaction.

For swales located on private property, the property owner or manager is responsible for maintenance as outlined in a legally binding maintenance agreement. Roadside swales in residential areas generally receive routine maintenance from homeowners who should be advised regarding recommended maintenance activities.

Table 4.8.6 Typical inspection and maintenance activities for enhanced grass swales

Activity	Schedule
▪ Inspect for vegetation density (at least 80% coverage), damage by foot or vehicular traffic, channelization, accumulation of debris, trash and sediment, and structural damage to pretreatment devices.	After every major storm event (>25 mm), quarterly for the first two years, and twice annually thereafter.
▪ Regular watering may be required during the first two years while vegetation is becoming established; ▪ Mow grass to maintain height between 75 to 150 mm; ▪ Remove trash and debris from pretreatment devices, the swale surface and inlet and outlets.	At least twice annually. More frequently if desired for aesthetic reasons.
▪ Remove accumulated sediment from pretreatment devices, inlets and outlets; ▪ Replace dead vegetation, remove invasive growth, dethatch, remove thatching and aerate (PDEP, 2006; ▪ Repair eroded or sparsely vegetated areas; ▪ Remove accumulated sediment on the swale surface when dry and exceeds 25 mm depth (PDEP, 2006); ▪ If gullies are observed along the swale, regrading and revegetating may be required.	Annually or as needed

Installation and Operation Costs

In study by the Center for Watershed Protection to estimate and compare construction costs for various stormwater BMPs, the median base construction cost for grass swales was estimated to be $44,850 (2006 USD) per impervious hectare treated with estimates ranging from $26,935 to $89,700 (CWP, 2007b). These estimates do not include design and engineering costs, which could range from 5 to 40% of the base construction cost, nor land acquisition costs (CWP, 2007b). However, since grass swales serve as a conveyance measure, their cost is offset by the savings in curb and gutter, inlets, and storm sewer pipe as well as the reduction in other stormwater best management practices needed.

4.8.4 References

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APPENDIX H
CITY OF OTTAWA DESIGN CHECKLIST

McINTOSH PERRY

City of Ottawa

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

Criteria	Location (if applicable)
☐ Executive Summary (for larger reports only).	N/A
☐ Date and revision number of the report.	On Cover
☐ Location map and plan showing municipal address, boundary, and layout of proposed development.	Appendix A
☐ Plan showing the site and location of all existing services.	Site Servicing Plan (C102)
☐ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management
☐ Summary of pre-consultation meetings with City and other approval agencies.	Appendix B
☐ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management
☐ Statement of objectives and servicing criteria.	3.0 Pre-Consultation Summary

☐ Identification of existing and proposed infrastructure available in the immediate area.	N/A
☐ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	Site Grading Plan (C101)
☐ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Site Grading Plan (C101)
☐ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
☐ Proposed phasing of the development, if applicable.	N/A
☐ Reference to geotechnical studies and recommendations concerning servicing.	Section 2.0 Background Studies, Standards and References
☐ All preliminary and formal site plan submissions should have the following information: ○ Metric scale ○ North arrow (including construction North) ○ Key plan ○ Name and contact information of applicant and property owner ○ Property limits including bearings and dimensions ○ Existing and proposed structures and parking areas ○ Easements, road widening and rights-of-way ○ Adjacent street names	Site Grading Plan (C101)

4.2 Development Servicing Report: Water

Criteria	Location (if applicable)
☐ Confirm consistency with Master Servicing Study, if available	N/A
☐ Availability of public infrastructure to service proposed development	N/A
☐ Identification of system constraints	N/A
☐ Identify boundary conditions	Appendix C
☐ Confirmation of adequate domestic supply and pressure	N/A
☐ Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Appendix C
☐ Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	N/A
☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
☐ Address reliability requirements such as appropriate location of shut-off valves	N/A
☐ Check on the 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 the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range	Appendix C, Section 4.2

☐ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Site Servicing Plan (C101)
☐ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
☐ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Appendix C
☐ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

4.3 Development Servicing Report: Wastewater

Criteria	Location (if applicable)
☐ Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	N/A
☐ Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐ Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
☐ Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 5.2 Proposed Sanitary Sewer

☐ Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Section 5.3 Proposed Sanitary Design
☐ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	N/A
☐ Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 5.2 Proposed Sanitary Sewer
☐ Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A
☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐ Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

Criteria	Location (if applicable)
☐ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ Analysis of available capacity in existing public infrastructure.	N/A
☐ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Pre & Post-Development Plans
☐ Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5-year event (dependent on the receiving sewer design) to 100-year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ Set-back from private sewage disposal systems.	N/A
☐ Watercourse and hazard lands setbacks.	N/A
☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A
☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
☐ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5-year return period) and major events (1:100-year return period).	Appendix G

☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Site Grading Plan
☐ Calculate pre-and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Section 7.0 Proposed Stormwater Management Appendix G
☐ Any proposed diversion of drainage catchment areas from one outlet to another.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ 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 and related approval requirements.	N/A
☐ Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ 100-year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Site Grading Plan (C101)
☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A

☐ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 8.0 Sediment & Erosion Control
☐ Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
☐ Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

Criteria	Location (if applicable)
☐ 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 (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

Criteria	Location (if applicable)
☐ Clearly stated conclusions and recommendations	Section 9.0 Summary Section 10.0 Recommendations
☐ Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	All are stamped
☐ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	All are stamped