Servicing and Stormwater Management Report - Norberry Residences - 740 Springland Drive

Project # 160401483

Prepared for:
Great Wise Developments

Prepared by:
Stantec Consulting Ltd.

July 18, 2019

Sign-off Sheet

This document entitled Servicing and Stormwater Management Report -Norberry Residences - 740 Springland Drive was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Great Wise Developments (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by _____
(signature)

Cameron Odam, Engineer Intern

Approved by _____
(signature)

Dustin Thiffault, P.Eng.

Stantec

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 BACKGROUND

Stantec Consulting Ltd. has been retained by Great Wise Developments to prepare a servicing and stormwater management report in support a zoning By-law amendment and site plan control submission. The development is located at 740 Springland Drive, Norberry Residences Ltd., within the existing Riverside Park Community in the City of Ottawa, displayed in **Figure 1**.

The proposed site is 5.68ha and currently consists of three 6-storey and one 10-storey residential apartment building for a total of 761 units. Each building is independently serviced.

The proposed development includes the construction of three new 4-storeyresidential buildings within the existing site property for a total of 231 additional units. The construction will also include modifications to the existing parking areas within the entire site. The proposed design is to have each new building block serviced independently to existing infrastructure, similar to the existing buildings, while revising existing and proposed parking areas as illustrated on the site plan "Proposed Site Plan Norberry Residence" by Roderick Lahey Architect Inc March 20, 2018, seen in **Appendix E**.

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 guidelines outlined per consultation with City of Ottawa staff.

Background
July 18, 2019

Figure 1 – Proposed Site Plan Location

2.0 REFERENCES

Documents referenced in preparation of this report include:

- Assessment of Adequacy of Public Services for Great Wise Developments, 740 Springland Drive, Ottawa ON, David Schaeffer Engineering Ltd., September 2017, Revision 1
- City of Ottawa Sewer Design Guidelines, 2nd Ed., City of Ottawa, October 2012
- City of Ottawa Design Guidelines – Water Distribution, Infrastructure Services Department, City of Ottawa, First Edition, July 2010
- GEOTECH

3.0 POTABLE WATER SERVICING

3.1 EXISTING CONDITIONS

The proposed 740 Springfield Drive development is a part of pressure zone 2C of the City of Ottawa water distribution system. Potable water is supplied to the site via a 200mm watermain within Norberry Crescent and a 300mm watermain on Springland Drive located just south of the Billings Bridge Pump station.

3.2 WATER DEMANDS

Water demands for the development were estimated using the Ministry of Environment's Design Guidelines for Drinking Water Systems (2008) and the Ottawa Design Guidelines – Water Distribution (2010). A daily rate of 350 L/cap/day has been applied for the population of the proposed site. The total estimated population count for all three proposed buildings is 416 persons based on a combined unit count of 231 using the average apartment unit density of 1.8 persons/unit set out by the City of Ottawa Water Distribution Guidelines. See **Appendix A.1** for detailed domestic water demand estimates.

The water demand for each building is displayed in **Table 1**below:

Table 1 - Domestic Water Demand Summary

Building ID	Unit Count	Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hourly Demand (L/s)
A	84	151	0.61	1.53	3.37
B	75	135	0.55	1.37	3.01
C	72	130	0.53	1.31	2.89
Total	231	416	1.68	4.21	9.26

Ordinary construction was considered in the assessment for fire flow requirements according to the FUS Guidelines. The FUS Guidelines indicate that low hazard occupancies include apartments, dwellings, dormitories, hotels, and schools, and as such, a low hazard occupancy / limited combustible building contents credit was applied. A sprinkler system conforming to NFPA 13 was considered, and a credit applied per FUS Guidelines. Based on calculations per the FUS Guidelines, the minimum required fire flows for this development are 200L/s (12,000L/min for Buildings A and B).

Based on Fire Underwriters' Survey (FUS) fire flow demand calculations (see **Appendix A**) the fire flow demands for each of the proposed buildings are displayed in **Table 2** below:

Table 2 - Building Fire Flow Demand Summary

Building ID	Building A	Building B	Building C
FUS Fire flow demand (L/s)	200	200	167

3.3 BOUNDARY CONDITIONS

Boundary conditions for two connection points along the Norberry Crescent 200mm watermain were provided by the City of Ottawa for the three demand scenarios. Connection point one corresponds to building A and connection point two applies to building B and C.

Boundary conditions were initially provided assuming a worst-case fire flow scenario between all the proposed buildings of 250L/s. Further assessment of the proposed buildings based on FUS criteria has determined a minimum fire flow requirement of 200L/s (see Section 3.4 below).

The following is a summary of the boundary conditions received from the City of Ottawa in an email dated June 18, 2019 (see **Appendix A**), and are displayed in **Table 3** below organized by Building ID:

Table 3 - Watermain Boundary Conditions for Hydraulic Analysis

Demand Scenario	**Building A**	**Building B**	**Building C**
Minimum HGL During Peak Hour Demand	125m	125m	125m
Max HGL – Average Day Demand	133.7m	133.7m	133.7m
HGL For Maximum Day + Fire Flow Demands	108m	102m	102m

Finished floor elevations used in the analysis are presented in **Drawing GP-1** found in **Appendix E.**

3.4 PROPOSED SERVICING

Water supply is proposed to be connected to each building independently, feeding directly off the adjacent 200mm watermain on Norberry Crescent. Each building is proposed to be fitted

with two 50mm service connections. The two connections per building will be required given the average day demand exceeds 50 m^3/day, as per the City of Ottawa Technical Bulletin ISTB 2014-02. The proposed servicing layout can be found in the **SSP Drawing** found in **Appendix E.**

Per the boundary conditions provided by the City of Ottawa and based on an site elevations per **Drawing GP-1**, adequate flows are available for the subject site with pressures ranging from 48.1m (68.4psi) to 57.3m (81.4psi) under average day and peak hour conditions. This pressure range is slightly above the guidelines of 50 - 80 psi based on Ottawa's Design Guidelines for Water Distribution. Per the Ontario Plumbing Code, services to buildings with pressures that are expected to exceed 550kPa (80psi) require the use of pressure reducing valves. However, assuming a 5psi head loss per floor of development, pressure reducing valves will only be required for the first floor.

Under emergency fire flow conditions, the minimum pressure in the distribution system is allowed to drop to 140kPa (20 psi).

Using boundary conditions for the proposed development under maximum day demands and a fire flow requirement of 200L/s per the FUS methodology, it can be confirmed that the system will maintain a residual pressure of approximately 35.7 psi; which is in excess of the required 140 kPa (20 psi). The above demonstrates that the existing watermain within Norberry Crescent can provide adequate fire and domestic flows in excess of flow requirements for the subject site. Existing hydrants along Norberry Crescent provide adequate building coverage and are located within 45m of proposed building fire department connections per Ontario Building Code requirements.

3.5 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. A pressure reducing valve is proposed for all three buildings for the first floor to maintain a maximum pressure of 80psi.

4.0 WASTEWATER SERVICING

4.1 EXISTING CONDITIONS

The proposed site is surrounded by a 225mm diameter sanitary sewer on Norberry Crescent and a 525mm sanitary sewer on Springland Drive, all of which form part of the Rideau River Collector Sewer catchment area. Both sewers within the adjacent rights-of-way are available to service the proposed buildings.

The four existing residential buildings on site are serviced by the Springland Drive 525mm diameter sanitary sewer adjacent to the subject site.

A residual flow capacity analysis by DSEL was performed based on contributary areas. It was determined in their Assessment of Adequacy of Services Report for Great Wise Developments (2017), see **Appendix B**, that there is a residual capacity of 16.1 L/s available in the north end of the sanitary sewer on Norberry Crescent.

4.2 DESIGN CRITERIA

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

- Minimum Full Flow Velocity – 0.6 m/s
- Maximum Full Flow Velocity – 3.0 m/s
- Manning's roughness coefficient for all smooth walled pipes – 0.013
- Average Wastewater Generation – 280L/cap/day
- Peak Factor – 4.0 (Harmon's)
- Extraneous Flow Allowance – 0.33 l/s/ha
- Manhole Spacing – 120 m
- Minimum Cover – 2.5m
- Population Density for Average Apartment– 1.8 pers./apartment

4.3 PROPOSED SERVICING

The proposed buildings will be serviced independently based on an overall waste generation for 416 people in addition to an assumed infiltration rate for the development area. The service connections consist of a 135mm diameter pipe that increases at an immediate manhole to a 200mm diameter pipe which outlets to the existing 225mm diameter sanitary sewer within the Norberry Crescent right of way. The contributing flow considers infiltration for only the building area given that there is only a small service connection pipe at the outer edge of the property

vulnerable to infiltration. The layout for the sanitary service connections can be found in the **OSSP-1 Drawing** in **Appendix E**. The calculations made to determine the projected sanitary outflows are set out in the sanitary design sheet found in **Appendix B** and summarized in **Table 4** below.

Table 4 - Sanitary Outflow Summary

Building ID	Total Sanitary Outflow (L/s)
A	1.8
B	1.6
C	1.5
Total	**4.9 L/s**

The estimated wastewater flow generation for the proposed site changes is 4.9 L/s which is well under the downstream flow capacity of 16.08 L/s, set out in the Assessment of Adequacy of Public Service by DSEL engineering (September 2017). Therefore, the sanitary outflow from the proposed development is predicted to be well within the capacity of the downstream wastewater infrastructure.

5.0 STORMWATER MANAGEMENT AND SERVICING

5.1 OBJECTIVES

The overall site has been provided stormwater management criteria set out by the City of Ottawa. Stormwater management criteria will be applied for site areas being redeveloped, whereas existing buildings and parking areas to remain will discharge to their contributing sewers per predevelopment conditions.

The site has been divided into subcatchments for both existing and post-development conditions. Each subcatchment is characterized as either developed or undeveloped for the means of determining which criteria applies.

The existing and proposed stormwater drainage areas are displayed in the **SD-1** and **EXSD Drawings** found in **Appendix E.**

5.1.1 Proposed Development Areas

The objective of this stormwater management (SWM) plan is to determine the measures necessary to control the post development peak minor system release rate from the 100-year storm event to that of the 5-year storm under existing conditions for on-site areas to be redeveloped (approximately 1.51ha of the 5.59ha site). Quality control will also be required for runoff associated with the proposed development areas.

5.1.2 Undeveloped Areas

The areas of the site not being redeveloped are not anticipated to require further modifications to the stormwater management plan. Areas not under redevelopment expect negligible change in runoff coefficient values, and thus would indicate no change in stormwater runoff quantity or direction for such areas..

5.2 SWM CRITERIA AND CONSTRAINTS

The stormwater runoff coming from the site are tributary to the Sawmill Creek sub-watershed and is part of the City of Ottawa sewer system. The stormwater management criteria for the proposed site have therefore been set out by City of Ottawa staff and the City of Ottawa Sewer Design Guidelines. The following summarizes the criteria used in the preparation of this stormwater management plan:

- Stormwater runoff from the proposed Building A, B and C and affected adjacent parking lots up to and including the 100-year event to be stored on site and released into the minor system at the 5-year storm release rate for the developed areas under existing conditions, at a maximum rate equivalent to 282.3 L/s for the for the portion of the site that will be developed.
- Maximum 100-year water depth of 0.35 m in parking and access areas
- Provide adequate emergency overflow conveyance (overland flow route) off-site for redeveloped areas. It is of note that some areas not forming part of the site redevelopment area may not have been designed with an overland flow outlet to the municipal right-of-way. Such areas are to remain as per existing conditions.
- Size storm sewers to convey 5-year storm event, assuming only roof controls are imposed. (i.e. provide capacity for system without inlet control devices installed)
- Size storm sewers using an inlet time of concentration (Tc) of 10 minutes.
- Quality control of runoff from the proposed developed areas with a TSS removal efficiency of 80% is to be provided on site prior to discharge into the Norberry Crescent Right of Way.
- Proposed sites to discharge the existing 1200mm diameter storm sewer running east along Springland Drive ROW at the boundary of the subject site and ultimately to Sawmill Creek (City of Ottawa).
- Post-development runoff coefficient (C) value based on proposed impervious areas as per site plan drawing (see **Appendix E**)
- Pre-development runoff coefficient (C) value based on existing impervious areas as per existing conditions / removals drawing (see **Appendix E**)

5.3 STORMWATER MANAGEMENT DESIGN

The proposed changes to the residential development will consist of adding three (3) four-storey buildings, revisions to existing parking and landscaped areas and associated servicing infrastructure. The remainder of the site will incur minimal to no changes from its existing conditions.

Stormwater runoff from the proposed development will be directed to the existing storm sewers on Norberry Crescent. Sump pumps and backwater valves will be provided for foundation drainage of the proposed buildings. The proposed site plan and existing storm sewer infrastructure on Norberry Crescent are shown on **Drawing SSP-1**.

5.3.1 Design Methodology

The proposed stormwater management plan is designed to detain runoff on the rooftops and on surface areas to ensure that peak flows after construction will not exceed the target release rates for the site.

Areas of the site incurring changes due to the newly proposed buildings and parking revisions will be controlled where possible via inlet control devices (ICDs) installed within receiving catch basins in order to restrict the peak minor system release rate to the target amount.

Any areas being developed that were left uncontrolled are as a result of grading restrictions, in particular to allow for emergency overland flow runoff from the proposed site and to avoid impacts to existing or proposed building openings. These uncontrolled release rates were compensated for by over controlling in other developed areas where inlet control devices (ICDs) were implemented.

5.3.2 Allowable Release Rate

The Modified Rational Method was used to assess the quantity and volume of runoff generated during post development conditions. The site was subdivided into subcatchments (subareas) tributary to storm sewer inlets, as defined by the location of catchbasins / inlet grates and used in the storm sewer design (see **Appendix C**). A summary of subareas and runoff coefficients is also provided in **Appendix C**, and **Drawing SD-1** indicates the stormwater management subcatchments, found in **Appendix E**.

City of Ottawa staff have provided the quantity control criteria for the overall site, with criteria specified for the developed areas. The City of Ottawa staff have outlined that the minor system target criteria for these areas is such that the 100-year post development release rate must be at most equal to the 5-year release rate of the same areas under existing conditions.

In order to determine this 5-year target release rate the Modified Rational Method was employed to assess the rate of runoff for existing conditions for the areas of the site being developed. Runoff coefficients (C) for the identified catchment areas have been calculated based on actual pervious and impervious areas shown on the existing site plan. C coefficient values have been increased by 25% for the post-development 100-year storm event based on MTO Drainage Manual recommendations.

A summary of the existing subcatchments used to establish the target release rate is displayed below in **Table 5**.

Q = 2.78 CiA
Where: Q = peak flow rate, L/s
A = drainage area, ha
I = rainfall intensity, mm/hr (per Ottawa IDF curves)
C = site runoff coefficient

Table 5: Target Release Rates

Existing Areas to be Developed	Area (ha)	Runoff Coefficient (C value)	5-year $Q_{release}$ (L/s)
EX-6	0.42	0.66	80.7
EX-16	0.48	0.58	80.8
EX-17	0.41	0.90	106.4
Ex-18	0.05	0.20	2.8
Ex-20	0.19	0.21	11.6
Post Development Target			**282.3**

5.3.3 Existing Development to Remain

The remaining 4.08ha of the development constituting areas EX1 through EX5, EX7 through EX15, and EX19 are not anticipated to receive significant changes with respect to tributary impervious area, and are not proposed to receive storm sewer modifications.

The area and runoff coefficient for the portions of the site to remain was summarized based on **Drawing SD-1** and **Drawing-EXSD**. The AxC values listed in the table below measure the area multiplied by the runoff coefficient during predevelopment and post-development. The imperviousness of the subcatchments vary individually based on soft landscaping being added to areas and hard surfacing to others, however, changes to overall AxC are negligible. A summary of the calculated pre-development and post-development AxC values is displayed in **Table 6** below.

Table 6: AxC Comparison Summary for Existing Areas to Remain

Area ID	Pre Development AxC	Post Development AxC
EX-1	0.091	0.094

EX-2	0.094	0.100
EX-3	0.209	0.208
EX-4	0.497	0.432
EX-5	0.208	0.208
EX-7	0.015	0.015
EX-8	0.495	0.464
EX-9	0.055	0.055
EX-10	0.201	0.259
EX-11	0.049	0.056
EX-12	0.209	0.209
EX-13	0.209	0.209
EX-14	0.118	0.132
EX-15	0.034	0.034
EX-19	0.062	0.07
Total	**2.54**	**2.54**

5.3.4 Storage Requirements

The site requires quantity control measures to meet the stormwater release criteria. It is proposed that restricted release rooftop drains are to be used to reduce the peak outflow from the site. Additionally, surface storage on parking areas will be provided. Detailed stormwater management calculations are provided in **Appendix C**.

5.3.4.1 Rooftop Storage

It is proposed to retain stormwater on the rooftops by installing restricted flow roof drains. The following calculations assume the roof will be equipped with Watts drains 25% open, see **Appendix C** for details.

Watts Drainage "Accutrol" roof drain weir data has been used to calculate a practical roof release rate and detention storage volume for the rooftops. It should be noted that the "Accutrol" weir has been used as an example only, and that other products may be specified for use, provided that the total roof drain release rate is restricted to match the maximum rate of release indicated in **Table 7**, and that sufficient roof storage is provided to meet (or exceed) the resulting volume of detained stormwater.

Further details regarding the retention of stormwater on the proposed rooftop during the 5 and 100-year storm events can be found in **Appendix C**.

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

Area ID	Area (ha)	Head (m)	$Q_{release}$ (L/s)	V_{stored} (m^3)
BLDGA	0.12	0.14	7.37	40
BLDGB	0.11	0.14	7.31	33.7
BLDGC	0.12	0.14	7.37	40

5.3.4.2 Surface Storage

In addition to rooftop storage, it is proposed to detain stormwater on the surface parking lot areas and in two pipe sections using inlet control devices (ICDs) in the proposed drainage structures. The modified rational method was used to determine the peak volume requirement for the parking areas. **Table 8** summarizes the proposed ICD characteristics.

Table 8: 5 and 100 Year ICD Characteristics

Area ID	Structure ID	Orifice Type	5-year Head (m)	5-year Release Rate (L/s)	100-year Head (m)	100-year Release Rate (L/s)
L103B	CB203	LMF 95	1.48	9.7	1.63	10.2
L103A	CB201	83mm Diameter Orifice	1.58	5.4	1.63	18.7
L102A	CB200B	LMF 80	1.54	7.1	1.66	7.4
L301A	AREA DRAIN 301	127mm Diameter Orifice	1.38	40.2	1.56	42.8
L300A	AREA DRAIN 300	127mm Diameter Orifice	1.38	40.2	1.56	42.8
L101B	CB207	102mm Diameter Orifice	1.28	11.1	1.32	25.4

5.3.5 Uncontrolled Area

A small portion of the site fronting and adjacent to Norberry Crescent (EX-18, UNC-2) could not be graded to enter the site's storm sewer system and will sheet drain uncontrolled on to the adjacent street. The runoff from drainage area F100A flows into a trench drain and is to connect with the adjacent on-site building's internal plumbing. These uncontrolled areas are displayed on **Drawing SD-1. Table 9** and

Table 10 below summarize the 5 and 100-year uncontrolled release rates from the proposed development.

Table 9: Peak Uncontrolled (Tributary) 5-Year Release Rate

Area ID	Area (ha)	Runoff 'C'	$Q_{release}$ (L/s)
F100A	0.11	0.49	15.6
UNC-2	0.05	0.30	4.6
EX-18	0.06	0.31	5.7

Table 10: Peak Uncontrolled (Tributary) 100-Year Release Rate

Area ID	Area (ha)	Runoff 'C'	$Q_{release}$ (L/s)
F100A	0.11	0.61	33.4
UNC-2	0.05	0.38	9.9
EX-18	0.06	0.39	12.2

5.3.6 Results

The proposed redeveloped areas have a 100-year minor system release rate of 276.6 L/s, which lies below the predevelopment release rate of 282.23 L/s. Therefore, the proposed stormwater network for the developed areas meets the stormwater management quantity control criteria set out by the City of Ottawa.

These results are quantified in **Table 11** below:

Table 11: Proposed Development Release Rate Summary

Proposed Developed Area of Site		
Flow Classification	**100-year Release Rate (L/s)**	**Target Release Rate (L/s)**
Controlled Runoff	169.1	**282.3**
Uncontrolled Runoff	107.5	
Total	**276.6**	

5.3.7 Water Quality Control

On-site water quality control is required to provide 80% TSS removal prior to discharging to Springland Drive and ultimately to Sawmill Creek . There are three Stormceptor units (model STC300) proposed downstream of the proposed buildings and parking areas to treat runoff from impervious surfaces prior to release to the existing downstream minor system. The Stormceptors will provide greater than 80% TSS removal per detailed sizing calculations for included in **Appendix C.4**.. The Stormceptor units will be privately maintained. The location and general arrangement of the Stormceptor units are indicated on **Drawing SD-1**.

6.0 GRADING AND DRAINAGE

A grading and drainage plan has been prepared which satisfies the stormwater management requirements and any grade raise restrictions for the site. Site grading has been established to provide an overland flow route required for stormwater management directed in its majority towards Norberry Crescent. Grades along the property lines of the site have been set to tie smoothly into the existing grades.

The subject site maintains emergency overland flow routes for flows deriving from storm events in excess of the maximum design event to the existing Springland Drive and Norberry Crescent as depicted in **Drawing GP-1**.

7.0 APPROVALS

Ontario Ministry of the Environment, Conservation and Parks (MOECP) Environmental Compliance Approvals (ECA) are not expected to be required as the subject site is not industrial in nature, and is a single parcel under singular ownership where each proposed building is to maintain a separate drainage and storm sewer system discharging to a pre-existing sewer system.

The subject site is not adjacent to any floodplain or watercourse, and no modifications are proposed that would require an application for alteration of a watercourse from the local Conservation Authority under the Lakes and Rivers Improvement Act. The Rideau Valley Conservation Authority will need to be consulted to obtain municipal approval for site development. There are no municipal drains adjacent to this site and no other approvals are required from other regulatory agencies.

8.0 GEOTECHNICAL INVESTIGATION

A geotechnical investigation was conducted by Paterson Group Inc. in March 2019 titled "*Geotechnical Investigation - Proposed Multi-Storey Buildings Norberry Crescent Ottawa, Ontario*". The following is a summary of existing soil conditions encountered within the subject area and construction recommendations. For details which are not summarized below, please see original Paterson Group report. . The subsurface profile at the borehole locations consists of asphaltic concrete followed by a silty sand with gravel fill overlying a hard to stiff silty clay crust and a grey, very stiff to firm silty clay deposit. Glacial till was encountered below the above noted layers consisting of dense to compact silty clay with sand to sandy silt with clay, gravel, cobbles and boulders. Practical refusal to augering on inferred bedrock was encountered in BH 2 to BH 5 and BH 8 at depths ranging between 5.3 to 7.0 m.

It is expected that the long-term groundwater level will be at a depth ranging between 2.5 to 3.5 m below existing grade. It should be noted that the groundwater level is subject to seasonal fluctuations. Therefore, groundwater could vary at the time of construction. (see **Appendix D** for excerpts from the geotechnical report). It is anticipated that groundwater infiltration into the excavations should be controllable using open sumps. Pumping from open sumps should be sufficient to control the groundwater influx through the sides of shallow excavations. The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium.

Geological mapping indicates the subject site is located in an area where the bedrock consists of limestone of the Bobcaygeon Formation. The overburden drift thickness is anticipated to be between 5 to 10 m in depth.

The native soil or approved fill has been considered to be an acceptable subgrade surface on which to commence backfilling for floor slab construction. Any soft areas should be removed and backfilled with appropriate backfill material. OPSS Granular A or Granular B Type II, with a maximum particle size of 50 mm, are recommended for backfilling below the floor slab.

Pavement structures for driveways and access routes are provided in **Table 12** and

Table 13 below.

Table 12 - Recommended Flexible Pavement Structure – 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 OPSS Granular B Type II material placed over in situ soil or fill.

Table 13 - Recommended Flexible 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
300	**Subbase –** OPSS Granular B Type II
-	**Subgrade** – Either fill or OPSS Granular B Type I or II material placed over in situ soil or fill.

9.0 EROSION AND SEDIMENT 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:

- Limit extent of exposed soils at any given time.
- Re-vegetate exposed areas as soon as possible.
- Minimize the area to be cleared and grubbed.
- Protect exposed slopes with plastic or synthetic mulches.
- Install silt fence to prevent sediment from entering existing ditches.
- Provide sediment traps and basins during dewatering.
- Install filter cloth between catchbasins and frames.
- Plan construction at proper time to avoid flooding.

Establish material stockpiles away from watercourses, so that barriers and filters may be installed.

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

1. Verification that water is not flowing under silt barriers.
2. Clean and change filter cloth at catch basins.

Refer to **Drawing ECDS-1** for the proposed location of silt fences, straw bales, filter cloth and other erosion control structures.

Utilities
July 18, 2019

10.0 UTILITIES

Hydro, Bell, Gas and Cable servicing for the proposed development should be readily available within subsurface utility infrastructure within or within close proximity to the subject site. It is anticipated that existing infrastructure will be sufficient to provide the means of distribution for the proposed site. Detailed design of the required utility services will be further investigated as part of the composite utility planning process following design circulation.

11.0 CONCLUSION

11.1 POTABLE WATER

The proposed residential 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 the modeling results and the boundary conditions determined, fire flow demands in excess of 12,000 L/min will be available within the watermain network proposed for the development.

The minimum pressure of **68.4 psi** (**472 kPa)** observed under peak demand conditions is within the acceptable pressure range of 40 psi (275kPa) to 80 psi (552kPa). No additional measures are required to address minimum pressure conditions.

The maximum static pressure of **81.4 psi (561 kPa)** observed under average day demand is within the acceptable pressure range of 50 psi (345kPa) to 80 psi (552kPa). Per the Ontario Plumbing Code, services to buildings with pressures that are expected to exceed 550kPa (80psi) require the use of pressure reducing valves.

11.2 SANITARY SERVICING

The proposed buildings are to have their wastewater serviced independently. The proposed sanitary sewer laterals are sufficiently sized to provide gravity drainage for the site. The proposed blocks will be serviced by 200 mm diameter service laterals directing wastewater flows to the existing 225 mm dia. Norberry Crescent sanitary sewer. A backflow preventer will be required for the proposed buildings in accordance with the Ottawa sewer design guidelines and will be coordinated with building mechanical engineers. The proposed sanitary drainage pattern is in accordance with the City of Ottawa Sewer Design guidelines and falls within the outlined downstream sewer capacity set out in the Assessment of Adequacy of Public Service by DSEL engineering (September 2017).

11.3 STORMWATER SERVICING

The proposed stormwater management plan is in compliance with the goals specified by the City of Ottawa staff and with the City of Ottawa Design guidelines. Rooftop, pipe, and surface storage in combination with ICDs are proposed to limit inflow from the site area into the minor system to the required target release rates. Quality control will be achieved by on-site oil grit separators sized to achieve 80% TSS removal as required.

11.4 GRADING

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

11.5 UTILITIES

All utilities (Hydro Ottawa, Bell Canada, Rogers Ottawa, and Enbridge Gas) have existing plants in the subject area. Exact size, location and routing of utilities will be finalized after design circulation.

11.6 APPROVALS

Ontario Ministry of the Environment, Conservation and Parks (MOECP) Environmental Compliance Approvals (ECA) are not expected to be required for the subject site.

The Rideau Valley Conservation Authority will need to be consulted to obtain municipal approval for site development.

No other approvals are anticipated to be required from other regulatory agencies.