

TECHNICAL MEMORANDUM

DATE: FEBRUARY 4, 2021 (REVISED)

TO: MIKE WIEBE

FROM: FRANCOIS THAUVETTE

RE: ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES **PROPOSED MIXED-USE DEVELOPMENT- 1335 & 1339 BANK STREET**

PROJECT: 119210 (NOVATECH REPORT REF. # R-2019-195)

Novatech has been retained by Lofty Riverside Development to assess the adequacy of the public services related to the proposed re-development of the 1335 & 1339 Bank Street properties. The proposed mixed-use development will consist of a 26-storey residential tower with a 7-storey podium, ground floor commercial space (i.e. café/bar, fitness gym), two levels of underground parking as well as indoor and outdoor amenity spaces. The purpose of this assessment is to demonstrate that the proposed development can be serviced by the municipal infrastructure surrounding the subject site.

This assessment includes a review of approximately 120m of the municipal sanitary sewer along Bank Street, from the westbound section of Riverside Drive down to the 1200mm dia. Rideau River collector sewer in the eastbound section of Riverside Drive, south of the site. Also included in the assessment is the review of the available municipal watermain network. The intent is to service the proposed development by extending new services to the municipal sanitary sewer and watermain in Bank Street. A second water service is being provided off Riverside Drive (south of the property) for redundancy purposes. Stormwater from the site will be directed to the municipal storm sewer in Riverside Drive, north of the site, which outlets to the Rideau River.

Figure 1: Aerial View of the Subject Site



The subject site currently consists of two (2) separate properties located on the east side of Bank Street, which cover a total area of approximately 0.28 hectares. The existing sites include:

- a used car dealership (1335 Bank Street), located immediately south of the Rideau River and Riverside Drive (southbound), and
- a Harvey's Restaurant and associated parking lot (1339 Bank Street), located immediately to the south of the used car dealership

The properties will be merged to accommodate the proposed mixed-use development. As indicated on **Figure 1**, the subject site is bounded by Riverside Drive to the north and south, Bank Street to the west and by a multi-storey commercial tower and associated parking lot to the northeast. The irregular property directly to the south is owned by the National Capital Commission (NCC).

The Serviceability Report (R-816-65A), dated October 2017, prepared by T.L. Mak Engineering Consultants Ltd. for the proposed development of a 16-storey mixed-use building on the 1335 Bank Street property was also reviewed to compare the results of the current assessment with the values previously submitted to the City of Ottawa.

The City of Ottawa's Municipal Design and Construction division is proposing a new capital works project for this area, referred to as the Bank Street Renewal Project. Construction for this project is currently being forecast for 2022, pending City council approval. The project currently proposes upgrading of the existing watermain, replacement of the existing sanitary sewer and extension of a new storm sewer in front of the subject property.





Sanitary Servicing

The existing commercial properties on the east side (1335 & 1339) and west side (1330, 1340 & 1346) of Bank Street, are currently being serviced by the existing 225mm dia. sanitary sewer in Bank Street. It is assumed that the property at 2211 Riverside Drive is also tributary to the sanitary sewer in Bank Street. There are no other upstream properties contributing flow to this sewer segment. The municipal sanitary sewer in Bank Street flows south and outlets into the 1200mm dia. Rideau River collector sewer located within the eastbound section of Riverside Drive, south of the site.

The preliminary Bank Street Renewal project includes an upgraded 250mm dia. PVC sanitary sewer in Bank Street. Based on discussions with City staff, it is assumed that the new sanitary sewer will be in place to accommodate the proposed development. If the new sewers are not yet installed, the proposed development could outlet to the existing 225mm dia. sanitary sewer in Bank Street. The service lateral would then have to be re-connected to the future 250mm dia. sanitary sewer, once constructed.

Based on criteria in Section 4 of the City of Ottawa Sewer Design Guidelines, the total theoretical peak sanitary flows from the existing commercial sites (1335 & 1339 Bank Street), tributary to the 225mm dia. sewer, were calculated to be approximately 0.34 L/s. Detailed sanitary flow calculations are provided in **Appendix A** for reference. The existing flows calculated for the 1335 Bank Street property are consistent with the values calculated in the Serviceability Report (R-816-65A), prepared by T.L. Mak Engineering Consultants Ltd.

Sanitary flows for the proposed mixed-use development (1335 & 1339 Bank Street), were calculated using the Ottawa Sewer Design Guidelines, based on information provided by the architect. Under post-development conditions, the total theoretical peak sanitary flow has increased to approximately 6.85 L/s. Detailed sanitary flow calculations are provided in **Appendix A** for reference. Contributing flows from the properties on the west side of Bank Street are assumed to remained unchanged.

An analysis of the existing 225mm dia. sanitary sewer system was completed to estimate the total peak flows tributary to this sewer, including flows from the west side of Bank Street, down to the 1200m dia. sanitary collector sewer in Riverside Drive. The City's geoOttawa website was used to determine existing sanitary sewer sizes, invert elevations, and the tributary drainage areas. Despite the increase in total theoretical flow, the analysis demonstrates that existing municipal infrastructure has enough excess capacity to service the proposed mixed-use development. Refer to the Pre-Development and Post-Development Sanitary Sewer Drainage Area Plans, sanitary sewage calculations and to the Post-Development Sanitary Sewer Design Sheet provided in **Appendix A** for details. It is assumed that the proposed building will be serviced by a 200mm dia. (8") sanitary service at a minimum slope of 1.0%. Refer to **Figure 2** for conceptual servicing layout.

The future sanitary sewer will have additional capacity due to it being a larger 250mm dia. PVC pipe at a steeper slope of 1.0% and will therefore also have sufficient capacity to accommodate the tributary peak flows calculated above. The sanitary sewage calculations and servicing design will be refined as part of the Site Plan Control Application to the City. An updated sanitary servicing analysis will be provided as part of the detailed design of this project, incorporating the current Bank Street Renewal detailed design information.

Water for Domestic Use and Firefighting

The existing commercial properties on the east side of Bank Street are currently being serviced by the existing 200mm dia. watermain in Bank Street. It is expected that under post-development conditions, the proposed development will continue to be serviced by the municipal watermain in

Bank Street. As per City of Ottawa Technical Bulletin (ISDTB-2014-02), the proposed development will require a second water service, as the daily water demands are greater than 50m³/day (0.58 L/s). Based on discussions with the City of Ottawa, the second (redundant) connection will be serviced off the existing watermain in Riverside Drive (south of the subject site). It is assumed that the building will be sprinklered and therefore serviced by two 150mm dia. water services. Refer to **Figure 2** for conceptual servicing layout.

Preliminary water demand and fire flow calculations have been prepared for the proposed development based on criteria in Section 4 of the City of Ottawa Design Guidelines for Water Distribution Systems. The fire flows are calculated using the Fire Underwriters Survey (FUS) method, based on general assumptions and information provided by the architect, including building materials, a design population of 623 residents (i.e. 388 residential units) and approximately 1,861m² of commercial space. Preliminary water demands and fire flows are summarized in in the table below.

| Proposed Building Use (1335 & 1339 Bank St.) | Avg. Daily Demand (L/s) | Max. Daily Demand (L/s) | Peak Hour Demand (L/s) | Fire Flow (L/s) |
|---|-------------------------------|-------------------------------|------------------------------|-----------------------|
| Residential + Commercial | 2.6 L/s | 6.4 L/s | 14.0 L/s | 183 L/s |

The domestic water demands represent approximately three and a half (3.5) times the domestic demands calculated in the Serviceability Report (R-816-65A), previously prepared by T.L. Mak Engineering Consultants Ltd., however these latter values were for a 16-storey mixed-use development on the 1335 Bank Street property <u>only</u>. The proposed FUS fire flow has increased, due to the size and design of the building (now including a 26-storey residential tower with a 7-storey podium, covering <u>both</u> the 1335 & 1339 Bank Street properties).

The following design criteria were taken from Section 4.2.2 – 'Watermain Pressure and Demand Objectives' of the City of Ottawa Design Guidelines for Water Distribution:

- Normal operating pressures are to range between 345 kPa (50 psi) and 483 kPa (70 psi) under Max Day demands
- Minimum system pressures are to be 276 kPa (40 psi) under Peak Hour demands
- Minimum system pressures are to be 140 kPa (20 psi) under Max Day + Fire Flow demands

The following table summarizes preliminary hydraulic analysis results based on municipal watermain boundary conditions provided by the City of Ottawa.

| Municipal Watermain Boundary Condition | Boundary Condition | Normal Operating Pressure Range (psi) | Anticipated WM Pressure (psi)* | | | | | | | | |
|---|-----------------------|---|--------------------------------------|--|--|--|--|--|--|--|--|
| WM Connection 1: Bank Street | | | | | | | | | | | |
| Minimum HGL (Peak Hour Demand) | 125.0 m | 40 psi (min.) | ~ 93 psi | | | | | | | | |
| Maximum HGL (Max Day Demand) | 132.5 m | 50 - 70 psi | ~ 104 psi | | | | | | | | |
| HGL (Max Day + Fire Flow) | 127.0 m | 20 psi (min.) | ~ 96 psi | | | | | | | | |

| WM Connection 2: Riverside Drive | | | | | | | | | | | |
|-----------------------------------|---------|---------------|-----------|--|--|--|--|--|--|--|--|
| Minimum HGL (Peak Hour Demand) | 125.0 m | 40 psi (min.) | ~ 93 psi | | | | | | | | |
| Maximum HGL (Max Day Demand) | 132.4 m | 50 - 70 psi | ~ 104 psi | | | | | | | | |
| HGL (Max Day + Fire Flow) | 109.6 m | 20 psi (min.) | ~ 71 psi | | | | | | | | |

*Based on an approximate roadway elevation of 59.5m in both Bank Street and Riverside Drive service connections.

Based on preliminary calculations the pressure within the municipal watermain network will exceed the upper end of the normal operating pressure range during Peak Hour and Max Day Conditions. Pressure reducing valves (PRV) will be required given the high system pressures. However, given the height of the proposed tower, it is also anticipated that a booster pump(s) will be required to provide adequate water pressure to the upper floors. The following watermain works are being included as part of the Bank Street Renewal project:

- Replacement and upsizing of the existing watermain in Bank Street with a new 300mm dia. PVC watermain
- Extension of an additional local 300mm dia. watermain from the existing 610mm dia. feedermain (discharge pipe from the Billings Bridge Pump Station) and looping it to the watermain in Bank Street

As part of the local improvements, the City of Ottawa will also be constructing a new watermain between Billings Avenue and Sarah Billings Place, south of the Riverside Hospital, to facilitate servicing for the adjacent streets. This new municipal loop should also benefit the proposed development, without relying on the private Hospital watermain. The proposed watermain upgrades will provide the redundancy and adequate fire flow for the subject site.

A multi-hydrant approach to firefighting will be required to supply the fire flow calculated above. This approach is in accordance with the City of Ottawa Technical Bulletin ISTB-2018-02. A complete analysis will be provided as part of the detailed design phase of the project, based on discussions with the City of Ottawa.

Refer to **Appendix B** for preliminary domestic water demand, FUS fire flow calculations, email correspondence from the City of Ottawa, including **Figure W1** (Conceptual Watermain Servicing Sketch) for details.

Storm Drainage and Stormwater Management

On-site stormwater management (SWM) will be required given the proximity of the site to the Rideau River. A SWM design and report, including on-site stormwater quantity control will be prepared as part of the Site Plan Control application. Stormwater quality control is not required since rainwater runoff from rooftop drainage and landscaped areas are considered clean for the purpose of protecting water quality for aquatic habitat. The SWM criteria have been provided based on pre-consultation meetings with the City of Ottawa and the Rideau Valley Conservation Authority (RVCA). Based on discussions with the architect, it is anticipated that all stormwater runoff from the building roofs and rooftop amenity areas will be directed to an internal SWM storage tank and the peak flows will be controlled to meet the City of Ottawa quantity control requirements. The proposed storm service will outlet to the existing storm sewer in Riverside Drive, where flows are ultimately directed to the Rideau River, via an existing storm outlet north-east of the subject site. A complete SWM analysis will be provided as part of the detailed design phase of the project.

The SWM criteria have been provided during pre-consultation meetings with the City of Ottawa and the RVCA. Based on correspondence from the City of Ottawa the allowable release rate from the site will be calculated using the Rational Method, with a maximum allowable runoff coefficient equivalent to existing conditions, but in no case greater than C=0.5, a time of concentration no less than 10 minutes and a 5-year rainfall intensity from City of Ottawa IDF curves. Refer to **Appendix C** for email correspondence from the City of Ottawa and the RVCA.

Based on a maximum allowable 5-year runoff coefficient (C_w =0.5) and a time of concentration of 10 minutes, the allowable release rate for the entire site was calculated using the Rational Method to be approximately 41 L/s. For the purposes of this report (and <u>preliminary</u> calculations), the site area (0.28 ha) was divided into the following sub-catchments with an estimated allowable release rate:

- A-1: Uncontrolled direct runoff (~0.04 ha) Estimated 100-year release rate = up to 20 L/s
- A-2: Controlled Flow from remainder of site (~0.24 ha) Allotted 100-year release rate = 21 L/s

The following table compares the post-development flows from the proposed development to both the uncontrolled pre-development flows and to the allowable release rate specified by the City of Ottawa, for both the 5-year and the 100-year design events.

| | | | Drainage Are | ainage Areas A-1 and A-2 | | | | | | | |
|--------|----------------------------|------------------------------------|-----------------------------|--------------------------|---------------------|---|--|--|--|--|--|
| Design | Pre-Develo Condit | opment ions | Post-Development Conditions | | | | | | | | |
| Event | Uncontrolled Flow (L/s) | Allowable Release Rate (L/s) | A-1 Flow (L/s) | A-2 Flow (L/s) | Total Flow (L/s) | Reduction in Flow (L/s or %) [*] | | | | | |
| 5-Yr | 69.5 | 41 | 10 | 21 | 31 | 38.5 or 55% | | | | | |
| 100-Yr | 132.6 | | 19 | 21 | 40 | 92.6 or 70% | | | | | |

Preliminary Stormwater Flow Comparison Table

^{*}Reduced flow compared to pre-development uncontrolled conditions

It is anticipated that the use of an internal SWM storage tank(s) will be required to control flows from the proposed building roofs and amenity area deck drains for catchment area A-2. The following table summarizes the approximate ponding volumes requirements for the various sub-catchment areas, based on the allotted release rates. Refer to **Appendix C** for preliminary SWM calculations.

Preliminary Stormwater Storage Requirements Table (Assuming Flow to Single SWM Tank)

| Design | Post-Development Storage Volume Requirements | | | | | | | | |
|--------|--|---|--|--|--|--|--|--|--|
| Event | A-1 Direct Runoff (L/s) | A-2 Tower & Podium above UG Parking (m³) | | | | | | | |
| 5-Yr | N/A | ~ 26+/- | | | | | | | |
| 100-Yr | N/A | ~ 72+/- | | | | | | | |

Represents preliminary calculations only.

A complete storm drainage design and stormwater management (SWM) analysis will be included as part of the Site Plan Control submission to the City.

Conclusion

Based on recent discussions with the City of Ottawa, it is anticipated that the Bank Street Renewal project infrastructure upgrades will be in place to accommodate the proposed development. As a result, the municipal infrastructure surrounding the subject site should have adequate capacity to service the proposed mixed-use development. On-site stormwater management will be implemented to meet the requirements of the City of Ottawa and the Rideau Valley Conservation Authority (RVCA). Further details will be provided as part of the Site Plan Control Application.

NOVATECH

Prepared by:

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Reviewed by:



François Thauvette, P. Eng. Senior Project Manager

APPENDIX A

Sanitary Drainage Area Plans, Sanitary Sewage Calculations & Sewer Design Sheet



SHT11X17.DWG - 279mmX432mm

1335 & 1339 Bank Street PRE-DEVELOPMENT SANITARY FLOWS

| Commercial Use - 1335 Bank Street | | |
|--------------------------------------|-----------------|--------------------------|
| Site Area | 0.114 ha | |
| Average Commercial Flow (Currently) | 28,000 L/ha/day | |
| Average Commercial Flow (Previously) | 50,000 L/ha/day | |
| Commercial Peaking Factor | 1.5 | |
| Peak Commercial Flow | 0.10 L/s | Based on 50,000 L/ha/day |
| Commercial Use - 1339 Bank Street | | |
| Site Area | 0.169 ha | |
| Average Commercial Flow (Currently) | 28,000 L/ha/day | |
| Average Commercial Flow (Previously) | 50,000 L/ha/day | |
| Commercial Peaking Factor | 1.5 | |
| Peak Commercial Flow | 0.15 L/s | Based on 50,000 L/ha/day |
| Site Area | 0.283 ha | |
| Infiltration Allowance | 0.33 L/s/ha | |
| Peak Extraneous Flows | 0.09 L/s | |
| Total Peak Sanitary Flow | 0.34 L/s | |



SHT11X17.DWG - 279mmX432mm

1335 & 1339 Bank Street: [26-Storey Tower with 7-Storey Podium] POST-DEVELOPMENT SANITARY FLOWS

| Residential Use | | Floor 1: Commercial and Amenity Space |
|-------------------------------------|----------------------|--|
| Number of Studio / 1-Bedroom Units | 308 | Floors 2 to 6: 5 storeys x (32 x Bach/1-Bdrm units + 1 x |
| Persons per Studio / 1-Bedroom Unit | 1.4 | 2-Bdrm units + 1 x 3-Bdrm unit) per floor |
| Number of 2-Bedroom Units | 56 | Floor 7: (6 x Bach/1-Bdrm units + 0 x 2-Bdrm units + 1 |
| Persons per 2-Bedroom Unit | 2.1 | x 3-Bdrm unit), amenity and outdoor space |
| Number of 3-Bedroom Units | 24 | Floor 8: (6 x Bach/1-Bdrm units + 0 x 2-Bdrm units + 1 |
| Persons per 3-Bedroom Unit | 3.1 | x 3-Bdrm unit), amenity space |
| Total Number of Units | 388 | Floors 9 to 25: 17 storeys x (8 x Bach/1-Bdrm units + 3 |
| Design Population | 623 | x 2-Bdrm units + 1 x 3-Bdrm units) per floor |
| Average Daily Flow | 280 L/c/day | Floor 26: Penthouse Amentity Space |
| Peak Factor (Harmon Formula) | 3.30 | |
| Peak Residential Flow | 6.66 L/s | |
| Commercial/Amenity Use | | |
| Commercial Space | 1,861 m ² | |
| Average Commercial Flow | 2.8 L/m²/day | |
| Commercial Peaking Factor | 1.5 | |
| Peak Commercial Flow | 0.09 L/s | |
| Site Area | 0.282 ha | |
| Infiltration Allowance | 0.33 L/s/ha | |
| Peak Extraneous Flows | 0.09 L/s | |
| Total Peak Sanitary Flow | 6.85 L/s | |



Post-Development Sanitary Flow Calculations

| Loca | ation | | Resid | Residential | | Commercial / Institutional | | onal Residential Cumulative | | tive Peak Factor Commercial / Institutional Residential | | Commercial / Institutional Residential Infiltration | | or Commercial / Institutional Residential Infiltration | | Fou | ndation | | | | Pipe | a Data | | |
|---|-----------------------------------|---------|------------|-------------------|-------------------|----------------------------|-----------------|-----------------------------|--------------------|---|-----------------|---|-------------------------|--|---------------------|----------------------|---------------------|---------------------------|-----------|-----------|------------|-------------------|-------------------------|----------------------------|
| Street / Area | From | То | Population | Area (ha) | Area (ha) | Accu. Area (ha) | Pop. | Area (ha) | Res Peak Factor | Comm Peak Factor | Peak Flow (I/s) | Accu. Peak Flow | Acc. Peak Flow (I/s) | Infilt. Flow (I/s) | Accu Infil. Flow | Found. Flow (I/s) | Accu Found. Flow | PEAK DESIGN FLOW (I/s) | Size (mm) | Slope (%) | Length (m) | Capacity (I/s) | Full Flow Vel. (m/s) | Q/Q _{full} (%) |
| Bank Street | SA32593 | SA32594 | 623 | 0.28 | 0.74 | 0.74 | 623 | 0.28 | 3.3 | 1.5 | 0.36 | 0.36 | 6.74 | 0.34 | 0.34 | 2.75 | 2.75 | 10.19 | 225 | 0.35 | 102.3 | 26.5 | 0.67 | 38.4% |
| Bank Street | SA32594 | SA01408 | 0 | 0.32 | 0.00 | 0.74 | 623 | 0.60 | 3.3 | 1.5 | 0.00 | 0.36 | 6.74 | 0.11 | 0.44 | 0.00 | 2.75 | 10.29 | 225 | 0.30 | 16.2 | 24.6 | 0.62 | 41.9% |
| | | | | Green cells inclu | ude both existing | (west side) numbers a | nd proposed dev | elopment (east side |) numbers | | | | | | | | | | | | | | | |
| City of Ottawa Sewer Desig Studio / 1-Bedroom Apartm | <u>an Guidelines</u> hent Unit | | | | | 1.4 | persons/unit | | | | | | | | | | | | | | | | | |
| 2-Bedroom Apartment Unit | | | | | | 2.1 | persons/unit | | | | | | | | | | | | | | | | | |
| 3-Bedroom Apartment Unit | | | | | | 3.1 | persons/unit | | | | | | | | | | | | | | | | | |
| Average Domestic Flow | | | | | | 280 | L/person/day | / | | | | | | | | | | | | | | | | |

Institutional / Commercial Flow

. L/ha/day 28,000 0.33 L/s/ha

5.0 L/s/ha (use 5.0 L/s/ha for tributary areas < 10 ha; 3.0 L/s/ha for tributary areas >10 ha and < 100 ha; 2.0 L/s/ha for tributary areas >100 ha) Harmon Equation, Correction Factor = 0.8 1.5

Notes:

Extraneous Flows

Foundation Drain Allowance

Residential Peaking Factor

Institutional / Commercial Peaking Factor

The number of units in the apartment building has been taken from preliminary architectural design plans.

Existing pipe information has been taken from the City of Ottawa geoOttawa website.

A foundation drain allowance has been accounted for along only those existing streets that do not have a separated storm sewer as indicated on the geoOttawa website.

APPENDIX B

Figure W1 the Conceptual Watermain Servicing Sketch, Preliminary Domestic Water Demand, FUS Fire Flow Calculations, and E-mail Correspondence from the City of Ottawa



FIGURE W1 Conceptual Watermain Servicing Sketch

2100

1335&1339 BankStreet: Connect one service to the existing 150mm dia. WM in Riverside and one service to the upgraded 300mm dia. WM in Bank St. (Part of works under the Bank Street Renewal Project)

355

1335 & 1339 Bank Street: [26-Storey Tower with 6-Storey Podium] WATER ANALYSIS

DOMESTIC WATER DEMAND

| Residential Use | | |
|--------------------------------------|----------------------|--|
| Number of Studio / 1-Bedroom Units | 308 | |
| Persons per Studio / 1-Bedroom Unit | 1.4 | |
| Number of 2-Bedroom Units | 56 | |
| Persons per 2-Bedroom Unit | 2.1 | |
| Number of 3-Bedroom Units | 24 | |
| Persons per 3-Bedroom Unit | 3.1 | |
| Total Number of Units | 388 | |
| Total Design Population | 623 | |
| Average Day Demand (350 L/c/day) | 2.52 L/s | |
| Maximum Day Demand (2.5 x avg. day) | 6.31 L/s | |
| Peak Hour Demand (2.2 x max. day) | 13.88 L/s | |
| Commercial/Amenity Use | | |
| Commercial Space | 1,861 m ² | |
| Average Day Demand (28,000 L/ha/day) | 0.06 L/s | |
| Maximum Day Demand (1.5 x avg. day) | 0.09 L/s | |
| Peak Hour Demand (1.8 x max. day) | 0.16 L/s | |
| Total Average Day Demand | 2.58 L/s | |
| Total Maximum Day Demand | 6.40 L/s | |
| Total Peak Hour Demand | 14.04 L/s | |
| | | |

| DOLINDARY CONDITIONS (Values with Benk Street Benewal | 11 | anadaa and Camilaa Cannaatian ta Bank) |
|---|----|--|
| DOUNDART CONDITIONS (Values with bank street kenewai | UD | Prades and Service Connection to Banki |
| | - | |

| | ides with Bank Street Kenewe | | | icclion to banky | | | | |
|------------------------------|--|-----------------------|---------------------------------------|------------------|-------|-----|---------|--|
| Maximum HGL = | 132.5 | m | | | | | | |
| Minimum HGL = | 125.0 | m | | | | | | |
| Max Day + Fire Flow = | 127.0 | m | | | | | | |
| | | | | | PSI | m (| OF HEAD | |
| | | | | | 1.423 | 197 | 1 | |
| PRESSURE TESTS | To conve | ert Head(n | n) to PSI: multiply b | y 1.42 | | | | |
| Average Ground Elevation | | | ! | 59.5 m | | | | |
| High Pressure Test = (Max HG | L - Avg.Ground Elev.) x 1.42 PS High Pres | SI/m (shou ssure = | ld be between 50- 103.8 PSI | 70 PSI) | | | | |

Floor 1: Commercial and Amenity Space

2-Bdrm units + 1 x 3-Bdrm unit) per floor

x 3-Bdrm unit), amenity and outdoor space

x 2-Bdrm units + 1 x 3-Bdrm units) per floor Floor 26: Penthouse Amentity Space

x 3-Bdrm unit), amenity space

Floors 2 to 6: 5 storeys x (32 x Bach/1-Bdrm units + 1 x

Floor 7: (6 x Bach/1-Bdrm units + 0 x 2-Bdrm units + 1

Floor 8: (6 x Bach/1-Bdrm units + 0 x 2-Bdrm units + 1

Floors 9 to 25: 17 storeys x (8 x Bach/1-Bdrm units + 3

Low Pressure Test = (Min. HGL - Avg. Ground Elev.) x 1.42 PSI/m (should be > 40 PSI) Low Pressure = **93.1** PSI

Max Day + Fire Flow Test = (Max Day + Fire Flow - Avg. Ground Elev.) x 1.42 PSI/m (should be > 20 PSI) Max Day + Fire Flow Pressure = **96.0** PSI

1335 & 1339 Bank Street: [26-Storey Tower with 6-Storey Podium] WATER ANALYSIS

DOMESTIC WATER DEMAND

| Residential Use | |
|--------------------------------------|----------------------|
| Number of Studio / 1-Bedroom Units | 308 |
| Persons per Studio / 1-Bedroom Unit | 1.4 |
| Number of 2-Bedroom Units | 56 |
| Persons per 2-Bedroom Unit | 2.1 |
| Number of 3-Bedroom Units | 24 |
| Persons per 3-Bedroom Unit | 3.1 |
| Total Number of Units | 388 |
| Total Design Population | 623 |
| Average Day Demand (350 L/c/day) | 2.52 L/s |
| Maximum Day Demand (2.5 x avg. day) | 6.31 L/s |
| Peak Hour Demand (2.2 x max. day) | 13.88 L/s |
| Commercial/Amenity Use | |
| Commercial Space | 1,861 m ² |
| Average Day Demand (28,000 L/ha/day) | 0.06 L/s |
| Maximum Day Demand (1.5 x avg. day) | 0.09 L/s |
| Peak Hour Demand (1.8 x max. day) | 0.16 L/s |
| Total Average Day Demand | 2.58 L/s |
| Total Maximum Day Demand | 6.40 L/s |
| Total Peak Hour Demand | 14.04 L/s |
| | |

| Floor 1: Commercial and Amenity Space |
|--|
| Floors 2 to 6: 5 storeys x (32 x Bach/1-Bdrm units + 1 > |
| 2-Bdrm units + 1 x 3-Bdrm unit) per floor |
| Floor 7: (6 x Bach/1-Bdrm units + 0 x 2-Bdrm units + 1 |
| x 3-Bdrm unit), amenity and outdoor space |
| Floor 8: (6 x Bach/1-Bdrm units + 0 x 2-Bdrm units + 1 |
| x 3-Bdrm unit), amenity space |
| Floors 9 to 25: 17 storeys x (8 x Bach/1-Bdrm units + 3 |
| x 2-Bdrm units + 1 x 3-Bdrm units) per floor |
| Floor 26: Penthouse Amentity Space |

BOUNDARY CONDITIONS (Values with Bank Street Renewal Upgrades and Service Connection to Riverside)

| Maximum HGL = | 132.4 | m | | | | |
|--|-------------------------|-------------|--------------------------|--------|----------------|---------|
| Minimum HGL = | 125.0 | m | | | | |
| Max Day + Fire Flow = | 109.6 | m | | | | |
| | | | | PSI | m (| DF HEAD |
| | | | | 1.4219 |) 7 | 1 |
| PRESSURE TESTS | To conve | rt Head(m) | to PSI: multiply by 1.42 | | | |
| Average Ground Elevation | | | 59.5 m | | | |
| High Pressure Test = (Max HGL - Avg.G | fround Elev.) x 1.42 PS | l/m (should | d be between 50- 70 PSI) | | | |
| | High Pres | sure = | 103.7 PSI | | | |
| Low Pressure Test = (Min. HGL - Avg. C | Ground Elev.) x 1.42 PS | l/m (shoul | d be > 40 PSI) | | | |
| | Low Press | sure = | 93.1 PSI | | | |
| | | | | | | |

Max Day + Fire Flow Test = (Max Day + Fire Flow - Avg. Ground Elev.) x 1.42 PSI/m (should be > 20 PSI) Max Day + Fire Flow Pressure = **71.2** PSI

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

Novatech Project #: 119210 Project Name: 1335 & 1339 Bank Street Date: 18/01/2021 Input By: S.Matthews Reviewed By: F.Thauvette



Engineers, Planners & Landscape Architects

Legend

Input by User No Information or Input Required

Building Description: 26-Storey Building with a 7-Storey Podium Fire Resistive Construction

| Step | | | Choose | | Value Used | Total Fire Flow | | | |
|---------|---|--|----------------|---------------|------------|--------------------|--|--|--|
| | | Base Fire Flo | A/ | | | (L/min) | | | |
| | | | | | | | | | |
| | Construction Ma | aterial | | Muit | plier | | | | |
| | Coefficient | Wood frame | | 1.5 | | | | | |
| 1 | related to type | Ordinary construction | | 1 | | | | | |
| | of construction | Non-combustible construction | | 0.8 | 0.6 | | | | |
| | С | Modified Fire resistive construction (2 hrs) | Yes | 0.6 | | | | | |
| | | Fire resistive construction (> 3 hrs) | | 0.6 | | | | | |
| | Floor Area | | | | | | | | |
| | | Podium Level Footprint (m ²) | 2035 | | | | | | |
| | | Total Floors/Storeys (Podium) | 7 | | | | | | |
| | Δ | Tower Footprint (m ²) | 869 | | | | | | |
| 2 | ^ | Total Floors/Storeys (Tower) | 19 | | | | | | |
| | | Protected Openings (1 hr) | | | | | | | |
| | | Area of structure considered (m ²) | | | 10,461 | | | | |
| | F | Base fire flow without reductions | | | | 14 000 | | | |
| | • | $F = 220 C (A)^{0.5}$ | | | | 14,000 | | | |
| | | Reductions or Surc | harges | | | | | | |
| | Occupancy hazard reduction or surcharge | | | Reduction | Surcharge | | | | |
| | (1) | Non-combustible | | -25% | | | | | |
| 3 | | Limited combustible | Yes | -15% | | 1 | | | |
| Ŭ | | Combustible | | 0% | -15% | 11,900 | | | |
| | | Free burning | | 15% | | | | | |
| | | Rapid burning | | 25% | | 1 | | | |
| | Sprinkler Reduc | tion | | Redu | ction | | | | |
| | - | Adequately Designed System (NFPA 13) | Yes | -30% | -30% | | | | |
| 4 | | Standard Water Supply | Yes | -10% | -10% | , | | | |
| - | (2) | Fully Supervised System | No | -10% | | -4,760 | | | |
| | | | Cun | ulative Total | 40% | , | | | |
| | Exposure Sureh | argo (oumulativo %) | Cui | | -40 /0 | | | | |
| | Exposure Surch | Arge (cumulative %) | > 15 1m | | | | | | |
| | | Fast Side | 10.1.20 m | | 15% | l l | | | |
| 5 | (2) | Cast Side | 10.1 - 20 m | | F0/ | 3 570 | | | |
| | (3) | South Side | 30.1-45 m | | 10% | 3,570 | | | |
| | | West Side | 20.1 - 30 III | ulativo Total | 10% | I | | | |
| | | Deculto | Cui | | 30% | | | | |
| Kesuits | | | | | | | | | |
| A | (1) + (2) + (3) | Total Required Fire Flow, rounded to nea | rest 1000L/mi | n | L/min | 11,000 | | | |
| Ŭ | (1) · (2) · (3) | (2,000 L/min < Fire Flow < 45,000 L/min) | | or | L/s | 183 | | | |
| | | · · · · · · · · · · · · · · · · · · · | | or | USGPM | 2,906 | | | |
| 7 | | Required Duration of Fire Flow (hours) | | | Hours | 2 | | | |
| | Storage volume | Required Volume of Fire Flow (m ³) | m ³ | 1320 | | | | | |

Steve Matthews

| From: | Baker, Adam <adam.baker@ottawa.ca></adam.baker@ottawa.ca> |
|--------------|---|
| Sent: | Tuesday, February 2, 2021 4:17 PM |
| То: | Francois Thauvette |
| Cc: | Mottalib, Abdul; Steve Matthews |
| Subject: | RE: 1335 & 1339 Bank Street - WM Boundary Condition Request |
| Attachments: | 1335_1339 Bank Street February 2021.pdf |

Hello,

Please find attached water boundary conditions for 1335/1339 Bank Street -

The following are future boundary conditions as per Development Review's request to include the future Bank Street renewal upgrades. The HGL for hydraulic analysis considers both developments (1335-1339 & 1330_1340_1346 Bank - zone 2W2C) and assumes them to be connected to the future Bank Street renewal upgrades (see attached PDF for location).

1335 1339 Bank

Riverside Connection:

Minimum HGL = 125.0m

Maximum HGL = 132.4m. The maximum pressure is estimated to be over 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

MXDY + Fire Flow (183 L/s) = 109.6m

Bank Connection:

Minimum HGL = 125.0m

Maximum HGL = 132.5m. The maximum pressure is estimated to be over 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

MXDY + Fire Flow (183 L/s) = 127.0m

These are for current conditions and are based on computer model simulation.

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

Please note that both developments have increased their demands from what was previously provided. The interim fire protection solution developed to install the hydrant on Riverside and move the pressure zone will not meet the new FUS demands of 183 L/s for 1335 & 1339 Bank Street.

Thanks,

Adam

Adam Baker, EIT Project Manager Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique Development Review - South Branch City of Ottawa | Ville d'Ottawa 110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1 613.580.2424 ext./poste 26552, <u>Adam.Baker@ottawa.ca</u>

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: January 27, 2021 3:14 PM
To: Baker, Adam <adam.baker@ottawa.ca>
Cc: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>; Steve Matthews <S.Matthews@novatech-eng.com>
Subject: 1335 & 1339 Bank Street - WM Boundary Condition Request

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Hi Adam,

As discussed during our Teams call this morning, we are sending this e-mail to request updated municipal watermain boundary conditions based on the understanding that the Bank Street Renewal project watermain upgrades will be in place to accommodate the proposed development. The anticipated water demands for the proposed site are as follows:

- Average Day Demand = 2.58 L/s
- Maximum Day Demand = 6.40 L/s
- Peak Hour Demand = 14.04 L/s
- Maximum Fire Flow Demand = 183 L/s (see attached FUS calculations for details)

Please refer to the attached sketch showing two (2) water services, one off Bank Street and the other off Riverside Drive (south of the subject site). A multi-hydrant approach to firefighting is also anticipated to be required. Based on a review of geoOttawa, there are a few hydrants within 150m of the subject site. Please confirm the existing hydrants will provide the necessary fire flow. As shown on the attached sketch, it may be possible to add a new hydrant along Bank Street, if necessary.

Regards,

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François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering

NOVATECH Engineers, Planners & Landscape Architects

Please note that I am working from home. Email or MS Teams are the best ways to contact me.

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 219 | Cell: 613.276.0310 | Fax: 613.254.5867 The information contained in this email message is confidential and is for exclusive use of the addressee.

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Steve Matthews

| From: | Baker, Adam <adam.baker@ottawa.ca></adam.baker@ottawa.ca> |
|-----------------|--|
| Sent: | Tuesday, January 12, 2021 10:39 AM |
| To: | Francois Thauvette |
| Cc: | Xu, Lily; Christine McCuaig; Polowin, Jeff; Lodoen Unseth, Kelby |
| Subject: | 1335/1339 Bank - Watermain Update |
| Follow Up Flag: | Follow up |
| Flag Status: | Flagged |

Hi Francois,

This email is to provide you an update on the Bank Street renewal project and additional watermain work which impact the development at 1335/1339 Bank Street.

The Bank Street renewal is currently forecast for 2022 pending council approval. Asset Management has added additional watermain work for this project. A new watermain between Billings Avenue and Sarah Billings Place will be constructed to facilitate servicing for the adjacent streets. As well, a new 305mm watermain will connect the existing 610mm watermain from the Billings Bridge Pump Station to the new 305mm watermain in Bank Street at Riverside. As a result, these additional watermains will also provide the required redundancy to 1335/1339 Bank Street properties. The Bank Street renewal will also meet the fire demands that you had previously provided.

Additional details on the watermain work for the Bank Street renewal will be provided to you as it becomes available.

Thank you, Adam

Adam Baker, EIT Project Manager Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique Development Review - South Branch City of Ottawa | Ville d'Ottawa 110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1 613.580.2424 ext./poste 26552, Adam.Baker@ottawa.ca

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Francois Thauvette

| From: | Baker, Adam <adam.baker@ottawa.ca></adam.baker@ottawa.ca> |
|----------|--|
| Sent: | Thursday, July 30, 2020 3:33 PM |
| То: | Christine McCuaig |
| Cc: | Francois Thauvette; Kevin McMahon; Pierre Boulet; George Gaty; dougv@hobinarc.com; |
| | Xu, Lily; James, Douglas; Shillington, Jeffrey; Lodoen Unseth, Kelby |
| Subject: | RE: Bank Street - Servicing Issues - 1335/1339 Bank Street |

Hello,

In response to the memo of Lloyd Phillips & Associates (dated July 9, 2020) and two accompanying geoOttawa Capture sketches showing the five options to provide a secondary watermain feed for redundancy to 1335 and 1339 Bank Street, please find below information:

- Option 1 This option will not provide the required redundancy to the site.
- Option 2 This option will not provide the required redundancy to the site (will not provide required fire flows).
- Option 3 This option, which proposes a connection to the 914mm backbone watermain is not an available option because this main is operated on a different pressure zone than the proposed site.
- Option 4 & 5 This general layout is viable in terms of providing the secondary watermain feed for redundancy to the project site. There are a few considerations:
 - Several utility poles are located in the sidewalk which will conflict with the proposed route of Option 5.
 - These layouts need to connect to and upsize the existing 203mm watermain running east-west on Riverside Drive to provide the required looping (illustrated below).
 - Consider connecting to the 1220mm watermain trunk rather than the 610mm as this would shorten the length of the proposed watermain and eliminate a watermain trunk crossing.



In terms of implementing the proposed watermain infrastructure, this will be a development driven project. The City is undertaking the Bank street infrastructure renewal project, currently scheduled for 2022, and will upgrade the existing 203mm diameter watermain to a 305mm diameter watermain (including in front of the subject properties – Riverside to Riverside) which will, based on current proposed water demands for the site, meet the primary domestic and fire demands. Cost-sharing of the construction of either Option 4 or 5 can be explored with the City through coordination of the proposed watermain works with this project to provide the required secondary feed for redundancy.

Thank you,

Adam Baker, EIT Project Manager Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique Development Review - South Branch City of Ottawa | Ville d'Ottawa 110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1 613.580.2424 ext./poste 26552, Adam.Baker@ottawa.ca

From: Christine McCuaig <christine@lloydphillips.com>

Sent: July 21, 2020 9:21 AM

To: Xu, Lily <Lily.Xu@ottawa.ca>; James, Douglas <Douglas.James@ottawa.ca>; Baker, Adam <adam.baker@ottawa.ca>;
 Shillington, Jeffrey <jeff.shillington@ottawa.ca>; Lodoen Unseth, Kelby <Kelby.LodoenUnseth@ottawa.ca>
 Cc: Francois Thauvette <f.thauvette@novatech-eng.com>; Kevin McMahon <kevin@loftydevelopments.com>; Pierre
 Boulet <pierreb@bouletconstruction.com>; George Gaty <ggaty@elkproperty.com>; dougv@hobinarc.com
 Subject: Bank Street - Servicing Issues - 1335/1339 Bank Street

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Hello Lily,

As you know, we are currently stalled until we can finalize a path forward to address the servicing constraints. On June 30th, we had a Teams meeting and the City requested options from Novatech. Francois prepared these and sent them to the City on July 2nd (email attached). We have not heard any response since.

I understand this is a larger issue, but we need to move forward with this project and request input and response from City staff on the presented options in order to service this proposal.

It would be greatly appreciated if you could obtain a response as soon as possible, ideally in the next couple days, so that our submission can be finalized.

Regards, Christine

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Christine McCuaig, RPP MCIP M.PI Senior Planner | <u>Lloyd Phillips & Associates Ltd.</u> <u>christine@lloydphillips.com</u> 24 Kirkstall Avenue, Ottawa, ON, K2G 3M5 (c) 613-850-8345

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AS OF AUGUST 1ST - NEW CONTACT DETAILS WILL BE: <u>christine@g9planning.com</u> | 613-850-8345 <u>www.g9planning.com</u>

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Francois Thauvette

| From: | Francois Thauvette |
|--------------|--|
| Sent: | Thursday, July 2, 2020 2:36 PM |
| То: | 'Baker, Adam'; Mottalib, Abdul |
| Cc: | 'Mike Wiebe'; 'dougv@hobinarc.com'; 'Shillington, Jeffrey'; Lee Sheets |
| Subject: | RE: 1335/1339 Bank Site Servicing (Watermain) |
| Attachments: | geoOttawaCapture(WM).pdf; geoOttawaCapture(WM2).pdf |

Hi Adam and Abdul,

As requested during our Teams meeting on Tuesday (June 30), please find attached two (2) sketches showing possible watermain work (extensions) that might alleviate the (lack of) redundancy and (low) fire flow issues related to the current configuration of the municipal watermain network in the area. These options are for review and discussion purposes. Please let us know if any of these options may be feasible from the City's perspective. The City's water modelling group will have to analyze the various scenarios to determine the impact the suggested improvements may have on the municipal watermain network. By no means is this an exhaustive list of possible options. Depending on the City's review and modelling results, other options and/or multiple options may be required (i.e. Option 2 & 3) to meet the requirements of the future developments in the area. Options 3, 4 and/or 5 could be coordinated with the on-going Bank Street Renewal project.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering

NOVATECH Engineers, Planners & Landscape Architects

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From: Francois Thauvette
Sent: Friday, June 26, 2020 2:02 PM
To: 'Baker, Adam' <adam.baker@ottawa.ca>
Cc: 'Mike Wiebe' <mike@loftydevelopments.com>; dougv@hobinarc.com; 'Shillington, Jeffrey'
<jeff.shillington@ottawa.ca>; Lee Sheets <l.sheets@novatech-eng.com>
Subject: RE: 1335/1339 Bank Site Servicing (Watermain)

Hi Adam,

Would the City have recent hydrant flow data for the hydrants in close proximity to our site (i.e. **Hydrants 368027-H024**, **368027-H025** and **368027-H064**)? I suspect that the fire flow is greater than the theoretical maximum of 90 L/s (previous provided by the City), as the private valves on the Riverside Hospital campus are likely open (the Hospital likely needs a redundant feed). If the valves are indeed open, then the watermain network is looped to the system on the east side of the Transitway.

If no data is available, could these hydrants be tested, so we can confirm the fire flow available? As discussed during our Teams Meeting on June 24/20, this has an impact on the <u>entire</u> area, including the Hospital as well as the residential and commercial properties, not just our site.

Also, does the City know if the watermain at the end of Sarah Billings Place is capped on the east or west side of the Transitway? If capped on the east side of the Transitway, it would be easy to extend the watermain (approx. 60m) onto

the Hospital property, to create a watermain loop that would be independent of the private Hospital watermain network. An easement may be required. See marked-up sketch (geoOttawa screen shot) for details.

Please also confirm when the City's water modelling group will be available to meet via Teams.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering

NOVATECH Engineers, Planners & Landscape Architects

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From: Francois Thauvette
Sent: Thursday, June 25, 2020 4:02 PM
To: Baker, Adam <<u>adam.baker@ottawa.ca</u>>
Cc: Mike Wiebe <<u>mike@loftydevelopments.com</u>>
Subject: RE: 1335/1339 Bank Site Servicing

Hi Adam,

Have you had any luck scheduling a meeting with the City's water modelling group?

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering

NOVATECH Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 219 | Cell: 613.276.0310 | Fax: 613.254.5867 The information contained in this email message is confidential and is for exclusive use of the addressee.

From: Baker, Adam <<u>adam.baker@ottawa.ca</u>>
Sent: Monday, June 22, 2020 11:23 AM
To: Francois Thauvette <<u>f.thauvette@novatech-eng.com</u>>
Subject: RE: 1335/1339 Bank Site Servicing

Hi Francois,

Yes, I've attached a screenshot of those invited to the meeting. Please feel free to forward the invite on if there's anyone else to include.



Thanks, Adam

-----Original Appointment----- **From:** Francois Thauvette <<u>f.thauvette@novatech-eng.com</u>> **Sent:** June 22, 2020 10:45 AM To: Baker, Adam Subject: Accepted: 1335/1339 Bank Site Servicing When: June 24, 2020 10:00 AM-12:00 PM (UTC-05:00) Eastern Time (US & Canada). Where: Microsoft Teams Meeting

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I can't see from the invitation, but I'm assuming that all others (i.e. architect, client, etc.) have also been invited to the meeting?

Regards,

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François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering

NOVATECH Engineers, Planners & Landscape Architects

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Francois Thauvette

| From: | Baker, Adam <adam.baker@ottawa.ca></adam.baker@ottawa.ca> |
|--------------|---|
| Sent: | Tuesday, June 16, 2020 3:55 PM |
| То: | Francois Thauvette |
| Cc: | Steve Matthews; Oram, Cody; Shillington, Jeffrey |
| Subject: | RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request |
| Attachments: | Current configuration.pdf |

Hi Francois,

Please find the response for your inquiry on the fire flow below with attached water map:

"The results provided are based on current configuration as shown in the attached figure. The 914mm watermain on Riverside is currently set up to be on 1W pressure, which is how Production normally operates. By doing so, the old 203mm UCI on Bank st is the main supply to the area in question, including the hydrants. You will not be able to pull more than 90L/s from the surrounding hydrants before which pressure falls below 20psi. The reason we didn't provide an HGL during fire is because the HGL/pressure is below 20psi based on their fire flow."

As well, unfortunately we have also determined that it is not feasible to use the 203mm watermain on Riverside west of Bank street to provide redundancy in case of a watermain break on Bank. The City's water departments are currently looking into available options that would be available to provide water service redundancy for these properties.

Once they have completed their due diligence, I am looking to set up a meeting with Novatech and include members of the City water department so that these issues can be discussed directly with them. I will be sure to keep you posted on any updated information that I receive in the meantime.

Thank you, Adam

Adam Baker, EIT

Engineering Intern Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique Development Review - South Branch City of Ottawa | Ville d'Ottawa 110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1 613.580.2424 ext./poste 26552, <u>Adam.Baker@ottawa.ca</u>

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: June 16, 2020 12:26 PM
To: Baker, Adam <adam.baker@ottawa.ca>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

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Hi Adam,

Have you received any additional response from the water modelling group? Please advise.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering

NOVATECH Engineers, Planners & Landscape Architects

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From: Baker, Adam <<u>adam.baker@ottawa.ca</u>>
Sent: Friday, June 12, 2020 11:46 AM
To: Francois Thauvette <<u>f.thauvette@novatech-eng.com</u>>
Cc: Steve Matthews <<u>S.Matthews@novatech-eng.com</u>>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

Hi Francois,

I forwarded your question regarding the fire flow to our water modelling group yesterday. I have made them aware that you and your client are very eager to submit. I will call you/set up a Teams meeting as soon as I hear back.

Thanks, Adam

Adam Baker, EIT

Engineering Intern Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique Development Review - South Branch City of Ottawa | Ville d'Ottawa 110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1 613.580.2424 ext./poste 26552, <u>Adam.Baker@ottawa.ca</u>

From: Francois Thauvette <<u>f.thauvette@novatech-eng.com</u>>
Sent: June 12, 2020 10:46 AM
To: Baker, Adam <<u>adam.baker@ottawa.ca</u>>
Cc: Steve Matthews <<u>S.Matthews@novatech-eng.com</u>>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

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Hi Adam,

Any chance you are available to chat via Teams? The client is very eager to submit, but we haven't received a response to the e-mail below.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering

NOVATECH Engineers, Planners & Landscape Architects 240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 219 | Cell: 613.276.0310 | Fax: 613.254.5867 The information contained in this email message is confidential and is for exclusive use of the addressee.

From: Francois Thauvette
Sent: Thursday, June 11, 2020 2:00 PM
To: Baker, Adam <<u>adam.baker@ottawa.ca</u>>
Cc: Steve Matthews <<u>S.Matthews@novatech-eng.com</u>>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

Hi Adam,

We have a concern with the following statement, provided in the e-mail below: *The total available flow @* 20psi using all hydrants within 150m of property is 90 L/s. Is this correct? It seems very low and should be addressed...

Please also provide the HGL during Max Day + Fire Flow conditions.

I will send you a Teams meeting invitation to discuss. What time works best for you?

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering

NOVATECH Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 219 | Cell: 613.276.0310 | Fax: 613.254.5867 The information contained in this email message is confidential and is for exclusive use of the addressee.

From: Baker, Adam <<u>adam.baker@ottawa.ca</u>>
Sent: Thursday, June 11, 2020 1:27 PM
To: Francois Thauvette <<u>f.thauvette@novatech-eng.com</u>>
Cc: Steve Matthews <<u>S.Matthews@novatech-eng.com</u>>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

Hi Francois,

We are still in the process of verifying that the unused watermain length along the portion of Riverside to the west of Bank could be put into use if there is a watermain break to provide temporary service to these properties in the case of a watermain break on Bank Street. I anticipate having an answer for you on this by the end of next week. If this is not a possibility, we will need to work with you further on how to provide water service redundancy for this development.

That being said, I understand that you and your client are very eager to submit the application. As such, I've provided the tentative boundary conditions below, which is based upon the proposed twin services, separated by a watermain valve, connecting on the 203mm Bank Street watermain:

The following are boundary conditions, HGL, for hydraulic analysis at 1335-1339 Bank St (zone 2W2C) assumed to be connected to the 203mm Bank St (see attached PDF for location).

Minimum HGL = 121.0m

Maximum HGL = 131.0m. The maximum pressure is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

Multi-Hydrant Analysis

The total available flow @ 20psi using all hydrants within 150m of property is 90 L/s.

These are for current conditions and are based on computer model simulation.

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

Pleased to discuss further. Feel free to send over a Teams invite if you want to chat.

Thanks, Adam

Adam Baker, EIT

Engineering Intern Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique Development Review - South Branch City of Ottawa | Ville d'Ottawa 110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1 613.580.2424 ext./poste 26552, <u>Adam.Baker@ottawa.ca</u>

From: Francois Thauvette <<u>f.thauvette@novatech-eng.com</u>>
Sent: June 11, 2020 12:16 PM
To: Baker, Adam <<u>adam.baker@ottawa.ca</u>>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

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Hi Adam,

I am available any time if you want to chat via Teams (re: WM boundary conditions). My preference would be to call via Teams rather than by cell phone (if possible).

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering

NOVATECH Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 219 | Cell: 613.276.0310 | Fax: 613.254.5867 The information contained in this email message is confidential and is for exclusive use of the addressee.

From: Baker, Adam <<u>adam.baker@ottawa.ca</u>>
Sent: Wednesday, June 10, 2020 10:45 AM
To: Francois Thauvette <<u>f.thauvette@novatech-eng.com</u>>
Cc: Steve Matthews <<u>S.Matthews@novatech-eng.com</u>>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

Hi Francois,

I've been working with our water resources group with regards to the water service redundancy on this site. Would you be available around 11:30 today for a Microsoft Teams call to discuss this?

Thanks, Adam

Adam Baker, EIT

Engineering Intern Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique Development Review - South Branch City of Ottawa | Ville d'Ottawa 110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1 613.580.2424 ext./poste 26552, <u>Adam.Baker@ottawa.ca</u>

From: Francois Thauvette <<u>f.thauvette@novatech-eng.com</u>>
Sent: June 10, 2020 9:57 AM
To: Baker, Adam <<u>adam.baker@ottawa.ca</u>>
Cc: Steve Matthews <<u>S.Matthews@novatech-eng.com</u>>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

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Hi Adam,

Any chance we can obtain the watermain boundary conditions today? The request was sent in over a week ago and the client is very eager to submit the Adequacy of Public Services report for OPA and ZBL amendments.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering

NOVATECH Engineers, Planners & Landscape Architects

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From: Francois Thauvette <<u>f.thauvette@novatech-eng.com</u>> Sent: Tuesday, June 2, 2020 4:25 PM To: Baker, Adam <<u>adam.baker@ottawa.ca</u>>
 Cc: Steve Matthews <<u>S.Matthews@novatech-eng.com</u>>
 Subject: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

Hi Adam,

We are working on the proposed 25-storey mixed-use development at 1335 & 1339 Bank Street. The properties will be merged and the new building will replace the old car dealership (1335) and Harvey's restaurant (1339) sites.

We are sending you this e-mail to request watermain boundary conditions for the 200mm dia. WM in Bank Street (as shown on geoOttawa). The anticipated water demands for the proposed site are as follows:

- Average Day Demand = 2.54 L/s
- Maximum Day Demand = 6.31 L/s
- Peak Hour Demand = 13.85 L/s
- Maximum Fire Flow Demand = 167 L/s (see attached FUS calculations for details)

Please note that we anticipate requiring two (2) water services due to the high domestic demands. These will likely be located near the NW property corner. A multi-hydrant approach to firefighting is also anticipated to be required. Based on a review of geoOttawa, there are a few hydrants within 75m of the subject site, one of which is near the NW corner of the subject site. A hydraulic analysis will be completed, once the WM boundary conditions are provided by the City.

We are aware that a Bank Street Renewal project is underway, including roadway modifications as well as underground infrastructure upgrades, but have no information regarding this project. Would you be able to provide us with preliminary plans related to the Bank Street Renewal project, s this will have an impact on our grading and servicing design. Our understanding is that the City PM for the Bank Street Project is Roxanne Tubb (roxanne.tubb@ottawa.ca).

Please send us an e-mail should you require any additional information.

Regards,

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François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering

NOVATECH Engineers, Planners & Landscape Architects

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APPENDIX C

E-mail Correspondence from the City of Ottawa & RVCA and Preliminary SWM Calculations

Development Review – Pre-application consultation Checklist (Municipal Servicing)

Storm Sewers:

Available Storm Sewers: Riverside Drive North – 300mm Riverside Drive South – 300mm concrete

SWM Criteria:

The post-development runoff release rates shall not exceed the five year pre-development conditions. The maximum allowable pre-development runoff coefficient (C) is 0.50.

Submission documents must address/discuss:

• Boundary conditions (civil consultant must request boundary conditions from the City's assigned Project Manager, Development Review)

Francois Thauvette

| From: | Jamie Batchelor <jamie.batchelor@rvca.ca></jamie.batchelor@rvca.ca> |
|----------|---|
| Sent: | Friday, June 5, 2020 4:14 PM |
| То: | Francois Thauvette |
| Cc: | Steve Matthews |
| Subject: | RE: 1335 & 1339 Bank Street Redevelopment - RVCA Pre-Consultation |

Good Afternoon Francois,

Rainwater runoff from rooftop drainage and landscaped areas are considered to be clean for the purpose of protecting water quality for aquatic habitat. Therefore, providing there is no surface parking being provided, there would be no additional onsite water quality treatment required.

Jamie Batchelor, MCIP, RPP Planner, ext. 1191 Jamie.batchelor@rvca.ca

3889 Rideau Valley Drive PO Box 599, Manotick ON K4M 1A5 T 613-692-3571 | 1-800-267-3504 F 613-692-0831 | www.rvca.ca

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From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: Friday, June 5, 2020 3:19 PM
To: Jamie Batchelor <jamie.batchelor@rvca.ca>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>
Subject: 1335 & 1339 Bank Street Redevelopment - RVCA Pre-Consultation

Hi Jamie,

We are working on the proposed re-development of the 1335 & 1339 Bank Street properties (currently occupied by a used car dealership and a Harvey's restaurant). The properties will be merged and the proposed development will consist of a 25-storey residential tower with a 7-storey podium, having UG parking, ground floor commercial space (i.e. café/bar, fitness gym) as well as roof-top amenity space. The building footprint will effectively take up the entire site area and all runoff from the roof will be directed to an internal SWM tank prior to being discharged into the nearby municipal storm sewer. The outlet is the Rideau River, located immediately to the north of the site/Riverside Drive (Southbound).

Based on the proposed development, please confirm if on-site stormwater quality control measures are required.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering

NOVATECH Engineers, Planners & Landscape Architects

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Proposed Mixed-Use Development 1335 & 1339 Bank Street - Lofty Riverside

| Pre - Development Site Flows | | | | | | | | | | |
|-------------------------------|----------------|----------|-------------------|----------|-----------------|-------------------|----------------|------------|--------------------|--------------|
| | Λ (ba) | Weighted | Weighted Weighted | 1.5 Voar | 1.100 Vear | Allowable | Allowable Flow | | | |
| Description | Area (ha) | C=0.9 | C=0.6 | C=0.2 | C _{w5} | C _{w100} | Flow (L/s) | Flow (L/s) | C _{value} | 5 year (L/s) |
| Existing Site to be Developed | 0.282 | 0.262 | 0.000 | 0.020 | 0.85 | 0.95 | 69.5 | 132.6 | 0.5 | 40.8 |

 $T_c = 10mins$

| Post - Development : Site Flows if the areas were left Uncontrolled | | | | | | | | | |
|---|--------------------------------|------------|-------|-------|------|------|--------|----------|--|
| Area Description Area (ba) A imp (ba) A perv (ba) C Uncontrolled Flow | | | | | | | | | |
| Alea | Description | Alea (lla) | C=0.9 | C=0.2 | 05 | 0100 | 5 year | 100 year | |
| A-1 | Direct Runoff to Riverside Dr. | 0.011 | 0.007 | 0.004 | 0.65 | 0.73 | 2.1 | 4.0 | |
| A-2 | Direct Runoff to Bank St. | 0.032 | 0.030 | 0.002 | 0.86 | 0.95 | 7.9 | 15.1 | |
| R-1 | Controlled Internal SWM Tank | 0.239 | 0.239 | 0.000 | 0.90 | 1.00 | 62.3 | 118.7 | |

Summed Area Check: 0.282

| Post - Development : Total Flows for Controlled Site + Uncontrolled Direct Runoff | | | | | | | | | | |
|---|--------------------------------|----------|----------------|------------|----------|-------------------|--|--|--|--|
| A | Description | Peak Des | ign Flow (L/s) | Storage Re | Provided | | | | | |
| Area Description | | 5 year | 100 year | 5 year | 100 year | (m ³) | | | | |
| A-1 | Direct Runoff to Riverside Dr. | 2.1 | 4.0 | - | - | - | | | | |
| A-2 | Direct Runoff to Bank St. | 7.9 | 15.1 | - | - | - | | | | |
| R-1 | Controlled Internal SWM Tank | 21.0 | 21.0 | 26.1 | 72.1 | > 95 | | | | |
| | Totals : | 30.9 | 40.2 | 26.1 | 72.1 | 95.0 | | | | |
| | Over Controlled: | 9.9 | 0.6 | | | | | | | |

Over Controlled: 9.9 $T_c = 10$ mins $T_c = 10$ mins

| Proposed Mixed-Use Development | | | | | | | | |
|-----------------------------------|---|-------|------------|-------------------|-----|--|--|--|
| Novatech Project No. 119210 | | | | | | | | |
| REQUIRED STORAGE - 1:5 YEAR EVENT | | | | | | | | |
| AREA A-1 | AREA A-1 Direct Runoff to Riverside Drive | | | | | | | |
| OTTAWA IDF | CURVE | | | | | | | |
| Area = | 0.011 | ha | Qallow = | 2.1 | L/s | | | |
| C = | 0.65 | | Vol(max) = | 0.0 | m³ | | | |
| | | | | | | | | |
| Time | Intensity | Q | Qnet | Vol | | | | |
| (min) | (mm/hr) | (L/s) | (L/s) | (m ³) | | | | |
| 5 | 141.18 | 2.79 | 0.73 | 0.22 | | | | |
| 10 | 104.19 | 2.06 | 0.00 | 0.00 | | | | |
| 15 | 83.56 | 1.65 | -0.41 | -0.37 | | | | |
| 20 | 70.25 | 1.39 | -0.67 | -0.80 | | | | |
| 25 | 60.90 | 1.20 | -0.85 | -1.28 | | | | |
| 30 | 53.93 | 1.06 | -0.99 | -1.79 | | | | |
| 35 | 48.52 | 0.96 | -1.10 | -2.31 | | | | |
| 40 | 44.18 | 0.87 | -1.18 | -2.84 | | | | |
| 45 | 40.63 | 0.80 | -1.25 | -3.39 | | | | |
| 50 | 37.65 | 0.74 | -1.31 | -3.94 | | | | |
| 55 | 35.12 | 0.69 | -1.36 | -4.50 | | | | |
| 60 | 32.94 | 0.65 | -1.41 | -5.06 | | | | |
| 65 | 31.04 | 0.61 | -1.44 | -5.63 | | | | |
| 70 | 29.37 | 0.58 | -1.48 | -6.20 | | | | |
| 75 | 27.89 | 0.55 | -1.51 | -6.78 | | | | |
| 80 | 26.56 | 0.52 | -1.53 | -7.35 | | | | |
| 85 | 25.37 | 0.50 | -1.56 | -7.93 | | | | |
| 90 | 24.29 | 0.48 | -1.58 | -8.52 | | | | |

| Proposed Mix | | ovolonmon | + | | | | |
|--------------------------------------|---|-----------|------------|-------------------|------|--|--|
| Novatoch Project No. 119210 | | | | | | | |
| DECITIPED STOPAGE - 1.100 VEAD EVENT | | | | | | | |
| | APEA A 1 Direct Punoff to Piverside Drive | | | | | | |
| | | | | | | | |
| | | ha | | 10 | l /c | | |
| | 0.011 | na | | 4.0 | L/3 | | |
| C – | 0.75 | | voi(max) – | 0.0 | 111 | | |
| Time | Intensity | Q | Qnet | Vol | | | |
| (min) | (mm/hr) | (L/s) | (L/s) | (m ³) | | | |
| 5 | 242.70 | 5.40 | 1.43 | 0.43 | | | |
| 10 | 178.56 | 3.97 | 0.00 | 0.00 | | | |
| 15 | 142.89 | 3.18 | -0.79 | -0.71 | | | |
| 20 | 119.95 | 2.67 | -1.30 | -1.56 | | | |
| 25 | 103.85 | 2.31 | -1.66 | -2.49 | | | |
| 30 | 91.87 | 2.04 | -1.93 | -3.47 | | | |
| 35 | 82.58 | 1.84 | -2.13 | -4.48 | | | |
| 40 | 75.15 | 1.67 | -2.30 | -5.52 | | | |
| 45 | 69.05 | 1.54 | -2.44 | -6.58 | | | |
| 50 | 63.95 | 1.42 | -2.55 | -7.65 | | | |
| 55 | 59.62 | 1.33 | -2.65 | -8.73 | | | |
| 60 | 55.89 | 1.24 | -2.73 | -9.82 | | | |
| 65 | 52.65 | 1.17 | -2.80 | -10.92 | | | |
| 70 | 49.79 | 1.11 | -2.86 | -12.03 | | | |
| 75 | 47.26 | 1.05 | -2.92 | -13.14 | | | |
| 80 | 44.99 | 1.00 | -2.97 | -14.26 | | | |
| 85 | 42.95 | 0.96 | -3.02 | -15.38 | | | |
| 90 | 41.11 | 0.91 | -3.06 | -16.51 | | | |
| | | | | | | | |

| Proposed Mixed-Use Development | | | | | | | | |
|-----------------------------------|---------------------------------------|-------|------------|-------------------|-----|--|--|--|
| Novatech Project No. 119210 | | | | | | | | |
| REQUIRED STORAGE - 1:5 YEAR EVENT | | | | | | | | |
| AREA A-2 | AREA A-2 Direct Runoff to Bank Street | | | | | | | |
| OTTAWA IDF | CURVE | | | | | | | |
| Area = | 0.032 | ha | Qallow = | 7.9 | L/s | | | |
| C = | 0.86 | | Vol(max) = | 0.0 | m³ | | | |
| | | | | | | | | |
| Time | Intensity | Q | Qnet | Vol | | | | |
| (min) | (mm/hr) | (L/s) | (L/s) | (m ³) | | | | |
| 5 | 141.18 | 10.75 | 2.82 | 0.85 | | | | |
| 10 | 104.19 | 7.94 | 0.00 | 0.00 | | | | |
| 15 | 83.56 | 6.36 | -1.57 | -1.41 | | | | |
| 20 | 70.25 | 5.35 | -2.59 | -3.10 | | | | |
| 25 | 60.90 | 4.64 | -3.30 | -4.95 | | | | |
| 30 | 53.93 | 4.11 | -3.83 | -6.89 | | | | |
| 35 | 48.52 | 3.70 | -4.24 | -8.91 | | | | |
| 40 | 44.18 | 3.37 | -4.57 | -10.97 | | | | |
| 45 | 40.63 | 3.09 | -4.84 | -13.07 | | | | |
| 50 | 37.65 | 2.87 | -5.07 | -15.21 | | | | |
| 55 | 35.12 | 2.68 | -5.26 | -17.36 | | | | |
| 60 | 32.94 | 2.51 | -5.43 | -19.54 | | | | |
| 65 | 31.04 | 2.36 | -5.57 | -21.73 | | | | |
| 70 | 29.37 | 2.24 | -5.70 | -23.94 | | | | |
| 75 | 27.89 | 2.12 | -5.81 | -26.16 | | | | |
| 80 | 26.56 | 2.02 | -5.91 | -28.38 | | | | |
| 85 | 25.37 | 1.93 | -6.00 | -30.62 | | | | |
| 90 | 24.29 | 1.85 | -6.09 | -32.87 | | | | |

| Proposed Mixed-Use Development | | | | | | | |
|-------------------------------------|---------------------------------------|-------|------------|-------------------|----------------|--|--|
| Novatech Project No. 119210 | | | | | | | |
| RECHIRED STORAGE - 1:100 YEAR EVENT | | | | | | | |
| ARFA A-2 | APEA A-2 Direct Punoff to Bank Street | | | | | | |
| | | | | | | | |
| Area = | 0.032 | ha | Oallow = | 15 1 | 1 /s | | |
| | 0.002 | na | | 0.0 | m ³ | | |
| 0- | 0.95 | | voi(max) – | 0.0 | 111 | | |
| Time | Intensity | Q | Qnet | Vol | | | |
| (min) | (mm/hr) | (L/s) | (L/s) | (m ³) | | | |
| 5 | 242.70 | 20.58 | 5.44 | 1.63 | | | |
| 10 | 178.56 | 15.14 | 0.00 | 0.00 | | | |
| 15 | 142.89 | 12.12 | -3.02 | -2.72 | | | |
| 20 | 119.95 | 10.17 | -4.97 | -5.96 | | | |
| 25 | 103.85 | 8.81 | -6.33 | -9.50 | | | |
| 30 | 91.87 | 7.79 | -7.35 | -13.23 | | | |
| 35 | 82.58 | 7.00 | -8.14 | -17.09 | | | |
| 40 | 75.15 | 6.37 | -8.77 | -21.04 | | | |
| 45 | 69.05 | 5.85 | -9.29 | -25.07 | | | |
| 50 | 63.95 | 5.42 | -9.72 | -29.15 | | | |
| 55 | 59.62 | 5.06 | -10.08 | -33.28 | | | |
| 60 | 55.89 | 4.74 | -10.40 | -37.44 | | | |
| 65 | 52.65 | 4.46 | -10.68 | -41.64 | | | |
| 70 | 49.79 | 4.22 | -10.92 | -45.86 | | | |
| 75 | 47.26 | 4.01 | -11.13 | -50.10 | | | |
| 80 | 44.99 | 3.81 | -11.33 | -54.36 | | | |
| 85 | 42.95 | 3.64 | -11.50 | -58.64 | | | |
| 90 | 41.11 | 3.49 | -11.65 | -62.93 | | | |
| | | | | | | | |

| Proposed Mixed-Use Development | | | | | | | |
|-----------------------------------|------------------|--------------|------------|---------|-----|--|--|
| Novatech Project No. 119210 | | | | | | | |
| REQUIRED STORAGE - 1:2 YEAR EVENT | | | | | | | |
| AREA R-1 | Controlle | d Internal S | SWM Tank | | | | |
| OTTAWA ID | OTTAWA IDF CURVE | | | | | | |
| Are | a = 0.239 | ha | Qallow = | 21.0 | L/s | | |
| | C = 0.90 | | Vol(max) = | 15.0 | m3 | | |
| | | | | | | | |
| Time | Intensity | Q | Qnet | Vol | | | |
| (min) | (mm/hr) | (L/s) | (L/s) | (m3) | | | |
| 5 | 103.57 | 61.93 | 40.93 | 12.28 | | | |
| 10 | 76.81 | 45.93 | 24.93 | 14.96 | | | |
| 15 | 61.77 | 36.94 | 15.94 | 14.34 | | | |
| 20 | 52.03 | 31.11 | 10.11 | 12.14 | | | |
| 25 | 45.17 | 27.01 | 6.01 | 9.01 | | | |
| 30 | 40.04 | 23.95 | 2.95 | 5.30 | | | |
| 35 | 36.06 | 21.56 | 0.56 | 1.18 | | | |
| 40 | 32.86 | 19.65 | -1.35 | -3.24 | | | |
| 45 | 30.24 | 18.08 | -2.92 | -7.88 | | | |
| 50 | 28.04 | 16.77 | -4.23 | -12.70 | | | |
| 55 | 26.17 | 15.65 | -5.35 | -17.66 | | | |
| 60 | 24.56 | 14.68 | -6.32 | -22.73 | | | |
| 65 | 23.15 | 13.84 | -7.16 | -27.91 | | | |
| 70 | 21.91 | 13.10 | -7.90 | -33.17 | | | |
| 75 | 20.81 | 12.45 | -8.55 | -38.49 | | | |
| 90 | 18.14 | 10.85 | -10.15 | -54.82 | | | |
| 105 | 16.13 | 9.65 | -11.35 | -71.52 | | | |
| 120 | 14.56 | 8.71 | -12.29 | -88.50 | | | |
| 135 | 13.30 | 7.95 | -13.05 | -105.70 | | | |
| 150 | 12.25 | 7.33 | -13.67 | -123.06 | | | |

| Proposed Mixed-Use Development | | | | | | | | |
|-----------------------------------|-----------|-------|------------|---------|------|--|--|--|
| | | | | | | | | |
| REQUIRED STORAGE - 1:5 TEAR EVENT | | | | | | | | |
| | | | | | | | | |
| | 0 230 | ha | Oallow = | 21.0 | l /e | | | |
| | 0.200 | Па | Vol(max) = | 26.1 | m3 | | | |
| 0 - | 0.00 | | VOI(Max) = | 20.1 | mo | | | |
| Time | Intensity | 0 | Onet | Vol | | | | |
| (min) | (mm/hr) | (1/s) | (1/s) | (m3) | | | | |
| 5 | 141.18 | 84.42 | 63.42 | 19.03 | | | | |
| 10 | 104.19 | 62.31 | 41.31 | 24.78 | | | | |
| 15 | 83.56 | 49.97 | 28.97 | 26.07 | | | | |
| 20 | 70.25 | 42.01 | 21.01 | 25.21 | | | | |
| 25 | 60.90 | 36.41 | 15.41 | 23.12 | | | | |
| 30 | 53.93 | 32.25 | 11.25 | 20.25 | | | | |
| 35 | 48.52 | 29.01 | 8.01 | 16.83 | | | | |
| 40 | 44.18 | 26.42 | 5.42 | 13.01 | | | | |
| 45 | 40.63 | 24.30 | 3.30 | 8.90 | | | | |
| 50 | 37.65 | 22.52 | 1.52 | 4.55 | | | | |
| 55 | 35.12 | 21.00 | 0.00 | 0.01 | | | | |
| 60 | 32.94 | 19.70 | -1.30 | -4.68 | | | | |
| 65 | 31.04 | 18.56 | -2.44 | -9.50 | | | | |
| 70 | 29.37 | 17.56 | -3.44 | -14.43 | | | | |
| 75 | 27.89 | 16.68 | -4.32 | -19.46 | | | | |
| 90 | 24.29 | 14.52 | -6.48 | -34.97 | | | | |
| 105 | 21.58 | 12.91 | -8.09 | -50.99 | | | | |
| 120 | 19.47 | 11.64 | -9.36 | -67.38 | | | | |
| 135 | 17.76 | 10.62 | -10.38 | -84.05 | | | | |
| 150 | 16.36 | 9.78 | -11.22 | -100.94 | | | | |
| | | | | | | | | |

| Proposed Mixed-Use Development | | | | | | | | |
|-------------------------------------|---------------------------------------|--------|------------|--------|-----|--|--|--|
| Novatech Project No. 119210 | | | | | | | | |
| REQUIRED STORAGE - 1:100 YEAR EVENT | | | | | | | | |
| AREA R-1 | AREA R-1 Controlled Internal SWM Tank | | | | | | | |
| OTTAWA IDF C | OTTAWA IDF CURVE | | | | | | | |
| Area = | 0.239 | ha | Qallow = | 21.0 | L/s | | | |
| C = | 1.00 | | Vol(max) = | 72.1 | m3 | | | |
| | | | | | | | | |
| Time | Intensity | Q | Qnet | Vol | | | | |
| (min) | (mm/hr) | (L/s) | (L/s) | (m3) | | | | |
| 5 | 242.70 | 161.26 | 140.26 | 42.08 | | | | |
| 10 | 178.56 | 118.64 | 97.64 | 58.58 | | | | |
| 15 | 142.89 | 94.94 | 73.94 | 66.55 | | | | |
| 20 | 119.95 | 79.70 | 58.70 | 70.44 | | | | |
| 25 | 103.85 | 69.00 | 48.00 | 72.00 | | | | |
| 30 | 91.87 | 61.04 | 40.04 | 72.07 | | | | |
| 35 | 82.58 | 54.87 | 33.87 | 71.12 | | | | |
| 40 | 75.15 | 49.93 | 28.93 | 69.43 | | | | |
| 45 | 69.05 | 45.88 | 24.88 | 67.17 | | | | |
| 50 | 63.95 | 42.49 | 21.49 | 64.48 | | | | |
| 55 | 59.62 | 39.62 | 18.62 | 61.43 | | | | |
| 60 | 55.89 | 37.14 | 16.14 | 58.10 | | | | |
| 65 | 52.65 | 34.98 | 13.98 | 54.52 | | | | |
| 70 | 49.79 | 33.08 | 12.08 | 50.74 | | | | |
| 75 | 47.26 | 31.40 | 10.40 | 46.79 | | | | |
| 90 | 41.11 | 27.31 | 6.31 | 34.10 | | | | |
| 105 | 36.50 | 24.25 | 3.25 | 20.47 | | | | |
| 120 | 32.89 | 21.86 | 0.86 | 6.16 | | | | |
| 135 | 30.00 | 19.93 | -1.07 | -8.66 | | | | |
| 150 | 27.61 | 18.35 | -2.65 | -23.89 | | | | |
| | | | | | | | | |

| Proposed Mixed-Use Development | | | | | | | |
|--|-----------|--------|------------|-------|-----|--|--|
| Novatech Project No. 119210 | | | | | | | |
| REQUIRED STORAGE - 1:100 YR + 20% IDF Increase | | | | | | | |
| AREA R-1 Controlled Internal SWM Tank | | | | | | | |
| OTTAWA IDF CURVE | | | | | | | |
| Area = | 0.239 | ha | Qallow = | 21.0 | L/s | | |
| C = | 1.00 | | Vol(max) = | 94.2 | m3 | | |
| | | | | | | | |
| Time | Intensity | Q | Qnet | Vol | | | |
| (min) | (mm/hr) | (L/s) | (L/s) | (m3) | | | |
| 5 | 291.24 | 193.51 | 172.51 | 51.75 | | | |
| 10 | 214.27 | 142.37 | 121.37 | 72.82 | | | |
| 15 | 171.47 | 113.93 | 92.93 | 83.64 | | | |
| 20 | 143.94 | 95.64 | 74.64 | 89.56 | | | |
| 25 | 124.62 | 82.80 | 61.80 | 92.70 | | | |
| 30 | 110.24 | 73.25 | 52.25 | 94.04 | | | |
| 35 | 99.09 | 65.84 | 44.84 | 94.16 | | | |
| 40 | 90.17 | 59.91 | 38.91 | 93.39 | | | |
| 45 | 82.86 | 55.05 | 34.05 | 91.95 | | | |
| 50 | 76.74 | 50.99 | 29.99 | 89.97 | | | |
| 55 | 71.55 | 47.54 | 26.54 | 87.58 | | | |
| 60 | 67.07 | 44.57 | 23.57 | 84.83 | | | |
| 65 | 63.18 | 41.98 | 20.98 | 81.80 | | | |
| 70 | 59.75 | 39.70 | 18.70 | 78.53 | | | |
| 75 | 56.71 | 37.68 | 16.68 | 75.05 | | | |
| 90 | 49.33 | 32.78 | 11.78 | 63.60 | | | |
| 105 | 43.80 | 29.10 | 8.10 | 51.03 | | | |
| 120 | 39.47 | 26.23 | 5.23 | 37.64 | | | |
| 135 | 36.00 | 23.92 | 2.92 | 23.62 | | | |
| 150 | 33.13 | 22.01 | 1.01 | 9.13 | | | |
| | | | | | | | |