# VOLUME I

# SAUQUOIT CREEK PUMPING STATION
# SANITARY SEWER OVERFLOW MITIGATION PLAN
# ONEIDA COUNTY SEWER DISTRICT

Prepared for

Oneida County Department of Water Quality
& Water Pollution Control
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SCE Project No. 07060.15

July 7, 2010


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# ONEIDA COUNTY, NEW YORK

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# 1.0 EXECUTIVE SUMMARY

## 1.1 HISTORICAL BACKGROUND

The Oneida County Sewer District (District) was formed in 1965 through an act by the former Oneida County Board of Supervisors. It is administered by Oneida County through the Oneida County Department of Water Quality and Water Pollution Control (WQ&WPC) which is responsible for the operation of the District's facilities and personnel. District facilities include 45 miles of interceptor sewers, the Sauquoit Creek and the Barnes Avenue Pumping Station, and the WPCP. The District services 15 municipalities, nine of which are within the Sauquoit Creek Pumping Station (SCPS) Basin. These municipalities own and operate their own collection systems.

## 1.2 CONSENT ORDER BACKGROUND

A Consent Order (No. R620060823-67) was executed between the New York State Department of Environmental Conservation (NYSDEC) and Oneida County (County) on July 11, 2007. This Consent Order was issued in conjunction with the renewal of the County's State Pollutant Discharge Elimination System (SPDES) permit (NY-0025780) which regulates discharges from District facilities.

The Consent Order focused on the mitigation of the wet weather discharge at the SCPS. Included in the Consent Order is the requirement for Oneida County to prepare and submit an approvable Plan of Study (hereinafter referred to as the Sauquoit Creek Pumping Station Sanitary Sewer Overflow (SSO) Mitigation Plan or SSO Mitigation Plan) to NYSDEC.

While the Consent Order negotiations were underway in early 2007, Oneida County issued a "Request for Qualifications for Engineering Services Relative to SPDES Permit Compliance and SSO Abatement". Oneida County received qualification packages from five consultant teams on June 1, 2007 that collectively were composed in total by over 20 professional firms consisting of

engineers, financial advisors, flow monitoring specialists, and public education and outreach consultants. An in-depth review of the submitted information was performed and an extensive interview process was conducted of each consultant team by a project review committee. Following a Qualification Based Selection (QBS) process, the consultant team of Shumaker Consulting Engineering, Stearns & Wheler, Brown and Caldwell, ADS Environmental Services, and Paige Group was awarded a professional services contract to perform the technical work necessary to meet the technical terms of the Consent Order, including the development of an implementable SSO Mitigation Plan. Environmental Capital, LLC, a financial advisory firm specializing in strategic fiscal planning and financing for large environmental and public infrastructure projects, is also a member of the project team.

## 1.3 CONSENT ORDER MILESTONES

There are a number of interim and two (2) major milestones set forth in the Consent Order entered into between NYSDEC and the County. The two major milestones are:

1. Plan of Study (SSO Mitigation Plan) due on July 11, 2010.
2. Mitigation of the SSO by October 31, 2014.

In response to the Consent Order, the County has invested nearly $5 million to: (a) prepare initial project deliverables, (b) undertake a series of engineering investigations of the County and member municipality wastewater systems, and (c) develop the SSO Mitigation Plan.

Through the development of the SSO Mitigation Plan, the County discovered that the sources of infiltration and inflow (I/I) causing the SSO at the SCPS are both numerous and widespread across the entire tributary service area. Further, preliminary estimates revealed that it may cost upwards of $79 million to address collection system deficiencies. In addition, it is apparent that sanitary sewer system rehabilitation of the collection systems will need to be supplemented by capacity upgrades to both the SCPS and the Water Pollution Control Plant (WPCP) at an estimated cost approaching an additional $79 million in order to mitigate the SSO.

The Executive Summary summarizes the major points presented in this plan and presents technical and financial reasons for supporting an alternative milestone schedule for the mitigation of the SSO based on the findings of the engineering investigations and financial studies completed to date.

## 1.4 TECHNICAL AND FINANCIAL CONSIDERATIONS

### 1.4.1 Work Completed in Support of the Project

Oneida County and the member municipalities of the District have undertaken an aggressive effort to comply with the requirement of the NYSDEC Consent Order and assess the condition of the sanitary sewer collection system within the SCPS Basin. As a result of those efforts, the following work is either underway or has been completed:

- Development of a District-wide Sewer Overflow Response Plan.
- Established a community-based Steering Committee to oversee the SSO Mitigation project.
- Development of a Wet Weather Operating Plan.
- Development of a Water Pollution Control Plant Capacity Assessment.
- Development of a Flow Management Plan.
- Development of a Temporary Treatment Alternatives Study – SCPS SSO.
- Development of an Interim Inflow/Infiltration Reduction Plan.
- Revisions to District Sewer Use Rules and Regulations.
- Development of an Inflow/Infiltration Offset Plan (and Amendment No. 1).
- Construction of an Environmental Benefit Project (trail head parking at Rayhill Trail).
- GPS mapping of the District interceptor sewers.
- GPS mapping of the municipal sewers tributary to the SCPS.
- LiDAR aerial mapping of the entire District sewer service area.
- Computer hardware/software purchases to store and process sewer system data.

- Six month continuous flow monitoring program (March – September 2008).
- Sanitary sewer manhole inspection program (Phase 1: May – December 2008).
- Private property inspection pilot study (November 2008).
- Sanitary sewer smoke testing and televising program (Phase 1: June – December 2009).
- Interim manhole rehabilitation construction contract (August 2009 – present):
    - 140+/- manholes rehabilitated to date with local funds.
- Interim sewer system rehabilitation and localized repairs.
- Public education/information:
    - Annual Reports for community leaders.
    - Numerous meetings with town/village boards and planning boards.
    - Informational meetings with business and civic organizations.
    - Media interviews and radio talk shows.
- CMOM Readiness Reviews.
- Institutional structure planning.
- SSO Mitigation Fund established through municipal sewer use surcharges.
- On-going funding research/coordination.
    - Includes listing on 2010 CWSRF Intended Use Plan.
    - Submission of CWSRF applications ($25.8 million).

### 1.4.2 Metering and Modeling

An extensive flow monitoring program was conducted during 2008. The resulting flow data showed that the sources of Inflow/Infiltration (I/I) are widespread and that each municipality tributary to the SCPS is contributing a significant amount of I/I to the District wastewater collection system. During extended periods of the year, each community conveys at least, if not more than, three times their daily water consumption to the District system.

A calibrated hydrologic/hydraulic model of the SCPS Basin area shows that 332 million gallons are discharged from the SSO during a typical year of precipitation. For the purposes of the

initial modelling, 1986 was selected as the typical year for consistency with the City of Utica (City) Long-Term Control Plan (LTCP) which is being developed concurrently to control the City's combined sewer overflows (CSOs). To mitigate the SSO to an assumed level of zero gallons of discharge in a typical year, the model predicts that a 50% reduction in I/I is required in conjunction with a 10 MGD increase in capacity of both the SCPS and WPCP. Other combinations of I/I reduction and capacity enhancements are also possible to realize the same level of control of overflow in a typical year.

### 1.4.3 SSO Mitigation Considerations

While expansion of the SCPS and WPCP by greater than 10 MGD may be viewed as a quick and somewhat expeditious solution to mitigating the SCPS SSO, such expansion is not an environmentally sustainable approach without first stabilizing the sanitary sewer collection systems. In other words, it is not considered sustainable to use more energy to pump and treat dilute wastewater while ignoring the primary cause of the SSO: excessive rates of I/I in the collection systems. The older sanitary sewer systems which are tributary to the SCPS require various combinations of rehabilitation, repair, or replacement. Without such repairs, the rates of I/I will continue to increase over time and the physical condition of these sewers will continue to further deteriorate as some of these older sewers are nearing the end of, or in some cases have exceeded their intended useful life. Further, any anticipated expansion at the WPCP requires close coordination with the City LTCP. With the assistance of the District, Utica is reviewing options for incorporating higher levels of CSO treatment technologies at the existing WPCP. Lastly, there are physical constraints to making the existing pumping and treatment facilities larger; particularly with the latter as there is simply insufficient available land at the WPCP for significant expansion.

Based on I/I reduction projects throughout the country, a targeted 50% reduction of I/I is an aggressive goal and generally requires projects that address both public and private sources. The County's nearly $5 million investment in developing the SSO Mitigation Plan to date included an extensive amount of field investigations, including the development of a GIS of the

wastewater collection systems, 44 miles of sewer televising, 99 miles of smoke testing, 1,800 inspected manholes, dye testing, and a private property pilot program. These field investigations have yielded the discovery of numerous and widespread sewer defects, and as the investigations continue, additional defects continue to be discovered. Even with the considerable work that has been completed to date, more investigation is required on both public and private property which requires more time to plan and execute. This is particularly true for the difficult challenge of addressing private sources of inflow within nine separate municipalities each with their own sanitary sewer collection systems.

### 1.4.4 Wastewater Collection System Rehabilitation

A strong focus on sanitary sewer system rehabilitation (both public and private) will allow the District and its member municipalities to responsibly work toward treating the sources of I/I that inundates the SCPS during significant wet weather periods. Initial rehabilitation will focus on those portions of the sewer system that show evidence of direct inflow as well as delayed inflow and rain-induced rapid infiltration. Of the approximately 232 miles of sanitary sewer within the SCPS Basin, the vast majority of the older pipe in the municipal sanitary sewer systems includes approximately 100 miles of vitrified clay (VC) pipe and 100 miles of asbestos cement (AC) pipe. System rehabilitation is, by its nature, time consuming.

The proposed rehabilitation program includes a combination of cured in place pipe (CIPP) lining, spot repair, limited sewer pipe replacement, and chemical grouting. Specifically, CIPP is recommended for the older VC pipe sewers. Once the material cures, it replaces the structure of the existing pipe and offers a reported 50 year useful life. Contractors typically are able to install approximately 600-800 feet of CIPP per day. Lateral connections will be restored and sealed against infiltration where CIPP is utilized. CIPP technologies are specialized construction with a limited number of construction companies that perform this work. Therefore, competition with other projects will limit the amount of CIPP rehabilitation work that can reasonably be performed in a given year without causing inflated construction costs due to the limited supply of available contractors.

In-situ spot repairs such as cured in-place pipe sleeves and chemical grouting are more common techniques for rehabilitating structurally sound asbestos cement pipe. These proven techniques also take time to complete, where qualified contractors are able to install 2-3 pipe sleeves over the course of a day. Similarly, contractors are typically able to pressure test and chemically grout 100 pipe joints per day. Techniques that minimize the actual exposure of asbestos cement pipe to construction workers are preferred due to regulatory requirements associated with handling asbestos.

Limited areas of complete pipe replacement, primarily in the villages, are also anticipated. Since these sewers are typically located in public roads, work progress can be slow; generally 50 to 100 feet per day of excavation, due to conflicts with existing utilities traffic control, and the need to maintain sewer service during construction.

Seasonally, sanitary sewer rehabilitation and repair is most productive from March through November with construction usually shut down during the winter months.

### 1.4.5 Financial and Institutional Structure Considerations

The District has commissioned an organizational study to determine the most cost effective and efficient way to finance and implement the SSO Mitigation Plan. This is necessitated by the substantial cost of the SSO Mitigation Plan, the complexity of the problem, and the multi-jurisdictional ownership of the sewer assets that must be improved and remediated. The organizational study has made substantial progress in identifying advantageous funding sources and potential organizational structures.

The optimal financing strategy appears to be for the towns and villages to obtain “preferential” financing for the currently estimated $45.9 million for capital improvements within the town and village collection systems. This does not include the estimated $26.1 million within the Town of New Hartford collection system, as it does not appear that New Hartford will qualify for any of

the preferential financing programs identified to date since it exceeds the population and median household income thresholds for those programs. Rather, the Town of New Hartford would need to explore other sources of financing. Additionally, financing for the estimated $79 million for upgrades at the WPCP and the SCPS will also be required.

"Preferential" financing is defined as that offering below market interest rates, extra long maturities (more than 30 years), or grants. Such financing may be available to as many as eight of the nine towns and villages, through either the U.S. Department of Agriculture Rural Development Agency (Rural Development) or the NYS Environmental Facilities Corporation (EFC). The applicable Rural Development program offers all of the above benefits, but is only available in limited amounts to small, rural communities. EFC offers a "hardship" program with interest rates that may be as low as 0%, but the hardship program is only available to projects of less than $14 million and for which hardship (generally a projected sewer charge that exceeds a prescribed percentage of median household income for residents of the applicant) may be demonstrated.

The remainder of the financing for upgrades at the WPCP and the SCPS will be comprised of either public bonds or, preferably, bonds issued to EFC under the Clean Water State Revolving Fund (CWSRF). Either the County or a newly formed or newly empowered County Sewer Authority would be the borrower. The County has begun listing the various components of the SSO Mitigation Plan on the EFC Intended Use Plan and will shortly close the first $25.8 million CWSRF loan.

While obtaining preferential financing will substantially lower the annual payment burden on the sewer system users, there are a number of programmatic issues, the most significant of which are as follows:

1. The towns and villages must agree to cooperate in applying for and obtaining the preferential financing. While the County will assist in the process, prepare applications,

and submit information on behalf of the towns and villages, they must be the applicants and borrowers in order to qualify for the preferential financing.

2. It is unlikely that all of the $45.9 million will be available immediately. Contacts with both Rural Development and EFC indicate that there is more demand than supply for their preferential financing programs. While each of the towns and villages may ultimately be fully funded with preferential financing, it may take several years for this to happen.

The organizational study is also evaluating whether the remainder of the financing should be done by the County through the issuance of its own bonds, by a newly created sewer authority, or by one of the existing environmental authorities in the County with newly granted sewer powers. There are a number of pros and cons to each organizational structure that the County, towns, and villages are currently evaluating. If they judge an authority structure to be the most effective structure, they must propose legislation to the State Legislature, either creating a new authority or expanding the powers of one of the existing ones. This will require time. The County is currently moving ahead with the implementation of the parts of the SSO Mitigation Plan that it controls pending any decision to create an authority. It is also continuing to work with the towns and villages to obtain their full participation in the project.

The County has also commenced a formal Financial Capability Assessment (FCA) as prescribed by the U.S. Environmental Protection Agency (EPA). A separate FCA is being prepared for each of the involved towns and villages. The individual FCAs are being prepared reflecting:

1. The distinct financial burden that will fall on each of the municipalities because of the different capital expenditures required within each of the municipalities to upgrade their

collection systems. These costs are in addition to the shared capital costs of the interceptor sewers, the SCPS, and the WPCP.

2. The different economic profiles of the different municipalities.

## 1.5 MITIGATION APPROACH

The recommended SSO Mitigation Plan includes a progressive implementation approach in order to ensure that the plan is implementable from a technical, cost-effective, and environmentally sustainable perspective. The approach is summarized as follows:

### 1.5.1 Initial Wastewater Collection System Rehabilitation and Continued Investigations and Evaluations

Initial sanitary sewer rehabilitation projects identified in the SSO Mitigation Plan will be implemented beginning in late 2010 and continue through 2011. Concurrently, the remaining portions of the SCPS Basin will be investigated, including televising sewers and inspecting manholes. Based on the investigation findings, annual sanitary sewer rehabilitation projects will be recommended.

Flow metering will be conducted in strategic locations at appropriate intervals to monitor the effectiveness of the completed sanitary sewer rehabilitation projects. The resulting flow metering data will be input into the calibrated hydrologic/hydraulic model, and the model will be used to evaluate the reduction in the targeted I/I to date, and to predict the anticipated I/I reduction after the implementation of future rehabilitation projects. As more data is collected, the model will be updated to reflect changes in the physical condition of the sanitary sewer system, and to reflect significant changes in SCPS operations.

While the sanitary sewer system rehabilitation and investigation work is being performed, a facility condition assessment and comprehensive capacity evaluation of the WPCP will be

performed. This will expand upon the preliminary capacity evaluation that was completed in December 2007 in accordance with the Consent Order requirements. A facility condition assessment of the WPCP is currently underway and is expected to be completed by late summer 2010. In addition, a detailed hydraulic evaluation of the SCPS and force main will be performed as a compliment to the WPCP evaluation with regards to pump station/force main capacity expansion and the impact on WPCP operations.

The calibrated hydrologic/hydraulic model will be updated using the results of the SCPS and WPCP evaluations and the realized I/I reduction from sewer system rehabilitation projects. The model will then be used to re-assess at appropriated intervals the progress being made toward achieving the most technically-feasible, cost-effective, and environmentally sustainable solution to mitigate the SSO. The preferred mitigation scenario will be rehabilitation of a significant portion of the public sanitary sewer system and implementation of selective private property I/I reduction projects in combination with some level of upgrades/optimization/expansion of the SCPS, WPCP, and the pumping station force main.

Because private property sources of I/I are also considered to be contributors to the cause of the SSO, a program for private property inspections will be implemented during the initial years of this project. The Village of New Hartford has already indicated its intent to begin inspections in 2010. District has provided the village with sample public information documents (letters, door hangers, etc.) and will provide the village with the field computer and software necessary to conduct the inspections, with the collected information managed by the District sewer system management software.

Work will also include the continuation and formalization of CMOM programs for both the member communities and District that were under preliminary development during the preparation of the SSO Mitigation Plan.

### 1.5.2 Continued Wastewater Collection System Rehabilitation and SCPS and WPCP Upgrades

This work element will include continued sanitary sewer system rehabilitation and the actual upgrades to the SCPS and WPCP. The extent of the upgrades will be based on the evaluations and optimization work performed under the previous work element. The major I/I reduction projects that were previously initiated will continue, the scope of which will be confirmed based on the effectiveness of the prior results.

Upon completion of this work, the SCPS SSO will be effectively mitigated using a technically-feasible, cost-effective, and environmentally sustainable solution derived from the evaluations and optimization work. Long-term success will require ongoing CMOM programs of both the municipal and District systems. Also, depending upon the level of SSO mitigation that is attainable, other longer-term projects may be identified as well.

## 1.6 CMOM: PERPETUAL CARE

To ensure that the SCPS remains in compliance, CMOM programs will be implemented. This will ensure that "perpetual care", or proactive routine sewer system maintenance and rehabilitation, will continue thereafter. Other programs, such as private property inflow reductions and wastewater collection system flow metering, will also continue, as appropriate.

## 1.7 SUMMARY

The SSO Mitigation Plan Implementation Schedule is presented in Section 10 of this Plan. This schedule incorporates an aggressive program of investigation/evaluations, capital improvement projects, and overall sewer system management programs. In most instances, the investigation/evaluations and programs that were initiated in preparation of this SSO Mitigation Plan will continue during implementation. This will include continued wastewater collection

system investigations, CMOM, SCPS, and WPCP evaluations, supplemental flow metering, and coordination with the City LTCP program.

# 2.0 INTRODUCTION

A Consent Order (No. R620060823-67) was executed between the New York State Department of Environmental Conservation (NYSDEC) and Oneida County (County) on July 11, 2007. This Consent Order was issued in conjunction with the renewal of the County's State Pollutant Discharge Elimination System (SPDES) permit (NY-0025780) which regulates discharges from District facilities.

Specifically, the Consent Order focused on the mitigation of the wet weather discharge (sanitary sewer overflow) at the District's Sauquoit Creek Pumping Station (SCPS). Included in the Consent Order is the requirement for Oneida County to prepare and submit an approvable Plan of Study (hereinafter referred to as the Sauquoit Creek Pumping Station Sanitary Sewer Overflow Mitigation Plan, or SSO Mitigation Plan) to NYSDEC.

## 2.1 BACKGROUND AND PURPOSE

This SSO Mitigation Plan is prepared pursuant to the requirements of the Consent Order. Specifically, Schedule "A" – Item 11, of the Consent Order requires that Oneida County "*submit to the Department an approvable plan of study, an approvable plan and implementation schedule to bring Outfall 002 into compliance with the permit by October 31, 2014.*" The purpose of the SSO Mitigation Plan is to identify projects and programs with an implementation schedule that will mitigate the sanitary sewer overflow at the SCPS.

The Consent Order requires that the SSO Mitigation Plan be submitted to the NYSDEC on or before July 11, 2010.

## 2.2 CONSENT ORDER

In September 2005, the District began a dialogue with NYSDEC regarding the renewal of its SPDES permit. The permit included two (2) permitted outfalls. Outfall 001 is for the treated

effluent from the WPCP in Utica. Outfall 002 permitted the wet-weather discharge from the SCPS. It should be noted that Outfall 002 was historically considered a combined sewer overflow (CSO), not its current designation as an SSO.

### 2.2.1 SCPS Wet Weather Discharge

Subsequent to the formation of the District, and the construction of the District-owned facilities, member communities began to connect their municipal collection systems to the District's interceptor sewers. Soon after the connection of the upstream communities, hydraulic surcharge and overflow conditions were experienced during wet weather conditions in the low lying areas of the sanitary sewer system.

Between 1979 and 1982, in an effort to address the surcharge and overflow conditions, a Sanitary Sewer Evaluation Survey (SSES) was completed by the District for the SCPS drainage area by the District. The SSES identified and presented an extensive list of inflow sources in the Villages of Yorkville, New York Mills, and Whitesboro, as well as infiltration sources in the Villages of Yorkville and New York Mills and portions of the Town of Whitestown, that were determined to be cost-effective to remove. Independently, a separate SSES was completed by the Village of New Hartford in 1980 for their sanitary sewer system. This New Hartford SSES also identified a number of inflow and infiltration (I/I) sources that were determined to be cost-effective to remove. While substantial capital projects to remove I/I were undertaken, a number of I/I sources in the tributary municipal sewers were not removed due to budgetary constraints, and further compounded by limitations of available state and federal funding.

Despite these efforts to reduce I/I throughout the municipal sanitary sewer systems, wet weather flows continued to exceed the capacity of the SCPS. This resulted in SSOs from manholes within the lower portions of the Villages of Whitesboro and Yorkville, and sewage back ups into basements.

In an effort to mitigate the immediate public health threats resulting from multiple SSO locations within the collection systems, the County sought to remedy the condition through the construction of a single wet weather overflow at the SCPS. With both funding assistance and permitting provided by the NYSDEC and the federal government, a pumped wet weather bypass was constructed from the SCPS directly to the Mohawk River. As influent flows to the SCPS increase during a wet weather event, and the pump station is unable to pump the increased influent flows to the WPCP, a valve is opened thereby allowing excess flows to discharge to the river. While considered to be raw sewage, the pumped bypass flow were screened as it entered the wet well at the SCPS.

As noted above, the initial and subsequent SPDES permits recognized the bypass discharge at the SCPS as a CSO and had been included in the County's permit as Outfall 002 since its completed construction in 1985.

This CSO designation, however, was changed by NYSDEC in 2006. Pursuant to the renewal of the County's SPDES permit that year, Outfall 002 at the SCPS was reclassified from a CSO to a SSO, based on NYSDEC's position that all of the municipalities tributary to the SCPS have separate storm and sanitary systems. NYSDEC subsequently provided the document "Bulletin No. 20 – Descriptive Data of Sewerage and Sewage Treatment Systems in New York State", dated 1935 and prepared by the New York State Department of Health – Division of Sanitation which documents the Villages of New York Mills, New Hartford, Oriskany, Whitesboro, and Yorkville as operating separate sanitary sewer systems. The major implication of the reclassification of Outfall 002 is that SSOs are not permitted under the Clean Water Act, and therefore Outfall 002 must be brought into regulatory compliance.

The reclassification of Outfall 002 to a SSO led to the execution of the Consent Order in July 2007.

## 2.3 ONEIDA COUNTY SEWER DISTRICT

The Oneida County Department of WQ&WPC is responsible for administering the operations of the Oneida County Sewer District. The District was created through a referendum held on November 2, 1965 and construction of the interceptor sewer system, pumping stations, and treatment plant began in 1968. The District services a population of approximately 110,000 and covers an area of approximately 170 square miles.

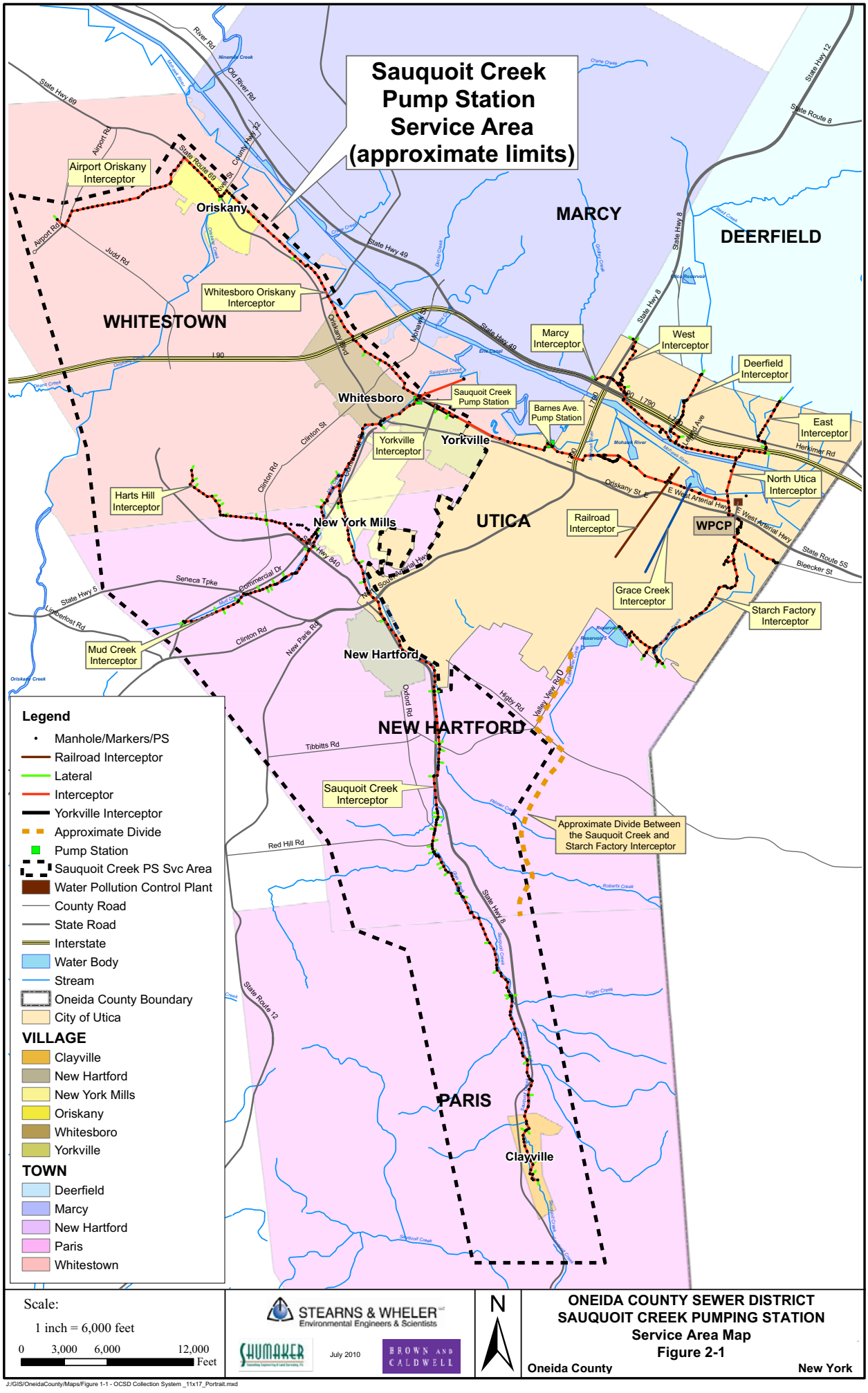
The District has 15 municipalities plus the County of Oneida. These include the City of Utica, the Villages of New York Mills, Yorkville, Whitesboro, Oriskany, New Hartford, Clayville, and Holland Patent; the Towns of Whitestown, New Hartford, Paris, Marcy, Deerfield, Frankfort, and Schuyler; and the Oneida County Business Park (and former Airport) whose sanitary sewers are owned directly by the County. Refer to Figure 2-1.

Oneida County, on behalf of the Oneida County Sewer District ("District"), holds the NYSDEC-issued SPDES permit. The member municipalities own and operate the collection systems within their own boundaries, and although not bound directly by the terms and conditions of the County's SPDES permit, their discharges to the District's system are regulated by the County's Sewer Use Ordinance.

### 2.3.1 District Collection System

The District owns and operates the WPCP, the SCPS, the Barnes Avenue Pumping Station, and 45 miles of interceptor sewers ranging in size from 12 inches to 66 inches in diameter connecting the member municipalities to the SCPS and/or the WPCP.

The District's sanitary sewers are constructed primarily of reinforced concrete pipe (RCP) with precast concrete manholes. The District's collection system is comprised of twelve interceptor sewers, five of which are tributary to the SCPS. These interceptors are: Sauquoit Creek Interceptor, Mud Creek Interceptor, Harts Hill Interceptor, Whitesboro-Oriskany-Airport


Sauquoit Creek Pump Station Service Area (approximate limits)
Airport Oriskany Interceptor
Oriskany
Whitesboro Oriskany Interceptor
WHITESTOWN
MARCY
DEERFIELD
Marcy Interceptor
West Interceptor
Deerfield Interceptor
East Interceptor
Whitesboro
Sauquoit Creek Pump Station
Barnes Ave. Pump Station
Yorkville Interceptor
Yorkville
Harts Hill Interceptor
New York Mills
UTICA
Railroad Interceptor
WPCP
North Utica Interceptor
Grace Creek Interceptor
Starch Factory Interceptor
Mud Creek Interceptor
New Hartford
NEW HARTFORD
Sauquoit Creek Interceptor
Approximate Divide Between the Sauquoit Creek and Starch Factory Interceptor
PARIS
Clayville
Legend
Manhole/Markers/PS
Railroad Interceptor
Lateral
Interceptor
Yorkville Interceptor
Approximate Divide
Pump Station
Sauquoit Creek PS Svc Area
Water Pollution Control Plant
County Road
State Road
Interstate
Water Body
Stream
Oneida County Boundary
City of Utica
VILLAGE
Clayville
New Hartford
New York Mills
Oriskany
Whitesboro
Yorkville
TOWN
Deerfield
Marcy
New Hartford
Paris
Whitestown
Scale:
1 inch = 6,000 feet
0 3,000 6,000 12,000 Feet
STEARNS & WHELER
Environmental Engineers & Scientists
SHUMAKER
July 2010
BROWN AND CALDWELL
N
ONEIDA COUNTY SEWER DISTRICT
SAUQUOIT CREEK PUMPING STATION
Service Area Map
Figure 2-1
Oneida County
New York
J:/GIS/OneidaCounty/Maps/Figure 1-1 - OCSD Collection System _11x17_Portrait.mxd

Interceptor, and Yorkville Interceptor. The remaining interceptor sewers are directly tributary to the WPCP, and include: Starch Factory Creek Interceptor, North Utica Interceptor, Mohawk River Interceptor, Marcy Interceptor, Deerfield East Interceptor, Deerfield West Interceptor, and Realls Creek Interceptor. All of the interceptor sewers were constructed between 1968 and 1979.

Some of the interceptor sewers, as their names imply, are constructed parallel to creeks or rivers in order to efficiently convey flow to the SCPS or WPCP. The majority of the manholes are located in off-road sewer easements and/or rights-of-way, as opposed to within or adjacent to roadways. Many of the more remote off-road easements/rights-of-ways require tree and overgrowth removal to facilitate improved accessibility for regular inspections as well as preventive and corrective manhole and pipeline maintenance. This issue is being addressed as part of the long-term maintenance recommendations of the SSO Mitigation Plan for both the District and municipal sewer systems.

### 2.3.2 Sauquoit Creek Pump Station

The SCPS basin includes nine of the 15 member municipalities, plus Oneida County: the Villages of New York Mills, Yorkville, Whitesboro, Oriskany, New Hartford, and Clayville; the Towns of Whitestown, New Hartford, and Paris. In addition, this sewer basin also includes the Oneida County Business Park (former airport), whose sewers are owned by Oneida County, but are located in the Town of Whitestown. The SCPS Basin area is illustrated in Figure 2-2.

The SCPS was designed and constructed with an estimated hydraulic capacity of approximately 15-million gallons/day (MGD). The SCPS was designed to accept flow from the tributary communities and then pump the wastewater via a 30-inch diameter force main to the WPCP, approximately 4.5 miles to the east. Plans for the SCPS force main included space within the force main right-of-way for a future, second force main to be constructed parallel to the first in the event that growth within the tributary service area required increased pumping capacity.

Since construction, there have been several upgrades to the SCPS. The original comminutors were replaced with both an automatic and a manual bar screen. The four pump motors were replaced with 250 hp high efficiency motors, and three of the pumps have been replaced. The entire pump station underwent a complete energy efficiency audit and upgrades which included new lighting, new variable frequency drives (VFDs) for all four pump motors, and new pump controls.

The 15 MGD hydraulic capacity of the SCPS is approximately 3 times the daily domestic water usage for the tributary area.

## 2.4 MUNICIPAL SANITARY SEWER COLLECTION SYSTEMS

The municipal collection systems are constructed from a variety of materials and have a wide range of ages. The village-owned systems tend to be the oldest systems within the SCPS sewer basin, whereas the town-owned systems are of generally newer construction. A discussion of general categories of sewer system age and composition follows.

### 2.4.1 Village-Owned Systems

The Villages of New Hartford, Whitesboro, Yorkville, Oriskany, and New York Mills all have similarly constructed sewer systems. Most of their sewers are constructed of VC pipe with 2- or 3-foot lengths. The villages also contain newer pipe materials, primarily polyvinyl chloride (PVC) or AC pipe. These materials are most likely a result of repairs made to the original system, or more recent expansions of the village sewer systems. Pipe sizes in the villages are typically smaller and generally range from 6 inches to 10 inches in diameter. Some sections of larger pipe, up to 18-inch diameter, exist in some areas and function as local trunk sewers.

Original joint sealing materials in the clay pipe are generally unknown, but historically has included cement mortar, asphalt, oakum, or in some cases, no sealing. Some newer VC pipe may have rubber gasket seals. VC pipe has been in use in the United States since about the mid

1800s, and as recently as the 1950s, and it is possible that the VC pipe present in areas of the villages are in excess of 100 years old. Sewer rehabilitation has occurred in some of the villages, primarily being spot repairs, joint sealing, and sewer replacement.

Manholes in the villages are primarily of brick construction. Some newer concrete block and precast concrete manholes exist. Many older brick manholes were constructed without benches, and flow through these structures is impeded by the loss of velocity and the resulting deposition of debris. Similar to collection system pipes, some of the manholes have been rehabilitated including patching and sealing, bench construction, and in some cases complete manhole replacement.

The Village of Clayville, although similar in age to the aforementioned villages, has a relatively newer sewer system. Prior to the construction of the sanitary sewer system in about 1975, the village relied on individual on-site systems for sewage disposal.

Clayville's sanitary sewer collection system is constructed almost exclusively of 8-inch diameter AC pipe with rubber gaskets and precast concrete manholes. At the time of construction of the sewer system, the village was nearly completely built out. As a result, no sewer system expansions have occurred beyond the original system.

### 2.4.2 Town-Owned Systems

The majority of the collection systems in the Towns of New Hartford, Paris, and Whitestown have been constructed since 1960. The construction of much of the original town sewer systems coincided with the construction of the District-owned interceptor sewers in the early to mid 1970s and consists primarily of AC pipe with precast concrete manholes.

Aside from the large construction contracts which built the majority of the town-owned systems, there were older, existing private sewer company-owned systems which have been taken over by

the towns. Those systems vary in age and construction materials, but are primarily VC and AC pipe, with brick, concrete block, and precast concrete manholes.

The balance of the town-owned systems consist of newer, mostly developer-constructed sewers that were taken over by the towns after construction. These newer, developer-constructed sewers primarily consist of PVC pipe of various sizes with precast concrete manholes.

All town-owned sewers generally range from 8- to 12-inches in diameter, with a limited amount of 18-inch diameter trunk sewer lines.

### 2.4.3 Oneida County Business Park

The Oneida County Business Park, located within the Town of Whitestown, formerly known as the Oneida County Airport Industrial Park, was initially developed around the former Oneida County Airport in 1960. The sanitary sewer collection system was similarly constructed to serve the airport and conveyed wastewater to on-site treatment lagoons.

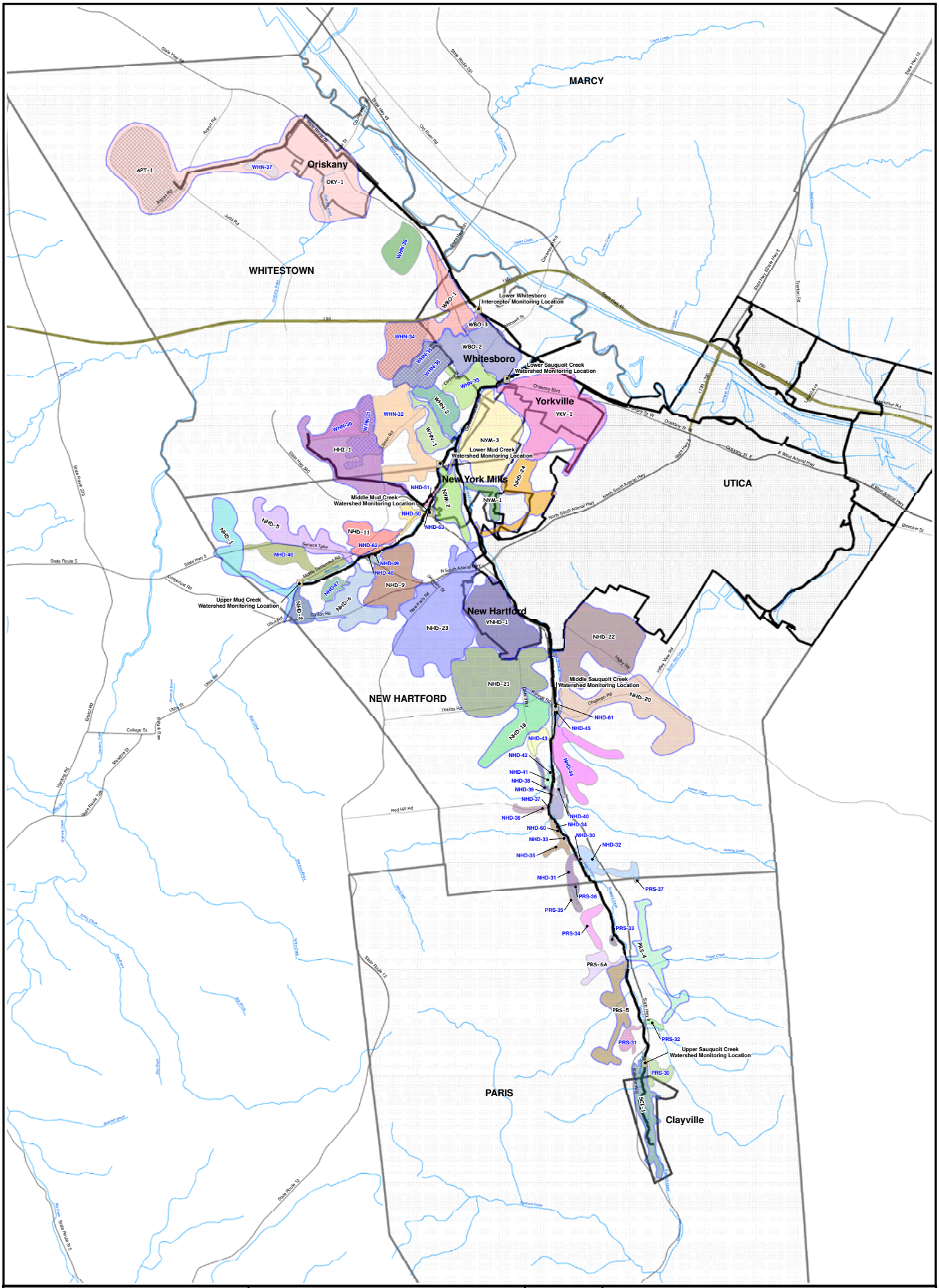
Expansion of the sewer system followed the growth of the Industrial Park in the 1970s, and the collection system was connected to the District Oriskany-Airport Interceptor in the 1970s. After the collection system was connected to the interceptor, the treatment lagoons were abandoned. They were remediated and closed in the late 1990s. The sanitary sewer collection system within the business park is owned by Oneida County (neither the District nor Whitestown), and operated and maintained by the Oneida County Department of Public Works.

Older sections of the Business Park, primarily the sewers serving the airport and adjacent facilities, were constructed of VC pipe. Newer sections were constructed of plastic truss pipe and precast concrete manholes. The Business Park contains approximately 11,000 linear feet of pipe ranging from 8 inches to 24 inches in diameter. A small, duplex pump station which collects wastewater from the lower elevations of the business park (Dry Road area) and conveys it to the gravity sewer system. Some limited sewer rehabilitation occurred in 1986 at the

business park as a result of the SSES completed by the County in 1982 and again in another rehabilitation project completed in 1995. Those projects addressed both structural defects and infiltration/inflow removal.

### 2.4.4 Sewer Basins

As presented in Section 2.3.2, the SCPS Basin includes 9 of the 15 member municipalities plus the Business Park sewers owned by Oneida County. The sewer collection system for each of these municipalities can be divided into unique sewer basins with common discharge points to the interceptor sewers. Each of these municipalities has one or more sewer basins that connect into the District interceptor sewers. For example, the Village of New York Mills has three connection points to the District interceptor sewers, and therefore, can be divided into three unique sewer basins. Figure 2-2 shows the sewer basins for each member municipality that in total make up the SCPS Basin.




Scale:

0 0.5 1 2 Miles

STEARNS & WHELER
Environmental Engineers & Scientists

SHUMAKER
Consulting Engineering & Land Surveying, P.C.

BROWN AND CALDWELL

N

**SAUQUOIT CREEK PUMPING STATION BASIN**
**MUNICIPAL SEWER BASINS**

**Figure 2-2**

Oneida County New York

# 3.0 WORK PERFORMED AS PART OF MITIGATION PLAN

Since July of 2007, the County has completed a significant amount of work towards complying with the conditions of the Consent Order. The County has also undertaken work not specifically required by the Consent Order, but necessary to mitigate the overflow at the SCPS. The completed work can be grouped into two general categories; Studies and Capital Projects.

## 3.1 INTERIM STUDIES AND INVESTIGATIONS REQUIRED BY CONSENT ORDER

The completion of a number of studies was required by the Consent Order. Those efforts are detailed below.

### 3.1.1 Flow Management Plan

Schedule "A" – Item 5 of the Consent Order requires the County to "*submit to the Department for review and comment an approvable Flow Management Plan that includes a schedule of implementation in accordance with the February 24, 2006 letter from Shayne Mitchell to Steven Devan."*

*A*ccording to NYSDEC, the goal of developing a Flow Management Plan is to identify and implement reductions in hydraulic loading to the publicly-owned treatment works (POTW) to stabilize annual average flows below the POTW design flow. The Flow Management Plan was submitted to NYSDEC on December 7, 2007.

### 3.1.2 Sewer Overflow Response Plan

Schedule "A" – Item 6 of the Consent Order requires Oneida County to "*submit to the Department for review and approval an Inter-municipal Sewer Overflow Response Plan to address and minimize the impacts of sanitary sewer overflows into basements and out of manholes."*

The Sewer Overflow Response Plan was prepared by the District and submitted to NYSDEC for review and comment on October 25, 2007. NYSDEC provided comments to the District on January 14, 2008, and the Plan was implemented on February 11, 2008.

Following plan implementation, it was distributed to all communities within the District to ensure that every report of a SSO is promptly responded to by the responsible sewer department personnel, or their designee for confirmation.

### 3.1.3 Inflow/Infiltration Offset Plan

Schedule "A" – Item 3 of the Consent Order requires the County to "*submit to the Department an approvable plan that ensures that any new connection(s) to the collection system of Outfall 002 is (are) offset by removal of infiltration and inflow in an amount five times (5) the flow the new connection(s) is (are) expected to contribute, until such time as discharges from Outfall 002 are brought into compliance with the permit."*

Additionally, Schedule "A" – Item 4 of the Consent Order requires that Oneida County "*Prior to hookup, or submission to the Department for approval of a new connection(s) and/or extension(s), whichever comes first, submit certification to the Department that any new connection(s) and/or extension(s) complies with #3 above. Allow no new connection(s) and/or extension(s) to the collection system of Outfall 002 unless in compliance with #3 above, until such time as discharges from Outfall 002 are brought into compliance with the permit."*

The primary objective of the Inflow/Infiltration Offset Plan (Offset Plan) is to enable the District to authorize new sewer service connection(s) and/or extension(s) to the sanitary sewer system tributary to Outfall 002, while requiring system improvements resulting in a net reduction of the SCPS through removal of flow to I/I in accordance with the Consent Order requirements.

The Offset Plan utilizes estimated sewage flow rates from proposed new development and established I/I flow contributions in evaluating the proposed flow additions and removals. The plan describes a sewer bank established to bank and monitor flow credits available for new development as calculated in accordance with the required offset ratio. The Offset Plan will remain in effect at least until such time as discharges from Outfall 002 are brought into compliance with the SPDES permit.

The Offset Plan was submitted to NYSDEC for review on January 4, 2008. NYSDEC provided comments to the County regarding the Offset Plan, which were subsequently incorporated into a revised Offset Plan that was submitted to NYSDEC on March 13, 2008. NYSDEC approved the revised Offset Plan on April 2, 2008.

The Offset Plan was updated on September 23, 2008 in order to incorporate Amendment Number 1, dealing with the redevelopment of existing sewer connections.

The District maintains an inventory of completed I/I offset projects, resulting credits, and disbursements. Documentation is available to NYSDEC Region 6 when requested.

### 3.1.4 Interim Remedial Measures

Schedule "A" – Item 8 of the Consent Order requires the County to "s*ubmit to the Department for review and approval an approvable engineering report evaluating implementation of "interim remedial measures" to reduce and/or treat discharges from the Sauquoit Creek Pump Station until such time as discharges from Outfall 002 are brought into compliance with the permit. The report should evaluate, but not be limited to, the use of overflow retention facilities*

*and chlorination/de-chlorination of the discharge, and the short-term and/or long-term removal of inflow and infiltration.*

The County prepared and submitted two reports in an effort to comply with this condition of the Consent Order. Potential interim bypass treatment strategies were evaluated in one report and interim I/I removal measures was addressed in the second. Those individual reports are discussed below.

#### 3.1.4.1 Evaluation of Temporary Treatment Alternatives for the Sauquoit Creek Pumping Station Bypass

On January 3, 2008, the County submitted an "Evaluation of Temporary Treatment Alternatives for the Sauquoit Creek Pumping Station Bypass" to NYSDEC to satisfy this requirement of the Consent Order. The report was approved by NYSDEC on May 12, 2008. The purposes of this report are threefold, and are listed below:

- Document the treatment technologies that are available for a temporary, satellite treatment system.
- Screen the technologies to determine which may be the most viable for the SCPS bypass.
- Develop conceptual plans of the most viable treatment alternatives and their associated cost estimates.

The report evaluated a number of treatment technologies, including: netting, screening, vortex separation, primary sedimentation, overflow retention basins, filters, ballasted sedimentation, biological treatment, and disinfection. The initial list of available technologies was narrowed to include screening, vortex separation, and disinfection. This combination was chosen based on its ability to surpass other technologies in the various evaluation criteria. Six alternate conceptual designs were advanced, using different variations of the chosen treatment technologies in two different locations.

The report concluded that all of the identified conceptual designs for temporary systems have relatively high estimated project costs ranging from $9.5 million for basic screening and disinfection to $19.1 million for off-site Vortex treatment with disinfection. Annual projected O & M costs range from $160,000 to $240,000. When considering the limited useful life prior to the ultimate build-out of the permanent mitigation measures, the economic feasibility of constructing such temporary facilities was determined to be marginal at best, thus not recommended. The report was accepted by NYSDEC on May 12, 2008.

### 3.1.4.2 Interim Infiltration/Inflow Reduction Plan

As an interim step in addressing the current I/I issues within the pumping station drainage area, a limited number of field inspections were conducted of the more significant I/I sources identified in the aforementioned SSES documents in order to assess the current status of those sources. In addition, the inspections were coordinated with the highway/sewer departments of the respective member communities to incorporate their knowledge of I/I sources present in their systems that have developed since those reports were prepared. A tabulation of potential I/I removal projects was then compiled.

This document establishes an Interim Infiltration/Inflow Reduction Plan (Reduction Plan) by which protocols and procedures will be followed to address quick impact and affordable I/I source removal projects in the sanitary sewer collection system tributary to the SCPS and ultimately to Outfall 002. The Reduction Plan is considered “interim” as it identifies initial projects that can be undertaken while the more comprehensive SSO Mitigation Plan of the sewer system is being developed.

The Reduction Plan was initially submitted to NYSDEC on January 4, 2008 for review and comment. NYSDEC comments were incorporated and the plan was approved in June 2008.

Several interim projects have been undertaken since 2008. The majority of projects, discussed in Section 3.3, are the result of significant defects found during the various engineering inspections

and investigations conducted by the District and its consulting engineers in support of development of the SSO Mitigation Plan.

### 3.1.5 Legal Authority

Schedule "A" – Item 9 of the Consent Order requires the County to "s*ubmit proposed inter-municipal and/or other enforceable legal instruments, necessary to ensure the County's authority to implement the offset program required…for Department review."*

The County initially determined that it had the necessary authority referred to in the Consent Order, through its existing Sewer Use Rules and Regulations (Ordinance). Upon review of the Ordinance, however, it was determined that some revisions were necessary. As a result, the Ordinance was updated, and subsequently adopted by the County with an effective date of August 14, 2008.

## 3.2 OTHER INITIATIVES, STUDIES, AND INVESTIGATIONS

In addition to items specifically required by the Consent Order, the County has undertaken a number of initiatives in support of the SSO mitigation planning efforts. Those efforts, both completed and ongoing are detailed here.

### 3.2.1 Steering Committee

One of the first actions taken by the County was the formation of a community-based Steering Committee. The decision to establish a facilitated and collaborative group process was especially appropriate given the financial magnitude of this project, coupled with the legal implications of operating under a NYSDEC Consent Order. High priority goals were to ensure full transparency, accountability, and a process for affected parties to consider alternatives and build consensus on the best options for addressing the problem.

A collaborative process along with public information and education are increasingly desired - and in some cases, required - as public infrastructure projects are funded by federal monies or financed through municipal efforts paid for by local taxes and/or surcharges. In some cases, such as MS4 stormwater compliance and CSO LTCP programs, public involvement and education programs are, in fact, a mandated program element.

The Sauquoit Creek Pumping Station SSO Mitigation Project Steering Committee is comprised of the chief elected officials or their designees from each of the 12 member municipalities that form the Sewer District, and three additional communities served by intermunicipal agreements. The committee also includes one community representative from each municipality and two rotating at-large seats appointed by the County Executive. The criteria used to select committee members included sufficient subject matter knowledge, interest, and technical expertise to contribute to the project oversight process.

The Steering Committee's responsibilities include strategic oversight, maintaining project focus and direction, and ensuring that the project meets defined goals, requirements, and deliverables in a timely and cost-effective manner. One especially critical role of Steering Committee members includes serving as community liaisons to share current project information with their municipal boards, residents, and businesses throughout the project area.

The Steering Committee has convened monthly since its formation in November 2007 and in 2009 established an additional working group, a subcommittee of the main body, which also meets monthly to conduct in-depth analysis of key issues.

Community delegates and elected officials who serve on the committee have actively participated in making recommendations on project issues that directly affect residents and property owners. This has included formal resolutions related to funding and operational issues. The process has been collaborative while recognizing municipalities' individual responsibility for repairing their own sewer system problems that are contributing to the overflow situation.

The Steering Committee has addressed such issues as:

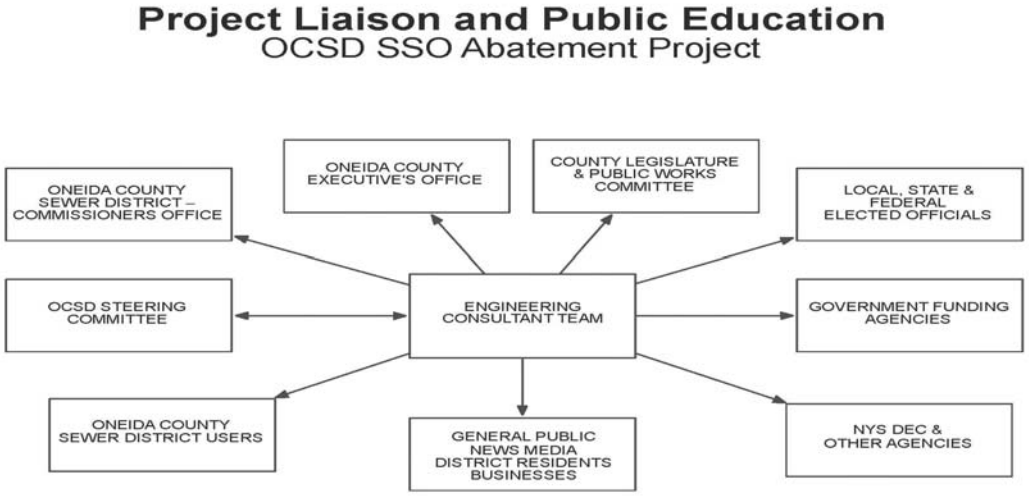
- I/I Offset Plan implementation.
- Establishment of flow credit bank and fee structure.
- Private property I/I removal and inspection.
- Sewer use ordinance revisions.
- Financing project costs.
- Institutional structure alternatives.
- Capacity, management, operation and maintenance (CMOM).
- Project funding.

In summary, the County supported the SSO Mitigation Plan with a customized, facilitated and collaborative group process that has helped ensure community involvement. Proven, interest-based methodologies were employed to promote a continuing dialogue and flow of information among the County and District leadership, the consultant team, the municipalities, and district citizens.

Over the last two-plus years, the Steering Committee process and supporting communication activities significantly enhanced public involvement, participation, and decision-making. Steering Committee meetings were open to the public and resulted in routinely published information about committee actions and decisions. Consequently, the County has addressed Consent Order compliance in an extremely open and examinable manner.

### 3.2.2 Public Education and Outreach

While Steering Committee members serve as important liaisons to the communities, organized educational outreach and key stakeholder communication also have been instrumental components of this project. This process has been organized to include all essential collaborators and partners, as illustrated in the chart below.




**Public Education/Information**

Public education and information initiatives since the beginning of the project in 2007 include:

- Information conveyance to the affected communities, general public and municipalities regarding the scope and magnitude of the project and its legal, technical and fiscal challenges.
  - Identifying and coordinating speaking engagements.
  - Working with the media on facts and interpretations to gain informational coverage about the issue.
  - Conducting community and stakeholder meetings.
  - Developing press releases and feature articles on the issue and its ramifications
  - Developing annual and interim reports on the project as an information and update piece.
  - Interfacing with Association of Towns and Counties regarding coordination of sewer use ordinances.

Communication vehicles and forums in public education have included:

- A web site devoted to the abatement project for Oneida County, with an intranet component for Steering Committee members.
- Development and publication of consumer-friendly reports including project overviews, FAQs, repair and cost data, and project funding information.
- Articles for municipality newsletters to homeowners regarding sources of inflow/infiltration.
- A public program featuring a PBS-produced documentary about water and wastewater infrastructure and its importance to individual communities and larger society.
- Webcasts and workshops to familiarize committee members and local sewer district operators on issues including private property inflow and infiltration removal, and sewer system capacity management, operations, and maintenance.
- Smoke testing educational materials and notification mailers to the specific neighborhoods being tested.
- A survey on institutional structure to gather community input.
- News media articles explaining the Consent Order and challenges facing the community, which are also posted to the project web site, www.ocgov.net

**Project Communications & Outreach**

Through the consultant team, the County also conducted outreach activities and provided essential linkages to help ensure a streamlined and continuous flow of accurate information to multiple audiences. Activities since 2007 have included:

- Project status briefings for local, state, and federal elected officials, state agency representatives and media.
- Informational presentations to local organizations including The Genesis Group, Mohawk Valley Home Builders Association, The League of Women Voters, and the Mohawk Valley Chamber of Commerce Government Affairs Committee. Media coverage of these events have been posted on the county's website, www.ocgov.net
- Establishment of a central "clearinghouse" process for resident and committee member inquiries. This included fielding project inquiries and responding to requests for information from member municipalities, state, and federal representatives, and NYS DEC.
- Coordination of project funding requests: meetings and presentations to elected officials and members of state and federal agencies who could help advocate for funding.
- Formulation of data and other information in support of grant funding applications.
- Status reports on funding application progress.

- Analysis of and consultation on critical issues affecting municipalities and other stakeholders.

### 3.2.3 GPS/GIS Mapping

To assist the County with the operation and maintenance of the wastewater collection system, it is useful to know the geography and history of the assets in the area. Since 1999, the District has worked closely with the Herkimer-Oneida Counties Comprehensive Planning Program (HOCCPP) to develop a spatial inventory of the manholes and sewers in the SCPS Basin using GPS and GIS technologies. HOCCPP has been using high accuracy GPS devices to accurately collect geographical location information on every manhole in the basin. In addition to the spatial location of these assets, other details are also collected and all of this information is mapped in GIS software. An example of information collected for each manhole is:

**Manhole Information**

| Manhole Attribute | Description |
|---|---|
| MA_ABVSURF | The maximum distance (in inches) above ' + or below ' - ' the surrounding grade. A positive number indicates that the manhole is on sloped ground (cover is higher than the grade of the adjacent area). A negative number indicates that the cover is lower than the grade of the adjacent area. |
| MA_ADR_BDG | The address of the inventory record is made up of a building number and a street name. With the street name validation turned on, the street names entered in the record will be restricted to those available in the current Street Name List. |
| MA_ADR_DIR | Street name. Press F9 to access the street name list. |
| MA_ADR_STR | Street name. |
| MA_ADR_TY | Street type (i.e., ST, AVE, TER, PL, etc.). |
| MA_BASIN | This is a unique alphanumeric identifier for the flow basin that the pump station is located in that the program automatically assigns. This data is from the flow basin table. |
| MA_MHID | Computer generated number for the manhole record. This is a unique number. |
| MA_DEPTH | The distance (in feet and tenth of feet) from the center of the trough to the center of the frame opening. If populated, this field will be used to calculate Active Elevation in the Elevation tab of the Pipe Inventory module. |
| MA_GPS | When marked, this signifies that the asset was located with a Global |

| Manhole Attribute | Description |
|---|---|
| | Positioning System. |
| MA_IN | Number of pipes flowing into the structure. |
| MA_OUT | Number of pipes where flow exits the manhole. |
| MA_RIM_ELE | Rim elevation of the structure. If populated, this field will be used to calculate Active Elevation in the Elevation tab of the Pipe Inventory module. |
| MA_STRC_CD | The code value for the type of structure of the manhole. |
| MA_STRC_TY | The text value for the type of structure of the manhole. |
| MA_SURF_CD | The code value for the type of surface surrounding the manhole - i.e., dirt, grass, concrete, asphalt. This will help determine cost of manhole repairs. |
| MA_SURF_TY | The text value for the type of surface surrounding the manhole - i.e., dirt, grass, concrete, asphalt. This will help determine cost of manhole repairs. |
| MA_MANHOLE | Unique manhole or structure identifier. Can be as long as 20 characters but we recommend a shorter length. Can use dashes or other characters as separators if desired. |
| MA_X | The placement of the pump station with respect to the X-axis, or the east or west coordinate. |
| MA_Y | The placement of the pump station with respect to the Y-axis, or the north or south coordinate. |
| MA_LINR_CD | The type of lining in the manhole. |
| MA_LINR_TY | The type of lining in the manhole. |
| MA_ATT_X | The placement of the manhole number from the manhole with respect to the X-axis, or the east or west coordinate. |
| MA_ATT_Y | The placement of the manhole number from the manhole with respect to the Y-axis or the north or south coordinate. |
| MA_LOCATIO | The description of where the manhole being observed is located (for example, the intersection of 5th and Vine Streets). This field is optional if the 'Address' and 'Lot Location' fields are completed. |
| MA_WO_COMM | Short comment. |
| MA_OWN_CD | Owner refers to the person or group who owns the structure. |
| MA_OWN_TY | Owner refers to the person or group who owns the structure. |

**Pipe Information**

| Pipe Attribute | Description |
|---|---|
| NT_BASIN | The basin where the upstream manhole is located. The program automatically imports this data from the flow basin table. |
| NT_DSMAN | A unique alphanumeric manhole identification number for the downstream manhole for the pipe segment inspected. |
| NT_FLOW_CD | The type of flow that typically travels through the pipe. |
| NT_FLOW_TY | The type of flow that typically travels through the pipe. |
| NT_IDM | IDM refers to inch-diameter-mile. The program calculates this field by |

| Pipe Attribute | Description |
|---|---|
| | multiplying the pipe diameter (in inches) by pipe length (in feet), and dividing that number by 5,280 feet. |
| NT_LENGTH | The length of the pipe from the center of the upstream manhole to the center of the downstream manhole. This can be calculated automatically by pressing <F5> if the upstream station and downstream station fields are populated. |
| NT_MAT_CD | The type of material from which the pipe is constructed. |
| NT_MAT_TY | The type of material from which the pipe is constructed. |
| NT_USID | US MH Link to MH Inv. |
| NT_DSID | DS MH Link to MH Inv. |
| NT_OWN_CD | Owner refers to the person or group who owns the segment. |
| NT_OWN_TY | The person or group who owns the segment. |
| NT_SURF_CD | The type of surface on the ground above the pipe. |
| NT_SURF_TY | The type of surface on the ground above the pipe. |
| NT_USMAN | The pipe's unique upstream manhole number. This is a required field (as is the downstream manhole number). The combination of the upstream and downstream manholes (the end points of a pipe) must exist in the Pipe Inventory table. The address information to the side of each manhole number is displayed only and comes from information stored in the manhole inventory module. |
| NT_ID | Database generated Record No. |
| NT_WO_COMM | Short comment. |

This GIS data is a key component to understanding the inventory of the assets within the SCPS Basin and establishes core information required for proper management of these assets.

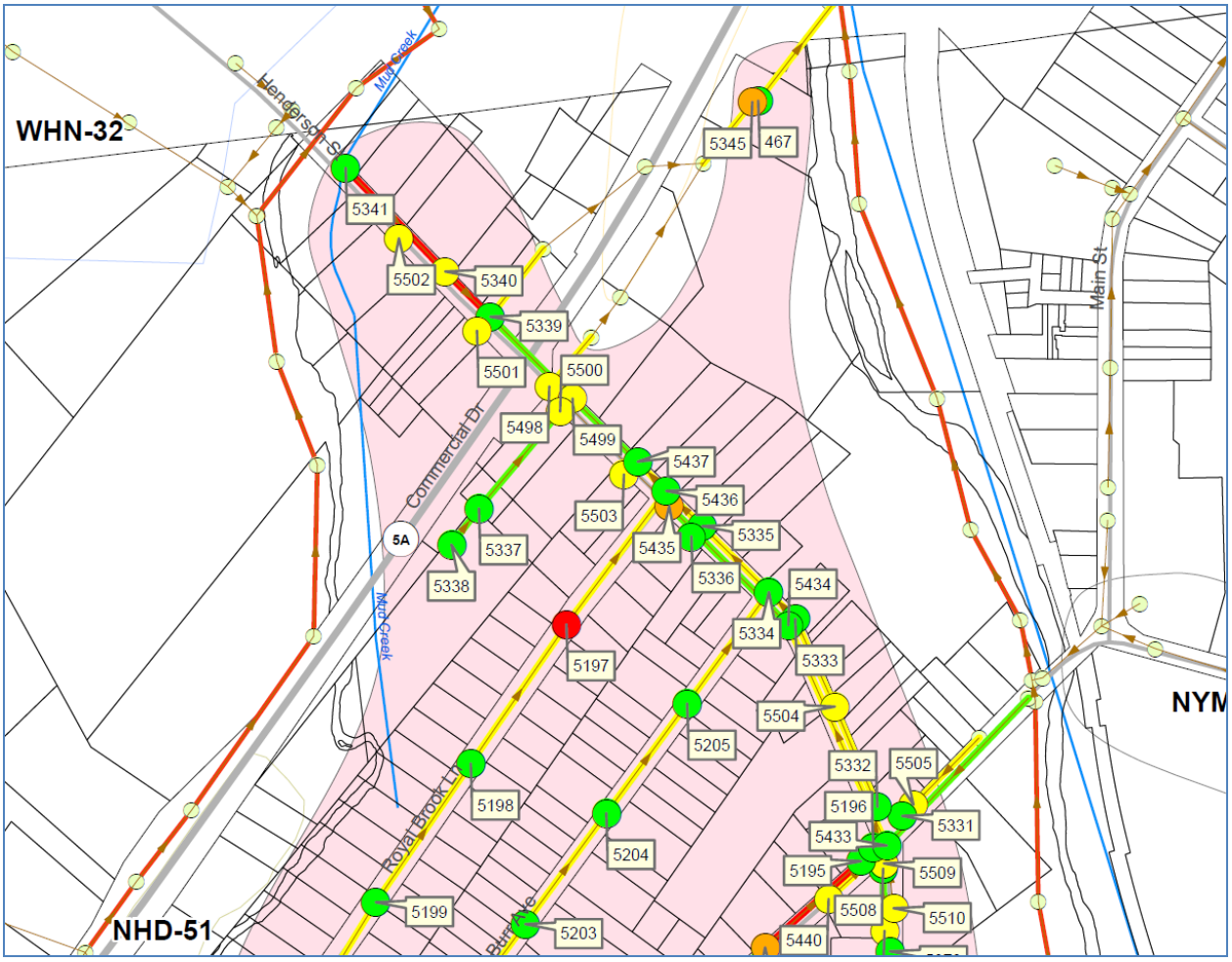
The following summarizes the benefits of the GIS, how this information is currently being used on this project, and potential future use of this data:

- The GIS data organizes the collection system information into one seamless environment, using industry standard software (ESRI), and makes it available to all parties involved with this project.
- The GIS data provides the future ability to perform and track daily work more efficiently (e.g., updating record plans, or keeping records of maintenance activities, overflows, and customer complaints).
- The GIS provides a geographical reference to the asset data.
- The GIS allows for better analyzing problems and identify solutions (e.g., mapping and identifying areas of significant I/I in terms of location, pipe size, material, or construction date).

- The GIS allows data to be presented that fosters better communication and cooperation among community leaders and the public.
- Historically, communities that have successfully implemented GIS have seen dramatic improvements in the way in which data are accessed, maintained, and analyzed. These improvements are allowing municipal departments such as the Oneida County Sewer District to make more informed decisions, collect information more efficiently, and better execute daily responsibilities.
- Properly collected GIS data can be used to construct accurate hydraulic models of the sewer system which can be used to identify, diagnose, and solve hydraulic bottlenecks.

The SCPS Basin GIS/GPS mapping efforts has produced information on about 6,300 manholes and 6,300 pipes. This data is continuously utilized by the project team in their analysis of asset condition assessments.

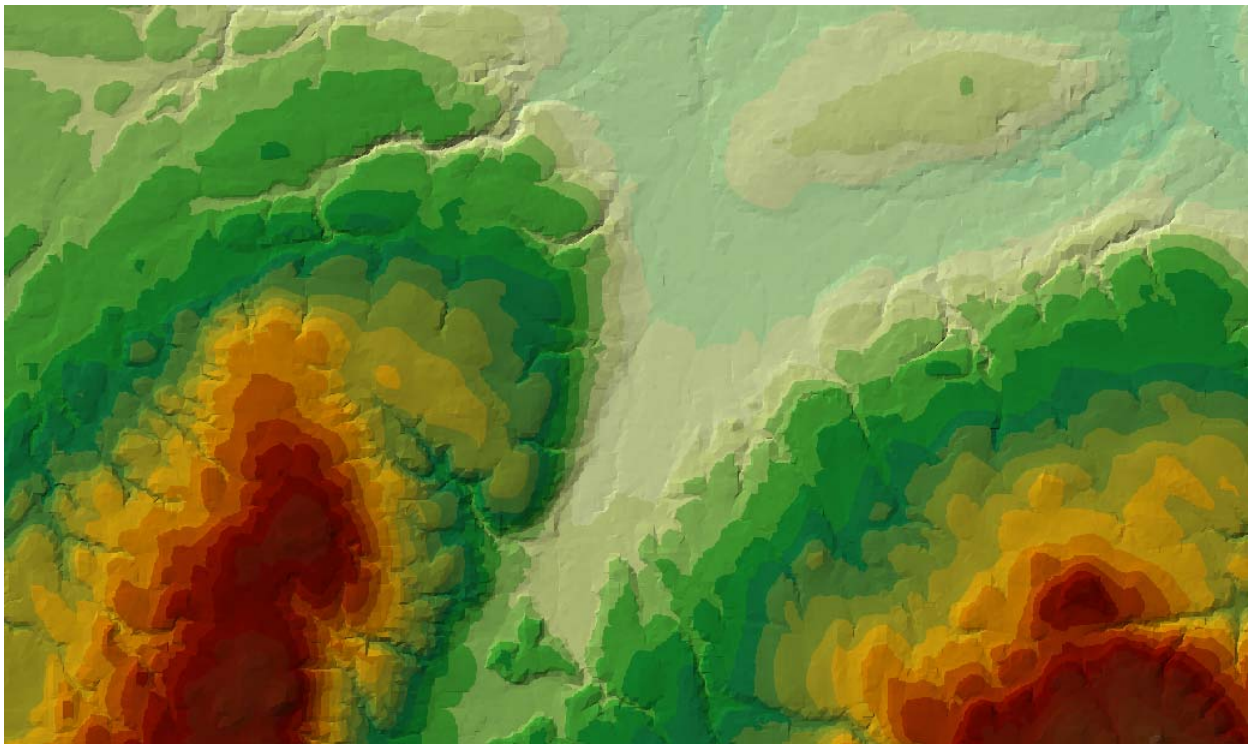
Below displays a sample of the GIS mapping that has been completed as part of these efforts.




### 3.2.4 LIDAR Mapping

In cooperation with NYS DEC and NYS DOT, in the Spring of 2008, the entire area of study was mapped using LiDAR (Light Detection and Ranging) technology to produce a dataset of terrain elevation, with high vertical accuracy (< 0.185m error). This data was then tested for accuracy according to National Standard for Spatial Data Accuracy (NSSDA) standards, per NYSDOT and NYSDEC specifications. The horizontal spacing of the elevation points varies according to terrain, but ranges from 0.2m to 2m, generally.

Once the data went through accuracy verification testing, it was used for this study to determine the rim elevation of the manholes in the system. This information was then used for hydraulic modeling, as the rim elevation and the distance to the pipe invert in the manholes (collected in the manhole inspection effort), determined the pipe slopes that were input into the model.



Example of Lidar data collected in Oneida County, showing terrain elevation features

## 3.3 INTERIM CAPITAL PROJECTS AND REHABILITATION WORK

Since the execution of the Consent Order in July of 2007, the District and some member municipalities have undertaken measures to find and remove I/I from their sewer systems. Some of these projects were performed as a reaction to conditions within the sewers and some were proactive measures. The following is a list of those projects.

### 3.3.1 Gilbert Road Sewer Replacement-Town of Whitestown

In September of 2008, plans and specifications were prepared for the replacement of approximately 400 linear feet of failing sanitary sewer. The existing sewer was constructed of VC pipe, and bituminized fiber pipe (Orangeburg pipe) of varying diameters. It was failing in several locations, and was plagued by root intrusion, infiltration, and partial collapse. The smaller diameter sections prevented the proper cleaning and did not allow the passage of a camera for inspection.

The Town of Whitestown performed the sewer replacement using their own forces in the fall of 2008. Two new precast concrete manholes and approximately 400 linear feet of 8-inch PVC sewer was installed. Additionally, all house laterals were reconnected using PVC pipe and fittings.

This sewer project replaced a section of sanitary sewer which was structurally unsound and subject to frequent blockages and excessive infiltration. The visible amount of infiltration removed as a result of this replacement project is unknown, as preconstruction flow measurements were not taken by the town. However, assuming a conservative 0.25 gal/min per pipe joint (3-foot pipe lengths), approximately 48,000 gpd of I/I may have been removed upon completion of this project.

### 3.3.2 New York State Route 5A Sewer Replacement-Town of New Hartford

In August of 2007, the Town of New Hartford began planning for the replacement of about 600 linear feet of deteriorated sanitary sewer on NYS Route 5A (Commercial Drive). The existing sewer was partially collapsed in two locations and was experiencing infiltration. Observations with a zoom camera ("pole camera") indicated at least one pipe joint or circumferential crack leaking at an estimated 5 gallons per minute. Additionally, there were three significant upstream pipe deteriorations identified during field investigations.

The sewer was located within the right-of-way of Commercial Drive, at depths ranging from 6- to 16-feet deep. Due to the depth, proximity to the traveled way of Commercial Drive, and location under curbed islands, alternate alignments were explored. After several design changes, it was decided to replace about half of the sewer in a slightly different location and rehabilitate the remainder.

The construction took place in November and December of 2009. Two new precast concrete manholes and approximately 320 linear feet of new PVC sanitary sewer were installed. Additionally, 4 cured in place repair sleeves were installed in the existing section of sewer to remain.

Each repair eliminated leaks on the order of 5 gallons per minute. Upon completion, this project eliminated an estimated 5 gallons per minute, or 7,200 gallons per day of I/I.

### 3.3.3 Interim Manhole Rehabilitation Contract

In the fall of 2009, the District awarded an Interim Manhole Rehabilitation contract. This contract included 13 unit price items intended to address a wide variety of I/I causing defects found in sanitary sewer manholes and was open to all member municipalities. The contract will remain open for one year so municipalities may take advantage of the unit prices through multiple budget cycles.

As of May, 2010, four municipalities have utilized the interim manhole rehabilitation contract. The Town of New Hartford rehabilitated 104 manholes and the Town of Whitestown rehabilitated 15 manholes. These were manholes which were identified during manhole inspections conducted in 2008 as having I/I. On average, each rehabilitated manhole could remove an estimated 1,500 gallons per day of infiltration (approximately 1 gpm). This figure is based on the previously approved values established in the I/I Offset Plan. The Village of New York Mills also utilized the manhole rehabilitation contract to rehabilitate six (6) manholes, as

part of a larger sewer rehabilitation project. The Town of Paris repaired four (4) manholes using this Contract.

Additionally, the District rehabilitated three structurally deteriorated manholes located in the floodplain of the Mohawk River. These defects were also discovered during the manhole inspections of 2008. During times of high river levels, one of the three manholes was observed with active inflow of an estimated 500,000 gallons per day (or 350 gpm). In addition to the structural repair of the manholes, easement clearing (brush and tree removal) was required to gain access to the manholes.

During the first round of manhole rehabilitation completed through May of 2010, an estimated 700,000 gallons per day of I/I may have been removed from peak flows at the SCPS.

### 3.3.4 Village of New York Mills Sewer Rehabilitation

During the fall of 2009, the Village of New York Mills completed a sewer rehabilitation project on approximately 5,000 linear feet of sanitary sewer in various locations throughout the Village. The project included cleaning and televising, pipe joint testing and sealing, protruding tap removal, root removal and treatment, and spot repairs. This work was identified in the 2008 Interim Infiltration/Inflow Reduction Plan. Flow measurements for I/I reduction were not taken by the Village, but are estimated to be on the order of 146,000 gal/day per the 2008 Interim I/I Reduction Plan. Also included was the rehabilitation of 6 manholes, under the manhole rehabilitation contract described above. Lateral inspection and rehabilitation was not included in the project. Visible I/I was removed as a result of this project.

### 3.3.5 Town of Paris Sewer Cleaning and Televising

The Town of Paris utilized the County's sewer cleaning and televising contract, further discussed in Section 4.4 of this report, to clean and televise approximately 6,300 linear feet of sanitary sewer. Although no I/I was found or removed as a result of this project, it represents a continued

effort to clean and televise the entire sanitary sewer system, and establish baseline conditions in advance of a Capacity Management Operation and Maintenance (CMOM) program.

### 3.3.6 Village of Yorkville Sewer Replacement

In July of 2009, The Village of Yorkville replaced approximately 70 linear feet of 18-inch diameter VC pipe sanitary sewer which was collapsed, discovered during the televising contract of 2009. This section of sewer is just upstream from one of the two main connections to the Yorkville Interceptor. Although not able to be televised completely, the collapsed section was submerged in ground water and observed to be contributing infiltration to the sewer system. The pipe was replaced from manhole to manhole with new PVC pipe, thereby eliminating any infiltration present in the collapsed section. Upon completion, an estimated 8,400 gallons per day of I/I was removed, assuming 3-foot pipe joints and a conservative 0.25 gal/min I/I flow rate per pipe joint.

### 3.3.7 Village of New Hartford Sewer Replacement

In December of 2008, the Village of New Hartford replaced approximately 220 linear feet of sanitary sewer adjacent to the post office on Campion Road. This section was immediately upstream from the Village's connection to the Sauquoit Creek Interceptor sewer, was constructed of VC pipe, and contained numerous misaligned pipe joints and infiltration sources. The old pipe was removed and replaced with new 18-inch diameter PVC pipe. Immediately prior to construction, flow in the pipe schedule for replacement was measured with a flow meter and averaged approximately 80 gallons per minute. It is assumed that this flow was completely attributed to infiltration, as all sanitary sewage flow was bypass pumped around the replacement location. As a result of this repair, an estimated 115,000 gallons per day of infiltration was removed from the sanitary sewer system.

### 3.3.8 Estimated Flow Reductions from Interim Projects

The following table summarizes the estimated I/I removed through locally funded efforts during this interim period:

**Table 3-1**
**I/I Reduction**

| Location | MH (gpd) | Pipe (gpd) | Total (gpd) |
|---|---|---|---|
| District | 500,000 | --- | 500,000 |
| Paris | 6,000 | --- | 6,000 |
| New Hartford (T) | 156,000 | 7,200 | 184,000 |
| New Hartford (V) | --- | 115,000 | 115,000 |
| New York Mills (V) | 9,000 | 146,000 | 155,000 |
| Whitestown (T) | 22,500 | 48,000 | 70,500 |
| Yorkville (V) | --- | 8,400 | 8,400 |
| **TOTALS** | 693,500 | 324,600 | 1,018,100 |

# 4.0 SEWER SYSTEM INVESTIGATIONS

Immediately following the signing of the Consent Order, the County and the consultant team began to formulate a work plan for data collection required for the mitigation of the overflow at the SCPS SSO. The work plan included investigation techniques utilized in sewer system evaluation surveys (SSES) programs completed elsewhere. Those investigation methods included flow metering, manhole inspections, smoke testing, sewer line CCTV inspection, limited dye testing, and limited private property inflow source inspections. These methods are discussed in detail below.

## 4.1 FLOW METERING

Continuous flow monitoring is one of the most critically important steps taken to both identify and quantify sources of I/I. As such, it was one of the first major activities performed during the development of the SSO Mitigation Plan. The primary goal of this Flow Monitoring Study was to assess flow characteristics within the sewer sheds tributary to the SCPS Basin and to identify those sewer sheds that contribute excessive rates of I/I. The SCPS has an approximate capacity of 15 MGD which is three times the daily domestic water consumption within the tributary service area (see Section 2.3.2). For purposes of the SSO Mitigation Plan, “excessive” I/I denotes rates within a sewer shed that exceed three times the corresponding rate of water consumption.

Ultimately, the collected wastewater flow data will be used to identify and characterize specific I/I source locations, quantify the I/I attributable to each member community, and develop administrative programs and construction projects to mitigate excessive I/I.

Continuous flow monitoring was performed throughout the District from March through September 2008 to meet the needs of the SSO Mitigation Plan. Additionally, continuous flow metering was also completed in northern and eastern areas of the District as well as the City of Utica’s Grace Creek and Railroad Interceptor CSOs in order to gain a better understanding of the

hydraulic water balance of the entire sanitary sewer collection system and treatment system. Figure 5.1 identifies the sewer basins throughout the SCPS Basin and also shows the locations of the continuous flow metering locations and other monitoring locations.

The flow monitoring program resulted in excellent data for characterizing and quantifying I/I sources. This time period includes a significant snow melt period in March, several average and significant rainfall events (including a 2-year frequency rainfall event), and also included some dry weather periods. This time period provided a variety of weather patterns where wastewater flow responses could be measured. In addition to having a variety of weather conditions, the quality of the data was very good. Most of the flow meters provided accurate data during 99 percent of the time while they were installed.

Criteria utilized in the selection of continuous flow metering locations were site accessibility, quantity of flow through the manhole, and tributary area upstream from the location. Metering of wastewater flow from the Villages of New Hartford, Whitesboro, New York Mills, and Yorkville was accomplished by installing flow meters at the point where these communities make connections to the District interceptors. In contrast, the Town of Paris and the Village of Clayville have several connections to the Sauquoit Creek Interceptor. The Town of Paris and the Village of Clayville were metered at a point where the Sauquoit Creek Interceptor leaves each community. The larger Towns of New Hartford and Whitestown have numerous connections to multiple interceptors. The approach for continuous flow metering in these communities was a combination of measuring at the most significant connection points and also at locations along the interceptors to capture a group of smaller connection points. The flow from the Village of Oriskany was indirectly measured by measuring above and below the Village's connection point within the Whitesboro-Oriskany-Airport Interceptor.

Sewer connections from municipalities which are tributary to the District interceptors that were not continuously flow metered were inspected at night when sanitary sewage flow was expected to be at a minimum. Estimates of late night wastewater flow rate, assumed to be mostly

infiltration under these conditions, and observations of wastewater strength were made during these inspections.

In addition to the installed flow meters and rainfall gauges, river stage and groundwater monitoring points were also set up throughout the SCPS Basin in order to obtain background data relative to the influence of precipitation and groundwater on pipe flow. Monitoring locations were chosen to represent the upper, middle, and lower reaches of the SCPS Basin. River stage level (i.e., water surface elevation) in Sauquoit Creek and Mud Creek was measured from relative datum established on bridges that cross the creeks. Groundwater levels in the interceptor sewers were measured from pizometers installed within District manholes.

## 4.2 MANHOLE INSPECTIONS

It is widely recognized that manholes can be significant sources of I/I. Additionally, it is generally easier to remove I/I from manholes than from other sources (sewer main, laterals, etc.). In June of 2008, physical inspections of District and municipal-owned sewer infrastructure, including selected pipe segments and manholes were initiated. The purpose of the inspections was twofold. First, invert and pipe size measurements were used to construct a hydraulic model of the complete sewer system. The hydraulic model will be a valuable tool in evaluating the probable effectiveness of proposed repair and rehabilitation projects. The second purpose of the manhole inspection program was to identify significant sources of I/I which needs to be removed from the sanitary sewer system.

Utilizing established inspection standards and procedures based on the National Association of Sewer Service Companies (NASSCO) Manhole Assessment and Certification Program (MACP) format, the County and their consultants developed custom software which was used in the field to produce a comprehensive, GIS derived database of inspection records. This software was loaded on tablet computers for use in the field for direct data entry at the time of inspection.

The manhole inspection program was started in early June, 2008. The consultant team members met for several days together to establish standard procedures to be used during the inspection process. After several days together, the inspection teams split into two separate teams of two members each. The two teams started with inspections of the District-owned interceptor sewers tributary to the SCPS including the Sauquoit Creek Interceptor, the Mud Creek Interceptor, the Harts Hill Interceptor, the Whitesboro-Oriskany-Airport Interceptor, and the Yorkville Interceptor. Every accessible manhole in the District interceptor sewers in the SCPS Basin was inspected. The inspection effort for the interceptor sewers continued through mid July 2008.

The inspection program was then focused on the municipal systems in the towns and villages tributary to the above mentioned interceptors. It was established early on in the development of the scope of work that all municipal manholes would not be inspected. Inspections would concentrate on the manholes which were part of the main trunk sewers, and upstream of the flow metering locations. Inspection locations were expanded as needed when excessive flow and/or I/I conditions were noted.

To date, portions of the Villages of Whitesboro, Yorkville, New York Mills, and New Hartford and the Towns of Whitestown and New Hartford have been inspected, with an inspection coverage rate of between 30% and 85%. The Town of Paris and the Villages of Oriskany and Clayville were not inspected under this phase due to a lack of GIS mapping at the time of inspections. All remaining manholes not yet inspected will be inspected under future phases.

## 4.3 SMOKE TESTING

Certain defects that cannot be fully explained by aboveground observations can be identified during smoke testing. These include, but are not limited to, the following:

- Ground leaks in ditches and swales.
- Smoke emissions from storm sewers and drains, indicating illegal connections.
- Smoke emissions through sidewalk or street seams and cracks.
- Connected downspouts from buildings.

Smoke testing involves blowing smoke into the sewer and observing and documenting where smoke exits. Depending on the specific circumstances, the exiting smoke can indicate the location of a broken pipe, cleanout, area drain, step drain, manhole, catch basin, or where roof or foundation drains might be connected to the sewer system, indicating where Rainfall Derived I/I (RDI/I) might enter the sanitary sewer system. Typically, smoke testing indicates inflow sources, but, in some circumstances, infiltration sources can be located.

During the testing, smoke will typically appear from roof drains, catch basins, or yard drains connected to the sewer system. The smoke may also appear from cracks in the pavement above the sewer, from landscaping above private connecting sewers, and around homes with foundation drains connected to the sewer.

Under some conditions, smoke may also appear in basements through unused floor drains, disconnected or faulty plumbing fixtures, and other direct openings to connecting sewers. The smoke, manufactured for this purpose, leaves no residuals or stains and has no effects on plant and animal life. The smoke has a distinctive, but inoffensive odor. Visibility and odor last only a few minutes where there is adequate ventilation. This smoke is nontoxic, harmless, and creates no fire hazard.

Based on analysis of the flow metering data, smoke testing was performed in selected areas of the sewer system believed to generate significant quantities of inflow. Inflow connections were documented using maps and photographs. The tributary drainage area(s) to each inflow source and estimated hydraulic impact of inflow sources was estimated.

Experienced contractors that performed the smoke testing for the project were selected through a competitive bid process. All findings were documented via a detailed inspection form that included sketches, digital pictures, video, and a digital database of observations and results was created. Public notices were developed for distribution prior to any smoke testing, and local fire

and police authorities were notified before testing. The inspection team was available at test sites to answer questions during the smoke testing.

To date, approximately 521,000 lineal feet (99 miles) of sewers have been smoke tested, representing approximately 45% of the SCPS basin. Smoke testing was conducted in the Towns of Paris, New Hartford, and Whitestown, and the Villages of Clayville, New York Mills, Yorkville, Whitesboro, New Hartford, and Oriskany. The above listed villages received smoke testing throughout 100% of their sewers, whereas the towns only received smoke testing in certain sewer basins, which were selected by analyzing the previous collected flow monitoring data.

Smoke testing proved more successful in the villages. As a result of the smoke testing, numerous catch basins were observed emitting smoke during the testing. Follow up inspections and dye testing indicates that a small percentage of the smoking catch basins are directly connected (i.e., piped connection) to the sanitary sewer system. Dye testing, in combination with televising indicate that most of the catch basins are most likely indirectly connected through deteriorated storm and sanitary sewer pipes. This most commonly occurs where a storm sewer crosses over top of the sanitary sewer. In such situations, dye testing yielded an almost immediate reaction, indicating a nearly direct connection through the soil structure between the storm and sanitary sewer systems.

In addition to the hydraulically connected catch basins discovered in the villages, smoke testing also revealed broken cleanouts, connected downspouts and driveway drains, and other surface defects.

## 4.4 CLOSED CIRCUIT TELEVISION INSPECTION

Based on the data collected during the flow monitoring, a recommendation of areas for further investigation using closed circuit television (CCTV) inspection was made. An inspection of the physical condition of sewer lines and structural integrity of the sewer lines and joints in those

areas was conducted. Video inspection was limited to areas where it would have the greatest impact. After reviewing the continuous flow monitoring data, portions of the system were identified for video inspection for identifying infiltration sources.

CCTV inspection will identify potential sources of infiltration, either groundwater or rainfall induced, within the collection system through video documentation within the selected sanitary sewers. Possible locations for groundwater infiltration are:

- Collapsed and missing pipe.
- Cracks and holes in pipes.
- Defective or misaligned pipe joints.
- Defective or misaligned manholes.
- Defective or misaligned house laterals connections.

During CCTV inspection, a CCTV camera is physically pulled through the sewer. The camera has the capability to pan and tilt 360 degrees to investigate various defects and/or sources of RDI/I in a pipe. To a more limited extent, the manhole interiors can also be video inspected. In addition, other non- RDI/I defects (physical) can also be determined. Examples of these include, but are not limited to, the following:

- Excessive debris in the pipe.
- Grease deposits.
- Pipe sags.
- Locations where other utilities have penetrated or otherwise damaged the pipe.
- Interior corrosion.
- Roots.

A NASSCO certified inspector conducted the CCTV inspections, and all defects were documented in accordance with NASSCO Pipeline Assessment and Certification Program (PACP) Standards. All digital videos were taken with a color pan and tilt camera, recorded to DVD, and indexed for review. Single pass, as needed, light cleaning was conducted in some areas ahead of CCTV inspection.

Approximately 231,000 lineal feet (44 miles) of sewers were CCTV inspected, representing approximately 20% of the SCPS Basin. Sewers were televised in the Towns of Paris, New Hartford, and Whitestown and in the Villages of New Hartford, Whitesboro, New York Mills, Yorkville, and Oriskany. Additionally, two short sections of the District's Sauquoit Creek Interceptor were televised in the upper reaches of the basin.

All of the CCTV data was imported into the District's data management software where it can be queried and sorted to extract defects used for the formulation of rehabilitation projects. Common defects discovered in the sewer systems include infiltration through cracks, defective joints, and faulty lateral connections. Other common defects discovered included roots, mineral deposits and encrustations, protruding taps, sags, and excessive debris in the sewers.

## 4.5 PRIVATE INFLOW SOURCE INSPECTIONS

During the course of the physical investigation tasks listed above, it was determined that a private property inflow source inspection pilot study was necessary. Private inflow generally includes roof leaders, sump pumps, area drains, etc. The pilot study would be conducted in a small sewer shed suspected of I/I influence, and procedures would be established to inspect the interior and exterior of homes to identify sources of potential private inflow.

The pilot study was undertaken to determine the most effective methods of contacting residents and conducting the inspections. The effort required to conduct the inspections, including notification, coordination, training of staff, and data management were also evaluated. Lessons learned from this pilot study will be applied to future, large scale private property inflow source inspections.

Based on the results of the flow monitoring, a small sewer shed basin was selected based on its relatively small size, observed response to rainfall, and its setting, which is typical of villages within the SCPS Basin. The selected sewer shed was in the Village of Whitesboro. Approximately 55 properties are present within the pilot study area and are composed primarily

of one- and two-family residential homes, with one large 33-unit apartment building and one used car lot and repair shop.

The pilot study was conducted in accordance with procedures established by the consultant team, and generally followed procedures which have been successfully applied to similar studies elsewhere. The process included coordination with the Village, notifying the property owners of the inspection program, hosting a public informational meeting, and performing the inspections within the study area.

The interior and exterior of each accessible property within the study area was inspected. All inspection data was collected electronically and stored in a database format. Photographs were taken of the exterior and interior of the buildings, focusing on roof leaders and interior plumbing. The photographs were linked to the associated database record. Dimensions of the roof and basement area were taken, and details regarding owner information, flooding history, building construction, occupancy, plumbing components, and number and discharge location of downspouts were recorded.

Building inspections revealed that five houses had downspouts connected to the sanitary sewer. Only one home had a sump pump connected to the sanitary sewer. Although not confirmed by interior inspections, it was assumed that the large apartment building also had its interior roof drains connected to the sanitary sewer.

An analysis of the procedures used for the pilot study will help in the formation of procedures for future private property studies throughout the SCPS Basin. Factors such as public reaction, access to homes, notification procedures, and inspection procedures were evaluated.

## 4.6 SEWER SYSTEM MANAGEMENT SOFTWARE

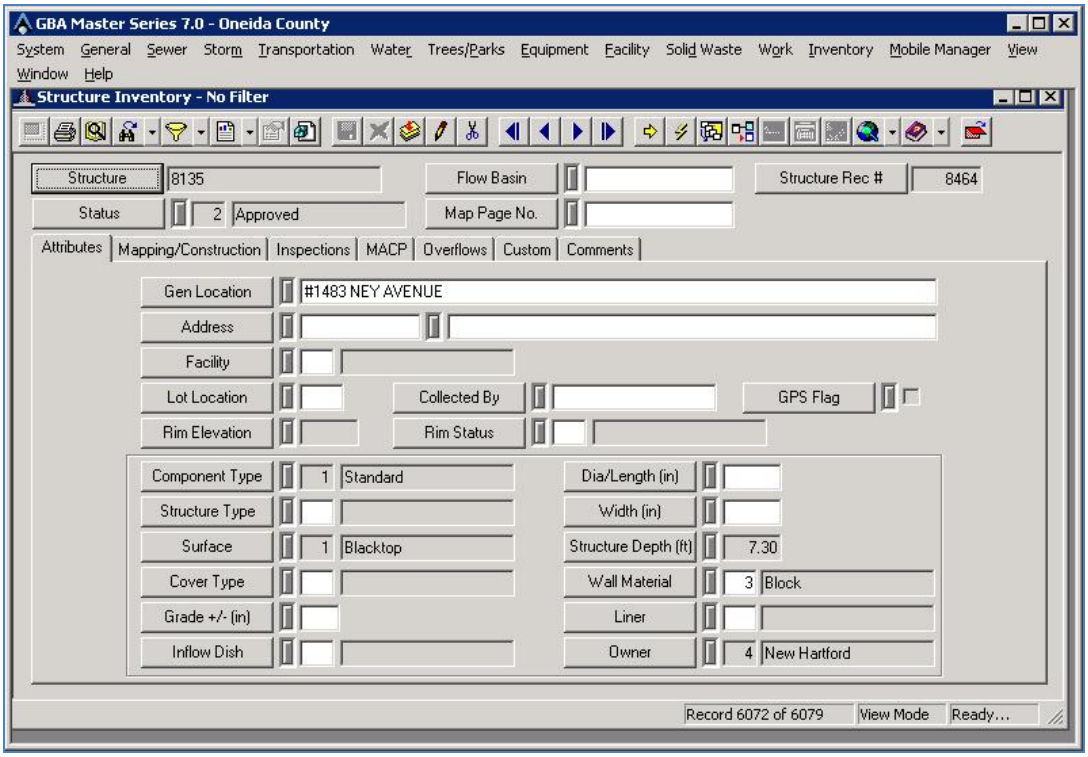
To assist with the data management involved with this project, and to assist the District and municipalities in moving forward with the operation and maintenance of the collection system, a

sewer system management software product was purchased and implemented. GBA Master Series, a software tool specifically designed to organize, manage, and centralize sewer system data. The software stores inventory and inspection data, then utilizes that data to help determine appropriate rehabilitation, and in the future can be used to prioritize and track maintenance of the system. GBA Master Series also integrates with the County's GIS system and provides the project team with the following abilities:

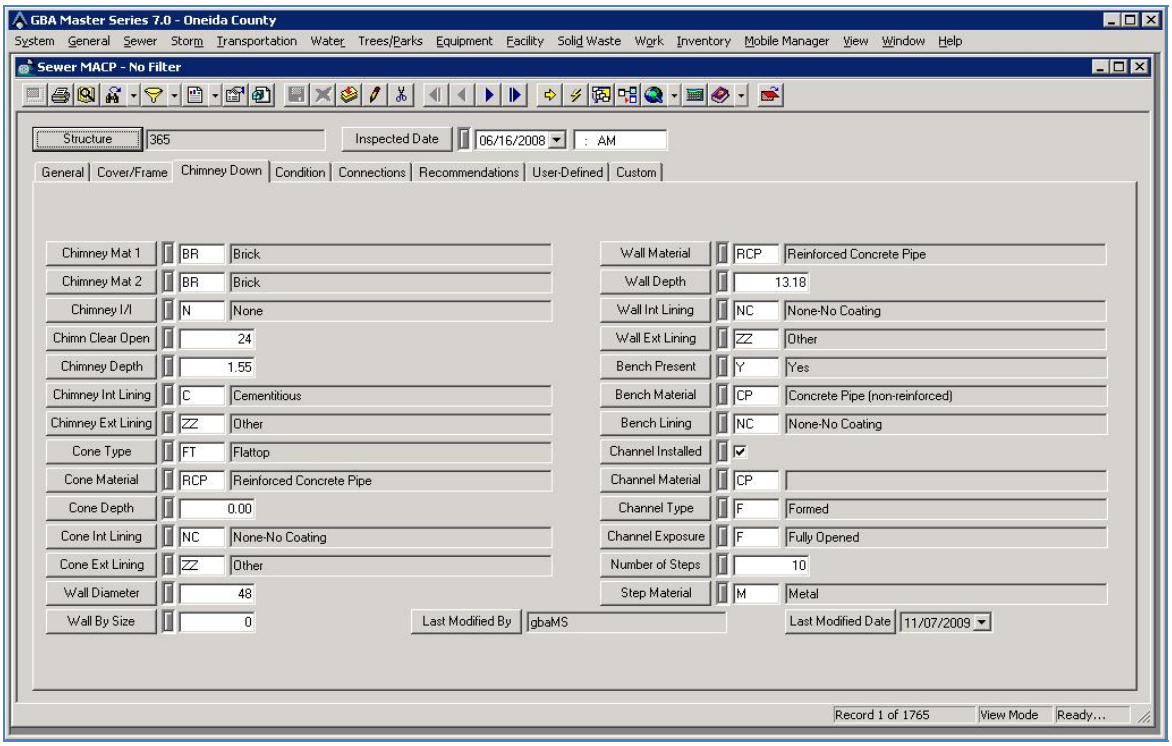
- Keep a synchronized inventory of manholes and sewers with the GIS tools used by HOCCPP.
- Allows inventoried assets to be viewed, queried, and reported on based upon any attribute information.
- Inspection applications track details and results of various types of condition assessments on the assets in the basin, as well as other information being used to determine appropriate and prioritize rehabilitations. The inspection modules consist of a structured database that archives field activity results to evaluate the structural condition, inflow/infiltration (I/I) leakage potential, and system maintenance requirements. Some modules currently being populated with condition assessment data include:
    - Smoke Testing and Smoke Testing Observations.
    - CCTV Inspections and specific observations (using PACP standards).
    - Manhole condition assessments using MAXP standards.
    - Private property inspections.

The following are some screens that display the system and data being populated as part of this project.

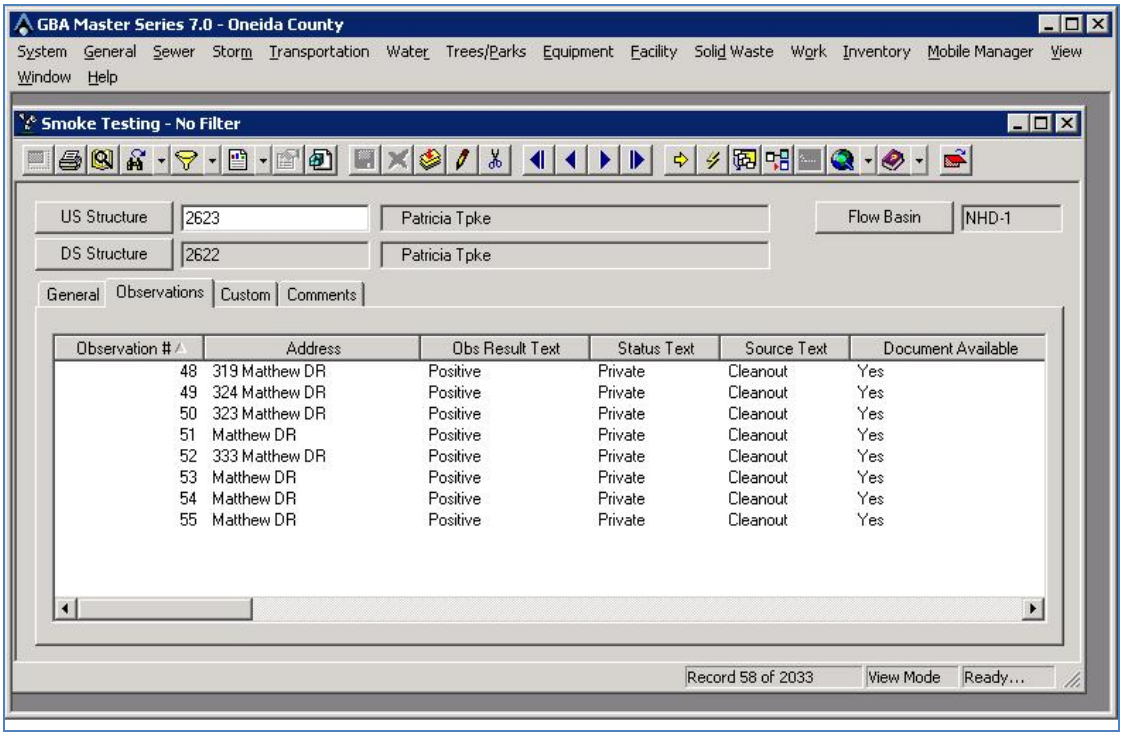
## Manhole Record



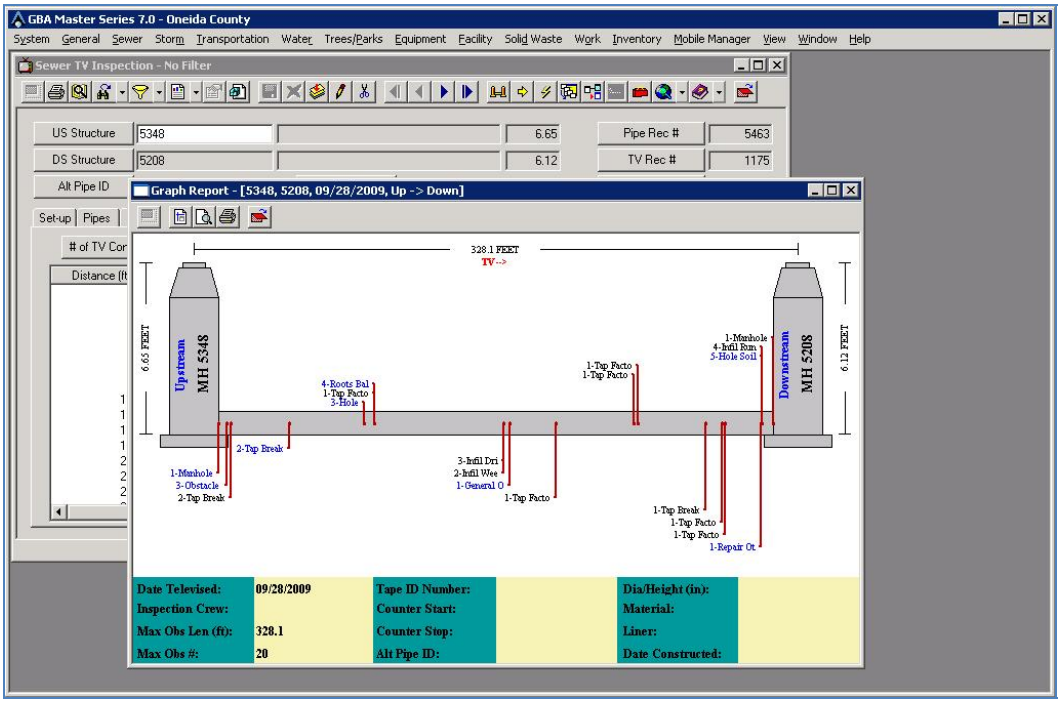

## MACP Manhole Inspection Record



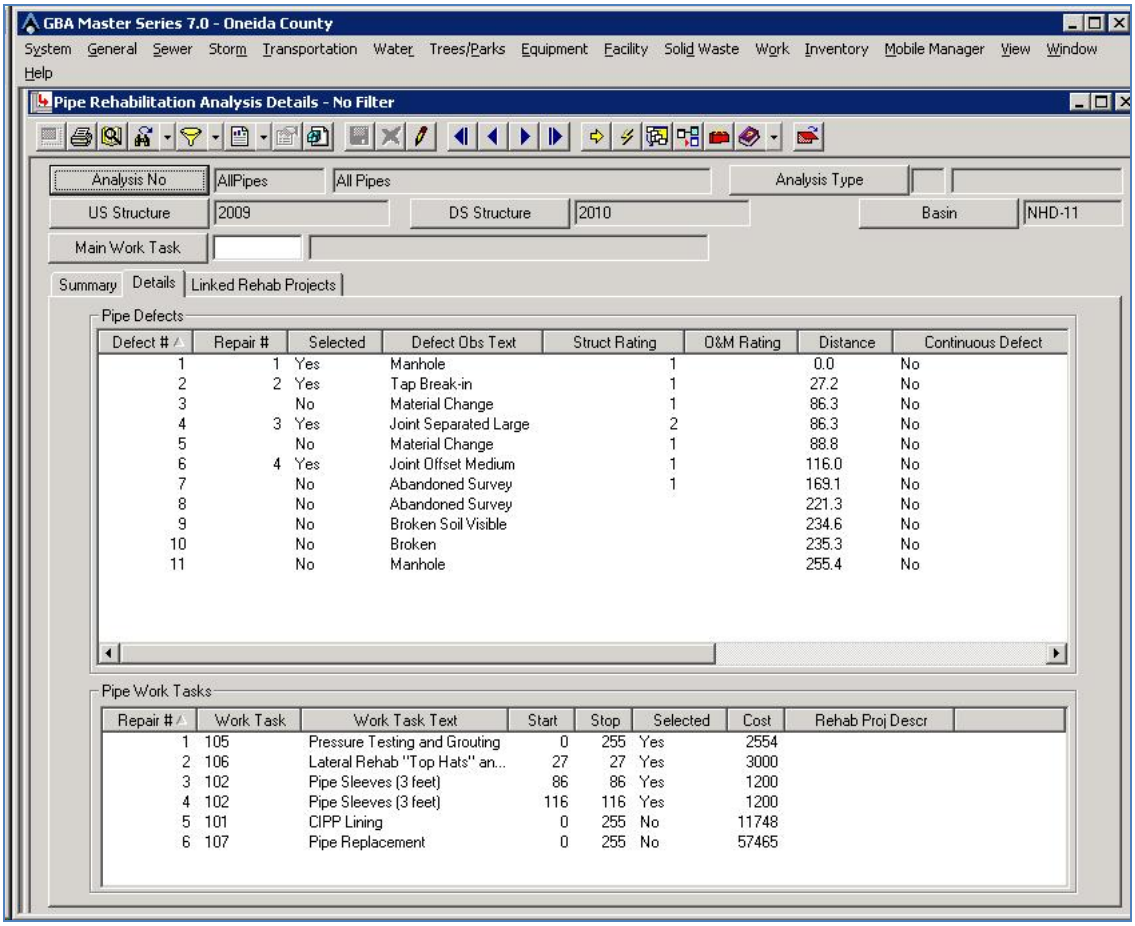
## Smoke Testing Record




## CCTV Data



## Sewer Rehabilitation Evaluation




In addition to tracking the inventory of assets and the details on inspections (which provides valuable information on the condition of the assets), the GBA software has capabilities to track on-going maintenance and details on other activities of these assets, such as rehabilitations, and preventive maintenance. Work can be scheduled, planned, executed, and recorded all within the GBA software providing valuable information for the ongoing management of these assets.

# 5.0 SEWER SYSTEM INVESTIGATION FINDINGS

## 5.1 INTRODUCTION

This section presents a summary of the findings from the sewer system investigations for each member municipality in the SCPS Basin. Detailed reports were generated for each major investigation effort. These reports are referenced as followed:

Flow Metering:
*Sauquoit Creek Pumping Station Basin Flow Metering Report, 2009.*

Manhole Inspection:
*Sauquoit Creek Pumping Station Basin Manhole Inspection Report, 2010.*

Smoke Testing:
*Sauquoit Creek Pumping Station Basin Smoke Testing Report, 2010.*

CCTV:
*Sauquoit Creek Pumping Station Basin CCTV Report, 2010.*

## 5.2 FLOW METERING SUMMARY OF FINDINGS

Continuous flow metering was performed throughout the SCPS Basin from March through September 2008. The wastewater flow from the largest sewer basins was continuous flow metered using area-velocity type meters that were installed during the period from March to September. Additionally, the wastewater flow from the smaller sewer basins was manually measured during "nighttime" inspections periodically during the spring season of 2008. These sewer basins are illustrated in Figure 2-1. Wastewater flow data was collected that represented the spring and summer seasons and wet and dry weather conditions.

The wastewater flow data was analyzed for the dry and wet weather conditions. The purpose of the dry day analysis was to calculate base infiltration and determine which sewer basins exhibited excessive base infiltration. Excessive base infiltration was defined as flows greater than 4,000 gallons per day per inch-diameter-mile of pipe. The purpose of the wet weather analysis was to establish the relative quantity of rain-derived infiltration versus inflow. Such a comparison was used to infer the possible types of defects present in a municipality's sewer basin.

The results of the dry and wet weather flow data analyses were used to prioritize the municipalities' sewer basins with respect to the sewer basin's relative contribution of infiltration and inflow. Once the flow metering and analyses were complete, the sewer basins with the greatest relative contribution of I/I were targeted for smoke testing and/or television inspections. Due to time constraints, it was not possible to inspect all manholes and sewer pipes, and therefore, the manholes and sewer pipes in the sewer basin with greatest relative rates of I/I were given the highest priority for inspections.

The flow metering data was also used to calibrate a hydrologic/hydraulic model as presented in Section 6 of this SSO Mitigation Plan.

### 5.2.1 Dry Weather Analysis

The dry weather analysis was performed on larger basins where continuous flow metering data was collected. This dry day analysis identified 18 large sewer basins that exhibited excessive base infiltration. The sewer basins that exhibited excessive base infiltration are presented in Table 5-1 and are shown on Figure 5-1.

| Table 5-1<br>Large Sewer Basins [1] with Excessive [2] Base Infiltration | | | |
|---|---|---|---|
| Sewer Basin | Infiltration Rate [3] | Sewer Basin | Infiltration Rate [3] |
| APT-1 | 5,000 | NYM-1 | 21,900 |
| HHI-1/ WHN-33 | 5,900 | NYM-2 | 17,900 |
| NHD-1 | 15,700 | NYM-3 | 5,800 |
| NHD-2 | 49,500 | VOKY | 6,000 |
| NHD-5 | 6,800 | PRS-5 | 4,100 |
| NHD-6 | 5,000 | PRS-6 | 4,100 |
| NHD-9 | 11,500 | VNHD-1 | 4,400 |
| NHD-11 | 7,900 | WBO-1 | 4,500 |
| NHD-20 | 6,100 | WHN-1 | 7,900 |
| NHD-21 | 7,200 | YKV-1 | 4,800 |

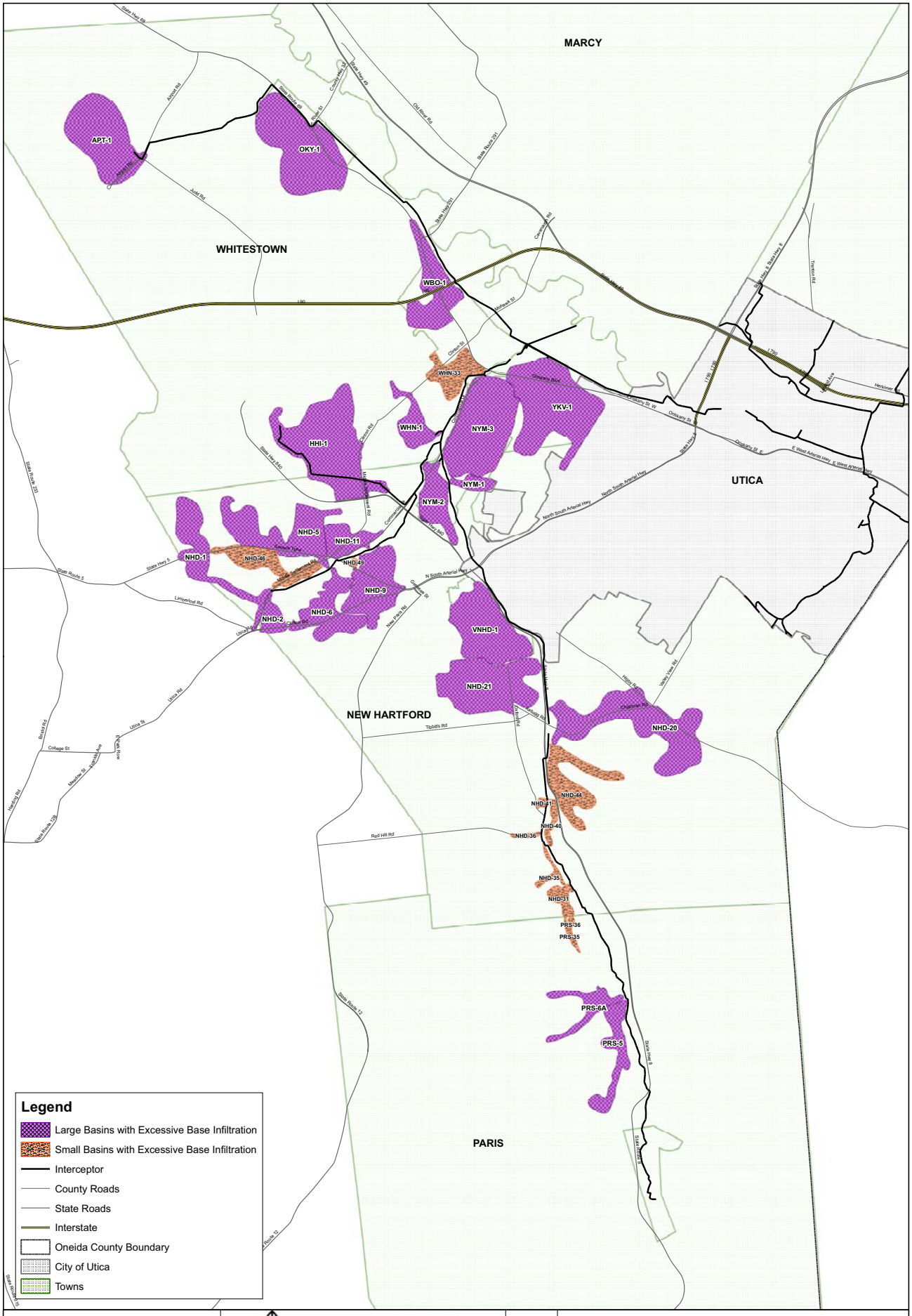
[1] Sewer basins where continuous flow metering data was collected.

[2] Greater than 4,000 gallons per day per inch-diameter-mile of pipe.

[3] Gallons per day per inch-diameter-mile of pipe

A similar dry day analysis was performed on sewer basins where only nighttime inspections were conducted. Wastewater flow at 44 sewer basins (smaller residential-type service areas) was measured during nighttime inspections during the period from March through April 2008 between the hours of midnight and 4:00 AM when water usage and sanitary sewage flow were at a minimum. These inspections occurred during non-rainfall events. As such, these instantaneous wastewater flow measurement were considered representative of base infiltration.

The dry day analysis identified 14 small sewer basins that exhibited excessive base infiltration. These sewer basins are presented in Table 5-2 and are shown on Figure 5-1.




J:/GIS/OneidaCounty/Maps/OneidaCounty-86.12198.06/July2010/Figure 5-1 - Basins with Excessive Infiltration.mxd

| Table 5-2<br>Small Sewer Basins [1] with Excessive [2] Base Infiltration | | | |
|---|---|---|---|
| Sewer Basin | Infiltration Rate [3] | Sewer Basin | Infiltration Rate [3] |
| NHD-31 | 6,600 | NHD-44C | 17,500 |
| NHD-35 | 34,600 | NHD-46 | 16,900 |
| NHD-36 | 15,600 | NHD-49 | 24,300 |
| NHD-40 | 22,100 | WHN-31 | 6,100 |
| NHD-41 | 30,400 | WHN-33 | 5,900 |
| NHD-44A | 7,000 | PRS-35 | 8,100 |
| NHD-44B | 10,500 | PRS-36 | 4,600 |

(1) Sewer basins where "nighttime" flow data was collected.

(2) Greater than 4,000 gallons per day per inch-diameter-mile of pipe.

(3) Gallons per day per inch-diameter-mile of pipe

### 5.2.2 Wet Weather Analysis

Rainfall-derived I/I (RDI/I) was estimated for a rainfall event in the spring season as represented by April 28, 2008 and a rainfall event in the summer season as represented by June 6, 2008. The pattern of the RDI/I hydrographs was considered in determining whether the sewer basin was impacted by inflow, infiltration, or both. Generally, if the RDI/I hydrograph showed a rapid increase in flow that corresponded to rainfall, and the increase in flow was three times greater than the flow prior to the rainfall event, the sewer basin was considered to be impacted by inflow. If the tailing limb of the RDI/I hydrograph extended longer than three days after the rainfall event, the sewer basin was considered to be impacted by infiltration. A sewer basin could be impacted by both rainfall-derived inflow and infiltration.

Table 5-3 presents the three categories of rainfall-derived I/I (inflow, infiltration, and both) for rainfall events in both the spring and summer seasons. Using these categories, the types of defects in a community sewer basin can be inferred. One hundred percent of the sewer basins

were significantly impacted by inflow during both the April 28 and June 6, 2008 rainfall events. Twenty-four percent of the sewer basins were significantly impacted by rainfall-derived infiltration during the April 28, 2008 rainfall event, and 76% were significantly impacted by rain-derived infiltration during the June 6, 2008 rainfall event.

| Table 5-3 Wet Day Analysis Inferring Rain Derived Infiltration and Inflow | | | | |
|---|---|---|---|---|
| | Spring Season | | Summer Season | |
| Sewer Basin | Infiltration | Inflow | Infiltration | Inflow |
| APT-1 | X | X | | X |
| HHI-1 | X | X | X | X |
| NHD-1 | X | X | | X |
| NHD-2 | X | X | X | X |
| NHD-5 | X | X | X | X |
| NHD-6 | | X | X | X |
| NHD-9 | X | X | X | X |
| NHD-11 | | X | X | X |
| NHD-18 | | X | X | X |
| NHD-20 | | X | X | X |
| NHD-21 | | X | X | X |
| NHD-23 | | X | X | X |
| NHD-24 | X | X | X | X |
| NYM-1 | | X | X | X |
| NYM-2 | | X | | X |
| NYM-3 | | X | X | X |
| VOKY | | X | | X |
| PRS-4 | | X | | X |
| PRS-5 | | X | | X |
| PRS-6 | | X | X | X |
| SCI-1 | | X | | X |
| VNHD-1 | | X | X | X |
| WBO-1 | | X | X | X |
| WBO-2 | | X | X | X |
| WBO-3 | | X | X | X |
| WHN-1 | | X | X | X |
| WHN-2 | | X | X | X |
| YKV-1 | | X | X | X |

## 5.3 MANHOLE AND SEWER INSPECTION FINDINGS

### 5.3.1 Scope of Work for Inspections

The manhole inspection program was started in early June 2008 and is ongoing. The program utilized inspection standards and procedures based on the National Association of Sewer Service Companies (NASSCO) Manhole Assessment and Certification Program (MACP). Basemapping used for this effort was generated from the extensive GPS manhole mapping program that was initiated in 1999 by the District through the assistance of HOCCPP. To date, a portion of the manholes in the Villages of Whitesboro, Yorkville, New York Mills, and New Hartford and in the Towns of Whitestown and New Hartford have been inspected, with an inspection coverage rate of between 30% and 85% within these municipalities.

Smoke testing of the sewers was conducted throughout the summer and autumn seasons of 2009. To date, approximately 521,000 lineal feet (99 miles) of sewers have been smoke tested, representing approximately 45% of the SCPS Basin. Nearly 100% of the sewers in the Villages of New York Mills, Yorkville, Whitesboro, New Hartford, Clayville, and Oriskany, and the Oneida County Business Park were smoked tested. Portions of the sewers in the Towns of Paris, New Hartford, and Whitestown were also smoked tested.

Sewer televising was conducted throughout the summer and autumn seasons of 2009. To date, approximately 231,000 lineal feet (44 miles) of sewers were CCTV inspected, representing approximately 20% of the SCPS basin. Sewers were televised in the Towns of Paris, New Hartford, and Whitestown and in the Villages of New Hartford, Whitesboro, New York Mills, Yorkville, and Oriskany. Additionally, two short sections of the upper reaches of the District's Sauquoit Creek Interceptor were also televised.

Due to time constraints, it was not possible to inspect all manholes and sewer pipes, and therefore, the manholes and sewer pipes in the sewer basin with greatest relative I/I were given the highest priority for inspections. Maps contained in Appendix A depict the status of

inspections. Manholes and sewer pipes that have not been inspected are scheduled to be inspected during first phase of the SSO Mitigation Plan as noted in the schedule in Section 10.

### 5.3.2 Common Defects Observed

To date, approximately 1,800 manholes have been inspected and 521,000 feet and 231,000 feet of sewer pipe have been smoke tested and televised, respectively. Through these inspections, over 2,000 individual defects were observed. Some defects were significant sources of I/I, such as a cracked manhole wall near the top of the manhole that allowed river water to inflow during high river stage conditions. Other defects were moderate to small sources of I/I, such as a leaky joint between two segments of VC pipe. Other defects such as sags in pipes were observed, but were not contributing to I/I.

Common defects found through manhole inspections included:

- Cracked and/or offset frames.
- Cracked walls and/all non-sealed joints.
- Non-sealed pipe connections to the manhole.

Common defects found through smoke testing included:

- Smoke emissions from the ground indicating a defect in the sewer pipe below grade in the vicinity of the smoke egress.
- Smoke emissions from catchbasins that are either directly connected to the sanitary sewer or indirectly connected through defects in the stormwater and/or sanitary sewers.

Common defects found in through sewer televising included:

- Cracks in pipes.
- Defective or misaligned pipe joints.
- Defective or misaligned manholes.
- Defective or misaligned house laterals.
- Summary of Defects Observed.

As stated above, over 2,000 defects were observed, and some of these were significant sources of infiltration and inflow. Figures 5-2 through 5-4 illustrate examples of some of the major defects observed during the inspections. These figures provide a general description and location of the defects and estimated infiltration and inflow flow rate associated with each defect.

In addition to these major defects, hundreds of more defects were observed. Table 5-4 provides a summary of the number of defects observed.

**Table 5-4 Defect Summary Table**

| Defect Type | Count [(1) (2)] |
|---|---|
| Broken/Cracked/Fractured Pipes | 545 |
| Offset/Separated Pipe Joints | 76 |
| Root Intrusion into Pipes | 582 |
| Defective Lateral Connection | 686 |
| Wall Cracks and Offset Joints in Manholes | 262 |
| Catchbasin Direct and Indirect Connections | 136 |
| Private Property Connection (i.e., area drains or downspouts) | 255 |

(1) Based 1,800 inspected manholes; 521,000 feet of Smoke Testing and 231,000 feet of Televising.

(2) Of the defects observed in pipes and manholes, over 1,600 resulted in active infiltration.

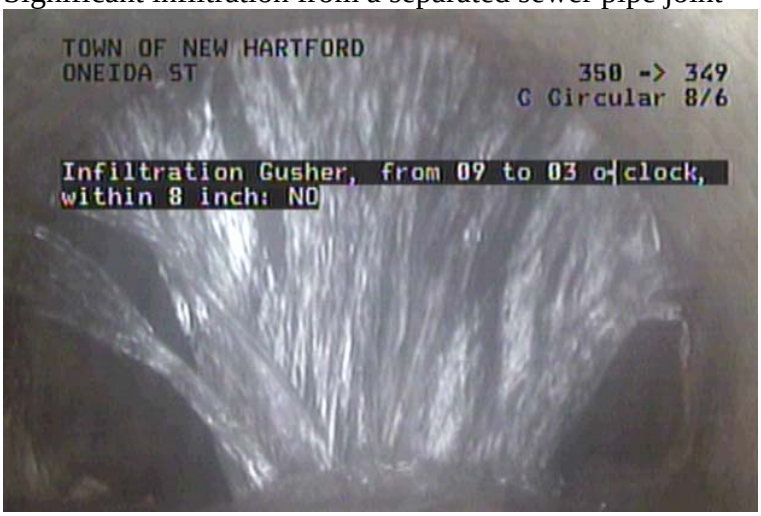
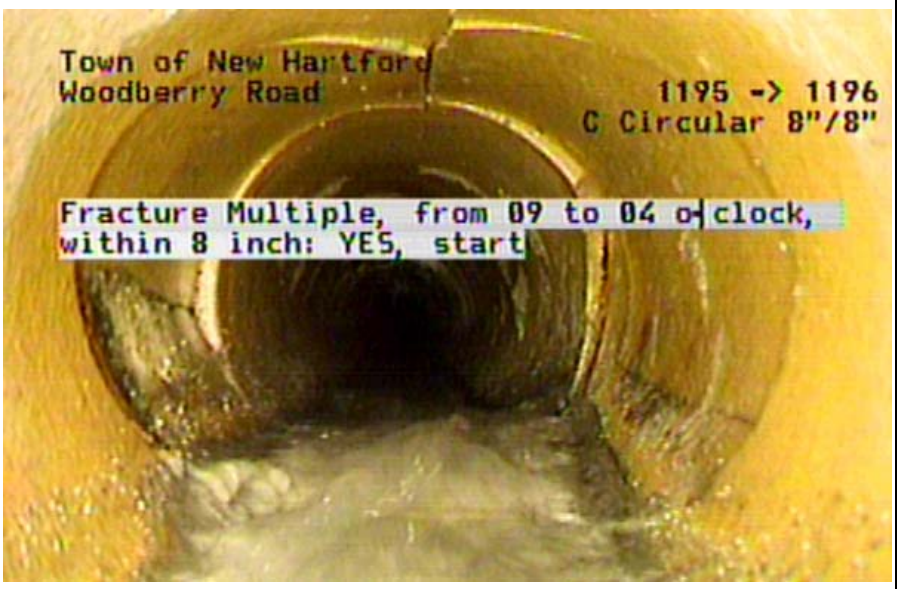
## 5.4 SUMMARY OF SEWER SYSTEM INVESTIGATION FINDINGS

The continuous flow metering data and the manhole and sewer inspection observations showed that the defects in the system that result in I/I are widespread. In summary:

- 100% of the sewer basins that were continuous flow metered showed increases in wastewater flow of more than three times normal water consumption during significant rainfall/snow melt events.
- Defects that could result in infiltration and inflow were observed in 100% of the sewer basins that were inspected. Some sewer basins had more defects than others.

The observed defects ranged from significant to minor. For example, a significant source of infiltration and inflow was observed through a cracked manhole wall in the river flood plain. Many minor defects such as leaky sewer pipe joints were also observed.

In as much as the defects and sources of I/I are widespread, a comprehensive rehabilitation approach is required to repair the specific defects, protect against the migration of I/I, and assure the longevity of the repairs and sewer system. A description of the sewer system rehabilitation is presented in Section 7.

| Figure 5-2 Pipe Defect Description | |
|---|---|
| **Defects** | **I/I Rate** |
| Significant infiltration from a separated sewer pipe joint<br>  | 20 gpm |
| Fractures along the pipe, which allows infiltration into the sewer system.<br>  | 10 gpm |

| Figure 5-3 Manhole Defect Description | |
|---|---|
| **Defects** | **I/I Rate** |
| Hole in manhole wall. The manhole is located in the Mohawk River flood plain. When the River is flooded the hole acts as a direct inflow source.<br>  | 175 gpm |
| Leaky joint between manhole wall and base. The manhole bottom is generally under the groundwater level and is a constant source of infiltration.<br>  | 3 gpm |

| Figure 5-4 Inflow Defect Description | |
|---|---|
| **Defects** | **I/I Rate** |
| Catchbasin directly or indirectly connected to the sanitary sewer system, which allows stormwater runoff directly into the sanitary sewer system.<br>  | 175 gpm |
| Residential rainlead/downspout connected to the sanitary sewer system, which allows rooftop runoff directly into the sanitary sewer system.<br>  | 20 gpm |

# 6.0 HYDRAULIC/HYDROLOGIC MODEL

## 6.1 OVERVIEW

A comprehensive mathematical model was constructed of the collection system tributary to the SCPS to assist in the SSO mitigation planning. The consultant team constructed the hydrologic/hydraulic model using HSPF and MWHSoft InfoSWMM to mathematically simulate current and future flow conditions and to assess abatement scenarios involving I/I reduction, both alone and in combination with capacity upgrades of the SCPS and WWTP. While HSPF, the hydrological portion of the model was only used for the SCPS Basin with its separate sanitary sewers and InfoSWMM, the hydraulic portion of the model, was used for both the SCPS Basin and the model that was constructed for the City's LTCP with its mainly combined sewers.

## 6.2 MODELING OBJECTIVES

The occurrence of SSO discharges from the SCPS is suspected to be caused by excessive rates of RDI/I, generally from the following sources:

- Connected rain gutters.
- Connected sump pumps.
- Storm sewer cross connections.
- Leaks in pipes, manholes, and joints.
- Dewatering activities.

Due to the nature of the RDI/I throughout the District system, as documented from analyzing the flow metering data, modeling flow from these sources required simulating a broad range of hydrologic phenomenon such as:

- Snowpack accumulation and melt.
- Groundwater flow above and below the water table.
- Surface runoff adjusted with the Unit Hydrograph method.

The goal of the modeling effort is to combine the simulation of the hydrology listed above with the simulation of flow in the collection system and through the SCPS Basin, in order to compare the effectiveness of different SSO mitigation strategies including RDI/I rehabilitation and repair, and SCPS and WPCP upgrades.

## 6.3 MODEL TECHNOLOGY OVERVIEW

To model sewer system flow requires modeling both hydraulic processes (routing) and hydrologic processes (runoff). InfoSWMM was used for modeling flow routing and HSPF was used for modeling runoff.

InfoSWMM is an integrated Stormwater and Wastewater Management Model developed within an environment built to run inside the ESRI ArcMap GIS Software platform. InfoSWMM utilizes an enhanced version of the SWMM5 analysis engine as developed and distributed by the Water Supply and Water Resources Division of the EPA National Risk Management Research Laboratory (SWMM Version 5.0.017).

## 6.4 HSPF

HSPF simulates the full range of hydrologic processes that produce RDI/I runoff. HSPF requires a large amount of data meterologic including records of precipitation and estimates of potential evapotranspiration for watershed simulation as well as air temperature, dew point temperature, wind, and solar radiation for snowmelt.

## 6.5 MODELING METHODS

### 6.5.1 Input Data

Data used in the model came from several sources; some data was already available (such as GIS) which expedited model construction. Other data such as the rain and flow data was collected as part of this study

#### 6.5.1.1 Hydrologic Data

The sewer flow data and rain gauge data collected for this project was used to calibrate this model. This data was provided at a 15-minute timestep which captures the range of peak flow and rain intensity seen in a variety of storms.

For typical and long-term modeling simulations, the NOAA Utica gauge was used. This rain gauge also recorded 15-minute timestep data and used antifreeze to record equivalent liquid precipitation during snow events, which is necessary for calibrating modeled snowpack accumulation and melt.

In addition to rainfall data, the hourly meterological data needed for HSPF such as solar radiation, temperature, dew point, and wind speed were acquired from the Syracuse Airport NOAA weather station.

#### 6.5.1.2 Hydraulic Data

Collection system GIS data was obtained from the HOCCPP. This data included planimetric locations of manholes and pipes, and some related attributes such as pipe diameter that were obtained from municipal as-built records. Additionally, LIDAR elevation data was obtained under joint contract between the State and County that included the project area; this data was used to derive the ground elevations near the manholes. Finally, as part of the abatement study,

manholes were inspected per NASSCO MACP standards. This provided further data that could be used to determine the manhole rim and invert elevation.

Using the GIS data, a computerized collection system network was created by defining the upstream and downstream manholes for each pipe segment based on the most downstream outlet point, the SCPS. This was done using a network connectivity tool in Brown and Caldwell's Capacity Assurance Planning Environment (CAPE) software package. Where necessary, flow direction in pipe loops was defined manually.

Next, the subset of the pipe and manhole data downstream of metering locations and upstream of SCPS were flagged and imported into the InfoSWMM model, along with the hydraulic attributes such as diameter, roughness, pipe offset, etc. To keep the model from becoming instable, short sections of pipe were combined with neighboring sections, where diameter and slope were constant. Manhole invert and rim elevations were calculated based on manhole inspection measurements and ground elevation from LIDAR.

Once the hydraulic network and depth information was input to the InfoSWMM model, the system was checked for errors. Using InfoSWMM tools, orphan manholes and pipes were discovered and removed. Next, profile plots of all pipe segments were generated to check slopes, as demonstrated in Figure 6-1. Where elevation data was missing or considered inaccurate, manholes were removed and the two pipe segments were combined, or elevations were recalculated based on more accurate slope information.

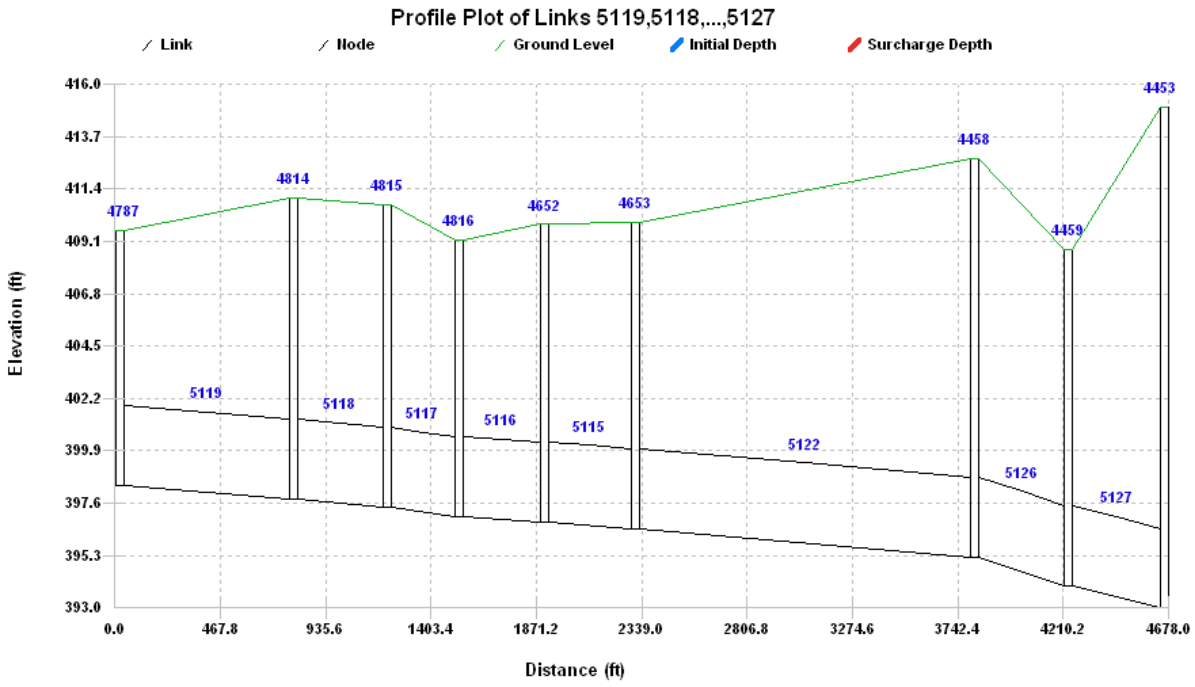



Figure 6-1. Example Profile Plot From InfoSWMM

### 6.5.2 Development of Flows

A modeling methodology that included simulating the different flow components seen in the flow data was developed for this study. Sewer flow is composed of two main sources: base flow and RDI/I. Figure 6-2 shows an example decomposition of measured flow data into these separate component flows. A separate methodology was used to simulate base flow and RDI/I.

#### 6.5.2.1 Base Flow

Base flow consists primarily of two components: base infiltration and sanitary contribution.

Base infiltration is the infiltration of groundwater into leaky pipes, joints, and manholes that are normally below the water table and hence create constant flow. While this flow may change during particularly dry or wet periods due to changing pressure head, the amount of variation is small, and therefore, is represented in the model as a constant infiltration.

Sanitary flow is the result of potable water consumption. While it can be relatively constant over a long period of time, months or years, it typically varies twice a day (diurnally), and often by day of the week and season as well. For this modeling effort, the sanitary flow pattern was simplified by assuming it varied diurnally only.

To determine the base infiltration and sanitary contribution, select dry-weather periods were averaged to determine a static daily base flow pattern. CAPE software was used to decompose flows from all the meters, and establish the daily flow base pattern.

#### 6.5.2.2 Rainfall Derived Inflow and Infiltration

For this project, a unique modeling approach was used whereby an HSPF model was developed and calibrated for the entire basin, and flow from different hydrologic zones was then calculated for each basin.

An initial HSPF model was created that included pervious and impervious area. This model was run for the 2008 monitoring period, and parameters for snow pack formation and melt, soil moisture accumulation and evapotranspiration, and depression storage accumulation and evaporation were adjusted until reasonable water mass balance was achieved.

Next, individual RDI/I models were created for each basin using the output from the initial HSPF model. To do this, outflows from the unsaturated soil (called IFWO in HSPF), saturated soil (called AGWO in HSPF), and surface runoff flow zones were adjusted using one coefficient per flow zone. Additionally, the surface runoff from the pervious (called PSURO in HSPF) and impervious areas (called ISURO in HSPF) were adjusted using the unit hydrograph, to distribute these overland runoff flows over a longer period. The coefficients were then adjusted until the summed HSPF flows for the basin closely matched the measured flow for the basin. This resulted in a calibrated runoff model for each basin.

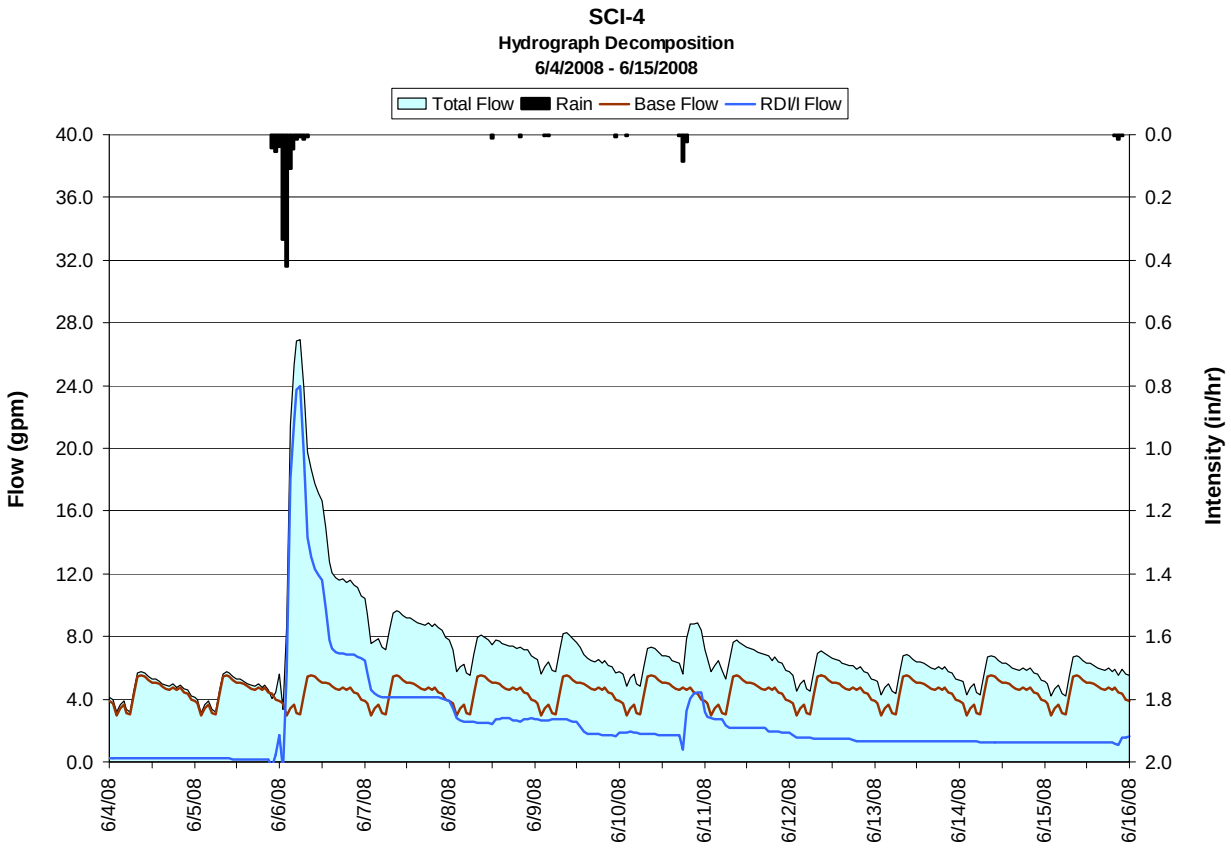



Figure 6-2. Example Hydrograph Decomposition of Measured Flow Data Into Base Flow and RDI/I Flow

### 6.5.3 Flow Routing

To simulate the hydraulic flow routing, the calibrated runoff flows from the basins were converted into a SWMM interface file and input to the InfoSWMM model. Flow was then routed, using a nominal 5-second timestep, through the collection system and eventually down to the SCPS where it either pumped to the WPCP or, during peak flow conditions, the Mohawk River.

In order to simulate flow through SCPS, a simplified operation was assumed. Up to 15 mgd of flow was sent to the WPCP and additional flow was sent to the river. To see if this would be a valid assumption, measured flows from the three meters placed immediately upstream of SCPS (SCI-4, WOI-1, and YKV-1) during 2008 were input into a reduced InfoSWMM model and run using the simplified operating conditions for SCPS. The reduced model output was then

compared to the daily outflow data on the monthly DMR records of the WPCP. While SCPS is in fact operated manually, the simplified automatic operation proved to be a safe assumption.

### 6.5.4 Calibration

The HSPF and InfoSWMM models were run for the period of 3/10/2008 to 9/25/2008, which corresponds to the rain data that was collected. The overflow data from SCPS was then compared to the overflow data from the simplified InfoSWMM model, which represented a surrogate of measured flow. To adjust the magnitude of overflow, changes in the amount of flow from the different flow regimes in HSPF were made evenly across all sub-basins. The timing of the overflow did not need to be adjusted, due to the calibration effort for the HSPF models.

Once modeled flow matched surrogate measured flow as much as possible, total monthly modeled flow was compared to monthly measured flow from the DMR reports.

#### 6.5.4.1 Results

The results of the model calibration show that the modeled volume of overflow from SCPS during the period of measured data is within 16%, and thus the model is well calibrated.

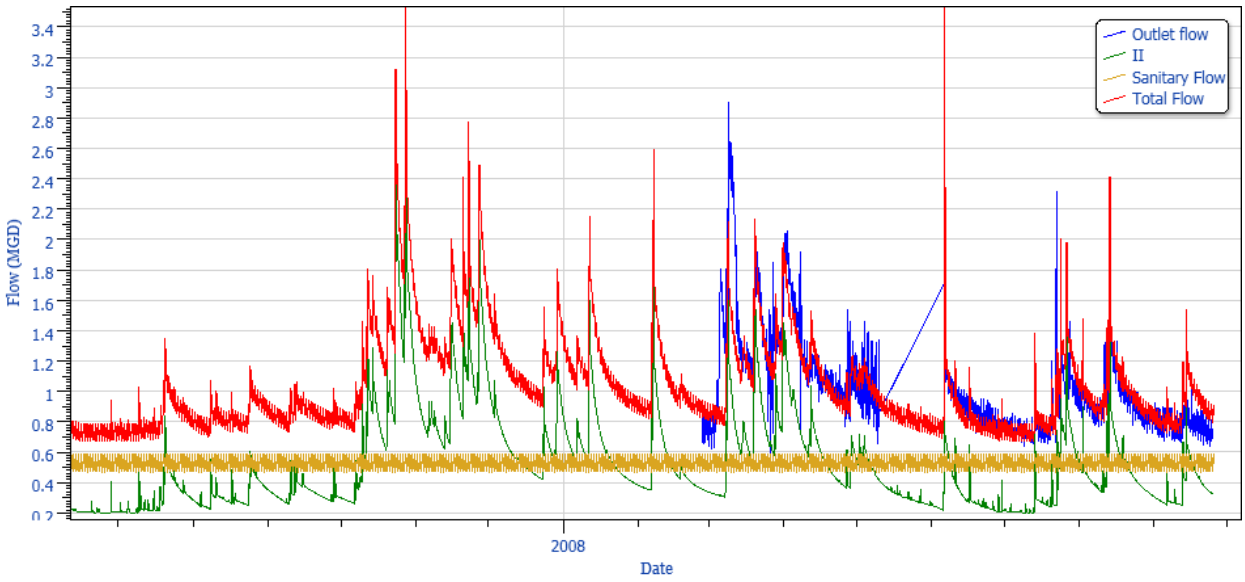



Figure 6-3. Example Calibration Plot of Basin NYM-2 Showing Metered Flow (blue) Vs. Modeled Flow (red)

### 6.5.4.2 System Changes Post 2008

Since monitoring was completed in 2008, some RDI/I rehab and repair efforts have been completed. This will likely change the fit of the calibration when the model is run for periods after 2008. To address this, continued collection of flow and rain data is recommended to maintain the model as a useful tool.

### 6.5.4.3 Upstream SSOs

Once the model was calibrated, as part of the calibration QAQC process, the collection system was analyzed for upstream SSOs. Several were found along the Mud Creek Interceptor. While no flow data exists to corroborate modeled versus measured SSO quantity, the timing of these upstream SSOs correlated well to field observations from the 2008 and 2009 manhole inspection efforts.

### 6.5.5 Typical Year Simulations

For the purposes of understanding system performance in average years, a typical year was used to compare SSO abatement scenarios. This analysis is an industry standard for comparing mitigation scenarios in a relative fashion to ensure consistency.

#### 6.5.5.1 Input data

A typical year was determined as part of the parallel Utica modeling effort by analyzing the existing 15-minute rain records from the official NOAA rain gauge in Utica, and comparing storm volumes, durations, and peak intensities. That analysis concluded 1986 had a typical rainfall.

### 6.5.6 Alternatives Evaluation under Typical Year Conditions

#### 6.5.6.1 Scenario descriptions

The scenarios analyzed using the calibrated model included a combination of RDI/I rehabilitation and repair effort and SCPS and WPCP capacity upgrades.

#### 6.5.6.2 RDI/I Rehab and Repair

Reductions in RDI/I of 10%, 25%, and 50% were simulated by reducing the unsaturated soil outflow (IFWO) and surface runoff (PSURO and ISURO) in the HSPF model evenly across all sub-basins.

#### 6.5.6.3 SCPS Capacity Improvement

The existing rated peak pumping capacity of the PCPS to the WWTP is 15 MGD; in addition, upgrades in capacity to 20 and 25 MGD were analyzed. The downstream effects on or from the WPCP were not considered in the model.

#### 6.5.6.4 Inflow versus Infiltration

To understand which component of RDI/I has the greatest effect on SCPS, two additional scenarios were run; one with reduced inflow from surface runoff (ISURO and PSURO parameters in HSPF) and one with reduced inflow (surface runoff) and reduced delayed inflow/quick infiltration from unsaturated soil outflow (IFWO parameter in HSPF). "Delayed inflow/quick infiltration" is the element of flow that occurs from several hours to several days after the start of the wet weather event, and typically is representative of flow from such sources as foundation drains, sump pumps, and leaky laterals. The existing SCPS capacity of 15 MGD was used in these scenarios.

#### 6.5.6.5 Results

Table 1 shows the model results for different SCPS pumping rates. As shown, at the existing station capacity of 15 mgd, the total volume of overflow during a typical year is 332 MG. Table 1 also shows that by increasing the capacity of the SCPS to 25 mgd results in a 93% overflow reduction. Table 2 shows that removing delayed inflow/quick infiltration can have a substantial effect on decreasing SSO from SCPS. Table 3 shows various combinations for increased pumping from SCPS and RDI/I removal. As shown, reducing RDI/I by 50% combined with increasing the SCPS capacity to 25 mgd results in a 100% removal of overflows to the river. Also, Figure 6-4 shows a graphical representation of how overflows are effected by various RDI/I removal percentages and increases to the SCPS capacity.

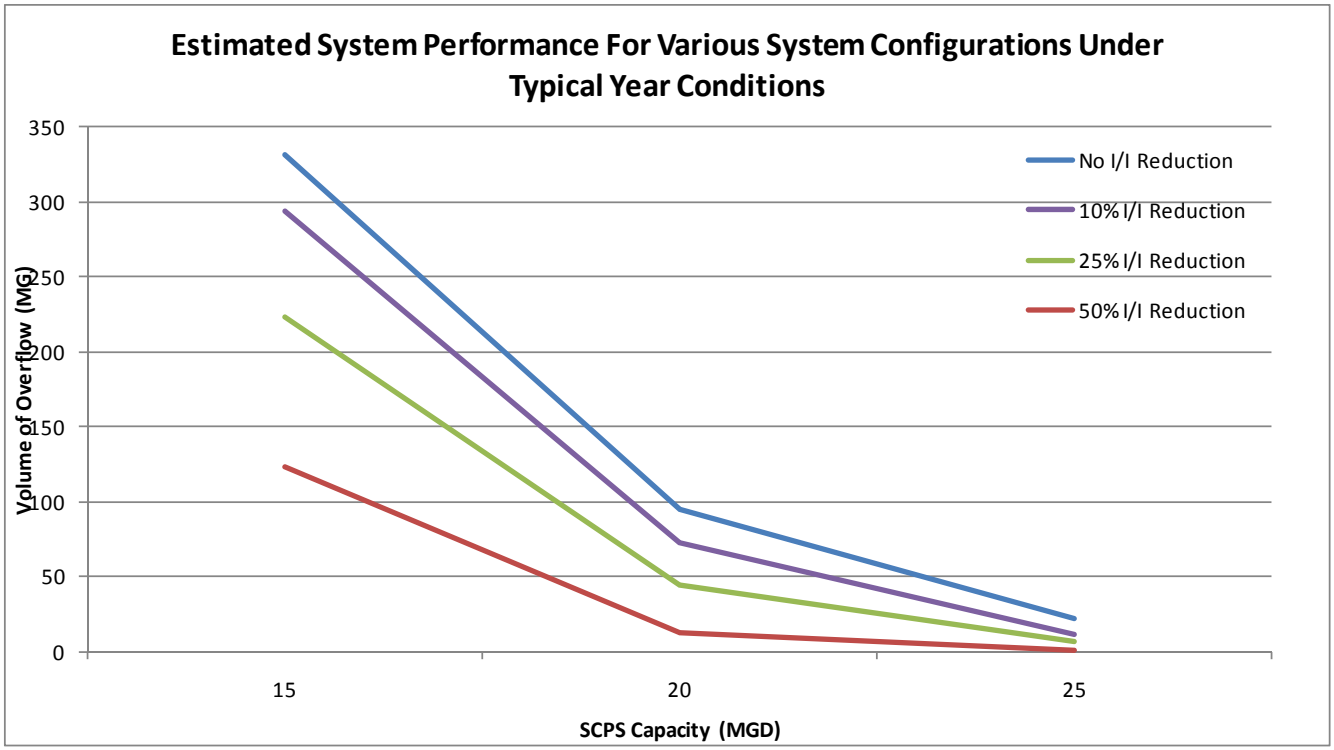



Figure 6-4. Comparison of Typical Year Scenarios

Table 6-1: Estimated System Performance For Various PS Increases Under Typical Year Conditions

| Pump Rate to WWTP (MGD) | Percent Removed[1] | | Pumped Overflow to River | | | Pumped Flow to Plant | |
|---|---|---|---|---|---|---|---|
| | Direct Inflow | Delayed Inflow/ Quick Infiltration[2] | Peak Q (MGD) | Total Vol (MG) | Removed Vol (%) | Peak Q (MGD) | Total Vol (MG) |
| 15 | 0% | 0% | 22 | 332 | - | 15 | 4,201 |
| 20 | 0% | 0% | 18 | 94 | 72% | 20 | 4,454 |
| 25 | 0% | 0% | 13 | 22 | 93% | 25 | 4,526 |

Table 6-2: Estimated System Performance For Various RDI/I Reductions Under Typical Year Conditions

| Pump Rate to WWTP (MGD) | Percent Removed[1] | | Pumped Overflow to River | | | Pumped Flow to Plant | |
|---|---|---|---|---|---|---|---|
| | Direct Inflow | Delayed Inflow/ Quick Infiltration[2] | Peak Q (MGD) | Total Vol (MG) | Removed Vol (%) | Peak Q (MGD) | Total Vol (MG) |
| 15 | 100% | 0% | 21 | 314 | 5% | 15 | 4,174 |
| 15 | 100% | 100% | 2 | 6.0 | 98% | 15 | 3,703 |

Table 6-3. Estimated System Performance For Various RDI/I Reduction and PS Increases Under Typical Year Conditions

| Pump Rate to WWTP (MGD) | Percent Removed[1] | | Pumped Overflow to River | | | Pumped Flow to Plant | |
|---|---|---|---|---|---|---|---|
| | Direct Inflow | Delayed Inflow/ Quick Infiltration[2] | Peak Q (MGD) | Total Vol (MG) | Removed Vol (%) | Peak Q (MGD) | Total Vol (MG) |
| 15 | 50% | 50% | 12 | 123 | 63% | 15 | 4,011 |
| 15 | 25% | 25% | 18 | 223 | 33% | 15 | 4,119 |
| 15 | 10% | 10% | 21 | 294 | 11% | 15 | 4,172 |
| 20 | 50% | 50% | 7 | 12.0 | 96% | 20 | 4,122 |
| 20 | 25% | 25% | 13 | 44 | 87% | 20 | 4,298 |
| 20 | 10% | 10% | 16 | 72 | 78% | 20 | 4,394 |
| 25 | 50% | 50% | 2 | 0.4 | 100% | 25 | 4,134 |
| 25 | 25% | 25% | 8 | 7 | 98% | 25 | 4,336 |
| 25 | 10% | 10% | 11 | 15 | 96% | 25 | 4,451 |

Notes:

1. Removal was applied uniformly across system.
2. I/I which typically responds several hours after rainfall events, and which can last for several days or even weeks afterwards. Potential sources include foundation drains, sump pumps, leaky lateral, leaky sewers, etc.

# 7.0 SSO MITIGATION PROJECTS AND PROGRAMS

This section describes the specific sewer rehabilitation projects and management programs that will be implemented by the County and the affected member municipalities in order to mitigate the SSO at the SCPS. These projects and programs will begin in 2010. Concurrent with the implementation of these rehabilitation projects and management programs, continued sewer investigations will be performed, with the resulting data used to develop annual sewer rehabilitation construction projects as required. Detailed evaluations of the SCPS and WPCP will also be performed as it is believed that mitigation of the SCPS SSO will ultimately result from a combination of sewer rehabilitation projects, management programs, and SCPS and WPCP capacity upgrades. While all three components are critical, the County and the member municipalities will seek the most cost-effective and technically sound combination of these efforts to bring the SCPS SSO into compliance.

The following sections provide more detail regarding the County's overall approach to SSO mitigation.

## 7.1 SEWER REHABILITATION PROJECTS

### 7.1.1 Magnitude of Sewer Rehabilitation

As discussed throughout this plan, the sewer system defects that were observed throughout the SCPS Basin are widespread and pervasive. There are estimated to be thousands of defects throughout the approximate 230 miles of sewer pipe in the SCPS Basin and their cumulative effect result in the overflow at the SCPS. This means that the mitigation of the SSO cannot be realized by simply sealing a few significant defective sewer pipe lengths and manholes, but rather a combination of:

- Taking a systematic approach to assessing the condition of the entire sewer system and,

- Rehabilitating the sewer system on a comprehensive sewer basin-by-sewer basin basis, and
- Operating, maintaining, and managing the sewer system in accordance with public utility standards.

The continuous flow metering performed in 2008 (see Section 5) indicated the widespread and pervasive nature of I/I throughout the SCPS Basin. The limited timeframe for the development of this SSO Mitigation Plan allowed for six months of preliminary studies, one year of continuous flow metering, one year of sewer investigations, and six months of mitigation plan development. Thus, there was only enough time to investigate targeted portions of the SCPC Basin through manhole inspections, smoke testing, and televising inspections. The investigation efforts were prioritized based on the magnitude of the I/I observed during the flow metering. The sewer basins with the highest I/I rates were given the highest priority for investigations.

Because investigations were completed in only a portion of the SCPS Basin, sewer system rehabilitation recommendations that are identified in this SSO Mitigation Plan have been developed to target only the sewer pipes and manholes where active I/I was observed. These specific sewer system rehabilitation projects are scheduled to be completed in the initial period of the SSO mitigation program as presented in the schedule in Section 10. Future and more comprehensive sewer rehabilitation projects will be recommended as the remaining sewer basins in the SCPS Basin are investigated.

### 7.1.2 Inflow Reduction Projects and Comprehensive Sewer Basin Rehabilitation Approach

The objective of the SSO Mitigation Plan is to reduce the amount of I/I entering the collection system and to ultimately mitigate the SSO at the SCPS. Reducing I/I through sewer rehabilitation will take several years to complete because the sewer system inspections need to be completed and because of the widespread nature of the sewer system defects found to date. Nonetheless, it is a goal to remove as much I/I as soon as possible. Therefore, defects observed to be causing I/I will be rehabilitated first, as presented in the schedule in Section 10. These

projects are herein referred to as inflow reduction projects. As more is learned about the collection system through the continued inspections and the I/I reduction realized through the inflow reduction projects, a comprehensive sewer basin rehabilitation approach will be adopted that will extend throughout the SSO mitigation program.

Historically, I/I projects typically rehabilitate only the visually observed I/I sources. Unfortunately, this historical approach does not address groundwater migration. If only the visually observed sources are repaired, then the groundwater often migrates to the nearest undetected defect resulting in little, if any, benefit to the sewer system. Therefore, repairing only the visually observed leaks (and not all potential leaks) may not maximize peak flow reduction as the groundwater migrates to the next weakest spot in the sewer system. To find the next source, follow-up inspections become necessary.

Alternatively, the recommended approach to sewer rehabilitation for this SSO mitigation program is to inspect and rehabilitate entire sewer basins, including pipe, manholes, and lateral connections. Projects that address I/I on this type of comprehensive sewer basin approach versus individual sewer sections or manholes are more successful in reducing peak flow and provide better long term results. By addressing I/I sources on a comprehensive sewer basin approach, as compared to individual observed defects, post-rehabilitation flows become easier to assess.

### 7.1.3 Private Property

As presented in Section 6, the calibrated sewer system model predicts that a 50% reduction in I/I is required in conjunction with a 10 MGD increase in pumping and treatment plant capacity to mitigate the SSO at the SCPS. Based on I/I reduction projects throughout the country, a 50% reduction of I/I is an aggressive goal and generally requires projects that address both public and private sources.

The inflow reduction projects identified in this SSO Mitigation Plan are focused on observed defects causing I/I on public property. As part of the comprehensive sewer basin rehabilitation

approach, private property projects will be completed in the future, once private property inspections are completed. In preparation of performing private property inspections throughout the SCPS Basin, a pilot private property inspections program was completed in the Village of Whitesboro. The Village of New Hartford, with technical support from the District, is planning to begin private property inspections during the summer of 2010. With these two experiences, the District will be able to further develop a SCPS Basin-wide private property inspection program through the upcoming years as presented in Section 10.

Once these inspections are completed, private property rehabilitation programs will be developed and implemented. Based on preliminary private property observations, the types of programs that will likely be implemented will be rain leader/downspout/area drain disconnections, sump-pump disconnections, and lateral replacement/rehabilitation. While these programs are focused on private property improvements, public works projects may also be necessary to accommodate private source removal. For example, installing or extending a stormwater sewer system to collect and convey rain leaders from residences that are not currently served by stormwater services.

Institutional structure as presented in Section 8 will play a major function in the development and implementation of the private property rehabilitation program. The most complex issue being how private property rehabilitation will be paid for, and, once paid, for how it be maintained. The institutional structure also needs to provide for municipalities to perform inspections and enforcement. Private property inspections along with associated repair costs have the potential to raise the level of public discourse.

### 7.1.4 Initial Inflow Reduction Projects

The purpose of the initial inflow reduction projects is to remove as much rainfall derived I/I from the sanitary sewer system as soon as possible from isolated sections of the sewer system where inflow sources were observed during the previously completed field investigations. Not all defects will be addressed under the initial inflow reduction projects. As previously discussed,

infiltration tends to migrate from the rehabilitated location to the next weakest (un-rehabilitated) section in the sewer system; thus there is a need for the future comprehensive sewer basin rehabilitation approach.

Initial inflow reduction projects will be completed on public property in the initial period of the SSO mitigation program, as presented in the schedule in Section 10. While inflow sources were also found on private property, most of them will be addressed in the future when private property inspections are completed and rehabilitation programs and institutional development including private property project financing, are formalized.

Inflow reduction projects can generally be categorized into the following three types:

- Catchbasin Removal
- Sewer Rehabilitation/Replacement
- Manhole Rehabilitation

***Catchbasin Removal.***

Stormwater catchbasins have been observed to be directly connected to the sanitary sewer or indirectly connected through defects (breaks, leaks in pipes) in both the sanitary and stormwater pipes. Catchbasin removal projects will involve installing stormwater sewer extensions to the improperly, direct-connected catchbasins. The indirect catchbains will be disconnected by rehabilitating the defects in the sanitary and stormwater sewers in the vicinity of the catchbasin (see Sewer Rehabilitation/Replacement).

***Sewer Rehabilitation/Replacement.***

In general, there are three options for rehabilitating defects in sewer pipe:

- Excavate and replace.
- Manhole-to-manhole rehabilitation (grouting, lining).
- Spot repairs.

Excavation and replacement is disruptive, more expensive, and requires more time than the other alternatives. Excavation and replacement is sometimes required if a pipe is undersized or in such bad condition that it is beyond the point of rehabilitation. However, where manhole-to-manhole rehabilitation or spot repairs are able to be completed, they will be the preferred methods of rehabilitation.

***Manhole Rehabilitation.***

Manhole rehabilitation is similar to sewer pipe rehabilitation in that spot repairs and lining are preferred methods over excavating and replacing because they are less disruptive and expensive methods and require less time. Replacement will generally be limited to manholes with serious structural deterioration.

***Inflow Reduction Projects.***

The number and type of inflow reduction projects proposed for the initial period of the SSO mitigation program are identified in Table 7-1 by member municipality. The projects are also presented in the maps in Appendix B. It is important to note that for this SSO Mitigation Plan, these projects are targeted at specific infiltration and inflow defects and sources. These targeted inflow reduction projects will likely be expanded upon further investigations or in the future when a more comprehensive rehabilitation approach is taken. For example, if two of three sewer pipes underneath a street were shown to have defects causing RD I/I, these two pipes appear in Table 7-1 and on the maps as individual projects. When the actual design is completed for these two sewer pipes, the third pipe may be added to the overall project if there are minor defects that would likely be rehabilitated in the future under the comprehensive approach.

| Table 7-1 - Summary of Inflow Reduction Projects by Municipality[(1)(2)] | | | |
|---|---|---|---|
| **Municipality** | **Catchbasin Removal** | **Sewer Rehabilitation /Replacement** | **Manhole Rehabilitation** |
| Oneida County Business Park | 0 | 0 | 2 |
| Town of Whitestown | 1 | 1 | 31 |
| Town of New Hartford | 11 | 217 | 141 |
| Village of New York Mills | 32 | 87 | 32 |
| Village of Oriskany | 9 | 35 | 1 |
| Town of Paris | 0 | 7 | 1 |
| Village of Clayville | 0 | 2 | 15 |
| Village of New Hartford | 11 | 14 | 7 |
| Village of Whitesboro | 46 | 61 | 22 |
| Village of Yorkville | 36 | 65 | 16 |

(1) Based 1,800 inspected manholes; 521,000 feet of Smoke Testing and 231,000 feet of Televising.

(2) Of the defects observed in pipes and manholes, over 1,600 resulted in active infiltration.

## 7.2 SSO MITIGATION APPROACH

### 7.2.1 Discussion of SSO Mitigation Approach

As described throughout this plan, the mitigation of the SCPS SSO will take several years to complete owing to the widespread and pervasive nature of the defects and I/I sources that have been identified throughout the member municipality's sanitary sewer systems and the need to continue the necessary investigations aimed at quantification of the defects and I/I sources. Therefore, the recommended SSO Mitigation Plan includes a progressive implementation approach in order to ensure a technically-feasible and cost-effective solution to mitigate the SCPS discharge. In general, the SSO mitigation approach is described as follows:

The remaining sewer basins in the SCPS Basin will be investigated, including televising sewers and inspecting manholes. Concurrently, the initial inflow reduction projects identified in this Plan will be implemented beginning in late 2010 and continue through the initial period of the

SSO mitigation program. Each year, an Annual Work Plan will be developed that identifies the rehabilitation projects for the upcoming year.

Flow metering will be conducted in strategic locations at appropriate intervals to monitor the effectiveness of the completed sanitary sewer rehabilitation projects. The resulting flow metering data will be input into the calibrated hydrologic/hydraulic model, and the model will be used to evaluate the reduction in the targeted I/I to date, and to predict the anticipated I/I reduction after the implementation of future rehabilitation projects. As more data is collected, the model will be updated to reflect changes in the physical condition of the sanitary sewer system and to reflect significant changes in SCPS operations.

While the sanitary sewer system rehabilitation and investigation work is being performed, a facility condition assessment and comprehensive capacity evaluation of the WPCP will be performed. The latter will expand upon the preliminary capacity evaluation that was completed in December 2007 in accordance with the Consent Order requirements. The facility condition assessment of the WPCP is currently underway and is expected to be completed by late summer 2010. In addition, a hydraulic evaluation of the SCPS and force main will be performed as a compliment to the WPCP evaluation with regards to pump station/force main capacity expansion and the impact on WPCP operations and potential displacement of Utica CSO flows.

Using the hydrologic/hydraulic model and the results of the SCPS and WPCP evaluations, different combinations of sewer system rehabilitation projects and pump station/force main and treatment upgrades will be assessed to determine the most technically-feasible, cost-effective, and environmentally sustainable solution to mitigate the SSO. The preferred mitigation scenario will be rehabilitation of a significant portion of the public sanitary sewer system and implementation of selective private property I/I reduction projects in combination with some level of upgrades/optimization/expansion of the SCPS, the pump station forcemain, and the WPCP.

The extent of the SCPS and WPCP upgrades will be based on the evaluations and optimization work performed under the previous work element. The major I/I reduction projects that were previously initiated will continue, the scope of which will be confirmed based on the effectiveness of the prior results.

Because private property sources of I/I are also considered to be contributors to the cause of the SSO, a program for private property inspections will be implemented during the initial years of this project. The Village of New Hartford has already indicated its intent to begin inspections in 2010. The District has provided the Village with sample public information documents (letters, door hangers, etc.) and will provide the Village with the field computer and software necessary to conduct the inspections with the collected information managed by the District sewer system management software.

Work will also include the continuation and formalization of CMOM programs for both the member municipalities and the District that were under preliminary development during the preparation of the SSO Mitigation Plan. To ensure that the SCPS remains in compliance, formally developed CMOM programs will continue to be implemented. This will ensure that continual enhanced operational efficiency through focused proactive routine sewer system maintenance, well defined corrective maintenance, and required rehabilitation. Other CMOM initiatives and related programs, such as private property inflow reduction, emergency overflow responses, and wastewater collection system flow metering, will also continue, as appropriate.

A summary of the anticipated "SSO Mitigation Plan Implementation Schedule" is presented in Section 10. This schedule incorporates different levels of investigation/evaluations, capital improvement projects, and overall sewer system management programs. In most instances, the investigation/evaluations and programs that were initiated in preparation of this SSO Mitigation Plan will continue during implementation. This will include continued wastewater collection system investigations, CMOM, SCPS, and WPCP evaluations, supplemental flow metering, and coordination with the City of Utica LTCP program.

### 7.2.2 Sewer System Investigation

The continuation and expansion of the SSES investigations will be a major focus of the initial implementation. These will be conducted in order to fill the information gap with respect to the specific locations and characterization of the I/I sources that are located throughout the member municipality sanitary sewer systems. CCTV inspections will continue, including isolated flow metering. Most importantly, private sources of inflow will be investigated beyond the pilot work previously performed as part of the study phase. These efforts will lead to a formal private property inflow removal program that will also be developed during the initial implementation of the SSO mitigation project.

### 7.2.3 Detailed SCPS and WPCP Capacity/Optimization Study

With regards to the SCPS and WPCP, a preliminary capacity evaluation was performed during the study phase on the WPCP using Ten States Standards as a guide. A more comprehensive WPCP study will be performed during the first phase of implementation and will include the following:

- Biological treatment process modeling of future flows and loadings based on future growth, economic development, and increased pumping capacity of the SCPS.
- Evaluation of the treatment process alternatives that may be necessary to treat additional flow.
- Evaluation of the primary and secondary clarifier's performance validated by conducting stress tests.
- Solids mass balance evaluation at incremental increases in flows and loadings.
- Physical condition assessment of the WPCP facilities.

The study will culminate in a report, Detailed WPCP Capacity/Optimization Study.

### 7.2.4 CMOM – Collection System Asset Management

CMOM is, in essence, asset management for wastewater collection systems. A CMOM Program to efficiently and economically manage, operate, and maintain the District and member municipality sanitary sewer systems will be developed and implemented. The benefits of a well developed and properly implemented CMOM Program include, but are not limited to:

- Enhanced wastewater transport service.
- Improved environmental compliance.
- Prioritized proactive maintenance.
- Prioritized corrective maintenance.
- I/I identification and quantification.
- Well developed prioritized capital improvement projects.
- Budgetary, resource, and staffing support.
- Enhanced emergency response.

The CMOM development process was initiated by conducting a kickoff work shop in February 2010 attended by representatives of the member municipalities and the District who have varying levels of collection system O&M oversight. This was followed up with interviews of system operators, site visits, and review of related sewer system information that will determine where the municipalities are with regard to the CMOM process. A majority of the information previously generated during development of the SSO Mitigation Plan (pipeline inspections, manhole inspections, smoke testing, etc.) will be used as part of this assessment phase. The CMOM assessment will be shared with designated municipal and county officials for additional input. The framework for a CMOM program will then be developed that will close the gap that exists between current status and minimum recommended standards to ensure efficient and timely implementation of a workable CMOM program.

### 7.2.5 Data Management and Flow Metering

As new data is collected and processed from the continual sewer system investigations and incorporated into GIS, it will be analyzed along with the previously collected data and fed into

the collection system hydrologic/hydraulic model for the next round of mitigation evaluations. In order to both further quantify I/I reductions and to assist in predicting removal rates, it is anticipated that additional flow metering will be conducted at designated locations within the sewer system at intervals to be determined based on work completed.

### 7.2.6 Coordination with the City of Utica's LTCP

The City of Utica is developing a LTCP that is due to the NYSDEC on the same day as this SSO Mitigation Plan. The due dates were purposefully made coincident to demonstrate the importance of a coordinated effort. To date, the District and the City have worked together on the following efforts:

- Continuous flow metering.
- Hydrologic/hydraulic modeling.
- Preliminary WPCP capacity assessment.

The latter effort is a very important point of coordination in that the City's two largest CSOs discharge just upstream of the WPCP. As part of the City's CSO LTCP, the City has coordinated its efforts with the District regarding the City's evaluation of options to treat CSO flows. These options include both utilizing existing (or expanded) facilities at the WPCP as well as stand alone end-of-pipe treatment, which would result in increased solids handling at the WPCP. The City and District have also discussed the potential opportunity of utilizing WPCP staff to perform the routine operation and maintenance of any CSO treatment facilities that may be located near the WPCP.

Because the District may ultimately need to upgrade the WPCP as part of the mitigation of the SSO at the SCPS, this effort must be closely coordinated with the City's CSO LTCP and the resulting CSO treatment system. The *Detailed WPCP Capacity/Optimization Study* (Section 7.2.3) will include evaluations of WPCP and end-of-pipe treatment configurations that will address both CSO treatment and SSO mitigation.

## 7.3 ANNUAL WORK PLAN AND SSO MITIGATION PROGRESS REPORT

As previously described, the SSO mitigation approach includes several years of concurrent investigations and capital improvement projects. To date, only a portion of the total projects have been identified. Future projects will be developed based on the findings from continued sewer system investigations and the findings from the SCPS and WPCP evaluations and optimization efforts.

As a tool for the member municipalities, the District will develop an Annual Work Plan. This Plan will describe the sewer system rehabilitation efforts that are required to be completed during the next year. This Work Plan would also be an annual milestone deliverable to the NYSDEC. It is proposed that the Annual Work Plans will be submitted to the DEC in November of each year.

The first of these Annual Work Plans will focus on the continuation of the manhole and sewer pipe investigation as well as the inflow reduction projects identified in Section 7.1.4. The Work Plan will be titled *Sauquoit Creek Pumping Station Basin – 2011 Work Plan.*

In addition to the Annual Work Plan, an Annual SSO Mitigation Progress Report will be created for submittal to the NYSDEC. This Progress Report will summarize the investigations and capital improvement projects completed during the prior year, and the costs of those projects. It is proposed that the Annual SSO Mitigation Progress Report will be submitted to the DEC in February of each year.

# 8.0 INSTITUTIONAL STRUCTURE CONSIDERATIONS

An integral component of the SSO Mitigation Plan is a review and analysis of the organizational and financial structure of the Oneida County Sewer District and its legal and contractual relationship with the member communities relative to how the program will be best managed and financed as the plan moves into the implementation phases. While the technical analysis will determine the best engineering approach to needed repairs and other mitigation strategies, successful execution will hinge on securing funding and establishing an effective operational structure.

The following factors are driving this assessment:

1. The current institutional framework and staff resources/capabilities (county and member municipalities) are limited to effectively manage a mitigation program of this magnitude; additional institutional and financial arrangements will be required.

2. The latest data and project cost projections indicate the SSO Mitigation Plan will result in each community bearing a proportionate financial burden based on an overall cost-effective solution. As a result, a strong fiscal strategy will be essential in ensuring timely and successful implementation of the SSO Mitigation Plan. Refer to Section 9 – Financial Challenges for additional discussion.

3. In order to gain approval from NYSDEC, the SSO Mitigation Plan must demonstrate major progress in both SSO mitigation and institutional/organizational modifications during the initial years of implementation.

4. Equitable cost allocation is required to successfully implement the program.

## 8.1 OVERVIEW OF CURRENT STRUCTURE

The District was formed in 1965 through an act by the former Oneida County Board of Supervisors. It is currently administered by the Oneida County Department of WQ&WPC which is responsible for the operations of the District's facilities and personnel. The District includes 12 member municipalities plus Oneida County through the original and amended charter plus three (3) municipalities via intermunicipal agreements. The municipalities currently served by the District include:

| | | |
|---|---|---|
| Village of Clayville | Town of New Hartford | • Town of Schuyler |
| Town of Deerfield | Village of New Hartford | City of Utica |
| • Town of Frankfort | Village of New York Mills | Town of Whitestown |
| • Village of Holland Patent | Village of Oriskany | Village of Whitesboro |
| Town of Marcy | Town of Paris | Village of Yorkville |

- - Served by intermunicipal agreement

### 8.1.1 District Facilities

District facilities include 45 miles of interceptor sewers, the SCPS and the Barnes Avenue Pumping Station, and the WPCP.

The District also provides disposal of septage, contaminated water from groundwater remediation sites, and landfill leachate from other locations within Oneida County. The District is also responsible for insuring compliance with federal pretreatment regulations that apply to all significant industrial users (SIUs) discharging to the WPCP.

The District is administered by a Commissioner who reports directly to the County Executive. The Department has four sections: Administration, Sanitary Sewer Maintenance, Sewage Treatment Plant Operations and Maintenance, and Industrial Pretreatment.

The Administration section coordinates all of the District activities which include long-term planning, financial administration, personnel management, billing coordination, capital project

administration, customer relations, and interaction with member municipalities and regulatory agencies.

The Sanitary Sewer Maintenance section is responsible for overseeing approximately 45 miles of interceptor sewers, including a GIS mapping system, and the upkeep of the pumping stations, grounds keeping, and snowplowing on all Sewer District property. The section is also responsible for coordinating the sewerage ash handling activities.

The Sewerage Treatment Operations/Maintenance section is responsible for the operation and maintenance of the WPCP and associated pump stations. This section is further divided into four groups which are maintenance, operations, laboratory, and sludge processing.

The Industrial Pretreatment section is responsible for insuring compliance with pretreatment regulations that apply to all significant industrial users of the WPCP. This section is also responsible for enforcement of the Oneida County Sewer Use Rules and Regulations.

The District's activities are fully funded by the ratepayers of the Sewer District and are not supported by the County General Fund. The required revenue is raised from a sewer service charge on users which is based on water consumption by the user. Most District users are served by the local public water systems and the sewer charge is a percentage of the water bill. Revenue requirements include debt service and annual operation and maintenance costs associated solely with District operations.

Sewer system users not served by a public water system are charged directly by the District based on a Fee Schedule established for private water well customers. All District funding, rate increases, and expenditures must be approved the Oneida County Board of Legislators.

### 8.1.2 Municipal Sanitary Sewer Facilities

Each member municipality of the District owns and operates its sanitary sewer collection system. Sewer operation and maintenance functions of the municipalities are typically incorporated into the Department of Public Works or highway departments. Staffing dedicated solely to sanitary sewer maintenance work is generally not available. The exception to this is the Town of Marcy in which sanitary sewer operation and maintenance is the responsibility of its Public Works Department with dedicated staff and equipment. Additionally, the Town of Paris utilizes staff assigned to the Sauquoit Water District for assistance with operation and maintenance of its sanitary sewers.

## 8.2 ROLE OF STEERING COMMITTEE

The Steering Committee has been tasked with studying institutional structure for both Consent Order compliance and for the future. In the short term, the group determined that a new institutional structure must be formed to oversee the ongoing administration of project work to comply with the DEC Consent Order through the period of 2014. As a result, in July 2009, the committee adopted a resolution to expand services provided by the District to include sewer system administrative support, funding research and grant application preparation, sewer system maintenance and technical support, and/or administration of construction projects for the member municipalities.

The committee continues to study institutional structure for the future. The group reviewed a number of alternative models used across the country, including a presentation by Erie County, which administers multiple county sewer districts. The committee has looked at other communities facing similar aging infrastructure and financing issues. A survey was also developed and administered to all communities within the SCPS to better determine the functions a new institutional structure would serve.

As a result of research and discussion, three potential institutional structure scenarios emerged for further review over the next several months. These scenarios include an enhanced District, a public utility authority, and a de-centralized model. These scenarios are discussed in Section 8.3. The Steering Committee will ultimately make a recommendation to the County and member municipalities.

## 8.3 INSTITUTIONAL STRUCTURE SCENARIOS

Based on the review of institutional structure options by the Steering Committee and elected officials, three scenarios have emerged for further review and discussion. These three scenarios include:

1. De-centralized Scenario - This scenario would be similar to the current Sewer District structure. This would require all municipalities to be responsible for their own required capital improvement projects and also required short- and long-term operation and maintenance requirements. The Department of WQ&WPQ would continue to administer projects within its current jurisdiction. A Memorandum of Agreement would be required to assure that requirements of the Consent Order were implemented and met by the municipalities.

2. Enhanced District Scenario - Under this scenario, the existing District would have a larger role that would include technical and administrative support to the municipalities regarding sewer issues, administering capital projects, engineering support, funding agency support, development and administration of programs (i.e., private property I/I, CMOM, etc.). Ownership of the municipal sewers would stay under the ownership of the municipality, including the incurring of debt of capital projects. Under this scenario, the Sewer Advisory Board (mayors and town supervisors of the member municipalities) would be re-activated. This board will recommend budgets and expenditures and make recommendations regarding the administration of District functions.

3. Public Utility Authority Scenario - This scenario would involve the creation of a stand alone Sewer Authority or potentially merge with an existing authority to include the sewer system. This new authority would own, operate, and maintain the current sewer system including treatment and would include maintenance, personnel, billing/accounting, engineering, support to member communities, etc. The new authority would set budgets, would have the ability to obtain financing and set rates, and would control expenditures. The authority could be governed by a board made up of representatives of the existing District member municipalities.

## 8.4 IMPACTS OF CMOM ON INSTITUTIONAL STRUCTURE

As CMOM programs are formalized and become District-wide compliance requirements, it is evident through the initial CMOM Readiness Reviews that most of the member municipalities lack the staff and resources, to varying degrees, that will be necessary to implement these programs. Solutions may include any combination of equipment purchases, new hires dedicated to sewer operations and maintenance, sharing of services (manpower and equipment) for sewer operation and maintenance, improved municipal budgeting specific for sewer purposes, annual contracting of sewer maintenance services, and/or consolidation of sewer operation and maintenance services. Moving forward, it is almost certain that the communities and local elected officials will need to work together closely in order to efficiently meet the needs of a properly administered CMOM program.

# 9.0 FINANCIAL CONSIDERATIONS

The District has commissioned an organizational study (see Section 8 – Institutional Structure Considerations) to determine the most cost effective and efficient way to finance and implement the SSO Mitigation Plan. This is necessitated by the substantial cost associated with the plan, the complexity of the problem, and the multi-jurisdictional ownership of the sewer assets that must be improved and remediated. This section expands upon the substantial progress made necessary to support these funding initiatives in identifying advantageous funding sources and potential organizational structures.

## 9.1 PROJECT COSTS

The total estimated cost of the SSO Mitigation Plan is $158 million (2008 Dollars) as set forth below in Table 9-1:

**TABLE 9-1 – ESTIMATED PROJECT COSTS ***

| Description | Amount |
|---|---|
| Sanitary Sewer Collection System – Manhole Rehabilitation | $5,000,000.00 |
| Sanitary Sewer Collection System – Phase 1 Sewer Rehabilitation/Replacement | $37,000,000.00 |
| Sanitary Sewer Collection System – Phase 2 Sewer Rehabilitation/Replacement | $30,000,000.00 |
| Private Property I/I Reduction | $7,000,000.00 |
| Sauquoit Creek Pump Station and Force Main Upgrades | $31,000,000.00 |
| Water Pollution Control Plant Upgrades | $48,000,000.00 |
| Total | $158,000,000.00 |

* - Estimates do not include cost escalations or financing charges

Of that total amount, $7.2 million is allocated toward District interceptor sewer improvements while an additional $72 million is required for sewer system rehabilitation within the individual towns and villages, as set forth below in Table 9-2:

**TABLE 9-2 – ESTIMATED SEWER REHABILITATION COST PER MUNICIPALITY**

| Sewer System Owner | Preliminary Cost Projection by Sewer System Owner (Collection System) |
|---|---|
| Village of Clayville | $1,600,000 |
| Town of New Hartford | $26,100,000 |
| Village of New Hartford | $5,600,000 |
| Village of New York Mills | $8,500,000 |
| Village of Oriskany | $5,400,000 |
| Town of Paris | $4,000,000 |
| Village of Whitesboro | $6,700,000 |
| Town of Whitestown | $7,900,000 |
| Village of Yorkville | $6,200,000 |
| Preliminary Budget Estimate | $72,000,000 |

The proposed method by which costs would be shared is to allocate those costs that occur within the individual town and village systems to those individual town and village rate payers. The costs at the District sewer improvements would be allocated equally over all users within the SCPS Basin.

## 9.2 PROJECTED FINANCIAL IMPACT ASSESSMENT

The financial impact of the SSO Mitigation Plan users in the SCPS sewer service area will be dramatic. The District has also commenced a formal Financial Capability Assessment ("FCA") process as prescribed by the U.S. Environmental Protection Agency ("EPA"). The FCA is an evaluation process that requires that all of the future projected costs of a given project plus all of the existing costs of a sewer system being developed as follows:

1. The current costs (operating and maintenance expenses and debt service) are combined with the net present value of the anticipated costs (cost increases of the existing system plus projected operating and maintenance expenses and debt service for the new project when fully constructed) to produce a total cost for the sewer system upon completion of the project.

2. This total is multiplied by the proportion of residential usage within the sewer system to give a total residential cost.

3. The total residential cost is then divided by the number of households served to give a total sewer cost per household. This gives a snapshot of the total cost that will fall on the average rate payer in one year when the project in question has been completed.

4. The total cost is divided by the median household income ("MHI") of the affected rate payers to determine what percentage sewer costs will constitute of the average rate payer's MHI.

A separate FCA is being prepared for each of the involved towns and villages. The individual FCAs are being prepared reflecting:

1. The distinct financial burden that will fall on each of the communities because of the different capital expenditures required within each of the communities to upgrade their collection systems. These costs are in addition to the shared capital costs of the interceptor sewers, the SCPS, and the WPCP.

2. The different economic profiles of the different communities.

Table 9.3 shows the preliminary results of the FCA process.

**TABLE 9-3 – PRELIMINARY FINANCIAL CAPABILITY ANALYSIS RESULTS**

NOTE: The chart below is a representation of the *potential* total financial impact to system users if no governmental grant monies or other forms of fiscal assistance are forthcoming to help the municipalities pay for the Oneida County Sewer District Sanitary Sewer Overflow Mitigation project. The figures represent the *potential* increases if all funding borrowed to complete necessary repairs and upgrades must be repaid only through monies generated by user fees.

| | Current | | After Sewer Project | | | | |
|---|---|---|---|---|---|---|---|
| **Respondent Communities** | Current Cost Per Household (CPH) | Current CPH as % of Median Household Income | Cost Per Household after Sewer Project | CPH as % of Median Household Income after Sewer Project | Projected Increase in CPH | Median Household Income*** | Number of Residential Accounts |
| Village of Oriskany | $199.16 | 0.41% | $1,250.55 | 2.55% | 627.91% | $49,009.92 | 477 |
| Village of New York Mills | $337.95 | 0.85% | $1,072.10 | 2.71% | 317.24% | $39,592.45 | 1161 |
| Village of Whitesboro | $213.02 | 0.52% | $885.71 | 2.17% | 415.79% | $40,811.15 | 1375 |
| Town of Whitestown | $276.23 | 0.54% | $812.04 | 1.59% | 293.97% | $51,205.88 | 2685 |
| Village of New Hartford | $531.34 | 0.95% | $1,225.82 | 2.20% | 330.70% | $55,650.18 | 699 |
| Village of Yorkville | $308.51 | 0.72% | $1,075.74 | 2.51% | 348.69% | $42,782.28 | 1001 |
| Town of New Hartford | $264.78 | 0.45% | $820.21 | 1.40% | 309.77% | $58,751.86 | 5785 |
| Town of Paris** | $293.15 | 0.55% | $1,308.07 | 2.46% | 446.20% | $53,105.47 | 703 |
| Village of Clayville** | $507.97 | 1.24% | $2,530.10 | 6.18% | 498.08% | $40,947.84 | 152 |

* CPH does not include overlapping debt (information unavailable)

** CPH for Towns of Paris and Clayville are based on 2009 numbers

***Median Household Income is based on data provided by the 2000 Census and adjusted for inflation to 2010

The FCA provides a good tool for policy makers in evaluating the financial effect of a proposed capital project. Assumptions for the financing terms (6% interest and 20-year debt amortization) have been used for calculating debt service on the proposed project that are conservative and that may be more onerous than the financing terms that the SCPS communities will be able to access. A discussion of more attractive alternatives that may be available follows.

## 9.3 PROJECT FINANCING STRATEGIES

The optimal financing strategy appears to be for the towns and villages to obtain "preferential" financing for the currently estimated $45.9 million required for capital improvements within the towns' and villages' collection systems. This does not include the estimated $26.1 million required within the Town of New Hartford collection system, as it does not appear that New Hartford will qualify for any of the preferential financing programs identified to date; nor does it include the estimated $7.2 million for the District sewer interceptor improvements or the $79 million for upgrades at the SCPS, its force main, and WPCP.

"Preferential" financing is defined as that financing offering below market interest rates, extra long maturities (more than 30 years) or grants. Such financing may be available to as many as eight of the nine towns and villages through either the U.S. Department of Agriculture Rural Development Agency ("Rural Development") or the NYS Environmental Facilities Corporation ("EFC"). The applicable Rural Development program offers all of the above benefits, but is only available in limited amounts to small, rural communities. EFC offers a "hardship" program with interest rates that may be as low as 0%, but the hardship program is only available to projects of less than $14 million and for which hardship (generally a projected sewer charge that exceeds a prescribed percentage of median household income for residents of the applicant) may be demonstrated.

The remainder of the financing for capacity upgrades at the SCPS and WPCP will be comprised of either public bonds or, preferably, bonds issued to EFC under the Clean Water State Revolving Fund ("CWSRF"). Either the County or a newly formed or newly empowered entity

would be the borrower. The District has begun listing the various components of the Plan on the EFC Intended Use Plan and will shortly close the first $25.8 million CWSRF loan.

## 9.4 IMPACTS OF FINANCING STRATEGIES WITH OPERATIONAL STRUCTURE

While obtaining preferential financing will substantially lower the annual payment burden on the sewer system users, there are a number of programmatic issues. The most significant of these issues are as follows:

1. The towns and villages must agree to cooperate in applying for and obtaining the preferential financing. While the District will assist in the process, prepare applications, and submit information on behalf of the towns and villages, they must be the applicants and borrowers in order to qualify for the preferential financing.

2. It is unlikely that all of the $45.9 million will be available immediately. Contacts with both Rural Development and EFC indicate that there is more demand than supply for their preferential financing programs. While each of the towns and villages may ultimately be fully funded with preferential financing, it may take several years for this to happen.

The organizational study is also evaluating whether the remainder of the financing related to shared infrastructure including the SCPS and WPCP should be done by the County through the issuance of its own bonds, or by a newly created sewer authority, or by an existing environmental authority in the County with newly granted sewer powers. There are a number of pros and cons to each organizational structure that the County, the towns, and villages are currently evaluating. If they judge an authority structure to be the most effective structure, they must propose legislation to the State Legislature, which will either create a new authority or expand the powers of one of the existing ones. This will require time. The County is currently moving ahead with the implementation of the parts of the Plan that it controls through existing

District operations and intermunicipal agreements pending any decision to create an authority. It is also continuing to work with the towns and villages to obtain their full participation in the project.

# 10.0 IMPLEMENTATION SCHEDULE

## 10.1 SUMMARY OF RECOMMENDED CAPITAL AND PROGRAMMATIC ACTIVITIES

### 10.1.1 Initial Wastewater Collection System Rehabilitation and Continued Investigations and Evaluations

Initial sanitary sewer rehabilitation projects identified in the SSO Mitigation Plan will be implemented beginning in late 2010 and continue through 2011. Concurrently, the remaining portions of the SCPS Basin will be investigated, including televising sewers and inspecting manholes. Based on the investigation findings, annual sanitary sewer rehabilitation projects will be recommended for the years 2012, 2013, and 2014.

Flow metering will be conducted in strategic locations at appropriate times to monitor the effectiveness of the completed sanitary sewer rehabilitation projects. The resulting flow metering data will be input into the calibrated hydrologic/hydraulic model, and the model will be used to evaluate the reduction in the targeted I/I to date, and to predict the anticipated I/I reduction after the implementation of future rehabilitation projects. As more data is collected, the existing calibrated model and the sewer system GIS-based data management software will be updated to reflect changes in the physical condition of the sanitary sewer system, and to reflect significant changes in SCPS operations.

While the sanitary sewer system rehabilitation and investigation work is being performed, a facility condition assessment and comprehensive capacity evaluation of the WPCP will be performed. This will expand upon the preliminary capacity evaluation that was completed in December 2007 in accordance with the Consent Order requirements. A facility condition assessment of the WPCP is currently underway and is expected to be completed by late summer 2010. In addition, a detailed hydraulic evaluation of the SCPS and force main will be performed

as a compliment to the WPCP evaluation with regards to pump station/force main capacity expansion and to identify potential impacts on WPCP operations.

Using the hydrologic/hydraulic model and the results of the SCPS and WPCP evaluations, different combinations of sewer system rehabilitation projects and pump station/force main and treatment upgrades will be assessed to determine the most technically-feasible, cost-effective, and environmentally sustainable solution to mitigate the SSO. The preferred mitigation scenario will be rehabilitation of a significant portion of the public sanitary sewer system and implementation of selective private property I/I reduction projects in combination with some level of upgrades/optimization/expansion of the WPCP, SCPS, and force main.

Because private property sources of I/I are also considered to be contributors to the cause of the SSO, a program for private property inspections will be implemented during the initial years of this project. The Village of New Hartford has already indicated its intent to begin inspections in 2010. The District has provided the Village with sample public information documents (letters, door hangers, etc.) and will provide the Village with the field computer and software necessary to conduct the inspections, with the collected information managed by the District sewer system management software.

Work will also include the continuation and formalization of CMOM programs for both the member communities and District that were under preliminary development during the preparation of the SSO Mitigation Plan.

### 10.1.2 Continued Wastewater Collection System Rehabilitation and SCPS and WPCP Upgrades

This work element will include continued sanitary sewer system rehabilitation and the actual upgrades to the SCPS and WPCP. The extent of the upgrades will be based on the evaluations and optimization work performed under the previous work element. The major I/I reduction

projects that were previously initiated will continue, the scope of which will be confirmed based on the effectiveness of the prior results.

### 10.1.3 CMOM: Perpetual Care

To ensure that the SSO remains in compliance, the CMOM programs will continue to be implemented. This will ensure that "perpetual care", or proactive routine sewer system maintenance and rehabilitation, will continue thereafter. Other programs such as private property inflow reductions and wastewater collection system flow metering will also continue, as appropriate.

## 10.2 INSTITUTIONAL STRUCTURE AND FINANCIAL CONSIDERATIONS

Addressing the challenges associated with the institutional structure of the sanitary sewer system, along with finalizing a short- and long-term financial and fiscal strategy necessary to ensure that sufficient progress is made toward SSO mitigation, will continue to be an ongoing effort among the District and the member municipalities. In the short term, intermunicipal agreements are being secured among Oneida County and the member municipalities relative to procedures for expending the initial $25.8 million in project financing from NYSEFC. Over the next several months as alternative sources of preferred financing are applied for, it is likely that additional or amended agreements among the county and municipalities will be needed.

## 10.3 SSO MITIGATION PLAN IMPLEMENTATION SCHEDULE

Figure 10-1 presents the proposed schedule for implementing the SSO Mitigation Plan. This schedule incorporates an aggressive program of investigation/evaluations, capital improvement projects, and overall sewer system management programs. In most instances the investigation/evaluations and programs that were initiated in preparation of this SSO Mitigation Plan will continue during implementation. This will include continued wastewater collection system investigations, CMOM, SCPS, and WPCP evaluations, supplemental flow metering, and

coordination with the City of Utica LTCP program. Tables 10-1 through 10-5 present further supporting justification for the time lines provided on the proposed schedule.

## 10.4 DELIVERABLES AND MILESTONES

To assist in achieving the project goals, the District has developed the following list of proposed project deliverables and milestones:

1. Semi-Annual Progress Reports
    a. Schedule
    b. Work Completed
    c. Future Work
    d. Variations in Schedule
    e. SCPS Overflows

2. Annual Work Plans
    a. Engineering Investigations
        i. Manhole Inspections (per year)
        ii. Sewer Inspection (per year)
        iii Private Property Inspections (per year)
        iv. WPCP (study, design, and construction)
        v. SCPS/FM (study, design, and construction)

    b. Proposed Construction
        i. Manhole Inspections (per year)
        ii. Sewer Inspection (per year)
        iii. Private Property Inspections (per year)
        iv. WPCP (study, design, and construction)
        v. SCPS/FM (study, design, and construction)

3. Technical Meeting with the Region (as needed or coincide with semi-annual progress reports)

4. Engineering Evaluations (completed based on Schedule)
    a. Sewer Investigations/Rehabilitation/Progress toward I/I Reduction
    b. WPCP
    c. SCPS/FM

5. CMOM
    a. Program Establishment
    b. Development of Compliance Procedures
    c. Work to be Completed (annual work plan)
    d. Work Completed (annual work plan)

6. Satellite Community Updates (annual)
    a. Work Completed
    b. Future Work

7. Steering Committee Updates (annual)

July 2010

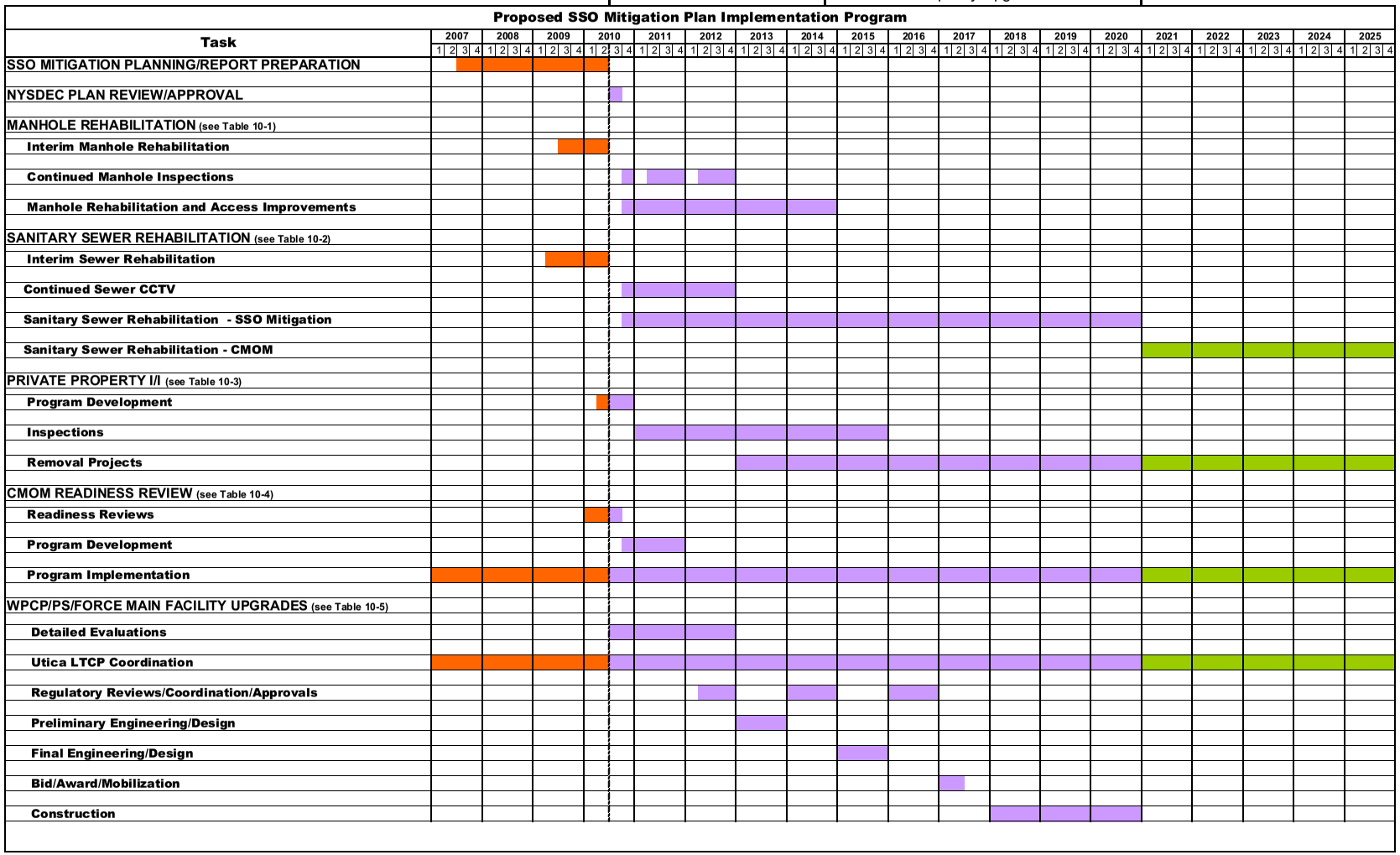
FIG. 10-1

**Oneida County Sewer District**
**Project Implementation Schedule**

Advance Work ➡

Wastewater Collection System Rehabilitation/Investgation

Continued Wastewater Collection System Rehabilitation and SCPS and WPCP Capacity Upgrades



**Oneida County Sewer District**
**Project Implementation Schedule**

**Table 10-1: Detailed Schedule Information - Manhole Rehabilitation**

**Funding Source:** $5.3 million CWSRF No. C6-6070-08-00 - 2010 CWSRF IUP, Annual List. Application submitted.

| TASK | Start | Duration | Assumptions |
|---|---|---|---|
| **Inspections** | Oct-10 | 2 years | |
| | (Dependent on NYSEFC financing) | | 4200 manholes remaining.<br>NASSCO standardized inspections for data consistency.<br>GBA sewer system management software.<br>15/day per crew, 280 crew days.<br>April-Nov (inspection season 32 weeks).<br>32 wks x 5 days = 160work days/season.<br>280/160 = 1.75 seasons - say 2 seasons.<br>Estimated completion November 2013 |
| **Rehabilitation** | Oct-10 | 1 season | <u>Right-of-Way Access Improvements (off-road/cross-lot locations)</u><br>Engineering/bid docs - 2 months design, 1 month NYSEFC review, 3 months bid/contract.mobilize. |
| (Dependent on NYSEFC financing) | | unkown | NYSDEC Region 6 has stated its desire to approve and permit the brush/tree removal over interceptor sewer rights-of-way prior to work commencing. Time requirement for permits and associated cultural resources investigations unknown. |
| | Apr-11 | 4 seasons | <u>Manhole Rehabilitation</u><br>Engineering/bid docs - 2 months design, 1 month NYSEFC review, 3 months bid/contract/mobilize<br>Assume 2500 (60%) manholes need rehabilitation<br>April-Nov (construction season - 32 weeks).<br>600 MH/season (10/wk reline, 25/wk grout, 3/wk replace).<br>2500/600 = 4.16 seasons |

Start date contingent on NYSDEC approval of Mitigation Plan and acquisition of project financing.

**Oneida County Sewer District**
**Project Implementation Schedule**

**Table 10-2: Detailed Schedule Information - Sanitary Sewer Rehabilitation**

**Funding Source:** $20.50 million CWSRF No. C6-6070-08-01 - 2010 Intended Use Plan - Annual list. Application submitted.
$57.26 million CWSRF No. C6-6070-08-02 - 2010 Intended Use Plan - Multi-year List

| Task | Start | Duration | Assumptions |
|---|---|---|---|
| **Inspections** | Oct-10<br><br>(Dependent on NYSEFC financing) | 2 years | **CCTV** - 150 miles (800,000 feet) remaining<br>NASSCO PACP standardized inspections for data consistency.<br>GBA sewer system management software for rehab planning.<br>April-Nov (inspection season 32 weeks).<br>Sewer cleaning req'd prior to CCTV - Limited during sub-freezing temps.<br>32 wks x 5 days = 160 work days/season.<br>Production rate - 3000 ft CCTV/day<br>800,000/3000 = 267 days/160 = 1.7, say 2 seasons.<br>Estimated Completion - December 2012. |
| | | concurrent | **Storm sewer inspections** (per smoke test results - direct/indirect connections)<br>2/day, 100 locations, 50 days = 10 weeks, say 3 months |
| | | concurrent | **Dye testing** at remaining indirect inflow locations<br>2/day, 100 locations, 50 days = 10 weeks, say 3 months |
| **Rehabilitation** | Oct-10<br><br>(Dependent on NYSEFC financing) | 10 years | April - Nov construction season (can't work during winter weather conditions).<br>32 week construction season (32 weeks x 5 days/week = 160 days). |
| **High priority inflow** | Dec-10 | 6 months | Engineering/bid docs - 2 months design, 1 month NYSEFC review, 3 months bid/contract/mobilize. Focus will be on known "low-hanging fruit" inflow sources (direct, indirect, and rapid rain induced infiltration). |
| | | 1 season | 130 catch basin removals/repairs - 1/day = 130 days = 26 weeks = 1 season. |
| **Annual work plan** | | | Rehab work plan for upcoming year prepared based current year's inspections. Will also include period of assessment (targeted flow monitoring) at appropriate intervals during the mitigation schedule to confirm progress made toward I/I reduction. |

Start date contingent on NYSDEC approval of Mitigation Plan and acquisition of project financing.

**Oneida County Sewer District**
**Project Implementation Schedule**

**Table 10-2 (cont.): Detailed Schedule Information - Sanitary Sewer Rehabilitation**

| Task | Start | Duration | Assumptions |
|---|---|---|---|
| **Annual rehab contracts** | | | **Engineering/bid docs (annually)** - 3 months design, 1 month NYSEFC review, 3 months bid/contract/mobilize<br><br>***Estimated Construction Production Rates***<br><br>**VCP pipe** - cured in-place lining - 79 miles<br>79 miles/(0.5 mile/week)/(32 weeks/yr) = 5.0 construction seasons.<br>Cold temperature limitations (freezing of product, freezing of sewer cleaning equipment (preparation work requires pipe cleaning immediately prior to the CIPP lining installation)), Winter road safety issues.<br>Requires by-pass pumping (limitations during wet weather flows and cold temps).<br>Limited contractors (supply/demand/availability).<br><br>**Asbetos Cement Pipe** - 92 miles<br>Environmental hazards requires asbestos abatement protocols.<br>Grouting will be used when practical to minimize asbestos exposure.<br>Pressure test/grout - 100 joints per day (50.000 joints) = 500 days = 4 years based on 32 week or 140 working day construction season.<br><br>**Spot repairs** (isolated sheer breaks repaired by CIP sleeves)<br>Assume 1500 breaks/3 repairs per day/32 weeks = 3.12 seasons<br><br>**Replacement** (localized areas (mainly VCP) will require complete replacement).<br>Assume 25,000 ft/(100 feet/day)/(160 days/season) = 1.5 seasons.<br>These sewers are mainly in road pavement and will conflict with existing utilities.<br><br>**Laterals** - the majority of defective lateral connections to the main sewers will be repaired/sealed using in-situ methods. 50% are assumed to be defective.<br>Assume 13,000 laterals x 50% = 6500/(12/day)/(140 days/season) = 4 seasons.<br>Limited contractors, cold weather and wet weather flow limitations. |

Start date contingent on NYSDEC approval of Mitigation Plan and acquisition of project financing.

**Oneida County Sewer District**
**Project Implementation Schedule**

**Table 10-3: Detailed Schedule Information - Private Property Inflow Sources**

**Funding Source:** Pending. An initial funding allocation has been requested through NYSEFC ($8.14 million CWSRF No. C6-6070-08-03 - 2010 CWSRF Intended Use Plan - Multi-year List). Project Implementation costs are unknown pending completion of the inspections.

| Task | Start | Duration | Assumptions |
|---|---|---|---|
| **Inspection Program** | Oct-10 | | Formalize standard Private Property inspection program/protocols.<br>Public information/education program.<br>GBA sewer system management software will be used.<br>Training for municipal inspectors is necessary.<br>13,000 connections. Assume 20% refused access = 10,400 inspections<br>10,400 inspections/(20 inspections/week) = 3.25 years, say 4 seasons<br>Home inspection program requires buy-in by elected municipal leaders from the 9 satellite communities.<br>Develop a proposed framework for a private property inflow removal program based on inspection findings and public/private financing needs. |
| **Projects Projects** | | | Private property repair program requires buy-in by elected municipal leaders from the 9 satellite communities.<br>Schedule is dependent on a suitable and legal public/private funding mechanism being put into place to assist homeowners with financing the cost of repairs.<br>Develop standardized list of repair options.<br>Develop annual bid documents (unit prices) for various repair options.<br>Develop a pre-qualified contractor list.<br>Estimated schedule - dependent on private property financing program. |

Start date contingent on NYSDEC approval of Mitigation Plan and acquisition of project financing

**Oneida County Sewer District**
**Project Implementation Schedule**

**Table 10-4: Detailed Schedule Information - CMOM Program**

**Funding Source:** Program development to funded by District operating budget. Projected implementation budgets are dependent on local municipal budget allocations.

| Task | Start | Duration | Assumptions |
|---|---|---|---|
| **Readiness Reviews** | Apr-10 | 6 mos. | Meet with all communities (done).<br>Prepare current CMOM readiness reviews. |
| **Program Development** | Oct-10 | 1 year | Develop framework for CMOM program.<br>Review the draft CMOM program with communities.<br>Finalize proposed amendment to Sewer Use Rules and Regulation by December 2011. |
| **Implementation** | Underway | continuous | District-wide Sewer Overflow Response Plan prepared and implemented in 2008.<br>Sewer system mapping within SCPS sewer service area is complete (232 miles).<br>Sewer and manhole inspections initiated within the SCPS sewer service area. |
| | Jan-12 | | Annual municipal CMOM work plans submitted to OCSD. |

Start date contingent on NYSDEC approval of Mitigation Plan and acquisition of project financing.

**Oneida County Sewer District**
**Project Implementation Schedule**

**Table 10-5: Detailed Schedule Information - WPCP and SCPS/Forcemain Upgrades**

**Funding Source:** Noted below for each task heading

| Task | Start | Duration | Assumptions |
|---|---|---|---|
| **Detailed Evaluations** | Included in the $20.50 million CWSRF No. C6-6070-08-01 - 2010 Intended Use Plan - Annual list | | |
| WPCP Condition Assessment | underway | 4 months | Assess condition of WPCP phyicial infrastructure<br>Estimated Completion - October 2010 |
| WPCP Capacity Evaluation | Oct-10 | 18 months | Detailed capacity evaluation of the treatment plant<br>- Stress testing, Bio-Win modeling, evaluation of unit processes.<br>- Evaluate incremental capacity expansion options to accommodate SSO, CSO, and growth.<br>- Incorporate Split Flow concepts into expansion options.<br>Environmental screenings (potential discharge limits, identify potential permits/approvals). |
| SCPS and Forcemain | | 4 months | Evaluate hydraulic and operational requirements to increase flow from SCPS to the WPCP.<br>Environmental screenings (wetlands, stream crossing). |
| Regulatory Reviews/Coordination/Approvals | | 6 months (post submission) | Submit engineering reports to NYSDEC for review and comment.<br>Assume review meetings with NYSDEC staff.<br>Assess potential permit issues and coordinate requirements with NYSDEC. |

Start date contingent on NYSDEC approval of Mitigation Plan and acquisition of project financing.

**Oneida County Sewer District**
**Project Implementation Schedule**

**Table 10-5 (cont.): Detailed Schedule Information - WPCP and SCPS/Forcemain Upgrades**

**Engineering/Design** $36.30 million CWSRF No. C6-6070-08-04 - 2010 Intended Use Plan - Mulit-year List - SCPS/FM
$56.00 million CWSRF No. C6-6070-08-05 - 2010 Intended Use Plan - Multi-year List - WPCP

| Task | Start | Duration | Assumptions |
|---|---|---|---|
| **Preliminary Design** | | | |
| **- WPCP Upgrades** | | 2 months | Survey/mapping. |
| | | 2 months | Geotechnical (poor soils and high water table at existing WPCP). |
| | | 6 months | Preliminary design of facility upgrades. |
| | | 12 months | Assumes availability of land. Add 12 months if land acquisition is required. |
| | | 2 months | Split Flow coordination - tied to Utica LTCP schedule and Utica's funding. |
| | | 2 months | Split flow design - need to coordinate layout to avoid process conflicts and duplicative costs, assuming Utica CSO treatment is designed/constructed at a later date. |
| **- SCPS and Forcemain** | | 3 months | Survey/mapping (4.5 miles of difficult terrain). |
| (based on current model predictions) | | 2 months | Geotechnical (required at all railroad, stream, and highway crossings). |
| | | 3 months | Preliminary design. |
| | | 3 months | Wetland delineations. |
| **- Regulatory Reviews/Coordination/Approvals** | | | |
| | | | ***WPCP Upgrades*** |
| | | 6 months | Permit limits (NYSDEC) - will they change from current permit? |
| | | 2-12 months | Cultural resources (archeological) reviews. Assumes Phase 1A only. Add additional 6-12 months if archeological surveys are required by NYSOPRHP. |
| | | 6 months | NYSDEC Plan reviews and technical meetings, address comments. |
| | | 6 months | SEQR. |
| | | | ***SCPS and Forcemain*** |
| | | 1 year | Wetland permits/stream crossing Joint Application, Nationwide ACOE permit). |
| | | 1 year | CSX Railroad reviews/approvals. |
| | | 2-12 months | Cultural Resources review - depends on alignment of second forcemain. Archeological survey durations vary depending on extent of work and weather limitations (can't perform surveys during winter (snow/frost) and flooded conditons). |
| | | 2 months | NYSDOT - major crossings at NYS Route 12 (N-S Arterial) and North Genesee Street). |
| | | 6 months | NYSDEC plan reviews, address comments. |
| | | 12 months | Harbor Point contaminated site - need access across/adjacent to remediation area. |

Start date contingent on NYSDEC approval of Mitigation Plan and acquisition of project financing.

**Oneida County Sewer District**
**Project Implementation Schedule**

**Table 10-5 (cont.): Detailed Schedule Information - WPCP and SCPS/Forcemain Upgrades**

| Task | Start | Duration | Assumptions |
|---|---|---|---|
| **Final Design** | | | |
| **- WPCP** | | | |
| | | 6 months | Prepare construction drawings, technical specifications, and related bidding documents. Incorporate preliminary design review comments from regulatory agencies. |
| | | 1 month | Stormwater Pollution Prevention Plan. |
| **- SCPS and Forcemain** | | | |
| | | 4 months | Prepare construction drawings, technical specifications, and related bidding documents. Incorporate preliminary design review comments from regulatory agencies. |
| | | 1 month | Stormwater Pollution Prevention Plan. |
| **- Regulatory Reviews/Coordination/Approvals** | | 6 months | Submit final design documents to NYSDEC and NYSEFC for review and approval. |
| | | 1 month | Incorporate final review comments into bid documents. |
| | | 6-12 months | Secure final permits and approvals (USACOE wetland, NYSDEC Water Quality Certification, CSX work permit, NYSDOT work permits, etc…). |
| | | 1 month | Submit Notice of Intent for inclusion in the General SPDES Permit for Construction Activities. |
| | | | Secure access across Harbor Point site (forcemain). |
| | | 1 month | Secure SWPPP approval from the jurisdictional MS4s (Whitestown, Yorkville, and Utica). |
| **Construction** | Jan-18 | Dec-20 | |
| **Bid/Award/Mobilize** | | 8 months | Bid (Wicks Law) - 8 weeks, Bid review (District and NYSEFC) - 4 weeks, Contract award - 8 weeks, Mobilization - 12 weeks. |
| **WPCP and Split Flow (?)** | | 2-3 seasons | Assumes land is available to accommodate space for construction. |
| **SCPS and forcemain** | | 2 seasons | Seasonal construction limitations due to late fall through early spring flooding of the forcemain route. Schedule is dependent on determination from NYSDEC regarding temporary displacement of Utica CSO flows if forcemain modifications are constructed prior to Utica's CSO treatment (Split flow). |

Start date contingent on NYSDEC approval of Mitigation Plan and acquisition of project financing.