

EXECUTIVE SUMMARY

INTRODUCTION

Rockland County Sewer District No. 1 is committed to protecting the environment by controlling wastewater flow collected by their sanitary sewer system and treated at their wastewater treatment plant. Collection and treatment of extraneous rainwater or groundwater that inadvertently enters into a well-maintained system can result in unwanted wastewater discharges to the environment under peak wet weather conditions. This peak flow adds significantly to the cost of operating large collection, pumping and treatment systems. Through the years, the District has taken a proactive roll in identifying and eliminating inflow and infiltration (I/I) that plagues most sewer systems.

Beginning in 1988, the District has implemented annual sewer system rehabilitation projects directed at identifying areas for addressing peak wet weather flow and reducing wet weather infiltration and inflow in the interceptor sewer system that lead to the elimination of sanitary sewer overflow (SSO) discharges and reducing wastewater treatment costs. These projects included internal sewer inspection and cleaning, testing and sealing of sewer pipe joints, and manhole inspections and repair of those that have sustained damage from underground shifting or aboveground activity. Between 1988 and 2006, the District initiated 15 sewer and manhole rehabilitation projects which resulted in the testing of approximately 225,000 sewer pipe joints, the sealing of 18,387 sewer pipe joints that failed the test, and the rehabilitation of 2,016 manholes. It is estimated that between 1,000,000 gallons and 1,750,000 gallons per day (gpd) of excess flow was eliminated from the collection and treatment system as a result of these efforts. In an aging sanitary sewer system, this is a significant accomplishment.

The Chairman of the Board, Vice Chairman, Sewer Commissioners, and the District's Executive Director have been instrumental in forging ahead and expanding the described efforts through the implementation of a comprehensive collection system evaluation on both District-owned and town-owned facilities. Recent efforts that have been initiated include:

1. Enforcement of inflow removal at the Palisades Mall for the elimination of wet weather inflow from parking lot drains and roof leaders. This work has been completed .

2. Repair of two manholes tributary to the North Pumping Station that had broken riser vents, identified during the pilot phase of smoke testing. This work was completed in the summer of 2007.
3. Removal of wet weather inflow sources tributary to the Town of Ramapo South Airmont Pumping Station through manhole rim elevation adjustments and the repair of a broken house connection. This work was completed in the Summer of 2007.
4. Resetting of displaced or loose manhole covers in the Town of Clarkstown. This work was completed in the Summer of 2007.
5. Installation of a watertight casting at a manhole on the Upper Hackensack River Interceptor in the Summer of 2007.
6. Improvements to the Ramapo Interceptor (Phase 1), which involved placing a third siphon barrel online to provide increased wet weather carrying capacity. This work was completed in the Summer of 2007.
7. Improvements to the Ramapo Interceptor (Phase 2), which include relocating the discharge from the Tallman Pumping Station to eliminate a known wet weather SSO. The construction of this project is currently underway.
8. Replacement of the Town of Clarkstown Congers Road Pumping Station, at District expense. This work, which is currently underway, will increase the capacity of the pumping station and eliminate a known SSO location.
9. Evaluation and upgrade of the Saddle River Pumping Station, which was identified as having wet weather capacity and control issues. The design documents have been developed for pump and control upgrades which will return the pumping station to its original design capacity and eliminate equipment failures that have occurred in the past. Construction is currently underway.
10. Smoke testing and wet weather manhole investigations to supplement the results of the pilot program. Moving aggressively, this work will be conducted beginning in 2008 on two high priority areas. By 2010, it is expected that smoke testing of nearly 100 percent of

the collection system will be completed to identify wet weather inflow sources. The removal of inflow sources identified by smoke testing and manhole inspections will be complete by the end of 2011.

11. Meetings have been scheduled with local code enforcement officials.
12. Install locking, watertight manhole covers at several manholes in the Monsey Interceptor vicinity. This work is expected to be completed in the Spring of 2008.

COMPREHENSIVE STUDY DETAILS

The development of an engineering scope of services and study had the following six goals:

1. Develop a plan to evaluate the operation of the District's and Towns of Ramapo and Clarkstown's collection and treatment systems.
2. Initiate a comprehensive flow monitoring program for the District and towns with the goal of identifying areas where high wet weather inflow is contributing to SSOs.
3. Analyze collected data and select pilot field investigation areas for detailed evaluation and identification of inflow sources.
4. Develop long-term improvement strategies that will continue to identify and eliminate inflow sources to control wet weather SSOs and control rising wastewater treatment costs.
5. Recommend immediate improvements that will achieve a goal of SSO elimination when coupled with long-term improvement strategies.
6. Develop a plan that summarizes study tasks, makes improvement recommendations and develops an implementation schedule to proactively move forward with system-wide improvements to eliminate SSOs and control treatment costs.

Study Components and Conclusions

A primary component of the study was a comprehensive sewer system flow and operation monitoring program. This program had two main monitoring components:

1. In-system temporary flow meters (up to 35 locations on District and town sewers).
2. Permanent pumping station dataloggers (30 total: 18 at District pumping stations; 6 each at Town of Ramapo and Town of Clarkstown pumping stations).

Flow data was initially collected from these components over a five-month period from October 2006 through February 2007. Data analysis during the initial flow monitoring period revealed the following:

1. During dry weather, the collection, pumping and treatment system operated as expected and was in compliance with the District's SPDES permit, without overflows.
2. The collection system has the capacity to convey peak flows during dry weather.
3. During wet weather events, the collection system experienced sanitary sewer overflows in limited areas and only in response to the most significant rainfall events. Of the 26 wet weather events recorded during the study, only 4 resulted in SSO discharges.
4. Flows from the Towns of Ramapo and Clarkstown are cumulative as they reach the District's interceptor and pumping system. During wet weather, these flow contributions have, at times, resulted in localized areas where SSOs occur.
5. Increased system flows during wet weather are the result of inflow as evidenced by rapid rise and fall in system flows. Based on the evaluation of flow monitoring data, inflow (surface water entering the collection system during rain events) is the primary cause of the SSOs.
6. Infiltration into the collection system potentially increases with rising groundwater elevations. Increased flows from infiltration occur during a longer period of time than flow

increases caused by inflow. Based on the evaluation of flow monitoring data, infiltration is not the primary cause of SSOs.

7. No single area or small numbers of areas were identified as contributing to volumes of inflow, causing the SSOs identified. Based on a review of all data, inflow accumulates in the system from throughout the District, occasionally resulting in SSOs during wet weather where several sewer lines or interceptors come together.

Based on the results of the initial flow monitoring program, the District decided to add additional flow meters to further subdivide the District and Town collection system and conduct a second flow monitoring period. The second flow monitoring period was extended from April 2007 through Mid-May 2007. The objective of the second flow monitoring period was to determine if certain areas could be eliminated from further study. Data analysis for the second flow metering period yielded the following:

1. Collected and analyzed data has identified small pockets of inflow that were not evident during the initial analyses. This was due to the fact that groundwater was at a higher elevation in March and April than groundwater elevations during the initial flow monitoring period.
2. Although pockets of infiltration were identified, they do not, in and of themselves, cause SSO discharges.
3. Evaluation of flow monitoring data led to the selection of pilot areas to perform detailed field investigations such as smoke testing, dye testing, and manhole inspections.
4. Based on the distribution of inflow (the primary cause of SSOs), additional detailed field investigations are recommended for most sewers that are either owned by the District or are tributary to their interceptor system to identify inflow sources that can be removed.
5. Data collected from the flow monitoring periods has allowed for the prioritization of field investigations to be completed by 2010.

Manhole inspections targeted areas on District interceptors and town collector sewers that were along lakeshores, streams, through marshy areas, or in road swales. Manholes were identified by

District and town staff as areas of concern. Many manhole inspections were performed during the significant wet weather event of April 15, 2007, which has a return frequency of approximately 25 years and averaged 6 inches of rain in 24 hours with as much as 7 inches of total rain during the storm. Conducting the inspections during this wet weather event added to the evaluation of the manholes and knowledge of sewer system operations during wet weather. Additional wet weather manhole inspections will take place through 2010 to identify inflow sources. The pilot manhole investigation program identified the following:

1. Manholes with active inflow sources or evidence of inflow.
2. Manholes within low-lying areas that were not equipped with locking watertight covers or were at elevations that made them susceptible to flooding by adjacent waterways.
3. Manholes with frames and covers that were broken, shifted, or required raising or resetting and mortaring of the frame and cover.

Ideally, smoke testing is conducted during dry ground conditions. The timing of this study did not permit smoke testing during these conditions. Although the smoke testing was postponed to allow time for the ground to dry following the April wet weather event, conditions were not ideal. Smoke testing resulted in identification of several inflow sources on both District interceptor and town-owned collector sewers. These sources are significant and add to the evaluation and inflow source identification. Additional smoke testing areas have been prioritized for dry weather periods through 2010.

Confirmatory dye testing was used on a limited basis to evaluate suspected private property inflow sources. Results of this effort were inconclusive and justify expanding this effort to a larger area. Each of these efforts was useful in identifying and confirming inflow sources. The primary conclusions from these tasks are:

1. No single or individual inflow source is resulting in SSO discharges.
2. A comprehensive program of inflow source identification through manhole inspections, smoke and dye testing is required.

RECOMMENDED IMPROVEMENTS

Based on the evaluation of collected flow data and results of the pilot field investigations, improvements to eliminate wet weather SSO discharges up to a 3-inch rainfall over 24 hours were developed, focusing on additional field investigations for inflow identification and resulting capital improvements. These recommended improvements are supported by the District's Chairman, Vice Chairman, Sewer Commissioners, and Executive Director:

Improvement 1: Wet Weather Inflow Identification. Wet weather inflow is believed to be the number one cause of SSO discharges from the collection system. The pilot field investigation program identified many locations with visible inflow and manhole defects. Continuing a field investigation program is expected to identify many similar conditions. Continued identification and elimination of inflow sources is an integral part of SSO elimination. Identification of the inflow sources and the condition of the collection system will allow for refinement of the model and development of detailed designs for inflow elimination. It is therefore recommended that the field investigation program be expanded to include additional areas that exhibit high peaking factors and/or high inflow rates during wet weather events. The investigations will include sewer smoke and dye testing, and manhole inspections. This work will be completed using an aggressive schedule over a three-year period.

Improvement 2: Identified Inflow Source Removal. The pilot field investigations (manhole inspections, smoke and dye testing) identified several "hot spots" that are contributing or have the potential to contribute inflow during wet weather. Removal of these known potential or existing inflow sources must be performed to achieve the District's goal of SSO discharge elimination. The District has proactively removed several inflow sources in recent months, including areas tributary to the North Pumping Station and the Town of Ramapo South Airmont Pumping Station. The remaining inflow sources identified during the pilot field investigations will be removed in 2008, and inflow sources identified by supplemental smoke testing, dye testing, and manhole inspections will be removed by the end of 2011.

Improvement 3: Locking Watertight Cover Installation at Monsey and Hillcrest Interceptors. Control of SSOs is believed to be achievable through the installation of locking watertight manhole covers in the Monsey and Hillcrest Interceptor junction area.

Additional elimination measures will include the installation of appropriate backflow prevention measures to prevent backups into adjacent structures. Engineering design will include manhole modifications and installation of backflow prevention devices. The first phase of improvements will be completed in the spring of 2008 and additional phases may be initiated if necessary.

Improvement 4: Redirect Tallman Pumping Station Discharge. The discharges from the Tallman and Twin Lakes Pumping Stations each terminate at the Ramapo Interceptor (Manhole 10019). This condition has caused SSO discharges during peak wet weather flows. Redirecting the Tallman Pumping Station discharge downstream to a location on the Ramapo Interceptor with the ability to convey peak wet weather flow is expected to eliminate SSO discharges in this area. This work was completed in November 2007.

Improvement 5: Evaluate Saddle River Pumping Stations Operations. The Saddle River Pumping Station accepts flows from its immediate surrounding area as well as from the Pinebrook and Cherry Lane Pumping Stations. An evaluation of the Saddle River Pumping Station has been completed. The evaluation has recommended replacement of the pumps and controls to restore the station to its original design capacity and to address pumping station failures attributed to pump control malfunctions. The work is currently under construction and is scheduled for completion in the Fall of 2008.

PROBABLE COST OF RECOMMENDED IMPROVEMENTS

Table 6-4 presents the probable cost for the recommended improvements.

IMPLEMENTATION SCHEDULE

Table 6-5 presents the schedule for implementing each of the recommended improvements. Some improvements are currently underway. Wet weather inflow identification is an ongoing effort, and identified source removal is expected to be completed by the end of 2011. The improvements to the Tallman Pumping Station discharge location have been completed, and this construction contract will be amended to include the installation of watertight manholes near the junction of the Monsey and Hillcrest Interceptors. The later work will be completed in the spring of 2008. The upgrades to the Saddle River Pumping Station have been designed and construction is underway.

The implementation schedule calls for the continuation of inflow identification and the design of inflow corrective measures that have been identified during the pilot field investigations. As additional inflow sources are identified, design of corrective measures will commence. It is intended that all recommended improvements be complete the end of 2011. Quarterly reports will be provided to the NYSDEC to document the progress of inflow removal efforts and will include an estimate of removed inflow volume.

The District is committed to the goal of eliminating SSOs as evidenced by the following statement from the Chairman:

“The Rockland County Sewer District is committed to the goal of eliminating SSOs from our collection system. Based on results of the flow monitoring study conducted by our Engineers it is evident that our system is well maintained and operated. Our professional staff continues to respond immediately to SSOs that occur to mitigate any environmental impacts. However, we want to be one of the best. Our comprehensive approach, by including other tributary communities in this study and forming a partnership with them to prioritize corrective actions shows our commitment. Our goal is to enhance our current system so that it continues to provide service to our users which is one of our assets that gives us the quality of life we have enjoyed over the years.”

Julius Graifman
Chairman, Rockland County Sewer District No. 1