



Ridge Road Buildout – Wastewater Servicing Review

Organization: Town of Fort Erie	GM BluePlan Project No: 621039
Attention: Brad Johnston	Date: October 13, 2023
Project: Wastewater Servicing Review	
RE: Ridge Road Buildout	



Prepared by:

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This technical memo summarizes the assessment of the existing Nigh Road wastewater sewer capacity under the potential buildout of the upstream catchment. The intent of the assessment is to confirm if any upgrades to the existing sewer are needed when potential road works along Nigh Road are undertaken in the near future.

1 Development Overview

The buildout developments, included in this analysis, are shown in **Figure 1** and summarized in **Table 1**. **Table 2** provides an overview of the proposed site's wastewater flows estimated using the Sanitary Design Parameters from the development review for 576 Ridge Road and the Town's design standards. It is our understanding that the developments will connect to the existing sanitary sewer as shown in **Figure 2**:

- 576 Ridge Road – Prospect Point North and Ridge Road North.
- Creekside Estates – Nigh Road.
- 3773 Nigh Road – Nigh Road.
- 613 Ridge Road North – Ridge Road North.
- 595 Bellview Boulevard – Bellview Boulevard and Pearl St0-8468 Prospect Point Road North – Prospect Point Rd N and Culter St.
- 0-8468 Prospect Point Road North – Prospect Point Rd N and Culter St.

The flows from all but the development at 8468 Prospect Point Road North flow into the Nigh Road SPS, until ultimately discharging to the Crystal Beach Wastewater Treatment Plant (**Figure 2**).



Figure 1. Development Location

Table 1 Buildout Developments

Nigh Road SPS Development Expansion Lands	Lot Area (ha)	Number of Units (#)	Development Status	Projected Use
576 Ridge Road North	5.7	189	Development Application under Review	Residential single-unit dwellings, a multi-family residential block and an apartment block
Creekside Estates	3.2	30	Draft Plan Approved	Residential single-unit dwellings
0-8468 Propsect Point Road North	1.2	17	Buildout	Residential town-home private road development
3773 Nigh Road	1.4	35	Buildout	Residential dwellings
613 Ridge Road North	1.4	51	Draft Plan Approved	Residential dwellings
595 Belleview Boulevard	1.3	44	Buildout	Potentially developable residential lands, could go south into High Road SPS2 catchment
Total:	14.0	366		

Table 2. Development Flows

Nigh Road SPS Development Expansion Lands	Lot Area (ha)	Number of Units	Projected Use	ppu (Fort Erie D.C.)	Projected People	RDII area (ha)	Average Domestic Flow	Peaking Factor (Harmon's)	RDII (L/s) @ 0.286 L/s/ha	Total Peak Design Flow (L/s)
576 Ridge Road North	5.7	189	Residential single-unit dwellings, a multi-family residential block and an apartment block	Details in Development review memo	497	0	1.96	4.50 (FSR)	0.00	8.80
Creekside Estates	3.2	30	Residential single-unit dwellings	2.59	78	3.18	0.23	1.83	0.91	1.33
0-8468 Propsect Point Road North	1.2	17	Residential town-home private road development	1.81	31	1.20	0.09	1.38	0.34	0.47
3773 Nigh Road	1.4	35	Residential dwellings	2.59	91	0	0.27	1.93	0.00	0.52
613 Ridge Road North	1.4	51	Residential dwellings	2.59	132	0	0.39	2.21	0.00	0.86
595 Belleview Boulevard	1.3	44	Potentially developable residential lands, could go south into High Road SPS2 catchment	2.59	115	0.352	0.34	2.10	0.10	0.82
Total:	14.0	366			943	4.734	3.27	13.96	1.35	12.79

*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. Therefore, for the purposes of this development analysis, only the development areas outside the model's existing catchment will be used for RDII allowance of 0.286 L/s/ha.

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

Most of the the proposed developments will tie-in to existing sewers flowing by gravity to the Nigh Road SPS ultimately discharging to the Crystal Beach Wastewater Treatment Plant, and otherwise conveyed by gravity to the WWTP. **Figure 2** shows the flow path and tie-in points from each of the development blocks to the existing network at the tie-in points as indicated.

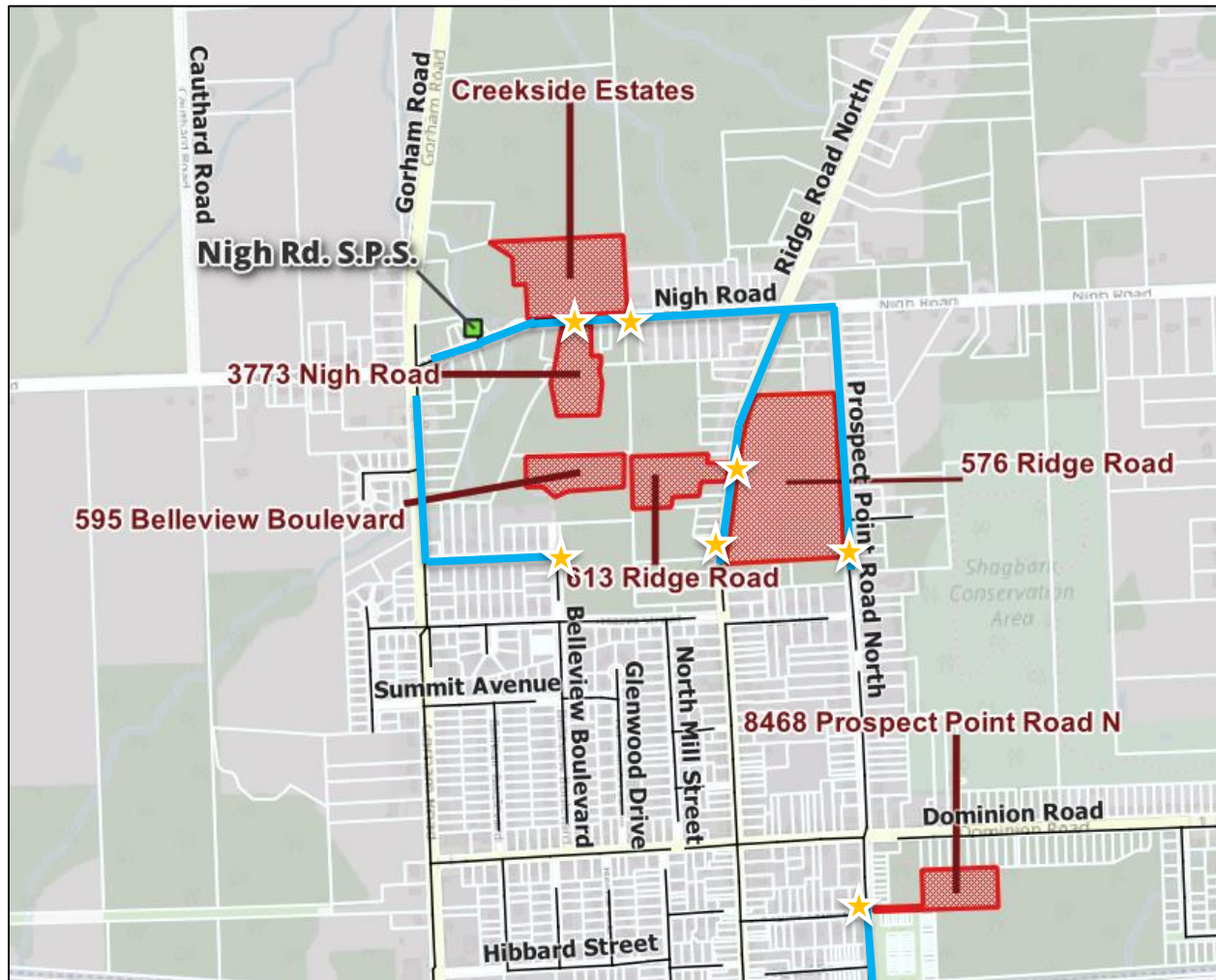


Figure 2. Proposed Developments. Flow route (blue), tie-in points (stars) shown.

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 deficits.

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), superceding 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 497 people is greater than the previous 2051 growth projection for the Nigh Road SPS catchment and fulfills the 2021 MSPU total buildout population growth projections of 561 equivalent people.

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 3. 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 + Ridge Road Buildout	943	21.5	16.5	74.3*	63.3*
2021 MSPU Growth Projection to 2051	179	54	7.9	65.2	54.2
2021 MSPU Growth Projection to 2051 + Ridge Road Buildout	1,122	54	19.3	78.0*	67.0*

*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 buildout scenario 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

Under existing conditions, modelling indicates that the existing 250 mm sewers on Nigh Road, downstream of the proposed development, are surcharging with a risk of basement flooding under the 5 year design flows. **Table 4** provides a summary of the downstream sewer performance:

Based on the sewer capacity analysis:

- The existing sewers downstream of the buildout development area at 8468 Prospect Road N have capacity to convey the 5 -year design storms under existing and buildout conditions.
- With the addition of the Ridge Road Buildout development flows, there is no additional flooding risk in the local 200 mm pipes downstream of the development under a 5-year design storm.
- Under existing conditions, the ≥ 250 mm sewers on Nigh Road and Gorham Road 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.
- 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 potential buildout growth scenario of 1,122 people.

Table 4. Sewer Performance in a 5 year design storm scenario

Scenario Flows	Ridge Road to Nigh Road (200 mm sewer)	Prospect Point Road to Nigh Road (200 mm sewer)	Nigh Road (east of SPS) (200 mm sewer)	Nigh Road (east of SPS) (250 mm sewer)	Nigh Road to Nigh Road SPS (300 and 350 mm sewer)	Pearl Street (200 mm sewer)	Gorham Road (300 and 350 mm sewers)	Nigh Road (west of SPS) (350 mm sewer)	Prospect Road from Cutler to Lost Lane (450, 600, and 850 mm sewer)
Existing	Within Obvert	Within Obvert	Within Obvert	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Within Obvert
Existing + Ridge Road Buildout	Within Obvert	Within Obvert	Within Obvert	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Within Obvert
Existing + Ridge Road Buildout within increased SPS capacity matching peak flows	Within Obvert	Within Obvert	Within Obvert	Within Obvert	Within Obvert	Within Obvert	Within Obvert	Within Obvert	Within Obvert
2021 MSPU growth projection to 2051 + Ridge Road Buildout with MSPU SPS Upgrade to 54 L/s	Within Obvert	Within Obvert	Within Obvert	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Surcharging, >1.8m below grade	Within Obvert
2021 MSPU growth projection to 2051 + Ridge Road Buildout within increased SPS capacity matching peak flows	Within Obvert	Within Obvert	Within Obvert	Within Obvert	Within Obvert	Within Obvert	Within Obvert	Within Obvert	Within Obvert

5 Recommendations

Based on the above analysis,

- Under existing conditions, the ≥ 250 mm sewers on Nigh Road and Gorham Road 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 buildout scenario 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 potential buildout growth scenario of 1,122 people.

Yours Truly,

GM BluePlan Engineering Ltd.

Per:



Julien Bell, P.Eng.

Infrastructure Planning, Partner

A handwritten signature in black ink, appearing to read "Joy Liu".

Joy Liu, M.A.Sc.

Infrastructure Planning