



# 1127 Garrison Road – Wastewater Servicing Review

<b>Organization:</b> Town of Fort Erie	GM BluePlan Project No: 621039
<b>Attention:</b> Brad Johnston	Date: January 31, 2024
<b>Project:</b> Wastewater Servicing Review	
<b>RE:</b> 1127 Garrison Rd	



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This technical memo summarizes the assessment of the existing wastewater sewer capacity under the proposed 1127 Garrison Road development, located south of Garrison Road, east of Crescent Road and west of Kraft Road.

## 1 Development Overview

The proposed development, shown in **Figure 1**, consists of developing 90 residential units and 0.034 ha of commercial space on an approximately 1 ha site area. **Table 1** provides an overview of the proposed site's wastewater flows estimated using the Sanitary Design Parameters from the Functional Servicing Design Brief provided by LandSmith Engineering & Consulting Ltd and the Town's Design Standards. It is our understanding that the development will connect to the existing 450 mm sanitary sewer along Garrison Road, flowing east to the Alliston Road SPS, until ultimately discharging to the Anger Avenue Wastewater Treatment Plant (**Figure 2**).

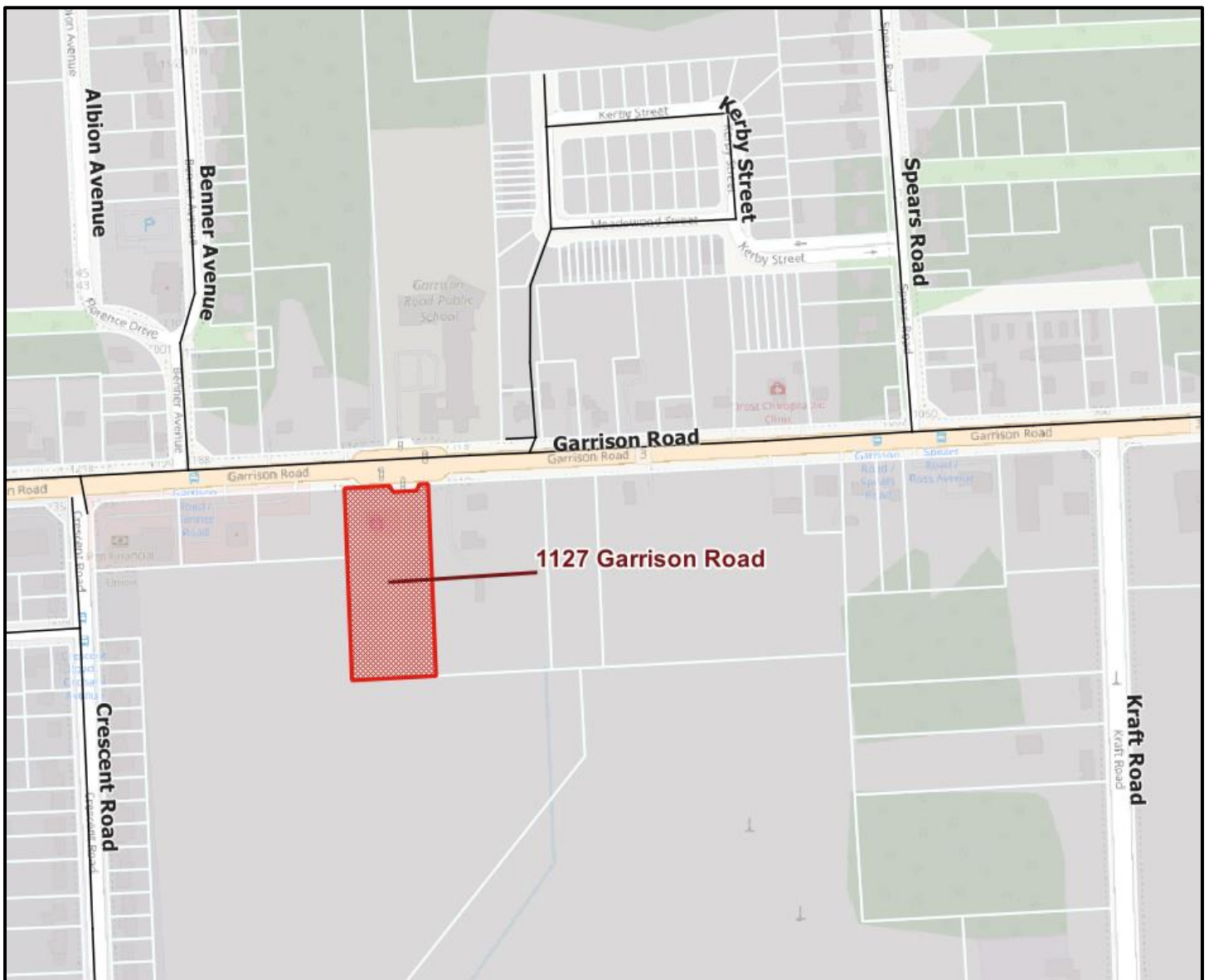


Figure 1. Development Location

**Table 1. Development Flows**

Source	Unit Type	Units	Density	Area (ha)	Total Design Population	Flow Generation	Average Dry Weather Flow (L/s)	Peaking Factor	Peak DWF (L/s)	RDII (L/s)	Total Peak Design Flow (L/s)
FSR	Apartments	90	3ppu	1.00	270	275 (L/c/d)	0.86	4.098 (4.0 - Corrected Harmon's PF)	3.52 (3.44)	0*	<b>3.52 (3.48)</b>
	Commercial (Corrected to include commercial flows)	-	750ppha	0.034	26	28 m <sup>3</sup> /ha/d	(0.011)	4.0 (Harmon's PF)	(0.044)		
GMBP Review	Apartments	90	1.5ppu	1.00	135	275 (L/c/d)	0.40	4.0 (Harmon's PF)	1.59	0*	<b>1.64</b>
	Commercial	-	750ppha	0.034	26	28 m <sup>3</sup> /ha/d	0.011	4.0 (Harmon's PF)	0.044		

\*It is noted that for proposed developments that are part of an existing serviced property, the existing baseline system flow accounts for the site's wet weather flow contributions. For the purposes of this development analysis, the peak WWF of **3.48 L/s** was used as a conservative estimate of peak flows.

## 2 Basis of Analysis

Further, the Town's most recent Pollution Prevention and Control Plan and Wastewater Master Plan (PPCP&MP) Study and Niagara Region's 2021 Water and Wastewater Master Plan Update (MSPU) Study were used to support the assessment of existing system capacities, identification of planned system upgrades, and identification of system performance objectives.

### 2.1 Level of Service Targets

#### *Pump Station Level of Service Target*

Niagara Region owns and operates the wastewater pumping stations within the Town. The Region's pump station firm capacities are designed to safely convey the peak wet weather flows from a design allowance of 0.286 L/s/ha for new developments and 0.4 L/s/ha for existing areas, and a peaking factor based on Harmon formula with values between 2 and 4 for average dry weather flows. Following the methodology for assessing upgrade needs:

- Pump station flow capacity was assessed using the Region's 0.286 L/s/ha design allowance for new developments and 0.4 L/s/ha for existing areas for wet weather flows; and,
- Manage excess wet weather flows, using storage, to not trigger overflows under the design 5 year storm.

#### *Gravity Sewer Level of Service Targets*

The Town owns and maintains the majority of trunk sewers within the wastewater system.

For existing sewer capacities, sewer performance criteria were assessed using the following conditions:

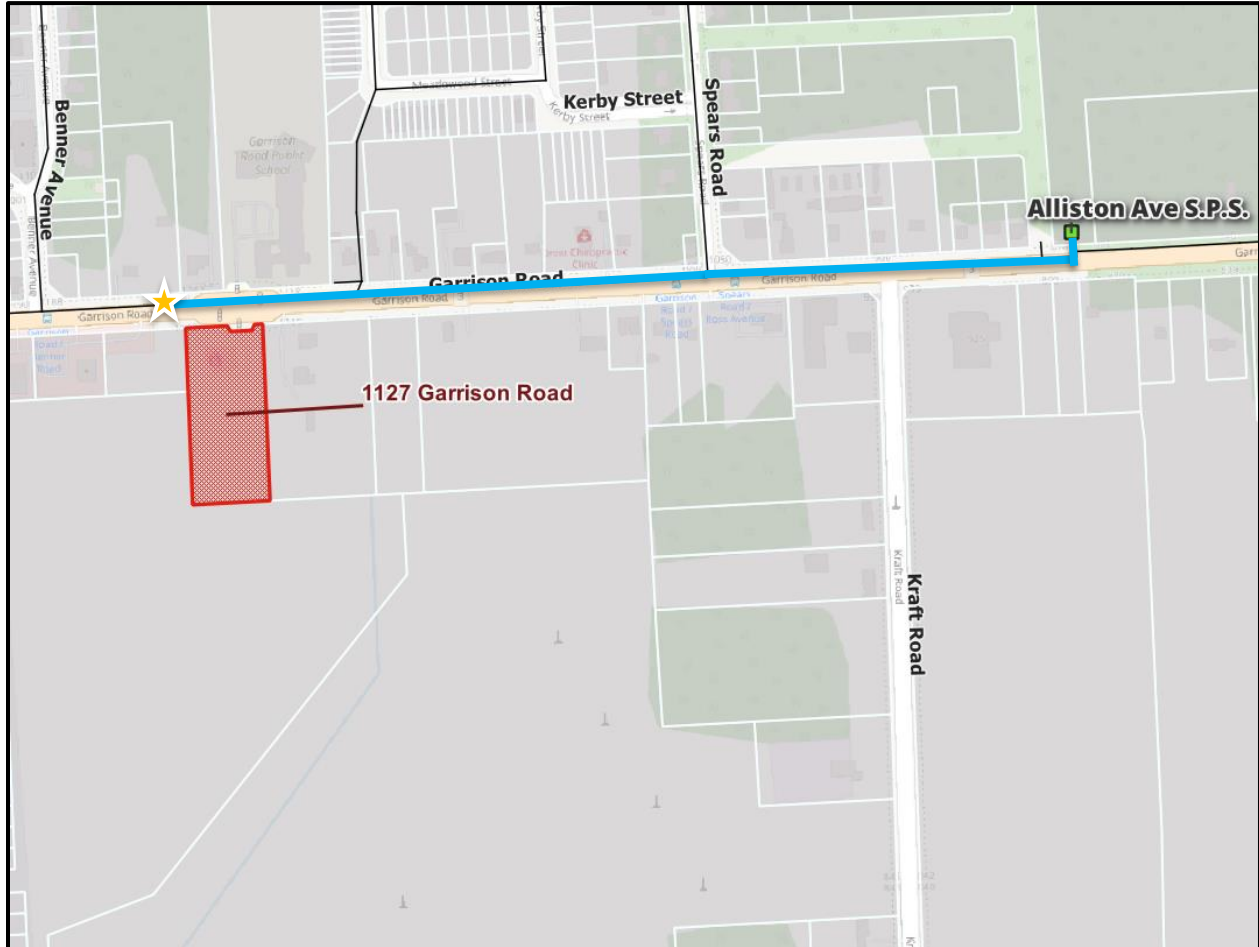
- Maintaining depth of flow in pipes equal to or less than obvert elevation ( $d/D \leq 1$ ); and, if failing to do so then,
- Maintain system hydraulic grade line (HGL) of a surcharging sewer below the basement protection freeboard of 1.8 meters below grade.

The Town has identified a current system performance target of meeting the design 5 year storm.

## 3 Baseline Understanding

### 3.1 Overview of Downstream System

The proposed development will tie-in to the existing 450 mm sewer along Gaarrison Road, flow by gravity to the Alliston Road SPS before ultimately discharge to the Anger Avenue Wastewater Treatment Plant. **Figure 2** shows the flow path and tie-in point from the development to the existing network.



**Figure 2. Proposed Development. Flow route (blue), tie-in points (star) shown.**

### 3.2 Previous Assessment and Upgrade Recommendations

The Town's PPCP&MP identified the 5-year peak I&I flows exceed the existing Alliston Road SPS capacity, but with sufficient wet well and system storage to prevent overflows and sewer surcharging with HGL remaining below basement flooding levels.

The Region's 2021 Master Servicing Plan Update (MSPU) identified the Alliston Road SPS as having existing and future deficiencies under both design allowance PWWF and a 5-year storm, and requires upgrades to support existing and future flows. The 2021 MSPU identified Anger Avenue WWTP as having surplus capacity to support 2051 flows based on the MSPU criteria.

The following capital projects were recommended from the 2021 MSPU:

- Replace existing 250 mm Alliston Road SPS forcemain with a new single 300 mm
- Upgrade the Alliston Road SPS from 67 L/s to ultimate ECA of 130 L/s by adding a final pump.

### 3.3 Previous Growth Assumptions

The recommendations outlined in **Section 3.2** were based on the 2021 MSPU projected growth of 1,507 people and 295 jobs within the area draining directly to the Alliston Road SPS. The proposed development adds a total of 270 people which is within the previous growth projection.

It should be noted that the Town had previously requested the assessment of other development review within the Alliston Road SPS catchment. The equivalent growth population of the previously proposed development was 387 people. This would result in a potential growth population of 657 people, which is within the 2021 MSPU growth projection to 2051.

## 4 Capacity Assessment

### 4.1 Alliston Road Sewage Pumping Station

The existing operational capacity of the Alliston Road SPS is 67.0 L/s. **Table 2** provides a summary of the flows to the station using the Region’s wet weather design allowance and 5 year design storm.

**Table 2. Pump Station Impacts**

Scenario	Growth Population	Pump Station Capacity (L/s)	Peak Dry Weather Flows (L/s)	Peak Wet Weather Flow (L/s) Using Design Allowance	Peak Wet Weather Flow (L/s) 5 Year Design Storm
Existing	0	67.0	9.2	102.0	100.0
Existing + 1127 Garrison Road	270	67.0	12.7*	105.5*	103.5*
2021 MSPU Growth Projection to 2051	1,507	130.0	29.1	133.7	131.8

\*calculated estimate, not modelled.

Based on the SPS capacity analysis:

- The SPS 5 year design storm are lower than the Region’s design allowance, as such, the 5 year design storm flows are used as the basis of the SPS capacity needs. The station’s existing peak design flow of 100 L/s exceeds the station’s operational firm capacity of 67 L/s.
- The existing Alliston Road SPS has insufficient capacity to support the proposed development at 1127 Garrison Road. However, the development can be accommodated within the MSPU identified SPS upgraded capacity of 130 L/s.



## 4.2 Existing System Performance – Gravity Sewers

The model demonstrates that:

- The existing 450 mm sewer along Garrison Road from the development to Spears Road surcharges beyond the basement flooding protection freeboard of 1.8m below grade under the current 5-year design flows.
  - When the development flows are added, the HGL increases but no additional flooding occurs beyond the existing conditions under the 5 year design storm.
  - When the 2021 MSPU recommendation of upgrading the Alliston Road SPS from 67 L/s to 130 L/s, the observed sewer surcharging is eliminated under both the existing scenario and the combined flow for the proposed development scenario under a 5 year design storm.

Table 3. Sewer Performance in a 5 year design storm scenario

Sewer Configuration	Scenario Flows	Garrison Road from development to Spears Road (450 mm sewer)	Garrison Road from Spears Road to Alliston Road SPS (450 mm sewer)
Existing	Existing	Surcharging, >1.8m below grade	Surcharging, <1.8m below grade
	Existing + 1127 Garrison Road	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade
With Upgrades	Existing	No Surcharging	Surcharging, <1.8m below grade
	Existing + 1127 Garrison Road	No Surcharging	Surcharging, <1.8m below grade



## 5 Recommendations

Based on the above analysis,

- The existing sewers downstream of the development are constrained.
  - The 450 mm sewer on Garrison Road from Spears Road to the Alliston Road SPS surcharge, however it is below the basement flooding protection freeboard of 1.8 m under the 5 year design storm.
    - When the development flows are added, the HGL increases beyond the 1.8m basement flooding protection freeboard under the 5 year design storm.
  - Sewer surcharging is primarily the result of the downstream pump station.
- Upgrading the capacity of the Alliston Road SPS from 67 L/s to 130 L/s (the Region MSPU upgrade recommendation) would provide sufficient capacity to eliminate the majority of system surcharging.
  - Sewer surcharging would remain along Garrison Road from Spears Road to the Alliston Road SPS, however the sewer surcharging would remain below the 1.8 m basement flooding protection freeboard under the 5 year design storm.
- Provided sufficient capacity is made available at the Alliston Road SPS, the existing sewer network has sufficient capacity to support the 1127 Garrison Road development.

Yours Truly,

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