Site Servicing and Stormwater Management Report – Sélection Retraite - Orléans

Project # 160401451

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Prepared for:

Réseau Sélection Developpement Hors Quebec Inc.

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Sign-off Sheet

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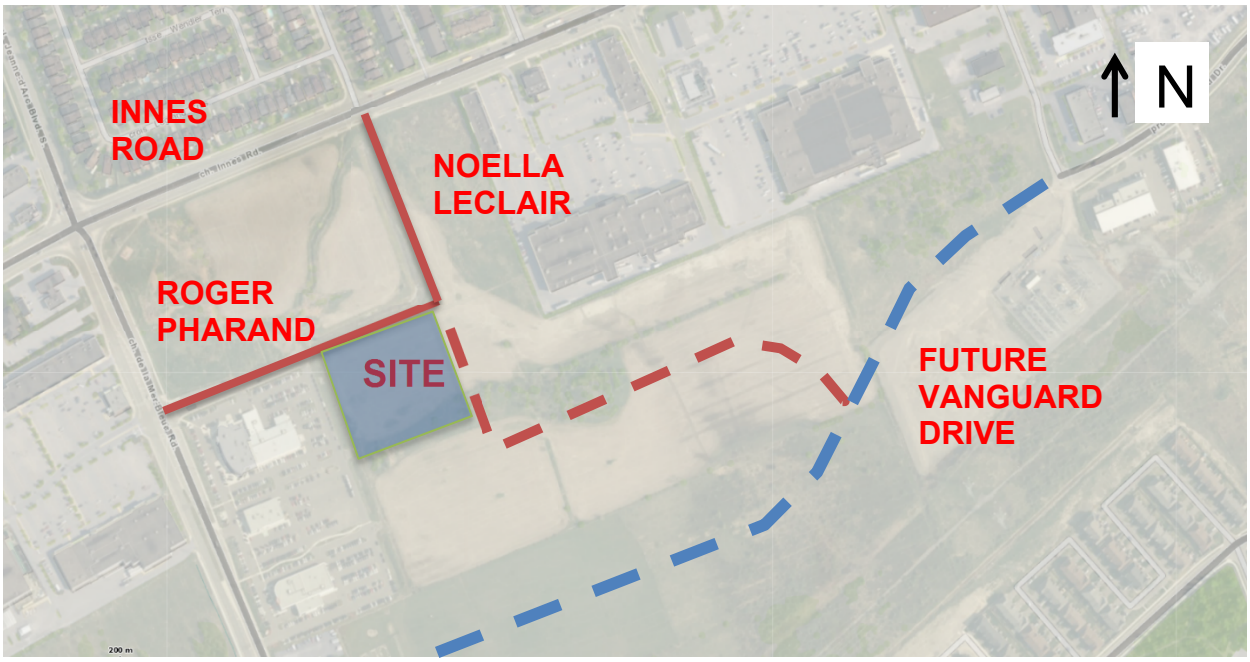
1.0 INTRODUCTION

Stantec Consulting Ltd. has been commissioned by Réseau Sélection Developpement Hors Quebec Inc. to prepare a servicing study in support of Site Plan Control submission of the proposed retirement residence development located at the intersection of Roger Pharand and Noella Leclair roadways. The site is situated southeast of the intersection and lies within the City of Ottawa. The property location is indicated in Figure 1. The proposed development comprises approximately 1.3ha of land, of which 1.16ha will be constructed as part of Phase 1 of the development. The intent of this report is to provide a servicing scenario for the site that is free of conflicts, provides on-site servicing in accordance with City of Ottawa design guidelines, and utilizes the existing local infrastructure in accordance with the background studies noted in Section 2.0, and as per consultation with City of Ottawa staff.

Figure 1: Location Plan



2.0 BACKGROUND

Documents referenced in preparation of the design for the proposed development include:

- Geotechnical Investigation – Proposed Pharand Lands-Commercial Developments – Innes Road, Patersongroup Consulting Engineers, April 24, 2006.
- Geotechnical Investigation – Proposed Multi-Storey Building – Phase 1 – Mer Bleue Road – Ottawa, Patersongroup Consulting Engineers, November 20, 2018.
- Geotechnical Investigation – Proposed Roadway Service Alignment – 2025 Mer Bleue Road – Ottawa, Patersongroup Consulting Engineers, March 20, 2017.
- Phase 1 Environmental Site Assessment, Proposed Commercial Property, Pharand Lands – Innes Road at Mer Bleue Road, Patersongroup Consulting Engineers, April 28, 2006.
- City of Ottawa Sewer Design Guidelines, City of Ottawa, October 2012.
- City of Ottawa Design Guidelines – Water Distribution, City of Ottawa, July 2010.
- Gloucester and Cumberland East Urban Community Expansion Area and Bilberry Creek Industrial Park Master Servicing Update, Stantec Consulting Ltd., July 2006.
- Pharand Lands, Innes Shopping Centres Limited – City of Ottawa, Stantec Consulting Ltd., February 22, 2012.
- Site Servicing and Stormwater Management Report – Orleans II Development Rezoning, Stantec Consulting Ltd., December 2016.
- Site Servicing and Stormwater Management Report – Orleans II Development – 2025 Mer Bleue Road, Stantec Consulting Ltd., March 2017.

3.0 WATER SUPPLY SERVICING

3.1 BACKGROUND

The proposed development comprises one retirement residence building comprising a total of 256 units, above and below ground parking areas, and amenity space. The residence building is to be phased to permit an initial development of 256 units, with the remaining 110 units as part of a second phase of construction. The site is located on the east side of Mer Bleue Road and south of the intersection with Innes Road. The site will be serviced via 200mm watermain connection directly to the existing 300mm watermain within Roger Pharand Road to the north, and in turn fed via 300mm mains within Mer Bleue Road and the existing 600mm watermain on Innes Road opposite from Wildflower Drive. Given the nature of the development, two connections to the 300mm watermain within Roger Pharand are proposed, separated by a line valve, to ensure that water supply to the facility will remain uninterrupted in the event of a planned or unplanned water outage. The property is located within the City's Pressure Zone 2E. Proposed ground elevations of the site vary from approximately 88.9m to 90.0m. Under normal operating conditions, hydraulic gradelines vary from approximately 127.3m to 130.8m as confirmed through boundary conditions as provided by the City of Ottawa during design of the adjacent commercial development to the north (see **Appendix A.3**).

3.2 WATER DEMANDS

Water demands for the development were estimated using the Ministry of Environment's Design Guidelines for Drinking Water Systems (2008), as well as the City of Ottawa's Design Guidelines for Water Distribution (2010). A daily per capita demand rate of 280L/person/day has been applied for the proposed development. Population estimates for the proposed residence units based on anticipated phasing is described in **Table 1** below, as well as within **Appendix A.1**. Additionally, commercial domestic demands have been estimated at 28,000 L/ha/day of floor area.

Table 1: Domestic Water Demands for Phase 1 and 2

Building ID	Area (m^2)	Population	Daily Rate of Demand (L/c/day)	Avg Day Demand	Max Day Demand	Peak Hour Demand
				(L/s)	(L/s)	(L/s)
1 Bedroom		315	280	1.02	1.53	2.76
2 Bedroom		197	280	0.64	0.96	1.73
3 Bedroom		34	280	0.11	0.17	0.30
Care unit		36	450	0.19	0.47	1.03
Commercial	305		2.8	0.01	0.01	0.03
Total Site:				**1.97**	**3.14**	**5.84**

As stated above, the average day demand (AVDY) for the ultimate site is 1.97L/s. The maximum daily demand (MXDY) is 2.5 times the AVDY for residential uses and 1.5 times for commercial area, which equates to 3.14L/s. The

peak hour demand (PKHR) is 2.2 times the MXDY for residential and 1.8 times for commercial areas, totaling 5.84L/s.

Non-combustible construction was considered in the assessment for fire flow requirements according to the FUS Guidelines and as specified in the Ontario Building Code section 3.2.2.48A. The building has been considered to be fully equipped with an automatic sprinkler system conforming to applicable NFPA requirements. 2hr rated fire separations are required on all floor assemblies. Based on calculations per the FUS Guidelines (**Appendix A.2**), the maximum required fire flows for the ultimate building are 9,000L/min (150 l/sec).

3.3 HYDRAULIC MODEL RESULTS

A hydraulic model of the water supply system was previously created by Stantec to assess the watermain layout within the existing commercial development under normal domestic demands and during fire flow scenarios. The model has been modified to include an additional node representing demands from the current proposed development. Results of the hydraulic modeling demonstrate that adequate flows are available for the subject site, with on-site pressures ranging from 54 psi to 59 psi under normal operating conditions. These values are within the normal operating pressure range as defined by MOECC and City of Ottawa design guidelines (desired 50 to 70 psi and not less than 40 psi). Results of the hydraulic model analysis can be found in **Appendix A.4**.

A fire flow analysis was carried out using the hydraulic model to determine the anticipated amount of flow that could be provided for the proposed development under maximum day demands and fire flow requirements per the FUS methodology. Results of the modeling analysis indicate that flows in excess of 9,000L/min (150 l/sec) can be delivered while still maintaining a residual pressure of 140 kPa (20 psi). Results of the hydraulic modeling are included for reference in Appendix A.4

3.4 SUMMARY OF FINDINGS

The proposed development is located in an area of the City's water distribution system that has sufficient capacity to provide both the required domestic and emergency fire flows. Based on boundary conditions as provided by City of Ottawa staff, fire flows are available for this development based on FUS guidelines and as per the City of Ottawa water distribution guidelines.

4.0 WASTEWATER SERVICING

4.1 BACKGROUND

The site will be serviced via the existing 250mm diameter sanitary sewer within Roger Pharand Road. The sewer directs flows to an existing 525mm diameter trunk sewer at the intersection of Lanthier Drive and Vanguard Drive and ultimately to the Tenth Line Road pumping station. A sanitary stub is not available to service the development. As such, it is proposed to make a new connection to the existing 250mm sanitary sewer (see **Drawing C200**).

For detailed information regarding the wastewater servicing and pump station improvements for the area, please refer to the Gloucester and Cumberland East Urban Community Expansion Area and Bilberry Creek Industrial Park Master Servicing Update (Stantec, July 2006).

4.2 DESIGN CRITERIA

As outlined in the City of Ottawa Sewer Design Guidelines and the MOE's Design Guidelines for Sewage Works, the following criteria were used to calculate estimated wastewater flow rates and to size the sanitary sewers:

- Minimum Velocity – 0.6 m/s (0.8 m/s for upstream sections)
- Maximum Velocity – 3.0 m/s
- Manning roughness coefficient for all smooth wall pipes – 0.013
- Minimum size – 200mm dia. for residential areas, 250mm for commercial areas
- Average Wastewater Generation (Commercial) – 28,000L/ha/day
- Average Wastewater Generation (Residential) – 280L/person/day
- Average Wastewater Generation (Care Units) – 450L/person/day
- Population Density (1 Bedroom Apartment) – 1.4persons/unit
- Population Density (2 Bedroom Apartment) – 2.1persons/unit
- Population Density (3 Bedroom Apartment) – 3.1persons/unit
- Peak Factor – per Harmon's equation with correction factor of 0.8
- Extraneous Flow Allowance – 0.33 l/s/ha (conservative value)
- Manhole Spacing – per Ottawa Sewer Design Guidelines
- Minimum Cover – 2.5m

4.3 PROPOSED SERVICING

The proposed site will be serviced by gravity sewers which will direct the wastewater flows (approx. 7.0 L/s with allowance for infiltration) to the existing 250mm diameter sanitary sewer. The proposed drainage pattern is detailed on **Drawing C600**. A sanitary sewer design sheet for the proposed service lateral is included in **Appendix B.1**. Full port backwater valves are to be installed on all sanitary services within the site to prevent any potential surcharge from the downstream sanitary sewer from impacting the proposed property.

5.0 STORMWATER MANAGEMENT

5.1 OBJECTIVES

The objective of this stormwater management plan is to determine the measures necessary to control the quantity/quality of stormwater released from the proposed development to criteria established by the *Pharand Lands – Innes Shopping Centres Limited – Serviceability Study (Stantec, February 2012*) for the region, and to provide sufficient detail for approval and construction.

5.2 SWM CRITERIA AND CONSTRAINTS

Criteria were established by combining current design practices outlined by the City of Ottawa Design Guidelines (2012), and through consultation with City of Ottawa staff. The following summarizes the criteria, with the source of each criterion indicated in brackets:

General

- Use of the dual drainage principle (City of Ottawa).
- Wherever feasible and practical, site-level measures should be used to reduce and control the volume and rate of runoff. (City of Ottawa).
- Assess impact of 100-year event outlined in the City of Ottawa Sewer Design Guidelines on major & minor drainage system (City of Ottawa).
- Enhanced quality control (80% TSS removal) to be provided on-site for the development.

Storm Sewer & Inlet Controls

- Proposed site to ultimately discharge to the existing 1350mm diameter storm sewer stub at the intersection of Wildflower Drive and Innes Road at the northern boundary of the subject site (City of Ottawa).
- Proposed storm sewers to be sized to service existing and future commercial/light industrial developments to the south and east of the subject site as per background reports (Pharand Lands Serviceability Study).
- Minor system inflow to be restricted for all contributing areas to 50L/s/ha (Pharand Lands Serviceability Study).
- Minor system inflow for municipal ROW contributing areas to be limited to 100L/s/ha (Pharand Lands Serviceability Study).
- 100-year Storm HGL to be a minimum of 0.30 m below building foundation footing (City of Ottawa).

Surface Storage & Overland Flow

- Building openings to be a minimum of 0.30m above the 100-year water level (City of Ottawa).
- No overland flow is to be permitted from internal sites to the municipal ROW (Pharand Lands Serviceability Study).
- Sites to provide minimum storage of 200 m3/ha or sufficient storage to contain 100-year storm event on-site, whichever is greater (Pharand Lands Serviceability Study).
- Road storage to be maximized where possible to provide 130 m3/ha of storage (Pharand Lands Serviceability Study).
- Maximum depth of flow under either static or dynamic conditions shall be less than 0.35m (City of Ottawa)
- Provide adequate emergency overflow conveyance off-site (City of Ottawa)

5.3 STORMWATER MANAGEMENT

The intent of the stormwater management plan presented herein is to mitigate any negative impact that the proposed development will have on the existing storm sewer infrastructure, while providing adequate capacity to service the proposed buildings, parking and access areas. The proposed stormwater management plan is designed to detain runoff on the surface within a proposed dry pond, and in the subsurface to ensure that peak flows after construction will not exceed the allowable site release rate detailed below.

5.3.1 Allowable Release Rate

Based on background information, the peak post-development discharge from the entirety of the development area to the minor system is to be limited to 50L/s/ha of contributing area. Per tributary areas depicted on **Drawing C500**, the development measures approximately 1.3ha in area, and therefore a total allowable discharge of 65L/s.

5.3.2 Storage Requirements

The site requires quantity control measures to meet the restrictive stormwater release criteria. Inlet control devices in combination with surface grading to permit storage within a proposed dry pond are proposed. Discharge from the dry pond as well as the building roof drains are proposed to then be controlled via a subsurface storage facility (StormTech unit). **Drawing SD-1** indicates the ICD size, location, storage volume, and design release rate of such controls.

5.3.3 Uncontrolled Catchments

Due to grading constraints, some subcatchments were designed without a storage component. These areas flow offsite uncontrolled and are not tributary to the subsurface storage facility. Areas that discharge offsite without entering the proposed stormwater management system must be compensated for in areas with controls, as drainage will re-enter the storm sewer system downstream of the proposed site. **Table 2** and **Table 3** summarize the peak uncontrolled 2 and 100-year catchment release rates for catchments that are non-tributary to the controlled outlet sewer.

Table 2: Peak Uncontrolled (Non-Tributary) 2-Year Release Rate

Area ID	Area (ha)	C	Tc (min)	Intensity (mm/hr)	Qrelease (L/s)
UNC 1	0.104	0.27	10	76.8	6.0

Table 3: Peak Uncontrolled (Non-Tributary) 100-Year Release Rate

Area ID	Area (ha)	C	Tc (min)	Intensity (mm/hr)	Qrelease (L/s)
UNC 1	0.104	0.34	10	178.6	17.4

5.3.4 Surface Storage

It is proposed to detain stormwater on the surface in a proposed dry pond and within the paved parking area via a singular inlet control device mounted at the last catch basin manhole in series from the pond to the receiving storm sewer. The modified rational method was employed to determine the peak volume stored in surface ponding areas. The inlet control device was sized based on the available storage volumes during the 2 and 100-year storm events and to meet the target release rate for the site.

The invert of the receiving catch basin has been set above the top of the downstream subsurface storage facility to ensure no backwater exists on the proposed ICD.

The inlet control device (ICD) was sized with the orifice equation $Q = C_d A(2gh)^{1/2}$ where:

- Cd = 0.61
- A = Area of Orifice (m2)
- g = 9.81 m/s2
- h = design head (m)

The design head used to determine restricted flow rates through the proposed orifice was measured from the downstream water level up to the level of surface ponding in the catchment area.

Table 4 and **Table 5** summarize the total controlled release rates tributary to the subsurface storage facility:

Table 4: Peak Controlled (Surface) 2-Year Release Rate

Area ID	Area (ha)	C	Head (m)	Qrelease (L/s)	Vstored (m^3)
PRKG	0.772	0.62	0.89	31.3	45.5

Table 5: Peak Controlled (Surface) 100-Year Release Rate

Area ID	Area (ha)	C	Head (m)	Qrelease (L/s)	Vstored (m^3)
PRKG	0.772	0.78	1.68	43.0	197.7

5.3.5 Subsurface Storage

Discharge from the dry pond as well as that from the building rooftops and ramp to underground parking are proposed to be directed to a subsurface storage facility (StormTech unit). The storage facility and accompanying ICD have been sized to store the entirety of the 100-year event with release approximating the available peak discharge from the site. **Tables 6** and **7** summarize the total controlled release rates from the proposed storage facility:

Table 6: Peak Controlled (Surface) 2-Year Release Rate

Area ID	Area (ha)	C	Head (m)	Qrelease (L/s)	Vstored (m^3)
BLDG, RAMP	0.424	0.90	1.53	44.4	22.3

Table 7: Peak Controlled (Surface) 100-Year Release Rate

Area ID	Area (ha)	C	Head (m)	Qrelease (L/s)	Vstored (m^3)
BLDG, RAMP	0.424	1.00	1.53	44.4	283.6

5.3.6 Results

Table 8 and Table 9 demonstrate that the proposed stormwater management plan provides adequate attenuation storage to meet the target peak outflow rates for the site.

Table 8: Peak Controlled (Surface) 2-Year Release Rate

Area Type	Area (ha)	Vstored (m^3)	Qrelease (L/s)	Target (L/s)
Uncontrolled	0.104	0	6.0	
Controlled – Surface	0.772	45.5	31.3	
Controlled – Subsurface	0.424	22.3	44.4	
Total	**1.30**	**67.8**	**50.4**	**65.0**

Table 9: Peak Controlled (Surface) 2-Year Release Rate

Area Type	Area (ha)	Vstored (m^3)	Qrelease (L/s)	Target (L/s)
Uncontrolled	0.104	0	17.4	
Controlled – Surface	0.772	197.7	43.0	
Controlled – Subsurface	0.424	283.6	44.4	
Total	**1.30**	**481.3**	**61.8**	**65.0**

*Note: Figures may not sum exactly due to rounding. Controlled surface release rates included in figure presented for Controlled subsurface areas.

5.4 QUALITY CONTROL

On-site quality control measures are expected for the proposed redevelopment per section 3.1.2.5.2 of the Gloucester Cumberland EUC & BCIP Servicing Update. It is assumed that enhanced protection (80% removal of suspended solids) will be required for the site similar to existing areas of the BCIP. As a result, an oil grit separator has been proposed to treat runoff from impervious areas directed to the proposed dry pond. The oil-grit separator unit will be privately maintained and located as shown on **Drawing C200**. The OGS unit has been sized via tools as provided by the manufacturer (Hydro International) to validate whether the unit is appropriate for the area. The analysis included as part of **Appendix C.3** indicates that the unit provides a minimum of 80% TSS removal for the site, meeting water quality objectives for the downstream Bilberry Creek. The downstream SWMF additionally provides quality control to normal protection criteria (70% TSS removal). As the majority of impervious surfaces are directed to the on-site OGS unit, suspended solids within runoff generated by the site are not anticipated to have a deleterious impact on downstream watercourses.

6.0 GRADING AND DRAINAGE

The proposed development measures approximately 1.3ha in area. The topography across the site is relatively flat, and currently drains from west to east. A detailed grading plan (see **Drawing C300**) has been provided to satisfy the stormwater management requirements, adhere to permissible grade raise restrictions (see **Section 10.0**) for the site, and provide for minimum cover requirements for storm and sanitary sewers where possible. Site grading has been established to provide emergency overland flow routes required for stormwater management in accordance with City of Ottawa requirements.

The subject site maintains emergency overland flow routes for flows deriving from storm events in excess of the maximum design event to the proposed and future municipal rights-of-way at the northern and eastern boundaries of the development, and ultimately to Innes Road as depicted in **Drawing C300**. Future areas to the south and east of the development are anticipated to maintain overland flow routes to the future Vanguard Road extension.

7.0 UTILITIES

As the subject site is bound to the north and west by an existing commercial business park, and by a municipal right-of-way to the north, Hydro, Bell, Gas and Cable servicing for the proposed development should be readily available. It is anticipated that existing infrastructure will be sufficient to provide a means of distribution for the proposed site. Exact size, location and routing of utilities will be finalized after design circulation

8.0 APPROVALS

Environmental Compliance Approval (ECAs, formerly Certificates of Approval (CofA)) under the Ontario Water Resources Act are not expected to be a requirement for the development as approval was already obtained for storm and sanitary sewer usage within the north-south and east-west shared access routes as a part of the existing commercial development, the proposed property is of a single parcel of non-industrial use, and discharges to approved separated sewers constructed as part of the previously approved commercial development to accommodate the current site.

9.0 EROSION CONTROL DURING CONSTRUCTION

Erosion and sediment controls must be in place during construction. The following recommendations to the contractor will be included in contract documents.

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit extent of exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with plastic or synthetic mulches.
6. Provide sediment traps and basins during dewatering.
7. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
8. Plan construction at proper time to avoid flooding.

The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:

9. Verification that water is not flowing under silt barriers.
10. Clean and change silt traps at catch basins.

Refer to **Drawing C400** for the proposed location of silt fences, straw bales and other erosion control structures

10.0 GEOTECHNICAL INVESTIGATION AND ENVIRONMENTAL ASSESSMENT

A geotechnical Investigation Report was prepared by Patersongroup dated November 20, 2018. The report summarizes the existing soil conditions within the entirety of the development and construction recommendations. For details which are not summarized below, please see the original Paterson report.

Subsurface soil conditions within the subject area were determined from 5 boreholes and 8 test pits (2006) distributed across the site. In general soil stratigraphy consisted of topsoil underlain by a silty clay deposit to depths of 3 to 3.8m below ground. Bedrock/inferred bedrock elevations range from depths of 0.6 to 9.1m below ground surface. Groundwater Levels were measured in October 2018, and vary in elevation from 1.7m to 2.76m below ground surface.

Grade raise fill restriction recommendations for grading within 6m of a building footprint was identified as 1m, and a 2m raise in parking areas and access lanes.

The required pavement structure for proposed hard surfaced areas are outlined in **Table 10 and 11** below:

Table 10: Pavement Structure – Car Only Parking Areas

Thickness (mm)	Material Description
50	Wear Course – HL 3 or Superpave 12.5 Asphaltic Concrete
150	Base – OPSS Granular A Crushed Stone
300	Subbase - OPSS Granular B Type II
-	Subgrade – Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or bedrock.

Table 11: Pavement Structure – Access Lanes and Heavy Truck Parking Areas

Thickness (mm)	Material Description
40	Wear Course – HL-3 or Superpave 12.5 Asphaltic Concrete
50	Binder Course – HL-8 or Superpave 19.0 Asphaltic Concrete
150	Base – OPSS Granular A Crushed Stone
450	Subbase - OPSS Granular B Type II
-	Subgrade – Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or bedrock.

11.0 CONCLUSIONS

11.1 WATER SERVICING

Based on the supplied boundary conditions for existing watermains and estimated domestic and fire flow demands for the subject site, it is anticipated that the proposed servicing in this development will provide sufficient capacity to sustain the required domestic demands and emergency fire flow demands of the proposed site. Fire flows greater than those required per the FUS Guidelines are available for this development.

11.2 SANITARY SERVICING

The proposed sanitary sewer network is sufficiently sized to provide gravity drainage of the site. The proposed development will be serviced by a network of gravity sewers which will direct wastewater flows to the existing 250mm dia. sanitary sewer stub constructed as part of the approved commercial development to the north. The proposed drainage outlet to the east has sufficient capacity to receive sanitary discharge from the site based on the findings of the Gloucester and Cumberland EUC Master Servicing Update.

11.3 STORMWATER MANAGEMENT

The proposed stormwater management plan is in compliance with the goals specified through consultation with the City of Ottawa. On-site storage facilities and connected ICDs have been proposed to limit peak storm sewer inflows to downstream storm sewers to 50L/s/ha for privately owned areas as determined by background reports. The downstream receiving sewer has sufficient capacity to receive runoff volumes from the site based on the findings of the Gloucester and Cumberland EUC Master Servicing Update.

11.4 GRADING

Grading for the site has been designed to provide an emergency overland flow route as per City requirements and reflects the recommendations made in the Geotechnical Investigation Report prepared by Patersongroup. Erosion and sediment control measures will be implemented during construction to reduce the impact on existing facilities.

11.5 UTILITIES

Utility infrastructure exists within the adjacent ROW at the northern boundary of the proposed site. It is anticipated that existing infrastructure will be sufficient to provide a means of distribution for the entirety of the development. Exact size, location and routing of utilities will be finalized after design circulation.

11.6 APPROVALS/PERMITS

An MOECP Environmental Compliance Approval is not expected to be required as approval was obtained for the receiving storm and sanitary sewers as part of the previously approved commercial development to the north. No other approval requirements from other regulatory agencies are anticipated