**669 Youngs Road**
**Pump Station Redesign**
**Town of Amherst, NY**

**Downstream Sewer Capacity Analysis**
**January 9, 2024**

GPI has performed a downstream sanitary sewer capacity analysis showing the impacts associated with the proposed pump station redesign located at 669 Youngs Road. Below are the findings of this analysis.

Existing Sanitary Sewer System:

The existing Town of Amherst Lawrence Bell Drive pump station flows easterly along the south side of Lawrence Bell Drive through an 8-inch forcemain, then connects to a 36-inch line that flows northerly along the east side of Curtwright Drive. The line turns to the east at Wehrle Drive, crosses the road to the north, and connects to an 8-inch forcemain flowing east along the north side of Wehrle Dr. The forcemain turns and flows north at George Karl Boulevard. At Main Street the forcemain connects to a 12-inch line, which continues westerly, increases to 15-inch, and then connects to a northerly 18-inch line. Flow continues northerly until it reaches Sheridan Drive, where it turns to the west in an 18-inch line along the south side of Sheridan Dr. The line then crosses Youngs Road where it flows northerly along the west side. Flow turns to the west between Pino Verde Lane and Laurel Lane, where the line increases to 30-inch and then 48-inch. The line continues to the west/northwest, increasing to 54-inch at Hopkins Road, 60-inch at Campbell Boulevard, and 66-inch at Sweet Home Road. It then increases to 84-inch south of Commerce Drive before discharging into the Town of Amherst Wastewater Treatment Plant No. 16 on Tonawanda Creek Road (See Exhibit 2 – Downstream Sanitary Sewer Routing Map).  The Wastewater Treatment Plant has an average daily flow of 22 mgd and is designed for 36 mgd.

Proposed Sanitary System:

The proposed sanitary sewage pump station and 2-inch forcemain will tie into the existing Town of Amherst Lawrence Bell Drive pump station and continue within the existing 8-inch sanitary system as described above. The Town of Amherst provided GPI with three flow locations (nodes) along the downstream route of the existing sanitary sewer system that were to be included in the downstream sewer capacity analysis. These nodes were located at 350 Lawrence Bell Drive, 120 Lawrence Bell Drive, and Sheridan Drive across from 5720. See Exhibit 1 for a map of the requested node locations.

GPI retained TECsmith Inc. to perform flow services at three nodes to capture flow readings following a 24-hour period with 0.5 inches of rain or greater.  Flow meters were installed on November 23, 2021 and flow data was recorded with readings every 15 minutes through January 3, 2022, at which time the meters were removed.  During this period one rain event exceeded 0.5 inches totaling 0.64 inches and occurred on December 25, 2021. See Attachment A for TECsmith's results report.

The information provided by TECsmith as well as additional downstream information provided from the Town of Amherst (see Exhibit 2) was used to assess the full flow and available capacities at the three nodes noted above. Below is a summary of the results. See attachment A for a full summary.

Node 1 – Sanitary Sewer Manhole

Location:  350 Lawrence Bell Drive

| | |
|---|---|
| Sanitary Sewer Pipe Exiting MH: | 10 inch VTP @ Slope = 0.22% |
| | (Provided by Town of Amherst) |
| Full Flow Capacity: | 0.92 MGD |
| Peak Flow Measured 12/25/21: | 0.174 MGD |
| Available Capacity: | 0.727 MGD (79%) |
| | |
| Projected Design Peak Flow: | 0.0210 MGD |
| Anticipated Peak Flow | 0.20 MGD |

The proposed peak flow is less than the theoretical capacity of the 10-inch VTP pipe, therefore there is sufficient capacity. At no time during the monitoring did the flow depth exceed the pipe diameter at Node 1 of the downstream monitoring points during the rain events monitored.
See Appendix A for sanitary sewer calculations.


Node 2 – Sanitary Sewer Manhole

Location:  120 Lawrence Bell Drive

| | |
|---|---|
| Sanitary Sewer Pipe Exiting MH: | 10 inch VTP @ Slope = 0.15% |
| | (Provided by Town of Amherst) |
| | |
| Full Flow Capacity: | 0.92 MGD |
| Peak Flow Measured 12/25/21: | 0.045 MGD |
| Available Capacity: | 0.856 MGD (93%) |
| | |
| Projected Design Peak Flow: | 0.0210 MGD |
| Anticipated Peak Flow | 0.07 MGD |

The proposed peak flow is less than the theoretical capacity of the 10-inch VTP pipe, therefore there is sufficient capacity. At no time during the monitoring did the flow depth exceed the pipe diameter at Node 2 of the downstream monitoring points during the rain events monitored.
See Appendix A for sanitary sewer calculations.


Node 3 – Sanitary Sewer Manhole (Data Taken From Town of Amherst Map of Downstream Sewer, Amherst Peanut Line & West Side Interceptor, November 2019)

Location: Across from 5720 Sheridan Drive

| | |
|---|---|
| Sanitary Sewer Pipe Exiting MH: | 18 inch PVC @ Slope = 0.08% |
| | (Provided by Town of Amherst) |
| Full Flow Capacity: | 6.49 MGD |
| Peak Flow Measured 12/25/21 | 0.625 MGD |
| Available Capacity: | 5.841 MGD (90%) |
| | |
| Projected Design Peak Flow: | 0.0210 MGD |
| Anticipated Peak Flow | 0.65 MGD |

The proposed peak flow is less than the theoretical capacity of the 18" PVC pipe, therefore there is sufficient capacity. At no time during monitoring did the flow depth exceed the pipe diameter at Node 3 of the downstream monitoring points during the rain events monitored. See Appendix A for sanitary sewer calculations.

Enclosed please find Appendix A which contains the sanitary sewer calculations, I&I mitigation fee calculation, developer's I&I commitment letter, and TECsmith's report summarizing the flow metering data. Also included herein are two exhibits showing the metered node locations and a downstream routing map.

APPENDIX A
SANITARY SEWER CALCULATIONS &
TECSMITH REPORT

| Project: | Youngs Road Private Pump Station | | By: | rbc | Date: | 1/10/2024 |
|---|---|---|---|---|---|---|
| Location: | Town of Amherst, New York | | Checked: | | Date: | |

## Sanitary Sewer Flow Calculations

Distribution Facility                    2

** REFERENCE: NYSDEC Design Standards for Wastewater Facilities, 2014

Total No. =                    2

Design Population, p =                    200          assumed no. of people per unit =          100

**Design Average Flow**

**Hydraulic Loading =     25 gpcd x design population =          5000 gpd     =     **0.005**     **mgd**
                                                                                              **3.47**     **gpm**
                                                                                              **0.01**     **cfs**

Peaking Factor, PF =   $[(18+((p/1000)^{0.5})) / (4+((p/1000)^{0.5}))]$ =          4.1480

**Peak Design Flow = Design Average Flow  x  Peaking Factor =**          20740 gpd     =     **0.0207**     **mgd**
                                                                                              **14.40**     **gpm**
                                                                                              **0.03**     **cfs**

NOTE:  Per the "Recommended Standards for Wastewater Facilities, 2014 Edition - Section 11.243, b.
           "The 100 gpcd figure shall be used in conjunction with a peaking factor from Figure 1(as calculated above),
           is intended to cover normal infiltration for systems built with modern construction techniques."

**Infiltration and Inflow: (Remove 4 gallons of I&I from the existing sanitary sewer system per every 1 gallon of Peak Design Flow)**
          **Required I&I removal = 4 x the Peak Design Flow  =**          57.61 gpm

**Example of I&I Mitigation Based On Repair or Replacement of Defective Residential Laterals:**
**Determine the number of Defective Residential Laterals to be repaired or replaced**
          I&I Contribution per each Defective Residential Lateral =          30 gpm
          No. of Defective Residential Laterals to be repaired or replaced =          **2 laterals**

**Example of I&I Mitigation Based On Financial Contribution To The Town of Amherst's I&I Mitigation Trust Fund:**
**Required Financial Contribution =**     $          250.00  per gallon of mitigated flow (i.e., required I&I removal)
                                                            X          57.61 gpm
**Required Financial Contribution =     $          14,402.91**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **GREENMAN-PEDERSEN, INC.** | | | PREPARED BY: | **ekw** | | PROJECT NO.: | **WNY-2300114.00** | | | |
| | | | DATE: | **1/22/2024** | | PROJECT: | **Youngs Rd Private PS** | | | |
| | | | REVISED: | | | COUNTY / TOWN: | **ERIE / AMHERST** | | | |

**SANITARY SEWER PIPE CAPACITY**

| STRUCT. NO. | STRUCT. TYPE | LINE TYPE | LINE LENGTH (FT) | DIA. (IN.) | SLOPE (%) | V (FPS) | CAPACITY (CFS) | CAPACITY (MGD) | NOTES & REMARKS | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | n (conc) = 0.013 |
| | | | | | | | | | | n (VTP) = 0.014 |
| | | | | | | | | | | n (brick) = 0.015 |
| | | | | | | | | | Formulas used for calculations herein | |
| | | | | | | | | | are based on Rational Method, Q=CiA; | |
| | | | | | | | | | Q=VA; and Manning's Equation | |
| | | | | | | | | | $V=Q/(3.1416*d^2/4)$; $R=d/4$ | |
| | | | | | | | | | $V=1.486/n*R^{.6667}*S^{.5}$ | |
| | | | | | | | | | $d=(Q*4/V/3.1416)^{.5}$ | |
| | | | | | | | | | $S=(V*n/1.486/(d/4)^{.6667})^2$ | |
| | | | | | | | | | | |
| | | | | | | | | | Location: 350 Lawrence Bell Drive | |
| NODE 1 | Ex. Manhole | PVC | | 10 | | | | | | |
| | | | | | 0.22 | **2.6** | 1.4 | 0.92 | = Pipe Capacity (MGD) | |
| | | | | | | | | 0.174 | = Peak Flow Measured (MGD) on 12/25/2021 | |
| | | | | | | | | 0.0210 | + Project Design Peak Flow (MGD) | |
| | | | | | | | | 0.20 | = Anticipated Peak Flows (MGD) | |
| | | | | | | | | 21% | Operating Capacity with Anticipated Peak Flows | |
| | | | | | | | | 79% | Available Capacity with Anticipated Peak Flows | |
| | | | | | | | | | Location: 120 Lawrence Bell Dr | |
| NODE 2 | Ex. Manhole | PVC | | 10 | | | | | | |
| | | | | | 0.15 | **2.6** | 1.4 | 0.92 | = Pipe Capacity (MGD) | |
| | | | | | | | | 0.045 | = Peak Flow Measured (MGD) on 12/25/2021 | |
| | | | | | | | | 0.0210 | + Project Design Peak Flow (MGD) | |
| | | | | | | | | 0.07 | = Anticipated Peak Flows (MGD) | |
| | | | | | | | | 7% | Operating Capacity with Anticipated Peak Flows | |
| | | | | | | | | 93% | Available Capacity with Anticipated Peak Flows | |
| | | | | | | | | | Location: 26 Glen Oak | |
| NODE 3 | Ex. Manhole | PVC | | 18 | | | | | | |
| | | | | | 0.08 | **5.7** | 10.0 | 6.49 | = Pipe Capacity (MGD) | |
| | | | | | | | | 0.625 | = Peak Flow Measured (MGD) on 12/25/2021 | |
| | | | | | | | | 0.0210 | + Project Design Peak Flow (MGD) | |
| | | | | | | | | 0.65 | = Anticipated Peak Flows (MGD) | |
| | | | | | | | | 10% | Operating Capacity with Anticipated Peak Flows | |
| | | | | | | | | 90% | Available Capacity with Anticipated Peak Flows | |
| | | | | | | | | | Location: across from 5720 Sheridan Drive | |

# **TEC***smith*

Date:  January 22, 2024

**SANITARY SEWER FLOW CAPACITY STUDY – Summary Review**

**Prepared For:**  669 Youngs Capacity Analysis

Ken Zollitsch
Greenman-Pedersen, Inc.
4950 Genesee Street
Suite 100
Buffalo, NY 14225

**Project Name:** 669 Youngs Capacity Analysis

**Flow Monitoring Period:** November 23, 2021 to January 3, 2022

**Rain Events (> 0.5-inches) Monitored:** December 25 (0.64**"**)

**Number of Monitoring Nodes:** Three (3) downstream manholes

**Node Locations and Descriptions:**

- Node 1        350 Lawrence Bell Dr (10")
- Node 2        120 Lawrence Bell  (10")
- Node 3        Sheridan Dr 18in  (18")

**Summary Conclusion:**

Based on the data presented in this report, specifically the flow depth measurements recorded (see graphs below)

- At no time did the flow depth exceed the pipe diameter at any of the downstream monitoring points during the rain events monitored.
- At no time during the monitoring period did the flow at any point slow or stall which would have caused a backup or flooding at the manhole.

*water and wastewater monitoring specialists*
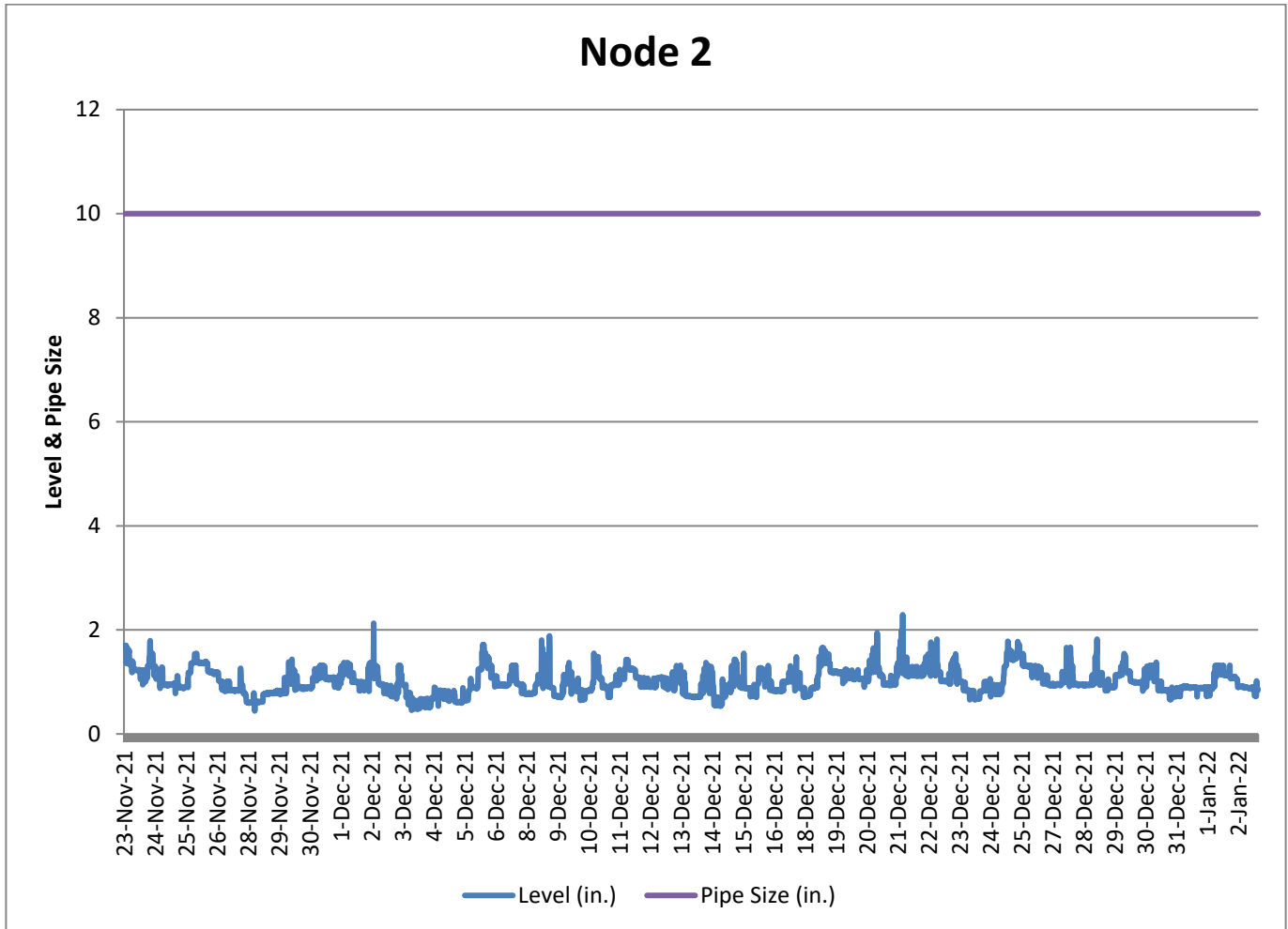
# TEC*smith*

**Depth of Flow Capacity Summary:**
*Depth of flow capacity is based on diameter of pipe. See graphs below.*

- At no time during the monitoring period did depth of flow exceed pipe diameter at Node 1.
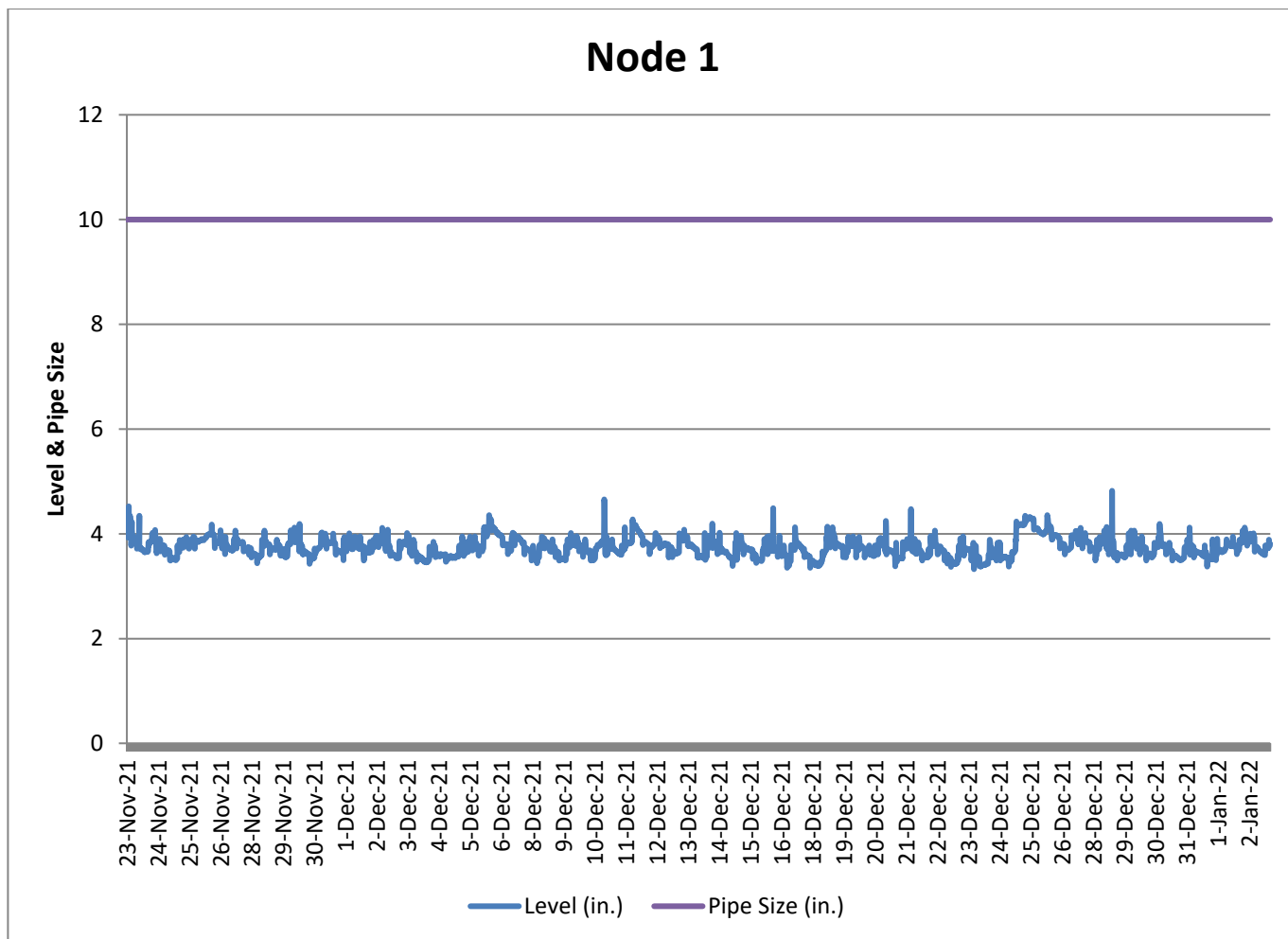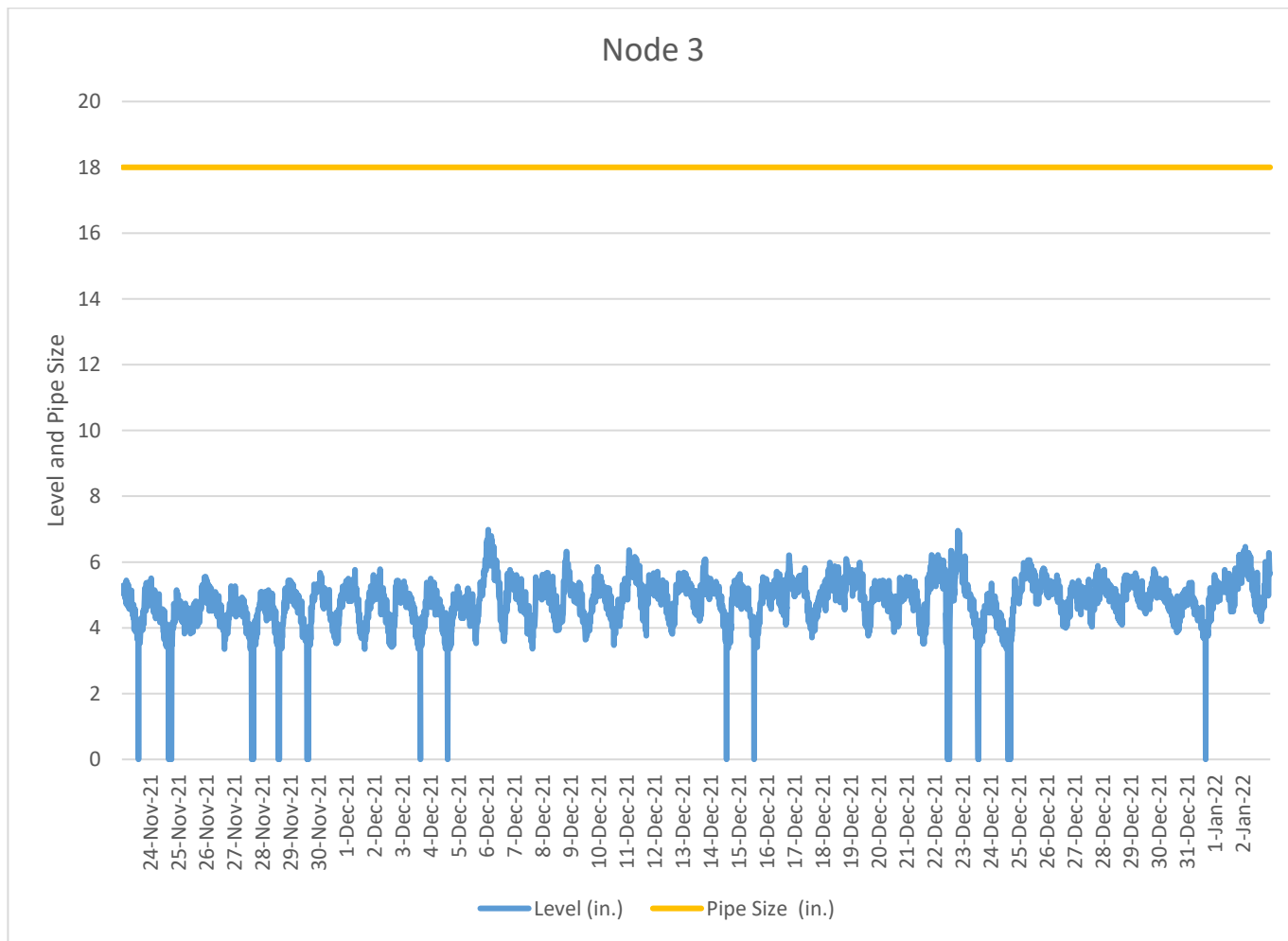
# TEC*smith*

- At no time during the monitoring period did depth of flow exceed pipe diameter at Node 2.

## Node 2

- At no time during the monitoring period did depth of flow exceed pipe diameter at Node 3.

# EXHIBITS

# EXHIBIT 1
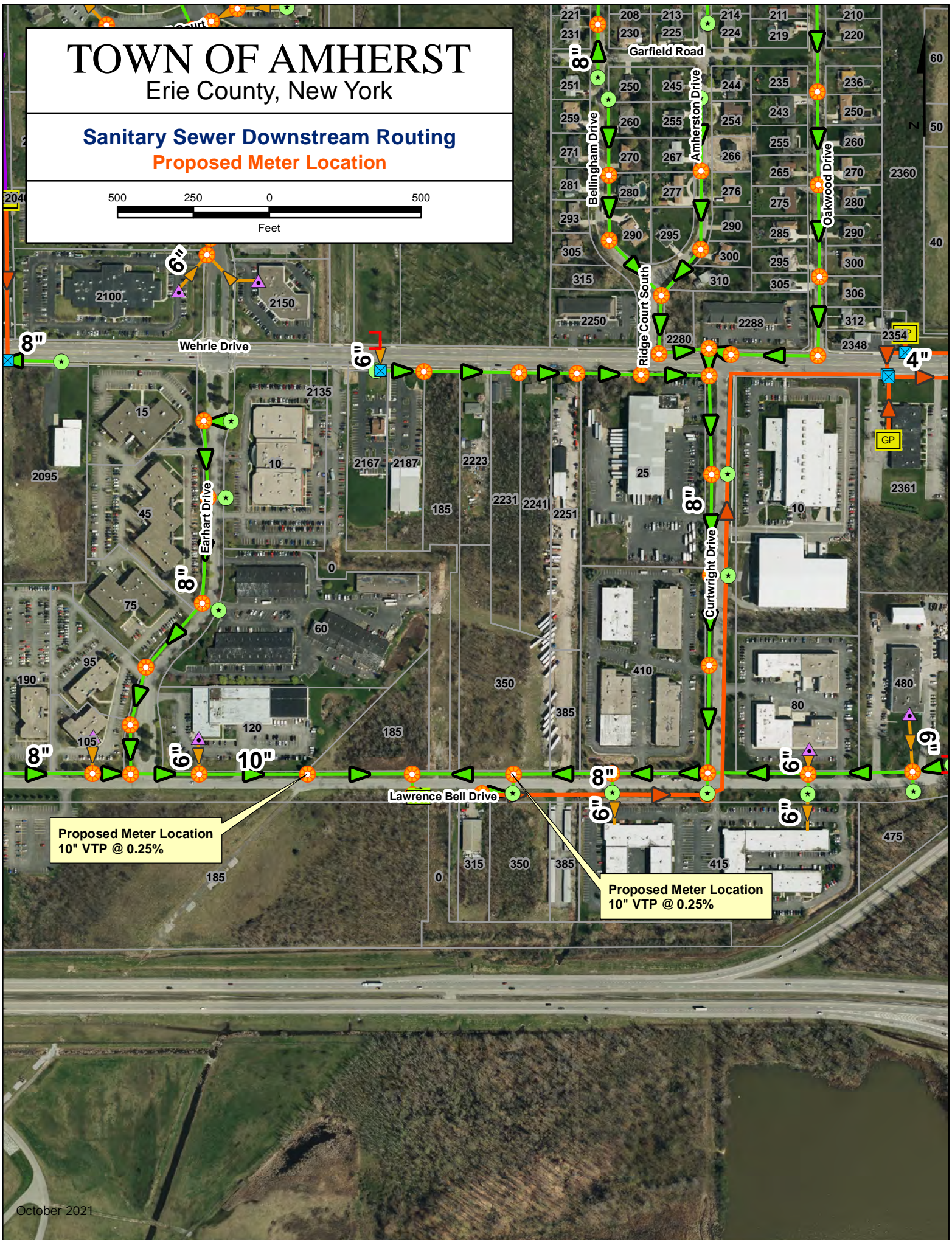
# DOWNSTREAM METER
# LOCATION MAP

# TOWN OF AMHERST
## Erie County, New York

**Sanitary Sewer Downstream Routing**
**Proposed Meter Location**

500    250    0    500

Feet

Garfield Road

Bellingham Drive
Amherston Drive
Oakwood Drive
Ridge Court South
Earhart Drive
Curtwright Drive

Wehrle Drive

Lawrence Bell Drive

Proposed Meter Location
10" VTP @ 0.25%

Proposed Meter Location
10" VTP @ 0.25%

GP

8"   6"   8"   4"   6"   10"   8"   6"   6"   6"

2100   2150   2135   2167   2187   2223   2231   2241   2251   2280   2288   2250
2040   2095   2360   2361   2348   2354

October 2021

**TOWN OF AMHERST**
Erie County, New York

**Sanitary Sewer Downstream Routing**
Proposed Meter Location

Proposed Meter Location
18" PVC @ 0.54%

October 2021