Servicing Report – 689 Churchill Avenue North

Project # 160401400

Prepared for:
TC United Group

Prepared by:
Stantec Consulting Ltd.

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Sign-off Sheet

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Prepared by _____
(signature)

Karin Smadella, P.Eng.

Reviewed by _____
(signature)

Kris Kilborn

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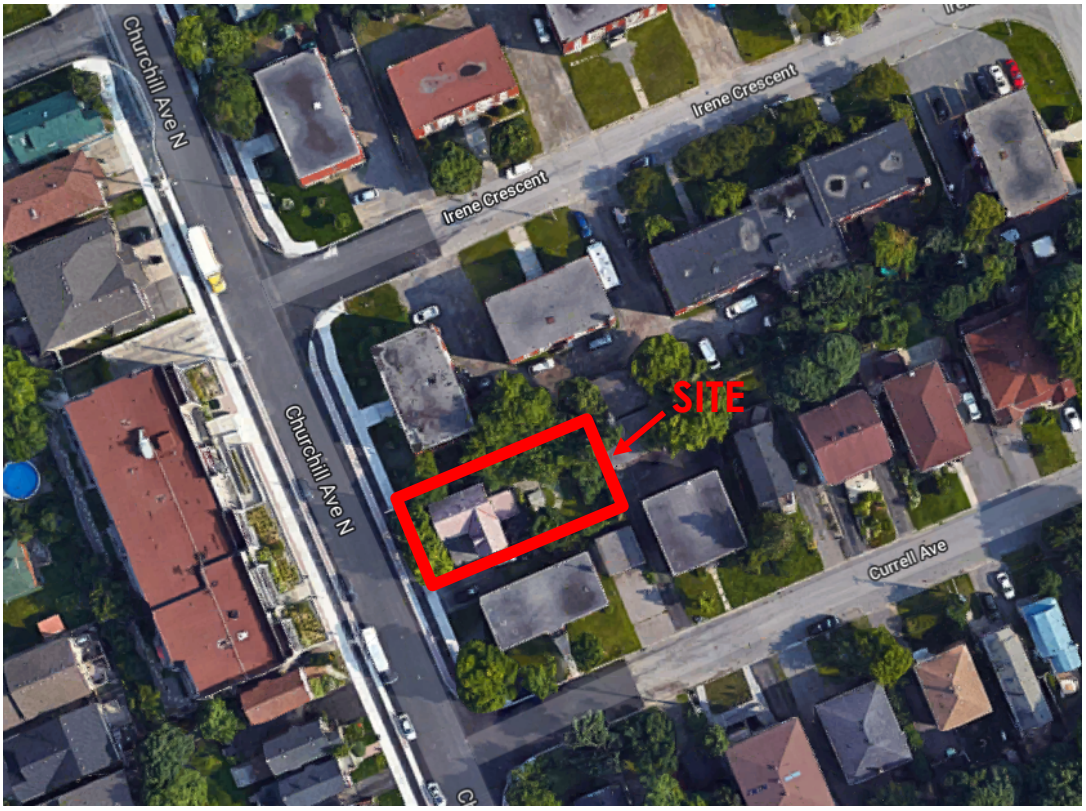
1.0 INTRODUCTION

Stantec Consulting Ltd. has been commissioned by TC United Group to prepare a servicing study in support of Site Plan Control submission of the proposed development located at 689 Churchill Avenue North. The site is situated on the east side of Churchill Avenue North, north of Currell Avenue within the City of Ottawa. The proposed development would replace an existing two storey residential property with a three-storey apartment unit comprising 15 total residential units. The location of the proposed development is shown in **Figure 1**. The 0.05ha (0.12 acre) site is presently zoned R4Q and permits the proposed development plan. 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.

Figure 1: Location Plan



2.0 BACKGROUND

Documents referenced in preparation of the design for the 689 Churchill Avenue North development include:

- Geotechnical Investigation Report– Proposed Residential Development – 689 Churchill Avenue North, Ottawa Ont, Stantec Consulting, April 30, 2018.
- City of Ottawa Sewer Design Guidelines, City of Ottawa, October 2012.
- City of Ottawa Design Guidelines – Water Distribution, City of Ottawa, July 2010.

3.0 WATER SUPPLY SERVICING

3.1 BACKGROUND

The proposed development comprises one three storey residential apartment building, complete with associated infrastructure and access areas. The site is located on the east side of Churchill Avenue North and north of Currell Avenue. The site will be serviced via a 50mm building service connection to the existing 400mm dia. watermain within the Churchill Avenue North ROW at the western boundary of the site. The property is located within the City's Pressure Zone 1W. Ground elevations of the site are approximately 77.8m. Under normal operating conditions, hydraulic gradelines vary from approximately 108.8m to 114.6m as confirmed through boundary conditions as provided by the City of Ottawa (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). A daily rate of 350 L/cap/day has been applied for the population of the proposed site. Population densities have been assumed as 1.4 pers./one bedroom apartment units and 2.1 pers./two bedroom apartment units. See **Appendix A.1** for detailed domestic water demand estimates.

The average day demand (AVDY) for the entire site was determined to be 0.09 L/s. The maximum daily demand (MXDY) is 2.5 times the AVDY (residential property), which equals 0.23 L/s. The peak hour demand (PKHR) is 2.2 times the MXDY, totaling 0.5 L/s.

Wood frame 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. Based on calculations per the FUS Guidelines (**Appendix A.2**), the maximum required fire flows for this development are 167 L/s (10,000L/min).

3.3 PROPOSED SERVICING

Per the boundary conditions provided by the City of Ottawa and based on an approximate elevation on-site of 77.8m, adequate flows are available for the subject site with pressures ranging from 31.0m (44.1 psi) to 36.8m (52.3psi). This pressure range is outside of those listed by Ottawa's Design Guidelines for Water Distribution (40-80psi), however, no rehabilitation or reconstruction works are currently proposed by the City to increase pressures in the region.

Using boundary conditions for the proposed development under maximum day demands and the calculated fire flow requirement of 10,000L/min per the FUS methodology, it can be confirmed

that the system will maintain a required minimum residual pressure of 140 kPa (20 psi). The above demonstrates that the existing watermain within Churchill Avenue North can provide adequate fire and domestic flows in excess of flow requirements for the subject site. An existing hydrant is located approximately 44m west of the subject site at the north east corner of the intersection of Irene Crescent Avenue and Churchill Avenue.

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 an existing 300mm diameter sanitary sewer situated within the Churchill Avenue North ROW (see **Drawing SSP-1**). It is proposed to make one 135mm diameter service lateral connection to the existing sewer to service the proposed site.

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
- Average Wastewater Generation – 350L/cap/day
- Peak Factor – 4.0 (Harmon's)
- Extraneous Flow Allowance – 0.33 l/s/ha (conservative value)
- Manhole Spacing – 120 m
- Minimum Cover – 2.5m
- Average Apartment Population Density – 1.4 pers./one bedroom unit
- Average Apartment Population Density – 2.1 pers./two bedroom unit

4.3 PROPOSED SERVICING

The proposed site will be serviced by a sanitary service which will direct the wastewater flows (approx. 0.31 L/s with allowance for infiltration) by gravity to the existing 300mm diameter sanitary sewer. The proposed drainage pattern is detailed on **Drawing SSP-1**. 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 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 during the pre-consultation process, 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)
- The proposed site is not subject to quality control criteria due to the predominantly developed neighborhood and distance from the storm sewer outfall (City of Ottawa).

Storm Sewer & Inlet Controls

- Size storm sewers to convey at minimum the 5 year storm event under free-flow conditions using City of Ottawa I-D-F parameters (City of Ottawa).
- Site discharge rates for each storm event to be restricted to 5-year storm event pre-development rates with a maximum pre-development C coefficient of 0.5.
- Proposed site to discharge the proposed 675mm diameter storm sewer within the Churchill Avenue ROW at the western boundary of the subject site (City of Ottawa).
- 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 0.15m above the maximum sill over point on the road
- 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 Modified Rational Method was employed to assess the rate and volume of runoff generated during post-development conditions. The site was subdivided into subcatchments (subareas) tributary to stormwater controls as defined by the location of inlet control devices. A summary of subareas and runoff coefficients is provided in **Appendix C** and **Drawing SD-1** indicates the stormwater management subcatchments.

5.3.1 Allowable Release Rate

Based on consultation with City of Ottawa staff, the peak post-development discharge from the subject site is to be limited to that of the 5-year event discharge under pre-development conditions, to a maximum discharge coefficient C of 0.5. The predevelopment release rate for the area has been determined using the rational method based on the criteria above. A time of concentration for the predevelopment area (10 minutes) was assigned based on the relatively small site and its proximity to the existing drainage outlet for the site. C coefficient values have been increased by 25% for the post-development 100-year storm event based on MTO Drainage Manual recommendations. Peak flow rates have been calculated using the rational method as follows:

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

The target release rate for the site is summarized in **Table 1** below:

Table 1: Target Release Rates

Design Storm	Target Flow Rate (L/s)
All Events	7.11

5.3.2 Storage Requirements

The site requires quantity control measures to meet the restrictive stormwater release criteria. It is proposed that rooftop storage via restricted roof release and inlet-control devices be used to reduce site peak outflow to target rates.

5.3.2.1 Rooftop Storage

It is proposed to retain stormwater on the building rooftops by installing restricted flow roof drains. The following calculations assume the roof will be equipped with standard Watts Model R1100 Accuflow Roof Drains.

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 2, and that sufficient roof storage is provided to meet (or exceed) the resulting volume of detained stormwater. Proposed drain release rates have been calculated based on the Accutrol weir setting at ¼ open. Storage volume and controlled release rate are summarized in **Table 2**:

Table 2: Roof Control Area

Design Storm	Depth (mm)	Discharge (L/s)	Volume Stored (m^3)
5-Year	97.9	1.56	2.15
100-Year	133.8	1.79	5.56

5.3.2.2 Surface Storage

It is proposed to detain stormwater within the rear catchbasin, 300mm diameter lead and the front yard catchbasin equipped with an IPEX Type LMF 55 ICD to reduce peak outflow from the proposed site. The catchbasin will release by gravity to the proposed 675mm diameter storm sewer to the west of the site. Should the catchbasin discharge orifice become blocked, flows will spill from the catchbasin grate overland to the west of the property. It is proposed to maintain a separate building connection to the storm sewer for building foundation drains/weeping tile to ensure operation of the catchbasin does not impact perimeter drainage of the building foundation.

The modified rational method was employed to determine the peak volume stored in the catchbasins & catchbasin leads. The Inlet control device was sized based on the available target release rate from the site during the 5 year storm event.

Table 3 summarizes the estimated storm release rates and storage volumes during the 5 and 100 events.

Table 3: 5 and 100 Year Peak Surface Volume and Controlled Discharge Summary

Control Structure	ICD	5-Year Event			100-Year Event		
		Discharge (L/s)	Vrequired (m3)	Vavailable (m3)	Discharge (L/s)	Vrequired (m3)	Vavailable (m3)
CB100	LMF 55	3.76	0.01	3.17	3.76	1.65	3.17

The inlet control device (ICD) was sized based on head/discharge curves as provided by the manufacturer (IPEX).

Downstream water levels were considered to be at the receiving sewer obvert immediately downstream of the proposed CB. Refer to calculations included as part of **Appendix C** for details.

5.3.2.3 Uncontrolled Area

Due to grade restrictions, one subcatchment has been designed without a storage component. This catchment area discharge off-site uncontrolled to the adjacent Churchill Avenue or are directed to internal plumbing. Peak discharge from uncontrolled area have been considered in the overall SWM plan and have been balanced through overcontrolling proposed site discharge rates to meet target levels.

Table 4 : Uncontrolled Non-Tributary Area (UNC-1)

Design Storm	Discharge (L/s)
5-Year	1.53
100-Year	2.98

5.3.3 Results

Table 5 demonstrates that the proposed stormwater management plan provides adequate attenuation storage to meet the target peak outflow rates for the site.

Table 5: Summary of Total 5 and 100 Year Event Release Rates

	5-Year Peak Discharge (L/s)	100-Year Peak Discharge (L/s)
Uncontrolled	1.53	2.98
Controlled	3.76	3.76
Total	**5.29**	**6.74**
Target	**7.11**	**7.11**

*Roof Drain Connected to 300mm diameter storage pipe.

6.0 GRADING AND DRAINAGE

The proposed development site measures approximately 0.05 ha in area. The topography across the site is relatively flat, and currently has split drainage with approximately ¼ of the site draining to the municipal right of way and the balance draining to the north, with overland flow directions split between the Churchill Avenue ROW and rear yards to the northeast. The grading for the proposed development has been designed to direct all stormwater to Churchill Avenue. A detailed grading plan (see **Drawing GP-1**) has been provided to satisfy the stormwater management requirements for the site, and provide cover requirements for storm and sanitary sewers.

The subject site maintains emergency overland flow routes for flows deriving from storm events in excess of the maximum design event based on existing drainage patterns as depicted in **Drawing GP-1.**

7.0 UTILITIES

As the subject site lies within a mature developed residential community, 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, along with determination of any off-site works required for redevelopment, will be finalized after design circulation.

8.0 APPROVALS

As the site will be under single private ownership and discharges to a pre-existing separated sewer system, an Ontario Ministry of Environment Conservation and Parks (MOECP) Environmental Compliance Approval (ECA, formerly Certificate of Approval (CofA)) under the Ontario Water Resources Act is not expected to be a requirement for the development to proceed.

Requirement for a MOECP Permit to Take Water (PTTW) for sewer construction dewatering and building footing excavation will be confirmed by the geotechnical consultant.

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 ECDS-1** for the proposed location of silt fences and other erosion control structures.

10.0 GEOTECHNICAL INVESTIGATION AND ENVIRONMENTAL ASSESSMENT

A geotechnical Investigation Report was prepared by Stantec Consulting on April 30, 2018. The report summarizes the existing soil conditions within the subject area and construction recommendations. For details which are not summarized below, please see the original Stantec report (excerpts included in **Appendix D)**.

Subsurface soil conditions within the subject area were determined from 2 boreholes distributed across the proposed site. In general soil stratigraphy consisted of surficial fill material including asphalt overlying by limestone bedrock.

Bedrock is anticipated to lie at a depth of 1.3m below ground surface as both borehole encountered refusal. Significant grade raises are not planned on the proposed site as proposed grades are very similar to existing. Groundwater levels were measured on April 13, 2018 at approximately 3.1m below ground surface and will be subjected to fluctuation due to seasonal changes and precipitation events.

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 both 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 site will be serviced by a gravity sewer service lateral which will direct wastewater flows (approx. 0.31 L/s) to the existing 300mm dia. sanitary sewer within the Churchill Avenue ROW. The proposed drainage outlet has sufficient capacity to receive sanitary discharge from the site based on pre-consultation through City of Ottawa staff.

11.3 STORMWATER SERVICING

The proposed stormwater management plan is in compliance with the goals specified through consultation with the City of Ottawa. On-site catchbasins connected to an ICD has been proposed to limit peak storm sewer inflows to downstream storm sewers to predevelopment levels as determined by City of Ottawa staff. The downstream receiving sewer has sufficient capacity to receive runoff volumes from the site based on pre-consultation through City of Ottawa staff.

11.4 GRADING

Grading for the site has been designed to provide an emergency overland flow route as per City requirements. Erosion and sediment control measures will be implemented during construction to reduce the impact on existing facilities.

11.5 UTILITIES

Utility infrastructure exists within overhead lines within the Churchill Avenue ROW. 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.

11.6 APPROVALS/PERMITS

As the site will be under single private ownership and discharges to a pre-existing separated sewer system, an Ontario Ministry of Environment Conservation and Parks (MOECP) Environmental

Compliance Approval (ECA, formerly Certificate of Approval (CofA)) under the Ontario Water Resources Act is not expected to be a requirement for the development to proceed.

No other approval requirements from other regulatory agencies are anticipated.