SERVICE REPORT

for

Potable Water and Sanitary Sewer

Alterations to 192 Main St.

Wellington,
Prince Edward County, ON

April, 2023

Prepared for:

The Principals of the
Wellington I. G.

192 Main St., Wellington

Prepared by:

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1. Introduction

The development consists of:
a) the alteration of the main house, excavating out the basement to create a usable basement, constructing a single floor addition on the west side of the building and adding approximately eight feet on the north side of the main floor of the building,
b) renovating an existing garage into a residential annex,
c) relocating a shed and converting it into a yoga studio,
d) construct six new garden suites, each having a single bedroom and a seventh 'A' frame 2-bedroom, and
e) construct a new seasonal retail building.

A significant amount of parking is proposed to accommodate the clients.

The current facility is used and zoned for residential use. The main building is a residence. The other existing buildings are 'garages' and 'storage' buildings. A zoning amendment is proposed to permit commercial 'D', assembly A2 [restaurant] and residential 'C' hotel occupancy.

The Municipality of Prince Edward County has requested an analysis of the services [potable water and sanitary sewer] that will be required to supply the proposed project. The analysis will include a comparison of the service requirements of the proposed project and pre-development conditions. The review will also include an evaluation of Town facilities to determine if the Municipal services are adequate to service the higher expected flows of water and sanitary.

2. Potable Water Service Requirements

2.1 Fire Underwriters Survey for Minimum Fire Fighting Water Supply

FUS reviews the fire fighting capability of the municipal water delivery system in the area [Part I] and the capability of the system to provide the minimum required fire fighting water to a particular structure [Part II], based on the structure's level of hazard, construction materials, size, its protection against fire and proximity to other buildings having their own level of potential fire fuel.

2.1.1 Comparing Water Delivery System Requirements

Part I recommends that hydrants be placed in spacings not exceeding 90 metres. The nearest fire hydrant is directly in front of the east neighbour, The adjacent hydrants to this one are spaced seven to eight metres farther than the recommended spacing.

Fire hydrant residual water pressure is recommended to be 150 kPa [21.75 psi]. The 23 April 2022 hydrant test indicated a residual water pressure of 209 kPa [30.33 psi]

The delivery system is recommended to provide 10600 litre/minute [2800 usgal/minute] for a duration of 2.25 hours. The system includes delivery by truck from storage facilities. Currently the system was mesured to be able to deliver 1000 to 1400 usgal/min. The town is in the process of constructing a new, larger and higher water tower that will be capably to deliver this recommended flow of fire fighting water. The tower is expected to be in service the summer of

2023.

2.1.2 Comparing Pre-Development and Proposed Development Requirements

The analysis indicated that the pre-development building would require a minimum fire fighting water supply of 2489 usgpm. The proposed complex of alterations and new building would require a minimum fire fighting water supply of 771 usgpm. A hydrant test was conducted 23 April 2022 that determined the available water supply at 30 psi would be 1021 gpm. At a pressure of 20 psi, the available water supply would be approximately 1220 usgpm.

2.1.3 Conclusion

This analysis leads to the conclusion that the current water supply is inadequate to supply the current development, while the supply is adequate for the proposed development.

2.1.4 Discussion

Even though the proposed development is significantly larger than the pre-development configuration, the fire fighting water demand significantly dropped after the proposed development.

The proposed building has several design specifications that reduce the fire hazard; hence the volume of required fire fighting water. These specification are as follows:

a) Part II, paragraph 1, both buildings are classified as 'low hazard', eligible for a reduction factor of 75%. The proposed development has fire protection of all structural elements as well as isolated and protected stairwells that divide the floor in fire protected volumes. This provided a reduction factor of 0.60 after the proposed developement.

b) Part II, paragraph 2 provides for a 15% reduction due to combustibility factor. The proposed building is designed with fire separated floors, wall and fire rated protected stairways with fire rated access doors.

c) Part II, paragraph 3 provided for fire fighting flow to be reduced due to presents of sprinklers and a 10% reduction for continuous supervision. The hotel has desk staff/monitors that are continuously on duty. Alarm are proposed at this station.

d) The proposed building has the main floor entirely sprinkled as per NFPA 13. Sprinkled buildings or portions thereof are not included in the fire fighting water volume. However the potable water service requirement for the building includes FUS water, sprinkler water, hose water and domestic water.

Supporting documentation of FUS calculations, April 2022 hydrant test, sprinkler water requirements and sprinkler hydraulic design are included in the Appendix No.1.

2.2 Sprinkler Water Supply

2.2.1 Comparison

There was no provision for a fire sprinkler system in the pre-development building. The proposed development included the main floor to be sprinkled. The main floor is that portion of the development with an 'Assembly', A2 Occupancy.

2.2.2 Benefits and Requirements

There were many benefits by including a sprinkler system design in the proposed building alteration. Apart from the safety benefit, the presence of a sprinkler system greatly reduced the requirement for a municipal fire fighting water supply.

The hydraulic calculations of the fire sprinkler system indicate that the minimum required demand as per NFPA 13 is 200 usgpm. The minimum fire hose demand for this development would be 250 usgpm, giving a minimum total demand of hose and sprinkler of 450 usgpm.

The FUS demand for fire fighting is 771. The total demand for all categories of fire fighting would be 1221 usgpm.

2.2.3 Conclusion

The current municipal water supply is adequate to supply all proposed fire fighting requirements - including fire sprinklers.

2.2.4. Discussion

The sprinkler system and outside fire hose supply was designed as per NFPA 13 and NFPA 14 respectively. The density/area method was used to determine sprinkler water demand. The area with the highest fire sprinkler water demand governs the amount of municipal service water that is allocated for the sprinkler system. The water demanded is based on the hydraulic remoteness while considering the minimum allowable delivery at the most remote sprinkler head and the classified 'hazard'. The 'A2' assembly occupancy has a 'low' hazard level while the portion of the governing area contains an 'ordinary' hazard level - the kitchen area. These are hazard classifications identified in NFPA 13. The 'ordinary' hazard is a higher level of hazard than the 'low' hazard. Because a portion of the governing area contained the 'ordinary' level, the entire area was considered 'ordinary'. The 'ordinary' classification also impacted the water flow for the hose water. The hose water flow for 'ordinary' is higher than for a 'low' hazard classification.

2.3 Municipal Potable Water Requirements

2.3.1 Comparison

The pre-development potable water demand on the distribution system was determined to be over 9422 litres per minute [from FUS]. The proposed development requires 2919 litres per minute [from FUS] and 3076 litres per minute of potable water supply, based on DGPW guidelines. The available municipal domestic water supply is currently 3865 litres per minute. Note the NFPA 13 guidelines determine that 4621 litres per minute are required. With the completion of the local water tower in the summer of 2023, the available water supply at the site will be 12540 litres per minute [from Tow water distribution model App #1].

2.3.2 Conclusion

This municipal water supply is adequate for the proposed development, but inadequate for the

pre-development water requirements. The new water tower, when available the summer of 2023, would provide an adequate water supply for the pre-development building.

2.3.3 Discussion

The "Design Guidelines for Potable Water" [DGPW] was used to determine the demand on the municipal water distribution system for the pre-development and proposed development conditions. The DGPW requires that the water demand be determined by selecting the greater of:

- Maximum Day Flow + Fire Flow, or
- Peak Day Flow

In both cases, the fire flow water demand added sufficient water demand to place the combination maximum day flow and fire flow as the governing flow for required potable water demand. The fire flow included the FUS requirement as well as the water required for sprinkle and hose flow.

The calculations for these flows is shown in the Appendix 1.

2.4 Municipal Water Service

2.4.1 Comparison

The pre-development potable water supply was a 19 mm municipal potable water service. The existing fixture units would suggest that the service should have been 25 mm. The proposed potable water service was determined to be 150 mm to carry 307 usgpm domestic [OBC12 Part 7, App #1 Table "Service requirement"] and fire fighting water of 450 usgpm [App #1 Table "Determine Adequacy of Municipal Water System to Supply Fire Sprinklers and Fire Hoses in Subject Building"]. This includes the water require to supply the rear yard fire hydrant, the fire sprinkler system on the main floor and the exterior hose connection. The fire sprinkler system and exterior hose connection are supplied by a 100 mm branch from the 150 mm service pipe. The 100 mm domestic water supply is supplied by the other 100 mm branch from the 150 mm potable water service.

2.4.2 Conclusion

The pre-development potable water supply was inadequate to supply the existing fixtures in the pre-development building. The 150 mm potable water service is adequate to supply potable water to the rear yard fire hydrant, the fire sprinkler system, the exterior fire hose connection and the domestic potable water network.

The water meter will be located in a water service vault [manhole] just inside the property lin, on the west side of the driveway curb. See detail drawing of the vault in Appendix 6.

2.4.3 Discussion

The domestic potable water demand was determined from OBC20 Table 7.4.9.3. [fixture units by source] and Table 7.4.10.5 [conversion of fixture units to flow]. The pipe size was determined from ASPE vol.2 Table 5-1. A pipe size was selected based on a maximum flow to 80% full pipe.

Prior to connection of the 150 mm water service lateral to the 200 mm municipal water, the contractor must disinfect the new water service lateral as per the Ontario standard "2020 Watermain disinfection procedure". For the convenience of all, the procedure is included in Appendix 2. The contractor is responsible to provide a written procedure to disinfect and test the new water service lateral, as per this standard.

The Appendix 1 contains all relevant calculations used to determine the water demand and pipe size.

2.5 Site Potable Water Distribution

A ULC approved 50 mm pvc 100 psi pressure pipe supplies potable municipal water to each of the east and west yards with out buildings. The individual water supply to each unit is 19 mm pressure pvc pipe.

To mitigate the possibility of contaminating the water supplies to the out buildings, the potable water is supplied from around the periphery of the site. The waste pressure pipes are not in the vicinity of the potable water supply.

This on site network of water supply must be protected against frost. The acceptable depth of frost protecting backfill is 1.8 metres. If bedrock is encountered at shallower depths, 25 mm of 600 mm wide SM insulation may replace each foot of backfill soil. The pipe must be buried at least 600 mm. The insulation must be inspected prior to backfill and the insulation must be within 150 mm of the supply pipes and within 25 mm of the centerline of the SM. A detailed drawing is provided in Appendix 6.

3. Sanitary Sewer Service Requirements

3.1 Municipal Sanitary Sewer Service Size

3.1.1 Comparison

The pre-development sanitary lateral from the municipality was a 100 mm pipe to the municipal sanitary main. The proposed development requires a 125 mm lateral to a proposed inspection manhole at the property line. From this inspection manhole the 125 mm municipal sanitary lateral is connected to the Town sanitary manhole that is located under Main St.

3.1.2 Conclusion

The pre-development sanitary lateral is adequate to convey the sanitary waste from the pre-development building. The 125 mm SDR18 pipe is adequate to convey all waste generated from the proposed development that includes the altered existing main building, the garden suites, the

seasonal retail building and the altered annex building.

3.1.3 Discussion

The domestic potable water demand was determined from OBC20 Table 7.4.9.3. [unit fixture units by source], Table 7.4.10.5 [conversion of fixture units to flow] and Table 7.4.10.8. [the maximum waste pipe flow].

3.2 Site Sanitary Collection

Because of the geographic size of the development and the limited drop to the municipal sanitary service, it is proposed to convey the sanitary waste from each of the out buildings using gravity to sanitary holding tanks via 100 mm abs pipes. A duplex pumping system is proposed to pump the sanitary waste to the front yard sanitary manhole, M/HSA2, in 50 mm ULC approved sanitary PE 100 psi waste tubing. This manhole collects the entire production of sanitary waste of the development.

The pumps are ½ h.p. sanitary effluent pumps [Appendix 5] that are activated by float switches, under a duplex controller. A display panel on the outside of the mechanical room will indicate that a pump has failed. The remaining pump will continue to operate after one pump fails. There is always one spare effluent pump on hand for replacement. As soon as the spare pump is used, a new spare pump is ordered. The completion of a mandatory check list is provided for the manager of each shift. This checklist is addressed within the first hour of the manager's shift. That is, the manager must engage a plumber to replace the defective pump with the spare operable pump.

The waste pipes must be frost protected by at least 1.2 metres of backfill. If bedrock is encountered at shallower depths, one inch of 600 mm wide SM insulation may replace each foot of backfill soil. The pipe must be buried at least 600 mm. The insulation must be inspected prior to backfill and the insulation must be within 150 mm of the waste pipes and within 25 mm of the centerline of the SM. A detail drawing is provided in Appendix 6.

3.3 Municipal Domestic Sanitary Sewer

3.3.1 Comparison

Sanitary peak flows were based on "Design Guidelines For Sewage Works" indicated that 0.17 litres per second of peak sanitary flow was generated for the pre-development condition. The proposed development would produce 1.06 litres per second of peak sanitary flow, a difference of 0.89 litres per second. Average daily flow increases from 4900 litres per day to 40910 litres per day. These are very low values of flow. The flow of 1.06 l/sec is approximately equivalent to the flow from a toilet flush. The equations used were intended for much larger populations.

Using OBC12 Part 8, Table 8.2.1.3.B., the daily design flows were calculated to be 5500 l/day and 34250 l/day for current building and proposed project, respectively.

3.3.2 Conclusion

The additional 0.89 litres per second in sanitary flow at peak does not seem to be a significant additional flow to the sanitary system of Wellington. There is an increase in daily flow [28750 l/day as per OBC12 Part 8 or 40910 l/day as per Design Guidelines for Sewage Works 5.5.2] . Should the town consider this increase in sanitary flow intolerable for current facility capacity, a timed release of sanitary waste could be achieved. The sanitary waste from the project to the Town's facility could be during late evening and early morning.

3.3.3 Discussion

This section of the Guidelines is actually used for 'domestic' use, not commercial use. There is a section in the guidelines for commercial use. This would result in sanitary flows that are less than for domestic use. The timing of the peak flow generated by the restaurant would be out of phase with the peak flow resulting from the community domestic use. Domestic peak flows are generally occurring in the morning as the general population awakens. The restaurant peak flow would be during early evening when patrons are dining for their supper.

The Service Site Plan is in Appendix 6. The plan indicates the location and size of the sanitary collection tanks and pressure pipes.

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Appendix follows