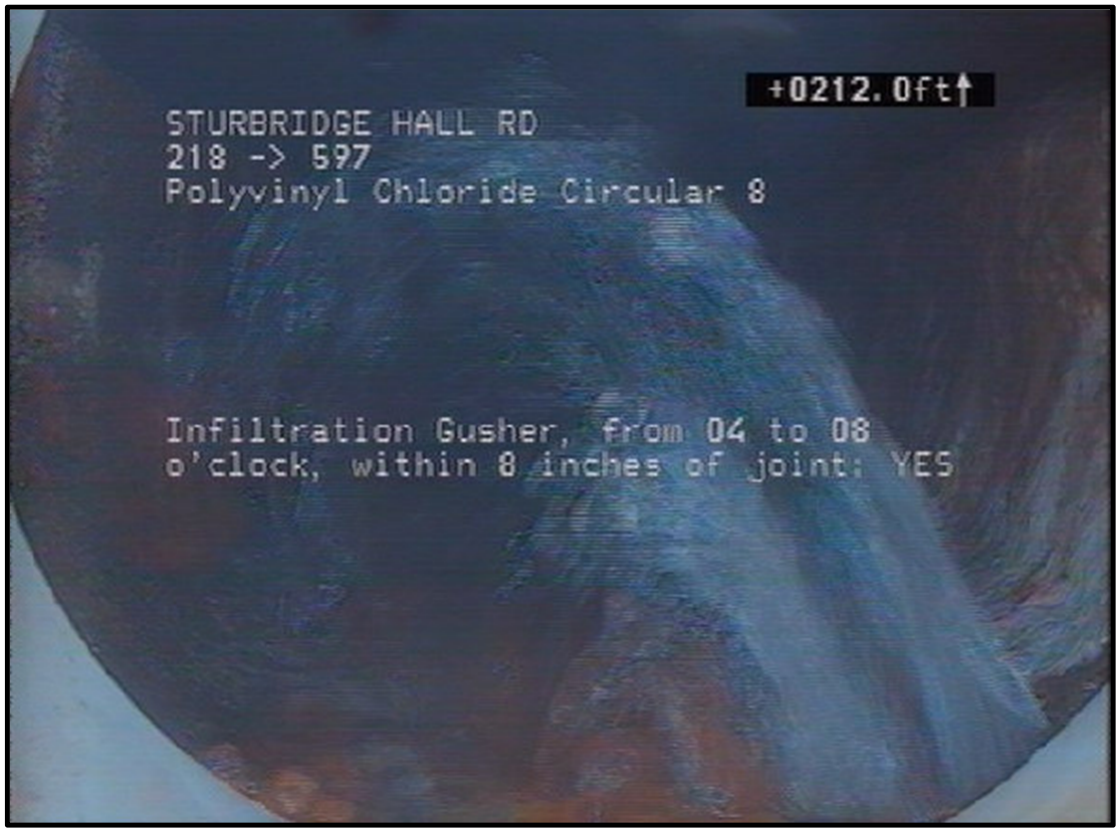
Town of Sturbridge, Massachusetts
Phase 2 report



Inflow and Infiltration Mitigation Plan

May 13, 2022

Mr. Butch Jackson
DPW Director
Town of Sturbridge, Massachusetts
69 New Boston Road Extension
PO Box 182
Sturbridge, Massachusetts 01566

Re: Inflow and Infiltration mitigation plan phase 2 report

Dear Mr. Jackson,

Veolia North America is pleased to have the opportunity to present the following report for phase 2 of the inflow and infiltration mitigation project in accordance with the Massachusetts Department of Environmental Protection (MassDEP) regulation 314 CMR 12.00 Operation, Maintenance, and Pretreatment Standards for Wastewater Treatment Works and Indirect Discharges. In the following report you will find a detailed summary of the work completed, defects identified, and recommendations for repairs. The Veolia team has taken the "find it and fix it" approach throughout the duration of the project, thus ensuring that the Town receives the greatest possible result for the work provided. If you have any questions or concerns regarding the information within this report please do not hesitate to contact me by phone at 401-265-0525 or by email at paul.rodman@veolia.com.

Best regards,

Paul Rodman
Special Projects Manager
Veolia North America

CC: Shane M. Moody, Project Manager II, Sturbridge WWTF & WTF, Veolia North America
John Oatley, Sr. Vice President of Operations, Veolia North America

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Glossary of Terms, Abbreviations, and Acronyms

CCTV	Closed Circuit Television Video (CCTV) sewer inspection refers to the process of using a camera to see inside of pipelines, sewer lines, or drains
CIPP	Cured-in-Place-Pipe Lining (CIPP) is a trenchless method of sewer construction. It requires little or no digging and significantly less time to complete than other sewer repair methods. It is suitable for repairing both short and long runs of pipes that do not need to be upsized.
Cross Connection	Any physical connection or arrangement between two otherwise separate piping systems, one of which contains potable water and the other either the water of unknown or questionable safety or steam, gas or chemical, whereby there exists the possibility for flow from one system to the other, with the direction of flow depending on the pressure differential between the two systems.
GIS	Geographic Information System is a type of database containing geographic data, combined with software tools for managing, analyzing, and visualizing those data.
GPM	Gallons per minute
I&I	Inflow and infiltration
IG	A infiltration gusher (IG) is the most severe form of an ingress of water into sewer pipes under constant pressure through a hole or break in a pipe or defective or faulty joint. It is the service condition of a fast-flowing leak into a sanitary sewer system
Infiltration	Infiltration is the excess water that sometimes seeps, trickles, or flows into old or damaged sanitary sewer systems from the surrounding soil.
Inflow	Inflow is surface water that enters the wastewater system from yard, roof, and footing drains, from cross-connections with storm drains and downspouts, and through holes in manhole covers.
InfoAsset Mobile	InfoAsset Mobile is the field software where the crews receive their schedules, view new data immediately, do their work, and report back, all using the mobile application.
InfoAsset Manager	InfoAsset Manager is asset management software that assembles all the information you have about your assets including condition, CCTV surveys, GPS surveys and history and allows the user to create workflows or work orders and create customized reports.
NASSCO	National Association of Sewer Service Companies, NASSCO is the industry standard for trenchless technology education, resources, and advocacy.
PSI	PSI is a unit of pressure expressed in pounds of force per square inch of area.
Roof leader	Roof leader or “downspout” means a pipe inside or outside of a building that

	conveys stormwater from the roof of a building to the sanitary sewer system.
SSO	Sanitary Sewer Overflow

Scope of work

The scope of work consisted of a base obligation of pipe cleaning 14,000 linear feet of public gravity sewer main, CCTVing 14,000 linear feet of public gravity sewer main, smoke testing 14,000 linear feet of public gravity sewer main, and 98 topside manhole inspections.

Area of study

Using the flow monitoring data from Phase 1, the Veolia team identified the Hall Road area to be one of the larger contributing areas of I&I. Utilizing the GIS the team identified pipes that connected to Hall Road and conducted the majority of the work in those areas. The following streets were focused on for the study.

1. Technology Park Road
2. Picker Road
3. Route 20 (between Picker Road and Hall Road)
4. Hall Road
5. Hawthorne Road
6. Maple Street
7. Morse Street
8. Whittemore Road
9. Old Farm Road
10. Summit Ridge Road

➢ After pipe cleaning and CCTVing Route 20, the State DOT would not allow the Veolia crews back onto the road to complete the manhole inspections or smoke testing. Whittemore Road and Old Farm Road were added in place of Route 20 as they also contribute to the Hall Road sewer area.

➢ Maple Street and Morse Street were added to the study as they contribute to the Hall Road sewer area, but to also assist the Veolia Town of Sturbridge sewer department to locate the private sewer lateral connections for each property prior to repaving the streets.

Methodology

Project setup

The Veolia team first used the data collected from the Phase 1 flow monitoring results to identify the area of study. Once identified all of the work orders were scheduled using InfoAsset Manager and then uploaded to each crew's handheld devices where they would use InfoAsset Mobile to complete work orders, take pictures of defects and track the progress of the project. At the end of each day, the crews would upload all of their completed work orders for the Project Manager to review. All project employees are NASSCO trained and certified to assure proper asset and defect identification, coding, review, and recommendations.

Pipe Cleaning

Prior to CCTVing each sanitary sewer pipe was cleaned using a combination vactor truck which provided a hydro cleaning pressure of 80 gallons per minute and 1500 psi to remove debris from the pipe walls and pull it down the pipe to the vacuum tubes where all debris was removed from the system as to prevent potential future backups or SSO's. All debris was dumped at the town of Sturbridge Wastewater Treatment Facility.

CCTV

After the sanitary sewer pipes were cleaned the crew began the CCTV portion of the project to assess each pipe's structural condition and identify any pipe defects. The crew used a steerable tractor that has the capability to drive through pipes 6” - 60” and WinCan software with NASSCO coding to complete inspection reports for each pipe segment from manhole to manhole. At the end of the CCTV portion of the project, the video files and access database were removed from the computer of the truck and uploaded to InfoAsset Manager for quality control review and reporting.

Manhole inspections

Each sanitary sewer manhole inspection consisted of structural measurements of the entire asset, its location, flow depths, defect identification, and photo documentation. At the completion of each day, all completed work was uploaded from InfoAsset Mobile to InfoAsset Manager for quality control and review.

Smoke Testing

Smoke testing was conducted in the same project area to look for any type of cross-connections with the storm sewer and sanitary sewer system, roof leaders, manhole defects that would allow inflow, broken pipes, and private plumbing deficiencies. Two weeks prior to the commencement of the testing a public notice was sent out notifying the public in the area of the work and a phone number was provided for any questions or concerns. The work consisted of setting up a fan on top of a manhole frame and pushing liquid smoke that turns to a harmless gray vapor through the sanitary sewer system in 1000 linear foot increments. Once smoke could be seen coming out of household vent pipes the crew walked the area looking for deficiencies and defects. All work and defects were recorded in InfoAsset and photos and measurements were taken so they can be quickly identified in InfoAsset Manager for reporting.

Reporting

All work orders, photos, and videos were uploaded into InfoAsset Manager where the NASSCO Certified Project Manager reviewed each CCTV video, defect photo, and work order for quality control. Customized reports were then generated and compiled into one single report providing the Town with all the information and data collected on the project and recommendations for any future repairs.

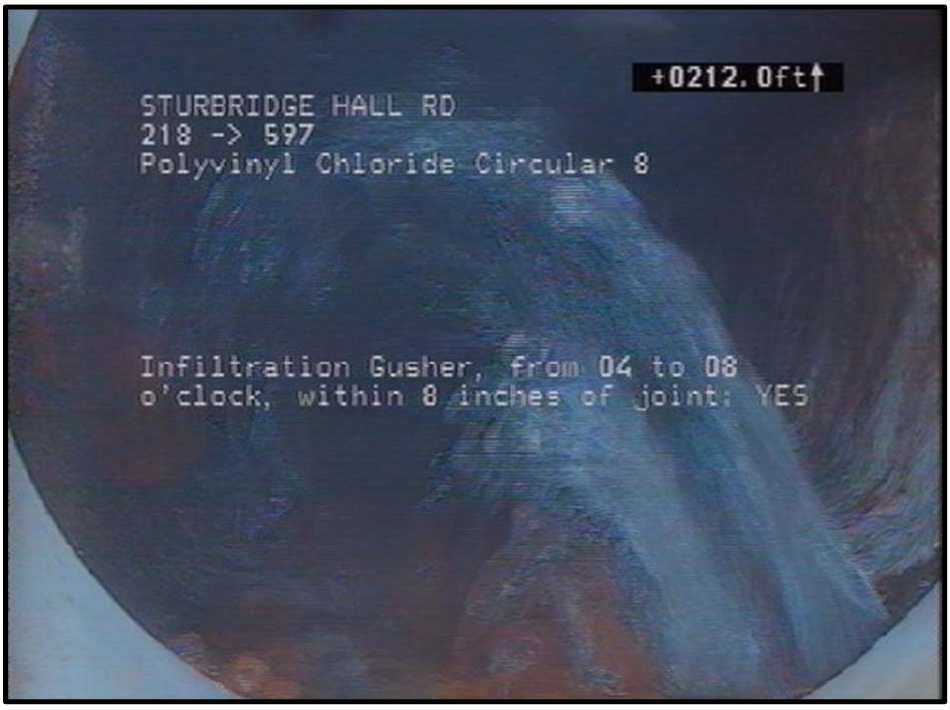
Summary of completed work

Activity	Total feet	Number of pipe segments	Number of manholes
Pipe Cleaning	14,141	58	N/A
CCTV	14,141	58	N/A
Smoke Testing	14,954.19	70	74
Manhole Inspections	N/A	N/A	101

Summary of defects found

CCTV inspection defects

Street	Upstream MH ID	Downstream MH ID	Distance from US MH (ft)	Defect Code	Estimated Infiltration (gpm)	Criticality (1-5)	Recommended Repair
Hall Road	218	597	212	(IG) Infiltration Gusher	4	5	Hydraulic grouting



Smoke testing defects

Street	Manhole ID or Street Address	Public or Private	Defect Type	Number of openings	Size of opening (in)	Potential I&I access	Estimated potential I&I (gpm)	Recommended repair
Fiske Hill Road	80 Fiske Hill Road	Private	Broken cleanout cover	1	1.0	Low point	4.8	Replace cover
Hall Road	Wendys	Private	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	212	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	213	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	214	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	1026	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	215	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	216	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	217	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket

Hall Road	597	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	218	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	219	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	221	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	222	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	223	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	225	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	226	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	227	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hall Road	120	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hawthorne Road	377	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Hawthorne Road	378	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Old Farm Road	598	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Old Farm Road	1120	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Old Farm Raod Easement	635	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Whittemore Road	116	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Whittemore Road	114	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Whittemore Road	138	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket
Whittemore Road	108	Public	Vented manhole cover	2	0.25	Sheeting	1.2	Install manhole gasket

- Source for I&I estimation - Guidelines for Preforming Infiltration/Inflow Analysis and Sewer System Evaluation Surverys, Commonwealth of Massachussets Department of Environmental Protection, May 2017, pg 42

Smoke Testing defect photos

1. 80 Fiske Hill Road - Broken cleanout cover


2. Hall Road - Wendys private manhole - Vented manhole cover

3. Hall Road - Manhole ID 212 - Vented manhole cover

4. Hall Road - Manhole ID 213 - Vented manhole cover

5. Hall Road - Manhole ID 214 - Vented manhole cover

6. Hall Road - Manhole ID 1026 - Vented manhole cover

7. Hall Road - Manhole ID 215 - Vented manhole cover

8. Hall Road - Manhole ID 216 - Vented manhole cover

9. Hall Road - Manhole ID 217 - Vented manhole cover

10. Hall Road - Manhole ID 597 - Vented manhole cover

11. Hall Road - Manhole ID 218 - Vented manhole cover

12. Hall Road Manhole ID 219 - Vented manhole cover

13. Hall Road - Manhole ID 221 - Vented manhole cover

14. Hall Road - Manhole ID 222 - Vented manhole cover

15. Hall Road - Manhole ID 223 - Vented manhole cover

16. Hall Road - Manhole ID 225 - Vented manhole cover

17. Hall Road - Manhole ID 226 - Vented manhole cover

18. Hall Road - Manhole ID 227 - Vented manhole cover

19. Hall Road - Manhole ID 120 - Vented manhole cover

20. Hawthorne Road - Manhole ID 377 - Vented manhole cover

21. Hawthorne Road - Manhole ID 378 - Vented manhole cover

22. Old Farm Road - Manhole ID 598 - Vented manhole cover

23. Old Farm Road - Manhole ID 1120 - Vented manhole cover

24. Old Farm Road Easement - Manhole ID 635 - Vented manhole cover

25. Whittemore Road - Manhole ID 116 - Vented manhole cover

26. Whittemore Road - Manhole ID 114 - Vented manhole cover

27. Whittemore Road - Manhole ID 138 - Vented manhole cover

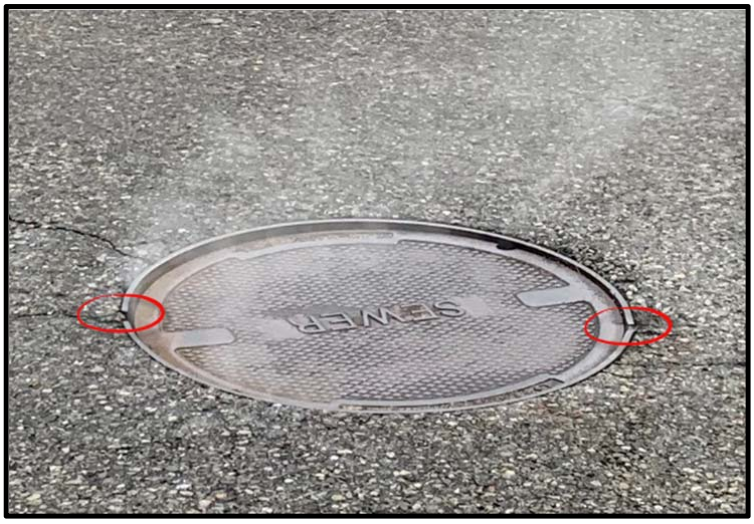
28. Whittemore Road - Manhole ID 108 - Vented manhole cover

Manhole inspection defects

Street	Manhole ID	Defect	Recommended repair
Route 20	197	Buried	Locate and bring to grade
Route 20	204	Buried	Locate and bring to grade
Hall Road	120	Broken adjustment ring	Replace adjustment ring or frame
Hall Road	597	Broken adjustment ring	Replace adjustment ring or frame

Manhole inspection defect photos

1. Hall Road - Manhole ID 120 - Broken adjustment ring



2. Hall Road - Manhole ID 597 - Broken adjustment ring