



EXETER PUBLIC WORKS DEPARTMENT

13 NEWFIELDS ROAD • EXETER, NH • 03833-4540 • (603) 773-6157 • FAX (603) 772-1355

www.exeternh.gov

October 15, 2014

Ms. Joy Hilton
Water Technical Unit
USEPA, OES4-3
5 Post Office Square, Suite 100
Boston, MA 02109-3912

Re: Quarterly Progress Report for the third quarter of 2014, July 1, 2014 to Sept 30, 2014, per Administrative Order Docket # 010-024, Town of Exeter.

Dear Ms. Hilton:

This report is being made as required by the Administrative Order, page 11, IV. Order, item 13, Quarterly Reports and Work Projections, and is for the calendar quarter ending Sept 30, 2014. This report details efforts taken to reduce, and ultimately prevent, Combined Sewer Overflow (CSOs) and Sanitary Sewer Overflows (SSOs) in the Town of Exeter. During this quarter the Town was successful in locating further sources of infiltration and inflow (I&I). Of particular note was the discovery of a previously suspected direct river infiltration route to the sanitary sewer.

Combined Sewer Overflow (CSOs) and Sanitary Sewer Overflows (SSOs) this quarter:

There were no CSO events during the third quarter of 2014.

There were no SSOs during the third quarter of 2014.

The following Planning and Operation & Maintenance activities were undertaken during this third quarter, 2014, reporting period:

- **Five Year Cycle of Sewer Cleaning and CCTV Inspections to date ending this Quarter:** To date this year there were 46,775.8 feet (8.9 miles) of cleaning (high pressure jetting) followed by CCTV

inspection on lines not previously cleaned/inspected within the last 5 year cycle. A table is included with this report listing the streets and specific footage. Work will continue in the fourth quarter.

- **Linden Street SSO Investigations and Cross-Country Cleaning:** *The Exeter River Cooperative Manufactured Mobile Home Park (MHP)*, a private collection system, continues to work with *Jones & Beach Engineering* for lift station upgrades. The Jones and Beach liaison with the Town is Chris Albert, who has prepared a RFP (Request for Proposals) with specifications and bid package for a generator manual transfer switch to be installed at each lift station and one portable generator that can be transported from station to station. A *Mission* cellular alarm system has been designed and specified for all seven of the sewage lift stations by AD Instruments (the same vendor normally used by the Town of SCADA services). The Town would receive an alarm call following automatic calls first to park maintenance staff and *Triple AAA Pump, Inc.*, the cooperative's sewage lift station service vendor. Also proposed is a new pump replacement for the 25 year old Cornwall Avenue station which pumps 75% of the Park's total flow. The Cooperative will hold its annual meeting in November and will vote on whether these projects will be financed.

The *Icey Hill Manufactured Mobile Home Park (MHP)*, a private collection system consisting of fifteen (15) units, in the same area of Linden Street, continues to work with *the Community Development Finance Authority* and the *NH Community Loan Fund*, for grants to upgrade their single sewage lift station with a stand-by generator and cellular based alarm system. The engineering consultant is CMA Engineers, Inc.

Regularly Scheduled Repeat Quarterly "High Maintenance" Cleaning (jetting) Activities: During this third quarter the Town fully jetted (cleaned) the Town's known 5,905 linear feet (LF) "high maintenance" areas. The town's two Squamscott River 8" siphons were cleaned (jetted) using the Town's new jet/vactor truck (pictures were included with the second quarter report). During the fourth quarter, the following will be due: Semi-annual cleaning of all nine pump station wet wells, the WWTP grit removal system and lagoon #1 main inlet cleanings and inspection.

- **Sewer User Ordinance (SUO) Enforcement and Private Sewer CMOM Education & Outreach:** On July 23rd the Town signed a contract for \$19,400 with *Underwood Engineering* to develop and implement an education/outreach/enforcement program for private inflow compliance with the Town's Sewer User Ordinances. This program will address page 8, 5. Collection System O&M Plan, items f. and g. of the NPDES Permit (Effective March 1, 2013). Item f.: "An ongoing program to identify and remove sources of I/I. The program shall include an inflow identification and control program that focuses on the disconnection and redirection of illegal sump pumps and roof down spouts. Item f: An educational public outreach program for all aspects of I/I control, particularly private inflow". A copy of the contract for this program work is included. The first deliverable is due on November 12th (Water & Sewer Advisory Committee public meeting) and the final on March 1st,

2015, which is an overall tabulated report to the Town. A sample outreach/education flier is attached to this report, final draft is being developed.

The program consists generally of the following tasks:

1) Program & Policy Development:

- Possible amnesty and/or support programs for users who “own-up” to violating
- Schedule for compliance
- Compliance inspection
- Town financed revolving fund availability

2) Documents & Templates:

- Informational tri-fold mailer
- Homeowner “Compliance Response” Questionnaire to be mailed to Town stating if homeowner has sump pump, if so when removing, applying for technical assistance and/or financing
- Town cover letter will explain need for compliance response, directions for doing so and ramifications for non-compliance with Town ordinances.

3) Underwood Engineering Data Analysis & Reporting:

- List of properties that have responded
 - List of properties requesting technical assistance
 - List of properties reporting a sump pump
 - reporting a sump pump to the sewer
 - List of properties reporting roof leaders in to the ground
 - List of properties with an illegal connection to the sewer
 - List of properties reporting a potential defective sewer service (historical problems with blockages/collapses/etc.)
-
- **Improvements in Sewer Mapping Updates and “as built” Digitizing:** The Town continues to make further progress in updating its collection system mapping and geographical information systems (GIS). New construction and rediscovered manholes continue to be gps located and directly field down loaded to the Town GIS system with June 30, 2015, the Town’s NPDES permit completion date.
 - **Capital Improvement Projects, Measures and Programs Implemented or Planned by the Town and/or Private Collection systems in 2014 to Resolve CMOM Deficiencies:**

- **Portsmouth Avenue Water/Sewer Project:** This project commenced on November 1, 2013 and was completed on May 29, 2014. A significant completion report was attached in the second quarter report.
- **Sewer Collection Capital Improvement-Jady Hill Utilities Project, Phase II:** The *Jady Hill Utilities Project*, Phase II, was completed in 2013 following an outfall easement for the newly constructed relief drains. In this third quarter of 2014 a follow-up I&I study assessing the reduction of I&I was completed by *Wright-Pierce Engineering* to evaluate the effectiveness of the sewage collection system component of the Jady Hill Utilities Improvement Project. The study indicated an overall reduction in I&I of 79% or approximately equaling 34 MG in volume annually. The four page report is attached to this third quarter report.
- **Sewer Collection Capital Improvement- Lift Station Generators:** The last Town lift station requiring a stand-by generator, Folsom Acres, is under contract with *Power Technologies* at a cost of \$22,104 to install a 28 kW natural gas generator and automatic transfer switch.
- **Court Street Lift Station Maintenance:** The malfunctioning 8” magnetic flow meter was replaced with a new Foxboro unit following sump pump improvements made to the meter vault to prevent flooding. During the second quarter a second pump (#2 of three 20 horse power pumps) was rebuilt and in 2015 the remaining third pump will also be rebuilt. Pump #3 received a variable frequency drive and VFD drives are planned for the other two pumps. The new flow meter and motor drives will make possible the long term goal of the use of a 6” force main (FM) which discharges to gravity sewer lines below the current 10” FM High Street sewer discharge point. The current 10” FM discharge to High Street is a known “bottle neck” that can contribute to SSOs on Fox Chapel Court and Ridgewood Terrace.

Continued Infiltration & Inflow Investigations & Corrections: An additional *Underwood Engineers* contract was signed for \$41,000 to assist the Town in discovering new sources of I&I and in rechecking suspected sources listed in previous reports from Camp, Dresser and McKee. During the second quarter on April 15th, *Underwood Engineering* and Town W/S staff did a full interior sewer manhole (SMH) inspection on the 2.18 mile long 15 inch cross-country sewer interceptor between Phinney Lane and Gilman Lane. Also during this quarter town wide smoke testing and some dye testing was performed with the following results:

- During the second quarter a storm water catch basin behind the *Phillips Exeter Academy* (PEA) campus Main Street faculty housing was found to be connected to the Town sanitary sewer. During the third quarter it was noted to be nearly all on *Unitil Gas Company* property. Unitil Gas granted permission to the Town to disconnect it from the Town’s sanitary sewer. On

September 15th, this significant source of inflow was removed with the sealing of the penetration to the Town sanitary sewer.

- Last quarter a storm water catch basin, located by #7 *Locust Avenue*, had been found to be connected to the Town sanitary sewer. During this third quarter this source of inflow was removed by proper sealing of the old storm-to-sanitary sewer connection.

- A direct river-to-sanitary sewer connection was confirmed and corrected on September 19th on Water Street. This connection, via storm drainage to the Squamscott River, was directly connected by 8" pipe to the Water Street sanitary sewer. It was not commonly connected to either of the Town's two CSO structures so astronomical high tide inflow would not be detected or measured at either CSO structure but would flow directly to the Town's main pump station located a short distance away on Water Street. Underwood Engineering surveyed the sewer pipe invert at the highest point and determined it to be 0.8' lower than the CSO weir crest and the river has previously been visually noted to rise within a few inches of the weir crests. Field investigations and an elevation loop will be included in the Underwood 2014 I&I investigation report. This is a possible source of the large number of white perch fish caught in the WWTP head works structure some years ago during a particularly high tide. Maps and pictures are included with this third quarter report.

- **Sewer Manhole Repairs Completed to mitigate Repeat SSOs:** There were no manhole repairs done this third quarter. There is at least one invert/shelf repair planned for a manhole located at 6 Dewey Street for the fourth quarter.

Please contact me with any questions or comments you may have concerning this quarterly progress report.

Sincerely,



Michael Jeffers, Water & Sewer Managing Engineer

Town of Exeter

Cc: Russ Dean, Town Manager
Jennifer Perry, Public Works Director
Paul Vlasich, PE, Town Engineer
Tracy Wood, NHDES-WWEB

Enc.

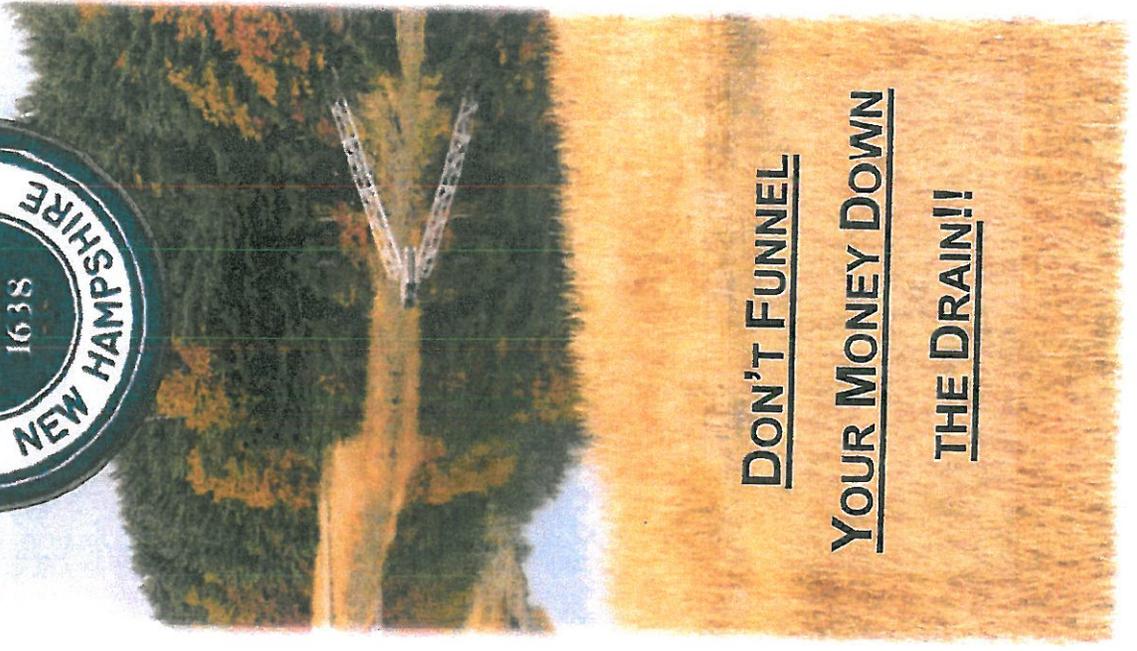
Sewer Televiser/Camera 2014- A.O 5 Year Plan Town of Exeter, NPDES# 0100871 & AO #010-024

10-15-14

Street Name:	Footage (ft)	Rate	Jetted
Allen Street	1,141.0		X
Bell Avenue	1,856.0	3	X
Brentwood Road	910.0		X
Cass Street	1,392.0	4	X
Clara Street	443.9	3	X
Columbus Avenue	839.0		X
Commerce Way	889.0	3	X
Continental Drive	2,285.0	3	X
Court Street	2,718.0	3	X
Crestview Drive	308.0		X
Downing Court	1,506.0		X
Epping Road	5,236.8	3	X
Forest Street	759.5	3	X
Gary Lane	1,481.0	3	X
Gill Street	506.0		X
Harvard Street	182.0		X
High Street	2,156.0		X
Industrial Drive	3,680.0	3	X
Kathleen Drive	1,037.2	3	X
Leary Court	800.0		X
Linden Commons	1,869.2	2	X
Locust Avenue	384.0		X
Main Street	715.0		X
Marilyn Avenue	506.1	3	X
Park Street	1,218.0	3	X
Patricia Avenue	861.4	2	X
Portsmouth Avenue	1,281.0		X
Prospect Street	694.0		X
Riverbend Circle	1,843.0	3	X
Stevens Court	801.0		X
Stoneybrook Lane	543.0		X
Summer Street	649.0	4	X
Thelma Drive	892.2	3	X
Wadleigh Street	303.1	3	X
Wallace Road	145.0		X
Walnut Street	986.4	4	X
Water Street	2,958.0		X
	46,775.8	feet	
	8.9	miles	

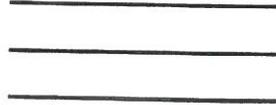
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DRAFT



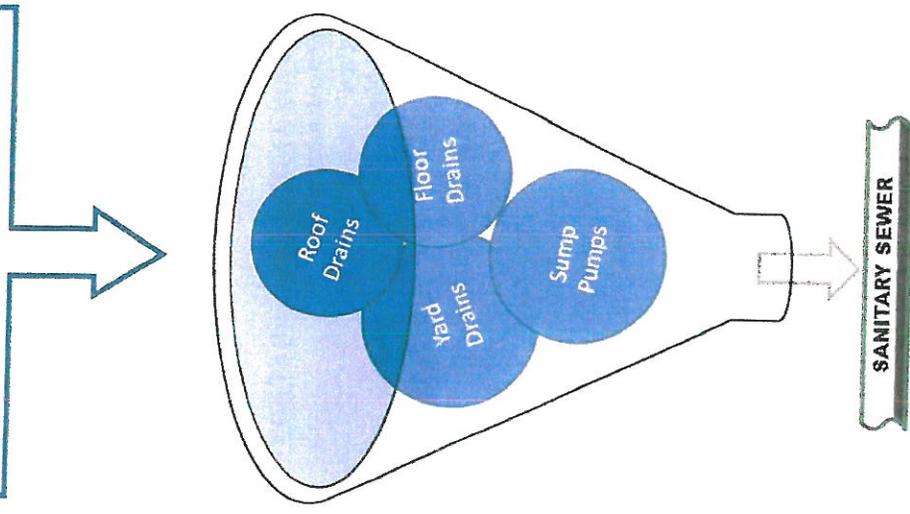
DON'T FUNNEL
YOUR MONEY DOWN
THE DRAIN!!

DRAFT



Town of Exeter
 10 Front Street
 Exeter, NH 03833

PRIVATE INFLOW



It is a violation of the Town's Sewer Ordinance to have any un-contaminated water (clear water inflow) discharging into the Town's sewer system.

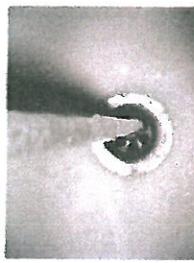
Please contact _____ @ 773-6157 with any questions you may have.

IS YOUR SUMP PUMP BREAKING THE LAW??

DEFINITIONS

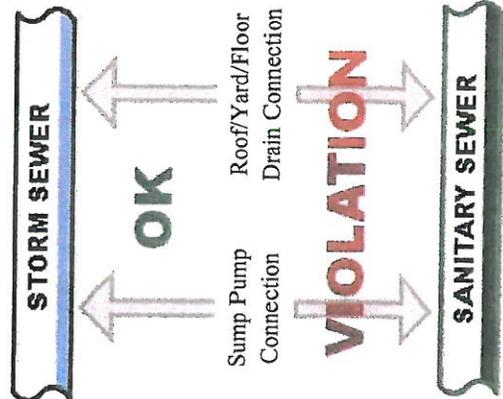
Combined Sewer Overflow (CSO) – When stormwater consumes the sewer system’s capacity, causing the sewer to overflow to the Squamscott River

Private Inflow (clear water) – Uncontaminated water other than sewage that enters the sewer system through direct, private connections such as:



- Sump pumps
- Basement drains
- Roof drains
- Yard drains
- Catch basins

Infiltration – Groundwater that enters the sewer system through cracked and broken pipes



TOWN ORDINANCE

Chapter 15 – Sewer Regulations
Section 1504.1, Paragraph 6

No person shall make connection of roof downspouts, foundation drains, area drains, or other surface runoff or groundwater to a building sewer or building drain which in turn is connected directly or indirectly to a public sanitary sewer unless such connection is approved by the Town for purposes of disposal of polluted surface drainage.

Why is inflow a big deal?

- It is a violation of the Town’s Ordinance
- Inflow can cause a CSO event during a large rain storm
- Valuable wastewater treatment capacity is consumed to treat already clean water
- Taxpayers pay to treat water that does not need to be treated
- New treatment would need to be constructed



Does my home discharge inflow?

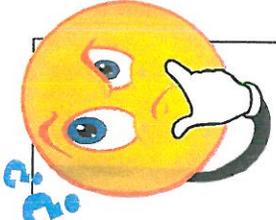
If any of the following are connected to your sanitary sewer service, your home is a source of inflow

- Sump pump
- Cellar drains
- Yard drains
- Roof leaders

DRAFT

Does my home contribute infiltration?

If your sewer service is in old and in disrepair, it may be allowing water to enter the system, contributing infiltration.



What can I do as a homeowner to remove my inflow discharge?

- Redirect your sump pump discharge to the exterior of your home (please visit [Town web link] for guidance on sump discharges)

When should I complete repairs?

- If you have a source of inflow, it is recommended repairs be complete as soon as possible. See [Town web link] for guidance
- Contact _____@ 773-6157 for more information



Is the Town doing their part too?

- The Town is continuously removing sources of I/I from Town owned infrastructure.
- Underwood Engineers, Inc. is assisting the Town in an Infiltration and inflow study throughout 2009
- The Town will gladly answer any questions you may have, please contact _____

YES!!

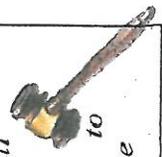
INFILTRATION AND INFLOW (I/I) STUDY – 2009

- Field work includes:
 - Flow metering of public sewers to find higher than expected flows
 - House to House Inspections
 - Select neighborhoods with known inflow
 - Video inspection of sewers
 - Evaluation:
 - Develop cost effective I/I removal strategies
 - I/I Removal strategies may include:
 - Replace/rehabilitate defective sewer pipes
 - Replace /rehabilitate defective manholes
 - Remove sources of public inflow (catch basins with direct connection to sewer)
 - Program removing private inflow
 - The Town is currently evaluating different private inflow removal programs:
 - Public Education (honor system)
 - Public Education and Enforcement
 - Town to complete work (“public money on private property”)
 - A combination of the above options
 - Infiltration removal program:
 - Cost effective recommendations



What if choose to not complete repairs?
You will be in violation of the Town’s Sewer Ordinance and may be subject to the following:

- Additional charges on you sewer bill
- Imposed fines per day of violation
- Any action the Town chooses to impose as specified in the ordinance



In an effort to reduce public and private I-I sources, the Town replaced approximately 7,600 linear feet of sewer mains, approximately 2,700 linear feet of sewer services within the right-of-way (ROW) and approximately 3,200 linear feet of private sewer services outside the ROW. The total volume I-I reduction rate was initially estimated at 80% if the sewer main and entire sewer service were replaced. Replacement of the private portion of the sewer service was assumed to account for 35% of the reduction, which was dependent on resident participation in the program. Approximately 75% of homes participated in the replacement of private services; therefore the target private I-I reduction rate was lowered to 26% and the overall anticipated reduction rate was revised to 71%.

FLOW MONITORING RESULTS

Post-construction flow monitoring was performed in the Jady Hill subset area which included 95 housing units (See Figure 1), from April 1, 2014 through June 30, 2014. Area-velocity flow meters recorded instantaneous flow data at 5-minute intervals at SMH-294 and SMH-301. The sum of these two flow meters captures the area monitored by only SMH-301 in the 2009 Underwood Engineers I-I evaluation. Rain data was collected in 15-minute intervals at the Main Pump Station. Flow monitoring results with rain data for the combined metering of the Jady Hill subset area is shown in Figure 3.

During two of the 2014 data collection events, debris was found to be obstructing the channel in SMH-301. The Town was notified on these instances and subsequently cleared the debris. However, channel debris appeared to distort flow measurements. Based on the dates obstructions were discovered and the sudden changes in anticipated flow patterns, data from May 22-28 and June 18-30 was omitted from the I-I analysis.

Post-construction flow monitoring results from 2014 were compared to pre-construction results from 2009 to quantify the reduction in I-I. Overall average monitoring event flows decreased from 91,479 gallons per day (gpd) in 2009 to 18,831 gpd in 2014, a reduction of 79%. This decrease in average flow corresponds to a daily average reduction of approximately 765 gpd/house in the Jady Hill project area. The comparison indicates that I-I flows have been notably reduced since the Jady Hill Utility Replacement Project was completed. To further quantify I-I reduction results, dry and wet weather conditions were compared.

Dry Weather Comparison

Dry weather flows were analyzed by comparing a 24-hour period with no precipitation for four days prior. Based on the comparison of pre-construction and post-construction flow monitoring results in the Jady Hill subset area, the average dry weather flow was reduced by 88% from 47,637 gpd to 5,642 gpd. This decrease in average dry weather flow indicates a significant reduction in infiltration.

Wet Weather Comparison

Wet weather flows were analyzed by comparing two similar storm events from pre-construction and post-construction flow monitoring results. The storm events were chosen based on total rainfall, duration, and intensity. Peak Storm Flow and Total Storm Volume were used to compare the difference in system response. As shown in Table 1, wet weather peak storm flows were reduced by an average of 71% and wet weather total storm volumes were reduced by an average of 82%. This decrease in peak storm flow and total storm volume indicates a significant reduction in I-I.

TABLE 1 - WET WEATHER FLOW COMPARISON

Parameter	2009 Flow Data	2014 Flow Data	Percent Reduction
Storm Event No. 1			
Date	5/27 - 5/31/09	4/30 - 5/4/14	-
Total Rainfall (inches)	1.56	1.23	-
Rainfall Duration (hours)	22	13	-
Peak Rainfall Intensity (inches/hour)	0.36	0.36	-
Peak Storm Flow (gpd)	164,736	68,280	59%
Total Storm Volume (gal)	403,986	105,518	74%
Storm Event No. 2			
Date	5/17/09	6/13/14	-
Total Rainfall (inches)	0.56	0.71	-
Rainfall Duration (hours)	5.25	7.50	-
Peak Rainfall Intensity (inches/hour)	0.32	0.44	-
Peak Storm Flow (gpd)	152,444	25,459	83%
Total Storm Volume (gal)	88,900	9,279	90%

Notes:

1. Table 1 values reflect a subset of the Jady Hill area as described above.
2. Groundwater effects are not included as part of the 2009 or 2014 results.
3. Peak Storm Flow definition: The maximum measured flowrate over the duration of the storm event.
4. Total Storm Volume definition: The total amount of flow measured over the storm event.

Sewer Capacity Analysis

The reduction in observed peak I-I flows corresponds to an increase in sewer capacity downstream of the Jady Hill subset area. The change in sewer capacity was evaluated by comparing overall peak flow rates with the downstream sewer capacity. Peak flows were extrapolated to include the additional houses not included in the flow monitoring subset. The limiting sewer pipe downstream of the Jady Hill subset area is a 15-inch reinforced concrete pipe located upstream of the inverted siphons. The full flow capacity of the 15-inch sewer ($S = 0.0015$, $n = 0.013$) is 1,615,800 gpd (2.5 cfs). The extrapolated peak flow, including the entire Jady Hill area, during the May 27, 2009 event was calculated to be 197,683 (0.31 cfs) gpd, which is approximately 12% of the pipe full flow capacity. The extrapolated peak flow, including the entire Jady Hill area, during the April 30, 2014 event was calculated to be 81,937 gpd, which is approximately 5% of the pipe full flow capacity. For these events referenced, the Jady Hill project appears to have freed up an average of approximately 7% of the full flow pipe capacity.

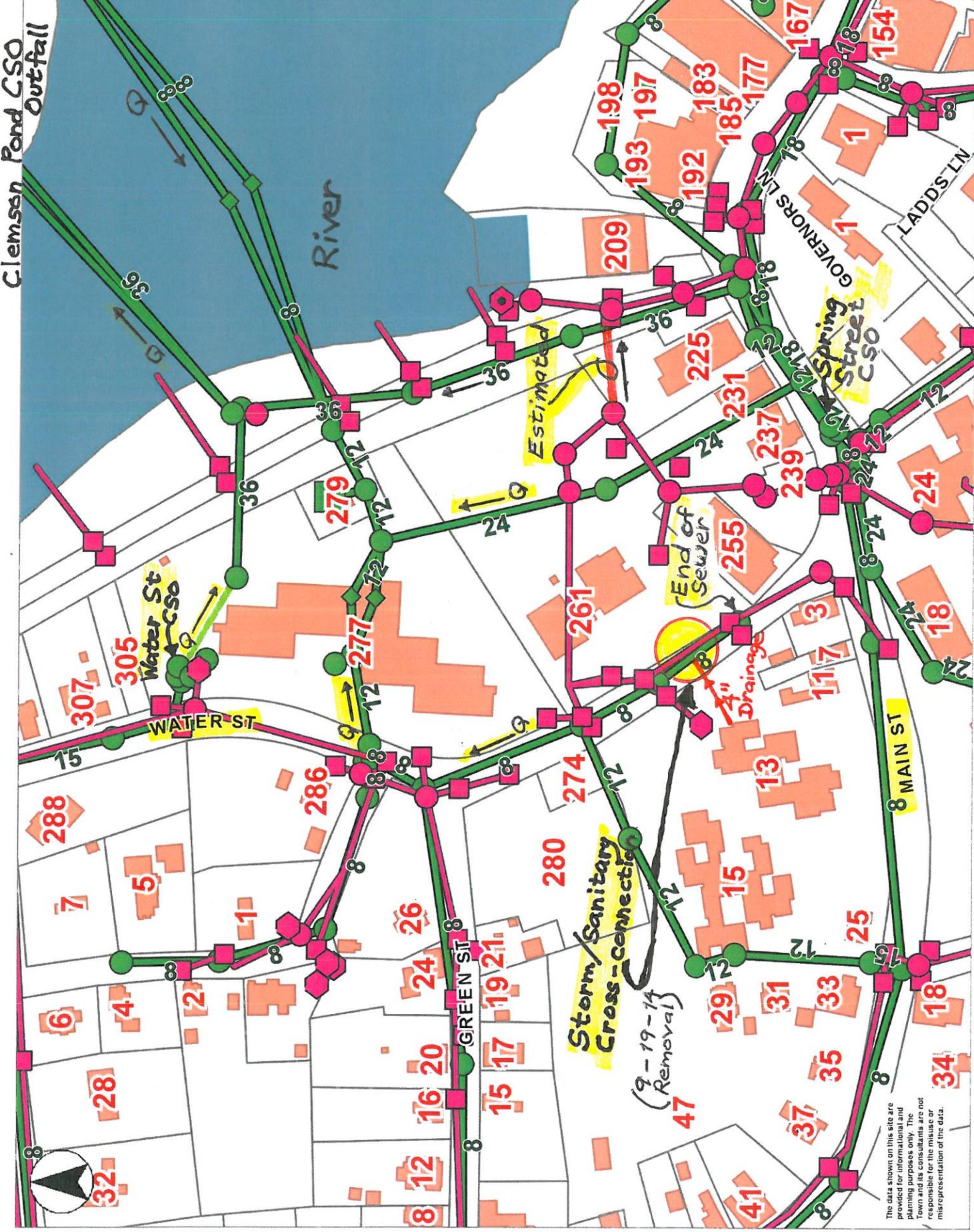
CONCLUSIONS

As discussed in the project background, the Jady Hill Utility Replacement project was anticipated to reduce I/I volume by 80%. This estimate was later reduced to 71% based on the number of homeowners who participated in the private service replacement program. Based on the analysis above, flow monitoring results indicate an average wet weather I-I volume reduction of 82%. This observed reduction exceeds both the revised and initial I/I volume reduction targets of 71% and 80%. Although only 95 of the 136 housing units were metered during the pre-construction and post-construction flow monitoring, we would extrapolate that the same reduction percentages were achieved for the 41 housing units outside the Jady Hill subset area.

Based on the flow monitoring results, the Jady Hill Utility Replacement project has resulted in the removal of approximately 79% of annual I-I volume, which equals approximately 34.0 MG removed from the Town's sewer system.



- Storm Water Structures
- Auxiliary Catchbasin
- Catchbasin
- Drainage
- Drainage Inlet
- Drainage Outlet
- Storm Water Pipes
- Wastewater Structures
- Cap
- Clean Out
- Deflection
- Grease Trap
- Manhole
- Other
- Pump Station
- Septic Tank
- Temporary
- Wastewater Pipes
- Sanitary
- Sewer Pipes
- Parcels
- NH Highways
- Interstate
- US Highway
- State Highway
- Town Boundary
- Abutting Towns
- Streets
- Misc Streams
- Perennial Streams
- Open Water
- Buildings

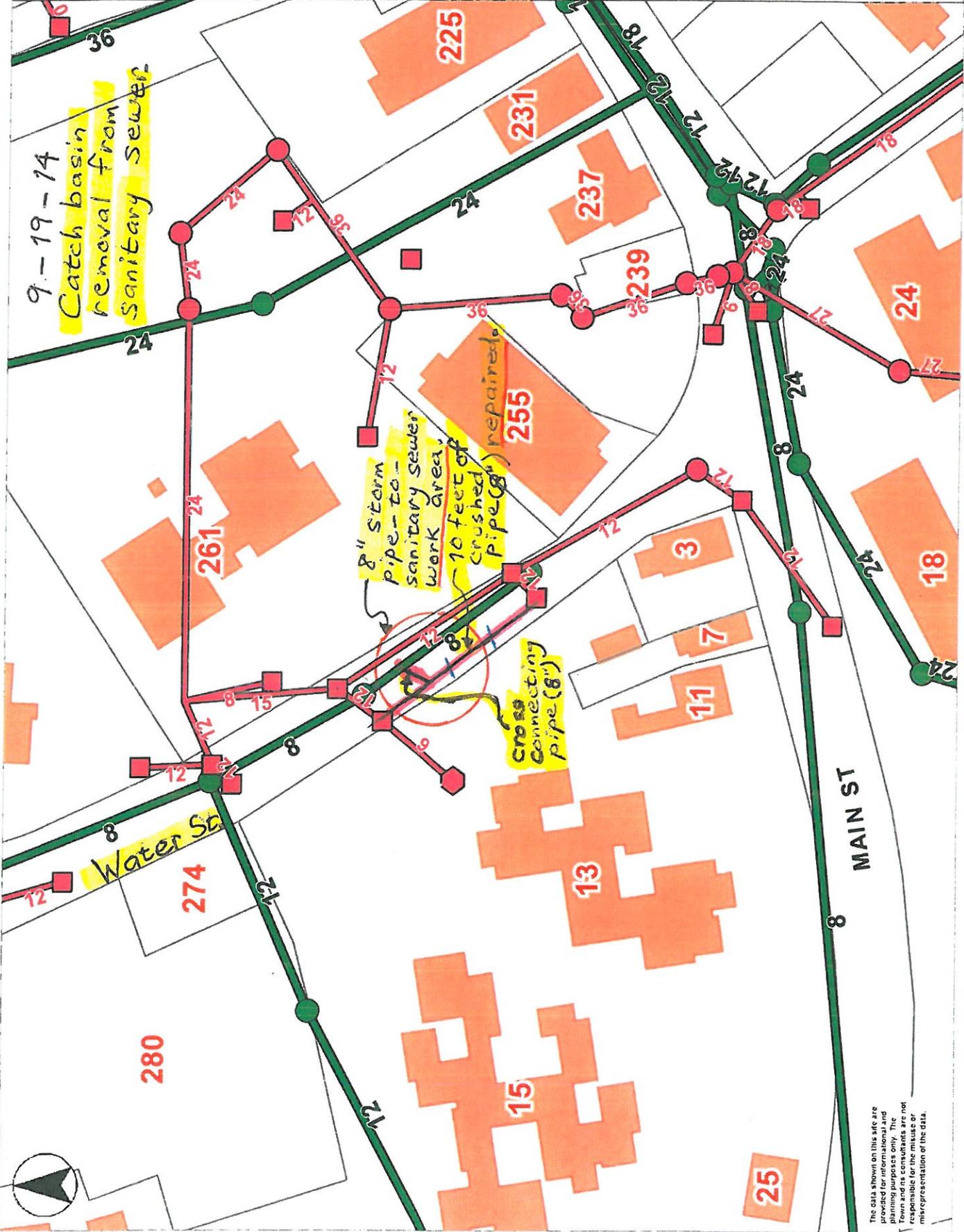


The data shown on this site are provided for informational and planning purposes only. The Town and its consultants are not responsible for the misuse or misrepresentation of the data.





- Storm Water Structures
- Auxiliary Catchbasin
- Manhole
- Drain Manhole
- Pipe End Inlet
- Pipe End Outlet
- Storm Water Pipes
- Wastewater Structures
- Cap
- Clean Out
- Reflection
- Open Trench
- Other Manhole
- Pump Station
- Septic Tank
- Temporary
- Wastewater Pipes
- Forced Main
- Private Sewer Pipes
- Plays
- NH Highways
- Interstate
- US Highway
- State Highway
- Town Boundary
- Abutting Towns
- Streets
- Micro Streams
- Parcel Streams
- Open Water
- Buildings



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Water St. Storm Drainage Removal
From Town Sanitary Sewer 9-19-14

Town of Exeter

8" Connection on "TY"
fittings located on Water
Street sanitary sewer
and parallel 8" Storm
drainage. A 4" pipe from
Phillips Exeter Academy,
(building #13) not used for
a sewer service, was
also disconnected. All
this storm/sewer
separation was completed
September 19, 2014.

2015



Water St.
Storm-to-Sanitary
Connection removal.
9-19-14