GEI Consultants

FORT ERIE ONTARIO

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Wastewater Servicing Review

Alliston Woods Phase 2 (0-10844 Morrison Ave) Development

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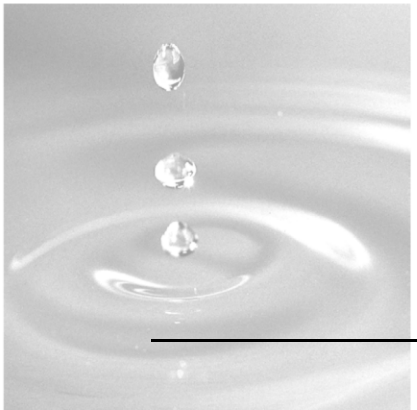

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1. Project Scope

This technical memo summarizes the results of the wastewater system capacity review for the proposed Alliston Woods Phase 2 (0-10844 Morrison Ave) development, located North of Garrison Road, west of Thompson Road, east of Spears Road and south of Bertie Street and the Queen Elizabeth Way in the Town of Fort Erie.

1.1. Development Overview

The proposed development, shown in **Figure 1-1**, includes two residential sites with a total area of 39.30 ha and a total population of 2,031 people. **Table 1-1** provides an overview of the proposed wastewater flows estimated using the Sanitary Design Parameters listed in the Functional Servicing Report (FSR) provided by Upper Canada Consultants, as well as GEI's calculated wastewater flows which are based on the Town of Fort Erie's and Ministry of Environment, Conservation, and Parks' (MECP) design criteria. It is our understanding that the development will connect to the existing 375 mm sanitary sewer that connects to the 450 mm sewer along Garrison Road flowing east towards the Alliston Road SPS before ultimately discharging at the Anger Avenue Wastewater Treatment Plant (**Figure 3-1**).

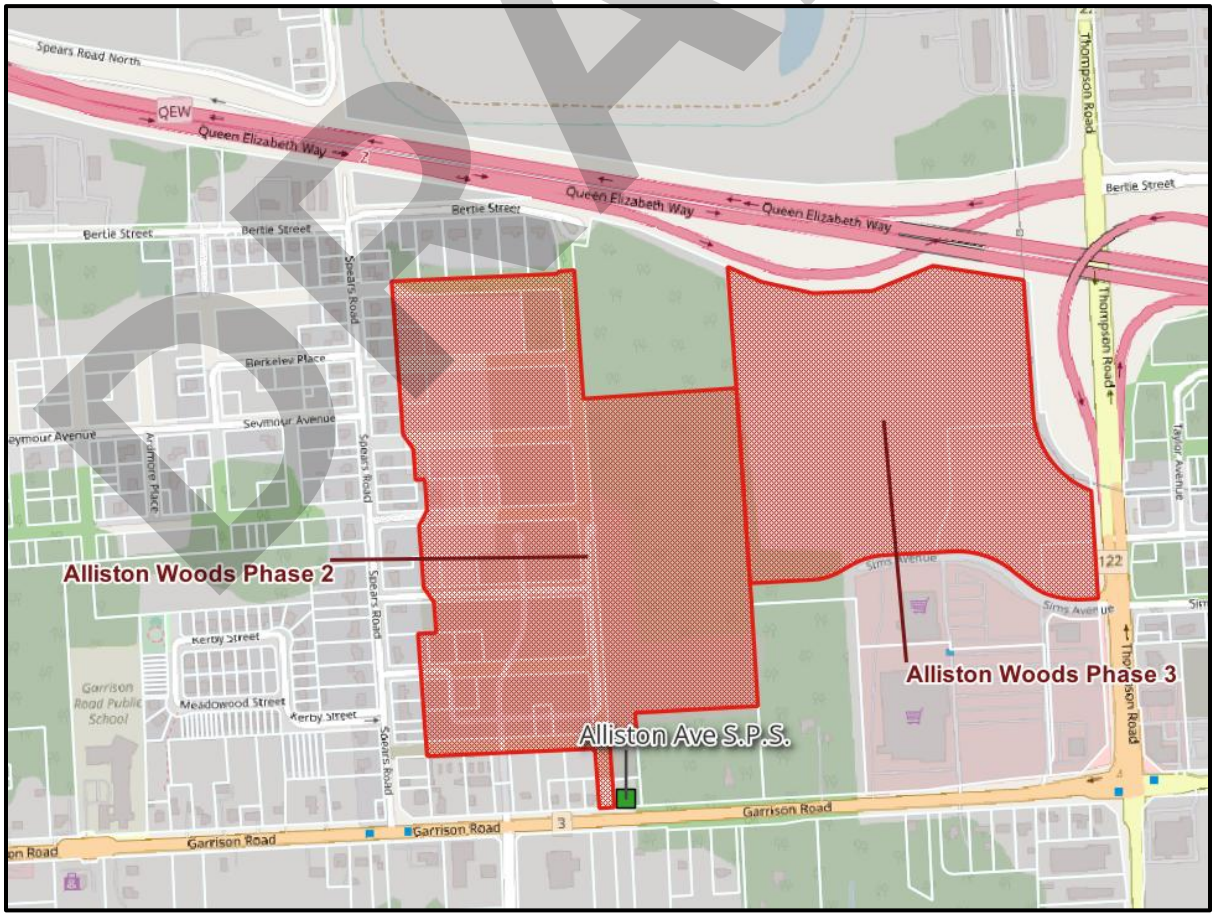

Figure 1-1. Development Location

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Table 1-1. Wastewater Flow Projections

Source	Site	Area (ha)	Population (persons)	Flow Generation (L/cap/day)	ADWF (L/s)	Peaking Factor	RDII (L/s)	PWWF (L/s)
FSR	Phase 2	23.65	947	255	5.99	3.581	11.0 (6.869[1])	**32.47** **(28.33)**
	Phase 3	15.65	1,084					
GEI Review	Phase 2	23.65	947	255	5.99	3.581	7.016[2]	**28.48**
	Phase 3	15.65	1,084					

Notes:

1. Used FSR rate of 0.28 L/s/ha on the site area not already included in the existing catchment.
2. Used Region 2021 MSPU rate of 0.286 L/s/ha on the site area not already included in the existing catchment.

It is noted that because the proposed development is partially included in the existing serviced catchment, the existing baseline system flow already accounts for part of the site's wet weather flow contributions. For the purposes of this development analysis, the peak WWF of **28.48 L/s** was used as a conservative but reasonable estimate of peak flows from this development.

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2. Basis of Analysis

The Town's most recent Pollution Prevention and Control Plan and Wastewater Master Plan (PPCP&MP) Study and the Niagara Region's 2021 Water and Wastewater Mater Plan Update (2021 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

2.1.1. Pump Station Level of Service Targets

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. The following methodology was used to assess 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 5-year design storm.

2.1.2. Gravity Sewer Level of Service Targets

The Town owns and maintains the majority of sewers within the wastewater system. For existing sewer capacities, sewer performance criteria were assessed using the following conditions:

- Maintaining depth of flow in pipe 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 5-year design storm.

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3. Baseline Understanding

3.1. Overview of Downstream System

The proposed development will tie-into the 375 mm sewer stub that flows into the 450 mm sewer along Garrison Road, which flows east to the Alliston Ave SPS until it ultimately discharges into the Anger Avenue Wastewater Treatment Plant. **Figure 3-1** shows the flow path in blue from the development to the Alliston Ave SPS.

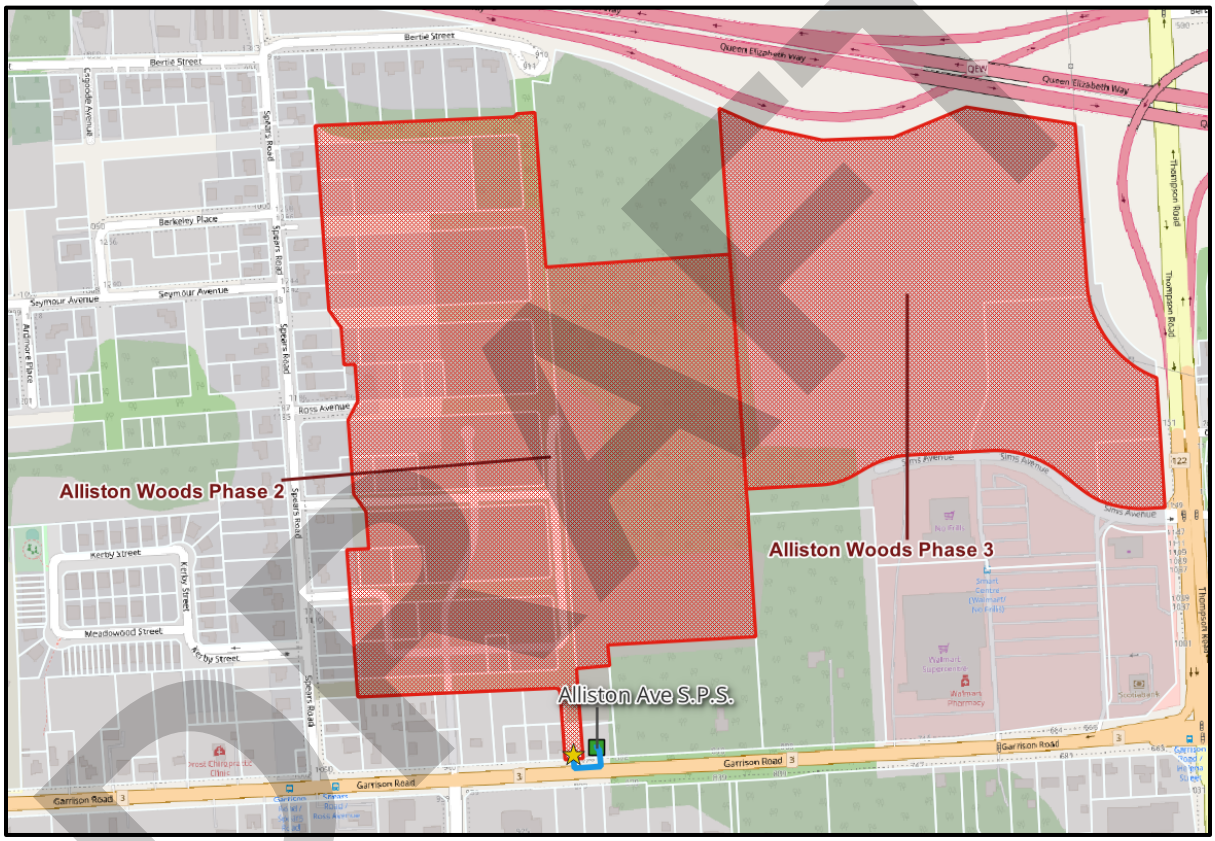

Figure 3-1. Proposed Development. Flow route (blue), tie-in point (star) shown.

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 the HGL remaining below basement flooding levels.

The Region's 2021 Master Servicing Plan Update (MSPU) identified the Alliston Ave SPS as having existing and future deficiencies under both design allowance PWWF and modelled flows for a 1-in-5-year design 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.

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The following capital projects were recommended from the 2021 MSPU:

- Replace the existing 250 mm Alliston Ave SPS forcemain with a new single 300 mm.
- Upgrade the Alliston Ave 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 a total projected growth of 1,507 people and 295 jobs within the Alliston Ave SPS catchment in the 2021 MSPU.

The proposed development will add a total of 2,031 people to the Alliston Ave SPS catchment. When accounting for all known previously assessed development review applications (1211 Pettit Road, 1127 Garrison Road, 644 Garrison Road and Spears Gardens - 1230 Pettit Road) within the Alliston Ave SPS catchment, the total growth sums to 3,568 equivalent people which exceeds the 2021 MSPU growth projected to 2051.

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4. Capacity Assessment

4.1. Alliston Ave Sewage Pumping Station

The existing operational capacity of the Alliston Ave SPS is 67.0 L/s. **Table 4-1** provides a summary of the flows to the station using the Region's wet weather design allowance and 5-year design storm.

Table 4-1: 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 + Alliston Woods + All Known Development Applications	3,568	67.0	57.8[1]	150.60[1]	148.60[1]
2021 MSPU Growth Projection to 2051	1,802	130.0	29.1	133.7	131.8

Notes:
1. Calculated estimate, not modelled.

Based on the SPS capacity analysis:

- Under existing conditions, when using the wet weather design allowance of 0.4 L/s/ha for existing areas and 0.286 L/s/ha for growth areas, the station's firm capacity of 67.0 is exceeded. The station's firm capacity is also exceeded under the 5-year design storm.
- The proposed development flows exceed the projected 2051 flows to the station and the 2021 MSPU recommended station upgrade of 130 L/s is also exceeded by all the previously known development applications flows including the proposed development.

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4.2. Existing System Performance – Gravity Sewers

The model demonstrates that:

- The existing sewers from the development to Garrison Road surcharge; however, the surcharging remains below the 1.8 m basement flooding protection freeboard under the 5-year design storm.
    - When the development flows and all known development application flows are accounted for, the HGL rises but remains below the 1.8 m basement flooding protection freeboard under the 5-year design storm.
- The existing sewers along Garrison Road from the development to the Alliston Ave SPS surcharge; however, the surcharging remains below the 1.8 m basement flooding protection freeboard under the 5-year design storm.
    - When the development flows and all known development applications flows are accounted for, the HGL rises above the 1.8 m basement flooding protection freeboard under the 5-year design storm due to a backwater effect resulting from the downstream restriction at the Alliston Ave SPS.
- With the 2021 MSPU Alliston Ave SPS capacity upgrade recommendation implemented in the model, the existing sewers from the development to Alliston Ave SPS surcharge but the surcharging is below the 1.8 m basement flooding protection freeboard, for both existing and proposed development conditions under the 5-year design storm.
    - The surcharging observed in the model downstream of the proposed development is caused by a backwater effect resulting from the Alliston Ave SPS capacity limitation.
- Provided sufficient capacity is made available at the Alliston Ave SPS, the existing sewer network has sufficient capacity to support the proposed development.

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Table 4-2. Sewer Performance in a 5 Year Design Storm Scenario

Sewer Configuration	Scenario Flows	From the development to Garrison Road (375 mm sewer)	Garrison Road to Alliston Ave SPS (450 mm sewer)
Existing	Existing	Pipes surcharging, HGL below 1.8 m basement flooding protection freeboard elevation	Pipes surcharging, HGL below 1.8 m basement flooding protection freeboard elevation
	Existing + Alliston Woods + all known developments[1]	Pipes surcharging, HGL below 1.8 m basement flooding protection freeboard elevation	Pipes surcharging, HGL above 1.8 m basement flooding protection freeboard elevation
MSPU SPS Upgrade to 130 L/s	Existing	Pipes surcharging, HGL below 1.8 m basement flooding protection freeboard elevation	Pipes surcharging, HGL below 1.8 m basement flooding protection freeboard elevation
	Existing + Alliston Woods + all known developments[1]	Pipes surcharging, HGL below 1.8 m basement flooding protection freeboard elevation	Pipes surcharging, HGL below 1.8 m basement flooding protection freeboard elevation

Notes:

1. 21211 Pettit Road, 1127 Garrison Road, 644 Garrison Road and Spears Gardens - 1230 Pettit Road

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5. Summary

Based on the above analysis:

- The existing sewers from the development to Garrison Road surcharge; however, the surcharging remains below the 1.8 m basement flooding protection freeboard under the 5-year design storm.
    - When the development flows and all known development application flows are accounted for, the HGL rises but remains below the 1.8 m basement flooding protection freeboard under the 5-year design storm.
- The existing sewers along Garrison Road from the development to the Alliston Ave SPS surcharge; however, the surcharging remains below the 1.8 m basement flooding protection freeboard under the 5-year design storm.
    - When the development flows and all known development applications flows are accounted for, the HGL rises above the 1.8 m basement flooding protection freeboard under the 5-year design storm due to a backwater effect resulting from the downstream restriction at the Alliston Ave SPS.
- With the 2021 MSPU Alliston Ave SPS capacity upgrade recommendation implemented in the model, the existing sewers from the development to Alliston Ave SPS surcharge but the surcharging is below the 1.8 m basement flooding protection freeboard, for both existing and proposed development conditions under the 5-year design storm.
    - The surcharging observed in the model downstream of the proposed development is caused by a backwater effect resulting from the Alliston Ave SPS capacity limitation.
- Provided sufficient capacity is made available at the Alliston Ave SPS, the existing sewer network has sufficient capacity to support the proposed development.

The Sanitary Flow Assessment completed by Upper Canada Consultants for the Alliston Ave SPS concluded that the Alliston Ave SPS has capacity to receive existing and future flows without the capacity upgrades recommended in the 2021 MSPU. Based on Niagara Region's MSPU performance criteria for sewage pumping stations, however, Alliston Ave SPS does not have adequate existing capacity to receive the additional wastewater flows from the subject development. Further discussion with Niagara Region may be necessary to arrive at a suitable resolution given that this is a Region-owned facility.

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