3770 Hazel Street –
Wastewater Servicing Review

Organization: Town of Fort Erie	GM BluePlan Project No: 621039
Attention: Brad Johnston	Date: January 24, 2024
Project: Wastewater Servicing Review	
RE: 3770 Hazel Street	

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This technical memo summarizes the assessment of the existing wastewater sewer capacity under the proposed 3770 Hazel Street development, located north of Hazel Street and east of Belleview Boulevard.

1 Development Overview

The proposed development, shown in **Figure 1**, consists of developing a 93 unit townhouse condominium dwelling on an approximately 2.58 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 WalterFedy and the Town's Design Standards. It is our understanding that the development will connect to the existing 200 mm sanitary sewer along Pearl Street, flowing west to the Nigh Rd SPS, until ultimately discharging to the Crystal Beach Wastewater Treatment Plant (**Figure 2**).

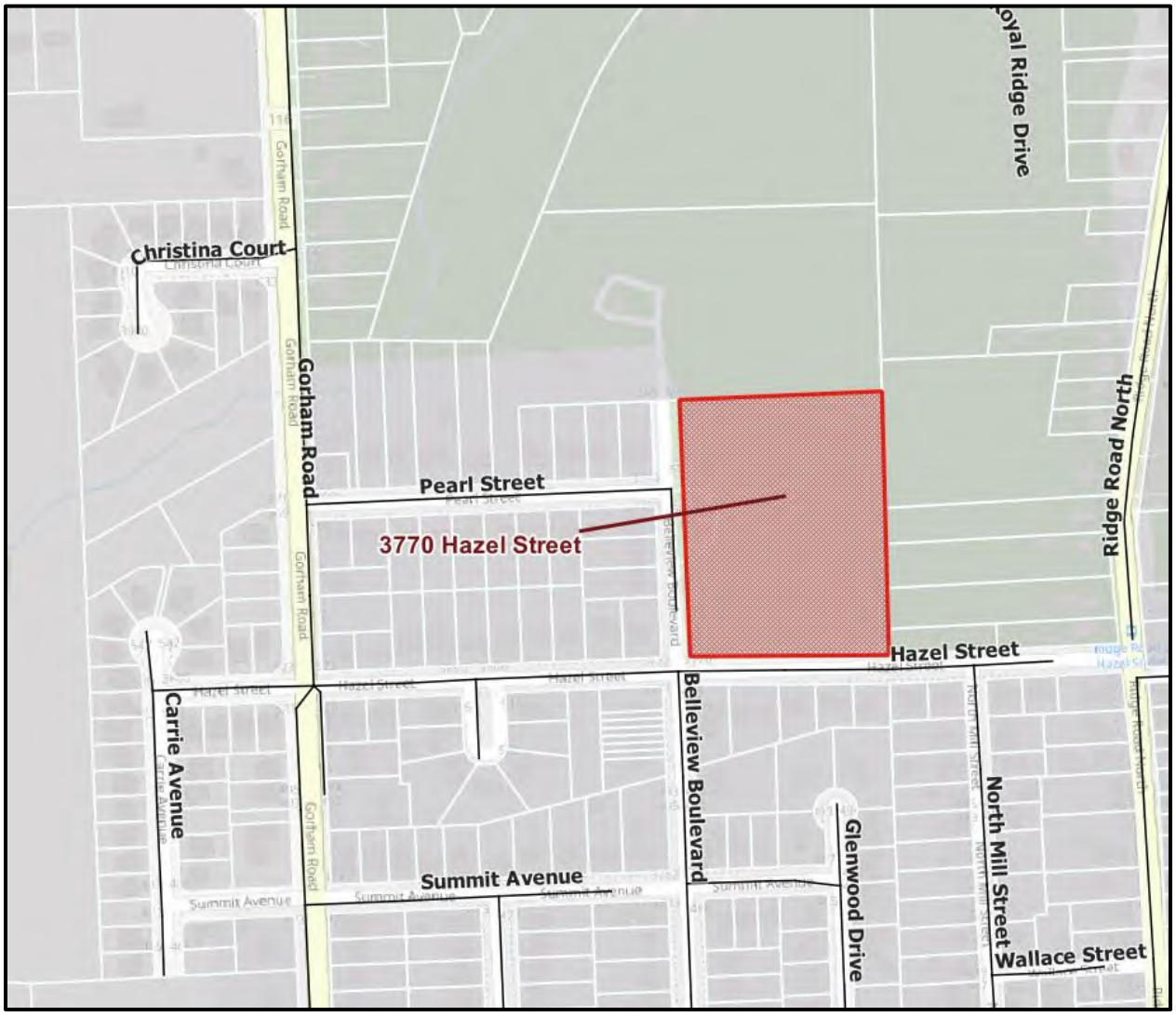

Figure 1. Development Location

Table 1. Development Flows

Source	Unit Type	Units	Density (ppu)	Area (ha)	Total Design Population	Flow Generation (L/c/d)	Average Dry Weather Flow (L/s)	Peaking Factor	Peak DWF (L/s)	RDII (L/s)	Total Peak Design Flow (L/s)
FSR	Townhouse	93	4.0	2.58	372	320	1.38	4.5 (Babbitt's PF)	6.21	0.39 (0*)	**6.60 (6.20)**
GMBP Review	Townhouse	93	1.81	2.58	168	255	0.50	4.0 (Harmon's PF)	1.99	0*	**1.99**

*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 **6.20 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 200 mm sewer along Pearl Street, flow by gravity to the Nigh Road SPS and ultimately discharge to the Crystal Beach Wastewater Treatment Plant. **Figure 2** shows the flow path and tie-in point from the development to the existing network.

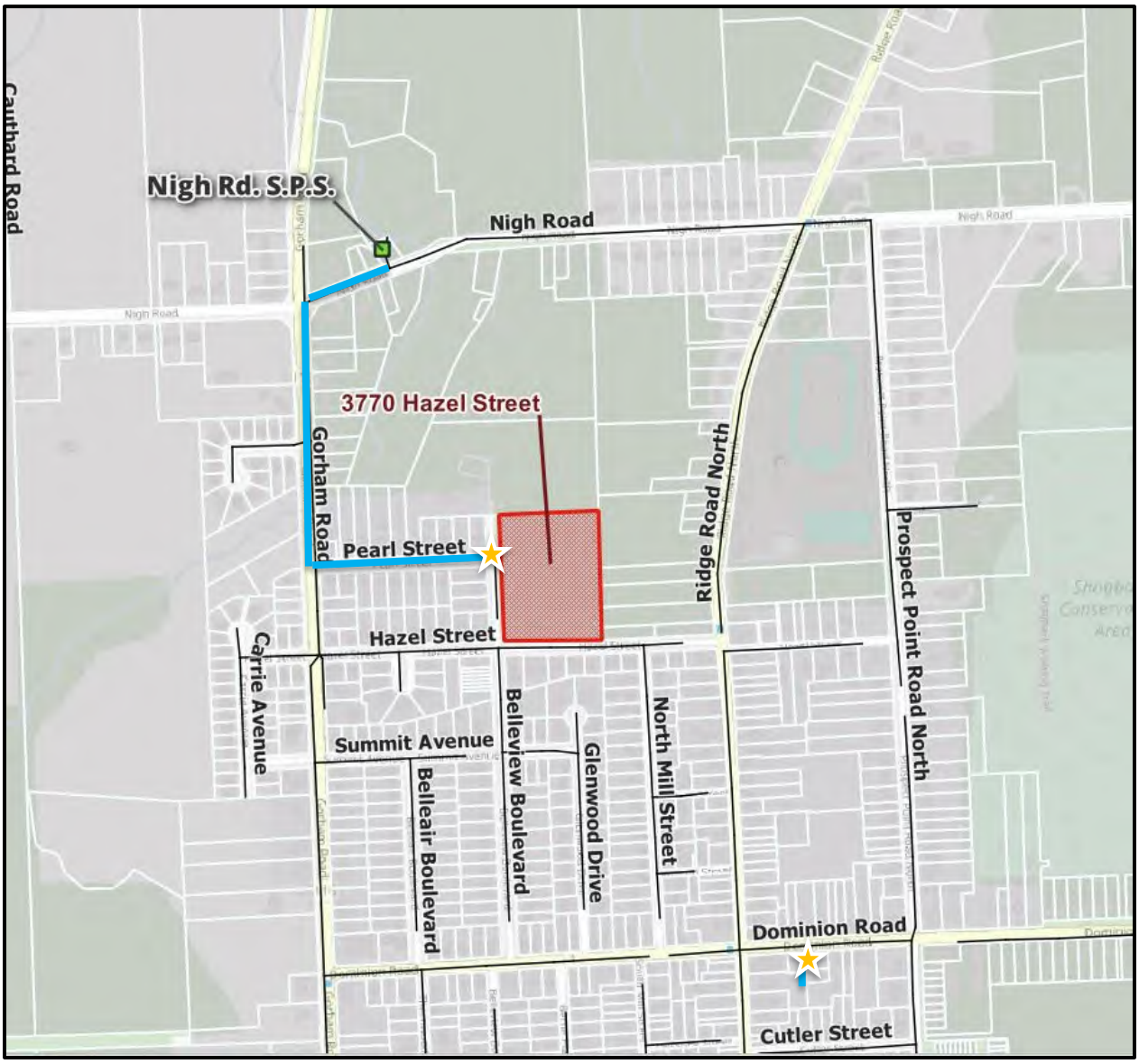

Figure 2. Proposed Development. Flow route (blue), tie-in points (star) shown.

3.2 Previous Assessment and Upgrade Recommendations

The Town's PPCP&MP identified the Nigh Road SPS catchment as having peak 2 year flows exceeding the existing SPS capacity, with some surcharging near the station expected. The 2021 MSPU also identified the Nigh Rd SPS as having existing and growth-related wet weather capacity defcits.

Additionally, the 2021 MSPU identified the Crystal Beach WWTP as having surplus capacity to support 2051 flows based on the MSPU criteria.

The following capital projects were recommended from the PPCP&MP and 2021 MSPU:

- Increase Nigh Rd SPS capacity to 54 L/s by replacing the existing two pumps (2021 MSPU), superceeding the upgrade recommendation from the Town's PPCP&MP.

3.3 Previous Growth Assumptions

The recommendations outlined in **Section 3.2** were based on a total projected growth of 179 people and 41 jobs within the Nigh Road SPS catchment, and 2,697 people and 547 jobs within the Crystal Beach WWTP catchment in the 2021 MSPU.

The proposed development's 372 people is greater than the previous 2051 growth projection for the Nigh Road SPS catchment.

It should also be noted that the Town requested that the 3770 Hazel Street development also be reviewed in the context of the local area's buildout potential. Through prior assignments, the the Ridge Road projected buildout population is an additional 943 people and the total peak design flow was 12.79 L/s (Ridge Road Buildout Wastewater Servicing Review report, dated October 2023), in addition to the development flows considered for the 3770 Hazel Street development.

4 Capacity Assessment

4.1 Nigh Road Sewage Pumping Station

The existing operational capacity of the Nigh Road SPS is 21.5 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	21.5	5.1	61.5	50.5
Existing + 3770 Hazel Street	372	21.5	11.3*	67.7*	56.7*
Existing + Buildout + 3770 Hazel	1,315	21.5	24.1*	80.5*	69.5*
2021 MSPU Growth Projection to 2051	179	54	7.9	65.2	54.2
2021 MSPU Growth Projection to 2051 + 3770 Hazel Street	551	54	14.1*	71.4*	60.4*
2021 MSPU Growth Projection to 2051 + Buildout + 3770 Hazel Street	1,494	54	26.9*	84.2*	73.2*

*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 stations firm capacity of 21.5 L/s is exceeded. Any growth added in advance of the pump station upgrade would require additional storage or wet weather flow reduction to manage the increased flows.

- The proposed development flows exceed the projected 2051 flows to the station and the 2021 MSPU recommended station upgrade based on 2051 projections, and exceed the currently proposed station upgrades.

- The currently planned capacity upgrades to the Nigh Road SPS may need to be reviewed to accommodate a greater development potential.

The current model flows align with observed flows at the pump station, However, it is noted that the existing limited station capacity is believed to be resulting in overflows at the station resulting in a potential underestimation of actual peak wet weather flows. Additional flow monitoring in the Nigh Road SPS catchment is recommended to confirm flows prior to the implementation of a station upgrade.

4.2 Existing System Performance – Gravity Sewers

The model demonstrates that:

- The existing sewers downstream of the proposed development from the development to the Nigh Rd SPS are surcharging beyond the basement flooding protection freeboard of 1.8 m below grade under the existing 5-year design storm.

    - When the development flows are added, the sewer HGL increases but there are no additional flooding risk under a 5-year design storm.
    - When the Ridge Road Buildout flows are added, the sewer HGL increases but there is no additional flooding risk under a 5-year design storm.

- With the 2021 MSPU Nigh Rd SPS capacity upgrade recommendation, the existing sewers downstream of the proposed development from the development to the Nigh Rd SPS are surcharging beyond the basement flooding protection freeboard of 1.8 m below grade under the existing 5-year design storm.

    - When the development flows are added, the sewer HGL increases but there are no additional flooding risk under a 5-year design storm.
    - When the Ridge Road Buildout flows are added, the sewer HGL increases but there are no additional flooding risk under a 5-year dsign storm.
    - Due to the Nigh Rd SPS catchment growth exceeding the 2021 MSPU projected growth the currently planned capacity upgrades to the Nigh Road SPS may need to be reviewed to accommodate a greater development potential.

- Provided that there is sufficient capacity at the Nigh Road SPS to accommodate the system peak flows, there is sufficient capacity in the local sewers, including the sewers on Nigh Road, to accommodate the 3770 Hazel Street development’s 372 people and the Ridge Road Buildout’s 943 people.

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

Scenario Flows	Pearl Street (200 mm sewer)	Gorham Road (300 and 350 mm sewers)	Nigh Road (west of SPS) (350 mm sewer)
Existing	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade
Existing + 3770 Hazel Street	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade
Existing + Buildout + 3770 Hazel Street	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade
Existing with MSPU SPS Upgrade to 54 L/s	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade
Existing + 3770 Hazel Street with MSPU SPS Upgrade to 54 L/s	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade
Existing + Buildout + 3770 Hazel Street with MSPU SPS Upgrade to 54 L/s	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade
Existing + 3770 Hazel Street with increased SPS capacity matching peak flows	Within Obvert	Within Obvert	Within Obvert
Existing + Buildout + 3770 Hazel Street with increased SPS capacity matching peak flows	Within Obvert	Within Obvert	Within Obvert

5 Recommendations

Based on the above analysis,

- Under existing conditions, all sewer sections from the development to the Nigh Rd SPS are surcharging above the basement flooding risk level during a 5 year design storm; however, the sewer surcharging is due to insufficient capacity at the pump station.
- The proposed development flows exceed the projected 2051 flows to the station and the 2021 MSPU recommended station upgrade based on 2051 projections, and exceed the currently proposed station upgrades.
- The currently planned capacity upgrades to the Nigh Road SPS may need to be reviewed to accommodate a greater development potential.
- Provided that there is sufficient capacity at the Nigh Road SPS to accommodate the system peak flows, there is sufficient capacity in the local sewers, including the sewers on Nigh Road, to accommodate the 3770 Hazel Street development growth of 372 people and the Ridge Road Buildout growth of 943 people.

Yours Truly,

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