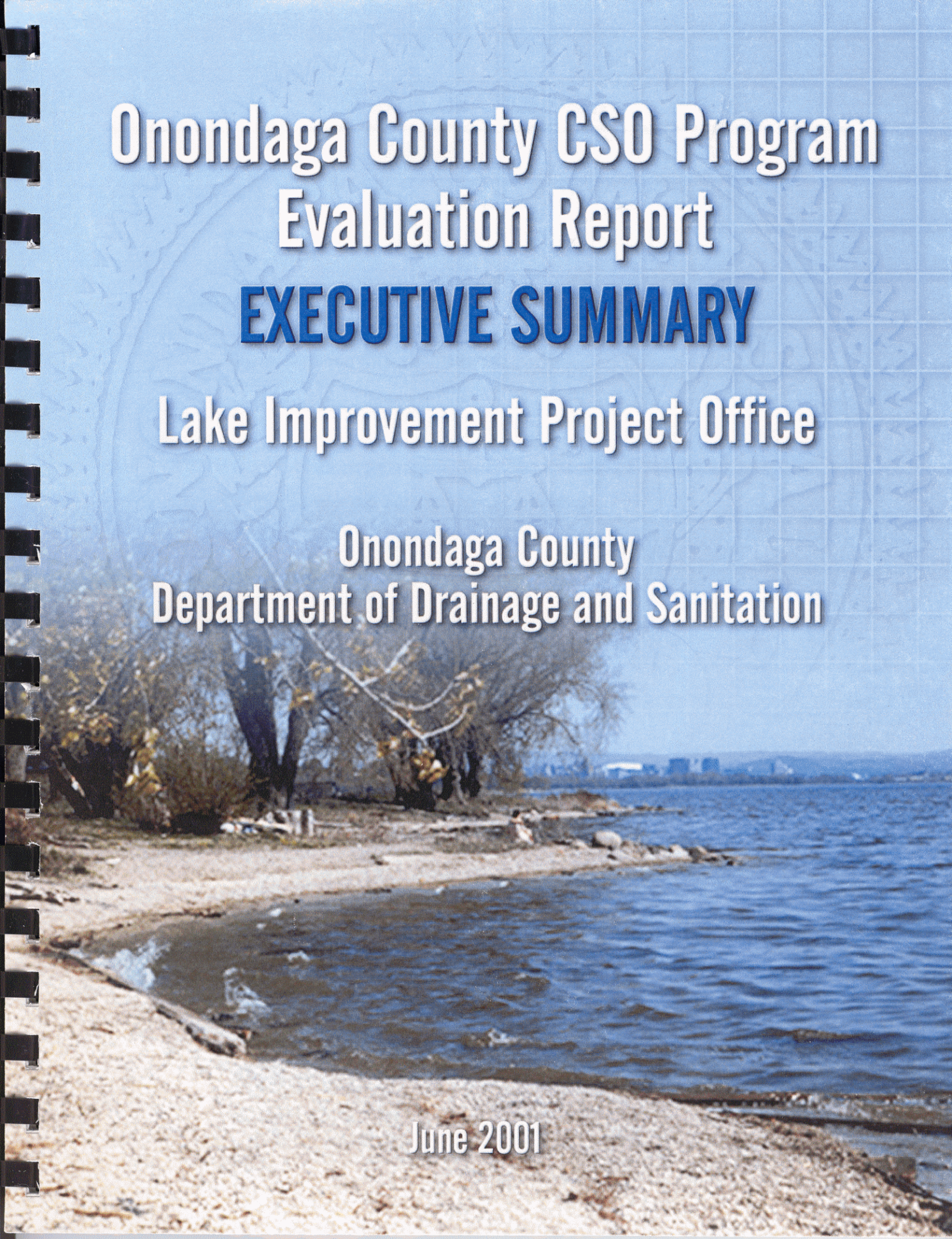
Onondaga County CSO Program Evaluation Report

EXECUTIVE SUMMARY

Lake Improvement Project Office

Onondaga County
Department of Drainage and Sanitation



June 2001

Table of Contents

Table of Contents

Figures

Tables

1.0 Introduction

1.1 Purpose

This Executive Summary provides a very abbreviated summary of the Onondaga County CSO Program Evaluation Report. Readers interested in specific components of the evaluation should read the full report, which provides significant detail on the procedures employed and results of the evaluation.

Onondaga County entered into an Amended Consent Judgment (ACJ) that was signed by the Federal Court on January 20, 1998. The scope of the ACJ includes improvements to the combined sewer system tributary to the Metropolitan Syracuse Wastewater Treatment Plant (Metro) to eliminate or abate the numerous combined sewer overflows (CSOs) that exist. Improvements to Metro and the CSO projects listed in the ACJ represent the County's Long-term CSO Control Plan.

The CSO Evaluation Report reviews the entire existing combined sewer system and verifies that the program will achieve Federal and State water quality standards and policies in compliance with the 1972 Clean Water Act as amended. In addition, the report addresses general and project specific issues regarding the appropriateness and effectiveness of the CSO abatement program in the context of the ACJ and community interests.

The essential objectives of the CSO evaluation were to determine the impact of the improved combined sewer system on the capacity and operations of Metro, to evaluate alternative technologies and approaches to achieving water quality standards and to determine whether a combination of supplemental or alternative projects would be more cost effective or provide enhanced water quality.

1.2 Background

Onondaga County has been making modifications and improvements to its combined sewer system since the 1970s and early 1980s, when the initial Combined Sewer Overflow (CSO) Facility Planning work was conducted. Best Management Practices (BMPs), to improve the operation and efficiency of the combined sewer system, were recommended and implemented in the early 1980's, which were very successful in reducing the frequency and magnitude of the CSO discharges. Facility planning activities were continued after the Atlantic States Legal Foundation filed suit against the County regarding water quality violations resulting in a New York State Department of Environmental Conservation (NYSDEC) Consent Order in 1989. The Consent Order required the County to proceed with development of a municipal compliance plan (MCP) for upgrading treatment processes at Metro and to abate combined sewer overflows (CSOs). After the draft MCP and

Environmental Impact Statement (DEIS) were submitted to the NYSDEC and Atlantic States Legal Foundation in January 1996, the MCP was found to be unacceptable by Atlantic States Legal Foundation and negotiations ensued ultimately resulting in the Amended Consent Judgment (ACJ) agreed to by the parties in 1997 and signed by the Federal Court on January 20, 1998.

Primary water quality objectives of the ACJ include reductions in the loading of phosphorus and ammonia to Onondaga Lake (through Metro improvements) and the reduction of bacterial and floating solids loading by improvements to the combined sewer system. The CSO projects included in the ACJ were determined during the negotiations leading to the ACJ to achieve compliance with the requirements of the Federal "CSO Control Policy" enacted in April 1994 and the New York State "CSO Control Strategy" dated October 1993. Although the evaluation report largely addresses the improvements to the combined sewer system, a number of issues related to Metro are also discussed.

A list of interim and major CSO projects from the ACJ are included in Table 1-1 along with notes on their current status. Figure 1-1 shows the location of the specific CSO abatement projects required by the ACJ and the geographical service area of these projects.

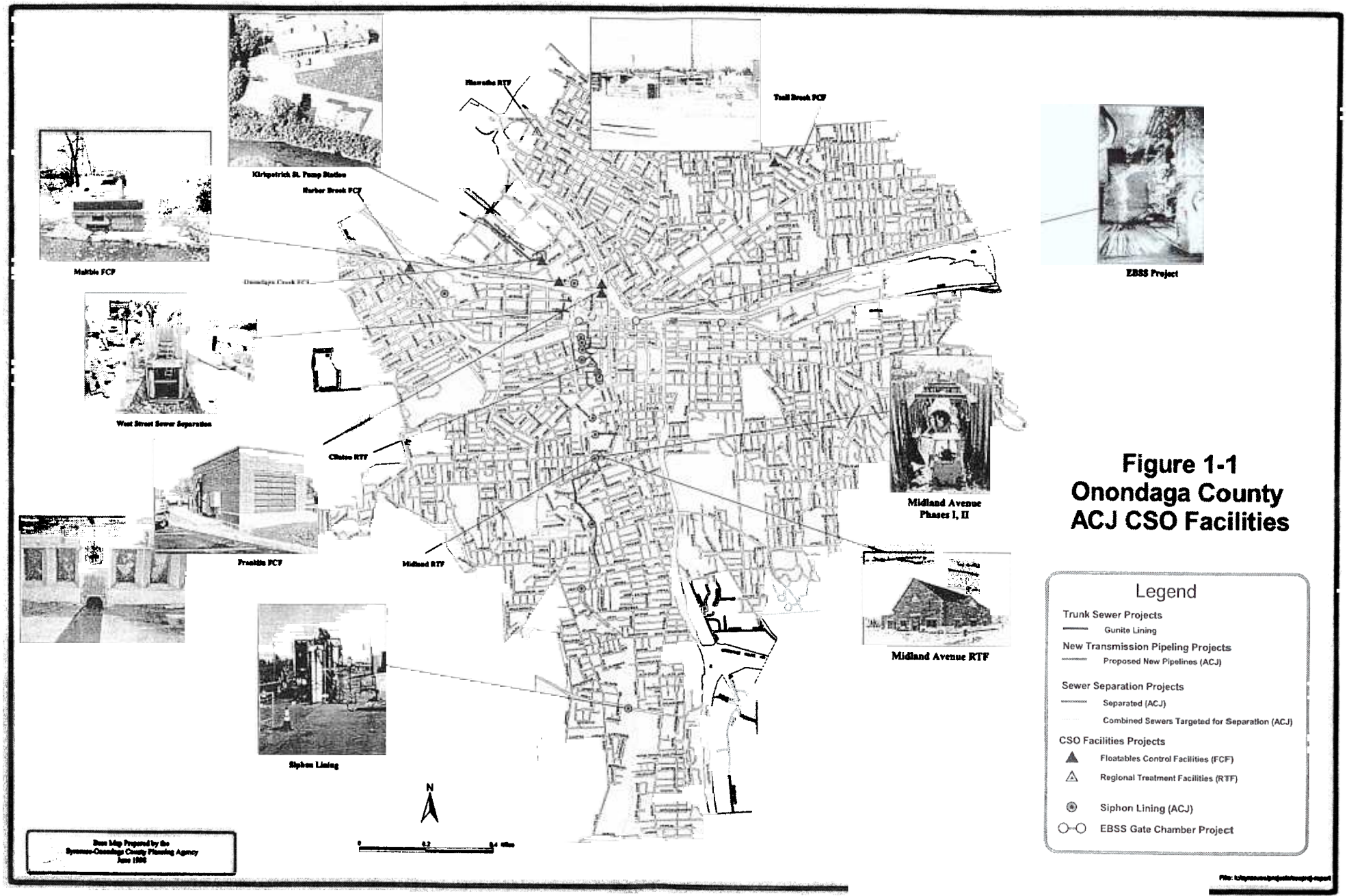

Kirkpatrick St. Pump Station
Harbor Brook FCF
Hawthorne RTF
Tuell Brook FCF
Maltbie FCF
EBSS Project
West Street Sewer Separation
Onondaga Creek FCF
Chase RTF
Midland Avenue Phases I, II
Franklin FCF
Midland RTF
Midland Avenue RTF
Siphon Lining
N
Figure 1-1
Onondaga County
ACJ CSO Facilities
Legend
Trunk Sewer Projects
Gunite Lining
New Transmission Pipeling Projects
Proposed New Pipelines (ACJ)
Sewer Separation Projects
Separated (ACJ)
Combined Sewers Targeted for Separation (ACJ)
CSO Facilities Projects
Floatables Control Facilities (FCF)
Regional Treatment Facilities (RTF)
Siphon Lining (ACJ)
EBSS Gate Chamber Project

TABLE 1-1
ONONDAGA COUNTY CSO PROGRAM EVALUATION REPORT
ONONDAGA COUNTY CSO PROGRAM STATUS AND POTENTIAL MODIFICATIONS

PROJECT NAME	DESCRIPTION OF PROJECT	STATUS
INTERIM PHASE PROJECTS		
Hiawatha Boulvard RTF Demonstration Project	Construction of CSO interceptor pipelines and vortex separator with disinfection and storage	Construction is complete and ready for startup
Newell Street RTF	Reactivation of existing swirl concentrator and disinfection facility. Evaluation of different disinfection processes.	Disinfection evaluation project completed
Harbor Brook In-Water System	Construction in Onondaga Lake of a "flow balance method" of floating pontoons and weighted curtains to entrap wet-weather flow from Harbor Brook.	Significant impediments to implementation will likely eliminate project, ongoing facility planning effort to assess alternatives
EBSS Storage Upgrade	Reactivation of storage system with the construction of new controls and other collection system improvements	Under design
Kirkpatrick Street Pumping Station Upgrade	Upgrade of the pump station capacity with construction of a new force main to Metro for wet weather flows	Bidding/Award Phase
Onondaga Creek	Construction of a floatables boom for Onondaga Creek	Under Design
Harbor Brook FCF	Construction of a net bag facility for Harbor Brook	Under Design
Teall Brook FCF	Installation of a "combing" type mechanical screen	Bidding/Award Phase
Environmental Benefit Project (EBP)	Confirmation of the impact of non-point nutrient loading to Onondaga Lake	EBP project underway
Evaluation of Siphon Crossings	Evaluation and repair of siphon structures along Onondaga Creek and Harbor Brook	Construction Completed
Evaluation of CSO Toxicity	Monitoring of the collection system adjacent to industrial discharge and evaluation of control methodologies to minimize or eliminate potential toxics from CSO discharges	Scope of work under development
MAJOR PROJECTS		
Midland Conveyances and RTF	Construction of CSO transmission facilities and a regional treatment facility with disinfection	RTF Facility under design, Phase I transmission facilities have been completed
Clinton Conveyances and RTF	Construction of CSO transmission facilities and a regional treatment facility with disinfection	In preliminary design phase
Franklin FCF	Construction of net bag type of facilities near the terminus of the Butternut and Burnet Avenue Trunk Sewers	Construction completed, facilities are operational
Maltbie FCF	Construction of a net bag facility at Onondaga Creek and Maltbie Street	Construction completed, facilities are operational
Sewer Separation	Construction of separate sanitary and/or storm sewers	Design near completion - Onondaga Creek Basin. Harbor Brook Basin in planning stages

2.0 Existing CSO System and CSO Abatement Program

2.1 Description of the Combined Sewer System

The combined sewer system located in the City of Syracuse is tributary to the Metropolitan Syracuse Treatment Plant (Metro) encompassing an area of 6,812 acres (approximately 10 square miles) and affects the Onondaga Creek, Harbor Brook, and Ley Creek watersheds of Onondaga Lake (see Figures 1-1 and 2-1). During periods of intense rainfall, combined sewer overflows and storm sewers discharge to these watercourses. Both storm sewer discharges and combined sewer overflows must be considered in the development of the different combined sewer overflow (CSO) abatement alternatives. The chart below summarizes the number and basin area for the combined system and dedicated storm systems in the three watersheds:

	Number of Basin Overflows	*Combined Acreage*	*Percentage of Total Combined*	*Storm Sewer Acreage*	*Total Acreage*
Harbor Brook	18	1,287	18.9%	0.0	1,287
Onondaga Creek	43	5,264	77.3%	637	5,901
Ley Creek	2	261	3.8%	628	889
TOTALS:	63	6812	100%	1265	8,077

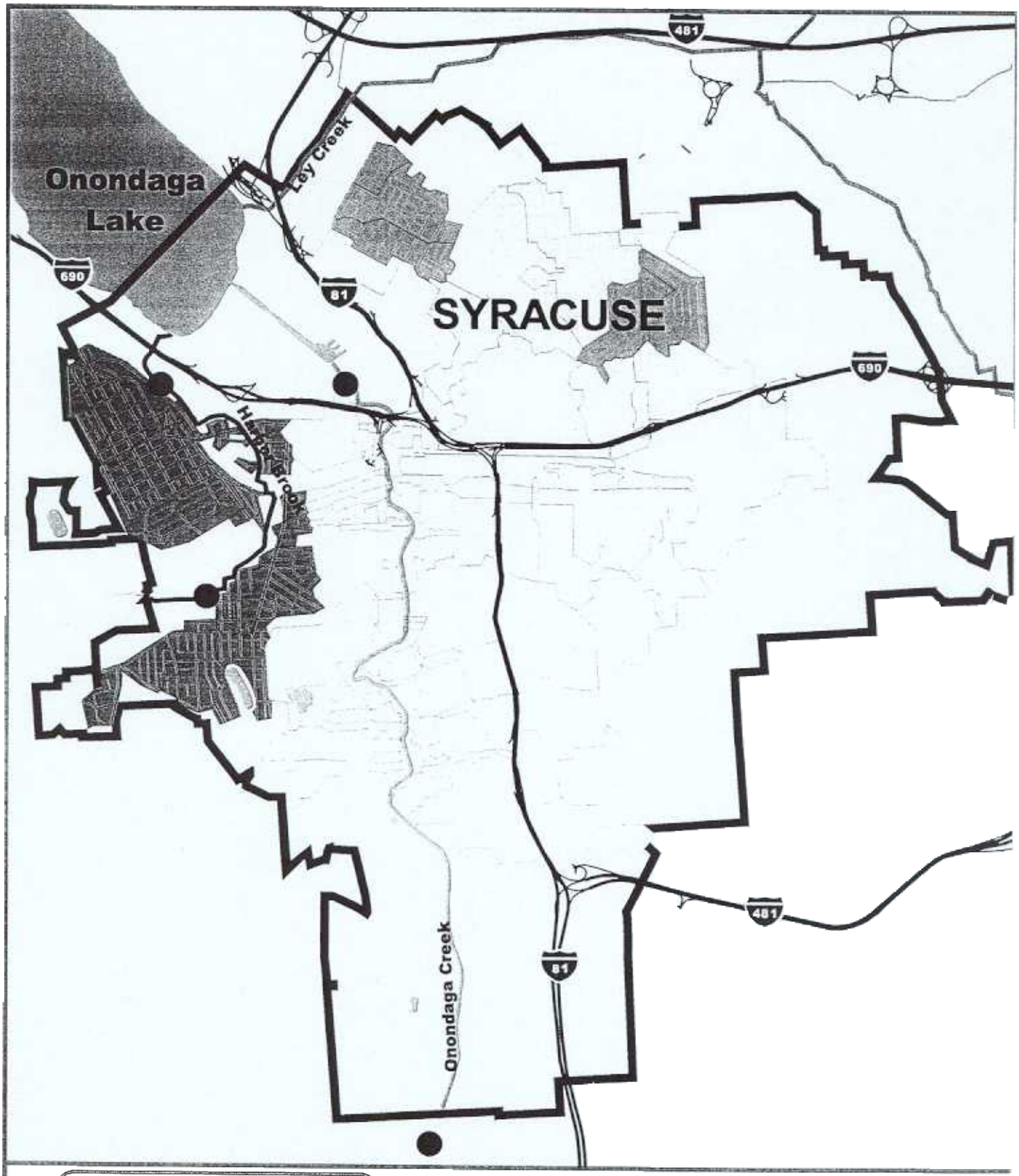
*Note: The West Street Sewer Separation Project completed in December 1999 eliminated 3 overflows leaving 40 CSOs to Onondaga Creek at this date including the Spencer Street Bypass.

Regulatory and ACJ Requirements

The ACJ requires the following:

"14. The County shall design, construct, maintain, and modify and/or supplement, as necessary, a CSO control and upgrade program in accordance with DEC CSO guidance, as set forth in TOGS 1.6.3 (CSO Control Strategy), which implements the "presumptive approach" in EPA's CSO control policy, as set forth in 59 F.R. 18688 (April 18, 1994). The County's program shall achieve the following:

A. elimination or the capture for treatment of no less than 85% by volume of the combined sewage collected in the combined sewer system during precipitation events on a system-



Lake Improvement Project, Onondaga County, New York

Onondaga County
CSO PROGRAM EVALUATION REPORT
LOCATION MAP

FIGURE 2-1

B. wide annual average basis [this requirement is consistent with the national CSO policy for the presumption approach],

C. elimination or minimization of floating substances in Onondaga Lake attributed to the County's CSOs, and

D. achievement of water quality standards for bacteria for all portions of Onondaga Lake that are classified as "Class B" pursuant to 6 NYCRR Part 895 [demonstration approach].

As part of the MCP and ACJ development, modeling (computer simulation) was performed to determine compliance with the 85% rule. A calibrated version of the USEPA Storm Water Management Model (SWMM) was used to demonstrate that a minimum of 85% elimination or capture for treatment could be accomplished.

2.3 Description of the CSO Program

The current Onondaga County CSO abatement plan utilizes a combination of flow-management approaches and technologies including sewer separation, and storage/transport to Metro for treatment, regional treatment utilizing vortex separator technology with high-rate disinfection and floatables containment/collection. Project descriptions and the basis of design for each project in the CSO Program are summarized in Table 2-3.

The ACJ CSO Program was originally developed to achieve 85% elimination or capture of the combined sewage volume collected by the combined sewer system tributary to Metro without consideration of the treatment provided by the proposed regional treatment facilities (RTF's). While the computer modeling used to develop the CSO Program takes into consideration the CSO captured by the proposed regional facilities, the capture analysis previously only considered the volume of flow that is conveyed for treatment at Metro and did not include the CSO treated and discharged by the regional facilities.

As part of this CSO Program Evaluation Report, the Capture Analysis was refined using more recent flow data and the actual design assumptions for a number of the projects that have been recently designed and/or constructed. An analysis was performed to evaluate the volume of combined sewage captured under existing conditions, while additional analyses were performed to evaluate future conditions upon completion of the proposed facilities that make up the ACJ CSO Abatement Program.

Table 2-4 provides the results of the analysis for existing conditions. The existing percent capture of 74% was determined by dividing the total volume of combined sewage captured

TABLE 2-3
ONONDAGA COUNTY CSO PROGRAM EVALUATION REPORT
PROPOSED CSO PROJECTS AND BASIS OF DESIGN

Proposed Project	Description of Proposed Facilities	Peak Design Flow Rate (CFS)	Storage Volume (MG)
Hiawatha RTF	29 ft. Dia. Swirl Concentrator, 0.27 MG off-line storage, and Disinfection	65	.047
Harbor Brook CSO Abatement (Long Term Control Facilities)	Facilities planning underway	To Be Determined	To Be Determined
Harbor Brook FCF	In Stream Net Bag System	200 Pending DEC Approval	N/A
EBSS Reactivation	5 MG Gated Storage Conduits	N/A	6
Teall FCF	Weir-Mounted Combing Screen for CSO Flow Only	144	N/A
Onondaga Creek FCF	Boom	600 Pending DEC Approval	N/A
Midland RTF	4, 42 ft. Dia. Swirl Concentrators and Disinfection	667	7.3
Clinton RTF	Facilities planning underway	To Be Determined	To Be Determined
Newell RTF	Reactivation of 12 ft. and 16 ft. Dia. Swirl Concentrator and Disinfection	23	0.07
Franklin FCF – Butternut FCF Burnet FCF	 Net Bag System (8 Bags) Net Bag System (6 Bags)	 311 267	 N/A N/A
Maltbie FCF	Net Bag System (3 Bags)	82	N/A
Sewer Separation	Separation of various Combined Sewer Service Areas totaling 212.8 Acres	Varies	N/A

TABLE 2-4
ONONDAGA COUNTY CSO PROGRAM EVALUATION REPORT
CSO VOLUME CAPTURE TABLE - EXISTING CONDITIONS

Sewer Service Area/ Proposed Facilities	Average Annual Combined Sewage Volume Conveyed to Metro for Treatment (Million Gallons) [1]	Average Annual Volume of Combined Sewage Discharged (Million Gallons) [2]	Total Annual Combined Sewage Volume Generated by the Metro Combined Sewer Service Area (Million Gallons) [3=1+2]	Percent Capture [4=1/3]	Project Status As of May 2001
Hiawatha RTF	116	24	140	83%	Construction
Harbor Brook In-Water System	638	172	810	79%	Planning
EBSS Upgrade	0	289	289	0%	Design
Teall Ave. FCF	77	7	84	92%	Construction
Midland RTF	728	322	1,050	69%	Planning
Clinton RTF	720	142	862	84%	Planning
Franklin FCF	683	83	766	89%	Operating
Maltbie FCF	69	21	90	77%	Operating
Sewer Separation Areas	95	33	128	74%	Varies by Area
Total	3,126	1,093	4,219	74%	

Notes:
1) During dry weather conditions, there is no flow from the EBSS to the Main Interceptor Sewer.
2) The basis of design for each regional facility is the 1-year, 2-hour duration design storm using 15-minute rainfall intervals, with the exception of the Harbor Brook In-Water System which is based upon 1/2 of the 1-year, 2-hour design storm using 15-minute intervals. EBSS is based upon the 90 percentile storm.
3) The estimated capture volumes provided in this table are based upon a SWMM model for the combined sewer system that was validated and calibrated using data collected during an extensive field monitoring program.
4) As the CSO evaluation report is intended to be a "living document", the capture volumes provided in this table will be updated to reflect the current information available at the time of each facility plan or design update.
5) Percent Capture refers to combined sewage captured for treatment at Metro and elimination of combined sewage overflows for separation areas.

and conveyed for treatment at Metro by the total volume of combined sewage generated by the combined sewer service area tributary to Metro. It is important to understand that the existing system (as upgraded in the mid-1980's) already captures a large percentage of the total combined sewage for treatment at Metro.

A summary of the estimated CSO volumes captured upon completion of the proposed facilities is provided in Table 2-5. This table includes the additional volume of combined sewage that will be captured by the proposed regional treatment facilities and conveyed to Metro for treatment. It also includes the additional combined sewage flow that will be conveyed to Metro as a result of the upgrades to the Kirkpatrick Street Pump Station. The volume of treated CSO discharged to the watercourse by each of the regional treatment facilities is not included in Table 2-5. The estimated percent capture of 90% indicates that the CSO Abatement Program will satisfy the 85% capture requirements of the ACJ. This is a critical factor in understanding how the County's CSO Abatement Program meets the Federal and State CSO Policy Guidelines.

Additionally, in an effort to evaluate the total volume of CSO that will receive treatment and disinfection, an analysis was also performed to include the CSO volumes treated by the regional treatment facilities in addition to the combined sewage volume conveyed to Metro. For the purposes of this evaluation, it was assumed that the regional treatment facilities would consist of vortex technology (USEPA Swirl Concentrators) followed by high-rate disinfection. The swirl concentrators remove floatables and settleable solids to facilitate high-rate disinfection. For most storms, no discharge of treated waste to adjacent watercourses will occur as a result of the capture of combined sewage within the conveyances and/or facilities. Upon considering the capture rates under these conditions on an annualized basis, percent capture rates for the regional treatment facilities will approach those of primary treatment. Table 2-6 summarizes the results of this analysis and shows that 95% of the combined sewage volume generated by the combined sewer service area tributary to Metro will be captured and receive treatment. Those flows that are captured and conveyed to Metro will receive a minimum of primary treatment and disinfection before discharge to Onondaga Lake. Depending upon plant conditions at the time, flows may also receive secondary or tertiary treatment. The flows treated at the regional treatment facilities will receive preliminary treatment and disinfection prior to discharge to the adjacent watercourses.

TABLE 2-5
ONONDAGA COUNTY CSO PROGRAM EVALUATION REPORT
CSO VOLUME CAPTURE TABLE - FUTURE CONDITIONS (Treatment at Metro Only)

Sewer Service Area/ Proposed Facilities	Average Annual Combined Sewage Volume Conveyed to Metro for Treatment (Million Gallons) [1]	Average Annual Additional Combined Sewage Volume Eliminated or Captured for Treatment at Metro (Million Gallons) [2]	Total Annual Combined Sewage Volume Eliminated or Captured for Treatment at Metro (Million Gallons) [3=1+2]	Total Annual Combined Sewage Volume Generated by the Metro Combined Sewer Service Area (Million Gallons) [4]	Percent Capture for Treatment at Metro [5=3/4]
Hiawatha RTF	116	23	139	140	99%
Harbor Brook In-Water System	638	143	781	810	96%
EBSS Upgrade	0	220	220	289	76%
Teall Ave. FCF	77	0	77	84	92%
Midland RTF	728	192	920	1,050	88%
Clinton RTF	720	62	782	862	91%
Franklin FCF	683	0	683	766	89%
Maltbie FCF	69	0	69	90	77%
Sewer Separation Areas	95	33	128	128	100%
Total	3,126	673	3,799	4,219	90%

Notes:
1) The capture volumes for the Hiawatha RTF also reflect the additional flow conveyed to Metro by the Kirkpatrick Street Pump Station Upgrade.
2) The basis of design for each regional facility is the 1-year, 2-hour duration design storm using 15-minute rainfall intervals, with the exception of the Harbor Brook In-Water System which is based upon 1/2 of the 1-year, 2-hour design storm using 15-minute intervals. The EBSS is based upon the 90 percentile storm.
3) During dry weather conditions, there is no flow from the EBSS to the Main Interceptor Sewer. Capture volumes reflect re-activation of the EBSS.
4) The capture volumes for Midland RTF include the Newell Street flows.
5) The capture volumes reflect the separation of 212.8 acres of combined sewer service area, as listed in the ACJ.
6) The estimated capture volumes provided in this table are based upon a SWMM model for the combined sewer system that was validated and calibrated using data collected during an extensive field monitoring program.
7) As the CSO evaluation report is intended to be a "living document", the capture volumes provided in this table will be updated to reflect the current information available at the time of each facility plan or design update.
8) Percent Capture refers to combined sewage captured for treatment at Metro and elimination of combined sewage overflows for separation areas.

TABLE 2-6
ONONDAGA COUNTY CSO PROGRAM EVALUATION REPORT
CSO VOLUME CAPTURE TABLE - FUTURE CONDITIONS (Treatment at Metro and RTF'S)

Sewer Service Area/ Proposed Facilities	Average Annual Combined Sewage Volume Conveyed to Metro for Treatment (Million Gallons) [1]	Average Annual Additional Combined Sewage Volume Eliminated or Captured for Treatment at Metro or a RTF (Million Gallons) [2]	Total Annual Combined Sewage Volume Eliminated or Captured for Treatment at Metro or a RTF (Million Gallons) [3=1+2]	Total Annual Combined Sewage Volume Generated by the Metro Combined Sewer Service Area (Million Gallons) [4]	Percent Capture for Treatment at Metro and the RTF's [5=3/4]
Hiawatha RTF	116	24	140	140	100%
Harbor Brook In-Water System	638	143	781	810	96%
EBSS Upgrade	0	220	220	289	76%
Teall Ave. FCF	77	0	77	84	92%
Midland RTF	728	322	1,050	1,050	100%
Clinton RTF	720	142	862	862	100%
Franklin FCF	683	0	683	766	89%
Maltbie FCF	69	0	69	90	77%
Sewer Separation Areas	95	33	128	128	100%
Total	3,126	884	4,010	4,219	95%

Notes:

1) The capture volumes for the Hiawatha RTF also reflect the additional flow conveyed to Metro by the Kirkpatrick Street Pump Station Upgrade.
2) The basis of design for each regional facility is the 1-year, 2-hour duration design storm using 15-minute rainfall intervals, with the exception of the Harbor Brook In-Water System which is based upon 1/2 of the 1-year, 2-hour design storm using 15-minute intervals. The EBSS is based upon the 90 percentile storm.
3) During dry weather conditions, there is no flow from the EBSS to the Main Interceptor Sewer. Capture volumes reflect re-activation of the EBSS.
4) The capture volumes for Midland RTF includes the Newell Street flows.
5) The capture volumes reflect the separation of 212.8 acres of combined sewer service area, as listed in the ACJ.
6) The estimated capture volumes provided in this table are based upon a SWMM model for the combined sewer system that was validated and calibrated using data collected during an extensive field monitoring program.
7) As the CSO evaluation report is intended to be a "living document", the capture volumes provided in this table will be update to reflect the current information available at the time of each facility plan or design update.
8) Percent Capture refers to combined sewage captured for treatment at Metro and elimination of combined sewage overflows for separation areas.
9) Treatment at Metro is equivalent to a minimum of primary treatment followed by disinfection, while treatment at the RTF's consists of preliminary treatment followed by disinfection to meet water quality compliance.

Based on the analyses, the current CSO Abatement Program will result in greater than 85% elimination or capture for treatment at Metro, thereby exceeding the requirements of the Federal CSO policy and guidelines. A separate analysis done as part of the CSO Evaluation Report also determined that the bacteria standard for water quality requirements in the Class B waters of the lake will be met or exceeded.

2.4 Metro Capacity Analysis

The national CSO policy requires that CSO treatment at the treatment facilities be maximized as part of the overall CSO abatement plan. During implementation of the Best Management Practices (BMPs), the County closed or modified a number of overflows to direct as much wet-weather flow to Metro as feasible. The BMP CSO improvements completed in the mid 1980s resulted in a 90% volume reduction in the average annual discharge of CSOs in the system. Additionally, the ACJ requires that flow from the Kirkpatrick Street Pump Station (KSPS) be directly discharged to the Metro Headworks, thereby alleviating a hydraulic restriction that prevents utilization of the full pumping capacity of the pumping station. A headworks analysis was conducted to investigate the maximum influent flows from all sources including MIS, HBIS, Ley Creek PS, West Side PS, and Liverpool PS.

The analyses concluded that the proposed KSPS upgrade would have little impact on the frequency or magnitude of flow bypassing at Metro and a wet-weather flow management plan for the KSPS service area would be able to largely control Metro flow bypass situations. Also, the existing tertiary clarifiers at Metro are currently being evaluated for storage or treatment of excess flows from the KSPS service area and those flows in the northern portion of the Harbor Brook basin.

3.0 Alternative Technology and Approaches Review/Evaluation

3.1 Currently Proposed Technologies/Approaches

The combined sewer overflow (CSO) abatement program projects intended to achieve the ACJ requirements employ several technologies and approaches as briefly described below.

Sewer separation.

Sewer seperation will result in the elimination of CSOs within the tributary service areas scheduled for sewer separation. The existing CSOs will either be permanently closed or converted to a stormwater-only discharge as part of the sewer separation process.

Regional storage with post-storm treatment at Metro.

Regional storage with post-storm treatment at Metro will include storage of CSO flows including the first flush up to the regulatory-approved design storm condition. CSO flows in excess of the design storm condition would continue to discharge to the receiving waters with minimal or no treatment. Following the storm event, the stored flows would be conveyed to the Metro plant for at least primary treatment and disinfection and likely secondary and tertiary treatment prior to final discharge.

Regional high-rate treatment for settleable solids and floatables removal, followed by effluent disinfection for bacterial reduction.

The regional high-rate treatment facilities are intended to address floatables capture and settleable solids removal to reduce disinfection demands and maximize bacterial reduction, as well as incorporate supplemental CSO capture/storage to the extent practical. Critical to the implementation of these facilities is the ability to achieve adequate bacterial reduction of CSO flows prior to discharge to receiving waters to facilitate compliance with the water quality standards for bacteria as specified in the ACJ.

Regional floatables capture/removal.

Regional floatables capture/removal will maximize floatables capture for the CSOs scheduled for this abatement approach. The captured floatables will be removed and disposed of off-site. Net-bag facilities were constructed and are currently operational at Maltbie Street (CSO 066) and the Franklin Street area (CSOs 020 and 021). A mechanical, fine screen has been designed for construction at Teall Brook (CSO 073). In addition to the above point source floatables control facilities, in-stream interim regional facilities are currently being designed for Onondaga Creek and Harbor Brook. The Onondaga Creek

facility will consist of a boom, while the Harbor Brook facility will consist of a floating in-stream net bag system. These "interim" regional facilities will be installed for the purposes of providing floatables control, at least, until the upstream CSO Abatement plans are fully developed and implemented. Although these facilities provide capture/removal of floatables, the CSOs will continue to discharge to the receiving water bodies (i.e., Harbor Brook, Onondaga Creek, or Ley Creek) without disinfection. These collective discharges will not cause violation of bacteria concentration standards in the "Class B" waters. In order to insure that the best, most cost-effective and appropriate technology is applied to the CSO abatement program, the County directed its consultants to undertake an updated review of high-rate treatment technologies. A summary of this updated review of alternative high-rate treatment technologies is presented in the following section.

3.2 Updated Review of Technologies/Approaches

A full range of alternative technologies was considered by the County's evaluation team. Based upon a preliminary assessment, alternative technologies such as vortex separators, screening equipment, continuous deflective separation (CDS) and overflow retention facilities (ORF), in addition to alternative approaches, such as regional conveyances and treatment, centralized storage/treatment at Metro, regional storage and sewer separation were considered to be appropriate for further evaluation to determine ability to meet CSO policy guidelines, water quality standards and/or cost effectiveness.

A secondary evaluation was conducted to further assess the capabilities of these technologies and approaches to meet the specific requirements of the ACJ. The alternatives were compared on the basis of size, operation and maintenance considerations, ability to meet ACJ objectives, and performance. Performance criteria included floatables removal, settleable solids removal, TSS removal, BOD removal, and effects on CSO volume capture.

In order to satisfy ACJ bacteriological requirements, high-rate disinfection will be a required component of any of the selected CSO treatment technologies or approaches, with the exception of Centralized Storage/Treatment at Metro and Sewer Separation. However, based on the limited database of disinfection performance data, TSS and nutrients have been demonstrated to reduce the effectiveness of disinfection of CSOs due to chemical reaction and harboring of bacteria within solids. While increasing disinfection dosage and contact time can improve performance, the associated increase in capital and operating costs and effluent toxicity make concurrent reduction of TSS and nutrient concentrations a preferable

option. It is also notable, that by maximizing the amount of flow to Metro for treatment, the loading of nutrients discharged to the receiving streams from the regional treatment facilities (RTF's) will be minimized regardless of the RTF technology employed.

Based upon the preliminary and secondary screening of CSO treatment technologies/approaches described above, the following technologies/approaches were determined to be the most feasible alternatives for compliance with the ACJ requirements:

A. Vortex separators with high-rate disinfection

B. Overflow retention facility (ORF) with high-rate disinfection

C. Regional Conveyance and Treatment

D. Centralized storage/treatment at Metro and Harbor Brook

E. Sewer separation

F. Regional storage in limited cases

4.0 Program Enhancement Options

A number of combined sewer overflow (CSO) evaluation workshops were held to identify opportunities to improve the existing CSO abatement program. The options determined to be worthy of more detailed analysis were as follows:

A. Additional Treatment at Metro using tertiary clarifiers to treat increased flows from the Kirkpatrick Street Pump Station and the Harbor Brook Drainage Basin

B. Consolidation of Midland Avenue and Clinton Street Regional Treatment Facilities (RTFs)

C. Construction of a Storage Facility at Schiller Park on the Butternut Trunk Sewer

D. Optimization of EBSS Capacity by separating storm water component

E. Optimization of Hiawatha Boulevard RTF

F. Raise the side wall elevation of the Spencer Street Bypass Structure

Summary of Conclusions and Recommendations

CSO Program Analysis Conclusions:

The latest analysis of the currently proposed CSO Abatement Plan projects 90% elimination or capture for treatment at the Metro plant. These projected capture rates exceed the Federal and State CSO policies and guidance, as well as the ACJ requirement of no less than 85% capture of the total average annual wet weather flow.

CSO Program Recommendations:

The CSO Program should be periodically reviewed and updated as changes in the CSO Abatement Plan evolve.

Metro Capacity Analysis Conclusions:

The Spencer Street Bypass is active approximately 9 times per year. The principal cause of its activation is the limited capacity (120-mgd) of the downstream twin barrel siphon crossing of Onondaga Creek.

The actual frequency of wet-weather bypasses at Metro is estimated to be once every five or six years. The SWMM Model indicates that the proposed KSPS upgrade will have little impact on the frequency or magnitude of bypasses.

5.4 Metro Capacity Analysis Recommendations:

The County will raise the overflow weir at the Spencer Street Bypass by 15 inches and monitor the frequency of overflow and impacts to upstream hydraulic conditions.

SWMM Model Technical Review Conclusions:

The SWMM model used to analyze the CSO system is generally sound and accurately reflects the current and projected conditions resulting from the proposed CSO abatement plan.

SWMM Model Technical Review Recommendations:

The model should be expanded to include the Spencer Street Bypass, Lower Crossing siphon and connection of the Harbor Brook collection systems, as well as all separate sanitary systems tributary to the MIS and Harbor Brook sewer service area. Additional modifications to the model should be performed as facilities are completed and become operational to ensure the model accurately reflects the system as the project evolves.

The history and development of the hydraulic and hydrologic models should be documented and background data should be updated as the model is expanded to include recently completed facilities. Additional rain gage installations should be considered to support future model analyses, calibration, and facility operations.

Bacteria Model Conclusions:

The Onondaga Lake Bacteria Model demonstrates compliance with the ACJ bacteria concentrations for the "Class B" sections of the lake.

Bacteria Model Recommendations:

The USEPA Draft CSO Guidance, released on December 20, 2000, should be reviewed in detail to determine the level of additional sampling, modeling and monitoring that may be necessary to document and evaluate the water quality improvements associated with the implementation of the CSO Abatement Program.

Evaluation of Treatment Technologies and Approaches-Conclusions:

The most feasible treatment technologies/approaches for compliance with the ACJ requirements are as follows:

- Vortex separators with high-rate disinfection
- Overflow retention facilities with high-rate disinfection
- Regional conveyance and treatment
- Centralized storage/treatment at Metro and Harbor Brook
- Sewer separation
- Regional storage

Evaluation of Treatment Technologies and Approaches – Recommendations:

No further recommendations at this time.

Program Enhancement Options – Conclusions/ Recommendations:

The following table summarizes the conclusions and recommendations contained in the CSO Evaluation Report.

Option	Conclusions	Recommendations
1	The tertiary clarifiers at Metro may be utilized to store and/or treat additional wet weather flow providing further enhancements to the CSO Abatement Program.	Further assessment of the use of the tertiary clarifiers at Metro for storage and/or treatment should be performed upon development of the CSO Facilities Plan for the Harbor Brook Drainage Basin.
2	Preliminary analysis indicates that combining the Midland and Clinton RTF's into one large RTF is more costly and disruptive than installing separate facilities.	Separate treatment facilities should be provided for the Midland and Clinton overflow points.
3	Construction of a storage or overflow retention facility at Schiller Park may provide performance benefits to the CSO program as well as reduce flooding in nearby neighborhoods.	An evaluation should be performed to further evaluate the benefits, impacts, feasibility and costs associated with the Schiller Park Storage or overflow retention facility option.
4	Separation of the storm sewer drainage area tributary to the Erie Boulevard Storage System by partitioning the interceptor sewer is not feasible.	The County should forego any further analysis of separating the sewer service area tributary to the Erie Boulevard Storage System and should continue with the design of the new control vaults and collection system improvements.
5	Optimization of the Hiawatha RTF and the provision of additional storage capacity in the replacement trunk sewer, as necessitated by the closure of Outfall 075 under the Carousel expansion plans, may help to reduce bypasses at Metro by attenuating flows to the Kirkpatrick Street Pumping Station.	Upon start-up and operational testing of the Hiawatha RTF, additional engineering analysis should be performed to evaluate the potential to modulate flows to Metro and maximize treatment of CSO's.
6	Raising the top of gate elevation at the Spencer Street Bypass structure will reduce overflows.	Should raising the top of gate elevation of the Spencer Street Bypass by 15 inches provide an insufficient reduction in the frequency of overflows at this site, additional SWMM modeling should be performed to assess the feasibility of further raising the weir or completely closing the outfall. The model should take into consideration the impacts of the Schiller Park Storage Facility (Option 3) and the storage and pump back volumes generated by the Midland and Clinton RTF's.