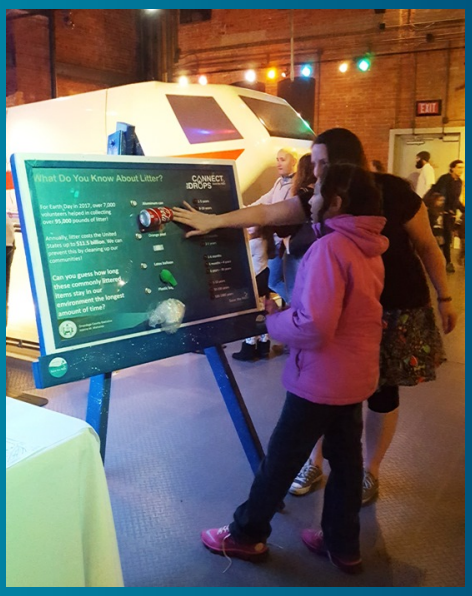
Save the Rain

First Quarterly Report 2018



January - March 2018

Joanne M. Mahoney
County Executive

Save the Rain
www.savetherain.us

ONONDAGA COUNTY DEPARTMENT OF WATER ENVIRONMENT PROTECTION

VISION

To be a respected leader in wastewater treatment, storm water management, and the protection of our environment using state-of-the-art, innovative technologies and sound scientific principles as our guide.

MISSION

To protect and improve the water environment of Onondaga County in a cost-effective manner ensuring the health and sustainability of our community and economy.

CORE VALUES

E*xcellence*
T*eamwork*
H*onesty*
I*nnovation*
C*ost-Effectiveness*
S*afety*

Save the Rain

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Project Progress

Report from the Commissioner

In this report, I would like to re-emphasize the important role that green infrastructure has played in managing and abating combined sewer overflows in the most cost efficient manner. Historically, green infrastructure solutions have been less costly to construct than traditional gray (concrete) solutions. Capital construction efficiency is measured by examining the cost of capturing, removing, and in some instances, treating stormwater. The County's costs are summarized below:

Project Type	Average County Construction Cost/Gallon of Stormwater Captured ($/Gallon)
Gray Infrastructure – Storage	$1.41/gallon
Green Streets (excluding Road Reconstruction Projects)	$0.58/gallon
Green Vacant Lots	$0.47/gallon
Green Parks	$0.42/gallon
Private – Ground Based (GIF)	$0.39/gallon
Road Reconstruction	$0.27/gallon

As briefly discussed in the last quarterly report, road reconstruction projects generally provide the most cost effective solutions to CSO abatement. Each year, the City of Syracuse works with the County team to identify road projects which will benefit from the incorporation of green infrastructure. Using the Storm Water Management Model (SWMM), the County team targets specific road reconstruction projects prior to the design phase, in order to develop intermunicipal agreements that will allow all of the work to be performed by one construction contractor. The County then reimburses the City for green portions of the work. By coordinating with the City and bundling the work, both parties enjoy further cost efficiency. To date, tremendous savings have been realized as a result of avoiding additional costs, such as repaving the roadway, as part of the County's CSO Abatement program.

On April 1, 2018, WEP submitted its Annual Report on ACJ progress through December 31, 2017. The Report affirms that the County has met all ACJ milestones and now is capturing 97.6% of the combined sewer overflow volume. This capture rate is far in excess of the traditional 85% capture rate seen in typical CSO control plans, and above the 95% capture rate the County Executive committed to with the ACJ Fourth Stipulation in 2009. Still, combined sewer overflows, when they occur, will lead to times when the receiving creeks and brooks will not meet ambient water quality standards. It is likely that even after the ACJ is complete, there will continue to be a need for a Long Term Control Plan (LTCP) to further reduce the frequency of overflow events.

As documented in the Report, Onondaga County's Save the Rain program continues to be the most cost effective solution to the abatement of combined sewer overflows. The use of green infrastructure provides many "co-benefits" to our community. The County Executive's Save the Rain program is

literally rebuilding neighborhoods instead of tearing them down to build regional treatment facilities (RTFs). Green infrastructure improves property values, enhances air quality, reduces urban heat island impacts and reduces the amount of stormwater released into the environment or sent for treatment. By reducing the volume of sanitary/stormwater that has to be treated, green infrastructure reduces the costs of treatment while reserving capacity for economic growth.

Attached please find a report further describing the "co-benefits" of the green infrastructure in the Save the Rain program.

Respectfully Submitted,

Tom Rhoads P.E.
Commissioner

attachment

Environmental Benefits and Values for Onondaga County's Save the Rain Green Infrastructure Program

Prepared for

Onondaga County, New York

July 2016, Revision 2

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Acronyms and Abbreviations

ACJ	amended consent judgment
BenMAP	Environmental Benefits Mapping and Analysis Program
Btu	British thermal unit
CSO	combined sewer overflow
CSS	combined sewer system
EPA	U.S. Environmental Protection Agency
ft	foot, feet
gal	gallons
GI	green infrastructure
GIF	Green Improvement Fund
hr	hour
in.	inch, inches
kW	kilowatt
kWh	kilowatt-hour
lb	pound
m	meter
Metro	Metropolitan Syracuse Wastewater Treatment Plant
MWh	megawatt-hour
OCDWEP	Onondaga County Department of Water Environment Protection
STR	Save the Rain Program
SUNY-ESF	State University of New York College of Environmental Science and Forestry
SWMM	Stormwater Management Model
UFORE-D	Urban Forest Effects-Dry Deposition
USFS	U.S. Forest Service
yr	year

Executive Summary

The environmental and economic benefits of the one hundred and sixty-nine (169) constructed GI projects in Onondaga County's Save the Rain program through 2014 have been determined and discussed. These projects include a range of technologies that provide multiple public benefits, including reducing CSOs. Green infrastructure seeks to manage stormwater volume at the micro scale of the site, while providing long-term environmental, social, and economic benefits. In addition to reducing pollutant-laden stormwater flows, environmental benefits of GI include improved air quality, improved aquatic ecosystem health, reduction in energy use, sequestering of carbon dioxide, and increased water quality. Green infrastructure projects provide community and social benefits, including improved human health related to the higher air quality, and enhanced aesthetics from tree plantings and landscaping of previously paved areas and vacant lots. Economic benefits of GI include wastewater treatment cost savings, reduced lost wages and health care expenditures due to illness and premature mortality, reduced costs to society from greenhouse gas emissions, value to the public of restoring and maintaining water quality and the health of the aquatic ecosystem, enhanced property values from the aesthetics of GI, and value to the public of increased recreation opportunities due to water quality improvements and to increased green open space.

Many of these benefits are tied directly or indirectly to trees and other vegetative cover. This study relies upon site-specific tree canopy growth information to quantify the air quality benefits of implementing a specific set of GI projects. Trees contribute to reducing stormwater volumes with the associated reductions in CSO overflows and stormwater treatment costs. They also provide the greatest source of carbon dioxide reduction. Linking the tree pollutant removal calculations to local data on pollutant concentrations and health incidence data within the US EPA's BenMAP model with the most current valuation data adds further credibility to the results.

Several other potential GI benefits that have been documented in the literature were considered, however were not quantified due to the significant additional empirical research required. These include creation of green jobs, reduction of crime, reduction in peak storm flows during storm events, improved climate change resiliency, increased recreational activity opportunities, reduced salting demand in porous pavement parking lots and enhanced property values. Additionally, the improved water quality of Onondaga Lake and its tributaries has helped to spawn significant investment into these areas. Examples include improvements to the Onondaga Creekwalk, investment in Armory Square and the Inner Harbor, the Onondaga Lake Loop the Lake Trail, Lakeview Amphitheater, among others. These investments further benefit the local economy in the form of increased tax and tourism revenue.

The total quantifiable economic benefits for all 169 projects is approximately $220,000 per year, for a total value of $8 million after 40 years. One project, Connective Corridor Phase 1, Contract 1 (C-29a), generated the highest average annual economic benefit of all of the 169 projects analyzed, with an annual value of over $8,700. The largest beneficial category in monetary terms is the reduction in wastewater treatment costs at an average of greater than $89,000 per year.

Due to the construction of these GI projects, the County has avoided the cost of equivalent gray infrastructure, equating to approximately $35 million. In addition to this quantifiable capital cost, gray infrastructure does not provide the numerous additional economic, environmental, and social benefits discussed throughout this report. The GI projects have also garnered significant public support and provided significant improvements to local infrastructure including re-paved roads and parking lots, reconstructed sidewalks, park and playground enhancements, etc.

Highlights of the environmental and economic benefits provided by the 169 GI projects analyzed are provided below.

Annual Benefits*

Water Quantity	
Total Reduced Stormwater Runoff Volume (MG/yr)	111.0
Reduced Stormwater Runoff Volume by Trees (MG/yr)	1.3
Reduced CSO Discharge (MG/yr)	53.4
Reduced Potable Water Usage (MG/yr)	13.5
Reduced Wastewater Treatment Volume (MG/yr)	39.0
Increased Groundwater Recharge	2.9%
Water Quality	
Reduced BOD_5 Loading (lbs)	13,000
Reduced TSS Loading (lbs)	37,100
Reduced Total Phosphorus Loading (lbs)	200
Reduced Total Nitrogen Loading (lbs)	1,600
Reduced Fecal Coliforms (trillion colonies)	7,600
Energy Usage	
Electricity Savings (kWh)	51,510
Natural Gas Savings (therms)	760
Air Quality	
Nitrogen Dioxide (NO_2) Reduction (lbs)	215
Sulfur Dioxide (SO_2) Reduction (lbs)	50,760
Ozone (O_3) Reduction (lbs)	300
Carbon Dioxide (CO_2) Reduction (lbs)	976,660
Economic Savings	
Reduced Wastewater Treatment	$89,700
Reduced Potable Water Treatment	$33,500
Equivalent Avoided Gray Infrastructure Cost	$35,000,000
Reduced Operation and Maintenance at Metro	$34,520
Reduction in CO_2 Equivalents	$54,745

*Annual direct benefits quantified for 169 projects in 2014 base year.

SECTION 1

Introduction

1.1 Save the Rain Program

Onondaga County's Save the Rain Program (STR) was created in response to the Fourth Stipulation of the Amended Consent Judgment (ACJ) entered into by Onondaga County, New York State, and the Atlantic States Legal Foundation on November 16, 2009. The Fourth Stipulation of the ACJ specifically identified green infrastructure (GI) as an acceptable technology to reduce or eliminate the discharge of untreated combined sewage into Onondaga Lake and its tributaries. The goal of the Fourth Stipulation of the ACJ is to bring the County's effluent discharges into compliance with the applicable water quality standards for the receiving waters.

During periods of heavy rainfall and snowmelt, the combined sewer system (CSS) becomes overwhelmed and combined sewage overflows to Harbor Brook, Ley Creek, and Onondaga Creek. The CSS tributary to these receiving waters and the Metropolitan Syracuse Wastewater Treatment Plant (Metro) on Onondaga Lake includes an area of 7,103 [1] acres, or approximately 11 square miles.

In 1998 the County estimated it was capturing 74 percent of combined sewage by volume, and at the time of the 2009 ACJ Fourth Stipulation, it was understood that the County had increased capture to approximately 84.6 percent with the assumed completion of several combined sewer overflow (CSO) projects. The ACJ requires the County to capture 95 percent of combined sewage annually by 2018. To meet this new goal, the County initiated STR, implemented a combination of green and gray infrastructure to reduce stormwater discharges to the sewer system, and thereby reduced CSO and Metro discharges to receiving waters.

1.2 Purpose of this Report

Green Infrastructure projects reduce urban runoff, as well as provide other environmental and social benefits. This report quantifies many of these benefits, where possible, from the data collected. The report is organized as follows:

- Section 1 – Introduction
- Section 2 – Software Tools and Assumptions
- Section 3 – Methodology
- Section 4 – Valuation
- Section 5 – Results
- Section 6 – Future Refinements
- Section 7 – Contributors
- Section 8 – References

1.3 Benefits of Green Infrastructure

There have been many types of GI technologies utilized since STR's inception in 2009. The technologies primarily include porous pavements, infiltration practices, green roofs, bioretention, vegetated curb extensions, tree trenches, enhanced tree plantings, cisterns, rain barrels, and green streets featuring the use of multiple technologies in one project. For this quantification of benefits, GI technologies are generally

[1] Source: *Onondaga County, New York, ACJ Fourth Stipulation 2012 Annual Report*, Onondaga County Department of Water Environment Protection, New York, April 2013; Appendix H – Review of Onondaga County's SWMM Files, Model Updates, Calibration and Green Modeling Approach, Table 3-11.

grouped into two categories: 1) structural technologies, which provide benefits through infiltration and/or storage; and 2) trees, including consideration of four shrubs as equivalent to one small tree.

GI provides multiple long-term benefits; some easily quantifiable, others reasonably quantifiable with the collection and analysis of additional data, and others that are best described in qualitative terms, depending upon the state of the science and the nature of the underlying relationships among water resources and the landscape ecology. GI manages stormwater volume close to the runoff source while providing broad environmental, social, and economic benefits. A number of additional benefits have been documented in the literature but have not been quantified in this report due to the significant empirical research required. These include creation of green jobs, reduction in crime, increased property values, enhanced climate change resiliency, and improved quality of life, among others discussed in Section 6.

As shown in Figure 1-1, the primary water *quantity* benefits of a reduction in stormwater volume are also associated with water *quality* benefits, such as reduced pollutant loadings, and infiltration benefits, such as groundwater recharge, stream flow moderation, and improvements in the health of the aquatic ecosystem. Energy and cost-savings benefits are also achieved from reduced treatment volumes.

Table 1-1 summarizes the environmental benefits of GI and some additional community and economic benefits. The table also indicates where these benefits are quantified in this report.

TABLE 1-1
Environmental, Social, and Economic Benefits Provided by Green Infrastructure Practices

Benefit Category	Specific Benefit	Benefit Quantification Source; Location in Report
Water Quantity	Reduced stormwater runoff volume	SWMM + i-Tree Hydro; Section 3.1.1
	Reduced combined sewer overflow (CSO) volume	SWMM; Section 3.1.2
	Reduced wastewater treatment needs/costs	SWMM; Section 3.1.3
	Increased groundwater recharge, base flow, and/or above-ground water supply for non-potable uses	SWMM; Section 3.1.4
	Reduced potable water usage	Section 3.1.5
Water Quality	Reduced pollutant loading in receiving waters	Calculated based on CSO quantity reduction and EPA data; Section 3.2
	Improved aquatic ecosystem health	Not quantified due to the empirical difficulty with attributing specific improvements with GI projects
Energy	Reduced energy use for building heating and cooling[a]	Calculated based on USFS data; Section 3.3.1
	Reduced energy use for treating wastewater	Calculated based on METRO WWTP data; Section 3.3.1.2
Air Quality: Direct Benefits	Reduced air pollutants[a] through tree pollutant uptake	i-Tree Eco; Section 3.4.1.1
Indirect Benefits	Reduced air pollutants[a] through avoided emissions	eGrid2012[b]; Section 3.4.1.2
Climate Change	Reduced atmospheric carbon dioxide[a]	i-Tree Eco; Section 3.5
Additional Environmental Benefits	Reduced urban heat island effect and noise pollution; improved wildlife habitat and enhanced wildlife food sources	Not quantified due to lack of data

TABLE 1-1
Environmental, Social, and Economic Benefits Provided by Green Infrastructure Practices

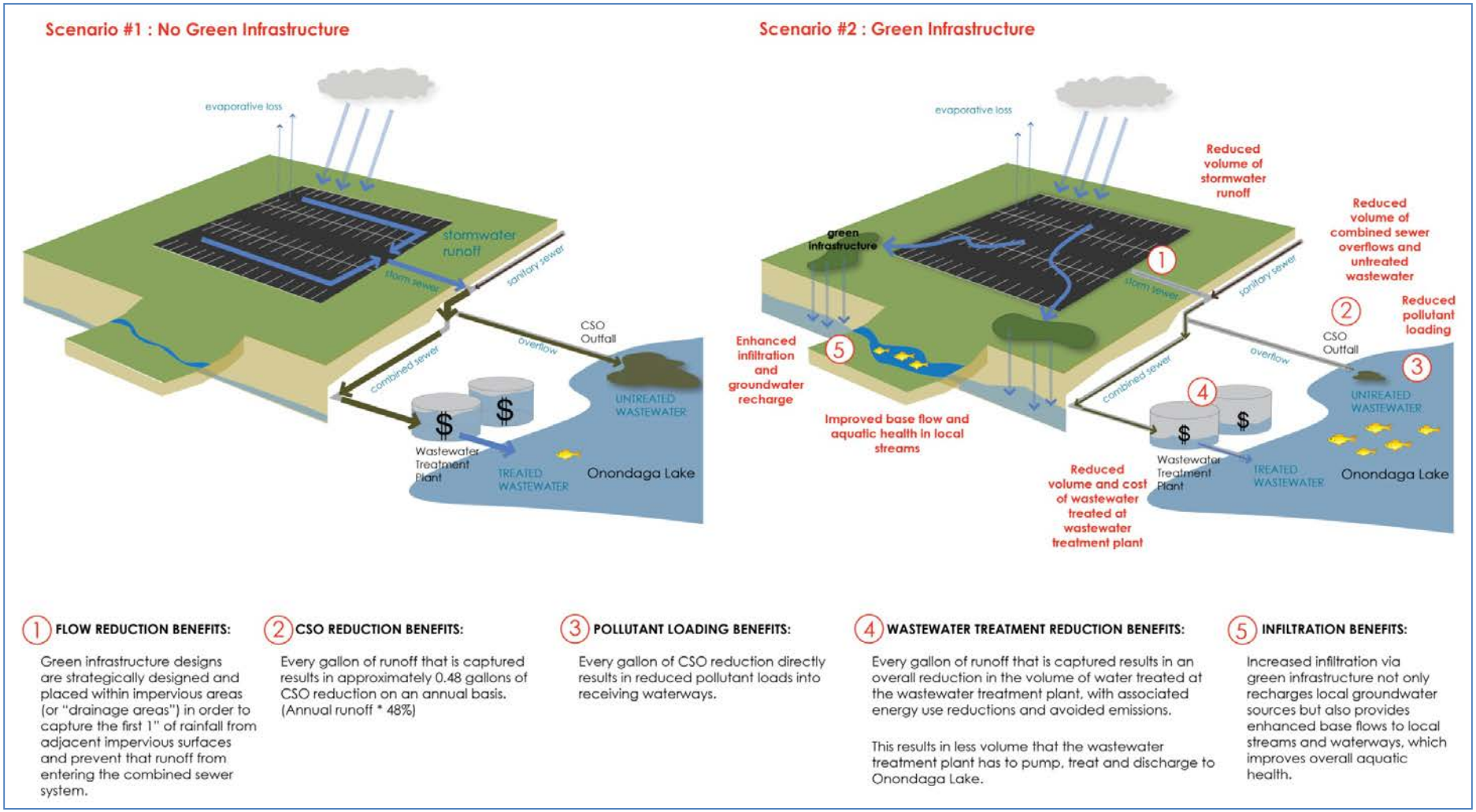
Benefit Category	Specific Benefit	Benefit Quantification Source; Location in Report
Additional Community and Economic Benefits[c]	Enhanced public environmental education opportunities, green job opportunities, pavement useful life due to tree shading, roof useful life due to green roofs, retention and attraction of businesses and residents, publicity, recreational opportunities, and community aesthetics; safer pedestrian intersections/enhanced traffic calming; decreased need for application of deicing salts on porous pavements, curb extensions and green streets; increased private property values and rental income, decreased crime, increased retail sales, reduced infrastructure costs, reduced flooding damages, improved worker productivity, general quality of life improvements, etc.	Not quantified due to lack of data

[a] These benefits are calculated based solely on the quantity of vegetation in a specific GI project; therefore GI projects using only porous pavement, infiltration without vegetation, cisterns/rain barrels, downspout disconnection and/or inflow removal will have no quantified benefit in these categories.
[b] http://www.epa.gov/cleanenergy/documents/egridzips/eGRID2012V1_0_year09_SummaryTables.pdf
[c] See the following sources in the reference section of this report:
Bell et al., 2008.
Center for Neighborhood Technology (CNT), 2010.
CSI, 2008.
Kondo et al., 2015.
Kuo, F. and W. Sullivan, 2001a.
Lee et al., 2015.
Madison, C. and J. Kovari, 2013.
Sullivan, 2005; cited in Davies and Deaville, 2008.
Weldon et al., 2007.
Wolf, K., 2014.

FIGURE 1-1

Water Quantity Reduction and Water Quality Benefits of Green Infrastructure

The primary water quantity benefits of green infrastructure are also associated with water quality and energy benefits.



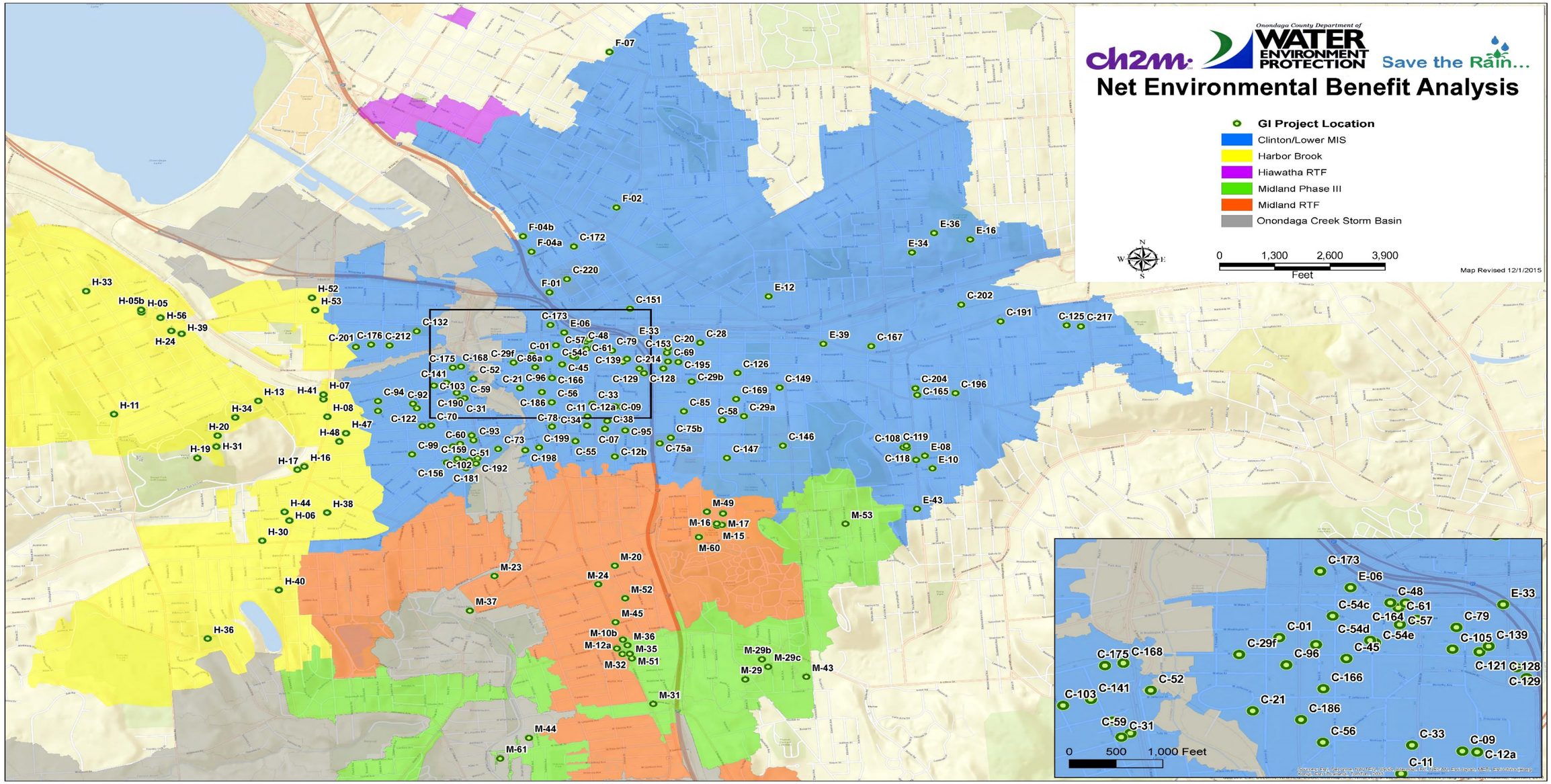
1.4 GI Projects Analyzed

This analysis calculates the benefits of GI for the 169 constructed projects listed in Appendix A. These projects and their calculated benefits correspond to the County's STR Program 2014 SWMM (Stormwater Management Model) output. Local data were used where readily available, and the most defensible estimates from the literature were substituted when site-specific data was not available. Local experts, data sources, and partners were consulted to validate the use of site-specific benefit data. A database module—the Onondaga County NEBA Calculation Database—was created to perform the benefits calculations, and pulls data from the primary GI Project Tracking Database. Figure 1-2 shows the projects analyzed for this effort, in relation to their location in the CSS. Each GI project was assigned a Project Identifier (ID) which is defined in Table 1-2. Only projects that were municipally procured, constructed via funds from the Green Improvement Fund (GIF), or funded by the County via an Intermunicipal Agreement (IMA) were included in the analysis. Projects that were voluntarily completed by community groups, private citizens or similar are not included in the analysis due to the lack of design detail available.

TABLE 1-2
Project IDs

Project Identifier (ID)	Definition/Sewershed
C	Clinton
E	Erie (part of Clinton sewershed)
F	Franklin (part of Clinton sewershed)
H	Harbor Brook
M	Midland

FIGURE 1-2
Distribution of 169 Constructed GI Projects in Relation to the Combined Sewersheds



SECTION 2

Software Tools and Assumptions

Specialized software tools and resources were required for this analysis:

- i-Tree Hydro - watershed-scale analysis of vegetation and impervious cover effects on hydrology
- i-Tree Eco – estimates environmental benefits of trees
- SWMM – estimates reductions in runoff to sewer systems and subsequent sewer system discharges based on green infrastructure implementation

2.1 Specialized Tree Benefit Software

i-Tree is a software suite (version 6.09) created by the USDA Forest Service that provides urban forestry analysis and benefit assessment tools. Two specific software programs within the i-Tree application suite, i-Tree Hydro and i-Tree Eco, were used for this analysis and are defined below.

2.1.1 i-Tree Hydro

i-Tree Hydro was still in beta form at the time of this analysis. SUNY-ESF used a forthcoming update of version 5.0 for this effort. The software program is designed for watershed-scale analysis of the effects of changes in tree and impervious cover characteristics within a defined watershed on stream flow and water quality. i-Tree Hydro takes into account local weather and evapotranspiration rates and provides a macro view of changes in the hydrology of a system with respect to increased vegetation and tree cover.

2.1.2 i-Tree Eco

i-Tree Eco (version 5.0) is a tool that allows users to collect tree inventory data for an urban forest and estimate the ecosystem benefits to the community. i-Tree Eco provided the following estimates for this analysis:

- Air quality: air pollution removed; calculated for carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), and particulate matter less than 2.5 microns ($PM_{2.5}$)
- Climate change: increase in carbon dioxide stored by trees on an annual basis, and therefore, removed from the atmosphere and annually sequestered and therefore reduced from the atmosphere
- Energy: effects of trees on building energy consumption

2.2 SWMM

In 2012, Onondaga County performed a comprehensive update to their USEPA SWMM 2009 baseline input files, in accordance with the Fourth Stipulation of the ACJ Paragraphs 14H (viii and ix) and I. The update included an upgrade to software version 5.0.022; incorporation of the Low Impact Development (LID) module; and inclusion of more accurate physical data, LIDAR topology, aerial survey of imperviousness, USDA soil survey parameters, 2012-2013 regulator weir survey, ArcHydro sub-catchment delineation, intra-sub-catchment routing, and real time control (RTC) programming. Subsequent updates in 2013 and 2014 further refined the SWMM model based on calibrations from flow data collected throughout the CSS. In 2012, 2013, and 2014, the 169 completed GI projects were entered into the SWMM model for capture analysis.

2.3 Assumptions within All Benefit Categories

This section identifies two types of general assumptions and boundary conditions used in the GI analysis of benefits. The first type pertains to assumptions underlying the tree benefit calculations and the second type involves the economic framework for assigning value to benefits.

2.3.1 Assumptions for Tree Benefits

Assumptions used in calculating benefits provided by trees include the following:

- Tree canopy growth projections, tree mortality rates, and tree size classifications were modeled in i-Tree Eco using Syracuse-specific inputs and values. Tree growth estimates were provided by the i-Tree Eco model per year over a 100-year period. Trees planted in an urban environment provide a multitude of benefits over its lifecycle, however, most environmental benefits are achieved later in the lifecycle because an older (larger) tree typically provides significantly more environmental benefit than a younger (smaller) tree.
- Tree size: If tree size classifications were not provided by i-Tree Eco for a specific benefit, then tree size classifications were determined using the size classes defined in the *Northeast Community Tree Guide* (USDA, 2007), which classifies trees as either deciduous or evergreen and then by size (small, medium, and large) based on height, spread, and leaf surface area.
- Shrub classification: If there are more than four shrubs in a project design, they are included in the benefit quantification for a particular project. To calculate their benefit, approximately four shrubs are considered to be the equivalent to one small deciduous tree in terms of environmental benefit. This 4:1 ratio is based on height, spread, and leaf surface area equivalency. Shrub mortality is accounted for in the same manner as tree mortality, discussed below. It is assumed that proper species selection, planting, and maintenance have occurred for the shrubs included in this analysis. Grasses, groundcovers, and other smaller plants are not included in the analysis to be conservative.
- Tree-related air quality and carbon sequestration benefits are calculated using i-Tree Eco as provided by the USFS.
- Tree-related stormwater flow reduction benefits are estimated using values from i-Tree Hydro as provided by SUNY-ESF.
- Younger, smaller trees generally provide less of a water quantity benefit than older, larger trees; this difference is factored into the equations.
- All benefit values derived from SUNY-ESF's i-Tree Eco outputs are based on local climate data for Syracuse.
- Incremental benefits: Benefits have been projected by the i-Tree Eco model per year over a 40-year period based on tree canopy cover projections.
- Mortality rate: The i-Tree Eco benefit outputs were provided by SUNY-ESF per year over a 100-year period based on varying annual average mortality rates of 0, 1, 2, 3, 4, 5, 10, and 20 percent. For this analysis, tree canopy projection data associated with a 3 percent average annual mortality rate was used. A 3 percent mortality rate correlates with an average tree life span of approximately 40 years, which might be optimistic given the most recent study of street tree longevity that resulted in an estimated mean life expectancy of 19–28 years (Roman and Scatena, 2011). However, tree plantings under STR are anticipated to have a longer tree life span than average street trees due to increased soil volumes, careful site and species selection, and supervised planting practices. The 3 percent average mortality rate accounts for varying tree mortality over time; i.e., higher mortality in earlier and later years of growth, and lower mortality in middle growth years. In addition, any mortality or significant disease within the first year of planting would typically be replaced under a contractor's warranty period so those would not contribute to the mortality rate as it is applied in this analysis.

  Note: While the 3 percent annual mortality rate is likely the most realistic for the type of tree plantings occurring under STR, better tree-planting practices, increased soil volumes, and improved tree maintenance programs are helping promote a healthier urban tree population. These actions have the

potential to shift the mortality rate lower, between 1 and 2 percent. Urban tree mortality rates are still being studied and vary widely.

- Tree replanting: Trees planted under STR are typically under a 1-year contractor warranty. If a tree has died or shows signs of disease during this first year of establishment, the tree must be replanted under the 1-year contractor warranty. After 1 year, it is up to the property owner/project owner to replant a dead or dying tree. If the tree is a street tree, the City Arborist has the role of procuring and replanting the dead or dying tree. At this time in the program, we do not yet track replanting rates of trees under STR. Replanting would affect the age of the total tree canopy in a study area and would alter tree benefit results that depend on the age of trees. If the replanted trees thrived, this would eventually result in a lower mortality rate for the larger urban tree population.

2.3.2 Assumptions for Determining the Value of Benefits

Assumptions used in valuing the benefits include the following:

- All monetary values are reported in 2014 dollar values unless otherwise stated, as that was the most current year available at the time the calculations were prepared.
- A 40-year period is used for assessing all benefits. This is a conservative assumption, as some benefits extend beyond this period. For the purpose of this analysis, the 40-year evaluation period is 2014 through 2054. Projects begin accruing benefits the year following their construction.
- Because both the benefit quantities and the monetary values change over time, the results present average “annual” benefits and current prices as well as the economic value of the benefit over a 40-year period. The descriptions for how these monetary values are projected to change over time are provided in the text or are otherwise referenced.
- The economic value over a 40-year period is calculated using a 3 percent discount rate, the rate that the U.S. Environmental Protection Agency (EPA) recommends for evaluating impacts from climate change (Interagency Working Group on Social Cost of Carbon, 2010).
- For the purposes of calculating the number of air pollution–related adverse health effects, the per capita population of the area encompassing the combined sewershed is assumed to remain constant. This is an important assumption to note, as it may either underestimate or overestimate the benefits that are tied to changes in population, such as the number of air pollution–related adverse health effects.

SECTION 3

Methodology

This section describes the methodology, category-specific assumptions, and calculations used to estimate benefits for the following categories of each of the 169 GI projects analyzed.

- Water quantity
- Water quality
- Energy
- Air quality
- Climate change

Water quantity, water quality, and energy benefits were quantified at the project scale and then summed across all projects. For the air quality and climate change categories, benefits were quantified at the sewershed scale by using specialized modeling software customized by local partners and then scaled down to the project level.

3.1 Water Quantity Benefit Methodology

The water quantity benefits of GI are primarily reduced stormwater runoff volume, reduced CSO volume and events, and reduced combined sewer flows requiring treatment at the wastewater treatment plant. The following subsections present the methodology, category-specific assumptions, and calculations used to estimate the water quantity benefits of the 169 GI projects.

3.1.1 Reduced Stormwater Runoff Volume

Water quantity benefits are calculated based on the type of GI used at a project site including structural (engineered) GI systems using SWMM, and tree and shrub plantings using i-Tree Hydro. The total reduction in stormwater volume for a project is calculated by summing these two values together.

3.1.1.1 Reduced Stormwater Runoff Volume (SWMM)

Structurally engineered GI systems reduce stormwater volume through processes such as storage, infiltration, and evapotranspiration. SWMM results of the 2014 constructed GI project list are provided in Appendix A. In total just under 110 MG of stormwater is captured by the 169 completed GI projects.

3.1.1.2 Reduced Stormwater Runoff Volume (i-Tree)

Tree and shrub plantings reduce stormwater volume over their lifespan through processes such as canopy interception and evapotranspiration. SUNY-ESF ran the i-Tree Hydro model was used for the sewershed area to calculate the total precipitation (rainfall and snowfall) that the current tree canopy cover is able to intercept. By linking the tree canopy cover predictions provided by i-Tree Eco (USFS) to the precipitation interception data, average interception predictions per small, medium, and large trees were generated for a 40-year scenario.

The i-Tree Hydro model relies upon the following assumptions:

- Precipitation data are based on the 2007 Water Year (October 1, 2006, through September 30, 2007) from the Hancock Airport weather station. Although this is a different precipitation record than that used by SWMM (1991), rainfall totals are similar and the runoff intercepted by the trees compared to structural GI only accounts for two percent of the total so the precipitation record difference is not considered to result in a significant difference in the results.
- Rainfall data were evaluated in 1-hour time intervals.

- The leaf area index (LAI) defined as leaf area/ground surface area (m^2/m^2) was assumed to equal 4 (range: 0 bare ground to 10 dense conifer forest) and to remain constant over time and among the tree size class categories.
- Trees were assumed to be planted in an average of 1 m^2 of pervious area, and the remaining area under the canopy was assumed to be impervious area.
- Younger, smaller trees generally provide less of a water quantity benefit than older, larger trees; this difference is factored into the equations. Four shrubs are considered equal to one small tree; "small trees" will be the terminology used and will include shrubs.

The stormwater runoff volume benefit provided by trees is calculated using the equation below.

Annual stormwater runoff reduction provided by trees (gal/yr)	=	Total number of small trees x average annual interception per small tree (gal/tree/yr)	+	Total number of medium trees x average annual interception per medium tree (gal/tree/yr)	+	Total number of large trees x average annual interception per large tree (gal/tree/yr)

Table 3-1 presents the tree quantities estimated for the STR program through 2014. Note: To be conservative, evapotranspiration from other landscape elements, such as planting plugs, turf grasses, etc. are not included in the analysis.

TABLE 3-1
Summary of Trees Planted as Part of the 169 Completed Projects through 2014

Tree Size[a]	Tree Quantity
Large trees	643
Medium trees	422
Small trees	2,141
TOTAL	**3,206**

[a] Tree size determined by comparing STR tree species with the USDA Forest Service database

3.1.1.3 Total Reduced Stormwater Runoff Volume (SWMM + i-Tree)

The total stormwater reduction benefit at the project level is calculated by adding the total gallons per year calculated for the structural GI systems from the SWMM results to the total gallons per year calculated for the tree plantings.

Total annual stormwater runoff reduction (gal/yr)	=	Annual runoff reduction provided by structural GI systems (gal/yr); provided by SWMM	+	Annual runoff reduction provided by trees (gal/yr; provided by i-Tree)

3.1.2 Reduced CSO Volume

To evaluate the CSO reduction provided by GI, the 2013 conditions model results with GI were compared to the updated 2009 baseline. As a result the CSO reduction efficiency (CRE) for GI projects is found to be 48%[2]. CSO reduction values for each of the completed projects are included in Appendix A.

Annual CSO reduction (gal/yr)	=	0.48	x	Total annual stormwater runoff reduction (gal/yr)

3.1.3 Reduced Wastewater Treatment Volume

Green infrastructure also provides a benefit in reduced treatment volume at the wastewater treatment plant. Of the 109.7 MG of stormwater captured by the 169 completed GI projects, SWMM (2014 conditions) estimates that 92.4 MG is removed from the sewer system through infiltration and evaporation (the remainder is ultimately discharged back to the combined sewer through underdrains, etc.). Based on the methodology presented in Section 3.1.2, the total CSO reduction for the 169 completed projects is 53.4 MG. This leaves 39.0 MG of flow that would have been treated at the Metro WWTP without the implementation of GI. Empirically, the reduced wastewater treatment volume is calculated as follows:

Reduced Wastewater Treatment Volume (39.0 MG)	=	Stormwater Removed from the Sewer System through Infiltration and Evaporation (92.4 MG)	-	Total CSO Reduction of 169 Completed GI Projects (53.4 MG)

3.1.4 Increased Groundwater Recharge

Stream flow alteration due to increases in impervious cover and decreases in infiltration of stormwater is the widely accepted primary cause for ecological impairment in urban waters (Carlisle et al., 2010.) A benefit of GI is its contribution to restoring the hydrology of the watershed and ultimately the health of the aquatic ecosystem by decreasing impervious cover and increasing groundwater recharge. SWMM was used to estimate the impervious drainage area captured by the structural GI projects analyzed in this report. As presented in Appendix A, approximately 7,235,000 square feet (166 acres) of impervious drainage is managed by the 169 completed GI projects. Of the 169 projects, approximately 30% feature systems that do not promote infiltration (i.e., vegetated roofs, capture and slow release, cisterns, etc.). The remaining 70% of the projects promote groundwater recharge. Utilizing this breakdown, approximately 116 impervious acres drain to GI projects with infiltration practices of the total 166 acres captured. The total pervious area within the combined sewer service system is estimated at 4,039 acres; therefore, the increase in groundwater recharge is estimated at: 116 acres / 4,039 acres = 2.9%.

3.1.5 Reduced Potable Water Usage

A benefit of utilizing rainwater harvesting GI technologies is the reduction in potable water usage. Onondaga County provides 55 gallon rain barrels to City of Syracuse residents that live within the combined sewershed, and attend a 1 hour training course. Through 2014, 902 rain barrels have been distributed by the County. The US EPA (2009) estimates that homeowners save “about” 1,300 gallons of water by utilizing rain barrels for lawn and garden watering during summer months. Using this estimate by the US EPA, and assuming that

[2] Source: *Onondaga County, New York, ACJ Fourth Stipulation 2012 Annual Report*, Onondaga County Department of Water Environment Protection, New York, April 2013; Table 3-9 Green/Total: 64 MG/133 MG= 0.48

60% of the rain barrels distributed by the County are operated and maintained properly, the total reduced amount of potable water is calculated as follows:

Reduced Potable Water Usage by Rain Barrels (gal)	=	Potable Water Savings per Rain Barrel (1,300 gal – US EPA)	x	Total Number of Rain Barrels Installed to date	X	60% Assumption of Rain Barrels properly operated and maintained

Two specific projects completed by the County were designed to capture and reuse stormwater.

The Rosamond Gifford Zoo Stormwater Wetland and Cistern project included a comprehensive capture and reuse system from a large portion of the Zoo campus. Stormwater is captured and redirected into a natural treatment recirculation system installed between an existing wetland exhibit and the newly lined waterfowl pond. Prior to this system being installed, the waterfowl pond was drained and re-filled with potable water bi-weekly during the summer months due to excess algae growth. This equated to approximately 250,000 gallons of potable water being used every two weeks.

Additionally, a 5,000 gallon belowground cistern was installed adjacent to the bear exhibit that captures stormwater from around the exhibit and recirculates it through the exhibit's stream system. Previously the stream system was fed with potable water that was continuously running through the stream and into the sewer.

Water usage data collected at the Zoo in 2012 (prior to project) and 2014 and 2015 (after the project was constructed), have indicated that the Zoo's potable water usage has decreased by approximately 12.5 million gallons per year over that time period. The Zoo has not undertaken any other significant water savings initiatives in that time period, therefore the 12.5 million gallon savings in potable water can be attributed to the GI implemented in the Stormwater Wetland and Cistern project.

During design, a detailed water balance was completed for the project to optimize the cistern storage volume to meet the expected potable water demands. This analysis concluded that the total yearly potable water demand at the War Memorial for ice making use was 260,000 gallons. Based on the analysis results, it can be concluded that the cistern system reduces potable water usage by the same amount, 260,000 gallons, on an annual basis.

Other Save the Rain projects have minor stormwater capture and reuse, and associated potable water reduction pieces, however, they are considered small in comparison to the rain barrels, Zoo and War Memorial projects and are not considered in this analysis. The total reduced potable water amount is calculated as follows:

Total Reduced Potable Water Usage (MG)	=	Reduced Potable Water Usage by Rain Barrels (MG)	+	Reduced Potable Water Usage at the Zoo (MG)	+	Reduced Potable Water Usage at the War Memorial (MG)

3.2 Water Quality Benefit Methodology

The primary water quality benefits are reduced pollutant loadings resulting from a reduction in direct (i.e., untreated) stormwater and combined sewer overflow discharges to receiving waters. The principal pollutants present in CSO discharges that are considered in this analysis are:

- Oxygen depleting substances (such as 5-day biochemical oxygen demand [BOD_5], pounds/year)
- Total suspended solids (TSS), pounds/year
- Nutrients (total phosphorus [TP] and total nitrogen [TN], pounds/year)
- Microbial pathogens (such as fecal coliform, colonies/gallon)

3.2.1 Methodology in Calculating Water Quality Benefits at the Project Scale

Through reduction of stormwater runoff volume, and the associated reductions in CSOs, GI projects provide pollutant removal at the project scale. CSO pollutants are monitored at the site of the Harbor Brook CSO 018 Constructed Wetland Pilot Treatment System during each qualifying storm event. The average influent values for BOD_5, TSS, TP, and NH_3-N from the first year of operation (April 2015-March 2016, 17 samples) were compared with average pollutant concentrations provided by the EPA (Table 3-2). The location of the data set used by the EPA in determining the average concentrations was not provided. The lower of the two values (Harbor Brook CSO 018 and US EPA) was chosen to calculate the pollutant loadings in CSOs by multiplying CSO volume reduction by the average concentration of each pollutant.

TABLE 3-2
Pollutant Concentrations Found in CSO Discharges

Pollutant	Harbor Brook CSO 018 Average Concentration[a]	EPA Average Concentration[b]	Selected Concentration used for this Analysis
BOD_5 (mg/L)	29	43	29
TSS (mg/L)	83	127	83
TP (mg/L)	0.6	0.7	0.6
TN (mg/L)	Not Available	3.6	3.6
Fecal coliform (colonies/100 mL)	386,641	215,000	215,000

[a] Based on qualifying storm event monitoring activities at Harbor Brook CSO 018 from April 2015-March 2016.

[b] Source: *US EPA Report to Congress: Impacts and Control of CSOs and SSOs*, August 2004 (http://cfpub1.epa.gov/npdes/docs.cfm?document_type_id=6&view=Program%20Status%20Reports&program_id=5&sort=name)

The equation used to calculate the reduction in pollutants due to GI projects is presented below. The annual CSO reduction volume discussed in Section 3.1.2 is used in the below equation.

Pollutant reduction (lb/yr) = Average pollutant concentration (mg/L) x Annual CSO volume reduction (gal/yr) x Conversion from liters to gallons (3.79 L/gal) ÷ Conversion from milligrams to pounds (453,592 mg/lb)

3.3 Energy Usage Benefit Methodology

3.3.1 Methodology for Calculating Energy Benefits

The location of tree-based GI relative to buildings plays an important role in the quantification of energy benefits. Depending on their proximity to a building, tree plantings can directly reduce a building's energy usage through shading during the cooling season and wind reduction in during the heating season. While trees within 30–50 feet of west-facing walls provide the greatest net heating and cooling benefits, it was assumed for this analysis that any trees planted within 60 feet of a building wall ("energy trees") will provide some degree of net heating and cooling benefits based on data provided by SUNY-ESF. The total number of "energy trees" planted in the 169 completed projects through 2014 is 649. This section quantifies the benefits of tree-plantings in terms of annual energy savings measured by heating reduction (gas savings) and cooling reduction (electricity savings).

The methodology for this analysis relied upon outputs from the i-Tree Eco model, run by SUNY-ESF. The output tables classified net energy savings according to leaf type (deciduous vs. evergreen), the side of the building that a tree is planted on (north, east, south, west), distance from a building (adjacent defined as 0–19 feet, near as 20–39 feet, and far as 40–60 feet), and tree size (small, medium, large). Trees farther than 60 feet from a building are not considered to have any impact on a building's energy usage for heating and

cooling. The i-Tree Eco output was averaged to provide gas savings (Therms) and electricity savings (kWh) for each tree size (small, medium, and large) within 60 feet of a building wall.

TABLE 3-3
Energy Savings from "Energy Trees" in Syracuse, NY

Trees within 60 feet of a Building Wall	Gas Savings (Therms/year)	Electricity Savings (kWH/year)
Large tree	2.3	57.0
Medium tree	1.9	28
Small tree	0.7	7.5

Source: i-Tree Eco Output

The equation used to calculate the reduced energy benefits is shown below and is calculated for each tree type (large, medium, and small) that is located within 60 feet of a building:

Reduced energy (either Therms/year or kWH/year)	=	Total number of small/medium/large trees within 60 feet of a building from	x	Utility savings per year (kWh/tree or Therm/tree)

3.3.1.1 Electricity Savings from Reduced Wastewater Treatment

The Onondaga County Metro plant operates using an advanced wastewater treatment process, with full secondary and tertiary treatment of up to 126 million gallons per day. During 2013 (most recent data available), Metro treated an average daily flow of 66.6 million gallons per day, which equates a total volume of approximately 24,300 million gallons. The average annual electric energy usage for Metro to treat the wastewater during this period was approximately 37,600,000 kWh. Therefore, the average annual electrical usage to treat the wastewater was therefore 1,550 kWh per million gallons.

The equation below calculates the electricity savings resulting from the decreased volume in wastewater treated as a result of the 169 constructed GI projects (39.0 MG – Section 3.1.3).

Electricity savings from reduced wastewater treatment (60,450 kWh/yr)	=	1,550 kWh/MG wastewater treated	x	39.0 million gal/year

3.4 Air Quality Benefit Methodology

Using biophysiological processes, trees directly sequester a range of air pollutants. This section quantifies the air quality benefits provided by tree plantings in terms of direct benefits from uptake (such as dry atmospheric deposition of pollutants) and indirect benefits obtained through reduced/avoided energy emissions.

Criteria pollutants analyzed for this report include nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), carbon monoxide (CO), and particulate matter of 2.5 micrometers or less ($PM_{2.5}$) such as smoke, ash, and dust.

3.4.1 Methodology Calculating Air Quality Benefits

The i-Tree Eco model was used by SUNY ESF to develop an assessment of the existing tree canopy cover in the Clinton, Harbor Brook, and Midland basins in Onondaga County. Pollutant removal values in tons per square meter of tree canopy per year indicated by the i-Tree Eco model were converted to pollutant removal in lbs/year for NO_2, SO_2, O_3, CO, and $PM_{2.5}$. These results are presented in Table 3-4.

TABLE 3-4
Estimated Air Pollutant Removal per Tree Size in Syracuse, NY

Tree Size	NO_2 lb/yr/tree	SO_2 lb/yr/tree	O_3 lb/yr/tree	CO lb/yr/tree	$PM_{2.5}$ lb/yr/tree
Small	0.0009	0.0031	0.0777	0.0028	0.0050
Medium	0.0013	0.0045	0.1144	0.0042	0.0073
Large	0.0016	0.0057	0.1448	0.0053	0.0092

Source: i-Tree Eco Output

From the aggregate data for the sewershed, a specific pollutant reduction value was attributed to an individual tree type, based on the specific tree's average canopy size (classified as small, medium, or large). This pollutant reduction value was then used to predict the net pollutant reduction for each GI project based on that project's associated tree plantings. These results are included in Appendix A.

3.4.1.1 Calculation of Direct Benefits: Pollutant Uptake Provided by Tree Plantings

The total annual air pollutant reduction benefit directly provided by trees due to their bio-physiological air pollutant uptake processes is calculated using the equation below. All calculations were performed according to the age and size class (small, medium, large) of trees:

Total annual air pollutant reduction (lb/yr);	=	Total number of small/medium/large trees	x	Average annual air pollutant removal per small/medium/large tree (lb/yr)

3.4.1.2 Calculation of Indirect Benefits: Avoided Emissions due to Reduced Energy Usage

The reduction in energy usage (both electricity and gas) translates to a benefit of avoided criteria pollutant emissions. Results from Section 3.3 (in both kWh of electricity savings and Therms of gas savings) are carried forward in Table 3-5 to estimate the associated reductions in criteria pollutants.

TABLE 3-5
Pollutant Reduction (pounds) per Electricity (kWh) and Gas (therms) Reduction

NO_2 Reduction (lb/therm)	SO_2 Reduction (lb/therm)	NO_2 Reduction (lb/kWh)	SO_2 Reduction (lb/kWh)
0.010	0.018	0.0003	0.0010

Data provided through EPA's eGRIDWeb, 2012

3.4.1.2.1 Avoided Emissions from Building Heating/Cooling Energy Savings

As previously described in Section 3.3.1, trees within approximately 60 feet of a building reduce energy use due to their shading properties in during the heating season.

Total avoided emissions resulting from building heating and cooling energy savings are calculated as follows.

Total pounds of emissions avoided annually (lb/yr)	=	Total number of small/medium/large trees	x	Average annual energy saved by small/medium/large tree (therm or kWh/yr)	x	Average pollutant emission per unit of energy (lb/therm or kWh)

3.4.1.2.2 Avoided Emissions from Wastewater Treatment Plant Energy Savings

By reducing stormwater runoff, and therefore, combined sewage volume conveyed for treatment at Metro, GI also produces energy savings by reducing end-of-pipe wastewater treatment needs.

Reduction in the energy used for wastewater treatment provides indirect air and climate benefits from reduced emissions.

Total pounds of emissions avoided annually (lb/yr)	=	Total electricity savings from reduced wastewater treatment (kWh/yr)	x	Average pollutant emission per unit of electricity (lb/kWh)

3.4.1.2.3 Avoided Emissions from Power Plant Electricity Savings

Through its online database eGRIDweb, EPA (2012) provides estimates of annual output emission factors for NO_2 and SO_2 associated with electricity production, with specific values provided by geographic region. Although power plants emit other pollutants, data were not available to quantify those other pollutants. In the Upstate New York service region, the values for pollutant emission rates based on 2009 data are the following:

- NO_2: 0.0004 lb/kWh
- SO_2: 0.0011 lb/kWh

Total avoided criteria pollutant emissions resulting from reduced electricity are calculated as follows.

Total pounds of emissions avoided annually (lb/yr)	=	Annual cooling savings (determined in Section 3.3 (kWh/yr)	x	Criteria pollutant emission rates (lb/kWh)

3.4.1.2.4 Avoided Emissions from Natural Gas Savings

eGRIDweb (EPA, 2012) provides NO_2 and SO_2 emission factors per Btu of natural gas input. Evaluations calculated in this report are based in units of therms, and converted accordingly. For the Upstate New York service region, the values for pollutant emission rates for 2009 are as follows:

- NO_2: 0.001 lb/Therms
- SO_2: 0.002 lb/Therms

The equation used to calculate the total avoided criteria pollutant emission from reduced gas use is:

Total pounds of emissions avoided annually (lb/yr)	=	Annual heating natural gas savings (determined in Section 3.3) (Therms/yr)	x	Criteria pollutant emission factor (lb/Therm)

To calculate the value of the indirect air quality benefits provided by “energy trees,” the total annual avoided criteria pollutant emissions from both electricity and natural gas savings are summed:

Total annual avoided criteria pollutant emissions (lb/yr)	=	Annual emissions avoided from electricity savings (lb/yr)	+	Annual emission avoided from natural gas savings (lb/yr)

3.4.2 Total Direct Benefits and Indirect Benefits

The total value of the air quality benefits provided by “energy trees” is the sum of direct and indirect benefits.

Total annual benefits of pollutant reduction (lb/yr)	=	Annual direct benefits in reduction of criteria pollutants (lb/yr)	+	Annual indirect benefits in reduction of criteria pollutants (lb/yr)

3.5 Climate Change Benefit Category

CO_2 is released into the atmosphere predominantly through the natural carbon cycle and the burning of fossil fuels that occurs due to power plants generating electricity and the operation of vehicles or other equipment that use fossil fuels. Through photosynthesis, trees and vegetation transform atmospheric CO_2 into above- and below-ground biomass, storing the CO_2 as carbon. Trees, shrubs, and perennials sequester CO_2 in their trunks, branches, stems, and leaves as they grow.

Projects incorporating vegetative GI provide both direct climate benefits from carbon sequestration and also indirect climate benefits from avoided emissions related to reduced energy usage for building heating and cooling. In this section, the direct and indirect benefits are calculated separately and the economic value is calculated based on the sum of each.

3.5.1 Methodology and Assumptions for Calculating Climate Change Benefits

The methodology used for the project-scale analysis of trees relied upon output from i-Tree Eco, completed by SUNY-ESF. The software used tree canopy cover projections based on local Syracuse data, and provided a value of CO_2 stored per square meter of increased tree canopy cover per year for 40 years.

Carbon storage potential varies depending on both a tree's size class (small, medium, large) and growth rate class (slow, moderate, and fast). Using i-Tree Eco output tables, a specific CO_2 reduction value was attributed to an individual tree type based on the size and growth rate classes to predict the net CO_2 reduction for each GI project's associated tree plantings. For this analysis, established tree growth classes were averaged to generate a growth rate for typical small, medium, and large trees. Average CO_2 sequestration rates for small, medium, and large trees were 0.030, 0.034, and 0.58 lb/m^2/year, respectively.

3.5.1.1 Reduced Atmospheric CO_2 Provided by Tree Plantings (Direct Benefit)

The total amount of CO_2 sequestered by tree plantings (pounds per tree) is determined by using the following equation:

Total annual climate benefit (lb CO_2 reduced/yr)	=	Total number of small/medium/large trees planted (#/yr)	÷	average growth rate of small/medium/large trees (m^2/yr)	x	Total CO_2 sequestered (lb/small/medium/large tree/average growth rate)] (lb/m^2/yr)

3.5.1.2 Reduced Atmospheric CO_2 Provided by Bioretention and Green Roofs (Direct Benefit)

For bioretention and green roof projects, the GI area is used to determine the amount of carbon sequestered by plant biomass per year, based on a Michigan State University study (Andresen et al., 2009). On average, 0.37 pounds of carbon is sequestered per square meter of plant biomass. The average includes a tiered sequestration rate where the carbon sequestered both above and below ground was included for the first 10 years and only the net increase in substrate carbon was included for the next 30 years. This approach accounts for decreased plant growth and the reduction of above ground biomass as the green roof ages over time. The embedded energy in the construction of the green roof is not included in this calculation.

The total amount of CO_2 sequestered by bioretention plantings and green roofs is determined as follows:

Total annual climate benefit (lb CO_2 reduced/yr)	=	Total bioretention and/or green roof area (m^2)	x	Amount of CO_2 sequestered (0.37 lb/m^2 of plant biomass/yr)

3.5.1.3 Avoided CO_2 Emissions from Reduced Energy Usage (Indirect Benefit)

Tree-planting practices provide an indirect benefit of avoided CO_2 emissions through reduction in energy usage (electricity and gas) for heating and cooling in adjacent buildings and reduced wastewater treatment of stormwater runoff.

3.5.1.3.1 Avoided CO_2 Emissions from kWh of Electricity Saved (Indirect Benefit)

To assess the indirect benefit of avoided CO_2 emissions due to reduced electric generation, the results discussed in Section 3.3 are used in the following calculation. Additionally, an emissions factor of 0.5 lb CO_2 /kWh is used. This value was published by EPA in 2012 and is also, upstate New York eGRID subregion CO_2 output emission rate (2009).

Total annual avoided emissions (lb CO_2/yr)	=	Total avoided annual electric usage (kWh)	x	CO_2 output emission rate (0.5 lb/kWh)

3.5.1.3.2 Avoided CO_2 Emissions from Therm of Natural Gas Saved (Indirect Benefit)

To assess the indirect benefit of CO_2 reduction due to natural gas savings based on tree plantings, the results from Section 3.3 are used in the following calculation. Additionally, an emissions factor of 0.14 lb CO_2 /therm is used. This value was published by EPA (2012) and represents the number of pounds of CO_2 released per therm for the upstate New York eGRID subregion (2009).

Total annual avoided CO_2 emissions from heating gas savings (lb CO_2 avoided/yr)	=	total annual heating natural gas saved (million Btu/yr)	x	CO_2 emissions factor (0.14 lb CO_2/therm)

3.5.2 Total Direct and Indirect Benefits

The total CO_2 reduction and climate change benefit is the sum of the direct and indirect results.

Total annual climate benefit (lb CO_2 reduced/yr)	=	Total annual sequestration benefit (lb CO_2/yr)	+	Total avoided CO_2 emissions from energy savings (lb CO_2/yr)

SECTION 4

Valuation

This section describes the valuation methodology, category-specific assumptions, and calculations used to estimate financial benefits of the 169 completed GI projects for the following categories:

- Water quantity
- Energy
- Air quality
- Climate change

The public derives many economic benefits from water quality improvements, including the following. Dollar-based financial benefits were not calculated for water quality improvements.

- Improved water-based recreation activities
- Increases in property values (especially waterfront properties)
- Intrinsic value derived from preserving a more healthy aquatic ecosystem for future generations to enjoy

The economic value was determined according to an economic benefit-cost accounting framework which provides a consistent and defensible basis for assessing the value of investments in GI. All values are reported in 2014 dollars and are estimated using standard market and nonmarket economic valuation methods, existing economic benefit-cost analysis models, per-unit values from empirical literature, and data specific to this project.

4.1 Water Quantity Benefit Valuation

There are several economic benefits associated with the reduction in stormwater runoff and CSO discharges. Economic benefits readily quantified include cost savings from reduced wastewater treatment and the economic value of increased groundwater recharge.

4.1.1 Valuation of Wastewater Treatment Cost Savings

For the Onondaga County CSS, reductions in stormwater runoff volume translate into reductions of combined sewage that must be treated at the Metro wastewater treatment facility.

The Metro operates using an advanced wastewater process, with full secondary and tertiary treatment of up to 126 million gallons per day. During 2013, Metro treated an average of 66.6 million gallons per day. The average cost, including all expenditures such as personnel, sludge disposal, energy, chemicals, etc., of wastewater treatment at Metro, as provided by OCDWEP, is $0.0023 per gallon.

This method of estimating economic benefits is known as the avoided cost method and can be estimated as follows. The treatment cost savings include reductions in use of energy and chemicals, and less sludge to be disposed of.

Wastewater treatment cost savings ($89,700/yr)	=	Wastewater Treatment Savings (39.0 MG/yr)	x	Cost of Metro wastewater treatment ($0.0023/gal)

4.1.2 Valuation of Increased Groundwater Recharge

The economic value of improving the health of aquatic ecosystems has been demonstrated in two studies (Londono and Ando, 2011; Wilson and Carpenter, 1999). Each of these studies relies upon survey data collected from a random sample of households to estimate their willingness to pay for the specified changes in the aquatic ecosystem of interest. The Londono and Ando (2011) study is particularly relevant to valuing improvements due to GI as it specifically estimates the value of changes in infiltration that are linked to the health of the aquatic ecosystem. For this recent economic study, economists conducted a survey of Illinois

households and estimated the value to the public of groundwater recharge using a stated preference valuation approach, known as conjoint analysis. The authors found that on average, households were willing to pay $0.30 annually per percentage increase in infiltration.

Infiltration valuation is calculated by the following equation. Current census information indicates 43,795 households within the combined sewer system in Syracuse.

Increased groundwater recharge / reduced imperviousness value ($)	=	area treated by GI practices (ft^2) / total area of CSS (ft^2)	x	43,795 households × $0.30 / household

4.1.3 Valuation of Potable Water Savings

The economic benefits of reducing potable water usage as a result of installed GI can be approximated by multiplying the quantity of potable water reduced by the rate charged by the City of Syracuse for potable water. This rate, as determined from the 2012, 2014, and 2015 water bills obtained from the Rosamond Gifford Zoo, is $0.0025 per gallon of water consumed. The value was determined by averaging the monthly rate charged in 2012 and 2014. Because the rate increased by a fraction of a cent over that time period the rate increase is not considered significant.

The equation for valuing the reduction in potable water usage is as follows:

Reduced potable water usage value ($)	=	Reduced potable water savings (gal)	x	Potable water billing rate ($0.0025/gal)

4.1.4 Valuation of Equivalent Avoided Gray Infrastructure Costs

In addition to providing benefits related to water quantity, water quality, energy, air, and climate, the GI projects also reduce the amount of gray infrastructure that will be required to meet the ACJ requirements. This benefit can be monetized by comparing to the average cost of constructing gray infrastructure per gallon of CSO reduced. Without the GI projects, the gray infrastructure program would more expensive, as it would have to manage an increased volume of stormwater runoff, which would result in larger and/or more storage tanks to achieve the same level of CSO reduction, for example.

The County has completed 4 major gray infrastructure projects. These projects, their capital costs, and CSO reductions are provided in Table 4-1. On an aggregate basis the cost of gray infrastructure implementation is $0.66 per gallon of CSO reduction provided.

TABLE 4-1
Average Cost per Gallon of CSO Reduction for Major Gray Infrastructure Projects

Major Gray Facilities	Capital Costs*	CSO Reduction (MG/yr)**	$/gal/yr
Midland RTF and Conveyances	$69,558,648	120.1	$ 0.58
Clinton Storage Facility and Conveyances	$104,936,874	92.1	$ 1.14
Lower Harbor Brook Storage Facility and Conveyances	$34,640,463	112.2	$ 0.31
CSO 022/045 Sewer Separation	$5,327,986	0.9	$ 5.92
TOTAL	$214,463,971	325.3	$ 0.66

*Capital Costs include construction costs and land acquisition fees

**Per 2014 SWMM Model

The 169 completed GI projects through 2014 are estimated to provide 53.4 MG of CSO reduction on an annual basis (Section 3.1.2). Utilizing the aggregate gray infrastructure unit cost for annual CSO reduction ($0.66/gal), the use of GI by the County has resulted in the avoidance of $35 million of gray infrastructure. The construction cost of these GI projects is $37 million dollars. However, it should also be noted that gray

infrastructure does not provide most of the other economic and environmental benefits provided by GI that are discussed throughout this report (totaling $8 million over 40 years). Further, life cycle analysis may identify additional cost avoidance when considering operation and maintenance (for example, numerous GI projects are maintained by private property owners at no cost to County).

4.2 Energy Usage Benefit Valuation

The value of the energy savings resulting in reduced cooling (i.e., reduced electricity usage) and heating (i.e., reduced gas usage) provided by tree plantings is estimated at the price per energy unit times the number of units saved. The electricity and natural gas savings estimates were based on the local utility National Grid rates for the Central Region of New York (central zone: Zone C).

4.2.1 Valuation of Energy Savings from Reduced Cooling

Electricity rates were provided from National Grid (2014). The marginal cost of the "last units of electricity consumed or saved," includes only costs related to distribution and supply and does not include the following:

- Basic service charge
- New York Power Authority's hydropower systems benefit charge and renewable benefit surcharge - these charges represent a transfer from the rate payers to the public for the provision of public benefits and renewable energy sources
- Merchant function charge: very small, yet complicated to calculate
- Transmission revenue adjustment: small and highly variable—sometimes positive and sometimes negative

Only the charges that are based upon the last kWh units saved are applicable. Therefore, for this benefit analysis, the price of electricity is estimated as follows:

Electricity unit price	=	Delivery charge	+	Incremental State surcharge	+	Delivery charge adjustment	+	Electric supply charge
$0.117/kWh		$0.047/kWh		$0.003/kWh		$0.001/kWh		$0.066/kWh

The value of electricity saved is estimated by the following equation:

Value of electricity savings ($/yr)	=	Amount of electricity saved (kWh/yr) (Table 3-3)	x	Electricity unit price ($0.117/kWh)

4.2.2 Valuation of Energy Savings from Reduced Heating

Natural gas rates were provided from National Grid (2014). Gas service charges include basic service plus additional charges per therm. Similar to the electricity calculation, the marginal cost of the "last units of gas consumed or saved," includes only costs related to distribution and supply and does not include the following:

- Basic service charge
- Merchant charges

There is a higher delivery charge for the first 5,000 therms of natural gas service than for an additional therm over 5,000; therefore, assuming that the energy "saved" will be the last units consumed, the conservative estimate for costs savings is used in this estimate (i.e., the delivery charge for the units consumed over and above the first 5,000 therms). The equation below provides the calculation used to estimate cost-savings associated with each unit reduction in gas usage:

Gas unit price $0.71/therm = Delivery charge $0.36/therm + Supply charge $0.35/therm

The equation below provides the calculation used to estimate the value of natural gas savings:

Value of natural gas savings ($/yr) = Amount of gas saved (Therms/yr) (Table 3-3) x Gas unit price ($0.71/therm)

4.3 Air Quality Benefit Valuation

4.3.1 Valuation of Air Quality Benefits

Emissions of NO_2, SO_2, O_3, and $PM_{2.5}$ are air pollutants that are responsible for increasing incidence of illness (e.g., cancer, respiratory and cardiovascular disease) and premature mortality. The magnitude of the economic damages depends upon factors such as the pollutant concentrations, local meteorological conditions, the size of the affected population, and the population's susceptibility to the pollutants.

i-Tree Eco results for changes in pollutant concentrations due to the existing tree canopy within the project boundary were available from EPA's (2009) BenMAP model to calculate the base case values. i-Tree Eco uses i-Tree's Urban Forest Effects-Dry Deposition (UFORE-D) model for these calculations. For this analysis, the project area was estimated to cover 29.73 km^2 with 24.5 percent tree cover, corresponding to 7.28 km^2. BenMAP considers changes to input pollutant concentrations based upon i-Tree Hydro and calculates changes in the incidence of health effects and mortality for the population of the City of Syracuse (144,669) as estimated from the 2013 census. Appendix B presents health effect and mortality assumptions.

For the purpose of this analysis, it was assumed that the age distribution for the project area is the same as for the broader Syracuse region. For each type of illness avoided, BenMAP assigns an economic value from the empirical literature (Abt Associates, Inc., 2010). In theory, this value would be based upon the individual's total willingness to pay to avoid the occurrence of the adverse health effect and would likely depend upon out-of-pocket medical expense, lost wages, and pain and suffering. In reality, for most illnesses only estimates of the medical costs are available, which leads to an underestimate of the benefits. The value of avoiding mortality is determined by the standard economic approach of referencing the value of a statistical life, which is based primarily on health care costs and lost wages. BenMAP default values were used for reducing the incidences of health effects and mortality for the population in the project area. The resultant base case estimates of dollars per square meter of tree canopy per year for removal of NO_2, O_3, $PM_{2.5}$, and SO_2 are presented in Table 4-2.

TABLE 4-2
Base Case for Economic Value of Human Health Effects Avoided due to Current Tree Cover in the CSS

Pollutant	Pollution Removal (Tons/yr)[a]	Removal Value ($/yr)[b]	Removal Value ($/$m^2$/yr)[a,c]
Nitrogen dioxide (NO_2)	0.324	472	0.00007
Ozone (O_3)	28.612	317,867	0.05
Particulate matter ($PM_{2.5}$)	1.825	866,397	0.14
Sulfur dioxide (SO_2)	1.125	448	0.00007
Total	31.886	1,185,184	—

[a] i-Tree Eco.
[b] BenMAP.
[c] Removal (tons/yr) and value ($/yr) are divided by the reference area of tree cover (m^2), which is 7,283,629 m^2.

The air pollution reduction benefit equals $1.37 million per year for the current tree cover in the project study area. The impact of tree cover due the number and types of trees planted in the 169 completed

projects and their associated growth rates will change over time. Each year throughout the 40-year life of the project, the cumulative increments in tree canopy cover are multiplied by the Table 4-3 pollutant removal values.

The equation used to calculate the value of the reduction in each of the pollutants is:

Annual total value of pollutant reduction ($/yr)	=	Cumulative change in tree cover (m^2)	+	Value of pollutant removal ($/$m^2$-yr)

4.4 Climate Change Benefit Valuation

4.4.1 Valuation of Climate Change Benefits

The economic value of reducing carbon emissions is estimated by the economic damages avoided. Executive Order 12866, mandated the use of benefit-cost analysis for evaluating any regulation with costs in excess of $100 million. The Interagency Working Group on the Social Cost of Carbon (2010) was charged with developing benefit-cost estimates to support analyses of regulations. This body recognized the large uncertainties involved in developing the estimates and therefore provide a range of values corresponding to different model assumptions and discount rates. All estimates are intended to include changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change. The range in estimates is not static over time, but varies in response to changing conditions.

In addition, the Working Group reported a range of estimates employing different assumptions about the discount rate. The 3% discount rate series represents the central tendency of the range in discount rates that were considered. The results for the social cost of carbon range from $0.014/lb in 2012 to $0.029/lb in 2052, all in 2011 dollars. The Working Group recommends considering the uncertainties underlying the estimates by using a probability density function for equilibrium climate sensitivity. Of particular concern are low probability-high impact events which correspond to the 95th percentile estimate across all three climate change integrated assessment models (at the 3% discount rate). In 2011 dollars, this estimate for the social cost of carbon ranges from $0.043/lb in 2012 to $0.088/lb in 2052.

Even as the Interagency Working Group finalized their analyses and recommendations, they recognized that the estimates were sensitive to the limited state of knowledge and they were committed to continue the research and reassess the social cost of carbon in two years. Indeed, the release of the report has spurred much debate with the general consensus that the Interagency Working Group has underestimated the social cost of carbon. Specifically, they did not sufficiently account for the low probability and high impact tail of the distribution (Dietz, 2012). This failure to adequately consider damages uncertainty is compounded for a risk adverse society. Considered jointly, the effect is to triple the estimate of the social cost of carbon (Kopp, et al., 2012). Others have contended that the estimate is off by more than an order of magnitude (Ackerman and Stanton, 2012). This more recent work suggests that pending an update by the Working Group, the best estimate currently supported by the Working Group is the series corresponding to the 95th percentile. That is the series used for the purposes of this benefit analysis.

The following equation is used to determine the value of CO_2 reduction provided by the tree plantings:

Annual value of CO_2 reduction ($/yr)	=	Total reduction in CO_2 (lb/yr)	x	Marginal cost of CO_2 ($/lb)

SECTION 5

Results

5.1 Net Environmental Benefit Analysis (NEBA) Results

The benefits of each GI project analyzed have been summarized for the five following categories:

- Water quantity
- Water quality
- Energy
- Air quality
- Climate change

Table 5-1 presents the average annual benefits for each of the five categories, and Table 5-2 presents the average annual economic benefits for the same categories. Both tables present results for the 169 constructed GI projects analyzed.

TABLE 5-1
Summary of Environmental Benefits Calculated for 169 Constructed Green Infrastructure Projects

Benefit Category	Specific Benefit	Average Annual Benefit[a]	Cumulative Benefit Over 40 Years
Water quantity	Total reduced stormwater runoff volume (MG/yr); SWMM + i-Hydro Output	111.0	4,440
	• Reduced stormwater volume from structural GI systems (MG/yr); SWMM Output[b]	109.7	4,388
	• Reduced stormwater volume from tree/shrub plantings (MG/yr); i-Hydro Output	1.3	52
	Reduced CSO volume (MG/yr); SWMM Output[b]	53.4	2,136
	Reduced stormwater runoff volume treated at Metro wastewater treatment plant (MG/yr); SWMM Output	39.0	1,560
	Increased percentage of groundwater recharge (treated impervious area/total area of CSS)	2.9%	2.9%
	Reduced potable water usage (MG/yr)	13.5	540
Water quality	Reduced 5-day biochemical oxygen demand loading (BOD_5; lbs/yr)	13,000	520,00
	Reduced total suspended solids loading (TSS; lbs/yr)	37,100	1,484,000
	Reduced total phosphorus loading (TP; (lbs/yr)	200	8,000
	Reduced total nitrogen loading (TN; lbs/yr)	1,600	64,000
	Reduced fecal coliform (colonies/yr)	$7{,}600 \times 10^{12}$	$304{,}000 \times 10^{12}$
Reduced energy usage	Reduced energy use for building heating—natural gas savings due to tree plantings (therm/yr)	760	30,400
	Reduced energy use for building cooling—electricity savings due to tree plantings (KWh/yr)	9,020	360,800
	Reduced energy use—electricity savings due to reduced wastewater treatment needs (kWh/yr)	42,490	1,699,600

TABLE 5-1
Summary of Environmental Benefits Calculated for 169 Constructed Green Infrastructure Projects

Benefit Category	Specific Benefit	Average Annual Benefit[a]	Cumulative Benefit Over 40 Years
Air quality	Reduced carbon monoxide (CO; lb/yr)	10	440
	Reduced nitrogen dioxide (NO_2, lb/yr)	215	8,400
	Reduced ozone (O_3; lb/yr)	300	12,000
	Reduced sulfur dioxide (SO_2; lb/yr)	50,760	2,030,400
	Reduced particulate matter of 2.5 microns or less ($PM_{2.5}$; lb/yr)	20	800
Climate change	Reduced atmospheric CO_2 (lb/yr)	976,660	39,066,400

[a]Benefits for the Onondaga County Save the Rain Program are still accruing as the program is still in progress.

[b]Source: *Onondaga County, New York, ACJ Fourth Stipulation 2014 Annual Report*, Onondaga County Department of Water Environment Protection, New York, April 2014; Table 4-2

TABLE 5-2
Summary of Economic Benefits Calculated for 169 Constructed Green Infrastructure Projects

Benefit Category	Specific Benefit	Average Annual Economic Benefit	Cumulative 40-Year Economic Benefit
Water quantity	Wastewater treatment cost savings	$89,700	$3,588,000
	Increased groundwater recharge/imperviousness	$300	$12,000
	Reduced potable water usage cost savings	$33,500	$1,340,000
Operation and Maintenance	Operation and maintenance cost savings at Metro WWTP	$34,520	$1,380,800
Reduced energy usage	Electricity savings due to tree plantings	$400	$16,000
	Natural gas savings due to tree plantings	$0[a]	$0[a]
	Electricity savings due to reduced wastewater treatment	$2,130[b]	$85,200[b]
Air quality (direct and indirect benefits)	Total reduced criteria pollutant savings (NO_2, SO_2, O_3, $PM_{2.5}$)	$4,530	$181,200
Climate change (direct and indirect benefits)	Reduced atmospheric CO_2 savings due to tree plantings	$54,745	$2,189,800
Total Economic Benefit of all benefits quantified not including avoided gray infrastructure		**$219,825**	**$8,793,000**
Equivalent Avoided Gray Infrastructure Cost			**$35,000,000 (one time benefit)**

TABLE 5-2
Summary of Economic Benefits Calculated for 169 Constructed Green Infrastructure Projects

Benefit Category	Specific Benefit	Average Annual Economic Benefit	Cumulative 40-Year Economic Benefit

[a] The value of the natural gas savings due to trees rounds to less than $1.
[b] The energy cost savings due to reduced water treatment needs are included in the wastewater treatment cost savings. Total economic benefit does not include these values to avoid double counting.

SECTION 6

Future Refinements

6.1 Future Uses of this Information

Project fact sheets have been created for the majority of the 169 Save the Rain projects included in this analysis. These sheets are currently featured on the Save the Rain website (www.savetherain.us) in order to highlight and summarize each project for a general audience. The environmental benefits could also be highlighted on the fact sheets.

6.2 Benefits and Costs for Future Consideration

The quantitative effort includes the most defensible benefits that could be estimated at reasonable cost and using readily available data. Additional benefits could be considered in future phases depending upon priorities, data availability, and new available research. These potential benefits are listed below to facilitate discussion and future consideration regarding how to expand the analysis.

Reduced pollutant loadings improve water quality and provide associated benefits (e.g., improved recreation opportunities, fewer swimming-beach closures, and increased property values for waterfront property). This beneficial category—enhanced water quality—may be relatively difficult to evaluate as it relies upon modeling and monitoring to understand how water quality in the receiving waters will respond to the changes in pollutant loading. Changes in pollutant loads resulting from a reduction in CSO overflow events do not provide a direct measure of water quality improvements in receiving waters.

Economists generally estimate the economic value of outdoor recreation opportunities by collecting survey data on the public's recreation activity levels and estimating recreation demands as a function of travel costs, water quality characteristics, and other site attributes. Absent the time or resources to conduct original research, economists may rely upon benefit transfer methods, which use results from the existing literature for similar resources and populations to develop an estimate or range in the value of the recreation benefits generated by the water quality improvements in the new context. Once that information is available, it may then be linked to the local population's use and enjoyment of the improved waterways and to any value that households may place on restoring and maintaining water quality for sustainability, preservation, and bequest motivations.

Potential Additional Benefits to Consider in Future Analyses:

- Reduced demand for salting areas that have been paved using porous pavement and associated cost savings. Adding this beneficial category would require collecting data on practices in reference areas (i.e., unimproved areas) and relevant project sites (e.g., porous pavement areas).
- Estimates for electricity and gas usage that would have occurred if traditional gray infrastructure methods were utilized for all of the County's CSO abatement, utilizing data from the Clinton and Lower Harbor Brook Storage facilities.
- Enhanced potential for green job opportunities over the life of the projects. Green infrastructure projects that rely upon long-term maintenance provide sustainable local job opportunities for a relatively low skilled workforce. Such jobs help workers decrease reliance on social services and increase their long-term productivity. This can be an important benefit to the local community.
- Enhanced recreation opportunities and reduction in crime due to greening projects. Except in the case where GI provides increased parkland (e.g., stormwater wetland park) or greenway, it is difficult to make a quantitative case for enhanced recreation opportunities. Nonetheless, beautifying areas that people can enjoy while at leisure is certainly a benefit that can be described more fully in qualitative terms. Similarly, the dampening effects on crime due to converting vacant lots to green space may be

difficult to quantify, but it could be worth exploring the circumstances that favor this benefit. If geo-referenced crime statistics are available for an area with GI project(s) pre- and post-construction, the potential dampening effects of GI on crime could be analyzed.

- Enhanced property values due to aesthetics of GI projects, especially landscaping and other tree plantings. This is potentially a significant economic benefit, especially when GI projects are sited on private property. The value of private property may also be affected by enhancements to adjacent public property or property in the owner's view, but such impacts to property values may be difficult to defend without the benefit of an empirical study.
- Increased air emissions due to construction vehicles (negative benefit). Constructing GI projects can involve the use of heavy trucks and other vehicles that burn fuel and emit air pollutants. These increased emissions are a short term negative benefit that would not be difficult to quantify using standard emissions factors.
- Enhanced economic benefits associated with GI projects due to improved water quality. This potentially significant economic benefit is also difficult to define without a robust empirical study. Thus far, several capital projects have been constructed around Onondaga Lake and its tributaries, due in part to the significantly improved water quality. These include the Lakeview Amphitheater, Onondaga Creekwalk, Onondaga Lake Loop the Lake pedestrian/bicycle trail, Destiny USA shopping center enlargement, hotel construction, and so on. Each of these facilities/improvements bring increased tax dollars, tourism dollars, and investment into the local economy.
- Economic, social, and environmental benefits related to reductions in peak storm flows. With improved flow monitoring data expected in the future, the use of this data may be able to be correlated to benefits associated with reduced peak storm flows after the implementation of GI.
- Completion of a more detailed analysis to derive methods for valuing groundwater recharge. The economic value may be able to be derived by analyzing areas of the US that have experienced dramatic reductions in the water table resulting in economic loss.

SECTION 7

Contributors

The i-Tree software package was used throughout much of this effort, specifically i-Tree Eco and i-Tree Hydro. The results presented here were created by individuals from the USDA Forest Service Northern Research Station in Syracuse (i-Tree Eco) and the SUNY College of Environmental Science and Forestry, Department of Environmental Resources Engineering:

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- Alison Bodine, Research Forester
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SUNY College of Environmental Science and Forestry (SUNY-ESF)

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- Thomas Taggart, Doctoral Candidate in Water Resources Engineering
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SECTION 8

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Appendix A
Environmental Benefits and Values by Project

Table A-1: Water Quantity and Quality Reduction Summary for Onondaga County Save the Rain Green Infrastructure Projects

Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Water Quantity						Water Quality				
						Stormwater Reduction (gal/yr)	Water Capture By Trees (gal/yr)	Total Stormwater Reduction (gal/yr)	CSO Reduction (gal/yr)	WWTP Treatment Reduction (gal/yr)	Percentage Impervious Treated	BOD_5 Reduction (lbs)	TSS Reduction (lbs)	TP Reduction (lbs)	TN Reduction (lbs)	Fecal Coliforms (In Trillions)
C-01	City Parking Lot #21	Southwest corner of W. Washington and Clinton Streets	027	Tree Trench Standard	2010	373,000	4,000	377,000	181,000	135,000	0.01%	44	126	0.96	5	9
C-07	OnCenter Parking Garage	817 - 835 S. State Street and E. Adams Street	034	Bioretention	2012	1,248,000	-	1,248,000	600,000	448,000	0.02%	146	418	3.19	18	82
C-09	Townsend Parking Lot B	431 Harrison St & Townsend Street	034	Tree Trench Standard	2011	1,002,000	60,000	1,062,000	510,000	382,000	0.02%	124	355	2.71	15	74
C-101	Green Park: Skiddy Park (Site)	Tully St between Oswego and Tioga	031,032	Stormwater Planter, Porous Pavement, Pavement Removal	2012	512,000	-	512,000	246,000	184,000	0.01%	60	171	1.31	7	17
C-102	IMA: Leonard Apartments	400-412 W Onondaga St / 828 S West St	036	Porous Pavement Parking Lot, Bioretention, Pavement Removal	2013	464,000	8,000	472,000	227,000	169,000	0.01%	55	158	1.21	7	25
C-103	GIF#039 Home HeadQuarters Marcellus	223 Marcellus St.	028	Bioretention, Vegetative Swale, Stormwater Planter	2013	85,000	4,000	89,000	43,000	31,000	0.00%	10	30	0.23	1	6
C-105	GIF#041 CNY Philanthropy Center	431 E Fayette St	027	Porous Pavement Parking Lot, Bioretention, Green Roof	2012	224,000	9,000	233,000	112,000	83,000	0.00%	27	78	0.60	3	6
C-108	GIF#044 American Beech	500 Westcott Street	EBSS Storm Basin	Porous Pavement Parking Lot, Cistern/Rain Barrel	2012	93,000	2,000	95,000	46,000	33,000	0.00%	11	32	0.24	1	13
C-11	Commercial Green Streets: Harrison Street	Harrison Street, from Montgomery to State Streets	034	Stormwater Planter - Sidewalk	2012	168,000	5,000	173,000	84,000	61,000	0.00%	20	59	0.45	3	13
C-110	Seymour Academy Parking Lot	180 Shonnard St	036	Porous Pavement Parking Lot	2012	303,000	4,000	307,000	148,000	109,000	0.01%	36	103	0.79	4	36
C-118	GIF#047 Gemmi Boy	508-510 Westcott Street	EBSS Storm Basin	Cistern/Rain Barrel, Infiltration Bed, Pavement Removal, Porous Pavement Parking Lot	2012	111,000	-	111,000	54,000	39,000	0.00%	13	38	0.29	2	7
C-119	GIF#048 Mister Lady Bug	500-506 Westcott Street	EBSS Storm Basin	Porous Pavement	2012	158,000	-	158,000	76,000	56,000	0.00%	19	53	0.40	2	10
C-121	GIF#051 Park Central Presbyterian Church	509 E Fayette St	027	Porous Pavement Parking Lot, Street Trees	2012	156,000	2,000	158,000	76,000	56,000	0.00%	19	53	0.40	2	11
C-122	GIF#052 St. Lucy's Parking Lot	432 Gifford Street	035	Porous Pavement	2014	274,000	-	274,000	132,000	98,000	0.01%	32	92	0.70	4	18
C-125	GIF#055 Bethany Baptist Church (Phase I)	149 Beattie Street	EBSS Storm Basin	Porous Pavement Parking Lot, Bioretention	2014	414,000	16,000	430,000	207,000	154,000	0.02%	51	144	1.10	6	30
C-126	GIF#056 Copper Beech Commons Student Housing	1054 East Genesee St	027,030, 080C	Porous Pavement Parking Lot, Infiltration Trench	2012	1,113,000	19,000	1,132,000	544,000	406,000	0.02%	133	379	2.90	16	61

Table A-1: Water Quantity and Quality Reduction Summary for Onondaga County Save the Rain Green Infrastructure Projects

Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Water Quantity						Water Quality				
						Stormwater Reduction (gal/yr)	Water Capture By Trees (gal/yr)	Total Stormwater Reduction (gal/yr)	CSO Reduction (gal/yr)	WWTP Treatment Reduction (gal/yr)	Percentage Impervious Treated	BOD_5 Reduction (lbs)	TSS Reduction (lbs)	TP Reduction (lbs)	TN Reduction (lbs)	Fecal Coliforms (In Trillions)
C-128	GIF#058 Loon Creek Properties	601 E. Genesee Street	030	Stormwater Planter - Raised, Porous Pavement Parking Lot, Tree Trench	2013	401,000	2,000	403,000	194,000	144,000	0.01%	47	135	1.03	6	23
C-129	GIF#059 McMahon-Ryan Child Advocacy Center	601 E. Genesee Street	030	Porous Pavement Parking Lot, Street Trees	2013	664,000	2,000	666,000	320,000	239,000	0.01%	78	223	1.70	10	48
C-12a	Townsend St Median Revegetation Phase 1	S Townsend St, from E Adams St to E Genesee St	030,034	Landscape Restoration	2012	392,000	6,000	398,000	192,000	142,000	0.01%	47	134	1.02	6	28
C-12b	Townsend St Median Revegetation Phase 2	E. Adams St to E. Taylor St	034	Pavement Removal	2011	59,000	-	59,000	29,000	20,000	0.00%	7	20	0.15	1	4
C-132	Green Park: Leavenworth/Barker Park	301 Park Ave and Matty Ave	066	Bioretention, Porous Pavement Court	2012	1,191,000	1,000	1,192,000	573,000	428,000	0.03%	140	399	3.05	17	84
C-139	GIF#060 Kopp Billing Agency	511 East Fayette St.	027	Cistern/Rain Barrel	2012	257,000	-	257,000	124,000	91,000	0.01%	30	86	0.66	4	18
C-140	GIF#061 The Spa at 500 Green Roof	500 W Onondaga St	036	Green Roof	2013	54,000	-	54,000	26,000	19,000	0.00%	6	18	0.14	1	6
C-141	GIF#062 Peace Incorporated	200 Wyoming Street	028	Porous Pavement Parking Lot, Pavement Removal	2013	127,000	2,000	129,000	62,000	46,000	0.00%	15	43	0.33	2	9
C-146	Havens Parking Lot at SU	E Adams St and Comstock Ave	030	Porous Pavement Parking Lot	2012	82,000	13,000	95,000	46,000	33,000	0.00%	11	32	0.24	1	6
C-147	Waverly Parking Lot at SU	805 South Crouse Avenue	080B	Porous Pavement Parking Lot	2012	163,000	-	163,000	79,000	57,000	0.00%	19	55	0.42	2	11
C-149	GIF#063 Brewster Medical Properties	1200-1224 E Genesee St	030	Infiltration Bed, Cistern/Rain Barrel	2013	89,300	-	89,300	43,000	32,000	0.02%	10	30	0.23	1	59
C-151	GIF#065 Housing Visions	114-116 Hawley Ave	080A	Porous Pavement, Bioretention, Cistern/Rain Barrel, Landscape Restoration	2013	463,000	5,000	468,000	225,000	168,000	0.01%	55	157	1.20	7	37
C-153	East Washington Street Green Corridor	727 E Washington St	027	Bioretention, Porous Paver Parking Lane, Infiltration Trench	2014	927,000	11,000	938,000	451,000	336,000	0.02%	110	314	2.40	14	65
C-155	Carrier Dome Rainwater Harvesting System	900 Irving Ave	039	Cistern	2014	673,000	-	673,000	324,000	241,000	0.00%	79	226	1.72	10	63
C-156	GIF#070 Onondaga Commons (Slocum Ave)	207-11,213,215 Slocum Ave	036	Porous Pavement Parking Lot	2013	450,000	10,000	460,000	221,000	165,000	0.01%	54	154	1.18	7	32
C-157	GIF#071 Onondaga Commons (Harris Health Center)	301 Slocum Ave	036	Porous Pavement Parking Lot, Pavement Removal	2013	212,000	-	212,000	102,000	76,000	0.00%	25	71	0.54	3	17
C-158	GIF#072 Onondaga Commons (Lean On Me Daycare)	422-28 W Onondaga St	036	Porous Pavement Parking Lot, Pavement Removal	2013	648,000	-	648,000	312,000	232,000	0.01%	76	217	1.66	9	43
C-159	GIF#073 Onondaga Commons (Rural Metro)	488 W Onondaga St.	036	Porous Pavement Parking Lot	2014	549,000	-	549,000	264,000	197,000	0.02%	64	184	1.41	8	6

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						Stormwater Reduction (gal/yr)	Water Capture By Trees (gal/yr)	Total Stormwater Reduction (gal/yr)	CSO Reduction (gal/yr)	WWTP Treatment Reduction (gal/yr)	Percentage Impervious Treated	BOD_5 Reduction (lbs)	TSS Reduction (lbs)	TP Reduction (lbs)	TN Reduction (lbs)	Fecal Coliforms (In Trillions)
C-164	GIF#074 Synapse Downtown	360 Erie Boulevard East & East Water Street	EBSS Storm Basin	Tree Trench, Infiltration Trench, Cistern/Rain Barrel, Pavement Removal	2012	95,000	13,000	108,000	52,000	38,000	0.00%	13	36	0.28	2	7
C-165	GIF#075 Syracuse Center for Peace and Social Justice	2013 East Genesee Street	EBSS Storm Basin	Underground infiltration, Bioretention, Pavement Removal	2014	150,000	3,000	153,000	74,000	54,000	0.00%	18	52	0.39	2	25
C-166	GIF#076 360 Warren Associates	125 East Jefferson Street	030	Green Roof	2014	84,000	-	84,000	41,000	29,000	0.01%	10	29	0.22	1	61
C-167	GIF#078 Teall Centre	1605-41 Erie Blvd	EBSS Storm Basin	Bioretention, Porous Pavement Parking Lot	2012	1,804,000	14,000	1,818,000	873,000	654,000	0.05%	213	608	4.65	26	119
C-168	GIF#079 Near Westside Initiative Case Supply	104 Marcellus Street	026,028	Bioretention, Pavement Removal	2013	70,000	10,000	80,000	39,000	28,000	0.00%	10	27	0.21	1	6
C-169	GIF#080 Grace Episcopal Church	819 Madison Street	080B	Rain Garden, Porous Pavement, Pavement Removal	2013	271,000	1,000	272,000	131,000	97,000	0.01%	32	91	0.70	4	17
C-172	GIF#122 Butternut Commons	Butternut Street and North Townsend Street	020	Underground Infiltration	2012	728,000	4,000	732,000	352,000	262,000	0.01%	86	245	1.87	11	4
C-173	GIF#082 100 Clinton Square	100 Clinton Square	021	Infiltration Trench	2012	1,185,000	-	1,185,000	569,000	426,000	0.03%	139	397	3.03	17	72
C-175	GIF#084 WCNY Case Supply Building	415 W Fayette St & Wyoming St	026,028	Pavement Removal, Bioretention, Porous Pavement Parking Lot, Street Trees	2013	387,000	22,000	409,000	197,000	146,000	0.02%	48	137	1.05	6	29
C-176	GIF#085 Graham Millwork Co	126 Richmond Ave	066	Green Roof	2013	61,000	-	61,000	30,000	21,000	0.00%	7	21	0.16	1	4
C-181	GIF#091 Onondaga Commons Parking Lot/Roof	506 West Onondaga St	036	Porous Pavement Parking Lot, Pavement Removal	2014	353,000	2,000	355,000	171,000	127,000	0.01%	42	119	0.91	5	16
C-186	Tree Pit Pilot Project	441 South Salina Street	034	Porous Pavement Sidewalk	2012	55,000	-	55,000	27,000	19,000	0.00%	7	19	0.14	1	4
C-190	GIF#100 Salt Quarters	109-15 Otisco Street	031	Bioretention, Porous Pavement Parking Lot, Pavement Removal	2013	128,000	3,000	131,000	63,000	47,000	0.01%	15	44	0.34	2	8
C-191	GIF#101 Erie Bruce Corp.	2112 Erie Boulevard East	EBSS Storm Basin	Bioretention, Porous Pavement Parking Lot	2013	501,000	2,000	503,000	242,000	180,000	0.02%	59	169	1.29	7	35
C-192	GIF#090 Onondaga Commons Rural Metro	414-16 West Onondaga Street	036	Porous Pavement Parking Lot, Pavement Removal	2014	783,000	3,000	786,000	378,000	282,000	0.01%	92	263	2.01	11	79
C-195	GIF#102 JNJ Syracuse	725 East Fayette Street	027	Porous Pavement Parking Lot, Pavement Removal	2014	56,000	1,000	57,000	28,000	19,000	0.00%	7	20	0.15	1	19

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C-196	GIF#103 VanKeuren Square	2223 East Genesee Street	EBSS Storm Basin	Porous Pavement, Cistern System, Bioretention	2014	227,000	49,000	276,000	133,000	98,000	0.01%	32	93	0.71	4	6
C-198	Road Reconstruction: Oneida Street	Oneida Street between W Adams and Temple St	037	Infiltration Trench	2013	1,722,000	-	1,722,000	827,000	619,000	0.03%	202	576	4.40	25	102
C-199	Road Reconstruction: South Clinton Street	S. Clinton Street between W. Adams St. and Temple St.	037	Infiltration Trench	2013	1,037,000	-	1,037,000	498,000	373,000	0.02%	122	347	2.65	15	61
C-20	Green Roof at Center of Excellence	727 E. Washington Street	027	Green Roof	2010	201,000	-	201,000	97,000	71,000	0.01%	24	68	0.52	3	15
C-201	Road Reconstruction: Richmond Ave	Richmond Ave. between N. Geddes St. and Van Renssellaer St	007,066	Infiltration Trench	2013	1,559,000	-	1,559,000	749,000	560,000	0.03%	183	522	3.99	23	72
C-202	GIF#105 JC Smith, Inc. 338 Peat Street	338 Peat Street	EBSS Storm Basin	Porous Pavement, Added Green Space	2014	343,000	3,000	346,000	167,000	123,000	0.01%	41	116	0.89	5	41
C-204	GIF#123 University Hill Apartments	205 Westcott Street	EBSS Storm Basin	Porous Pavement, Drywell, Added Green Space	2014	216,000	5,000	221,000	107,000	78,000	0.00%	26	75	0.57	3	11
C-21	GIF#004 Jefferson Clinton Commons	500 S. Clinton St	030	Porous Pavement Parking Lot, Green Roof	2010	272,000	-	272,000	131,000	97,000	0.01%	32	91	0.70	4	48
C-212	GIF#117 United Auto Supply	450 Tracy Street	066	Infiltration Bed	2013	455,000	-	455,000	219,000	163,000	0.01%	53	153	1.17	7	32
C-214	GIF#121 Taksum Development	708 East Genesee Street	027	Porous Pavement Parking Lot, Pavement Removal	2014	218,000	1,000	219,000	106,000	77,000	0.00%	26	74	0.56	3	14
C-217	GIF#096 Bethany Baptist Church (Phase 2)	149 Beatie Street	EBSS Storm Basin	Porous Pavement Parking Lot, Pavement Removal	2014	573,000	-	573,000	276,000	205,000	0.01%	67	192	1.47	8	24
C-219	GIF#125 Nojaims' Grocery Store	307 Gifford Street	035,036	Underground Infiltration Trench, Porous Pavement, Pavement Removal	2014	1,134,000	13,000	1,147,000	551,000	412,000	0.02%	134	384	2.93	17	17
C-220	St. Joseph's Hospital Campus Expansion and Redevelopment	301 Prospect Ave.	020	Green Roof	2012	695,000	33,000	728,000	350,000	261,000	0.02%	85	244	1.86	11	53
C-28	IMA: SUNY Upstate: Biotechnology Center	820-900 E. Water St.	027	Bioretention, Pavement Removal	2012	3,109,000	78,000	3,187,000	1,530,000	1,147,000	0.06%	373	1066	8.14	46	143
C-29a	Connective Corridor Phase 1 - Contract 1 (University Ave)	University Ave, from E Genesee to Waverly St	030,080B	Green Street	2012	4,799,000	179,000	4,978,000	2,390,000	1,791,000	0.09%	583	1665	12.72	72	318
C-29b	Connective Corridor Phase 1 - Contract 2 (E. Genesee St)	E Genesee St from University Ave to Forman Ave	030,080B	Green Street	2012	3,065,000	62,000	3,127,000	1,501,000	1,125,000	0.05%	366	1046	7.99	45	205
C-29f	West Fayette Street Sewer Separation	West Fayette Street between the Creek and Salina Street	027/029	Separated Sewer	2013	7,767,000	-	7,767,000	3,729,000	2,795,000	0.17%	910	2599	19.85	112	541

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C-31	GIF#010 Near Westside Initiative Lincoln Supply	109 Otisco St	032	Bioretention	2011	624,000	-	624,000	300,000	224,000	0.01%	73	209	1.60	9	43
C-33	Cistern System at the War Memorial	200 Madison Street	034	Cistern/Rain Barrel	2012	288,000	-	288,000	139,000	102,000	0.01%	34	97	0.74	4	20
C-34	Green Roof at OnCenter	800 S. State Street	034	Green Roof	2011	1,517,000	-	1,517,000	729,000	545,000	0.02%	178	508	3.88	22	105
C-38	OnCenter Surface Parking Lot	801 - 813 S. State Street; 422 - 434 Harrison St	034	Tree Trench, Porous Pavement Parking Lot	2012	2,530,000	6,000	2,536,000	1,218,000	912,000	0.04%	297	849	6.48	37	169
C-45	GIF#018 Putnam Properties	210 E. Fayette St.	030	Green Roof	2011	61,000	-	61,000	30,000	21,000	0.00%	7	21	0.16	1	4
C-48	Green Roof at the Erie Canal Museum Visitor Center	318 Erie Blvd. East	027	Green Roof	2012	51,000	-	51,000	25,000	17,000	0.00%	6	17	0.13	1	4
C-51	GIF#001 The Spa at 500 W. Onondaga	500 W. Onondaga St	036	Porous Pavement Parking Lot, Rain Garden	2011	43,000	18,000	61,000	30,000	21,000	0.00%	7	21	0.16	1	10
C-52	GIF#006 Green Roof at King & King Architects	358 W. Jefferson St.	028, 031	Green Roof	2010	259,000	-	259,000	125,000	92,000	0.00%	30	87	0.67	4	18
C-54c	Downtown Streetscape: 200 Water Street (North)	200 block E Water	027	Tree Trench Silva Cells High	2012	109,000	4,000	113,000	55,000	39,000	0.00%	13	38	0.29	2	8
C-54d	Downtown Streetscape: 200 Montgomery Street (West)	300 block Montgomery	027	Tree Trench Silva Cells High	2012	134,000	3,000	137,000	66,000	49,000	0.00%	16	46	0.35	2	10
C-54e	Downtown Streetscape: 200 Montgomery Street (East)	200 block Montgomery St	027	Tree Trench Standard	2012	154,000	4,000	158,000	76,000	56,000	0.00%	19	53	0.40	2	11
C-54f	Downtown Streetscape: 100 South State Street (West)	100 S. State St.	027	Tree Trench Standard	2012	220,000	10,000	230,000	111,000	82,000	0.01%	27	77	0.59	3	16
C-55	Green School: SCSD Institute of Technology	258 E. Adams St.	037	Sewer Separation	2012	2,154,000	-	2,154,000	1,034,000	775,000	0.04%	252	721	5.50	31	150
C-56	GIF#012 The Galleries Office Towers	147 E. Onondaga St.	034	Porous Pavement Parking Lot	2011	462,000	-	462,000	222,000	166,000	0.01%	54	155	1.18	7	32
C-57	GIF#013 The Monroe Building	333 E. Onondaga St.	030	Green Roof	2011	64,000	-	64,000	31,000	22,000	0.00%	8	22	0.16	1	4
C-58	GIF#007 Hotel Skyler	609 S. Crouse Ave.	080B	Porous Pavement Parking Lot	2011	226,000	4,000	230,000	111,000	82,000	0.00%	27	77	0.59	3	16
C-59	GIF#015 Near West Side Initiative: Artist Studio	109-115 Otisco & Wyoming St	032	Porous Pavement Sidewalk, Vegetated Infiltration Basin, Bioretention	2011	171,000	-	171,000	83,000	60,000	0.00%	20	58	0.44	2	12

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C-60	Green School: Seymour Academy Playground	108 Shonnard Street	036	Bioretention, Pavement Removal, Tree Trench	2012	137,000	10,000	147,000	71,000	52,000	0.01%	17	49	0.38	2	12
C-61	Water Street Green Gateway	300 Block of East Water Street	027	Porous Pavement Parking Lot, Green Street, Infiltration Trench	2012	857,000	44,000	901,000	433,000	323,000	0.02%	106	302	2.30	13	63
C-69	GIF#017 Create Public Art	713 E. Fayette St	027	Green Roof, Porous Pavement Parking Lot, Pavement Removal	2013	136,000	-	136,000	66,000	48,000	0.00%	16	46	0.35	2	9
C-70	GIF#020 St Lucy's Church	316 - 318 - 320 Seymour Street	035,036	Porous Pavement Parking Lot	2011	219,000	-	219,000	106,000	77,000	0.01%	26	74	0.56	3	22
C-73	West Onondaga Street Green Corridor	From W Adams to South Ave	036	Green Street	2013	5,684,000	28,000	5,712,000	2,742,000	2,056,000	0.10%	669	1911	14.59	82	375
C-74a	Otisco Street Green Corridor - Phase 1	from Ontario St to Seneca St	011,031	Curb Extension, Pavement Removal	2012	2,433,000	11,000	2,444,000	1,174,000	878,000	0.05%	286	818	6.25	35	137
C-75a	IMA: SUNY Upstate: Cancer Center Green Roof	750 E Adams St	034	Green Roof	2014	325,000	24,000	349,000	168,000	125,000	0.00%	41	117	0.89	5	26
C-75b	IMA: SUNY Upstate: Cancer Center Rain Garden	750 E Adams St	034	Bioretention	2014	61,000	7,000	68,000	33,000	24,000	0.00%	8	23	0.18	1	31
C-78	GIF#024 CNY Regional Transportation Authority	624-662 South Warren Street	034	Infiltration Trench	2012	189,000	-	189,000	91,000	67,000	0.02%	22	63	0.48	3	13
C-79	GIF#026 Central New York Jazz Arts Foundation	441 E. Washington Street	027	Green Roof	2012	33,000	-	33,000	16,000	11,000	0.00%	4	11	0.09	0	2
C-85	SCSD Central Offices	725 Harrison Street	034	Porous Pavement Parking Lot, Infiltration Trench	2012	1,991,000	-	1,991,000	956,000	716,000	0.04%	233	666	5.09	29	148
C-86a	Bank Street/Alley Storm Sewer	Alley between E Washington and E Fayette St	027	Infiltration Trench	2013	304,000	-	304,000	146,000	109,000	0.01%	36	102	0.78	4	22
C-92	GIF#040 Courts4Kids: Skiddy Park Porous Basketball Courts	Tully St between Oswego and Tioga	031	Porous Pavement Court	2011	370,000	-	370,000	178,000	132,000	0.01%	43	124	0.95	5	23
C-93	Seymour School Rain Garden	108 Shonnard Street	036	Bioretention	2011	8,000	1,000	9,000	5,000	2,000	0.00%	1	3	0.03	0	1
C-94	GIF#032 Consuela's Westside Taqueria and BBQ	523 Marcellus St	028	Bioretention, Porous Pavement Parking Lot, Street Trees, Pavement Removal	2013	45,000	1,000	46,000	23,000	15,000	0.00%	6	16	0.12	1	4
C-95	IMA: SUNY Upstate: Townsend Towers	507-523 E Adams Street	034	Bioretention	2012	806,000	-	806,000	387,000	290,000	0.01%	94	270	2.06	12	60
C-96	GIF#034 Pike Block	300 S Salina & W Fayette St	029	Cistern System, Underground Infiltration System	2014	588,000	-	588,000	283,000	210,000	0.01%	69	197	1.51	9	16
C-99	Vacant Lot: 701 Oswego St.	701 Oswego Street	036	Urban Garden, Infiltration Trench	2012	66,000	11,000	77,000	37,000	27,000	0.01%	9	26	0.20	1	14

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E-06	City Parking Lot #3	101 Oswego Blvd	EBSS Storm Basin	Porous Pavement Parking Lot	2010	708,000	19,000	727,000	349,000	261,000	0.01%	85	243	1.86	10	51
E-08	Green Library: Petit Branch	105 Victoria Place	EBSS Storm Basin	Porous Pavement Parking Lot	2012	168,000	-	168,000	81,000	60,000	0.01%	20	56	0.43	2	12
E-10	Road Reconstruction: Concord Place	Concord Place from Westcott St. to Allen St.	EBSS Storm Basin	Infiltration Trench	2011	365,000	-	365,000	176,000	130,000	0.01%	43	123	0.94	5	25
E-12	Dr Edwin E Weeks Elementary School	710 Hawley Ave	080A	Bioretention	2012	896,000	4,000	900,000	432,000	324,000	0.05%	105	301	2.30	13	106
E-16	Lower Sunnycrest Park	Caleb Ave	080H	Pavement Removal, Bioretention, Storage Bed	2012	742,000	25,000	767,000	369,000	275,000	0.01%	90	257	1.96	11	18
E-33	I-690 Downspout Disconnections	I-690 between Willow, James and State St.	080A, EBSS Storm Basin	Infiltration Trench, Bioretention	2013	1,533,000	9,000	1,542,000	741,000	554,000	0.04%	181	516	3.94	22	193
E-34	Rain Garden at Henninger High School	600 Robinson St	080H	Bioretention, Cistern/	2011	29,000	1,000	30,000	15,000	10,000	0.00%	4	10	0.08	0	2
E-36	Upper Sunnycrest Park	St. Anne Dr and Robinson St	080H	Bioretention, Pavement Removal, Porous Pavement Parking Lot	2011	1,533,000	19,000	1,552,000	745,000	558,000	0.03%	182	519	3.97	22	78
E-39	East Water Street Pavement Removal	Intersection of S Beech and E Water at Erie Blvd.	EBSS Storm Basin	Tree Trench, Porous Pavement, Pavement Removal	2012	462,000	6,000	468,000	225,000	168,000	0.01%	55	157	1.20	7	32
E-40ab	Westcott Street Green Corridor and Knoll	Westcott St from Dell to S. Beech St	EBSS Storm Basin	Porous Pavement Parking Lane, Infiltration Trench	2013	1,170,000	5,000	1,175,000	564,000	423,000	0.03%	138	393	3.00	17	70
E-43	Westcott Community Center	822-26 Euclid Ave and Westcott St	EBSS Storm Basin	Porous Pavement Parking Lot	2012	57,000	-	57,000	28,000	19,000	0.00%	7	20	0.15	1	7
F-01	Pearl Street Parking Lot	400 block of Pearl Street	021	Porous Pavement Parking Lot	2010	1,579,000	1,000	1,580,000	759,000	568,000	0.02%	185	529	4.04	23	80
F-02	Green Library: White Branch	763 Butternut St	020-2	Infiltration Trench, Cistern/Rain Barrel, Porous Pavement Parking Lot, Bioretention	2012	344,000	4,000	348,000	168,000	124,000	0.01%	41	117	0.89	5	51
F-04a	City Parking Lot #4	Butternut and N State Sts	020-1	Porous Pavement Parking Lot	2012	991,000	14,000	1,005,000	483,000	361,000	0.02%	118	337	2.57	15	89
F-04b	North State Street Green Street	N State St bw Butternut and Ash	020-1	Bioretention, Bioretention	2012	1,186,000	-	1,186,000	570,000	426,000	0.02%	139	397	3.03	17	84
F-07	Magnarelli Community Center Green Roof	2308 Grant Blvd	020-2	Green Roof	2014	234,000	-	234,000	113,000	83,000	0.00%	28	79	0.60	3	11
H-05	Green Roof at Hazard Branch Library	1620 West Genesee St	003	Green Roof	2012	124,000	-	124,000	60,000	44,000	0.00%	15	42	0.32	2	9
H-05b	Green Library: Hazard Branch Site Improvements	1620 West Genesee St	003	Porous Pavement Parking Lot, Bioretention	2012	412,000	11,000	423,000	204,000	151,000	0.01%	50	142	1.09	6	29

Table A-1: Water Quantity and Quality Reduction Summary for Onondaga County Save the Rain Green Infrastructure Projects

Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Water Quantity						Water Quality				
						Stormwater Reduction (gal/yr)	Water Capture By Trees (gal/yr)	Total Stormwater Reduction (gal/yr)	CSO Reduction (gal/yr)	WWTP Treatment Reduction (gal/yr)	Percentage Impervious Treated	BOD_5 Reduction (lbs)	TSS Reduction (lbs)	TP Reduction (lbs)	TN Reduction (lbs)	Fecal Coliforms (In Trillions)
H-06	Green Library: Mundy Branch	1204 South Geddes St	014	Tree Trench, Porous Pavement Parking Lot	2012	228,000	3,000	231,000	111,000	83,000	0.00%	27	77	0.59	3	16
H-07	GIF#011 Vibrant Syracuse Spaces	196 S. Geddes St	010	Porous Pavement Parking Lot, Bioretention	2011	254,000	2,000	256,000	123,000	92,000	0.00%	30	86	0.65	4	18
H-08	Road Reconstruction: Geddes Street	300-500 blocks S. Geddes St	011	Bioretention	2011	604,000	-	604,000	290,000	217,000	0.01%	71	202	1.54	9	38
H-11	Pass Arboretum	Avery Ave and Tompkins St	004	Bioretention	2012	683,000	46,000	729,000	350,000	262,000	0.01%	85	244	1.86	11	51
H-13	Zoo Entrance Enhancements and Coleridge Ave. Widening	S Wilbur Ave and Coleridge Ave	004	Bioretention	2012	686,000	9,000	695,000	334,000	249,000	0.01%	81	233	1.78	10	48
H-16	Porous Concrete Sidewalk on Grand Ave	100 Grand Ave	014	Porous Pavement Sidewalk	2012	14,000	-	14,000	7,000	4,000	0.00%	2	5	0.04	0	1
H-17	Rain Garden at Grand & Delaware	Grand Ave & Delaware St	014	Bioretention, Porous Pavement Roadway	2012	534,000	33,000	567,000	273,000	203,000	0.01%	67	190	1.45	8	39
H-19	Rosamond Gifford Zoo: Elephant Exhibit	One Conservation Place	004	Green Roof	2011	185,000	-	185,000	89,000	66,000	0.00%	22	62	0.47	3	13
H-20	Rosamond Gifford Zoo: Primate Exhibit	One Conservation Place	004	Porous Pavement Sidewalk	2011	283,000	8,000	291,000	140,000	104,000	0.01%	34	98	0.75	4	20
H-24	GIF#031 ARC of Onondaga County	401 Lowell Ave.	004	Porous Pavement Parking Lot	2012	266,000	-	266,000	128,000	95,000	0.00%	31	89	0.68	4	19
H-30	Vacant Lot: 1344-50 W. Onondaga St	Arthur St and W Onondaga St	015	Bioretention, Urban Forestry	2012	82,000	4,000	86,000	42,000	30,000	0.00%	10	29	0.22	1	9
H-31	Rosamond Gifford Zoo: Stormwater Wetland	One Conservation Place	004	Stormwater Wetland, Cistern/Rain Barrel	2013	1,310,000	15,000	1,325,000	636,000	477,000	0.04%	155	443	3.39	19	60
H-33	Green Park: Lewis Park	305 Lewis St and 825 Milton Ave	003,063	Porous Pavement Roadway, Porous Pavement Court	2013	551,000	-	551,000	265,000	197,000	0.01%	65	185	1.41	8	38
H-34	Rosamond Gifford Zoo: Parking Lot	One Conservation Place	004	Porous Pavement Parking Lot, Bioretention, Vegetated Infiltration Basin, Infiltration Bed	2013	3,938,000	47,000	3,985,000	1,913,000	1,434,000	0.08%	467	1333	10.18	58	277
H-36	Green Park: Wadsworth Park	1204 Glenwood Ave and Wolcott Ave	018	Infiltration Bed, Pavement Removal, Bioretention	2013	936,000	11,000	947,000	455,000	340,000	0.02%	111	317	2.42	14	66
H-38	Vacant Lot: 224-226 Putnam Street	224, 226 Putnam St	014	Bioretention, Urban Forestry	2012	51,000	4,000	55,000	27,000	19,000	0.00%	7	19	0.14	1	9
H-39	GIF#077 St. Patrick's Apartments	216 North Lowell Ave.	004	Cistern/Rain Barrel, Porous Pavement Parking Lot, Pavement Removal	2013	491,000	6,000	497,000	239,000	178,000	0.01%	58	167	1.27	7	35
H-40	Infiltration Basin at Woodland Reservoir	Stolp Avenue and Hancock Drive	017	Infiltration Bed	2013	440,000	-	440,000	212,000	157,000	0.01%	52	148	1.13	6	32
H-41	GIF#069 Vibrant Syracuse Spaces Green Roof	200 S Geddes St.	010	Green Roof	2012	296,000	5,000	301,000	145,000	107,000	0.00%	35	101	0.77	4	21
H-44	Vacant Lot: 109 Hartson Street	109 Hartson Street	014	Bioretention, Urban Forestry	2012	109,000	2,000	111,000	54,000	39,000	0.00%	13	38	0.29	2	8

Table A-1: Water Quantity and Quality Reduction Summary for Onondaga County Save the Rain Green Infrastructure Projects

Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Water Quantity						Water Quality				
						Stormwater Reduction (gal/yr)	Water Capture By Trees (gal/yr)	Total Stormwater Reduction (gal/yr)	CSO Reduction (gal/yr)	WWTP Treatment Reduction (gal/yr)	Percentage Impervious Treated	BOD_5 Reduction (lbs)	TSS Reduction (lbs)	TP Reduction (lbs)	TN Reduction (lbs)	Fecal Coliforms (In Trillions)
H-47	Road Reconstruction: Gifford Street	Geddes St to Ontario St	011	Infiltration Trench	2012	1,392,000	-	1,392,000	669,000	500,000	0.02%	163	466	3.56	20	88
H-48	GIF#083 Smith Housing	542-548 Seymour Street	011	Porous Pavement Parking Lot	2013	240,000	-	240,000	116,000	85,000	0.00%	28	81	0.62	3	15
H-52	GIF#099 VNA Home Care	1050 W Genesee St	005	Infiltration Bed, Cistern/Rain Barrel	2013	412,000	-	412,000	198,000	148,000	0.01%	48	138	1.05	6	30
H-53	GIF#113 Genesee Plaza	1001-1055 West Genesee Street	006A	Infiltration Trench, Pavement Removal	2013	3,172,000	-	3,172,000	1,523,000	1,141,000	0.07%	372	1061	8.11	46	231
H-56	GIF#081 Brooklyn Pickle	1600 West Genesee Street	004	Bioretention, Infiltration Trench	2012	45,000	4,000	49,000	24,000	17,000	0.00%	6	17	0.13	1	3
M-10b	Green Library: Beauchamp Site Improvements	2111 S. Salina St	060/077	Bioretention	2012	162,000	5,000	167,000	81,000	59,000	0.00%	20	56	0.43	2	17
M-12a	Green Roof at the Salina Street Post Office	2200 S. Salina St	060/077	Green Roof	2013	269,000	-	269,000	130,000	95,000	0.00%	32	91	0.69	4	19
M-15	IMA: SUNY ESF Parking Project at Bray Hall	1 Forestry Drive/930 Irving Ave Rear	039	Cistern/Rain Barrel, Porous Pavement Parking Lot, Landscape Restoration, Bioretention	2012	301,000	40,000	341,000	164,000	122,000	0.01%	40	114	0.87	5	25
M-16	SUNY ESF Gateway Building	1 Forestry Drive	039	Green Roof	2012	178,000	-	178,000	86,000	63,000	0.00%	21	60	0.46	3	14
M-17	GIF#009 SUNY ESF Residence Hall (Centennial Hall)	1 Forestry Drive	039	Porous Pavement Sidewalk	2011	81,000	-	81,000	39,000	29,000	0.00%	10	27	0.21	1	6
M-20	GIF#008 Dunbar Association	1453 S. State St.	039	Porous Pavement Parking Lot	2011	362,000	-	362,000	174,000	130,000	0.01%	42	121	0.93	5	27
M-23	Greening the Grey in Basin 044	400-700 W Castle Street	044	Bioretention	2012	487,000	19,000	506,000	243,000	182,000	0.02%	59	169	1.29	7	35
M-24	GIF#003 Syracuse Model Neighborhood Corp	1721 S. Salina Street	044	Porous Pavement Parking Lot, Bioretention	2011	508,000	-	508,000	244,000	182,000	0.01%	60	170	1.30	7	35
M-29	Hughes Magnet School Parking Lot	370 Jamesville Ave	077	Infiltration Bed, Porous Pavement Parking Lot	2012	739,000	-	739,000	355,000	265,000	0.00%	87	247	1.89	11	9
M-29bc	Vacant Lots at 147 Hughes Place and 220 Lorraine Avenue	147 Hughes Place & 220 Lorraine Ave	077	Rain Garden, Pavement Removal	2012	454,000	16,000	470,000	226,000	168,000	0.03%	55	157	1.20	7	83
M-31	GIF#025 Salina Shoe Company Inc	2809 S. Salina Street	060/077	Porous Pavement Parking Lot	2014	109,000	3,000	112,000	54,000	40,000	0.02%	13	38	0.29	2	60
M-32	GIF#027 People's AME Zion Church Parking Lot	2226-28 South Salina St.	077	Porous Pavement Parking Lot	2013	164,000	-	164,000	79,000	58,000	0.00%	19	55	0.42	2	8
M-35	GIF#030 The People's Community Development Corporation	2307-2315 S. Salina St	077	Green Roof	2013	117,000	-	117,000	57,000	41,000	0.00%	14	40	0.30	2	13
M-36	GIF#033 Matawon Development Group	2221 South Salina Street	077	Infiltration Bed	2012	44,000	-	44,000	22,000	14,000	0.00%	5	15	0.12	1	8

Table A-1: Water Quantity and Quality Reduction Summary for Onondaga County Save the Rain Green Infrastructure Projects

Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Water Quantity						Water Quality				
						Stormwater Reduction (gal/yr)	Water Capture By Trees (gal/yr)	Total Stormwater Reduction (gal/yr)	CSO Reduction (gal/yr)	WWTP Treatment Reduction (gal/yr)	Percentage Impervious Treated	BOD_5 Reduction (lbs)	TSS Reduction (lbs)	TP Reduction (lbs)	TN Reduction (lbs)	Fecal Coliforms (In Trillions)
M-37	Rooftop Disconnect in CSO 045	119 Crescent Ave	045	Downspout Disconnect	2011	19,000	1,000	20,000	10,000	6,000	0.00%	2	7	0.05	0	4
M-43	Green Park: Comfort-Tyler Park	1212-14 E Colvin St and Comstock Ave	077	Infiltration Trench, Porous Pavement, Bioretention	2014	382,000	7,000	389,000	187,000	139,000	0.02%	46	130	1.00	6	44
M-44	Site Improvements at Bishop Foery Center	Edmund Ave	067	Bioretention	2011	17,000	-	17,000	9,000	5,000	0.00%	2	6	0.05	0	1
M-45	Rain Garden at Barnabas Center	1941 S Salina St	044-2	Bioretention	2011	23,000	-	23,000	12,000	7,000	0.00%	3	8	0.06	0	2
M-49	Stadium Parking Lot at SU	Stadium Place at E Raynor Ave	039	Porous Pavement Parking Lot	2012	2,131,000	-	2,131,000	1,023,000	767,000	0.04%	250	713	5.44	31	155
M-51	GIF#107 South Side Community Coalition	2331 South Salina Street	060/077	Porous Pavement Parking Lot, Porous Paver Sidewalk, Tree Trench, Pavement Removal	2013	161,000	2,000	163,000	79,000	57,000	0.00%	19	55	0.42	2	12
M-52	Road Reconstruction: South State Street	From Kennedy to E Colvin	044	Infiltration Trench	2012	1,435,000	-	1,435,000	689,000	516,000	0.04%	168	480	3.67	21	100
M-53	Road Reconstruction: Sumner Ave.	From Euclid to Stratford	077	Infiltration Trench	2012	238,000	-	238,000	115,000	84,000	0.01%	28	80	0.61	3	23
M-60	SUNY ESF: Baker Lab Stormwater Collection System	Baker Lab on Campus Drive West	039	Cistern/Rain Barrel	2011	89,000	-	89,000	43,000	31,000	0.00%	10	30	0.23	1	7
M-61	OEI Demonstration Rain Garden: 133 Vale Street	133 Vale Street	067	Bioretention	2012	2,000	-	2,000	1,000	-	0.00%	0	1	0.01	0	0

Note: Refer to Table 5.1 for Summary and Totals

Table A-2: Energy Reduction and Air Quality Summary for Onondaga County Save the Rain Green Infrastructure Projects

Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Energy Usage			Air Quality											
						Electricity Reduction Provided by Trees (kWh)	Natural Gas Reduction Provided by Trees (therms)	Energy Saved by Treatment Reduction (kWh)	CO Removed by Trees (lbs)	NO_2 Removed by Trees (lbs)	SO_2 Removed by Trees (lbs)	O_3 Removed by trees (lbs)	$PM_{2.5}$ Removed by Trees (lbs)	NO_2 Reduced by Electricity Usage Reduced (lbs)	SO_2 Reduced by Electricity Usage Reduced (lbs)	NO_2 Reduced by Natural Gas Reduced (lbs)	SO_2 Reduced by Natural Gas Reduced (lbs)	CO_2 Sequestered Through Trees (lbs)	CO_2 Sequestered through GI (lbs)	CO_2 Avoided Due To Decreased Electricity Use (lbs)	CO_2 Avoided Due to Reduced Natural Gas Consumption (lbs)
C-01	City Parking Lot #21	Southwest corner of W. Washington and Clinton Streets	027	Tree Trench Standard	2010	0	0	200	0.03	0.01	0.03	0.90	0.06	0.20	49.90	0.00	0.00	3834	0	26	0
C-07	OnCenter Parking Garage	817 - 835 S. State Street and E. Adams Street	034	Bioretention	2012	0	0	690	0.00	0.00	0.00	0.00	0.00	1.80	449.29	0.00	0.00	0	122	228	0
C-09	Townsend Parking Lot B	431 Harrison St & Townsend Street	034	Tree Trench Standard	2011	0	0	590	0.51	0.16	0.55	13.90	0.89	1.64	408.00	0.00	0.00	42169	0	208	0
C-101	Green Park: Skiddy Park (Site)	Tully St between Oswego and Tioga	031,032	Stormwater Planter, Porous Pavement, Pavement Removal	2012	7	1	280	0.00	0.00	0.00	0.10	0.01	0.40	99.08	0.01	0.00	175	24	50	10
C-102	IMA: Leonard Apartments	400-412 W Onondaga St / 828 S West St	036	Porous Pavement Parking Lot, Bioretention, Pavement Removal	2013	74	6	260	0.06	0.02	0.07	1.80	0.11	0.85	212.53	0.06	0.04	6216	17	108	89
C-103	GIF#039 Home HeadQuarters Marcellus	223 Marcellus St.	028	Bioretention, Vegetative Swale, Stormwater Planter	2013	70	5	40	0.03	0.01	0.03	0.80	0.05	0.41	102.43	0.05	0.03	2416	37	52	74
C-105	GIF#041 CNY Philanthropy Center	431 E Fayette St	027	Porous Pavement Parking Lot, Bioretention, Green Roof	2012	30	3	120	0.08	0.03	0.09	2.20	0.14	0.26	63.86	0.03	0.02	4910	23	32	39
C-108	GIF#044 American Beech	500 Westcott Street	EBSS Storm Basin	Porous Pavement Parking Lot, Cistern/Rain Barrel	2012	0	0	50	0.01	0.00	0.02	0.40	0.03	0.28	68.58	0.00	0.00	877	0	35	0
C-11	Commercial Green Streets: Harrison Street	Harrison Street, from Montgomery to State Streets	034	Stormwater Planter - Sidewalk	2012	96	9	90	0.04	0.01	0.04	1.10	0.07	0.66	164.44	0.09	0.05	3495	35	84	127
C-110	Seymour Academy Parking Lot	180 Shonnard St	036	Porous Pavement Parking Lot	2012	0	0	160	0.04	0.01	0.04	1.00	0.06	0.79	196.25	0.00	0.00	3721	0	100	0
C-118	GIF#047 Gemmi Boy	508-510 Westcott Street	EBSS Storm Basin	Cistern/Rain Barrel, Infiltration Bed, Pavement Removal, Porous Pavement Parking Lot	2012	0	0	60	0.00	0.00	0.00	0.00	0.00	0.15	36.65	0.00	0.00	0	0	19	0
C-119	GIF#048 Mister Lady Bug	500-506 Westcott Street	EBSS Storm Basin	Porous Pavement	2012	0	0	80	0.00	0.00	0.00	0.00	0.00	0.22	54.97	0.00	0.00	0	0	28	0
C-121	GIF#051 Park Central Presbyterian Church	509 E Fayette St	027	Porous Pavement Parking Lot, Street Trees	2012	0	0	80	0.02	0.01	0.02	0.50	0.03	0.23	58.01	0.00	0.00	1539	0	30	0
C-122	GIF#052 St. Lucy's Parking Lot	432 Gifford Street	035	Porous Pavement	2014	0	0	150	0.00	0.00	0.00	0.00	0.00	0.39	97.72	0.00	0.00	0	9	50	0
C-125	GIF#055 Bethany Baptist Church (Phase I)	149 Beattie Street	EBSS Storm Basin	Porous Pavement Parking Lot, Bioretention	2014	15	1	230	0.13	0.04	0.14	3.70	0.23	0.72	179.13	0.01	0.01	8984	795	91	20
C-126	GIF#056 Copper Beech Commons Student Housing	1054 East Genesee St	027,030,080C	Porous Pavement Parking Lot, Infiltration Trench	2012	239	22	620	0.16	0.05	0.18	4.50	0.29	2.30	572.71	0.23	0.13	12365	0	291	315
C-128	GIF#058 Loon Creek Properties	601 E. Genesee Street	030	Stormwater Planter - Raised, Porous Pavement Parking Lot, Tree Trench	2013	0	0	220	0.02	0.01	0.02	0.50	0.03	0.51	126.34	0.00	0.00	1539	7	64	0
C-129	GIF#059 McMahon-Ryan Child Advocacy Center	601 E. Genesee Street	030	Porous Pavement Parking Lot, Street Trees	2013	18	1	370	0.02	0.01	0.02	0.60	0.04	1.12	278.14	0.01	0.01	1924	0	141	18
C-12a	Townsend St Median Revegetation Phase 1	S Townsend St, from E Adams St to E Genesee St	030,034	Landscape Restoration	2012	25	2	220	0.05	0.02	0.06	1.40	0.09	0.71	176.21	0.02	0.01	6390	0	90	32
C-12b	Townsend St Median Revegetation Phase 2	E. Adams St to E. Taylor St	034	Pavement Removal	2011	0	0	30	0.00	0.00	0.00	0.00	0.00	0.09	22.52	0.00	0.00	0	0	11	0

Table A-2: Energy Reduction and Air Quality Summary for Onondaga County Save the Rain Green Infrastructure Projects

Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Energy Usage			Air Quality												
						Electricity Reduction Provided by Trees (kWh)	Natural Gas Reduction Provided by Trees (therms)	Energy Saved by Treatment Reduction (kWh)	CO Removed by Trees (lbs)	NO_2 Removed by Trees (lbs)	SO_2 Removed by Trees (lbs)	O_3 Removed by trees (lbs)	$PM_{2.5}$ Removed by Trees (lbs)	NO_2 Reduced by Electricity Usage Reduced (lbs)	SO_2 Reduced by Electricity Usage Reduced (lbs)	NO_2 Reduced by Natural Gas Reduced (lbs)	SO_2 Reduced by Natural Gas Reduced (lbs)	CO_2 Sequestered Through Trees (lbs)	CO_2 Sequestered through GI (lbs)	CO_2 Avoided Due To Decreased Electricity Use (lbs)	CO_2 Avoided Due to Reduced Natural Gas Consumption (lbs)
C-132	Green Park: Leavenworth/Barker Park	301 Park Ave and Matty Ave	066	Bioretention, Porous Pavement Court	2012	0	0	660	0.01	0.00	0.01	0.30	0.02	1.84	458.20	0.00	0.00	701	661	233	0
C-139	GIF#060 Kopp Billing Agency	511 East Fayette St.	027	Cistern/Rain Barrel	2012	0	0	140	0.00	0.00	0.00	0.00	0.00	0.40	99.25	0.00	0.00	0	0	50	0
C-140	GIF#061 The Spa at 500 Green Roof	500 W Onondaga St	036	Green Roof	2013	0	0	20	0.00	0.00	0.00	0.00	0.00	0.14	34.74	0.00	0.00	0	59	18	0
C-141	GIF#062 Peace Incorporated	200 Wyoming Street	028	Porous Pavement Parking Lot, Pavement Removal	2013	0	0	70	0.01	0.00	0.02	0.40	0.03	0.20	49.12	0.00	0.00	877	0	25	0
C-146	Havens Parking Lot at SU	E Adams St and Comstock Ave	030	Porous Pavement Parking Lot	2012	149	12	50	0.11	0.03	0.12	3.00	0.19	0.73	182.52	0.13	0.07	8380	0	93	173
C-147	Waverly Parking Lot at SU	805 South Crouse Avenue	080B	Porous Pavement Parking Lot	2012	0	0	80	0.00	0.00	0.00	0.00	0.00	0.25	61.46	0.00	0.00	0	0	31	0
C-149	GIF#063 Brewster Medical Properties	1200-1224 E Genesee St	030	Infiltration Bed, Cistern/Rain Barrel	2013	0	0	40	0.00	0.00	0.00	0.00	0.00	1.31	325.99	0.00	0.00	0	0	165	0
C-151	GIF#065 Housing Visions	114-116 Hawley Ave	080A	Porous Pavement, Bioretention, Cistern/Rain Barrel, Landscape Restoration	2013	88	6	260	0.05	0.01	0.05	1.30	0.08	1.16	290.22	0.07	0.04	3746	23	147	92
C-153	East Washington Street Green Corridor	727 E Washington St	027	Bioretention, Porous Paver Parking Lane, Infiltration Trench	2014	0	0	520	0.10	0.03	0.10	2.60	0.17	1.43	356.60	0.00	0.00	7116	144	181	0
C-155	Carrier Dome Rainwater Harvesting System	900 Irving Ave	039	Cistern	2014	0	0	370	0.00	0.00	0.00	0.00	0.00	1.38	344.70	0.00	0.00	0	0	175	0
C-156	GIF#070 Onondaga Commons (Slocum Ave)	207-11,213,215 Slocum Ave	036	Porous Pavement Parking Lot	2013	224	20	250	0.09	0.03	0.09	2.30	0.15	1.59	395.91	0.21	0.12	5261	0	201	293
C-157	GIF#071 Onondaga Commons (Harris Health Center)	301 Slocum Ave	036	Porous Pavement Parking Lot, Pavement Removal	2013	0	0	110	0.00	0.00	0.00	0.00	0.00	0.37	93.14	0.00	0.00	0	0	47	0
C-158	GIF#072 Onondaga Commons (Lean On Me Daycare)	422-28 W Onondaga St	036	Porous Pavement Parking Lot, Pavement Removal	2013	0	0	350	0.00	0.00	0.00	0.00	0.00	0.95	235.91	0.00	0.00	0	0	120	0
C-159	GIF#073 Onondaga Commons (Rural Metro)	488 W Onondaga St.	036	Porous Pavement Parking Lot	2014	0	0	300	0.00	0.00	0.00	0.00	0.00	0.13	33.59	0.00	0.00	0	73	17	0
C-164	GIF#074 Synapse Downtown	360 Erie Boulevard East & East Water Street	EBSS Storm Basin	Tree Trench, Infiltration Trench, Cistern/Rain Barrel, Pavement Removal	2012	315	23	50	0.11	0.03	0.12	3.00	0.19	1.40	350.37	0.24	0.13	10007	0	179	332
C-165	GIF#075 Syracuse Center for Peace and Social Justice	2013 East Genesee Street	EBSS Storm Basin	Underground infiltration, Bioretention, Pavement Removal	2014	15	1	80	0.03	0.01	0.03	0.70	0.05	0.60	150.59	0.01	0.01	1578	21	76	20
C-166	GIF#076 360 Warren Associates	125 East Jefferson Street	030	Green Roof	2014	0	0	40	0.00	0.00	0.00	0.00	0.00	1.35	336.68	0.00	0.00	0	170	171	0
C-167	GIF#078 Teall Centre	1605-41 Erie Blvd	EBSS Storm Basin	Bioretention, Porous Pavement Parking Lot	2012	120	10	1010	0.12	0.04	0.13	3.30	0.21	3.09	770.23	0.10	0.06	8549	159	391	143
C-168	GIF#079 Near Westside Initiative Case Supply	104 Marcellus Street	026,028	Bioretention, Pavement Removal	2013	302	26	40	0.09	0.03	0.10	2.40	0.16	1.31	327.78	0.27	0.15	8968	35	167	371

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C-169	GIF#080 Grace Episcopal Church	819 Madison Street	080B	Rain Garden, Porous Pavement, Pavement Removal	2013	0	0	150	0.01	0.00	0.01	0.30	0.02	0.37	92.89	0.00	0.00	701	16	47	0
C-172	GIF#122 Butternut Commons	Butternut Street and North Townsend Street	020	Underground Infiltration	2012	15	1	400	0.04	0.01	0.04	1.00	0.06	0.15	36.19	0.01	0.01	2280	0	18	20
C-173	GIF#082 100 Clinton Square	100 Clinton Square	021	Infiltration Trench	2012	0	0	660	0.00	0.00	0.00	0.00	0.00	1.58	394.70	0.00	0.00	0	0	200	0
C-175	GIF#084 WCNY Case Supply Building	415 W Fayette St & Wyoming St	026,028	Pavement Removal, Bioretention, Porous Pavement Parking Lot, Street Trees	2013	324	28	220	0.19	0.06	0.20	5.10	0.33	1.91	475.93	0.29	0.16	17557	152	242	400
C-176	GIF#085 Graham Millwork Co	126 Richmond Ave	066	Green Roof	2013	0	0	30	0.00	0.00	0.00	0.00	0.00	0.10	24.05	0.00	0.00	0	143	12	0
C-181	GIF#091 Onondaga Commons Parking Lot/Roof	506 West Onondaga St	036	Porous Pavement Parking Lot, Pavement Removal	2014	0	0	190	0.02	0.01	0.02	0.50	0.04	0.36	89.84	0.00	0.00	1228	0	46	0
C-186	Tree Pit Pilot Project	441 South Salina Street	034	Porous Pavement Sidewalk	2012	0	0	20	0.00	0.00	0.00	0.00	0.00	0.08	19.47	0.00	0.00	0	0	10	0
C-190	GIF#100 Salt Quarters	109-15 Otisco Street	031	Bioretention, Porous Pavement Parking Lot, Pavement Removal	2013	30	3	70	0.03	0.01	0.03	0.80	0.05	0.28	70.73	0.03	0.02	1754	9	36	39
C-191	GIF#101 Erie Bruce Corp.	2112 Erie Boulevard East	EBSS Storm Basin	Bioretention, Porous Pavement Parking Lot	2013	0	0	270	0.02	0.01	0.02	0.50	0.04	0.77	192.14	0.00	0.00	1228	127	98	0
C-192	GIF#090 Onondaga Commons Rural Metro	414-16 West Onondaga Street	036	Porous Pavement Parking Lot, Pavement Removal	2014	0	0	430	0.03	0.01	0.03	0.80	0.05	1.74	434.15	0.00	0.00	1754	0	220	0
C-195	GIF#102 JNJ Syracuse	725 East Fayette Street	027	Porous Pavement Parking Lot, Pavement Removal	2014	22	2	20	0.01	0.00	0.01	0.20	0.02	0.51	127.77	0.02	0.01	526	0	65	29
C-196	GIF#103 VanKeuren Square	2223 East Genesee Street	EBSS Storm Basin	Porous Pavement, Cistern System, Bioretention	2014	371	30	150	0.41	0.13	0.44	11.30	0.72	1.61	400.83	0.31	0.17	35904	73	205	428
C-198	Road Reconstruction: Oneida Street	Oneida Street between W Adams and Temple St	037	Infiltration Trench	2013	0	0	950	0.00	0.00	0.00	0.00	0.00	2.24	558.08	0.00	0.00	0	0	283	0
C-199	Road Reconstruction: South Clinton Street	S. Clinton Street between W. Adams St. and Temple St.	037	Infiltration Trench	2013	0	0	570	0.00	0.00	0.00	0.00	0.00	1.33	332.87	0.00	0.00	0	0	169	0
C-20	Green Roof at Center of Excellence	727 E. Washington Street	027	Green Roof	2010	0	0	110	0.00	0.00	0.00	0.00	0.00	0.33	82.45	0.00	0.00	0	553	42	0
C-201	Road Reconstruction: Richmond Ave	Richmond Ave. between N. Geddes St. and Van Renssellaer St	007,066	Infiltration Trench	2013	0	0	860	0.00	0.00	0.00	0.00	0.00	1.59	396.23	0.00	0.00	0	0	201	0
C-202	GIF#105 JC Smith, Inc. 338 Peat Street	338 Peat Street	EBSS Storm Basin	Porous Pavement, Added Green Space	2014	0	0	190	0.02	0.01	0.02	0.60	0.04	0.90	225.47	0.00	0.00	1403	93	114	0
C-204	GIF#123 University Hill Apartments	205 Westcott Street	EBSS Storm Basin	Porous Pavement, Drywell, Added Green Space	2014	67	6	120	0.05	0.01	0.05	1.20	0.08	0.51	127.30	0.06	0.04	2806	0	65	88
C-21	GIF#004 Jefferson Clinton Commons	500 S. Clinton St	030	Porous Pavement Parking Lot, Green Roof	2010	0	0	150	0.00	0.00	0.00	0.00	0.00	1.06	264.54	0.00	0.00	0	67	134	0
C-212	GIF#117 United Auto Supply	450 Tracy Street	066	Infiltration Bed	2013	0	0	250	0.00	0.00	0.00	0.00	0.00	0.70	175.59	0.00	0.00	0	0	89	0
C-214	GIF#121 Taksum Development	708 East Genesee Street	027	Porous Pavement Parking Lot, Pavement Removal	2014	0	0	110	0.01	0.00	0.01	0.30	0.02	0.31	78.38	0.00	0.00	701	0	40	0

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C-217	GIF#096 Bethany Baptist Church (Phase 2)	149 Beatie Street	EBSS Storm Basin	Porous Pavement Parking Lot, Pavement Removal	2014	0	0	310	0.00	0.00	0.00	0.00	0.00	0.53	132.46	0.00	0.00	0	282	67	0
C-219	GIF#125 Nojaims' Grocery Store	307 Gifford Street	035,036	Underground Infiltration Trench, Porous Pavement, Pavement Removal	2014	111	10	630	0.11	0.03	0.12	3.00	0.19	0.82	203.56	0.10	0.06	9266	0	104	142
C-220	St. Joseph's Hospital Campus Expansion and Redevelopment	301 Prospect Ave.	020	Green Roof	2012	840	61	400	0.28	0.09	0.30	7.70	0.49	4.48	1116.98	0.64	0.36	25786	1763	569	884
C-28	IMA: SUNY Upstate: Biotechnology Center	820-900 E. Water St.	027	Bioretention, Pavement Removal	2012	792	67	1770	0.66	0.21	0.71	18.10	1.16	6.27	1563.88	0.70	0.40	61562	756	796	971
C-29a	Connective Corridor Phase 1 - Contract 1 (University Ave)	University Ave, from E Genesee to Waverly St	030,080B	Green Street	2012	613	45	2770	1.52	0.47	1.64	41.60	2.66	9.41	2346.82	0.47	0.26	112941	1763	1192	645
C-29b	Connective Corridor Phase 1 - Contract 2 (E. Genesee St)	E Genesee St from University Ave to Forman Ave	030,080B	Green Street	2012	947	84	1740	0.52	0.16	0.57	14.40	0.92	8.25	2057.91	0.88	0.49	42191	0	1045	1214
C-29f	West Fayette Street Sewer Separation	West Fayette Street between the Creek and Salina Street	027/029	Separated Sewer	2013	0	0	4330	0.00	0.00	0.00	0.00	0.00	11.89	2964.83	0.00	0.00	0	0	1505	0
C-31	GIF#010 Near Westside Initiative Lincoln Supply	109 Otisco St	032	Bioretention	2011	0	0	340	0.00	0.00	0.00	0.00	0.00	0.96	238.20	0.00	0.00	0	933	121	0
C-33	Cistern System at the War Memorial	200 Madison Street	034	Cistern/Rain Barrel	2012	0	0	150	0.00	0.00	0.00	0.00	0.00	0.44	109.75	0.00	0.00	0	0	56	0
C-34	Green Roof at OnCenter	800 S. State Street	034	Green Roof	2011	0	0	840	0.00	0.00	0.00	0.00	0.00	2.32	578.32	0.00	0.00	0	2247	294	0
C-38	OnCenter Surface Parking Lot	801 - 813 S. State Street; 422 - 434 Harrison St	034	Tree Trench, Porous Pavement Parking Lot	2012	0	0	1410	0.05	0.02	0.06	1.40	0.09	3.71	925.01	0.00	0.00	6390	0	470	0
C-45	GIF#018 Putnam Properties	210 E. Fayette St.	030	Green Roof	2011	0	0	30	0.00	0.00	0.00	0.00	0.00	0.09	23.29	0.00	0.00	0	85	12	0
C-48	Green Roof at the Erie Canal Museum Visitor Center	318 Erie Blvd. East	027	Green Roof	2012	0	0	20	0.00	0.00	0.00	0.00	0.00	0.08	19.47	0.00	0.00	0	76	10	0
C-51	GIF#001 The Spa at 500 W. Onondaga	500 W. Onondaga St	036	Porous Pavement Parking Lot, Rain Garden	2011	287	21	30	0.15	0.05	0.16	4.10	0.26	1.36	338.44	0.22	0.13	13945	26	173	309
C-52	GIF#006 Green Roof at King & King Architects	358 W. Jefferson St.	028, 031	Green Roof	2010	0	0	140	0.00	0.00	0.00	0.00	0.00	0.40	98.87	0.00	0.00	0	383	50	0
C-54c	Downtown Streetscape: 200 Water Street (North)	200 block E Water	027	Tree Trench Silva Cells High	2012	172	16	60	0.04	0.01	0.04	1.00	0.07	0.85	211.91	0.16	0.09	4473	0	108	227
C-54d	Downtown Streetscape: 200 Montgomery Street (West)	300 block Montgomery	027	Tree Trench Silva Cells High	2012	0	0	70	0.03	0.01	0.03	0.70	0.05	0.21	53.48	0.00	0.00	3195	0	27	0
C-54e	Downtown Streetscape: 200 Montgomery Street (East)	200 block Montgomery St	027	Tree Trench Standard	2012	49	5	80	0.04	0.01	0.04	1.00	0.07	0.43	108.09	0.05	0.03	4473	0	55	65

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C-54f	Downtown Streetscape: 100 South State Street (West)	100 S. State St.	027	Tree Trench Standard	2012	133	12	120	0.09	0.03	0.09	2.40	0.15	0.89	220.72	0.13	0.07	6878	0	112	176
C-55	Green School: SCSD Institute of Technology	258 E. Adams St.	037	Sewer Separation	2012	0	0	1200	0.00	0.00	0.00	0.00	0.00	3.30	822.24	0.00	0.00	0	0	417	0
C-56	GIF#012 The Galleries Office Towers	147 E. Onondaga St.	034	Porous Pavement Parking Lot	2011	0	0	250	0.00	0.00	0.00	0.00	0.00	0.71	176.36	0.00	0.00	0	0	90	0
C-57	GIF#013 The Monroe Building	333 E. Onondaga St.	030	Green Roof	2011	0	0	30	0.00	0.00	0.00	0.00	0.00	0.10	24.43	0.00	0.00	0	180	12	0
C-58	GIF#007 Hotel Skyler	609 S. Crouse Ave.	080B	Porous Pavement Parking Lot	2011	37	3	120	0.03	0.01	0.03	0.90	0.06	0.50	124.39	0.04	0.02	1929	0	63	49
C-59	GIF#015 Near West Side Initiative: Artist Studio	109-115 Otisco & Wyoming St	032	Porous Pavement Sidewalk, Vegetated Infiltration Basin, Bioretention	2011	0	0	90	0.00	0.00	0.00	0.00	0.00	0.26	65.28	0.00	0.00	0	38	33	0
C-60	Green School: Seymour Academy Playground	108 Shonnard Street	036	Bioretention, Pavement Removal, Tree Trench	2012	0	0	80	0.09	0.03	0.10	2.40	0.16	0.26	65.45	0.00	0.00	7053	34	33	0
C-61	Water Street Green Gateway	300 Block of East Water Street	027	Porous Pavement Parking Lot, Green Street, Infiltration Trench	2012	597	55	500	0.37	0.12	0.40	10.10	0.65	3.75	934.84	0.57	0.32	31283	480	475	787
C-69	GIF#017 Create Public Art	713 E. Fayette St	027	Green Roof, Porous Pavement Parking Lot, Pavement Removal	2013	0	0	70	0.00	0.00	0.00	0.00	0.00	0.19	47.72	0.00	0.00	0	104	24	0
C-70	GIF#020 St Lucy's Church	316 - 318 - 320 Seymour Street	035,036	Porous Pavement Parking Lot	2011	0	0	110	0.00	0.00	0.00	0.00	0.00	0.49	122.53	0.00	0.00	0	0	62	0
C-73	West Onondaga Street Green Corridor	From W Adams to South Ave	036	Green Street	2013	471	43	3180	0.24	0.07	0.26	6.50	0.42	10.10	2518.51	0.45	0.25	21953	0	1279	621
C-74a	Otisco Street Green Corridor - Phase 1	from Ontario St to Seneca St	011,031	Curb Extension, Pavement Removal	2012	0	0	1360	0.10	0.03	0.10	2.60	0.17	3.02	752.08	0.00	0.00	11503	469	382	0
C-75a	IMA: SUNY Upstate: Cancer Center Green Roof	750 E Adams St	034	Green Roof	2014	446	38	190	0.20	0.06	0.22	5.60	0.36	2.34	584.58	0.40	0.22	15794	439	297	551
C-75b	IMA: SUNY Upstate: Cancer Center Rain Garden	750 E Adams St	034	Bioretention	2014	47	4	30	0.06	0.02	0.07	1.70	0.11	0.86	215.45	0.04	0.03	4146	99	109	62
C-78	GIF#024 CNY Regional Transportation Authority	624-662 South Warren Street	034	Infiltration Trench	2012	0	0	100	0.00	0.00	0.00	0.00	0.00	0.30	73.67	0.00	0.00	0	0	37	0
C-79	GIF#026 Central New York Jazz Arts Foundation	441 E. Washington Street	027	Green Roof	2012	0	0	10	0.00	0.00	0.00	0.00	0.00	0.05	12.60	0.00	0.00	0	86	6	0
C-85	SCSD Central Offices	725 Harrison Street	034	Porous Pavement Parking Lot, Infiltration Trench	2012	0	0	1100	0.00	0.00	0.00	0.00	0.00	3.26	813.08	0.00	0.00	0	0	413	0
C-86a	Bank Street/Alley Storm Sewer	Alley between E Washington and E Fayette St	027	Infiltration Trench	2013	0	0	160	0.00	0.00	0.00	0.00	0.00	0.48	119.10	0.00	0.00	0	0	60	0
C-92	GIF#040 Courts4Kids: Skiddy Park Porous Basketball Courts	Tully St between Oswego and Tioga	031	Porous Pavement Court	2011	0	0	200	0.00	0.00	0.00	0.00	0.00	0.50	125.59	0.00	0.00	0	0	64	0
C-93	Seymour School Rain Garden	108 Shonnard Street	036	Bioretention	2011	0	0	0	0.01	0.00	0.01	0.20	0.01	0.02	4.45	0.00	0.00	351	10	2	0

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C-94	GIF#032 Consuela's Westside Taqueria and BBQ	523 Marcellus St	028	Bioretention, Porous Pavement Parking Lot, Street Trees, Pavement Removal	2013	0	0	20	0.01	0.00	0.01	0.30	0.02	0.09	22.27	0.00	0.00	701	17	11	0
C-95	IMA: SUNY Upstate: Townsend Towers	507-523 E Adams Street	034	Bioretention	2012	0	0	440	0.00	0.00	0.00	0.00	0.00	1.31	327.14	0.00	0.00	0	111	166	0
C-96	GIF#034 Pike Block	300 S Salina & W Fayette St	029	Cistern System, Underground Infiltration System	2014	0	0	320	0.00	0.00	0.00	0.00	0.00	0.36	88.94	0.00	0.00	0	0	45	0
C-99	Vacant Lot: 701 Oswego St.	701 Oswego Street	036	Urban Garden, Infiltration Trench	2012	30	3	40	0.09	0.03	0.10	2.50	0.16	0.43	106.75	0.03	0.02	5612	0	54	39
E-06	City Parking Lot #3	101 Oswego Blvd	EBSS Storm Basin	Porous Pavement Parking Lot	2010	0	0	400	0.16	0.05	0.18	4.50	0.29	1.11	277.64	0.00	0.00	17329	0	142	0
E-08	Green Library: Petit Branch	105 Victoria Place	EBSS Storm Basin	Porous Pavement Parking Lot	2012	0	0	90	0.00	0.00	0.00	0.00	0.00	0.26	64.13	0.00	0.00	0	0	33	0
E-10	Road Reconstruction: Concord Place	Concord Place from Westcott St. to Allen St.	EBSS Storm Basin	Infiltration Trench	2011	0	0	200	0.00	0.00	0.00	0.00	0.00	0.56	139.33	0.00	0.00	0	0	71	0
E-12	Dr Edwin E Weeks Elementary School	710 Hawley Ave	080A	Bioretention	2012	82	7	500	0.04	0.01	0.04	1.00	0.06	2.64	659.61	0.08	0.04	2280	0	335	107
E-16	Lower Sunnycrest Park	Caleb Ave	080H	Pavement Removal, Bioretention, Storage Bed	2012	0	0	420	0.21	0.07	0.23	5.90	0.38	0.39	96.29	0.00	0.00	16386	221	49	0
E-33	I-690 Downspout Disconnections	I-690 between Willow, James and State St.	080A, EBSS Storm Basin	Infiltration Trench, Bioretention	2013	0	0	850	0.08	0.02	0.08	2.00	0.13	4.23	1056.16	0.00	0.00	6176	55	536	0
E-34	Rain Garden at Henninger High School	600 Robinson St	080H	Bioretention, Cistern/	2011	18	1	10	0.01	0.00	0.01	0.30	0.02	0.11	26.97	0.01	0.01	911	23	14	18
E-36	Upper Sunnycrest Park	St. Anne Dr and Robinson St	080H	Bioretention, Pavement Removal, Porous Pavement Parking Lot	2011	138	12	860	0.17	0.05	0.18	4.50	0.29	2.25	561.87	0.13	0.07	14469	39	286	178
E-39	East Water Street Pavement Removal	Intersection of S Beech and E Water at Erie Blvd.	EBSS Storm Basin	Tree Trench, Porous Pavement, Pavement Removal	2012	32	3	260	0.05	0.02	0.06	1.50	0.10	0.82	205.38	0.03	0.02	5237	0	104	42
E-40ab	Westcott Street Green Corridor and Knoll	Westcott St from Dell to S. Beech St	EBSS Storm Basin	Porous Pavement Parking Lane, Infiltration Trench	2013	160	15	650	0.05	0.01	0.05	1.30	0.08	2.17	541.14	0.15	0.09	4423	0	275	211
E-43	Westcott Community Center	822-26 Euclid Ave and Westcott St	EBSS Storm Basin	Porous Pavement Parking Lot	2012	0	0	20	0.00	0.00	0.00	0.00	0.00	0.15	38.17	0.00	0.00	0	0	19	0
F-01	Pearl Street Parking Lot	400 block of Pearl Street	021	Porous Pavement Parking Lot	2010	7	1	880	0.01	0.00	0.01	0.30	0.02	1.78	444.17	0.01	0.00	701	0	225	10
F-02	Green Library: White Branch	763 Butternut St	020-2	Infiltration Trench, Cistern/Rain Barrel, Porous Pavement Parking Lot, Bioretention	2012	0	0	190	0.03	0.01	0.04	0.90	0.06	1.12	279.39	0.00	0.00	2681	54	142	0
F-04a	City Parking Lot #4	Butternut and N State Sts	020-1	Porous Pavement Parking Lot	2012	0	0	550	0.12	0.04	0.13	3.20	0.20	1.96	488.90	0.00	0.00	9095	0	248	0
F-04b	North State Street Green Street	N State St bw Butternut and Ash	020-1	Bioretention, Bioretention	2012	0	0	660	0.00	0.00	0.00	0.00	0.00	1.85	460.74	0.00	0.00	0	48	234	0
F-07	Magnarelli Community Center Green Roof	2308 Grant Blvd	020-2	Green Roof	2014	0	0	120	0.00	0.00	0.00	0.00	0.00	0.23	58.40	0.00	0.00	0	359	30	0
H-05	Green Roof at Hazard Branch Library	1620 West Genesee St	003	Green Roof	2012	0	0	60	0.00	0.00	0.00	0.00	0.00	0.19	46.95	0.00	0.00	0	186	24	0

Table A-2: Energy Reduction and Air Quality Summary for Onondaga County Save the Rain Green Infrastructure Projects

Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Energy Usage			Air Quality											
						Electricity Reduction Provided by Trees (kWh)	Natural Gas Reduction Provided by Trees (therms)	Energy Saved by Treatment Reduction (kWh)	CO Removed by Trees (lbs)	NO_2 Removed by Trees (lbs)	SO_2 Removed by Trees (lbs)	O_3 Removed by trees (lbs)	$PM_{2.5}$ Removed by Trees (lbs)	NO_2 Reduced by Electricity Usage Reduced (lbs)	SO_2 Reduced by Electricity Usage Reduced (lbs)	NO_2 Reduced by Natural Gas Reduced (lbs)	SO_2 Reduced by Natural Gas Reduced (lbs)	CO_2 Sequestered Through Trees (lbs)	CO_2 Sequestered through GI (lbs)	CO_2 Avoided Due To Decreased Electricity Use (lbs)	CO_2 Avoided Due to Reduced Natural Gas Consumption (lbs)
H-05b	Green Library: Hazard Branch Site Improvements	1620 West Genesee St	003	Porous Pavement Parking Lot, Bioretention	2012	89	8	230	0.10	0.03	0.10	2.70	0.17	0.99	247.39	0.08	0.05	7868	37	126	117
H-06	Green Library: Mundy Branch	1204 South Geddes St	014	Tree Trench, Porous Pavement Parking Lot	2012	74	7	120	0.02	0.01	0.03	0.70	0.04	0.64	160.73	0.07	0.04	2443	0	82	97
H-07	GIF#011 Vibrant Syracuse Spaces	196 S. Geddes St	010	Porous Pavement Parking Lot, Bioretention	2011	0	0	140	0.02	0.01	0.02	0.50	0.04	0.40	99.38	0.00	0.00	1228	86	50	0
H-08	Road Reconstruction: Geddes Street	300-500 blocks S. Geddes St	011	Bioretention	2011	0	0	330	0.00	0.00	0.00	0.00	0.00	0.83	207.28	0.00	0.00	0	346	105	0
H-11	Pass Arboretum	Avery Ave and Tompkins St	004	Bioretention	2012	0	0	400	0.39	0.12	0.42	10.60	0.68	1.11	277.80	0.00	0.00	35570	353	142	0
H-13	Zoo Entrance Enhancements and Coleridge Ave. Widening	S Wilbur Ave and Coleridge Ave	004	Bioretention	2012	0	0	380	0.08	0.02	0.08	2.10	0.14	1.06	265.35	0.00	0.00	8068	342	135	0
H-16	Porous Concrete Sidewalk on Grand Ave	100 Grand Ave	014	Porous Pavement Sidewalk	2012	0	0	0	0.00	0.00	0.00	0.00	0.00	0.02	4.96	0.00	0.00	0	0	3	0
H-17	Rain Garden at Grand & Delaware	Grand Ave & Delaware St	014	Bioretention, Porous Pavement Roadway	2012	0	0	310	0.28	0.09	0.30	7.60	0.49	0.87	216.31	0.00	0.00	23468	342	110	0
H-19	Rosamond Gifford Zoo: Elephant Exhibit	One Conservation Place	004	Green Roof	2011	0	0	100	0.00	0.00	0.00	0.00	0.00	0.28	70.62	0.00	0.00	0	380	36	0
H-20	Rosamond Gifford Zoo: Primate Exhibit	One Conservation Place	004	Porous Pavement Sidewalk	2011	0	0	160	0.07	0.02	0.08	1.90	0.12	0.45	111.20	0.00	0.00	6866	0	57	0
H-24	GIF#031 ARC of Onondaga County	401 Lowell Ave.	004	Porous Pavement Parking Lot	2012	0	0	140	0.00	0.00	0.00	0.00	0.00	0.41	101.54	0.00	0.00	0	0	52	0
H-30	Vacant Lot: 1344-50 W. Onondaga St	Arthur St and W Onondaga St	015	Bioretention, Urban Forestry	2012	0	0	40	0.03	0.01	0.04	0.90	0.06	0.21	51.54	0.00	0.00	2104	45	26	0
H-31	Rosamond Gifford Zoo: Stormwater Wetland	One Conservation Place	004	Stormwater Wetland, Cistern/Rain Barrel	2013	0	0	730	0.13	0.04	0.14	3.50	0.22	1.32	329.09	0.00	0.00	12189	639	168	0
H-33	Green Park: Lewis Park	305 Lewis St and 825 Milton Ave	003,063	Porous Pavement Roadway, Porous Pavement Court	2013	0	0	300	0.00	0.00	0.00	0.00	0.00	0.84	210.33	0.00	0.00	0	0	107	0
H-34	Rosamond Gifford Zoo: Parking Lot	One Conservation Place	004	Porous Pavement Parking Lot, Bioretention, Vegetated Infiltration Basin, Infiltration Bed	2013	0	0	2220	0.40	0.12	0.43	10.80	0.69	6.10	1521.01	0.00	0.00	35453	152	773	0
H-36	Green Park: Wadsworth Park	1204 Glenwood Ave and Wolcott Ave	018	Infiltration Bed, Pavement Removal, Bioretention	2013	0	0	520	0.09	0.03	0.10	2.50	0.16	1.45	360.69	0.00	0.00	7726	306	183	0
H-38	Vacant Lot: 224-226 Putnam Street	224, 226 Putnam St	014	Bioretention, Urban Forestry	2012	0	0	20	0.03	0.01	0.03	0.80	0.05	0.21	51.75	0.00	0.00	2506	24	26	0
H-39	GIF#077 St. Patrick's Apartments	216 North Lowell Ave.	004	Cistern/Rain Barrel, Porous Pavement Parking Lot, Pavement Removal	2013	86	8	270	0.05	0.02	0.05	1.40	0.09	1.10	275.15	0.08	0.05	4310	0	140	114
H-40	Infiltration Basin at Woodland Reservoir	Stolp Avenue and Hancock Drive	017	Infiltration Bed	2013	0	0	240	0.00	0.00	0.00	0.00	0.00	0.70	174.07	0.00	0.00	0	0	88	0
H-41	GIF#069 Vibrant Syracuse Spaces Green Roof	200 S Geddes St.	010	Green Roof	2012	0	0	160	0.04	0.01	0.04	1.10	0.07	0.46	114.45	0.00	0.00	3784	443	58	0
H-44	Vacant Lot: 109 Hartson Street	109 Hartson Street	014	Bioretention, Urban Forestry	2012	0	0	60	0.02	0.01	0.02	0.50	0.04	0.17	42.50	0.00	0.00	1228	14	22	0
H-47	Road Reconstruction: Gifford Street	Geddes St to Ontario St	011	Infiltration Trench	2012	0	0	770	0.00	0.00	0.00	0.00	0.00	1.93	480.59	0.00	0.00	0	0	244	0
H-48	GIF#083 Smith Housing	542-548 Seymour Street	011	Porous Pavement Parking Lot	2013	0	0	130	0.00	0.00	0.00	0.00	0.00	0.33	81.69	0.00	0.00	0	0	41	0
H-52	GIF#099 VNA Home Care	1050 W Genesee St	005	Infiltration Bed, Cistern/Rain Barrel	2013	0	0	220	0.00	0.00	0.00	0.00	0.00	0.66	165.67	0.00	0.00	0	0	84	0

Table A-2: Energy Reduction and Air Quality Summary for Onondaga County Save the Rain Green Infrastructure Projects

Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Energy Usage			Air Quality											
						Electricity Reduction Provided by Trees (kWh)	Natural Gas Reduction Provided by Trees (therms)	Energy Saved by Treatment Reduction (kWh)	CO Removed by Trees (lbs)	NO_2 Removed by Trees (lbs)	SO_2 Removed by Trees (lbs)	O_3 Removed by trees (lbs)	$PM_{2.5}$ Removed by Trees (lbs)	NO_2 Reduced by Electricity Usage Reduced (lbs)	SO_2 Reduced by Electricity Usage Reduced (lbs)	NO_2 Reduced by Natural Gas Reduced (lbs)	SO_2 Reduced by Natural Gas Reduced (lbs)	CO_2 Sequestered Through Trees (lbs)	CO_2 Sequestered through GI (lbs)	CO_2 Avoided Due To Decreased Electricity Use (lbs)	CO_2 Avoided Due to Reduced Natural Gas Consumption (lbs)
H-53	GIF#113 Genesee Plaza	1001-1055 West Genesee Street	006A	Infiltration Trench, Pavement Removal	2013	0	0	1760	0.00	0.00	0.00	0.00	0.00	5.09	1269.24	0.00	0.00	0	0	644	0
H-56	GIF#081 Brooklyn Pickle	1600 West Genesee Street	004	Bioretention, Infiltration Trench	2012	15	1	20	0.04	0.01	0.04	1.00	0.06	0.13	33.52	0.01	0.01	2280	4	17	20
M-10b	Green Library: Beauchamp Site Improvements	2111 S. Salina St	060/077	Bioretention	2012	25	2	90	0.04	0.01	0.05	1.20	0.07	0.46	115.42	0.02	0.01	2919	64	59	32
M-12a	Green Roof at the Salina Street Post Office	2200 S. Salina St	060/077	Green Roof	2013	0	0	140	0.00	0.00	0.00	0.00	0.00	0.41	102.30	0.00	0.00	0	402	52	0
M-15	IMA: SUNY ESF Parking Project at Bray Hall	1 Forestry Drive/930 Irving Ave Rear	039	Cistern/Rain Barrel, Porous Pavement Parking Lot, Landscape Restoration, Bioretention	2012	0	0	180	0.34	0.11	0.37	9.30	0.59	0.54	135.13	0.00	0.00	23814	24	69	0
M-16	SUNY ESF Gateway Building	1 Forestry Drive	039	Green Roof	2012	0	0	90	0.00	0.00	0.00	0.00	0.00	0.30	74.05	0.00	0.00	0	170	38	0
M-17	GIF#009 SUNY ESF Residence Hall (Centennial Hall)	1 Forestry Drive	039	Porous Pavement Sidewalk	2011	0	0	40	0.00	0.00	0.00	0.00	0.00	0.12	30.92	0.00	0.00	0	0	16	0
M-20	GIF#008 Dunbar Association	1453 S. State St.	039	Porous Pavement Parking Lot	2011	0	0	200	0.00	0.00	0.00	0.00	0.00	0.60	149.64	0.00	0.00	0	0	76	0
M-23	Greening the Grey in Basin 044	400-700 W Castle Street	044	Bioretention	2012	0	0	280	0.16	0.05	0.17	4.40	0.28	0.77	193.15	0.00	0.00	14960	111	99	0
M-24	GIF#003 Syracuse Model Neighborhood Corp	1721 S. Salina Street	044	Porous Pavement Parking Lot, Bioretention	2011	0	0	280	0.00	0.00	0.00	0.00	0.00	0.78	193.92	0.00	0.00	0	4	98	0
M-29	Hughes Magnet School Parking Lot	370 Jamesville Ave	077	Infiltration Bed, Porous Pavement Parking Lot	2012	0	0	410	0.00	0.00	0.00	0.00	0.00	0.19	47.72	0.00	0.00	0	0	24	0
M-29bc	Vacant Lots at 147 Hughes Place and 220 Lorraine Avenue	147 Hughes Place & 220 Lorraine Ave	077	Rain Garden, Pavement Removal	2012	0	0	260	0.14	0.04	0.15	3.70	0.24	1.83	455.74	0.00	0.00	16152	0	232	0
M-31	GIF#025 Salina Shoe Company Inc	2809 S. Salina Street	060/077	Porous Pavement Parking Lot	2014	0	0	60	0.03	0.01	0.03	0.70	0.05	1.32	328.67	0.00	0.00	1578	90	167	0
M-32	GIF#027 People's AME Zion Church Parking Lot	2226-28 South Salina St.	077	Porous Pavement Parking Lot	2013	0	0	80	0.00	0.00	0.00	0.00	0.00	0.18	45.43	0.00	0.00	0	0	23	0
M-35	GIF#030 The People's Community Development Corporation	2307-2315 S. Salina St	077	Green Roof	2013	0	0	60	0.00	0.00	0.00	0.00	0.00	0.28	69.09	0.00	0.00	0	0	35	0
M-36	GIF#033 Matawon Development Group	2221 South Salina Street	077	Infiltration Bed	2012	0	0	20	0.00	0.00	0.00	0.00	0.00	0.18	45.81	0.00	0.00	0	159	23	0
M-37	Rooftop Disconnect in CSO 045	119 Crescent Ave	045	Downspout Disconnect	2011	35	3	0	0.01	0.00	0.01	0.20	0.02	0.23	56.62	0.03	0.01	770	0	29	37
M-43	Green Park: Comfort-Tyler Park	1212-14 E Colvin St and Comstock Ave	077	Infiltration Trench, Porous Pavement, Bioretention	2014	0	0	210	0.06	0.02	0.06	1.50	0.10	0.96	240.32	0.00	0.00	6566	93	122	0
M-44	Site Improvements at Bishop Foery Center	Edmund Ave	067	Bioretention	2011	0	0	0	0.00	0.00	0.00	0.10	0.01	0.03	6.62	0.00	0.00	175	9	3	0
M-45	Rain Garden at Barnabas Center	1941 S Salina St	044-2	Bioretention	2011	0	0	10	0.00	0.00	0.00	0.00	0.00	0.04	8.78	0.00	0.00	0	7	4	0
M-49	Stadium Parking Lot at SU	Stadium Place at E Raynor Ave	039	Porous Pavement Parking Lot	2012	0	0	1180	0.00	0.00	0.00	0.00	0.00	3.41	851.63	0.00	0.00	0	0	432	0
M-51	GIF#107 South Side Community Coalition	2331 South Salina Street	060/077	Porous Pavement Parking Lot, Porous Paver Sidewalk, Tree Trench, Pavement Removal	2013	70	5	80	0.02	0.01	0.02	0.50	0.03	0.55	137.29	0.05	0.03	1539	0	70	74

Table A-2: Energy Reduction and Air Quality Summary for Onondaga County Save the Rain Green Infrastructure Projects

Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Energy Usage			Air Quality												
						Electricity Reduction Provided by Trees (kWh)	Natural Gas Reduction Provided by Trees (therms)	Energy Saved by Treatment Reduction (kWh)	CO Removed by Trees (lbs)	NO_2 Removed by Trees (lbs)	SO_2 Removed by Trees (lbs)	O_3 Removed by trees (lbs)	$PM_{2.5}$ Removed by Trees (lbs)	NO_2 Reduced by Electricity Usage Reduced (lbs)	SO_2 Reduced by Electricity Usage Reduced (lbs)	NO_2 Reduced by Natural Gas Reduced (lbs)	SO_2 Reduced by Natural Gas Reduced (lbs)	CO_2 Sequestered Through Trees (lbs)	CO_2 Sequestered through GI (lbs)	CO_2 Avoided Due To Decreased Electricity Use (lbs)	CO_2 Avoided Due to Reduced Natural Gas Consumption (lbs)
M-52	Road Reconstruction: South State Street	From Kennedy to E Colvin	044	Infiltration Trench	2012	0	0	790	0.00	0.00	0.00	0.00	0.00	2.20	547.78	0.00	0.00	0	0	278	0
M-53	Road Reconstruction: Sumner Ave.	From Euclid to Stratford	077	Infiltration Trench	2012	0	0	130	0.00	0.00	0.00	0.00	0.00	0.50	125.59	0.00	0.00	0	0	64	0
M-60	SUNY ESF: Baker Lab Stormwater Collection System	Baker Lab on Campus Drive West	039	Cistern/Rain Barrel	2011	0	0	40	0.00	0.00	0.00	0.00	0.00	0.16	40.08	0.00	0.00	0	0	20	0
M-61	OEI Demonstration Rain Garden: 133 Vale Street	133 Vale Street	067	Bioretention	2012	0	0	0	0.00	0.00	0.00	0.00	0.00	0.01	2.29	0.00	0.00	0	9	1	0

Note: Refer to Table 5.1 for Summary and Totals

Table A-3: Economic Benefits for Onondaga County Save the Rain Green Infrastructure Projects

Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Value of Infiltration Dollars	NPV Reductions in Operation and Maintenance Costs	Energy Saving Economic Benefits			Air Quality Economic Benefits								Climate Change Economic Benefits				
								Energy Tree Value Electricity Savings	Energy Tree Value Natural Gas Savings	NPV Dollars Electricity Reduction At WWTP	Direct Benefit from NO_2 Pollutant Removal	Direct Benefit from SO_2 Pollutant Removal	Direct Benefit from O_3 Pollutant Removal	Direct Benefit from $PM_{2.5}$ Pollutant Removal	NPV of NO_2 Reduction at WWTP	NPV of SO_2 At WWTP	NPV of NO_2 Avoided Emissions Energy by Trees	NPV of SO_2 Avoided Emissions Energy by Trees	NPV of Tons of CO_2 Avoided Energy by Trees (Electricity)	NPV of tons of CO_2 Avoided Energy by Trees (Natural Gas)	NPV of CO_2 Reduction At WWTP (Includes Trees And Structural BMPs)	NPV of CO_2 Reduction From Tree Adsorption	NPV Value of CO_2 Sequestered through GI
C-01	City Parking Lot #21	Southwest corner of W. Washington and Clinton Streets	027	Tree Trench Standard	2010	$1.08	$40.45	$0.00	$0.00	$2.50	$0.00	$0.00	$2.56	$6.99	$0.00	$0.77	$0.00	$0.00	$0.00	$0.00	$1.36	$226.04	$0.00
C-07	OnCenter Parking Garage	817 - 835 S. State Street and E. Adams Street	034	Bioretention	2012	$2.98	$374.91	$0.00	$0.00	$23.15	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$2.55
C-09	Townsend Parking Lot B	431 Harrison St & Townsend Street	034	Tree Trench Standard	2011	$2.27	$321.40	$0.00	$0.00	$19.84	$0.06	$0.06	$42.72	$116.45	$0.02	$10.87	$0.00	$0.00	$0.00	$0.00	$1.36	$2,458.92	$0.00
C-101	Green Park: Skiddy Park (Site)	Tully St between Oswego and Tioga	031,032	Stormwater Planter, Porous Pavement, Pavement Removal	2012	$1.11	$76.45	$0.39	$0.00	$4.72	$0.00	$0.00	$0.24	$0.67	$0.00	$0.05	$0.00	$0.86	$0.11	$0.30	$1.36	$10.12	$0.50
C-102	IMA: Leonard Apartments	400-412 W Onondaga St / 828 S West St	036	Porous Pavement Parking Lot, Bioretention, Pavement Removal	2013	$1.08	$113.72	$3.31	$0.00	$7.02	$0.01	$0.01	$5.30	$14.45	$0.00	$1.47	$0.03	$7.22	$1.07	$2.56	$1.36	$363.87	$0.35
C-103	GIF#039 Home HeadQuarters Marcellus	223 Marcellus St.	028	Bioretention, Vegetative Swale, Stormwater Planter	2013	$0.22	$26.76	$3.07	$0.00	$1.65	$0.00	$0.00	$2.59	$7.07	$0.00	$0.69	$0.03	$6.68	$1.00	$2.14	$1.36	$139.90	$0.77
C-105	GIF#041 CNY Philanthropy Center	431 E Fayette St	027	Porous Pavement Parking Lot, Bioretention, Green Roof	2012	$0.44	$25.80	$1.58	$0.00	$1.59	$0.01	$0.01	$6.84	$18.64	$0.00	$1.54	$0.02	$3.44	$0.46	$1.20	$1.36	$283.45	$0.47
C-108	GIF#044 American Beech	500 Westcott Street	EBSS Storm Basin	Porous Pavement Parking Lot, Cistern/Rain Barrel	2012	$0.23	$56.70	$0.00	$0.00	$3.50	$0.00	$0.00	$1.22	$3.33	$0.00	$0.27	$0.00	$0.00	$0.00	$0.00	$1.36	$50.62	$0.00
C-11	Commercial Green Streets: Harrison Street	Harrison Street, from Montgomery to State Streets	034	Stormwater Planter - Sidewalk	2012	$0.42	$56.70	$4.16	$0.00	$3.50	$0.01	$0.00	$3.48	$9.48	$0.00	$0.88	$0.04	$9.05	$1.36	$3.56	$1.36	$204.13	$0.73
C-110	Seymour Academy Parking Lot	180 Shonnard St	036	Porous Pavement Parking Lot	2012	$1.16	$162.45	$0.00	$0.00	$10.03	$0.00	$0.00	$2.87	$7.82	$0.00	$0.81	$0.00	$0.00	$0.00	$0.00	$1.36	$218.74	$0.00
C-118	GIF#047 Gemmi Boy	508-510 Westcott Street	EBSS Storm Basin	Cistern/Rain Barrel, Infiltration Bed, Pavement Removal, Porous Pavement Parking Lot	2012	$0.24	$30.58	$0.00	$0.00	$1.89	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-119	GIF#048 Mister Lady Bug	500-506 Westcott Street	EBSS Storm Basin	Porous Pavement	2012	$0.32	$45.87	$0.00	$0.00	$2.83	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-121	GIF#051 Park Central Presbyterian Church	509 E Fayette St	027	Porous Pavement Parking Lot, Street Trees	2012	$0.34	$47.78	$0.00	$0.00	$2.95	$0.00	$0.00	$1.37	$3.74	$0.00	$0.41	$0.00	$0.00	$0.00	$0.00	$1.36	$89.28	$0.00
C-122	GIF#052 St. Lucy's Parking Lot	432 Gifford Street	035	Porous Pavement	2014	$0.64	$81.54	$0.00	$0.00	$5.03	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.18
C-125	GIF#055 Bethany Baptist Church (Phase I)	149 Beattie Street	EBSS Storm Basin	Porous Pavement Parking Lot, Bioretention	2014	$2.67	$132.19	$0.79	$0.00	$8.16	$0.02	$0.02	$11.47	$31.26	$0.00	$2.69	$0.01	$1.72	$0.23	$0.60	$1.36	$519.69	$16.55
C-126	GIF#056 Copper Beech Commons Student Housing	1054 East Genesee St	027,030,080C	Porous Pavement Parking Lot, Infiltration Trench	2012	$3.03	$275.21	$10.48	$0.00	$16.99	$0.02	$0.02	$13.98	$38.10	$0.00	$3.37	$0.11	$22.84	$3.41	$8.92	$1.36	$719.26	$0.00
C-128	GIF#058 Loon Creek Properties	601 E. Genesee Street	030	Stormwater Planter - Raised, Porous Pavement Parking Lot, Tree Trench	2013	$0.67	$104.80	$0.00	$0.00	$6.47	$0.00	$0.00	$1.37	$3.74	$0.00	$0.41	$0.00	$0.00	$0.00	$0.00	$1.36	$89.28	$0.14
C-129	GIF#059 McMahon-Ryan Child Advocacy Center	601 E. Genesee Street	030	Porous Pavement Parking Lot, Street Trees	2013	$1.41	$216.92	$0.77	$0.00	$13.39	$0.00	$0.00	$1.72	$4.67	$0.00	$0.52	$0.01	$1.67	$0.25	$0.54	$1.36	$111.60	$0.00
C-12a	Townsend St Median Revegetation Phase 1	S Townsend St, from E Adams St to E Genesee St	030,034	Landscape Restoration	2012	$0.74	$124.86	$0.99	$0.00	$7.71	$0.01	$0.01	$4.27	$11.65	$0.00	$1.29	$0.01	$2.16	$0.34	$0.89	$1.36	$376.73	$0.00
C-12b	Townsend St Median Revegetation Phase 2	E. Adams St to E. Taylor St	034	Pavement Removal	2011	$0.12	$18.79	$0.00	$0.00	$1.16	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-132	Green Park: Leavenworth/Barker Park	301 Park Ave and Matty Ave	066	Bioretention, Porous Pavement Court	2012	$3.67	$381.92	$0.00	$0.00	$23.58	$0.00	$0.00	$0.98	$2.66	$0.00	$0.22	$0.00	$0.00	$0.00	$0.00	$1.36	$40.49	$13.75
C-139	GIF#060 Kopp Billing Agency	511 East Fayette St.	027	Cistern/Rain Barrel	2012	$0.77	$82.82	$0.00	$0.00	$5.11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-140	GIF#061 The Spa at 500 Green Roof	500 W Onondaga St	036	Green Roof	2013	$0.23	$28.99	$0.00	$0.00	$1.79	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$1.22
C-141	GIF#062 Peace Incorporated	200 Wyoming Street	028	Porous Pavement Parking Lot, Pavement Removal	2013	$0.29	$40.45	$0.00	$0.00	$2.50	$0.00	$0.00	$1.22	$3.33	$0.00	$0.27	$0.00	$0.00	$0.00	$0.00	$1.36	$50.62	$0.00
C-146	Havens Parking Lot at SU	E Adams St and Comstock Ave	030	Porous Pavement Parking Lot	2012	$0.16	$25.48	$6.80	$0.00	$1.57	$0.01	$0.01	$9.08	$24.76	$0.00	$2.36	$0.07	$14.81	$2.17	$5.06	$1.36	$485.67	$0.00
C-147	Waverly Parking Lot at SU	805 South Crouse Avenue	080B	Porous Pavement Parking Lot	2012	$0.30	$51.28	$0.00	$0.00	$3.17	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-149	GIF#063 Brewster Medical Properties	1200-1224 E Genesee St	030	Infiltration Bed, Cistern/Rain Barrel	2013	$1.93	$272.02	$0.00	$0.00	$16.79	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00

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Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Value of Infiltration Dollars	NPV Reductions in Operation and Maintenance Costs	Energy Saving Economic Benefits			Air Quality Economic Benefits								Climate Change Economic Benefits				
								Energy Tree Value Electricity Savings	Energy Tree Value Natural Gas Savings	NPV Dollars Electricity Reduction At WWTP	Direct Benefit from NO_2 Pollutant Removal	Direct Benefit from SO_2 Pollutant Removal	Direct Benefit from O_3 Pollutant Removal	Direct Benefit from $PM_{2.5}$ Pollutant Removal	NPV of NO_2 Reduction at WWTP	NPV of SO_2 At WWTP	NPV of NO_2 Avoided Emissions Energy by Trees	NPV of SO_2 Avoided Emissions Energy by Trees	NPV of Tons of CO_2 Avoided Energy by Trees (Electricity)	NPV of tons of CO_2 Avoided Energy by Trees (Natural Gas)	NPV of CO_2 Reduction At WWTP (Includes Trees And Structural BMPs)	NPV of CO_2 Reduction From Tree Adsorption	NPV Value of CO_2 Sequestered through GI
C-151	GIF#065 Housing Visions	114-116 Hawley Ave	080A	Porous Pavement, Bioretention, Cistern/Rain Barrel, Landscape Restoration	2013	$1.30	$168.50	$3.84	$0.00	$10.40	$0.01	$0.01	$3.87	$10.54	$0.00	$1.05	$0.04	$8.35	$1.25	$2.68	$1.36	$216.98	$0.48
C-153	East Washington Street Green Corridor	727 E Washington St	027	Bioretention, Porous Paver Parking Lane, Infiltration Trench	2014	$3.16	$294.00	$0.00	$0.00	$18.15	$0.01	$0.01	$8.06	$21.96	$0.00	$1.94	$0.00	$0.00	$0.00	$0.00	$1.36	$413.90	$3.00
C-155	Carrier Dome Rainwater Harvesting System	900 Irving Ave	039	Cistern	2014	$0.00	$287.63	$0.00	$0.00	$17.76	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-156	GIF#070 Onondaga Commons (Slocum Ave)	207-11,213,215 Slocum Ave	036	Porous Pavement Parking Lot	2013	$0.80	$143.34	$11.84	$0.00	$8.85	$0.01	$0.01	$7.33	$19.97	$0.00	$1.65	$0.13	$25.79	$3.44	$9.00	$1.36	$303.70	$0.00
C-157	GIF#071 Onondaga Commons (Harris Health Center)	301 Slocum Ave	036	Porous Pavement Parking Lot, Pavement Removal	2013	$0.50	$77.72	$0.00	$0.00	$4.80	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-158	GIF#072 Onondaga Commons (Lean On Me Daycare)	422-28 W Onondaga St	036	Porous Pavement Parking Lot, Pavement Removal	2013	$1.25	$196.85	$0.00	$0.00	$12.15	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-159	GIF#073 Onondaga Commons (Rural Metro)	488 W Onondaga St.	036	Porous Pavement Parking Lot	2014	$2.73	$28.03	$0.00	$0.00	$1.73	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$1.51
C-164	GIF#074 Synapse Downtown	360 Erie Boulevard East & East Water Street	EBSS Storm Basin	Tree Trench, Infiltration Trench, Cistern/Rain Barrel, Pavement Removal	2012	$0.30	$29.30	$13.81	$0.00	$1.81	$0.01	$0.01	$8.92	$24.31	$0.00	$2.68	$0.13	$30.08	$4.52	$9.63	$1.36	$580.34	$0.00
C-165	GIF#075 Syracuse Center for Peace and Social Justice	2013 East Genesee Street	EBSS Storm Basin	Underground infiltration, Bioretention, Pavement Removal	2014	$0.33	$112.44	$0.79	$0.00	$6.94	$0.00	$0.00	$2.20	$5.99	$0.00	$0.49	$0.01	$1.72	$0.23	$0.60	$1.36	$91.11	$0.45
C-166	GIF#076 360 Warren Associates	125 East Jefferson Street	030	Green Roof	2014	$0.60	$280.94	$0.00	$0.00	$17.34	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$3.54
C-167	GIF#078 Teall Centre	1605-41 Erie Blvd	EBSS Storm Basin	Bioretention, Porous Pavement Parking Lot	2012	$6.24	$539.91	$5.85	$0.00	$33.33	$0.02	$0.01	$10.17	$27.72	$0.00	$2.52	$0.06	$12.75	$1.78	$4.31	$1.36	$494.46	$3.32
C-168	GIF#079 Near Westside Initiative Case Supply	104 Marcellus Street	026,028	Bioretention, Pavement Removal	2013	$0.42	$22.30	$12.53	$0.00	$1.38	$0.01	$0.01	$7.28	$19.85	$0.00	$2.19	$0.13	$27.29	$4.22	$10.32	$1.36	$523.18	$0.72
C-169	GIF#080 Grace Episcopal Church	819 Madison Street	080B	Rain Garden, Porous Pavement, Pavement Removal	2013	$0.59	$77.08	$0.00	$0.00	$4.76	$0.00	$0.00	$0.98	$2.66	$0.00	$0.22	$0.00	$0.00	$0.00	$0.00	$1.36	$40.49	$0.32
C-172	GIF#122 Butternut Commons	Butternut Street and North Townsend Street	020	Underground Infiltration	2012	$1.70	$16.56	$0.79	$0.00	$1.02	$0.00	$0.00	$3.17	$8.65	$0.00	$0.71	$0.01	$1.72	$0.23	$0.60	$1.36	$131.60	$0.00
C-173	GIF#082 100 Clinton Square	100 Clinton Square	021	Infiltration Trench	2012	$3.49	$329.36	$0.00	$0.00	$20.33	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-175	GIF#084 WCNY Case Supply Building	415 W Fayette St & Wyoming St	026,028	Pavement Removal, Bioretention, Porous Pavement Parking Lot, Street Trees	2013	$2.51	$123.91	$13.71	$0.00	$7.65	$0.02	$0.02	$15.43	$42.05	$0.01	$4.18	$0.14	$29.87	$4.57	$11.22	$1.36	$1,027.45	$3.17
C-176	GIF#085 Graham Millwork Co	126 Richmond Ave	066	Green Roof	2013	$0.24	$20.07	$0.00	$0.00	$1.24	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$2.97
C-181	GIF#091 Onondaga Commons Parking Lot/Roof	506 West Onondaga St	036	Porous Pavement Parking Lot, Pavement Removal	2014	$0.71	$74.22	$0.00	$0.00	$4.58	$0.00	$0.00	$1.71	$4.66	$0.00	$0.38	$0.00	$0.00	$0.00	$0.00	$1.36	$70.86	$0.00
C-186	Tree Pit Pilot Project	441 South Salina Street	034	Porous Pavement Sidewalk	2012	$0.12	$16.25	$0.00	$0.00	$1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-190	GIF#100 Salt Quarters	109-15 Otisco Street	031	Bioretention, Porous Pavement Parking Lot, Pavement Removal	2013	$0.71	$33.45	$1.58	$0.00	$2.06	$0.00	$0.00	$2.44	$6.66	$0.00	$0.55	$0.02	$3.44	$0.46	$1.20	$1.36	$101.23	$0.19
C-191	GIF#101 Erie Bruce Corp.	2112 Erie Boulevard East	EBSS Storm Basin	Bioretention, Porous Pavement Parking Lot	2013	$2.73	$159.58	$0.00	$0.00	$9.85	$0.00	$0.00	$1.71	$4.66	$0.00	$0.38	$0.00	$0.00	$0.00	$0.00	$1.36	$70.86	$2.65
C-192	GIF#090 Onondaga Commons Rural Metro	414-16 West Onondaga Street	036	Porous Pavement Parking Lot, Pavement Removal	2014	$1.88	$361.21	$0.00	$0.00	$22.30	$0.00	$0.00	$2.44	$6.66	$0.00	$0.55	$0.00	$0.00	$0.00	$0.00	$1.36	$101.23	$0.00
C-195	GIF#102 JNJ Syracuse	725 East Fayette Street	027	Porous Pavement Parking Lot, Pavement Removal	2014	$0.24	$87.91	$1.18	$0.00	$5.43	$0.00	$0.00	$0.73	$2.00	$0.00	$0.16	$0.01	$2.58	$0.34	$0.90	$1.36	$30.37	$0.00
C-196	GIF#103 VanKeuren Square	2223 East Genesee Street	EBSS Storm Basin	Porous Pavement, Cistern System, Bioretention	2014	$1.07	$13.70	$17.28	$0.00	$0.85	$0.05	$0.05	$34.42	$93.81	$0.01	$9.33	$0.17	$37.63	$5.43	$12.64	$1.36	$2,090.05	$1.53
C-198	Road Reconstruction: Oneida Street	Oneida Street between W Adams and Temple St	037	Infiltration Trench	2013	$3.67	$465.69	$0.00	$0.00	$28.75	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-199	Road Reconstruction: South Clinton Street	S. Clinton Street between W. Adams St. and Temple St.	037	Infiltration Trench	2013	$2.08	$277.76	$0.00	$0.00	$17.15	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00

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								Energy Tree Value Electricity Savings	Energy Tree Value Natural Gas Savings	NPV Dollars Electricity Reduction At WWTP	Direct Benefit from NO_2 Pollutant Removal	Direct Benefit from SO_2 Pollutant Removal	Direct Benefit from O_3 Pollutant Removal	Direct Benefit from $PM_{2.5}$ Pollutant Removal	NPV of NO_2 Reduction at WWTP	NPV of SO_2 At WWTP	NPV of NO_2 Avoided Emissions Energy by Trees	NPV of SO_2 Avoided Emissions Energy by Trees	NPV of Tons of CO_2 Avoided Energy by Trees (Electricity)	NPV of tons of CO_2 Avoided Energy by Trees (Natural Gas)	NPV of CO_2 Reduction At WWTP (Includes Trees And Structural BMPs)	NPV of CO_2 Reduction From Tree Adsorption	NPV Value of CO_2 Sequestered through GI
C-20	Green Roof at Center of Excellence	727 E. Washington Street	027	Green Roof	2010	$0.70	$68.80	$0.00	$0.00	$4.25	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$11.51
C-201	Road Reconstruction: Richmond Ave	Richmond Ave. between N. Geddes St. and Van Rensselaer St	007,066	Infiltration Trench	2013	$3.38	$330.63	$0.00	$0.00	$20.41	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-202	GIF#105 JC Smith, Inc. 338 Peat Street	338 Peat Street	EBSS Storm Basin	Porous Pavement, Added Green Space	2014	$0.92	$187.30	$0.00	$0.00	$11.56	$0.00	$0.00	$1.95	$5.32	$0.00	$0.44	$0.00	$0.00	$0.00	$0.00	$1.36	$80.99	$1.93
C-204	GIF#123 University Hill Apartments	205 Westcott Street	EBSS Storm Basin	Porous Pavement, Drywell, Added Green Space	2014	$0.54	$49.37	$3.55	$0.00	$3.05	$0.01	$0.01	$3.91	$10.65	$0.00	$0.88	$0.04	$7.74	$1.03	$2.70	$1.36	$161.97	$0.00
C-21	GIF#004 Jefferson Clinton Commons	500 S. Clinton St	030	Porous Pavement Parking Lot, Green Roof	2010	$0.91	$220.74	$0.00	$0.00	$13.63	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$1.39
C-212	GIF#117 United Auto Supply	450 Tracy Street	066	Infiltration Bed	2013	$1.75	$146.52	$0.00	$0.00	$9.05	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-214	GIF#121 Taksum Development	708 East Genesee Street	027	Porous Pavement Parking Lot, Pavement Removal	2014	$0.44	$64.98	$0.00	$0.00	$4.01	$0.00	$0.00	$0.98	$2.66	$0.00	$0.22	$0.00	$0.00	$0.00	$0.00	$1.36	$40.49	$0.00
C-217	GIF#096 Bethany Baptist Church (Phase 2)	149 Beatie Street	EBSS Storm Basin	Porous Pavement Parking Lot, Pavement Removal	2014	$1.15	$110.53	$0.00	$0.00	$6.82	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$5.86
C-219	GIF#125 Nojaims' Grocery Store	307 Gifford Street	035,036	Underground Infiltration Trench, Porous Pavement, Pavement Removal	2014	$2.84	$74.22	$5.12	$0.00	$4.58	$0.01	$0.01	$9.16	$24.98	$0.00	$2.39	$0.05	$11.14	$1.62	$4.11	$1.36	$540.11	$0.00
C-220	St. Joseph's Hospital Campus Expansion and Redevelopment	301 Prospect Ave.	020	Green Roof	2012	$2.09	$230.93	$36.82	$0.00	$14.26	$0.03	$0.03	$22.98	$62.64	$0.01	$6.91	$0.35	$80.21	$12.05	$25.69	$1.36	$1,495.48	$36.69
C-28	IMA: SUNY Upstate: Biotechnology Center	820-900 E. Water St.	027	Bioretention, Pavement Removal	2012	$7.38	$628.78	$34.44	$0.00	$38.82	$0.08	$0.08	$55.00	$149.91	$0.02	$14.98	$0.36	$75.01	$11.28	$27.58	$1.36	$3,597.56	$15.73
C-29a	Connective Corridor Phase 1 - Contract 1 (University Ave)	University Ave, from E Genesee to Waverly St	030,080B	Green Street	2012	$12.07	$1,397.71	$26.85	$0.00	$86.29	$0.19	$0.18	$129.13	$351.97	$0.05	$31.03	$0.26	$58.48	$8.78	$18.73	$1.36	$6,566.95	$36.69
C-29b	Connective Corridor Phase 1 - Contract 2 (E. Genesee St)	E Genesee St from University Ave to Forman Ave	030,080B	Green Street	2012	$6.60	$918.96	$40.18	$0.00	$56.73	$0.07	$0.06	$44.26	$120.63	$0.02	$11.07	$0.42	$87.54	$13.35	$33.95	$1.36	$2,458.34	$0.00
C-29f	West Fayette Street Sewer Separation	West Fayette Street between the Creek and Salina Street	027/029	Separated Sewer	2013	$22.28	$2,473.99	$0.00	$0.00	$152.74	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-31	GIF#010 Near Westside Initiative Lincoln Supply	109 Otisco St	032	Bioretention	2011	$1.11	$198.76	$0.00	$0.00	$12.27	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$19.42
C-33	Cistern System at the War Memorial	200 Madison Street	034	Cistern/Rain Barrel	2012	$0.93	$91.58	$0.00	$0.00	$5.65	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-34	Green Roof at OnCenter	800 S. State Street	034	Green Roof	2011	$2.71	$482.57	$0.00	$0.00	$29.79	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$46.76
C-38	OnCenter Surface Parking Lot	801 - 813 S. State Street; 422 - 434 Harrison St	034	Tree Trench, Porous Pavement Parking Lot	2012	$5.50	$769.89	$0.00	$0.00	$47.53	$0.01	$0.01	$4.27	$11.65	$0.00	$1.29	$0.00	$0.00	$0.00	$0.00	$1.36	$376.73	$0.00
C-45	GIF#018 Putnam Properties	210 E. Fayette St.	030	Green Roof	2011	$0.11	$19.43	$0.00	$0.00	$1.20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$1.76
C-48	Green Roof at the Erie Canal Museum Visitor Center	318 Erie Blvd. East	027	Green Roof	2012	$0.09	$16.25	$0.00	$0.00	$1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$1.58
C-51	GIF#001 The Spa at 500 W. Onondaga	500 W. Onondaga St	036	Porous Pavement Parking Lot, Rain Garden	2011	$0.33	$40.77	$12.50	$0.00	$2.52	$0.02	$0.02	$12.32	$33.58	$0.01	$3.67	$0.12	$27.22	$4.10	$8.92	$1.36	$809.85	$0.53
C-52	GIF#006 Green Roof at King & King Architects	358 W. Jefferson St.	028, 031	Green Roof	2010	$0.45	$82.50	$0.00	$0.00	$5.09	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$7.97
C-54c	Downtown Streetscape: 200 Water Street (North)	200 block E Water	027	Tree Trench Silva Cells High	2012	$0.31	$34.08	$6.93	$0.00	$2.10	$0.00	$0.00	$2.99	$8.15	$0.00	$0.90	$0.07	$15.10	$2.38	$6.22	$1.36	$263.71	$0.00
C-54d	Downtown Streetscape: 200 Montgomery Street (West)	300 block Montgomery	027	Tree Trench Silva Cells High	2012	$0.39	$43.64	$0.00	$0.00	$2.69	$0.00	$0.00	$2.14	$5.82	$0.00	$0.64	$0.00	$0.00	$0.00	$0.00	$1.36	$188.37	$0.00
C-54e	Downtown Streetscape: 200 Montgomery Street (East)	200 block Montgomery St	027	Tree Trench Standard	2012	$0.43	$48.42	$1.98	$0.00	$2.99	$0.00	$0.00	$2.99	$8.15	$0.00	$0.90	$0.02	$4.32	$0.68	$1.78	$1.36	$263.71	$0.00
C-54f	Downtown Streetscape: 100 South State Street (West)	100 S. State St.	027	Tree Trench Standard	2012	$0.62	$71.35	$6.13	$0.00	$4.41	$0.01	$0.01	$7.26	$19.80	$0.00	$1.80	$0.07	$13.35	$1.94	$5.06	$1.36	$400.96	$0.00
C-55	Green School: SCSD Institute of Technology	258 E. Adams St.	037	Sewer Separation	2012	$5.25	$686.11	$0.00	$0.00	$42.36	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-56	GIF#012 The Galleries Office Towers	147 E. Onondaga St.	034	Porous Pavement Parking Lot	2011	$0.82	$147.16	$0.00	$0.00	$9.09	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-57	GIF#013 The Monroe Building	333 E. Onondaga St.	030	Green Roof	2011	$0.21	$20.39	$0.00	$0.00	$1.26	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$3.74

Table A-3: Economic Benefits for Onondaga County Save the Rain Green Infrastructure Projects

Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Value of Infiltration Dollars	NPV Reductions in Operation and Maintenance Costs	Energy Saving Economic Benefits			Air Quality Economic Benefits								Climate Change Economic Benefits				
								Energy Tree Value Electricity Savings	Energy Tree Value Natural Gas Savings	NPV Dollars Electricity Reduction At WWTP	Direct Benefit from NO_2 Pollutant Removal	Direct Benefit from SO_2 Pollutant Removal	Direct Benefit from O_3 Pollutant Removal	Direct Benefit from $PM_{2.5}$ Pollutant Removal	NPV of NO_2 Reduction at WWTP	NPV of SO_2 At WWTP	NPV of NO_2 Avoided Emissions Energy by Trees	NPV of SO_2 Avoided Emissions Energy by Trees	NPV of Tons of CO_2 Avoided Energy by Trees (Electricity)	NPV of tons of CO_2 Avoided Energy by Trees (Natural Gas)	NPV of CO_2 Reduction At WWTP (Includes Trees And Structural BMPs)	NPV of CO_2 Reduction From Tree Adsorption	NPV Value of CO_2 Sequestered through GI
C-58	GIF#007 Hotel Skyler	609 S. Crouse Ave.	080B	Porous Pavement Parking Lot	2011	$0.40	$71.99	$1.97	$0.00	$4.44	$0.00	$0.00	$2.69	$7.32	$0.00	$0.60	$0.02	$4.30	$0.57	$1.50	$1.36	$111.36	$0.00
C-59	GIF#015 Near West Side Initiative: Artist Studio	109-115 Otisco & Wyoming St	032	Porous Pavement Sidewalk, Vegetated Infiltration Basin, Bioretention	2011	$0.30	$54.47	$0.00	$0.00	$3.36	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.79
C-60	Green School: Seymour Academy Playground	108 Shonnard Street	036	Bioretention, Pavement Removal, Tree Trench	2012	$1.65	$51.28	$0.00	$0.00	$3.17	$0.01	$0.01	$7.51	$20.47	$0.00	$1.85	$0.00	$0.00	$0.00	$0.00	$1.36	$411.08	$0.70
C-61	Water Street Green Gateway	300 Block of East Water Street	027	Porous Pavement Parking Lot, Green Street, Infiltration Trench	2012	$2.15	$275.85	$26.31	$0.00	$17.03	$0.05	$0.04	$31.07	$84.70	$0.01	$7.86	$0.28	$57.31	$8.52	$22.30	$1.36	$1,827.04	$9.98
C-69	GIF#017 Create Public Art	713 E. Fayette St	027	Green Roof, Porous Pavement Parking Lot, Pavement Removal	2013	$0.24	$39.82	$0.00	$0.00	$2.46	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$2.16
C-70	GIF#020 St Lucy's Church	316 - 318 - 320 Seymour Street	035,036	Porous Pavement Parking Lot	2011	$0.74	$102.25	$0.00	$0.00	$6.31	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-73	West Onondaga Street Green Corridor	From W Adams to South Ave	036	Green Street	2013	$13.02	$1,705.73	$20.58	$0.00	$105.31	$0.03	$0.03	$19.85	$54.11	$0.01	$5.34	$0.22	$44.82	$6.70	$17.54	$1.36	$1,283.19	$0.00
C-74a	Otisco Street Green Corridor - Phase 1	from Ontario St to Seneca St	011,031	Curb Extension, Pavement Removal	2012	$6.67	$624.00	$0.00	$0.00	$38.52	$0.01	$0.01	$7.69	$20.97	$0.00	$2.31	$0.00	$0.00	$0.00	$0.00	$1.36	$678.12	$9.76
C-75a	IMA: SUNY Upstate: Cancer Center Green Roof	750 E Adams St	034	Green Roof	2014	$0.52	$113.40	$20.17	$0.00	$7.00	$0.03	$0.02	$17.21	$46.92	$0.01	$4.31	$0.21	$43.95	$6.45	$15.90	$1.36	$918.07	$9.15
C-75b	IMA: SUNY Upstate: Cancer Center Rain Garden	750 E Adams St	034	Bioretention	2014	$0.12	$138.88	$2.17	$0.00	$8.57	$0.01	$0.01	$5.31	$14.48	$0.00	$1.23	$0.02	$4.74	$0.68	$1.79	$1.36	$240.14	$2.05
C-78	GIF#024 CNY Regional Transportation Authority	624-662 South Warren Street	034	Infiltration Trench	2012	$2.92	$61.48	$0.00	$0.00	$3.80	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-79	GIF#026 Central New York Jazz Arts Foundation	441 E. Washington Street	027	Green Roof	2012	$0.10	$10.51	$0.00	$0.00	$0.65	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$1.80
C-85	SCSD Central Offices	725 Harrison Street	034	Porous Pavement Parking Lot, Infiltration Trench	2012	$4.92	$678.47	$0.00	$0.00	$41.89	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-86a	Bank Street/Alley Storm Sewer	Alley between E Washington and E Fayette St	027	Infiltration Trench	2013	$1.01	$99.38	$0.00	$0.00	$6.14	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-92	GIF#040 Courts4Kids: Skiddy Park Porous Basketball Courts	Tully St between Oswego and Tioga	031	Porous Pavement Court	2011	$0.80	$104.80	$0.00	$0.00	$6.47	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-93	Seymour School Rain Garden	108 Shonnard Street	036	Bioretention	2011	$0.02	$3.50	$0.00	$0.00	$0.22	$0.00	$0.00	$0.49	$1.33	$0.00	$0.11	$0.00	$0.00	$0.00	$0.00	$1.36	$20.25	$0.22
C-94	GIF#032 Consuela's Westside Taqueria and BBQ	523 Marcellus St	028	Bioretention, Porous Pavement Parking Lot, Street Trees, Pavement Removal	2013	$0.13	$18.16	$0.00	$0.00	$1.12	$0.00	$0.00	$0.98	$2.66	$0.00	$0.22	$0.00	$0.00	$0.00	$0.00	$1.36	$40.49	$0.36
C-95	IMA: SUNY Upstate: Townsend Towers	507-523 E Adams Street	034	Bioretention	2012	$1.88	$272.98	$0.00	$0.00	$16.85	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$2.30
C-96	GIF#034 Pike Block	300 S Salina & W Fayette St	029	Cistern System, Underground Infiltration System	2014	$1.36	$74.22	$0.00	$0.00	$4.58	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
C-99	Vacant Lot: 701 Oswego St.	701 Oswego Street	036	Urban Garden, Infiltration Trench	2012	$0.60	$61.16	$1.58	$0.00	$3.78	$0.01	$0.01	$7.81	$21.30	$0.00	$1.76	$0.02	$3.44	$0.46	$1.20	$1.36	$323.95	$0.00
E-06	City Parking Lot #3	101 Oswego Blvd	EBSS Storm Basin	Porous Pavement Parking Lot	2010	$1.58	$225.52	$0.00	$0.00	$13.92	$0.02	$0.02	$13.49	$36.78	$0.01	$3.78	$0.00	$0.00	$0.00	$0.00	$1.36	$1,018.34	$0.00
E-08	Green Library: Petit Branch	105 Victoria Place	EBSS Storm Basin	Porous Pavement Parking Lot	2012	$0.62	$53.51	$0.00	$0.00	$3.30	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
E-10	Road Reconstruction: Concord Place	Concord Place from Westcott St. to Allen St.	EBSS Storm Basin	Infiltration Trench	2011	$1.58	$116.26	$0.00	$0.00	$7.18	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
E-12	Dr Edwin E Weeks Elementary School	710 Hawley Ave	080A	Bioretention	2012	$6.43	$481.62	$4.34	$0.00	$29.73	$0.00	$0.00	$3.17	$8.65	$0.00	$0.71	$0.05	$9.46	$1.26	$3.30	$1.36	$131.60	$0.00
E-16	Lower Sunnycrest Park	Caleb Ave	080H	Pavement Removal, Bioretention, Storage Bed	2012	$1.48	$72.31	$0.00	$0.00	$4.46	$0.03	$0.03	$18.19	$49.59	$0.01	$4.41	$0.00	$0.00	$0.00	$0.00	$1.36	$953.76	$4.60
E-33	I-690 Downspout Disconnections	I-690 between Willow, James and State St.	080A, EBSS Storm Basin	Infiltration Trench, Bioretention	2013	$5.64	$878.50	$0.00	$0.00	$54.24	$0.01	$0.01	$6.29	$17.14	$0.00	$1.58	$0.00	$0.00	$0.00	$0.00	$1.36	$360.46	$1.15
E-34	Rain Garden at Henninger High School	600 Robinson St	080H	Bioretention, Cistern/	2011	$0.07	$7.64	$0.77	$0.00	$0.47	$0.00	$0.00	$1.08	$2.93	$0.00	$0.27	$0.01	$1.67	$0.25	$0.54	$1.36	$52.69	$0.49

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Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Value of Infiltration Dollars	NPV Reductions in Operation and Maintenance Costs	Energy Saving Economic Benefits			Air Quality Economic Benefits								Climate Change Economic Benefits				
								Energy Tree Value Electricity Savings	Energy Tree Value Natural Gas Savings	NPV Dollars Electricity Reduction At WWTP	Direct Benefit from NO_2 Pollutant Removal	Direct Benefit from SO_2 Pollutant Removal	Direct Benefit from O_3 Pollutant Removal	Direct Benefit from $PM_{2.5}$ Pollutant Removal	NPV of NO_2 Reduction at WWTP	NPV of SO_2 At WWTP	NPV of NO_2 Avoided Emissions Energy by Trees	NPV of SO_2 Avoided Emissions Energy by Trees	NPV of Tons of CO_2 Avoided Energy by Trees (Electricity)	NPV of tons of CO_2 Avoided Energy by Trees (Natural Gas)	NPV of CO_2 Reduction At WWTP (Includes Trees And Structural BMPs)	NPV of CO_2 Reduction From Tree Adsorption	NPV Value of CO_2 Sequestered through GI
E-36	Upper Sunnycrest Park	St. Anne Dr and Robinson St	080H	Bioretention, Pavement Removal, Porous Pavement Parking Lot	2011	$4.44	$349.11	$5.91	$0.00	$21.55	$0.02	$0.02	$13.83	$37.69	$0.01	$3.60	$0.06	$12.88	$1.95	$4.99	$1.36	$845.06	$0.82
E-39	East Water Street Pavement Removal	Intersection of S Beech and E Water at Erie Blvd.	EBSS Storm Basin	Tree Trench, Porous Pavement, Pavement Removal	2012	$1.82	$143.02	$1.39	$0.00	$8.83	$0.01	$0.01	$4.52	$12.31	$0.00	$1.21	$0.01	$3.02	$0.45	$1.19	$1.36	$307.03	$0.00
E-40ab	Westcott Street Green Corridor and Knoll	Westcott St from Dell to S. Beech St	EBSS Storm Basin	Porous Pavement Parking Lane, Infiltration Trench	2013	$3.65	$318.21	$6.93	$0.00	$19.65	$0.01	$0.01	$3.85	$10.48	$0.00	$1.03	$0.07	$15.09	$2.27	$5.94	$1.36	$259.23	$0.00
E-43	Westcott Community Center	822-26 Euclid Ave and Westcott St	EBSS Storm Basin	Porous Pavement Parking Lot	2012	$0.36	$31.85	$0.00	$0.00	$1.97	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
F-01	Pearl Street Parking Lot	400 block of Pearl Street	021	Porous Pavement Parking Lot	2010	$3.00	$364.08	$0.39	$0.00	$22.48	$0.00	$0.00	$0.98	$2.66	$0.00	$0.22	$0.00	$0.86	$0.11	$0.30	$1.36	$40.49	$0.00
F-02	Green Library: White Branch	763 Butternut St	020-2	Infiltration Trench, Cistern/Rain Barrel, Porous Pavement Parking Lot, Bioretention	2012	$0.99	$231.89	$0.00	$0.00	$14.32	$0.00	$0.00	$2.81	$7.65	$0.00	$0.70	$0.00	$0.00	$0.00	$0.00	$1.36	$156.33	$1.12
F-04a	City Parking Lot #4	Butternut and N State Sts	020-1	Porous Pavement Parking Lot	2012	$2.91	$403.58	$0.00	$0.00	$24.92	$0.01	$0.01	$9.89	$26.96	$0.00	$2.42	$0.00	$0.00	$0.00	$0.00	$1.36	$529.74	$0.00
F-04b	North State Street Green Street	N State St bw Butternut and Ash	020-1	Bioretention, Bioretention	2012	$2.48	$384.47	$0.00	$0.00	$23.74	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.99
F-07	Magnarelli Community Center Green Roof	2308 Grant Blvd	020-2	Green Roof	2014	$0.43	$48.74	$0.00	$0.00	$3.01	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$7.48
H-05	Green Roof at Hazard Branch Library	1620 West Genesee St	003	Green Roof	2012	$0.22	$39.18	$0.00	$0.00	$2.42	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$3.87
H-05b	Green Library: Hazard Branch Site Improvements	1620 West Genesee St	003	Porous Pavement Parking Lot, Bioretention	2012	$0.90	$129.96	$3.76	$0.00	$8.02	$0.01	$0.01	$8.18	$22.30	$0.00	$2.03	$0.04	$8.19	$1.25	$3.27	$1.36	$458.88	$0.78
H-06	Green Library: Mundy Branch	1204 South Geddes St	014	Tree Trench, Porous Pavement Parking Lot	2012	$0.50	$72.62	$2.97	$0.00	$4.48	$0.00	$0.00	$2.01	$5.49	$0.00	$0.55	$0.03	$6.47	$1.02	$2.67	$1.36	$143.39	$0.00
H-07	GIF#011 Vibrant Syracuse Spaces	196 S. Geddes St	010	Porous Pavement Parking Lot, Bioretention	2011	$0.45	$82.18	$0.00	$0.00	$5.07	$0.00	$0.00	$1.71	$4.66	$0.00	$0.38	$0.00	$0.00	$0.00	$0.00	$1.36	$70.86	$1.80
H-08	Road Reconstruction: Geddes Street	300-500 blocks S. Geddes St	011	Bioretention	2011	$1.22	$172.96	$0.00	$0.00	$10.68	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$7.19
H-11	Pass Arboretum	Avery Ave and Tompkins St	004	Bioretention	2012	$1.59	$217.24	$0.00	$0.00	$13.41	$0.05	$0.05	$32.42	$88.36	$0.01	$8.49	$0.00	$0.00	$0.00	$0.00	$1.36	$2,082.30	$7.34
H-13	Zoo Entrance Enhancements and Coleridge Ave. Widening	S Wilbur Ave and Coleridge Ave	004	Bioretention	2012	$1.59	$218.51	$0.00	$0.00	$13.49	$0.01	$0.01	$6.34	$17.27	$0.00	$1.91	$0.00	$0.00	$0.00	$0.00	$1.36	$471.57	$7.12
H-16	Porous Concrete Sidewalk on Grand Ave	100 Grand Ave	014	Porous Pavement Sidewalk	2012	$0.02	$4.14	$0.00	$0.00	$0.26	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
H-17	Rain Garden at Grand & Delaware	Grand Ave & Delaware St	014	Bioretention, Porous Pavement Roadway	2012	$1.11	$170.09	$0.00	$0.00	$10.50	$0.03	$0.03	$23.31	$63.54	$0.01	$5.94	$0.00	$0.00	$0.00	$0.00	$1.36	$1,369.91	$7.12
H-19	Rosamond Gifford Zoo: Elephant Exhibit	One Conservation Place	004	Green Roof	2011	$0.45	$58.93	$0.00	$0.00	$3.64	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$7.91
H-20	Rosamond Gifford Zoo: Primate Exhibit	One Conservation Place	004	Porous Pavement Sidewalk	2011	$0.68	$90.14	$0.00	$0.00	$5.57	$0.01	$0.01	$5.86	$15.97	$0.00	$1.58	$0.00	$0.00	$0.00	$0.00	$1.36	$402.62	$0.00
H-24	GIF#031 ARC of Onondaga County	401 Lowell Ave.	004	Porous Pavement Parking Lot	2012	$0.57	$84.73	$0.00	$0.00	$5.23	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
H-30	Vacant Lot: 1344-50 W. Onondaga St	Arthur St and W Onondaga St	015	Bioretention, Urban Forestry	2012	$0.39	$41.73	$0.00	$0.00	$2.58	$0.00	$0.00	$2.93	$7.99	$0.00	$0.66	$0.00	$0.00	$0.00	$0.00	$1.36	$121.48	$0.94
H-31	Rosamond Gifford Zoo: Stormwater Wetland	One Conservation Place	004	Stormwater Wetland, Cistern/Rain Barrel	2013	$4.62	$269.79	$0.00	$0.00	$16.66	$0.02	$0.02	$10.65	$29.03	$0.00	$2.89	$0.00	$0.00	$0.00	$0.00	$1.36	$713.46	$13.31
H-33	Green Park: Lewis Park	305 Lewis St and 825 Milton Ave	003,063	Porous Pavement Roadway, Porous Pavement Court	2013	$1.22	$175.51	$0.00	$0.00	$10.84	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
H-34	Rosamond Gifford Zoo: Parking Lot	One Conservation Place	004	Porous Pavement Parking Lot, Bioretention, Vegetated Infiltration Basin, Infiltration Bed	2013	$9.83	$1,254.37	$0.00	$0.00	$77.44	$0.05	$0.05	$33.02	$90.01	$0.01	$8.67	$0.00	$0.00	$0.00	$0.00	$1.36	$2,072.50	$3.17
H-36	Green Park: Wadsworth Park	1204 Glenwood Ave and Wolcott Ave	018	Infiltration Bed, Pavement Removal, Bioretention	2013	$2.28	$297.51	$0.00	$0.00	$18.37	$0.01	$0.01	$7.79	$21.24	$0.00	$1.97	$0.00	$0.00	$0.00	$0.00	$1.36	$450.83	$6.37
H-38	Vacant Lot: 224-226 Putnam Street	224, 226 Putnam St	014	Bioretention, Urban Forestry	2012	$0.39	$42.05	$0.00	$0.00	$2.60	$0.00	$0.00	$2.56	$6.99	$0.00	$0.64	$0.00	$0.00	$0.00	$0.00	$1.36	$146.21	$0.50
H-39	GIF#077 St. Patrick's Apartments	216 North Lowell Ave.	004	Cistern/Rain Barrel, Porous Pavement Parking Lot, Pavement Removal	2013	$1.46	$156.72	$3.95	$0.00	$9.68	$0.01	$0.01	$4.15	$11.32	$0.00	$1.06	$0.04	$8.61	$1.25	$3.28	$1.36	$251.93	$0.00
H-40	Infiltration Basin at Woodland Reservoir	Stolp Avenue and Hancock Drive	017	Infiltration Bed	2013	$1.04	$145.25	$0.00	$0.00	$8.97	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
H-41	GIF#069 Vibrant Syracuse Spaces Green Roof	200 S Geddes St.	010	Green Roof	2012	$0.53	$93.97	$0.00	$0.00	$5.80	$0.01	$0.00	$3.42	$9.32	$0.00	$0.90	$0.00	$0.00	$0.00	$0.00	$1.36	$221.56	$9.23

Table A-3: Economic Benefits for Onondaga County Save the Rain Green Infrastructure Projects

Project ID	Project Name	Project Address	CSO Basin	GI Technology	Construction Completion Year	Value of Infiltration Dollars	NPV Reductions in Operation and Maintenance Costs	Energy Saving Economic Benefits			Air Quality Economic Benefits								Climate Change Economic Benefits				
								Energy Tree Value Electricity Savings	Energy Tree Value Natural Gas Savings	NPV Dollars Electricity Reduction At WWTP	Direct Benefit from NO_2 Pollutant Removal	Direct Benefit from SO_2 Pollutant Removal	Direct Benefit from O_3 Pollutant Removal	Direct Benefit from $PM_{2.5}$ Pollutant Removal	NPV of NO_2 Reduction at WWTP	NPV of SO_2 At WWTP	NPV of NO_2 Avoided Emissions Energy by Trees	NPV of SO_2 Avoided Emissions Energy by Trees	NPV of Tons of CO_2 Avoided Energy by Trees (Electricity)	NPV of tons of CO_2 Avoided Energy by Trees (Natural Gas)	NPV of CO_2 Reduction At WWTP (Includes Trees And Structural BMPs)	NPV of CO_2 Reduction From Tree Adsorption	NPV Value of CO_2 Sequestered through GI
H-44	Vacant Lot: 109 Hartson Street	109 Hartson Street	014	Bioretention, Urban Forestry	2012	$0.31	$34.72	$0.00	$0.00	$2.14	$0.00	$0.00	$1.71	$4.66	$0.00	$0.38	$0.00	$0.00	$0.00	$0.00	$1.36	$70.86	$0.29
H-47	Road Reconstruction: Gifford Street	Geddes St to Ontario St	011	Infiltration Trench	2012	$3.20	$401.03	$0.00	$0.00	$24.76	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
H-48	GIF#083 Smith Housing	542-548 Seymour Street	011	Porous Pavement Parking Lot	2013	$0.48	$68.17	$0.00	$0.00	$4.21	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
H-52	GIF#099 VNA Home Care	1050 W Genesee St	005	Infiltration Bed, Cistern/Rain Barrel	2013	$1.00	$138.24	$0.00	$0.00	$8.53	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
H-53	GIF#113 Genesee Plaza	1001-1055 West Genesee Street	006A	Infiltration Trench, Pavement Removal	2013	$8.48	$1,059.11	$0.00	$0.00	$65.39	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
H-56	GIF#081 Brooklyn Pickle	1600 West Genesee Street	004	Bioretention, Infiltration Trench	2012	$0.16	$14.33	$0.79	$0.00	$0.88	$0.00	$0.00	$3.17	$8.65	$0.00	$0.71	$0.01	$1.72	$0.23	$0.60	$1.36	$131.60	$0.09
M-10b	Green Library: Beauchamp Site Improvements	2111 S. Salina St	060/077	Bioretention	2012	$0.53	$74.54	$0.99	$0.00	$4.60	$0.01	$0.01	$3.60	$9.82	$0.00	$0.84	$0.01	$2.16	$0.34	$0.89	$1.36	$169.28	$1.33
M-12a	Green Roof at the Salina Street Post Office	2200 S. Salina St	060/077	Green Roof	2013	$0.48	$85.37	$0.00	$0.00	$5.27	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$8.37
M-15	IMA: SUNY ESF Parking Project at Bray Hall	1 Forestry Drive/930 Irving Ave Rear	039	Cistern/Rain Barrel, Porous Pavement Parking Lot, Landscape Restoration, Bioretention	2012	$0.80	$100.02	$0.00	$0.00	$6.17	$0.04	$0.04	$29.00	$79.04	$0.01	$6.81	$0.00	$0.00	$0.00	$0.00	$1.36	$1,381.76	$0.49
M-16	SUNY ESF Gateway Building	1 Forestry Drive	039	Green Roof	2012	$0.39	$61.79	$0.00	$0.00	$3.82	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$3.55
M-17	GIF#009 SUNY ESF Residence Hall (Centennial Hall)	1 Forestry Drive	039	Porous Pavement Sidewalk	2011	$0.14	$25.80	$0.00	$0.00	$1.59	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
M-20	GIF#008 Dunbar Association	1453 S. State St.	039	Porous Pavement Parking Lot	2011	$0.77	$124.86	$0.00	$0.00	$7.71	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
M-23	Greening the Grey in Basin 044	400-700 W Castle Street	044	Bioretention	2012	$2.14	$155.12	$0.00	$0.00	$9.58	$0.02	$0.02	$13.43	$36.61	$0.01	$3.54	$0.00	$0.00	$0.00	$0.00	$1.36	$876.10	$2.30
M-24	GIF#003 Syracuse Model Neighborhood Corp	1721 S. Salina Street	044	Porous Pavement Parking Lot, Bioretention	2011	$0.90	$161.81	$0.00	$0.00	$9.99	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.09
M-25	Hughes Magnet School Parking Lot	370 Jamesville Ave	077	Infiltration Bed, Porous Pavement Parking Lot	2012	$0.00	$39.82	$0.00	$0.00	$2.46	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
M-29	Vacant Lots at 147 Hughes Place and 220 Lorraine Avenue	147 Hughes Place & 220 Lorraine Ave	077	Rain Garden, Pavement Removal	2012	$3.29	$375.23	$0.00	$0.00	$23.17	$0.02	$0.02	$10.93	$29.79	$0.00	$3.27	$0.00	$0.00	$0.00	$0.00	$1.36	$951.96	$0.00
M-29bc	GIF#025 Salina Shoe Company Inc	2809 S. Salina Street	060/077	Porous Pavement Parking Lot	2014	$2.21	$273.30	$0.00	$0.00	$16.87	$0.00	$0.00	$2.20	$5.99	$0.00	$0.49	$0.00	$0.00	$0.00	$0.00	$1.36	$91.11	$1.87
M-31	GIF#027 People's AME Zion Church Parking Lot	2226-28 South Salina St.	077	Porous Pavement Parking Lot	2013	$0.23	$37.91	$0.00	$0.00	$2.34	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
M-32	GIF#030 The People's Community Development Corporation	2307-2315 S. Salina St	077	Green Roof	2013	$0.36	$57.65	$0.00	$0.00	$3.56	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
M-35	GIF#033 Matawon Development Group	2221 South Salina Street	077	Infiltration Bed	2012	$0.22	$38.22	$0.00	$0.00	$2.36	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$3.31
M-36	Rooftop Disconnect in CSO 045	119 Crescent Ave	045	Downspout Disconnect	2011	$0.13	$18.16	$1.53	$0.00	$1.12	$0.00	$0.00	$0.69	$1.87	$0.00	$0.21	$0.01	$3.34	$0.50	$1.07	$1.36	$44.64	$0.00
M-43	Green Park: Comfort-Tyler Park	1212-14 E Colvin St and Comstock Ave	077	Infiltration Trench, Porous Pavement, Bioretention	2014	$2.06	$198.44	$0.00	$0.00	$12.25	$0.01	$0.01	$4.52	$12.31	$0.00	$1.34	$0.00	$0.00	$0.00	$0.00	$1.36	$386.86	$1.93
M-44	Site Improvements at Bishop Foery Center	Edmund Ave	067	Bioretention	2011	$0.06	$5.42	$0.00	$0.00	$0.33	$0.00	$0.00	$0.24	$0.67	$0.00	$0.05	$0.00	$0.00	$0.00	$0.00	$1.36	$10.12	$0.18
M-45	Rain Garden at Barnabas Center	1941 S Salina St	044-2	Bioretention	2011	$0.08	$7.33	$0.00	$0.00	$0.45	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.14
M-49	Stadium Parking Lot at SU	Stadium Place at E Raynor Ave	039	Porous Pavement Parking Lot	2012	$5.67	$710.64	$0.00	$0.00	$43.87	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
M-51	GIF#107 South Side Community Coalition	2331 South Salina Street	060/077	Porous Pavement Parking Lot, Porous Paver Sidewalk, Tree Trench, Pavement Removal	2013	$0.42	$56.38	$3.07	$0.00	$3.48	$0.00	$0.00	$1.37	$3.74	$0.00	$0.41	$0.03	$6.68	$1.00	$2.14	$1.36	$89.28	$0.00
M-52	Road Reconstruction: South State Street	From Kennedy to E Colvin	044	Infiltration Trench	2012	$5.47	$457.09	$0.00	$0.00	$28.22	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
M-53	Road Reconstruction: Sumner Ave.	From Euclid to Stratford	077	Infiltration Trench	2012	$0.73	$104.80	$0.00	$0.00	$6.47	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
M-60	SUNY ESF: Baker Lab Stormwater Collection System	Baker Lab on Campus Drive West	039	Cistern/Rain Barrel	2011	$0.26	$33.45	$0.00	$0.00	$2.06	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.00
M-61	OEI Demonstration Rain Garden: 133 Vale Street	133 Vale Street	067	Bioretention	2012	$0.00	$1.91	$0.00	$0.00	$0.12	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36	$0.00	$0.18

Note: Refer to Table 5.2 for Summary and Totals

GRAY PROJECTS UPDATE

Gray Projects Update

There were no gray projects underway in the Save the Rain program during the first quarter of 2018.

GREEN PROJECTS UPDATE

Green Projects Update:

Progress continued on several Save the Rain projects during the first quarter of 2018.

During the first quarter, the County and their contractors began planning the construction schedule for 2018. Green infrastructure projects led by the County targeted for completion in 2018 include:

- Infiltration Manholes on Bishop and Craddock (CSO 052)
- McKinley Park Greening (CSO 067)
- Roney Lane Green Street (CSO 060/077)
- Comstock Avenue Green Street (CSO 060/077)
- South Avenue Green Street (CSO 052)
- Elmhurst Avenue Green Street (CSO 052)
- Charmouth Drive Green Street (CSO 052)
- Fairfield Avenue Green Street (CSO 052)
- Hutchinson Avenue Green Street (CSO 052)
- Syracuse Fire Station No. 5 (CSO 007)

Completion of the green infrastructure installation on East Colvin Street (CSO 060/077) and Hastings Place (CSO 073A) as part of the City's road reconstruction program is also planned in early 2018.

In the first quarter, the County also began planning for the 2018 City road reconstruction program partnership projects, targeting South Geddes Street between Shonnard and Delaware (CSO 014), Ostrom Place between Euclid and the dead end (CSO 060/077) and Berkeley Drive between Stratford and Broad (CSO 060/077) for green infrastructure implementation.

Also during the quarter, the designs of several green infrastructure projects progressed. The Harbor Brook Green Streets projects on Lakeview Avenue, Richmond Avenue, West Genesee Street, Wilbur Avenue, and Magnolia Street reached the 25% design phase. Additionally, the additional green street candidate projects in CSO 060/077 were awarded to the selected design consultant and fieldwork began. Design work on these streets, South Salina Street, Elk Street, Robert Drive, Moore Avenue, and Vincent Street, is expected to begin later in 2018.

The County continues to hold public information meetings and conducts targeted public outreach with specific neighborhood groups for all of the projects in motion and expects an increase in the frequency of these meetings as the 2018 construction season begins.

Save The Rain Clean The Lake

Joanne M. Mahoney
County Executive

FACT SHEET
Infiltration Manholes on Bishop Ave. and Craddock St.

Project:	Infiltration Manholes on Bishop Ave and Craddock St.
Project Owner:	City of Syracuse
Project Location:	Bishop Ave. at Elmhurst Ave. and Craddock St. at Glenwood Ave.
Sewershed:	Midland
CSO:	052
GI Technology:	Infiltration Manholes
Capture Area:	20,440 sq. ft.
Runoff Reduction:	540,000 gal/yr
Year Contracted:	2018
Construction Cost:	$168,338
Prime Contractor:	DE Tarolli, Inc.

The infiltration manholes on Bishop Avenue and Craddock Street introduce a new green infrastructure technology for the Save the Rain Program. Infiltration manholes are similar to dry wells, however, are more substantial and capture a greater volume of stormwater than dry wells. The manhole walls are perforated with rings of 3" holes and open on the bottom to allow stormwater to infiltrate into the surrounding gravel storage and subgrade native soils.

Bishop Avenue and Craddock Street were chosen as the first location for this product because they are located within the high priority CSO 052 area, and because they are narrow streets with utility restrictions that prevent other traditional forms of green infrastructure. These infiltration manholes allow for increased stormwater capture volume in a small space, compared to stone storage alone.

In addition, two catch basins along Bishop Avenue are being separated from the sanitary sewer and being directed to Furnace Brook as part of this project. These catch basins are located within 30 feet of Furnace Brook and the close proximity allows for simple separation. Water quality treatment for the new separated catch basins will be provided via filter inserts that capture street borne debris and an intermediary infiltration manhole.

Infiltration manholes are planned to be used in a much greater frequency in future projects in utility complex areas and are an excellent addition to the Save the Rain Program's portfolio of green infrastructure technologies. A total of approximately 540,000 gallons of stormwater will be captured annually with these infiltration manholes on Bishop Avenue and Craddock Street.

Infiltration Manhole Before Installation

Installation of an Infiltration Manhole (Right)

Save the Rain

Save The Rain Clean The Lake
Joanne M. Mahoney
County Executive

FACT SHEET
Green Streets in CSO 060/077 Sewershed

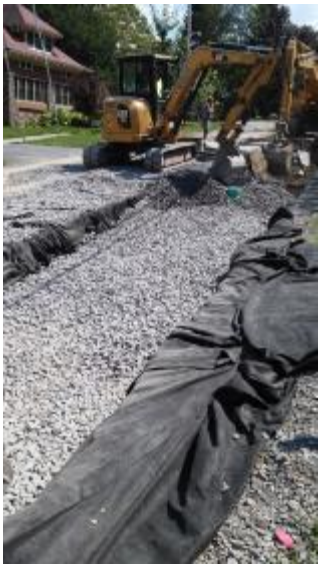
Project:	Green Streets in CSO 060/077
Property Owner:	City of Syracuse
GI Technologies:	Bioretention, Bioswales, Infiltration Trenches
Project Locations:	McKinley Ave. between S. Salina St. & S. State St.; Roney Ln. at Smith Ln.; Comstock Ave. between E. Colvin St. & Euclid Ave.; Ackerman Ave between Euclid Ave. & Kensington Rd.; Lancaster Ave. between Euclid Ave. & Kensington Rd.
Sewershed:	Midland
CSO:	060/077
Capture Area:	1,918,715 sq. ft. (total, all areas)
Runoff Reduction:	14,460,000 gal/year (total)
Year Contracted:	2017/2018
Cost:	$3,369,600 (estimated total)
Contractors:	D.E. Tarolli and J&J Landscaping

Project Description: The Green Streets in CSO 060/077 Sewershed projects are comprehensive green street applications located on multiple streets within the CSO 060/077 sewershed. CSO 060/077 is a high priority sewershed that discharges frequently during rain events. The candidate streets are listed below with capture area and runoff reduction estimates:

- Lancaster Avenue (Spring 2017)
  Capture Area: 560,489 sq. ft.
  Runoff Reduction: 3,290,000 gal/yr
  Completed Project Cost: $880,980
- Ackerman Avenue (Summer 2017)
  Capture Area: 387,245 sq. ft.
  Runoff Reduction: 3,450,000 gal/yr
  Completed Project Cost: $655,860
- McKinley Avenue (Summer 2017)
  Capture Area: 123,709 sq. ft.
  Runoff Reduction: 1,370,000 gal/yr
  Completed Project Cost: $202,760
- Roney Lane (Spring 2018)
  Capture Area: 187,778 sq. ft.
  Runoff Reduction: 760,000 gal/yr
  Project Cost: $430,000 (Estimated)
- Comstock Avenue (Spring 2018)
  Capture Area: 659,494 sq. ft.
  Runoff Reduction: 5,590,000 gal/yr
  Project Cost: $1,200,000 (Estimated)

In 2018, the remaining 2 streets identified above will proceed to construction. Each design is intended to demonstrate green infrastructure applications at key points along these streets in order to capture stormwater and enhance local urban streetscapes.

Each project is proposed to incorporate street tree plantings in the right-of-way, the installation of infiltration trenches underneath the roadway, tree planters, and rain gardens and bioretention areas throughout the project boundaries.



Underground Roadway Infiltration Trench

Save the Rain

During Construction →
Project Completion

McKinley Avenue
Roadway Infiltration Trench

Lancaster Avenue Vegetated Infiltration Swale

Ackerman Avenue Vegetated Infiltration Swale

Save the Rain

FACT SHEET
Green Streets in Harbor Brook Sewershed

Project:	Green Streets in Harbor Brook
Property Owner:	City of Syracuse
GI Technologies:	Rain Gardens, Infiltration Trenches
Project Locations:	Lakeview Ave. between W. Genesee St. & Apple Street; Magnolia St. between W. Fayette St. & W. Marcellus St.; S. Wilbur Ave. between Conservation Pl. & W. Marcellus St.; Richmond Ave. between Liberty St. & N. Geddes St.; W. Genesee St. between Eureka St. & N. Geddes St.
Sewershed:	Harbor Brook
CSOs:	005, 006, 007, 009
Capture Area:	197,116 sq. ft. (total, all areas)
Runoff Reduction:	4,851,494 gal/year (total)
Year Contracted:	Estimated 2018
Bid Price:	TBD
Contractors:	D.E. Tarolli and J&J Landscaping

Project Description: The Green Streets in Harbor Brook Sewershed projects are comprehensive green street applications located on multiple streets within the Harbor Brook sewershed. CSOs 005, 006, 007 and 009 are high priority sewersheds that discharge frequently during rain events. The candidate streets are listed below with capture area and runoff reduction estimates:

- Lakeview Avenue (CSO 006)
  Capture Area: 37,448 sq. ft.
  Runoff Reduction: 661,174 gal/yr
- Magnolia Street (CSO 009)
  Capture Area: 61,315 sq. ft.
  Runoff Reduction: 1,082,565 gal/yr
- South Wilbur Avenue (CSO 009)
  Capture Area: 19,901 sq. ft.
  Runoff Reduction: 351,368 gal/yr
- Richmond Avenue (CSO 007)
  Capture Area: 41,318 sq. ft.
  Runoff Reduction: 729,502 gal/yr
- West Genesee Street (CSO 005)
  Capture Area: 114,800 sq. ft.
  Runoff Reduction: 2,026,885 gal/yr

This proposed project will incorporate infiltration trenches, rain gardens (also known as bioretention), and tree planting to manage stormwater from Lakeview Avenue, Magnolia Avenue, S. Wilbur Avenue, Richmond Avenue and West Genesee Street.

Infiltration trenches capture water in an underground stone trench located beneath a roadway. From there, it slowly infiltrates to groundwater. A rain garden is a depressed, vegetated area that receives stormwater runoff from adjacent paved areas. The runoff then infiltrates to groundwater or is released to the atmosphere through evapotranspiration.

When complete, these green streets will capture a total of 4,851,494 gallons of stormwater annually.

Project Locations Map (Google Maps)

Examples of a rain garden and an infiltration trench

FACT SHEET
Green Park:
McKinley Park

Project:	McKinley Park
Project Owner:	City of Syracuse Parks Department
Project Location:	West Newell Street, West Calthrop, and West Pleasant Avenues.
Sewershed:	Midland
CSO:	067
GI Technologies:	Bioretention, Infiltration, and Porous Pavement
Capture Area:	51,800 sq. ft. (estimated)
Runoff Reduction:	945,000 gal/yr (estimated)
Year Contracted:	2017
Cost:	$690,000
Prime Contractor:	D.E. Tarolli and J&J Landscaping

Project Description: The McKinley Park Project is one of many projects accomplished through the collaborative efforts of Onondaga County Save the Rain and the City of Syracuse Parks and Recreation Department. As a neighborhood park, McKinley Park has served the recreational needs of the community since 1920. The primary goal of the project is to reduce the volume of stormwater that flows into the combined sewer system along West Newell Street, West Calthrop Avenue, and West Pleasant Avenue – all within the CSO 067 area. This project implements various green infrastructure technologies, including bioretention (also known as rain gardens) and porous pavement with an underground infiltration system. This infrastructure will capture runoff from the park and surrounding areas, totaling 51,000 square feet of drainage area. Stormwater will slowly soak into the ground or evaporate, eliminating excess runoff into the sewer system and improving the overall stormwater management and drainage in this area.

A secondary goal of this project is to enhance McKinley Park by increasing green space and improving the basketball court. Existing pavement formerly used as a tennis court was removed entirely and replaced with open green space. Additionally, the former basketball half court was replaced with a full-sized porous pavement basketball court in partnership with the Jim and Juli Boeheim Foundation's Courts4Kids Program. Court construction was completed in the summer of 2017. Phase 2 construction of the remaining improvements is scheduled to start in spring of 2018 with completion in early summer of 2018. When the project is complete, an estimated 945,000 gallons of stormwater runoff per year will be removed from the combined sewer in the CSO 067 area.

Courts 4 Kids Porous Pavement Basketball Court Ribbon Cutting

Rendering of Bioretention Area Along W. Newell Street, Scheduled for 2018 Construction

GREEN IMPROVEMENT FUND

Green Improvement Fund (GIF) Projects Update:

During the first quarter of 2018, five of the new GIF applications that were received at the end of the 2017 GIF application period were reviewed by the GIF Committee, and award amounts were approved.

An additional two project applications received in 2017 are still under technical review and are expected to advance to design and construction in 2018. Construction of previously approved projects continued, and one project, Mill Pond Landing, reached completion during the first quarter. Construction of several other GIF projects is anticipated later in 2018.

Green Improvement Fund Summary (as of 03/31/18)

Projects Completed	94
Contract/Implementation Phase	17
Projects in Award Phase	5
Applications Under Review	2
Inactive/Ineligible	53
Total Applications Received	**171**

Save The Rain Clean The Lake
Joanne M. Mahoney
County Executive

FACT SHEET
Green Improvement Fund
Mill Pond Landing (MPL Armory)

Project:	Mill Pond Landing (MPL Armory)
Project Owner:	Private
Project Location:	329 West Fayette Street
Sewershed:	Clinton/Lower MIS
CSO:	029
GI Technology:	Cisterns
Capture Area:	9,036 sq. ft.
Runoff Reduction:	130,425 gal/yr
Year Contracted:	2017
GIF Award:	$48,000

Project Description: The Mill Pond Landing green infrastructure project, located at 329 West Street in Armory Square, was completed in 2018. The GIF project consisted of the installation of 48 200 to 250 gallon cisterns in the basement of the building totaling 10,000 gallons of stormwater storage for runoff from the building roof.

The captured water will be used for irrigation of on-site green features, and any excess water is allowed to slowly drain back to the combined sewer system after peak flows in the sewer have passed, following rainy days or snow melting. This type of "capture and slow release" technology has been used in several other green infrastructure projects at locations where infiltration into the ground is not practical or feasible.

Each of the cisterns is hydraulically connected, creating a large storage network for rainfall capture. The "first flush" of rainwater from the roof, typically the dirtiest portion of the runoff, is allowed to proceed to the combined sewer system before a diversion valve opens allowing the runoff to collect within the cisterns.

In total, runoff from 9,036 square feet of impervious area is managed by the installed green infrastructure in this project, equating to approximately 130,425 gallons of stormwater runoff capture annually in high priority CSO 029.

Photos of the installed cisterns

Save the Rain

METRO WWTP PHOSPHORUS PROJECTS/TMDL/AMBIENT MONITORING PROGRAM UPDATE

ACJ Quarterly Status Report – 1st Quarter 2018

Metro WWTP Projects

METRO OPTIMIZATION PROJECT

Construction began on the Metro Optimization project in October 2017. The plant is providing full secondary treatment while the improvements are made to the tertiary system. Full treatment will resume by April 2018 while construction will be proceeding in areas not requiring a tertiary treatment shut-down. Construction has been focused on improvements to provide chemical feed for poly-aluminum chloride and construction of the channel divider wall to allow isolation of the biological aerator filter (BAF) treatment system.

Ambient Monitoring Program (AMP)

2017 Tributary Fecal Coliform Compliance Assessment

Compliance with the AWQS for fecal coliform bacteria is specified by NYSDEC as the geometric mean of a minimum of five observations per month being less than or equal to 200 colony forming units (cfu) per 100 milliliters (mL). The abundance of fecal coliform bacteria in the tributaries during wet weather is affected by stormwater runoff and functioning of the combined sewer system. CSO remedial measures and improved stormwater management measures are underway. Table 1 summarizes the 2017 fecal coliform compliance with the AWQS for the CSO and non-CSO affected tributaries. Onondaga Creek sampling results indicate non-compliance at in-stream sampling locations upstream of CSO discharges (29%). Results for the non-CSO tributaries indicate other potential contributing sources of fecal coliform including failing septic systems, domestic and wild animal waste, and storm water runoff.

Table 1: 2017 Tributary Fecal Coliform Compliance Summary

Sampling Location	Percentage of months in compliance with the fecal coliform bacteria
Onondaga Creek (at Dorwin Avenue)	71%
Onondaga Creek (at Kirkpatrick Street)	29%
Harbor Brook (at Hiawatha Boulevard)	0%
Harbor Brook (at Velasko Road)	57%
Ley Creek at Park Street	25%
Ninemile Creek at Route 48	57%
Bloody Brook	71%
Sawmill Creek	29%

Tributary Bacteria Compliance Summary (First Quarter 2018)

Fecal Coliform compliance was not assessed for the months of November 2017 - January 2018. As per the AMP 2017 Work Plan, five (5) Fecal Coliform samples per month at the AMP Tributary sampling sites are limited during the April to October disinfection period.

Tributary Water Quality Compliance Status

The County's obligation for the ACJ Fourth Stipulation is to achieve compliance with the CSO Stage IV Compliance Schedule for volume limitation. This schedule requires capture for treatment or elimination, within the meaning of EPA's National CSO Control Policy, of no less than 95.0 percent by volume, on a system-wide annual average basis, of the combined sewage generated during precipitation events. The annual capture percentage under 2017 system conditions exceeds the 95.0 percent final capture milestone mandated for 2018.

The second key metric of success for infrastructure improvements, as specified in the ACJ Fourth Stipulation, is compliance with water quality standards in the CSO impacted tributaries for one full year. In light of the upcoming final compliance deadline for the Fourth Stipulation of the ACJ, the County has begun to plan out the path forward to meet the requirements of the ACJ and to implement additional CSO control and water quality improvement measures after the ACJ. The County's PCCM data collected during 2015 through 2017 indicate that despite completion of most ACJ abatement projects, CSOs continue to contribute to elevated FCOLI and exceedances of AWQS in Onondaga Creek and Harbor Brook during wet weather.

The following is a summary of the meetings and discussions of the ACJ Parties regarding the challenge of meeting AWQS in urban streams which is being recognized by CSO communities within New York State and across the country.

- **On January 25, 2017, a Water Quality Compliance Conference was convened by Atlantic States Legal Foundation (ASLF) in response to the following directive in Appendix I of the ACJ Fourth Stipulation**
  "ASLF will assist the County in organizing and convening a conference of experts focusing on water quality assessment and compliance pursuant to the National CSO Policy 59 F.R. 16888, (1994) with the goal of developing scientific and policy recommendations with respect to compliance oriented water quality monitoring, and the formulation of wet weather standards that take into consideration both CSO and non-CSO related conditions, including structural and safety related use constraints."

  The conference was attended by staff from the USEPA Headquarters, NYSDEC Central and Regional offices, ASLF, Onondaga County and members of the County's Onondaga Lake Technical Advisory Committee. The conference provided an opportunity for attendees to learn about progress in other CSO communities and their strategies for managing their CSOs for achieving future compliance with AWQS for bacteria. It is clear that meeting the goals of the Clean Water Act (CWA) and achieving compliance with bacteria standards in urban streams will remain a national water quality challenge into the foreseeable future.

- **A follow-up "Variance Approach Discussion and Next Steps Planning" meeting was held on July 17, 2017, with attendance by staff from NYSDEC Regional Office, ASLF, USEPA Headquarters and Onondaga County.**
  The discussion focused on the variance approach and next steps. As suggested by ASLF, three sub-committees were formed and include representatives from ASLF, NYSDEC and Onondaga County.

  The roles and responsibilities of the three sub-committees are defined as follows:
  - Technical sub-committee to identify data needs, create and implement plan to fulfill needs relating to the Long-term Control Plan (LTCP).

- Legal sub-committee to plan how to transition from the ACJ to the SPDES Permit.
- Outreach sub-committee to create and implement plan for meaningful public participation in the County's LTCP.

- **Two (2) meetings of the Technical Sub-committee were held on September 8, 2017, and February 21, 2018.**
  The sub-committee reviewed results to-date of the PCCM and the "Recovery Time Monitoring (RTM)" event results for OC and HB. The RTM data are intended to inform the Variance Approach, based on indications from NYSDEC at the January 2017 Water Quality Compliance Conference that the Albany Pool CSO community is considering this approach. During the February 21, 2018, sub-committee meeting, NYSDEC noted that the Albany CSO Pool is no longer looking to pursue the Variance Approach, as there was no consensus on proceeding with this approach with the parties involved. A framework has yet to be established to transition to either the SPDES Permit or a State Consent Order. The sub-committees will continue to collaborate on technical, legal, and regulatory solutions in 2018.

Tributary Sampling Event Summary (First Quarter 2018)

January 2018:
- Tributary Biweekly sampling event: January 9
- Tributary Biweekly with High Flow event: January 24

February 2018:
- Tributary Biweekly sampling event: February 6
- Tributary Biweekly with High Flow sampling event: February 28

March 2018:
- Tributary Quarterly sampling event: March 6
- Tributary Biweekly sampling event: March 20

BIOLOGICAL MONITORING PROGRAM (January - March 2018)

Sampling Summary (January)
- Sorting of 2017 Onondaga Lake Macroinvertebrate samples.

Sampling Summary (February)
- Continued sorting 2017 Onondaga Lake Macroinvertebrate samples.

Sampling Summary (March)
- Continued sorting 2017 Onondaga Lake Macroinvertebrate samples.

Macroinvertebrates

Since 2000, Onondaga County has sampled the macroinvertebrate communities of Onondaga Lake. Macroinvertebrates are an important component of the aquatic food web. Because they have limited migration patterns or a sessile mode of life, they are well suited for assessing site-specific impacts of point and nonpoint discharges. Many state agencies, including the NYSDEC, use macroinvertebrate community structure as an indicator of the biological health of surface waters.

Freshwater macroinvertebrate taxa include aquatic insects (Insecta), worms (Oligochaeta), snails (Gastropoda), clams (Bivalvia), leeches (Hirudinea), and crustaceans (Crustacea). These organisms provide the link in the food web between microscopic organisms and fish, and facilitate the transfer of energy and materials between the terrestrial and aquatic ecosystems. There are important differences among groups of macroinvertebrates that influence the structure and function of a particular community. Difference in tolerance to environmental conditions is the basis for using these organisms as biological indicators of environmental quality. The biological community integrates the effects of different pollutant stressors and thus provides a holistic measure of their aggregate effect.

One important difference between groups of macroinvertebrates is their tolerance to organic (oxygen-demanding) wastes. Macroinvertebrates can be grouped into three broad categories: Intolerant, moderately tolerant, and tolerant to this class of pollutant. The intolerant group includes species of mayflies, stoneflies, caddisflies, riffle beetles, and hellgrammites; the tolerant group includes worms, some midges, leeches, and some snails. The moderately tolerant group includes most snails, sowbugs, scuds, blackflies, craneflies, fingernail clams, dragonflies, and some midges.

Results of the 16-year tributary macroinvertebrate monitoring program indicate varying degrees of improvement in macroinvertebrate community measures in the monitored portions of the watershed (Figure 1). Although the most upstream site on Onondaga Creek (Tully Farms Road) has shown a recent decline (i.e., increased adverse impact), the mid-reach sites (Webster Road and Dorwin Avenue) have been generally stable (slightly impacted). The most downstream site (Spencer Street) has shown notable recent improvement (from moderately impacted to slightly impacted). The improvement in the macroinvertebrate community at the Spencer Street site from 2010 to 2015 is likely a response to the reduced organic load to the stream once the Clinton storage facility came on line in December 2013 (Figure 1).

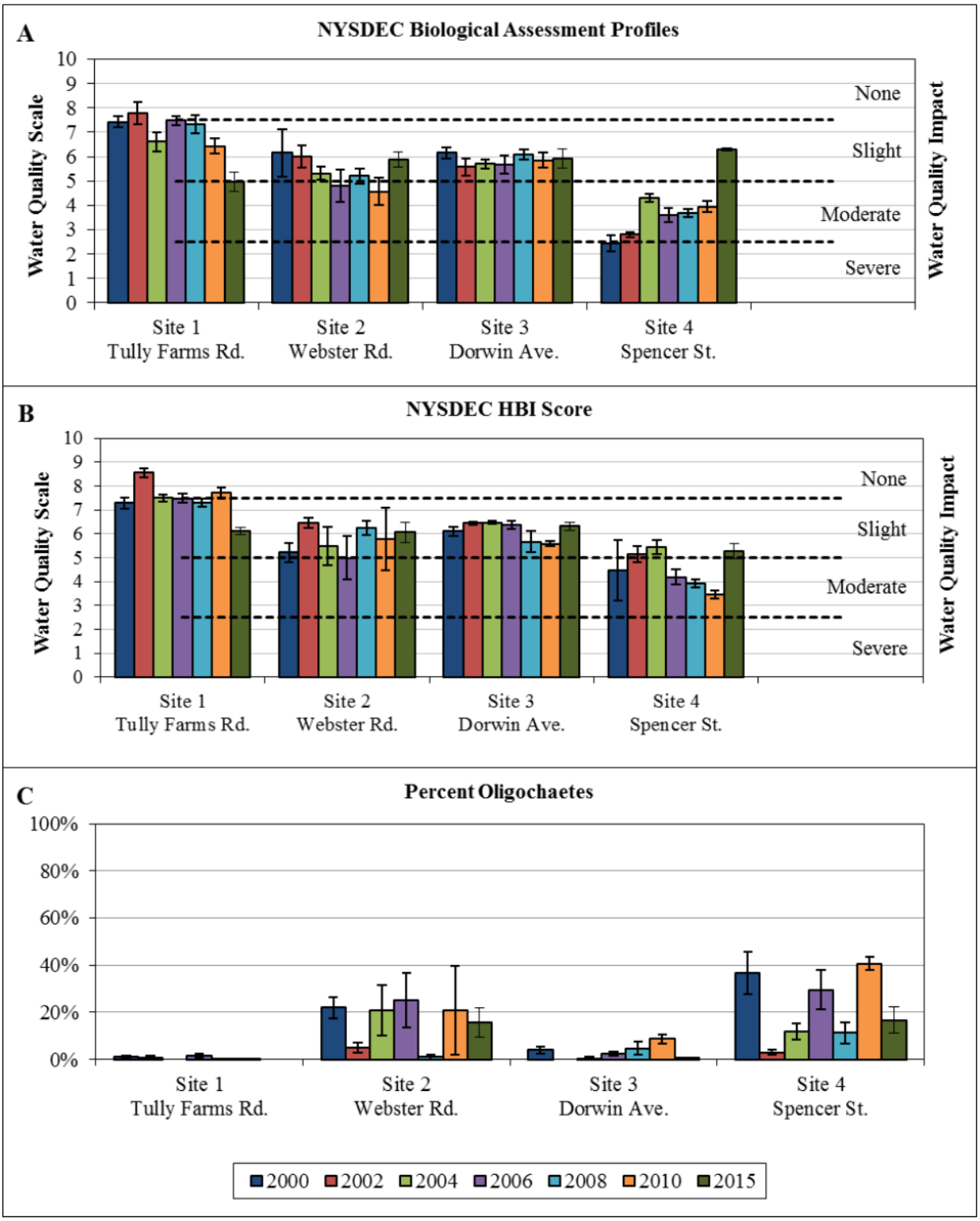


Figure 1. NYSDEC water quality scale scores (A), NYSDEC HBI scores (B), and percent oligochaetes (C) of sites in Onondaga Creek collected since 2000. Error bars are standard error.

WEP Technician collecting macroinvertebrates with a kick screen in Onondaga Creek at Tully Farms Road

Stonefly collected from Onondaga Creek at Tully Farms Road

Onondaga LAKE WATER QUALITY MONITORING

Onondaga Lake Quarterly Sampling Event Summary

No lake sampling events were conducted during the winter months from January through March 2018. The AMP has been tracking the development and extent of ice cover on Onondaga Lake since the winter of 1987 (refer to Figure 2). Observations for the winter of 2017-2018 indicate ice cover was first observed on December 14, 2017, and last observed on February 23, 2018. Routine lake sampling will resume in April.

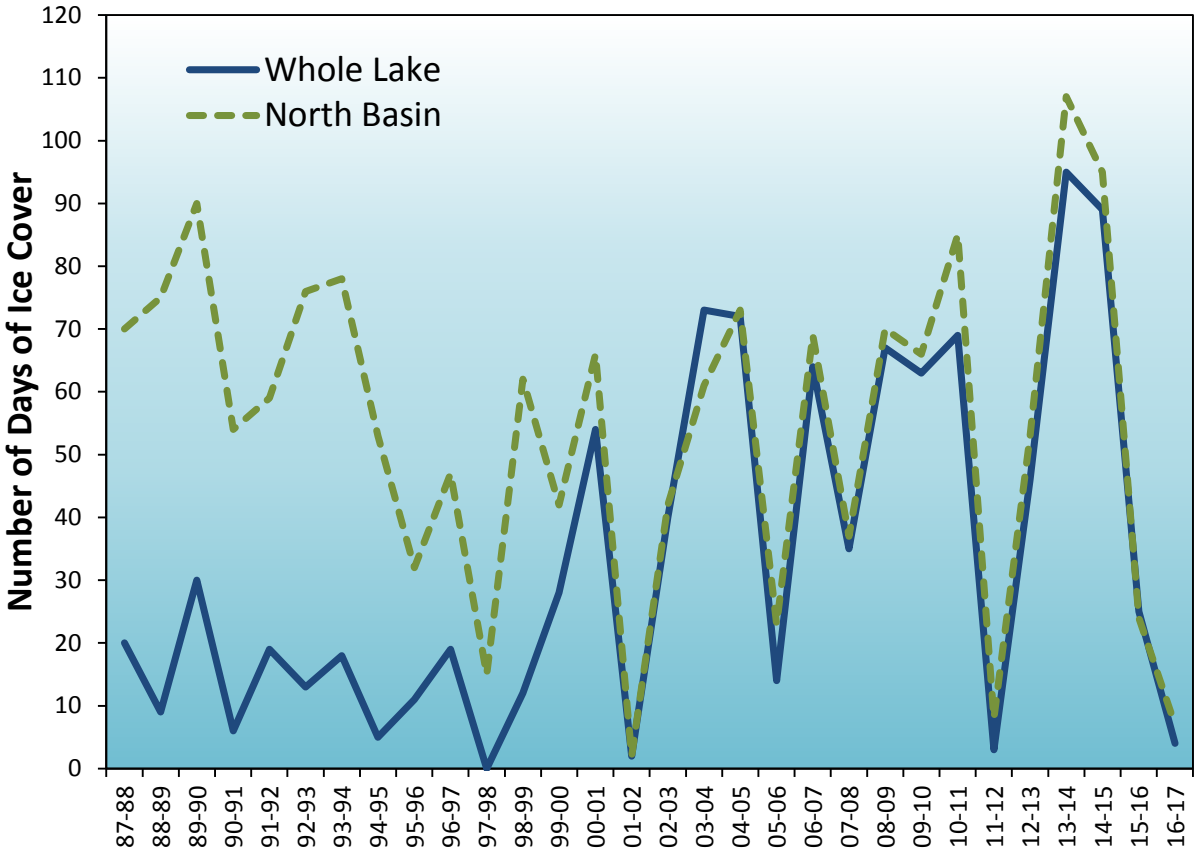


Figure 2: Approximate Number of Days of Full Ice Cover on Onondaga Lake (Whole Lake and North Basin) 1987-2018

LEGISLATIVE/REGULATORY/ MEDIA UPDATE

Legislative/Regulatory Update

Action Items for the County Legislature (January – March)

- Authorizing the Execution of Grant Agreements to Accept Grant Funding from NYS EFC in Connection with South Salina Street Green Corridor Project ($1,310,000).

- Authorizing the Execution of Grant Agreements to Accept Grant Funding from NYS EFC in Connection with the Development of a Meadowbrook-Limestone Inflow and Infiltration Reduction Facility Plan ($50,000).

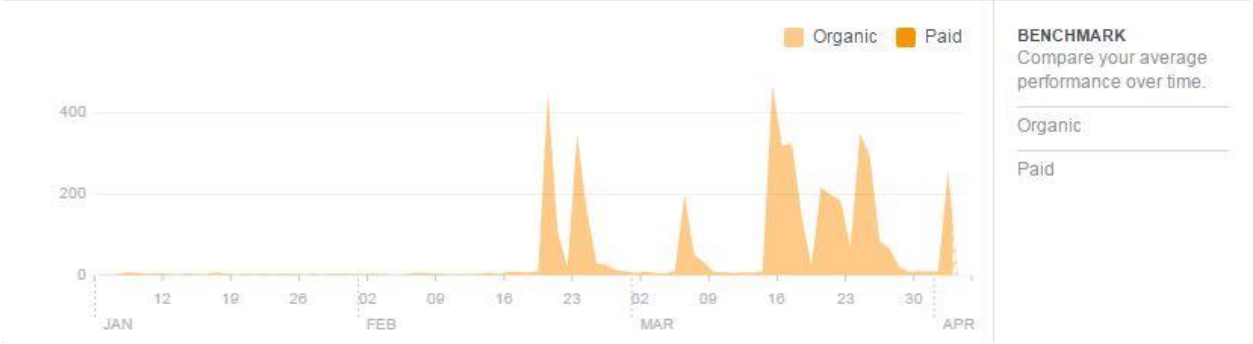
Action Items for the Environmental Protection Committee (March)

- None to Report.

Save the Rain Facebook Analytics for Q1 2018

Total Reach

The number of people who had any content from your Page or about your Page enter their screen.

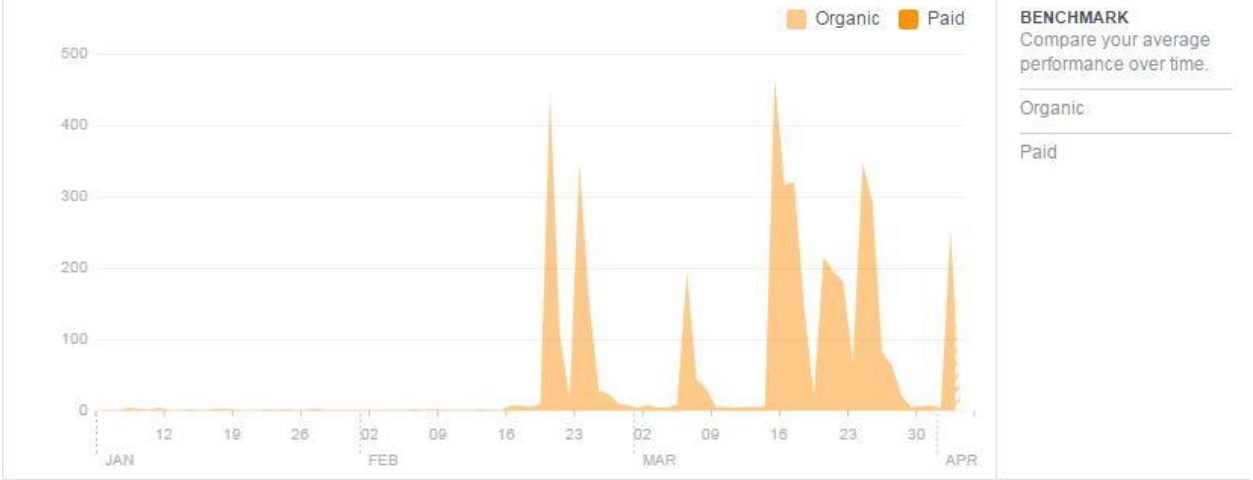


Reactions, Comments, Shares, and More

These actions will help you reach more people.

Post Reach

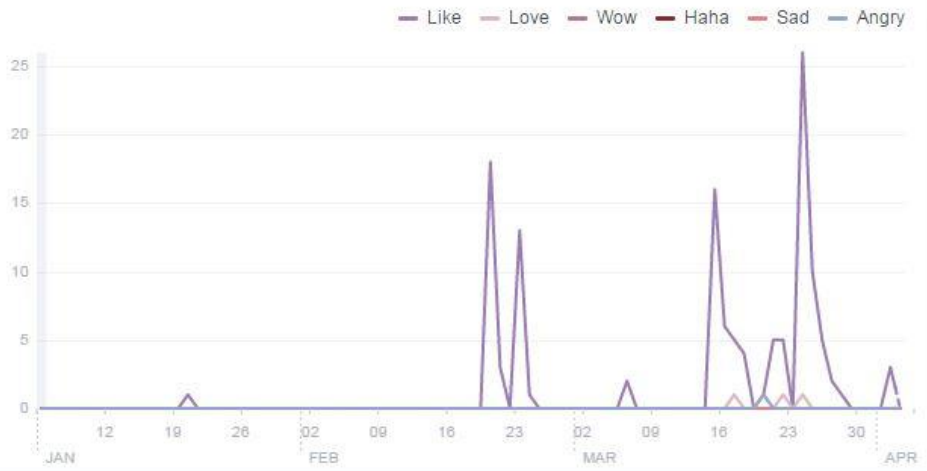
The number of people who had any posts from your Page enter their screen.



Save the Rain Facebook Analytics for Q1 2018

Reactions

Likes and other ways people react to your Page posts.



BENCHMARK
Compare your average performance over time.

- Like
- Love
- Wow
- Haha
- Sad
- Angry

Post Details

Onondaga County Save the Rain added 4 new photos.
Published by Madison Quinn [?] · March 24 at 10:01pm ·

Syracuse Crunch WIN!!! We had a great time at the game tonight with Onondaga Earth Corps & Ronny the Raindrop, talking to #SyrCrunch fans about #SaveTheRain

Get More Likes, Comments and Shares
When you boost this post, you'll show it to more people.

499 people reached **Boost Post**

Performance for Your Post

499 People Reached

15 Likes, Comments & Shares

14 Likes	14 On Post	0 On Shares
0 Comments	0 On Post	0 On Shares
1 Shares	1 On Post	0 On Shares

26 Post Clicks

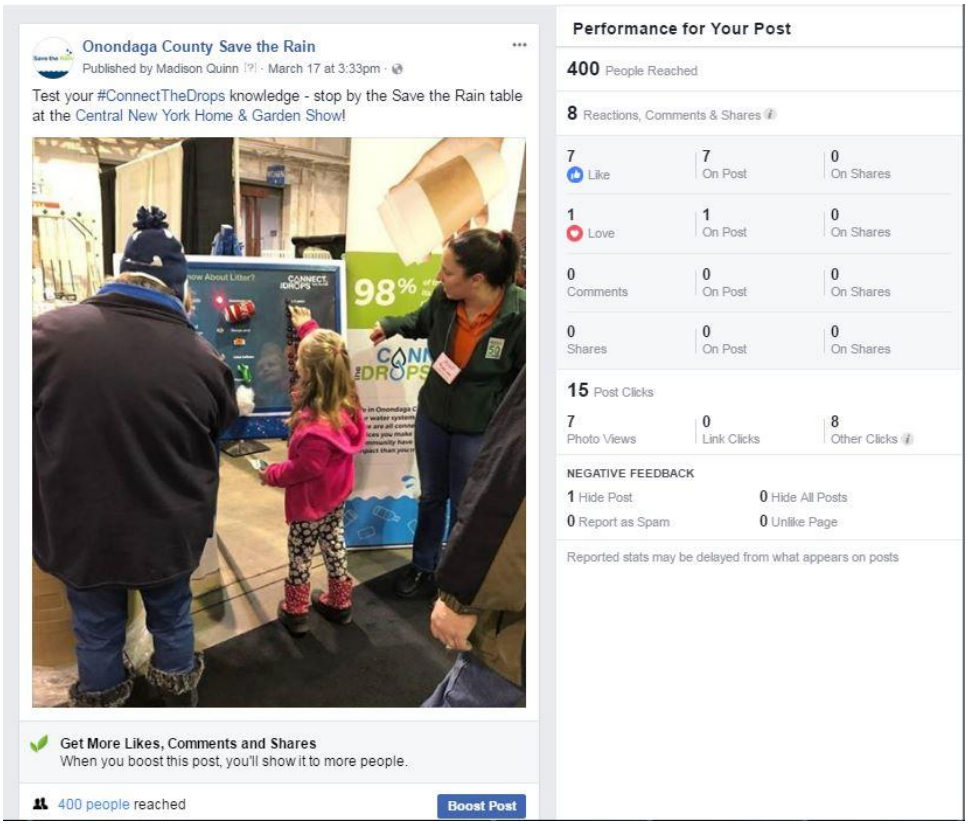
12 Photo Views	0 Link Clicks	14 Other Clicks

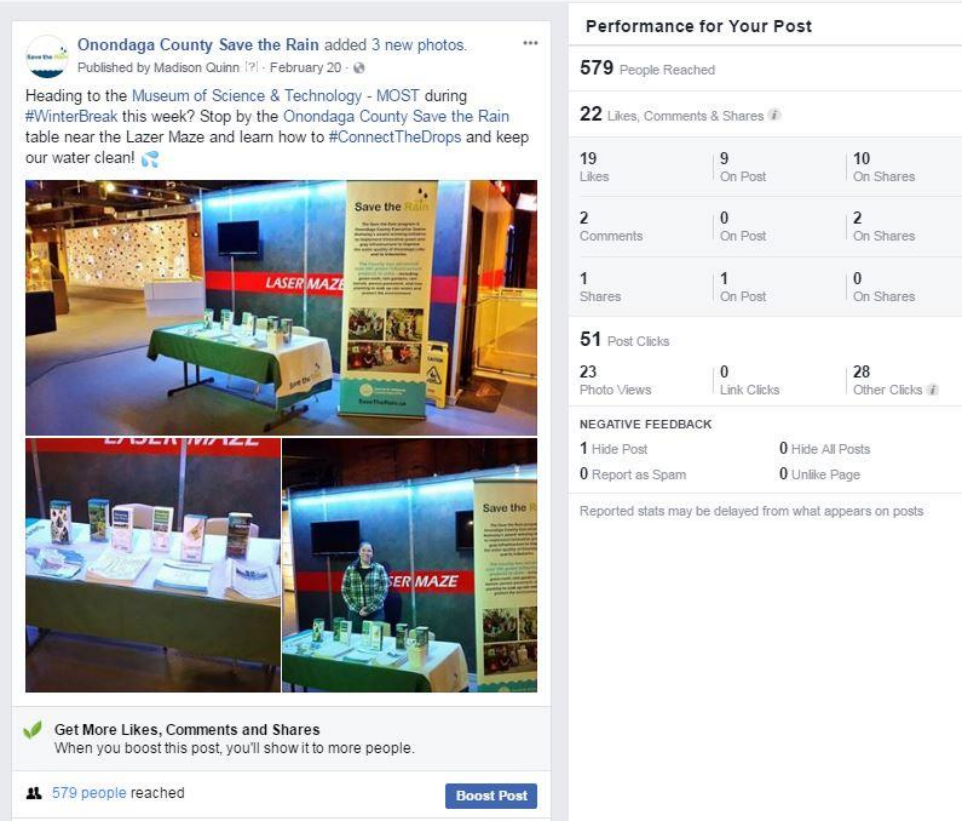
NEGATIVE FEEDBACK

1 Hide Post	0 Hide All Posts
0 Report as Spam	0 Unlike Page

Reported stats may be delayed from what appears on posts

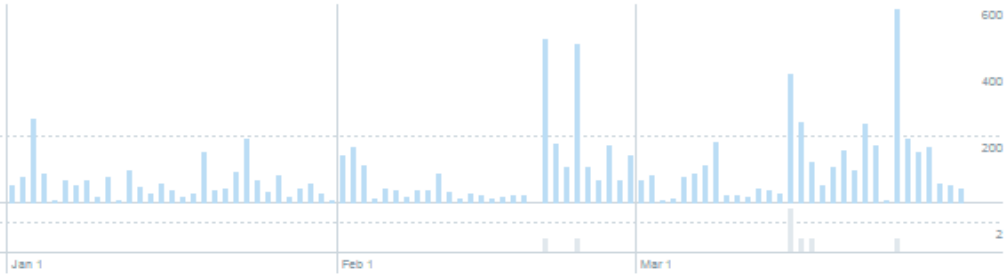
Save the Rain Facebook Analytics for Q1 2018





@SavetheRainUS Twitter Analytics for Q1 2018

Your Tweets earned **8.3K impressions** over this **90 day** period



YOUR TWEETS
During this 90 day period, you earned **92 impressions** per day.

Tweets | Top Tweets | Tweets and replies | Promoted

	Impressions	Engagements	Engagement rate
Save the Rain @SaveTheRainUS · Mar 24 Congrats @SyracuseCrunch on your win tonight! We had a great time at the game with @OnonEarthCorps, talking about #SaveTheRain with #SyrCrunch fans! twitter.com/SyracuseCrunch… View Tweet activity	371	7	1.9%
Save the Rain @SaveTheRainUS · Mar 17 Test your #ConnectTheDrops knowledge - stop by the Save the Rain table and take our quiz at the @HomeBuildersCNY Home & Garden Show! pic.twitter.com/HxVHhZvDCz View Tweet activity	198	3	1.5%
Save the Rain @SaveTheRainUS · Mar 16 And the winner of our daily #rainbarrel raffle is... Mike Clough!Congratulations, Mike You could be the next winner - stop by the Save the Rain booth at the @HomeBuildersCNY Home & Garden Show Saturday or Sunday! pic.twitter.com/5yBcIJ7IpM View Tweet activity	193	1	0.5%
Save the Rain @SaveTheRainUS · Mar 15 Congratulations to Lori Newcomb, the winner of today's Rain Barrel Raffle at the @HomeBuildersCNY Home and Garden show! View Tweet activity	148	0	0.0%
Save the Rain @SaveTheRainUS · Mar 15 Visit the @SaveTheRainUS table at the @HomeBuildersCNY Home & Garden Show and enter to win a free #rainbarrel We're drawing a winner every day of the show! pic.twitter.com/RzhjFta5tw View Tweet activity	199	5	2.5%
Save the Rain @SaveTheRainUS · Mar 15 Save the Rain is ready for the @HomeBuildersCNY Home and Garden Show at the @NYSFair - tonight through Sunday. Visit our booth & learn how you can #ConnectTheDrops to keep our water clean! pic.twitter.com/LtdxCGXHMs View Tweet activity	326	6	1.8%
Save the Rain @SaveTheRainUS · Feb 23 It's a great day at the @MOSTSyracuse! Stop by the @SaveTheRainUS table to test your #ConnectTheDrops knowledge and learn how you can keep litter out of our water pic.twitter.com/j7tOKvnRHx View Tweet activity	797	13	1.6%
Save the Rain @SaveTheRainUS · Feb 20 Heading to the @MOSTSyracuse during #WinterBreak this week? Stop by the @SaveTheRainUS table near the Lazer Maze and learn how to #ConnectTheDrops and keep our water clean! pic.twitter.com/Kj0LPGqKgM View Tweet activity	1,007	20	2.0%

You've reached the end of Tweets for the selected date range. Change date selection to view more.

Engagements
Showing 90 days with daily frequency

Engagement rate
0.4%
Mar 31
0.0% engagement rate

Link clicks
11
Mar 31
0 link clicks

On average, you earned **0 link clicks** per day

Retweets
6
Mar 31
0 Retweets

On average, you earned **0 Retweets** per day

Likes
20
Mar 31
0 likes

On average, you earned **0 likes** per day

Replies
2
Mar 31
0 replies

On average, you earned **0 replies** per day

Onondaga County Save the Rain: GI Project Development and Implementation; Taking Concept to Reality

Save the Rain

Onondaga County Executive Joanne M. Mahoney

Zachary Monge, P.E.

NYWEA 90th Annual Meeting and Exhibition
February 7, 2018

JACOBS ch2m

www.jacobs.com | worldwide

Onondaga County Save the Rain

- Onondaga County under an Amended Consent Judgment (ACJ) with the US EPA to reduce CSOs tributary to Onondaga Lake
- Program initiated by County Executive Joanne Mahoney in 2009
- Program goals are to improve the water quality of Onondaga Lake and its tributaries by 2018 by reducing CSOs via gray and green infrastructure (GI)
  - Requirement: 95% CSO Capture compared to 1991 base conditions by Gray and Green infrastructure by 12/31/2018
  - Status: As of 12/31/2017, **97.6% capture!**

Save the Rain Program Accomplishments

- 2011 EPA Green Infrastructure Partner Community
- 2013 U.S. Water Prize Winner
- NYS Environmental Excellence Award Winner
- Landmark Green Improvement Fund (GIF) Program for funding the inclusion of GI in private development/redevelopment projects
- Several GI project awards:
  - APWA Environmental Project of the Year
  - Stormwater Solutions Magazine Project of the Year
  - American Academy of Environmental Engineers Honor Award

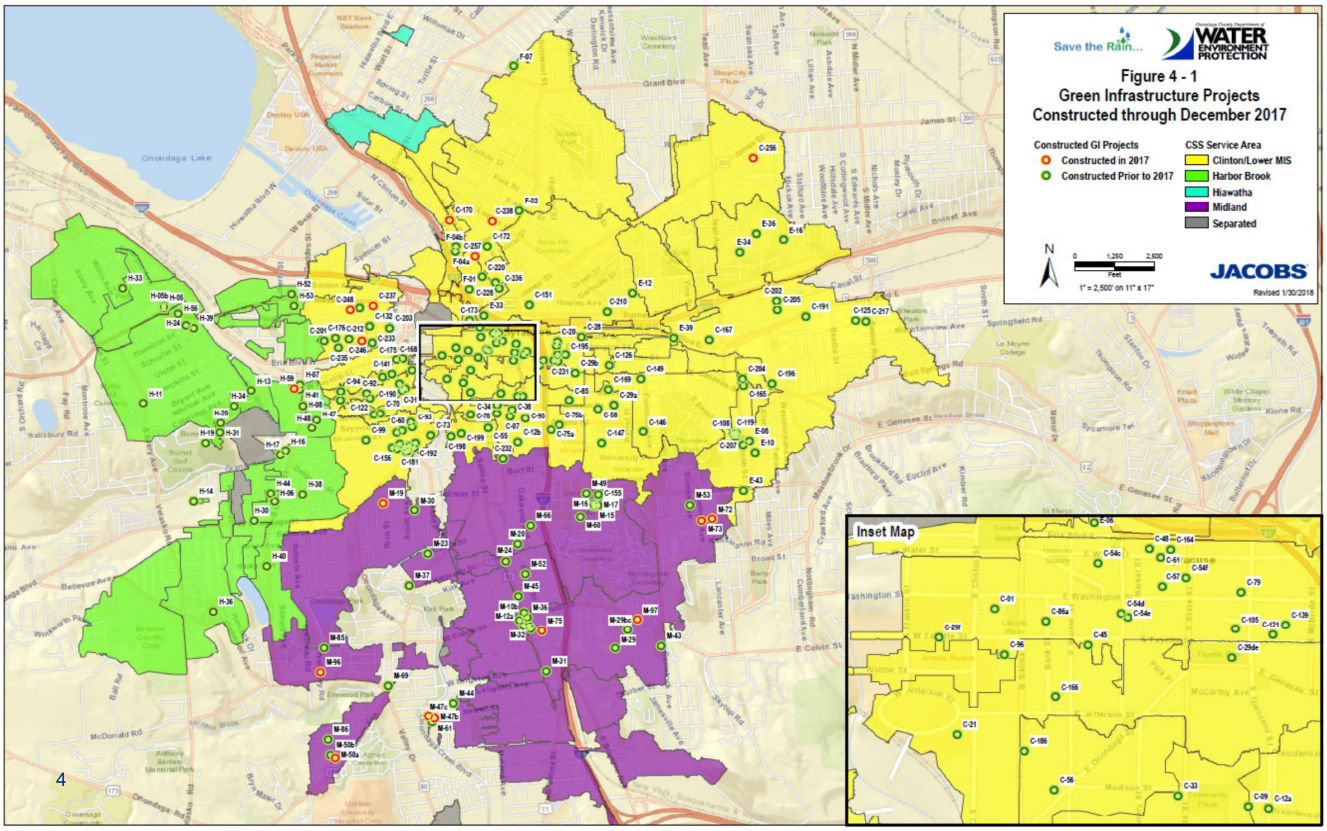
Onondaga County Executive Joanne M. Mahoney

Save the Rain
www.savetherain.us

JACOBS ch2m

Save the Rain GI Project Map

206 projects completed and 150+ MG of runoff reduction



So How Do We Plan All These Projects?

2009 - 2013

- Aggressively implement GI – Make a Statement!
  - Demonstrate its effectiveness
    - To regulators
    - To the public
  - Grab the “low hanging fruit”
  - Become a model community for others
  - Project 50!

Onondaga County Executive Joanne M. Mahoney

Save the Rain
www.savetherain.us

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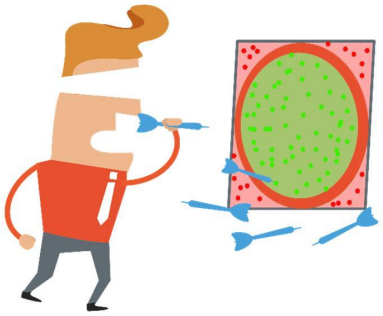
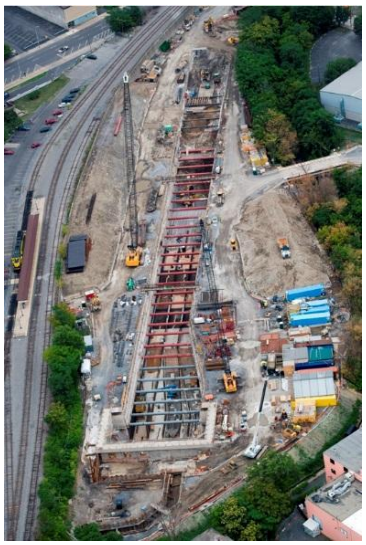
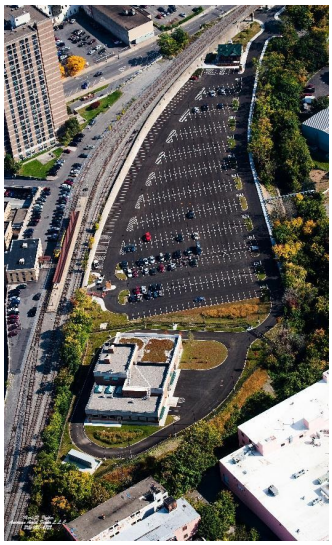
2009 - 2013

- Specific planning mechanisms not yet fully refined
  - System SWMM model in its infancy
  - Several large gray projects under construction
    - Impacts to system as a whole not yet understood
  - Effectiveness of specific GI technologies being tested



Gray Projects





2013/2014 SWMM Model Update

- Three separate models combined into one system-wide model
- Model calibrated with sewer and CSO flow and precipitation data
- Model updated with completed gray and green projects
- Model validated
- Updated results lead to…

CSO Priority Maps

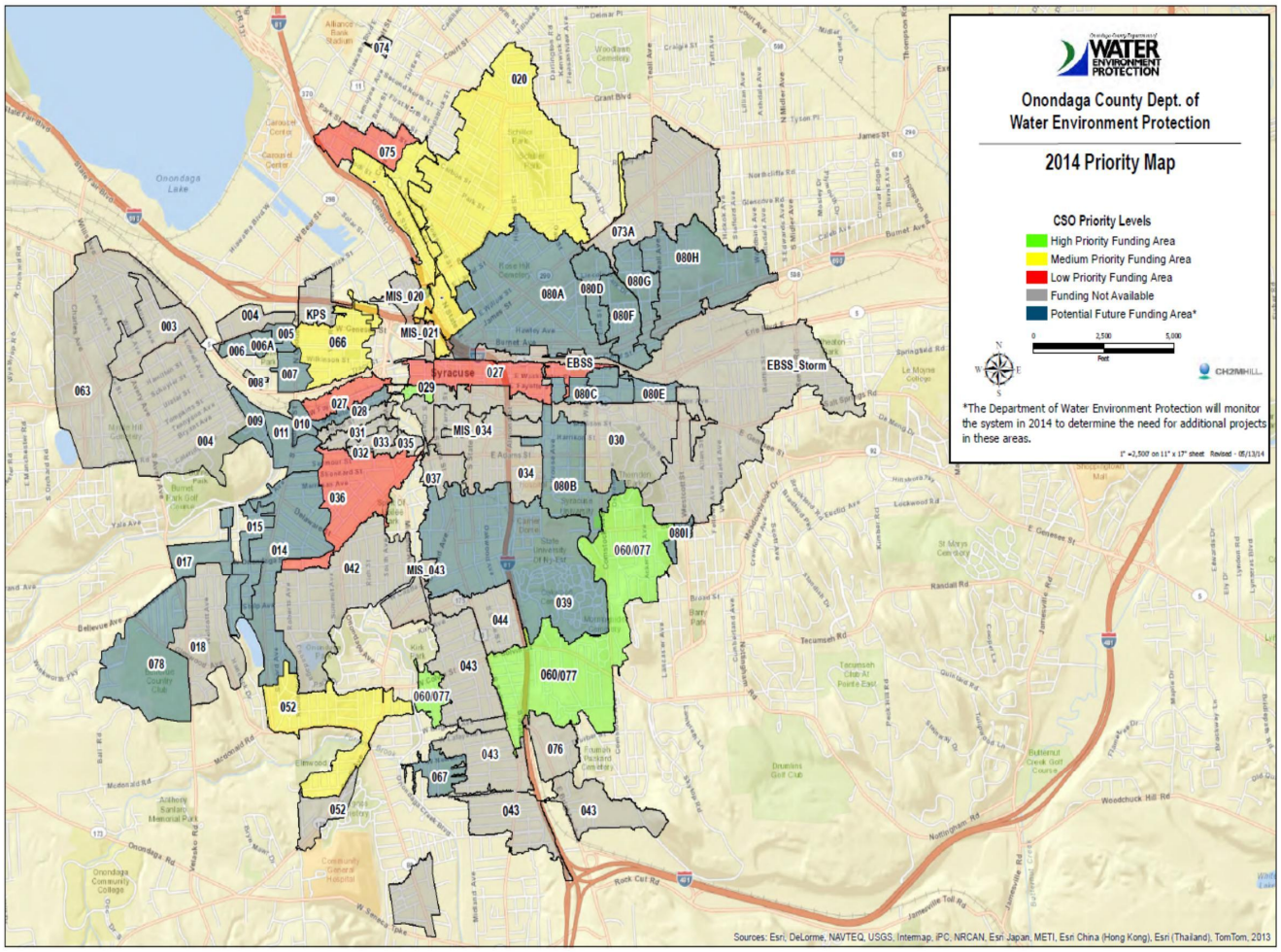
- Based on activation volume/frequency for each CSO
  - Green = High Priority
  - Yellow = Medium Priority
  - Red = Low Priority
  - Gray = Additional GI not needed
  - Blue = TBD (pending budgets, completion of other projects, etc.)

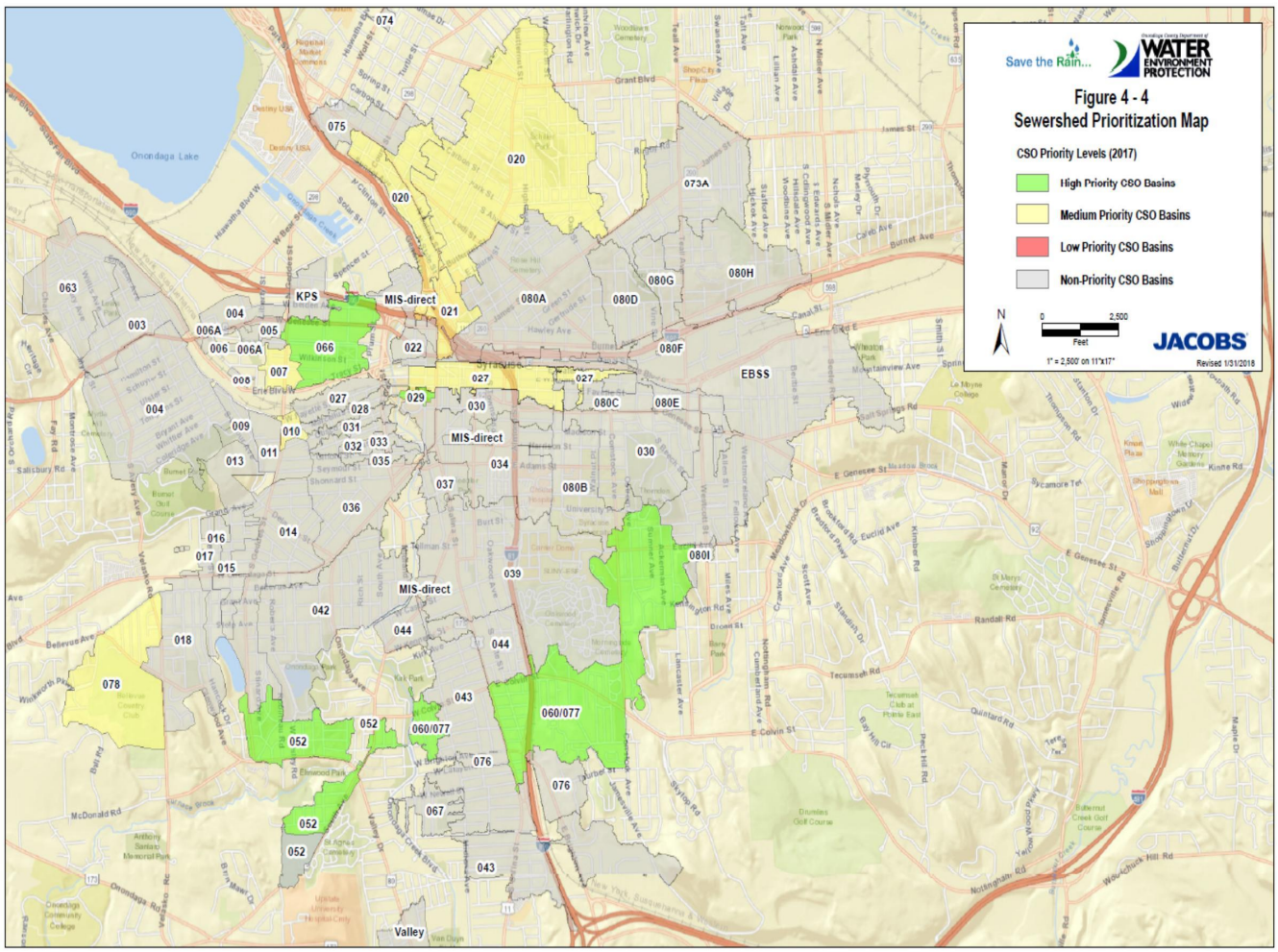
Goal: Reduce CSO discharges to 4-6 events or less in the 1991 typical year

Onondaga County
Executive Joanne M.
Mahoney

Save the Rain
www.savetherain.us

JACOBS ch2m


Onondaga County Dept. of
Water Environment Protection
2014 Priority Map
CSO Priority Levels
High Priority Funding Area
Medium Priority Funding Area
Low Priority Funding Area
Funding Not Available
Potential Future Funding Area*
*The Department of Water Environment Protection will monitor the system in 2014 to determine the need for additional projects in these areas.
Onondaga Lake
Syracuse
KPS
MIS_020
MIS_021
MIS_034
MIS_043
EBSS
EBSS_Storm
Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

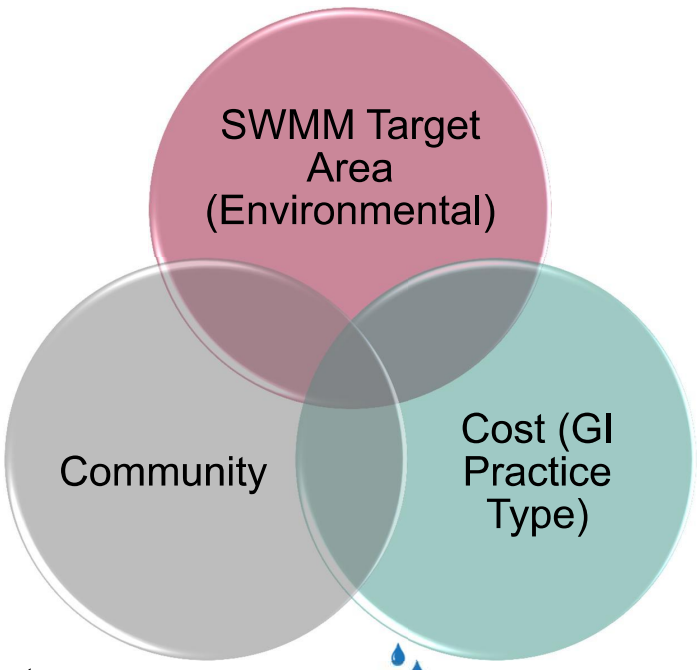

Save the Rain...
Figure 4 - 4
Sewershed Prioritization Map
CSO Priority Levels (2017)
High Priority CSO Basins
Medium Priority CSO Basins
Low Priority CSO Basins
Non-Priority CSO Basins
JACOBS
Revised 1/31/2018
Onondaga Lake
KPS
MIS-direct
EBSS
Valley

Green Planning Committee (GPC)

- 4 Members
  - County Legislature
  - City Planning
  - Community Member
  - CH2M/Jacobs (Program Manager)

- *Goal: Development of stormwater capture and cost effective GI project ideas in high priority CSO areas to shave CSO volume and frequency*

GPC Target – Balancing needs to reduce volume and frequency of CSOs



Project Development Screening Process

1. Strategic Partnership Opportunities
   A. Other projects that enhanced GI measures can be incorporated into
2. Public Spaces (parks, schools, post offices)
3. Green Streets
4. Publicly Owned Vacant Lots
5. Targeted Private Business Project

Maximizing the County's Dollar

Project Type	Average County Construction Cost/Gallon of Stormwater Captured ($/Gallon)
Gray Infrastructure – Storage	$1.41
Green Streets (Excluding Road Reconstruction Projects)	$0.58
Green Parks	$0.42
Green Vacant Lots	$0.47
Road Reconstruction	$0.27
Private – Ground Based	$0.39
Private – Green Roofs	$0.90

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Project Development Screening Process

- CH2M develops an initial list of project candidates using screening process
  - Impervious drainage area
  - Estimated stormwater capture
  - Preliminary GI practice idea
  - Estimated construction costs
  - Street condition rating (for street projects)
  - Pros and cons or other factors to be considered

Target Construction Cost Metric = $0.35/gal stormwater captured

Project Development Screening Process

- CH2M provides project candidates, stormwater capture goal, and construction budget
- Through a collaborative effort, final candidates are selected by the Committee
- Final candidates are submitted to the County for design and eventual construction

P-ID	Candidate Name	Estimated Runoff Reduction (gal)	Estimated CSO Reduction (gal)	GI Idea	Estimated GI Cost	GI Cost/Gal
M-99	S Salina St. between E Colvin St and E Newell St.	6,107,000	2,931,360	Bioretention, Underground Infiltration, Tree Trench	$2,442,800	$0.40
M-100	Elk Street between S Salina St. and Dougall Ave.	1,074,000	515,520	Bioretention	$429,600	$0.40
M-12b	South Salina St. Post Office Parking Lot	858,000	411,840	Porous Pavement	$257,400	$0.30
M-101	Robert Dr. between E Colvin St. and N. Hughes Pl.	1,007,000	483,360	Bioretention, Underground Infiltration	$402,800	$0.40
M-102	Moore Ave. between E Colvin St. and Smith Ln.	1,071,000	514,080	Underground Infiltration	$428,400	$0.40
M-103	Vincent St. between Harriette Ave. and Burten St.	1,905,200	914,496	Underground Infiltration	$476,300	$0.25

Design Review Process to Construction

- County retains design professionals for each project
- 25%, 50%, and 90% designs are reviewed by the County, City, and CH2M
- Green Planning Committee reviews 25% and 90% designs and advises on public outreach strategy
- Construction:
  - Issue to GI Term Construction Contractors
    - No advertisement/bid period
    - Set unit prices
      - Expedites construction turnaround and adds cost efficiencies

Public Education and Outreach (WEP, Designer, CH2M)

- Goals:
  - Engage the public early and often; receive their buy-in!
  - Educate the public of the GI project goals and benefits
    - Environmental (CSO reduction)
    - Collaborative benefits (infrastructure improvements, air pollutant reduction, climate change, enhanced recreation, property values, etc.)
  - Incorporating concerns early in design avoids costly changes during construction
  - Neighborhood buy-in measurably improves adoption of GI and helps reduce vegetation mortality

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Public Education and Outreach

- Methodology:
  - Engage the public during project development phase (GPC)
  - Public information meetings during design
    - At the 25% and 90% design phases
    - Interim and more frequent meetings with specific community groups/leaders
  - Construction status
    - Pre-Construction: What to expect and when
    - During Construction: Progress updates, feedback/concerns from public
    - Post-Construction: How did we do?

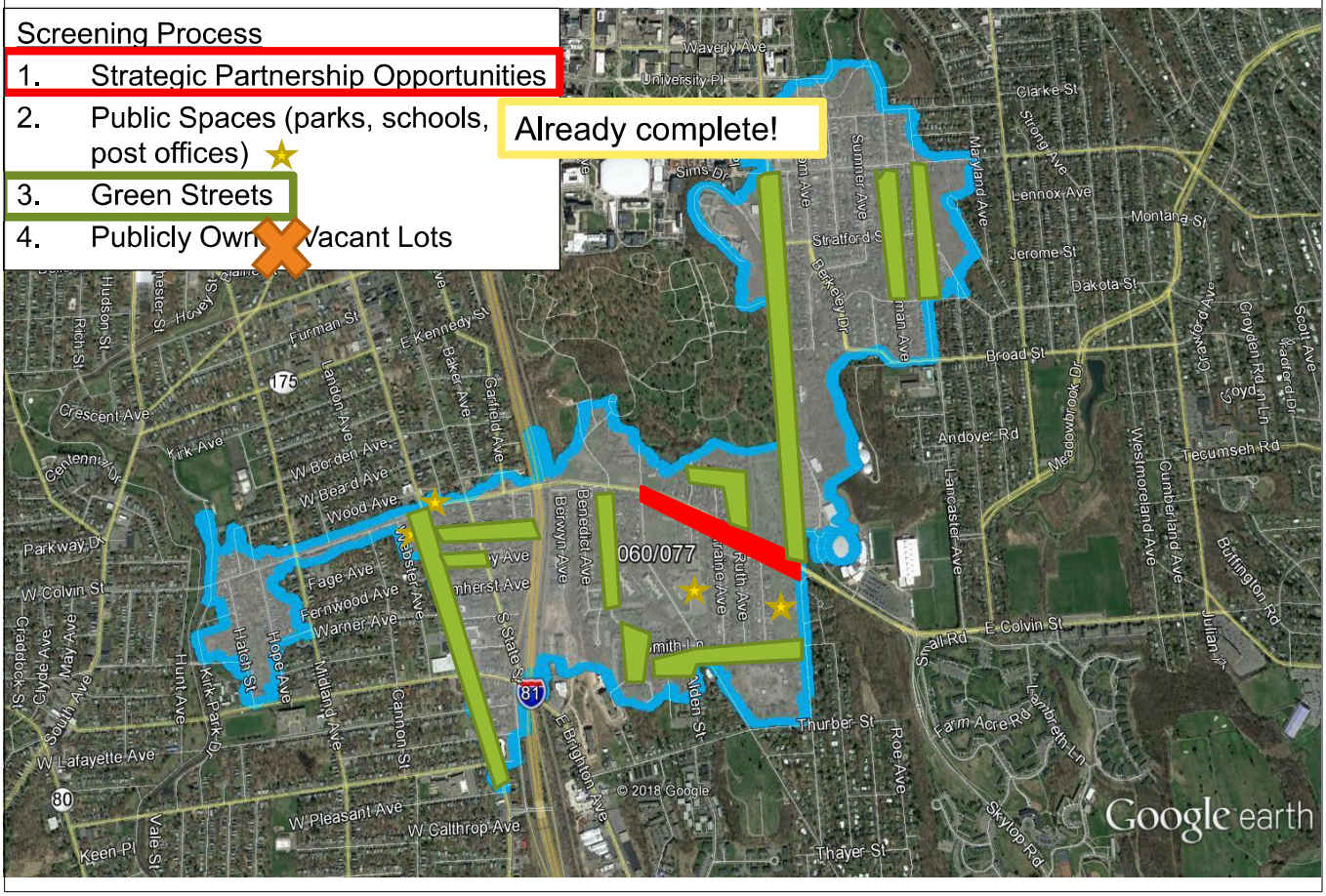
Public Education and Outreach

Case Study: CSO 060/077

Screening Process

1. Strategic Partnership Opportunities
2. Public Spaces (parks, schools, post offices) ★
3. Green Streets
4. Publicly Owned Vacant Lots ✖

Already complete!



CSO 060/077 Construction

- Projects Complete
  - Green Streets: Lancaster Ave., Ackerman Ave., and McKinley Ave. (B&L design)
  - Road Reconstruction: East Colvin St. partially complete (Strategic partnership, CH2M design)
- Public Outreach
  - 3 community meetings held to discuss projects
  - Several other individual community group discussions, sit downs, discussions, etc.
  - Excellent feedback received

CSO 060/077 Construction

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CSO 060/077 Construction

CSO 060/077 Progress

- Total runoff reduced to date: 11.5 MG
- SWMM Estimates prior to construction
  - Frequency: 31
  - CSO Volume: 12 MG
- SWMM Estimates as of 12/31/2017
  - Frequency: 26
  - CSO Volume: 8.6 MG

Summary

- Green Planning Committee and Screening Process has led to…
  - Cost effective GI projects in high priority target areas
  - Increased public education and involvement in project development and implementation
  - Further collaboration between the County and other stakeholders
  - Improved water quality in Onondaga Lake and its tributaries

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Special Thanks To

- Committee Members
  - Sue Stanczyk, Onondaga County Legislature
  - Owen Kerney, City of Syracuse Planning
  - Aggie Lane, Partnership for Onondaga Lake
- Co-Authors
  - Tom Rhoads, Commissioner Dept. of Water Environment Protection
  - Adam Woodburn, Stormwater Program Coordinator
  - Madison Quinn, Save the Rain Program Project Coordinator

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Thank You!

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February 7, 2018

Facilitating Community Support through Public Outreach Programs: Onondaga County's Save the Rain and Connect the Drops Initiatives

Madison M. Quinn, Project Coordinator
Onondaga County Dept. of Water Environment Protection
NYWEA 90th Annual Meeting
February 6, 2018

Presentation Overview

- Background – Onondaga County, Onondaga Lake
- Save the Rain program overview
- Green and gray infrastructure projects
- Gaining input, community buy-in
- Education and outreach
  - Community partnerships
  - Outreach initiatives
  - Educational programming
  - Annual Clean Water Fair
  - Connect the Drops litter reduction
- Triple Bottom Line benefits
- Onondaga Lake as a resource

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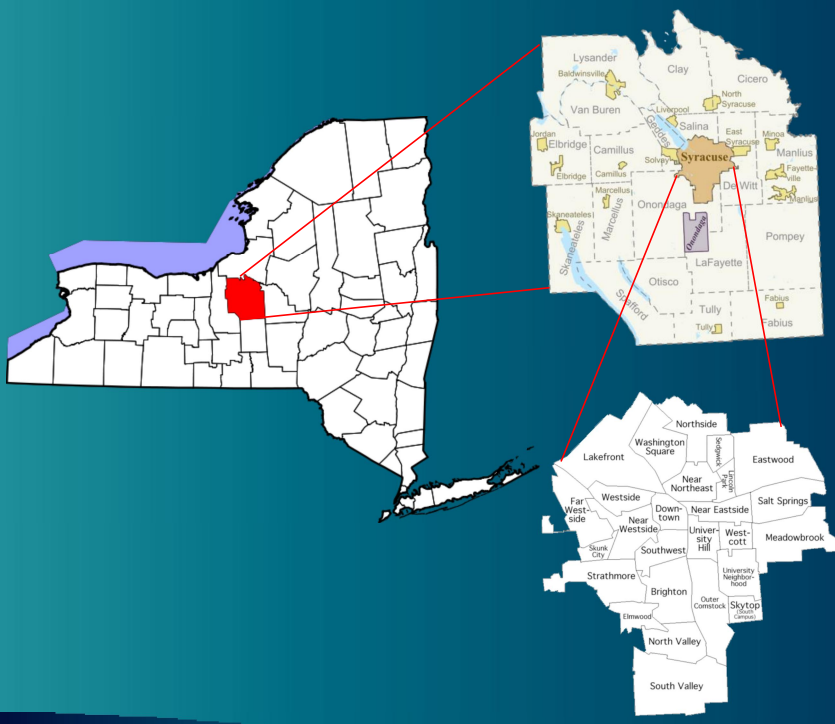
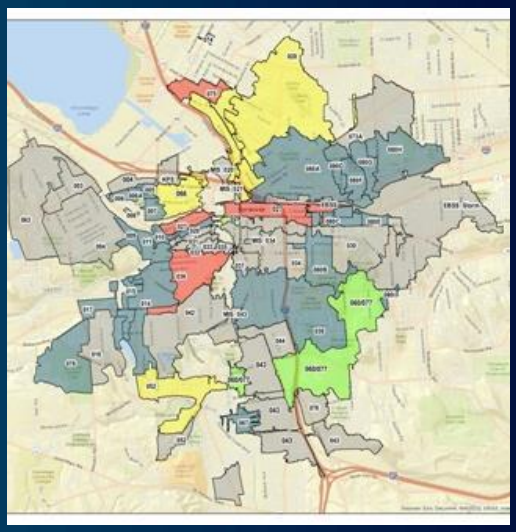
Onondaga County & Syracuse





Onondaga Lake Facts

- Watershed: 285 square miles
- 1 mi. Wide, 4.6 mi. long
- Average Depth: 35 ft.
- Max Depth: 63 ft.

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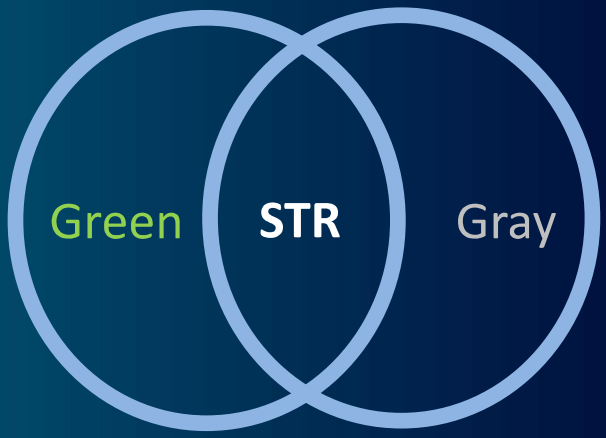
Save the Rain Program Overview

- County Executive Joanie Mahoney wanted a better way to meet environmental goals without building more Regional Treatment Facilities (RTFs)
- Combined approach – gray and green infrastructure



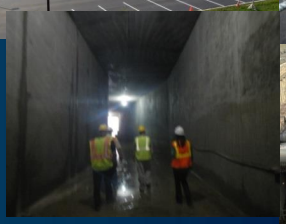
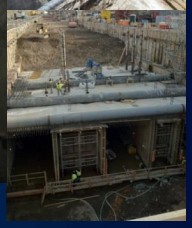
National and Regional Recognition

- 2011 – EPA Green Infrastructure Partner Community
- 2011 – NRDC featured Save the Rain in *Rooftops to Rivers II* report
- 2012 – US Green Building Council Global Community Leadership Award to County Executive Joanie Mahoney
- 2013 – US Water Alliance awarded US Water Prize to Onondaga County
- 2013 – NYS Environmental Excellence Award to Save the Rain
- 2013 – Onondaga County and EPA cohost the first national summit of Green Infrastructure Partner Communities
- 2013 – CNY APWA Environmental Project of the Year, West Onondaga Street
- 2013 – Storm Water Solutions Magazine Top Stormwater Project for Save the Rain at Rosamond Gifford Zoo
- 2013 – American Academy of Environmental Engineers Honor Award for Water Street Green Gateway
- 2014 – Audubon New York awarded County Executive Mahoney the Donald G. Colvin Award
- 2014 – Water Environment Federation (WEF) awarded Onondaga County Save the Rain the Best Nonprofit/Government video in StormTV awards program
- 2014 – Onondaga County hosted the first New York State Green Infrastructure Community Summit
- 2015 – NYWEA Public Education Award for Save the Rain Projects at Rosamond Gifford Zoo
- 2016 – Save the Rain partnered with NYSDEC and USDA Natural Resources Conservation Service to install a rain barrel and rain garden at the NYS Fairgrounds
- 2017 – NYWEA Public Education Award for the annual Save the Rain Clean Water Fair

Gray Infrastructure – CSO Storage Facilities

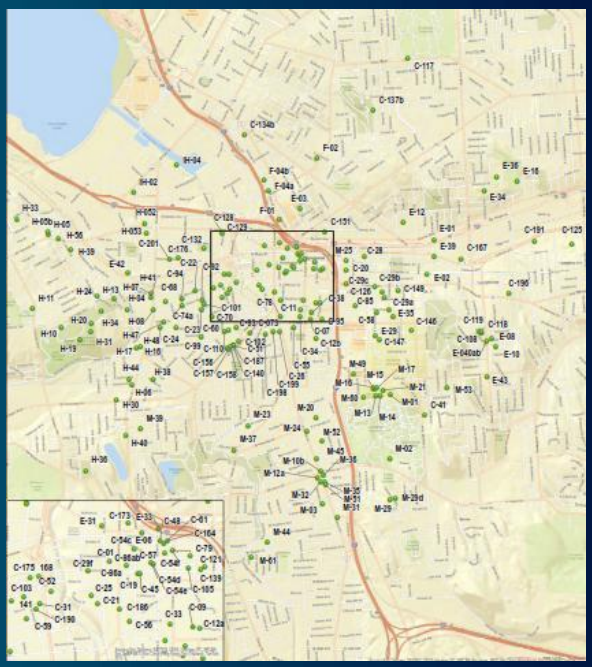
- Gray Projects
  - Harbor Brook Interceptor (ARRA)
  - Midland Conveyance (CSO 044)
  - Clinton Storage Facility
  - Lower Harbor Brook Storage Facility and Conveyances
  - Erie Boulevard Storage System (EBSS) Gate Chamber #3 Improvement
  - Sewer separation projects
- Facilities Planning
  - Floatable Controls



Green Infrastructure Projects

- Over 200 projects completed to date (2010-2017)
- Variety of green infrastructure technology, project size, & land ownership
- Millions of gallons captured annually



Green Infrastructure Technologies

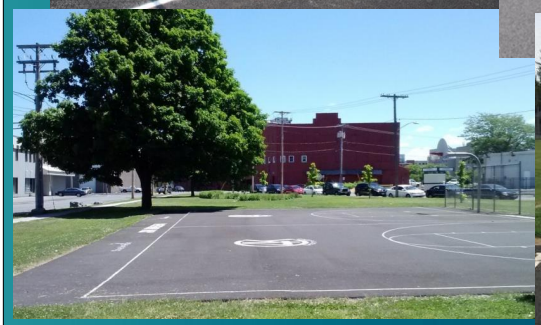
Public Input Facilitates Stewardship

- Reach out early, often
  - 25%, 90%, final design
- Design with community feedback in mind, gain buy-in
- Transparency
  - If an idea isn't feasible, tell stakeholders why
  - Timelines and follow-up

Save the Rain Website and Social Media

- www.SaveTheRain.us
- Completely open sourced STR program materials – including fact sheets, project plans, technical specs, photos, presentations, construction updates
- Social media responsiveness

Courts 4 Kids Porous Basketball Courts



Outreach at Rosamond Gifford Zoo

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Stewardship within the Community

- Volunteers adopt green projects, help with green infrastructure spring and fall maintenance
- Community tree planting events
- Tree adoption
- Community cleanups

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Partnerships – Public & Private

- Onondaga County
- City of Syracuse
- NY State Dept. of Environmental Conservation
- US Environmental Protection Agency
- Public-private partnership through Green Improvement Fund
- Connective Corridor: Syracuse University

Partnerships – Community Groups

- Onondaga Earth Corps
- Cornell Cooperative Extension of Onondaga County
- Baltimore Woods Nature Center
- Museum of Science & Technology
- Onondaga Lake Conservation Corps

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Green Jobs: Onondaga Earth Corps

- Employs and trains Syracuse youth (ages 15-18) & young adult (ages 19-25) crews working in the spring, summer and fall.
- Crews are trained in green infrastructure installation & maintenance best practices which they apply to their work throughout the season.

Onondaga Earth Corps

Green Jobs: Onondaga Earth Corps

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Nature in the City – 3rd Grade Program

- Baltimore Woods Nature Center outreach program to Syracuse City School District
- Teaching every 3rd grader in district about water quality and stormwater infrastructure
  - 19 schools
  - 63 classes
  - 1,600+ students

Nature in the City – 3rd Grade Program

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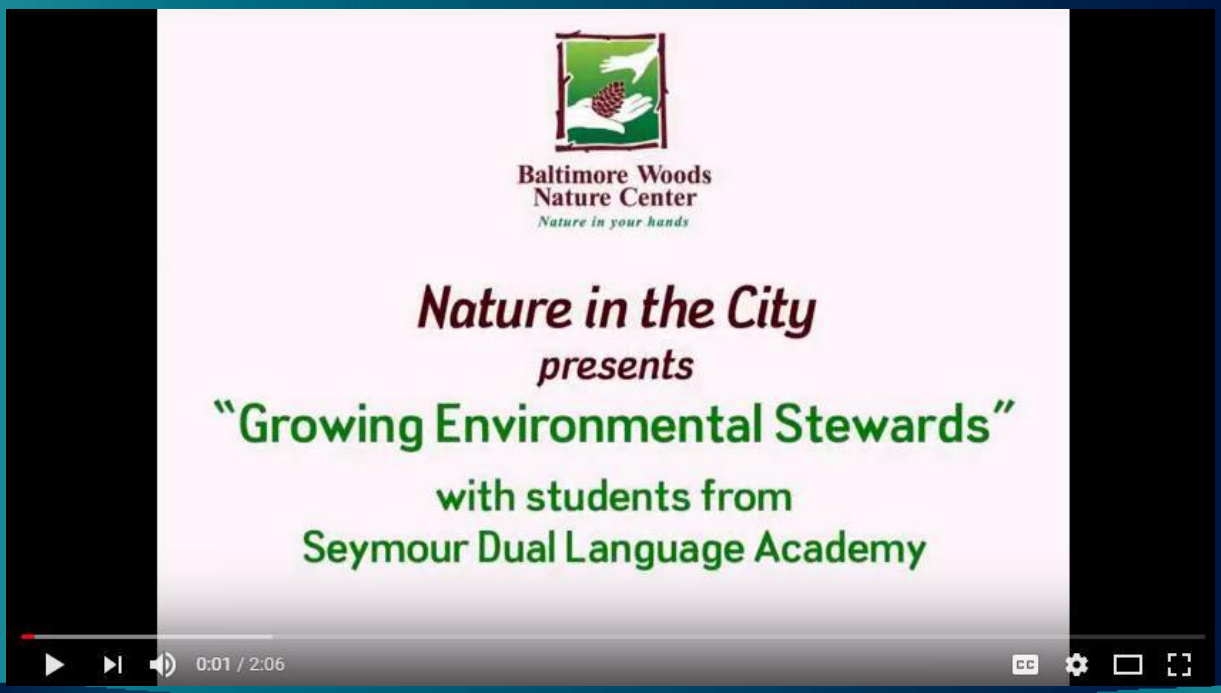
Nature in the City – 3rd Grade Program

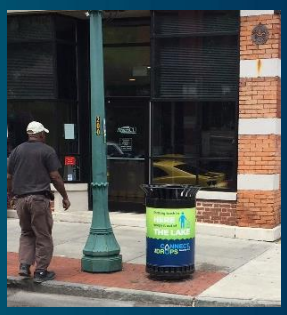


Rain Barrel Program

- FREE rain barrels given to Syracuse homeowners
- Public engagement tool
- NYSEFC grant

“Connect the Drops” Education & Outreach

- Traditional, digital, & social media
- Downtown marketing tactics targeting pedestrians – including trash can wraps and signage
- Sidewalk art & rain activated messages



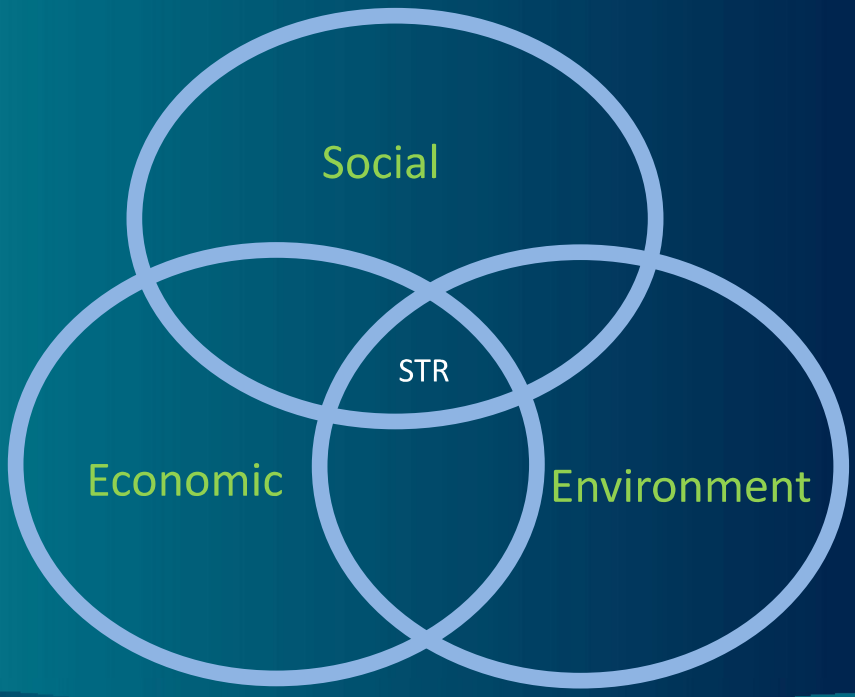
From Awareness to Action: Block Litter

- 650+ residents of Onondaga County took the Block Litter pledge
- In 2018, we will work to build on the first year and mobilize these residents to perform regular cleanups

Block Litter

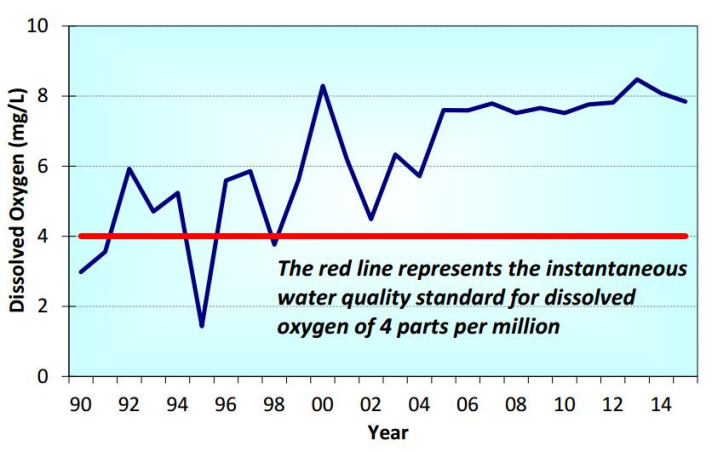
- Under Connect the Drops initiative, partnered with Onondaga County Resource Recovery Agency (OCRRA) to encourage cleanups – one block at a time

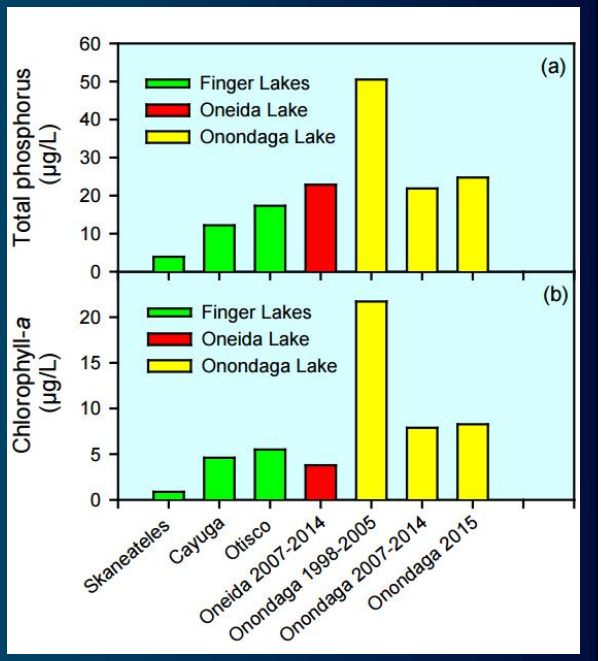
Triple Bottom Line Benefits



Water Quality Improvements

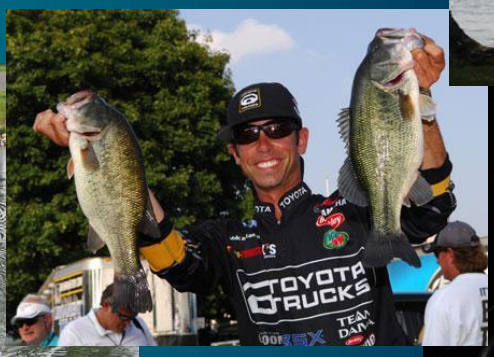
- Remarkable recovery, greatly improved water quality in Onondaga Lake

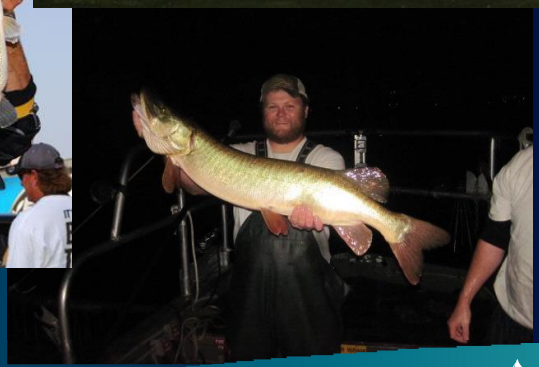




Fish Communities of Onondaga Lake

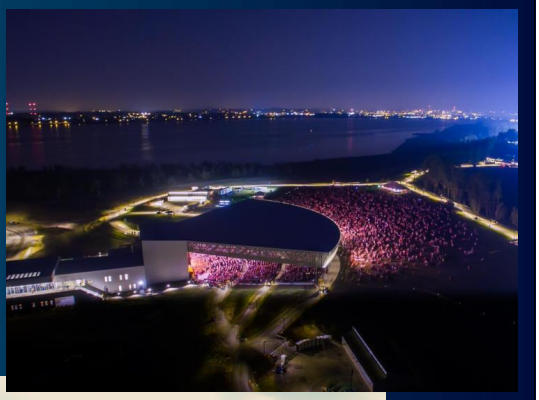
- Greater diversity than years past – 53 species of fish identified by county sampling





Onondaga Lake as an Asset

- Remarkable recovery of the ecosystem
- Recreational and environmental resource
  - Fishing tournaments
  - Rowing/boating
  - Trails at Onondaga Lake Park, Creekwalk, & West Shore Trail
  - Lakeview Amphitheater



Questions?

MadisonQuinn@ongov.net

Please visit our website: www.SaveTheRain.us/drops

Follow @SaveTheRainUS on Twitter & @savetherain.us on Instagram

"Like" Onondaga County Save the Rain on Facebook:
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Subscribe to savetherainus on YouTube

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FINANCIAL UPDATE

Financial Update

Contracts

New Contracts

- **Save the Rain Outreach & Public Education**
- Contract with the Museum of Science & Technology (MOST) to partner for outreach events throughout the year.
- Contract amount: $25,000. Executed: 2/23/18.

Amendments to Existing Contracts

- **Green Improvement Fund**
- Contract with Viraj, NY amended to include additional green improvements in the Midland Ave sewershed.
- Amendment Amount: $15,000 Executed: 2/2/18.

Change Orders

- **Green Separation CSO 052**
- Contract with Marcellus Construction amended to include additional costs associated with modifications for additional stone fill, surveying and installation of storm line.
- Change Order Amount: $7,902.15 Executed: 1/18/18.

- **Lower Harbor Brook Storage Facility**
- Contract with CO Falter Construction amended to include additional costs associated with modification of drain piping, installation of gate valves, reinforcing brackets and additional tank work.
- Change Order Amount: $178,943.57 Executed: 3/5/18.

Funding

Grants

State Bond Act Funds

- Reimbursements **requested**: None
- Reimbursements **received:** None

Federal EPA Funds

- Reimbursements **requested**: None
- Reimbursements **received:** None

Federal Army Corps of Engineers Funds

- Reimbursements **requested:** None
- Reimbursements **received:** None

- ~~GIGP Grants~~
  Requested: None
  Received: None

EFC Reimbursements **Requested:**

Midland LT $54,534.06 on 1/4/18
Clinton LT $54,534.06 on 1/4/18
Harbor Brook LT $74,209.41 on 1/4/18
Midland LT $384,880.57 on 2/8/18

EFC Reimbursements **Received:**

Harbor Brook LT $74,209.41 on 1/19/18

Clinton LT $54,534.06 on 1/22/18

Midland LT $54,534.06 on 1/22/18

Midland LT $384,880.57 on 3/1/18

Total reimbursement monies received to date through EFC loans for the funded ACJ projects: $247,603,598 (short term) and $124,904,397 (long term).

Onondaga County Lake Improvement Project

4th Stipulation of the ACJ

Clinton/Lower MIS CSO Improvements

Summary of Current and County Authorizations

	Total Project Costs		
***Project*/Task/Line Item**	Total Proposed Budget	Expended To Date 3/31/18	Authorization Remaining
Clinton Street CSO Facility Planning (Original)			
Engineering Services (EEA)	$ 751,266	$ 751,266	$ (0)
Original Facility Plan Subtotal	**$ 751,266**	**$ 751,266**	**$ (0)**
Clinton Street CSO Conveyances Project			
Contract No. 1 - Phase 1 Conveyances (Delaney)	$ 14,478,053	$ 14,478,053	$ (0)
Contract No. 2 - Phase 2A Conveyances (Delaney)	$ 4,074,455	$ 4,074,455	$ (0)
Engineering/Construction Services (CDM/C&S)	$ 2,738,000	$ 2,738,000	$ 0
Conveyances Subtotal	**$ 21,290,508**	**$ 21,290,508**	**$ (0)**
Clinton Storage Project (1)			
Construction Estimate	$ 77,742,858	$ 79,831,600	$ (2,088,742)
Engineering Services (EEA and others)	$ 12,122,013	$ 11,925,712	$ 196,301
Construction Management and Administration (CDM/C&S)	$ 4,833,411	$ 4,521,602	$ 311,809
Construction Testing (CME)	$ 327,847	$ 277,716	$ 50,131
			$ -
CSO Storage Subtotal	**$ 95,026,129**	**$ 96,556,631**	**$ (1,530,502)**
Facility Plan for CSOs 027 & 029			
Construction Estimate	$ 3,100,000		$ 3,100,000
Engineering Services (Ch2MHill)	$ 91,211	$ 91,186	$ 25
Engineering Services (TBD) Floatables Arcadis	$ 782,032	$ 15,133	$ 766,899
County Administration and Other Costs	$ -		$ -
Facility Plan Subtotal	**$ 3,973,243**	**$ 106,318**	**$ 3,866,925**
Clinton/Lower MIS Green Implementation Program			
Construction Contracts incl. GIF Public/Private	$ 38,508,611	$ 32,857,248	$ 5,651,363
Ch2MHill Program Management & Engineering	$ 15,900,000	$ 11,739,310	$ 4,160,690
Green Subtotal	**$ 54,408,611**	**$ 44,596,558**	**$ 9,812,053**
Program Management			
Project Management (CDM/C&S)			$ -
Project Management for Facility Plan (CDM/C&S) (2)	$ -		$ -
Program Management Subtotal	**$ -**	**$ -**	**$ -**
Miscellaneous County Costs			
Land Acquisition	$ 3,726,350	$ 3,726,350	$ -
IMA	$ 4,861,000	$ 3,959,746	$ 901,254
Legal	$ 126,115	$ 350,857	$ (224,742)
Consulting (John Clare & Mezey)	$ 301,334	$ 226,334	$ 75,000
Debt	$ 234,885	$ 879,337	$ (644,452)
Other	$ 310,738	$ 740,944	$ (430,206)
Contingency	$ 489,863		$ 489,863
Miscellaneous Subtotal	**$ 10,050,285**	**$ 9,883,567**	**$ 166,718**
	$ 185,500,042	**$ 173,184,849**	**$ 12,315,193**
Authorized Budget 185,500,042			

Onondaga County Lake Improvement Project

4th Stipulation of the ACJ

Harbor Brook Drainage Basin CSO Abatement

Summary of Current and Proposed Costs, and County Authorizations

	Total Project Costs		
Project **/Task/**Line Item	Total Proposed Budget	Expended to Date 3/31/18	Authorization Remaining
Harbor Brook CSO Abatement Project			
Original Engineering Expenses	**$ 5,500,000**	**$ 5,500,000**	**$ -**
HBIS Replacement and CSO Abatement Project			
Construction Contract No. 1 (1) (JJ Lane)	$ 18,289,918	$ 23,391,425	$ (5,101,507)
Other Miscellaneous Work	$ 2,482,920	$ -	$ 2,482,920
Engineering/Construction Sevices (CDM/C&S)	$ 2,012,615	$ 2,651,315	$ (638,700)
County Administration and Other Costs	$ 114,547	$ 953,749	$ (839,202)
HBIS Replacement and CSO Abatement Project Total	**$ 22,900,000**	**$ 26,996,490**	**$ (4,096,490)**
Lower Harbor Brook Storage & Conveyance			
Construction Estimate (with contingency)	$ 34,502,000	$ 29,468,827	$ 5,033,173
Engineering Services (EEA)	$ 4,200,000	$ 3,971,487	$ 228,513
Barton & Loguidice (flood plain dev permit)	$ -	$ 4,600	$ (4,600)
Engineering Services (CDM/C&S)	$ 3,390,000	$ 1,497,536	$ 1,892,464
Project Escalation to Midpoint of Construction	$ 2,280,000	$ 5,360,579	$ (3,080,579)
Lower Harbor Brook Storage & Conv Total	**$ 44,372,000**	**$ 40,303,030**	**$ 4,068,970**
Harbor Brook CSOs FCF Program			
Construction Estimate	$ 12,000,000		$ 12,000,000
Engineering Services (Arcadis)	$ 1,878,731	$ 144,843	$ 1,733,888
County Administration and Other Costs	$ 800,000	$ 15,300	$ 784,700
Project Escalation to Midpoint of Construction	$ 400,000		$ 400,000
FCF Program Total	**$ 15,078,731**	**$ 160,143**	**$ 14,918,588**
Other Harbor Brook Green			
Construction Contracts incl. GIF Public/Private & Rain Barrels	$ 13,000,000	$ 16,745,922	$ (3,745,922)
O'Brien & Gere Wetlands disinf project	$ -	$ 44,500	$ (44,500)
CH2MHILL Cso 018 Monitoring	$ -	$ 178,008	$ (178,008)
Ch2MHill Engineering & Program Management	$ 3,650,000	$ 6,515,310	$ (2,865,310)
Harbor Brook Green Project Total	**$ 16,650,000**	**$ 23,483,739**	**$ (6,833,739)**
Program Management			
Project Management (CDM/C&S)	$ 499,269	$ 2,813,628	$ (2,314,359)
Project Management for FCF Plan Implem (CDM/C&S)	$ -		
Program Management Total	**$ 499,269**	**$ 2,813,628**	**$ (2,314,359)**
Harbor Brook Mitigation	**$ 3,500,000**	**$ 3,265,000**	**$ 235,000**
Total Costs for Harbor Brook CSO Area under 4th Stip	**$ 108,500,000**	**$ 102,522,030**	**$ 5,977,970**

Onondaga County Lake Improvement Project

4th Stipulation of the ACJ

Midland CSO Abatement

Summary of Current and Proposed Costs, and County Authorizations

	Total Project Costs		
Project **/Task**/Line Item	Total Proposed Budget	Expended to Date 3/31/18	Authorization Remaining
Midland Ave. RTF & Conveyances			
Midland Phase 1 Conveyances - Construction	$ 1,836,434	$ 1,836,434	$ (0)
Midland Phase 2 RTF & Conveyances - Construction	$ 53,372,689	$ 53,372,689	$ (0)
Midland Demolition Contracts - Construction	$ 748,483	$ 748,483	$ 0
Other Construction	$ 137,000	$ 155,114	$ (18,114)
Phase 1 and 2 Engineering (Parsons & EEA)	$ 14,717,163	$ 12,503,353	$ 2,213,810
CME Construction Testing	$ 227,341	$ 219,815	$ 7,526
RTF Modifications (Construction, Eng, CM, Admin)	$ 3,000,000		$ 3,000,000
Facility Plan Total	**$ 74,039,110**	**$ 68,835,888**	**$ 5,203,222**
			$ 5,203,222
CSO 044 Conveyances Project			
Contract No. 6. - JJ Lane	$ 12,296,549	$ 12,098,662	$ 197,887
Construction Contingency 5%	$ 64,800	$ 66,130	$ (1,330)
Engineering Services (EEA)	$ 750,000	$ 729,224	$ 20,776
Construction Management Sevices (CDM/C&S) see below			$ -
Conveyances Project Total	**$ 13,111,349**	**$ 12,894,017**	**$ 217,332**
			$ 217,332
FCF Facility Plan			
Construction Estimate	$ 1,300,000	$ -	$ 1,300,000
Engineering Services (Arcadis and others)	$ 623,954	$ 46,039	$ 577,915
Construction Management and Administration	$ 210,000		$ 210,000
Project Escalation to Midpoint of Construction	$ -		
Clinton Storage Project Total	**$ 2,133,954**	**$ 46,039**	**$ 2,087,915**
			$ 2,087,915
Facility Plan for Midland CSOs			
Construction Estimate	$ 14,900,000	$ -	$ 14,900,000
Engineering Services (Ch2MHill)	$ 121,401	$ 121,368	$ 33
Engineering Services, County Admin, ect (TBD)	$ 3,720,000	$ 12,069	$ 3,707,931
Facility Plan Total	**$ 18,741,401**	**$ 133,437**	**$ 18,607,964**
			$ 18,607,964
Midland Green Implementation Program			
Construction Contracts incl. GIF Public/Private	$ 7,500,000	$ 9,927,732	$ (2,427,732)
Ch2MHill Program Management & Engineering	$ 3,917,636	$ 3,175,970	$ 741,666
Clinton Green Program Total	**$ 11,417,636**	**$ 13,103,701**	**$ (1,686,065)**
			$ (1,686,065)
Program Management			
Project Management (CDM/C&S) includes CSO 044	$ 6,530,602	$ 6,641,383	$ (110,781)
Project Management for Facility Plan (CDM/C&S) [1]		$ -	
Program Management Total	**$ 6,530,602**	**$ 6,641,383**	**$ (110,781)**
			$ (110,781)
Miscellaneous County Costs			
Land Acquisition	$ 1,809,802	$ 1,809,802	$ -
IMA			
Legal	$ 182,323	$181,975	$ 348
Consulting (John Clare & Mezey)	$ 194,317	$ 194,317	$ 0
Debt	$ 635,031	$ 746,035	$ (111,004)
Contingency	$ 2,591,117	$ -	$ 2,591,117
Other	$ 526,211	$ 529,813	$ (3,602)
Miscellaneous Costs Total	**$ 5,938,801**	**$ 3,461,941**	**$ 2,476,860**
Total Cost for Midland project under 4th stipulation	**$ 131,912,853**	**$ 105,116,407**	**$ 26,796,446**
Authorized Master Budget $128,300,000			

Onondaga County Lake Improvement Project

4th Stipulation of the ACJ

Sewer Separation of CSO Areas 022/038/040/045/046A/046B/047/048/050/051/053/054

Summary of Current and Proposed Costs, and County Authorizations

	Total Project Costs		
Project **/Task/Line Item**	Total Proposed Budget	Expended to Date 3/31/18	Authorization Remaining
Sewer Separation Construction Contracts			
CSO 024 (Falter)	$698,864	$698,864	$0
CSO 053/054 (Falter)	$2,000,817	$2,000,817	$0
CSO 038//40/046A/046B (Falter)	$3,598,931	$3,524,487	$74,444
CSO 047/048 (Falter)	$1,654,022	$1,654,022	$0
CSO 050 (Lane)	$4,362,188	$4,362,188	$0
CSO 051 (Lane)	$5,037,280	$5,037,280	$0
CSO 022/045 (estimated Project Costs)	$6,750,000	$5,611,423	$1,138,577
Construction Total	**$24,102,102**	**$22,889,082**	**$1,213,020**
Service Contracts (Engineering /Consulting /Program Management)			
ACE	$484,286	$484,286	$0
CDM/C&S	$1,446,468	$1,997,539	-$551,071
CME	$109,492	$49,704	$59,788
Department of the Army	$153,504	$153,504	$0
Spectra	$437,996	$437,996	$0
Engineering/Management Total	**$2,631,746**	**$3,123,029**	**-$491,283**
Green Implementation Program			
Construction Contracts incl. GIF Public/Private	$569,885	$15,928	$457,077
Green Subtotal	**$569,885**	**$15,928**	**$457,077**
Miscellaneous County Costs			
City of Syracuse	$135,084	$135,084	$0
Consulting (John Clare & Mezey)	$101,425	$101,425	$0
Debt	$116,269	$142,816	-$26,547
Legal	$14,235	$14,235	$0
Other	$13,540	$4,093	$9,447
Miscellaneous Costs Total	**$380,553**	**$397,652**	**-$17,099**
Total	**$27,684,286**	**$26,425,692**	**$1,161,715**

Onondaga County Lake Improvement Project

Save The Rain Education and Outreach Grant

Summary of Current and Additional Costs, and County Appropriations

Mar2018

Funding Sources			Appropriations
Program Funding			
09,10,11 Appropriations			$ 875,000
2011 Suburban Green Infrastructure			$ 200,000
2012 Appropriation			$ 400,000
2011 Trolley Lot Parking Mitigation Appropriation*			$ 125,000
2012 Green grant education			$ 200,000
2013 Green Grant education			$ 400,000
2014 Green Grant education			$ 400,000
2015 Green Grant education			$ 100,000
2016 Green Grant education			$ 185,000
2017 Green Grant education			$ 185,000
2018 Green Grant education			$ 170,000
Total Appropriation			$ 3,240,000
Funding Uses			
Retz Advertising + Design	**Contract Amount**	**Expended to Date**	**Difference + (-)**
2010/2011 Marketing Services	$ 411,789	$ 411,789	
2012 Marketing Services	$ 224,303	$ 224,303	
Marketing Services Subtotal	$ 636,092	$ 636,092	*$ (0)*
Environmental Finance Center Education and Outreach	**Contract Amount**	**Expended to Date**	**Difference + (-)**
Environmental Finance Center Staff	$ 100,155	$ 84,510	
Onondaga Environmental Institute	$ 110,212	$ 70,623	
ESF	$ 49,937	$ 27,024	
Onondaga Earth Corps	$ 13,040	$ 2,833	
Baltimore Woods Nature Center	$ 22,601	$ 22,601	
Purchased Services (ASLF)	$ 7,937	$ 20,000	
SubTotal	$ 303,882	$ 227,590	
Non-Labor Expenses (EFC)			
Printing-Outreach	$ 21,000	$ 10,131	
Postage	$ 4,000	$ 78	
Travel	$ 1,200	$ 1,359	
Facilities Rental	$ 5,200	$ 35	
Program-related Supplies - Other	$ 3,000	$ 2,022	
Web -based Marketing Efforts	$ 1,000	$ -	
Training Supplies and Materials	$ 4,000	$ -	
Indirect/Overhead	$ 60,614	$ 50,328	
SubTotal	$ 100,014	$ 63,953	
2011 Education and Outreach	$ 346,677	$ 346,677	
2012 Education and Outreach	$ 241,815	$ 241,815	
2013 Education and Outreach	$ 237,758	$ 237,758	
2014 Education and Outreach	$ 350,126	$ 350,125	
Education & Outreach Subtotal	$ 1,176,376	$ 1,176,376	$ 0

	Contract Amount	Expended to Date	Difference + (-)
Baltimore Woods			
Supplies	$ 15,346	$ 9,987	$ 5,359
Transport	$ 35,013	$ 24,373	$ 10,640
Travel	$ 3,854	$ 1,220	$ 2,634
Env Educator Hours	$ 62,726	$ 47,944	$ 14,782
Administrative Hours	$ 48,008	$ 40,612	$ 7,396
Dev & other	$ 5,855		
Baltimore Education & Outreach	$ 170,801	$ 124,136	$ 46,665
Miscelaneous Ed/Outreach Expenses	**Contract Amount**	**Expended to Date**	**Difference + (-)**
2010/2011 Miscellaneous Exp.	$ 105,764	$ 105,764	
2012 Miscellaneous Exp.	$ 79,852	$ 79,852	
2013 Miscellaneous Exp	$ 34,158	$ 34,158	
2014 Miscellaneous Exp	$ 46,657	$ 46,657	
2015 Miscellaneous Exp	$ 20,988	$ 20,988	
2016 Miscellaneous Exp	$ 48,494	$ 48,494	
2017 Miscellaneous Exp	$ 24,168	$ 24,168	
2018 Miscellaneous Exp	$ 162,795		
Travel			
Purchase card/Petty cash		$ 10	
Rain harvest syst		$ 17,648	
The Page seed Co		$ 1,860	
MOST	$ 25,000.00	$ 2,500	
7 Enterprises Marketing	$ 200,000.00	$ -	
Focus Greater Syr	$ 20,000	$ 17,375	
OEI - RB Workshops	$ 38,603	$ 29,466	
Pinckney Hugo Grp	$ 400,000	$ 399,562	
Environmental Design and Research	$ 20,000	$ 20,000	
2010/2011 media	$ 28,750	$ 28,750	
2012 Media	$ 1,500	$ 1,500	
	$ -	$ -	$ -
Miscellaneous Subtotal	$ 1,256,730	$ 878,751	$ 377,979
STR Education and Outreach Totals	**Contract Amount**	**Expended to Date**	**Difference + (-)**
	$ 3,240,000	**$ 2,815,356**	**$ 424,644**
Remaining Balance			**$ 424,644**

APPENDIX

March 2018

	FINANCIAL TRACKING SUMMARY: FEDERAL & STATE GRANTS/LOANS APPROVED & RECEIVED										
		NYS	NYS	FED EPA	FED EPA	SHORT-TERM	SHORT-TERM	LONG-TERM	LONG-TERM	ACE	ACE
	PROJECT	GRANT	GRANT	GRANT	GRANT	EFC LOAN	EFC LOAN	EFC LOAN	EFC LOAN	GRANT	GRANT
PROJECT NAME	BUDGET	APPROVED	RECEIVED	APPROVED	RECEIVED	APPROVED	RECEIVED	APPROVED	RECEIVED	APPROVED	RECEIVED
METRO - CURRENT											
AERATION SYSTEM UPGRADE	$8,500,000	$5,834,381	$5,834,381			$7,365,000	$6,868,954	$1,049,185	$14,613		
AMMONIA REMOVAL DEMO	$2,000,000	$1,145,109	$1,145,109			Full-Scale	$202,078				
BIOSOLIDS-MECHANICAL THICKENERS[c]								$14,676,422	$14,711,148		
DIGESTER MOD/CHEMICAL STORAGE	$5,600,000	$4,319,819	$4,319,819			$4,938,419	$4,938,419	$775,509	$154,126		
DIGITAL SYSTEM IMPROVEMENTS	$2,900,000	$1,563,317	$1,563,317			$1,849,000	$1,849,000	$285,682	$3,833		
MISCELLANEOUS IMPROVEMENTS	$1,400,000										
ODOR CONTROL	$7,700,000							$7,413,199	$7,389,197		
AMMONIA REMOVAL FULL SCALE/ STAGE II PHOSPHORUS REMOVAL	$190,000,000	$47,331,203	$47,331,203	$54,705,015	$54,705,015	$108,000,000	$105,860,930	$17,200,000	$989,323		
PHOSPHORUS REMOVAL PILOT	$5,000,000					Full Scale	$1,936,991				
PHOS TREAT OPTIMIZATION (587601)											
CSO - CURRENT											
CLINTON ST CONVEYANCE & RTF	$31,245,000	$54,870,000	$54,870,000			$70,288,890	$41,834,264	$78,568,119	$39,951,184		
ERIE BLVD SEW SEP STORAGE	$3,000,000	$1,700,000	$1,700,000			$2,301,876	$2,094,314	$923,162	$216,543		
FRANKLIN ST FCF	$3,200,000	$3,828,053	$3,828,053			$4,726,762	$4,589,759	$1,179,012	$296,823		
HARBOR BROOK FCF	$250,000	$384,200	$384,200					$343,500	$348,596		
HARBOR BROOK CSO ABATEMENT	$5,444,000	$3,880,000	$3,880,000	$14,003,569	$15,378,304	$53,689,500	$46,700,136	$62,477,416	$26,187,641		
HIAWATHA INTERCEPTOR/RTF[a]	$8,000,000							$2,710,169	$37,749	$3,406,000	$3,406,000
KIRKPATRICK ST PUMP STATION	$5,642,000	$7,502,302	$7,502,302			$12,000,000	$10,940,632	$4,246,376	$828,115		
MALTBIE ST FCF	$250,000	$211,097	$211,097			$212,000	$188,106				
MIDLAND AVE CONVEYANCE	$3,000,000	$26,055,238	$26,055,238	$34,900,616	$33,525,880						
MIDLAND AVE PHASE II & RTF	$45,000,000					$15,000,000	$15,000,000	$37,339,317	$24,340,459		
MIDLAND AVE PHASE III	$27,000,000					$10,000,000					
MIDLAND AVE MITIGATION COSTS											
NEWELL ST FCF[b]	$1,310,000	$367,737	$367,737								
ONONDAGA CREEK FCF	$3,000,000	$442,154	$442,154								
SEWER SEPARATION[a]	$7,704,000							$11,332,407	$10,276,648	$14,050,177	$14,050,177
SIPHON REHABILITATION	$1,230,000	$870,768	$870,768			$1,435,500	$1,024,433	$140,623	$1,958		
TEALL BROOK FCF	$175,000	$1,045,162	$1,045,162			$1,236,594	$1,094,139	$188,809	$5,743		
WEST ST SEWER SEPARATION	$1,000,000	$2,299,460	$2,299,460			$3,059,716	$2,481,443	$395,540	$6,621		
OTHER											
AMBIENT WATER MONITORING	$8,000,000										
OXYGENATION DEMO	$2,400,000										
SEQR REGULATORY	$50,000										
TOTAL DOLLARS	***$380,000,000**	$163,650,000	$163,650,000	$103,609,200	$103,609,200	$296,103,257	$247,603,598	$241,244,447	$125,760,319	$17,456,177	$17,456,177

***Original budget figures were based on 1997 dollars**

NYS includes awards beyond original pledge (i.e. civic strip)

(a) NOTE: PROJECT IS US ARMY CORPS OF ENGINEERS PROJECT

(b) NOTE: PROJECT RECEIVED $40,500 COST SHARE GRANT FROM (NYSERDA)

(c)NOTE: PROJECT RECEIVED $87,500 COST SHARE GRANT FROM (NYSERDA)

Lake Improvement Project Status Report For The Period Ending 3/31/2018

	Project Title	ACJ START DATE	ACJ FINISH DATE	COUNTY FINISH DATE	ORIGINAL BUDGET(2)	AUTHORIZED BUDGET	ENGINEER	
	METRO - Current							
1	AERATION SYSTEM UPGRADE		7/1/2002	01/03/00	$ 8,500,000	$ 6,925,115	EEA	1
2	AMMON. REMOVAL DEMONSTRATION	11/1/1998	3/1/2000	12/31/99	$ 2,000,000	$ 1,347,187	EEA	2
3	BIOSOLIDS - MECHANICAL THICKENERS					$ 14,815,674		3
4	DIGESTER MOD/CHEMICAL STORAGE		7/1/2002	10/31/00	$ 5,600,000	$ 5,092,545	C&S	4
5	DIGITAL SYSTEMS IMPROVEMENTS		7/1/2002	06/31/01	$ 2,900,000	$ 3,520,317	Systems Integrated	5
6	MISCEL. IMPROVEMENTS		7/1/2002	01/31/99	$ 1,400,000	$ 1,400,000		6
7	ODOR CONTROL		7/1/2002	12/20/00	$ 7,700,000	$ 8,393,855	OBG	7
8	AMMONIA REMOVAL FULL SCALE/	10/1/2001	11/1/2003	11/01/03	$ 125,000,000	$ 128,688,040	EEA	8
	STAGE II PHOSPHORUS REMOVAL	10/1/2003	4/1/2005		$ 65,000,000			
9	PHOSPHORUS REMOVAL - PILOT	4/1/2006	4/1/2007	12/31/00	$ 5,000,000	$ 4,111,714	EEA	9
	PHOSPHORUS OPTIMIZATION (587601)					$ 2,840,000	GHD	
	CSO - Current							
10	CLINTON ST. CONVEYANCE/	5/1/2003	5/1/2007	10/28/06	$ 15,987,190	$ 185,500,042	EEA	10
	CLINTON ST. RTF	5/1/2007	1/1/2012	12/28/10	$ 15,258,090			
11	ERIE BLVD STORAGE SYSTEM		7/1/2002	04/13/02	$ 3,000,000	$ 2,684,523	Barton & Loguidice	11
12	FRANKLIN ST. FCF	4/26/1999	5/1/2000	05/01/00	$ 3,200,000	$ 4,948,516	EEA	12
13	HARBOR BROOK FCF		7/1/2002	07/01/02	$ 250,000	$ 889,109	EEA	13
14	HARBOR BROOK CSO ABATEMENT		7/1/2002		$ 5,443,980	$ 108,500,000	Moffa & Assoc.	14
15	HIAWATHA INTERCEPTOR/RTF (3)		7/1/2002	12/31/00	$ 8,000,000	$ 6,047,183	EEA/Parsons	15
16	KIRKPATRICK ST. PUMP STATION		7/1/2002	10/29/02	$ 5,641,860	$ 12,558,335	EEA	16
17	MALTBIE STREET FCF	8/31/1998	7/1/2002	04/26/99	$ 250,000	$ 362,028	EEA	17
18	MIDLAND AVE RTF & CSO ABATEMENT	5/1/1999	5/1/2004	12/06/00	$ 75,000,000	$ 131,912,853	EEA	18
19	MIDLAND AVE MITIGATION COSTS					$ 3,000,000		19
20	NEWELL STREET RTF		7/1/2002	07/01/01	$ 1,310,000	$ 473,132	Moffa & Assoc.	20
21	ONONDAGA CREEK FCF		7/1/2002	07/01/02	$ 3,000,000	$ 648,342	Parsons	21
22	SEWER SEPARATION		1/1/2012	01/01/12	$ 7,703,880	$ 27,684,286	OBG	22
23	SIPHON REHABILITATION		7/1/2002	06/11/99	$ 1,230,000	$ 1,026,391	C&S	23
24	TEALL BROOK FCF		7/1/2002	12/01/01	$ 175,000	$ 1,235,346	EEA	24
25	WEST ST SEWER SEPARATION	5/1/1999		01/14/00	$ 1,000,000	$ 2,720,572	CHA	25
26	ERIE BLVD CSO ABATEMENT						New Project	26
	OTHER							
27	AMBIENT WATER MONITORING(4)		7/1/2002		$ 8,000,000			27
28	OXYGENATION DEMO PROJECT	5/1/1999	4/1/2003	02/25/04	$ 2,400,000	$ 10,087		28
29	SEQRA REGULATORY COMPLIANCE(1)				$ 50,000		Parsons	29
	TOTAL DOLLARS (2)			*	$ 380,000,000	$ 667,335,192		
	***Original budget figures were based on 1997 dollars**							

(1) SEQR costs are reflected in the individual projects under total payments to date

(2) Original budget figures were based on 1997 dollars

(3) Hiawatha project costs did not all appear on county account partial ACE

(4) AMP is paid through operating funds not in projects

Lake Improvement Project Status Report For The Period Ending 3/31/2018

SOFT COST CONTRACTS	CONSTRUCTION CONTRACT AMOUNTS		TOTAL PAYMENTS TO DATE	FORECASTED COSTS	TOTAL ESTIMATED COST	OVER/UNDER BUDGET	% COMPLETED EXPENDITURES
$ 352,747	$ 6,473,110		$ 6,925,115		$ 6,925,115	$ (1,574,885)	100.00%
$ 1,346,856			$ 1,347,187		$ 1,347,187	$ (652,813)	100.00%
$ 1,266,345	$ 13,131,105		$ 14,815,674		$ 14,815,674	$ 14,815,674	100.00%
$ 748,386	$ 4,357,480		$ 5,092,545		$ 5,092,545	$ (507,455)	100.00%
$ 451,713	$ 2,974,514		$ 3,520,317		$ 3,520,317	$ 620,317	100.00%
			$ 1,400,000		$ 1,400,000	$ -	100.00%
$ 999,299	$ 6,956,868		$ 8,393,855		$ 8,393,855	$ 693,855	100.00%
$ 21,289,868	$ 106,962,810		$ 128,688,040		$ 128,688,040	$ (61,311,960)	100.00%
$ 4,055,734			$ 4,111,714		$ 4,111,714	$ (888,286)	100.00%
$ 1,749,597			$ 4,244,372	$ 19,950,628	$ 24,195,000	$ 24,195,000	17.54%
$ 34,294,218	$ 127,115,744		$ 173,184,849	$ 12,315,193	$ 185,500,042	$ 154,254,762	93.36%
$ 901,556	$ 1,734,929		$ 2,684,523		$ 2,684,523	$ (315,477)	100.00%
$ 973,543	$ 3,920,238		$ 4,948,516		$ 4,948,516	$ 1,748,516	100.00%
$ 436,363	$ 373,370		$ 889,109		$ 889,109	$ 639,109	100.00%
$ 22,748,443	$ 77,385,459		$ 102,522,029	$ 5,977,971	$ 108,500,000	$ 103,056,020	94.49%
$ 540,945	$ 5,535,152		$ 6,047,183		$ 9,453,183	$ 1,453,183	63.97%
$ 2,520,394	$ 9,882,154		$ 12,558,335		$ 12,558,335	$ 6,916,475	100.00%
$ 109,483	$ 152,418		$ 362,028		$ 362,028	$ 112,028	100.00%
$ 26,070,792	$ 75,550,125		$ 105,116,408	$ 26,796,445	$ 131,912,853	$ 56,912,853	79.69%
			$ 3,000,000	$ -	$ 3,000,000	$ 3,000,000	100.00%
$ 472,572			$ 473,132		$ 473,132	$ (836,868)	100.00%
$ 503,551			$ 648,342		$ 648,342	$ (2,351,658)	100.00%
$ 2,600,778	$ 22,879,464		$ 26,425,692	$ 1,258,594	$ 27,684,286	$ 19,980,406	95.45%
	$ 1,021,823		$ 1,026,391		$ 1,026,391	$ (203,609)	100.00%
$ 320,039	$ 903,566		$ 1,235,346		$ 1,235,346	$ 1,060,346	100.00%
$ 403,332	$ 2,311,126		$ 2,720,572		$ 2,720,572	$ 1,720,572	100.00%
					$ -		
			$ 22,077,709	$ -	$ -		
$ 10,087			$ 10,087		$ 10,087	$ (2,389,913)	100.00%
$ 125,166,639	$ 469,621,456		$ 644,469,069	$ 66,298,831	$ 692,096,192	$ 320,146,192	

March 2018

	Project Title	TOTAL PAYMENTS TO DATE 3-31-18	TOTAL PAYMENTS TO DATE 12-30-17	Change
	METRO - Current			
1	AERATION SYSTEM UPGRADE	$ 6,925,115	$ 6,925,115	$ -
2	AMMON. REMOVAL DEMONSTRATION	$ 1,347,187	$ 1,347,187	$ -
3	BIOSOLIDS - MECHANICAL THICKENERS	$ 14,815,674	$ 14,815,674	$ -
4	DIGESTER MOD/CHEMICAL STORAGE	$ 5,092,545	$ 5,092,545	$ -
5	DIGITAL SYSTEMS IMPROVEMENTS	$ 3,520,317	$ 3,520,317	$ -
6	MISCEL. IMPROVEMENTS	$ 1,400,000	$ 1,400,000	$ -
7	ODOR CONTROL	$ 8,393,855	$ 8,393,855	$ -
8	AMMONIA REMOVAL FULL SCALE/	$ 128,688,040	$ 128,688,040	$ -
	STAGE II PHOSPHORUS REMOVAL	$ -	$ -	
9	PHOSPHORUS REMOVAL - PILOT	$ 4,111,714	$ 4,111,714	$ -
	PHOSPHORUS OPTIMIZATION	$ 4,244,372	$ 1,389,809	$ 2,854,563
	CSO - Current			$ -
10	CLINTON ST. CONVEYANCE/	$ 173,184,849	$ 172,969,945	$ 214,904
	CLINTON ST. RTF	$ -	$ -	$ -
11	ERIE BLVD STORAGE SYSTEM	$ 2,684,523	$ 2,684,523	$ -
12	FRANKLIN ST. FCF	$ 4,948,516	$ 4,948,516	$ -
13	HARBOR BROOK FCF	$ 889,109	$ 889,109	$ -
14	HARBOR BROOK CSO ABATEMENT	$ 102,522,029	$ 102,073,308	$ 448,721
15	HIAWATHA INTERCEPTOR/RTF	$ 6,047,183	$ 6,047,183	$ -
16	KIRKPATRICK ST. PUMP STATION	$ 12,558,335	$ 12,558,335	$ -
17	MALTBIE STREET FCF	$ 362,028	$ 362,028	$ -
18	MIDLAND AVE RTF & CSO ABATEMENT	$ 105,116,408	$ 104,647,177	$ 469,231
19	MIDLAND AVE MITIGATION COSTS	$ 3,000,000	$ 3,000,000	$ -
20	NEWELL STREET RTF	$ 473,132	$ 473,132	$ -
21	ONONDAGA CREEK FCF	$ 648,342	$ 648,342	$ -
22	SEWER SEPARATION	$ 26,425,692	$ 26,425,692	$ -
23	SIPHON REHABILITATION	$ 1,026,391	$ 1,026,391	$ -
24	TEALL BROOK FCF	$ 1,235,346	$ 1,235,346	$ -
25	WEST ST SEWER SEPARATION	$ 2,720,572	$ 2,720,572	$ -
26	ERIE BLVD CSO ABATEMENT	$ -	$ -	$ -
	OTHER			$ -
27	AMBIENT WATER MONITORING	$ 22,077,709	$ 22,077,709	$ -
28	OXYGENATION DEMO PROJECT	$ 10,087	$ 10,087	$ -
29	SEQRA REGULATORY COMPLIANCE	$ -	$ -	$ -
				$ -
	TOTAL DOLLARS	$ 644,469,069	$ 640,481,651	$ 3,987,418

Chronology
of
Project Construction Starts

	Status	Location
Pre-ACJ Signing (1/20/98)		
• General Improvements	Complete	Metro
• Odor Control and Residuals Handling	Complete	Metro
1998		
• Digital Systems Upgrade	Complete	Metro
• Ammonia Removal Demonstration	Complete	Metro
• Aeration System Upgrade	Complete	Metro
• Hiawatha RTF - ACOE	Complete	Regional Market
• Newell St. RTF Demo/Improvements	Complete	W.Newell/Vale St.
• Maltbie St. FCF	Complete	Maltbie/Plum St.
• Siphon Rehab	Complete	Various
1999		
• Digester Modifications/Chemical Storage	Complete	Metro
• Franklin St. FCF	Complete	I-690/Franklin
• West Street Sewer Separation	Complete	W. Genesee, Plum, Tracy, N. West St.
• Ammonia Trackdown	Complete	Metro
2000		
• Midland Ave. Conveyance Phase I	Complete	Tallman/Oxford St.
• Phosphorus Removal – Phase I Pilot	Complete	Metro
2001		
• Erie Blvd. Storage System Upgrade	Complete	Franklin to Teall
• Full Scale Ammonia Removal/ Stage II Phosphorus Removal	Complete	Metro
• Kirkpatrick St. Pump Station & Force Main	Complete	Kirkpatrick St.
• Onondaga Creek FCF	Complete	Inner Harbor
• Teall Brook FCF	Complete	Teall Ave.
• Water Street Sewer Separation (CSO 024)	Complete	Water Street
2002		
• Harbor Brook FCF	Complete	W.Hiaw./I-690
• Brighton Ave Sewer Separation (CSO 053/054)	Complete	Brighton/Bishop Ave

	Project	Status	Location
2004			
	• Tallman/Onondaga Sewer Separation (CSO 038, 040, 046A &046B)	Complete	Tallman/Onondaga
	• Midland Phase II RTF/Conveyances	Complete	Blaine/Oxford St.
2005			
	• Phosphorus Removal – Phase II Pilot	Complete	Metro
	• Biosolids Handling Improvements	Complete	Metro
2006			
	• Sewer Separation – CSO 047 & 048	Complete	South Ave/ Bissell St.
2007			
	• Sewer Separation – CSO 050	Complete	Parkway/Rockland
	• Clinton Phase I Conveyances	Complete	
2008			
	• Clinton Phase IIA Conveyances	Complete	
2009			
	• Sewer Separation – CSO 051	Complete	Colvin St.
2010			
	• Harbor Brook Interceptor Sewer	Complete	Velasko/Fayette
2011			
	• Midland CSO 044	Complete	W. Castle/South Ave
	• Clinton Storage Facility	Complete	Armory Square
	• Lower Harbor Brook (Conveyance & Storage)	Complete	Hiawatha/State Fair Blvd.
	• Save the Rain Green Projects	Authorized/Underway	Various
	• CSO 022 Sewer Separation Project	Authorized/Underway	West Genesee/Franklin
	• CSO 045 Sewer Separation Project	Authorized/Underway	South Avenue
2012			
	• Save the Rain Green Projects	Completed	Various
2013			
	• Save the Rain Green Projects	Completed	Various
2014			
	• Save the Rain Green Projects	Completed	Various
	• Harbor Brook CSO 063 Conveyances Project	Underway	Hiawatha/State Fair Blvd.

CONTRACTORS FOR
CONSTRUCTION PROJECTS
Metro Treatment Plant

AERATION SYSTEM UPGRADE	
Bongiovanni Construction (General)	$ 5,626,956.41
Ridley Electric (Electrical)	$ 846,154.00
DIGITAL SYSTEM UPGRADE	
Systems Integrated	$ 2,974,514.27
ODOR CONTROL CONTRACT #1	
Falconet, Inc. (General)	$ 4,872,660.53
Scriba Electric (Electrical)	$ 315,580.30
Burns Bros. (Heating/Ventilation)	$ 82,459.00
Burns Bros. (Plumbing)	$ 50,168.00
ODOR CONTROL CONTRACT #2	
Murnane Construction	$ 1,636,000.00
PHASE III IMPROVEMENTS CONTRACT 1 - DIGESTER & LAGOON IMPROVEMENTS	
Maxim Construction	$ 645,730.74
PHASE III IMPROVEMENTS CONTACT 2 - CHEMICAL STORAGE & FEED FACILITIES	
C.O. Falter Construction Corp. (General)	$ 2,527,300.08
Barry & Barry Electrical Co. (Electrical)	$ 193,665.22
Burns Bros. (HVAC)	$ 224,232.51
Edward Joy Company (Plumbing)	$ 38,669.35
PHASE III IMPROVEMENTS CONTRACT 3 - DIGESTER & LAGOON CLEANING	
Waste Stream Environmental Inc.	$ 727,881.80
FULL SCALE AMMONIA/PHOSPHORUS REMOVAL - FIELD OFFICE	
James & Son Construction	$ 28,388.00
Resun Leasing, Inc.	$ 112,224.00
Ridley Electric Co.	$ 32,295.00
Burns Brothers	$ 18,440.00
FULL SCALE AMMONIA/PHOSPHORUS REMOVAL	
U.S. Filter - Kruger Products, Inc.	$ 8,261,182.00
U.S. Filter - Kruger Products, Inc.	$ 3,918,080.00

CONTRACTORS FOR
CONSTRUCTION PROJECTS
Metro Treatment Plant

FULL SCALE AMMONIA/PHOSPHORUS REMOVAL

SITE PREPARATION - CONTRACT 2

C.O. Falter Construction Corp. (General)	$ 22,243,604.98
Ridley Electric (Electrical)	$ 255,627.00
C.O. Falter Construction Corp. (Pile Testing)	$ 431,008.00
Moretrench Environmental	$ 4,602,086.57

PILE INSTALLATION - CONTRACT 3

M.A. Bongiovanni Construction	$ 9,045,731.95

GENERAL - CONTRACT 4

The Pike Company (General)	$ 46,860,263.46
Ridley Electric Co. (Electrical)	$ 6,927,238.00
Edward Joy Company (HVAC)	$ 3,009,057.61
Burns Brothers (Plumbing/Fire Protection)	$ 1,217,583.74

BIOSOLIDS HANDLING IMPROVEMENTS

C. O. Falter Construction Corp. (General)	$ 10,929,016.19
Ridley Electric (Electrical)	$ 1,476,223.00
Airside Technology (HVAC)	$ 532,187.00
Burns Bros. (Plumbing)	$ 173,679.09
Independent Field Svs (Cogen)	$ 18,019.75

CSO's

CLINTON CONVEYANCES PHASE I & 2A

The Delaney Group, Inc.	$ 14,478,053.39
The Delaney Group, Inc.	$ 4,074,455.32
SIDA	$ 2,634,999.43
MOU (City of Syracuse)	$ 168,000.00
MOU City of Syracuse (Connective Corridor)	$3,825,000.00

CLINTON CSO ABATEMENT

Ruston Paving (Farmers' market Lot)	$ 188,046.14
Davis Wallbridge (Pearl St/Lot 3)	$ 635,873.93
Davis Wallbridge (Townsend St.)	$ 476,625.39
J&B (Pirro Conv. Center)	$ 1,083,727.39
C.O. Falter (War Memorial)	$ 692,298.87
Ridley (War Memorial)	$ 447,957.66
Economy Paving (On Center)	$ 1,094,119.49
J&B (Erie Canal Museum)	$ 73,480.00
Jett Industries (Clinton Storage)	$ 79,762,239.12
Joy Process Mechanical (Cistern War Memorial)	$ 82,615.00
C&S Technical (Cistern War Memorial)	$ 233,652.56
Green Culture (Rain Barrels)	$ 44,335.50
Syracuse Utilities (Duct Bank)	$ 59,982.56
Water Cooling Corp. (Storage Tank)	$ 2,875.00

CONTRACTORS FOR
CONSTRUCTION PROJECTS
CSO's (cont)

MOU City of Syracuse (Road Reconstruction)	$	638,997.06
MOU City of Syracuse (Dr. Weeks)	$	89,000.00
MOU City of Syracuse (Bank Alley)	$	108,000.00
MOU City of Syracuse (Upstate)	$	1,500,000.00
Wallbridge (Streetscape/Water St)	$	1,432,437.86
Ruston Paving (Sunnycrest Parking Lot)	$	410,372.20
MA Bongiovanni Inc.	$	3,000.00
Acts II Construction (Skiddy Park)	$	550,916.44
D.E. Tarolli (Otisco Street)	$	1,847,459.81
Orchard Earth & Pipe (Syr School dist Park Lot)	$	430,172.42
Slate Hill Construction (E. Water St)	$	147,952.84
Davis Wallbridge (Onon Cty Pub Library)	$	320,291.95
Tumbers, Schichtels Nursery (Trees), Martisco, Dixie, Pro Scapes	$	991,497.10
Acts II (Seymour Academy)	$	373,309.00
Paul R. Vitale (City Lot 4)	$	607,852.44
John R. Dudley (Leavenworth Park)	$	719,311.20
VIP (Onon Public Library)	$	51,382.74
Ballard Construction (Westcott Comm Ctr)	$	52,500.00
Cornerstone Paving (Oswego St)	$	109,046.54
John Dudley Construction (W. Onondaga St.)	$	1,371,475.75
Barrett Paving (W. Fayette St.)	$	588,982.07
Davis Wallbridge (Westcott St.)	$	870,263.89
ProScapes (Sunnycrest Arena) & C&S Sweeping	$	89,441.47
Acts II (E. Washington St)	$	155,591.53
John R. Dudley (690 Downspout)	$	597,965.65
Josall (Maganelli Comm Ctr)	$	378,400.00
Spectra (Butternut Circle)	$	65,640.00
Barton & Loguidice (State St)	$	159,400.00
D E Tarolli (annual green)	$	2,099,385.19
J&J Landscape (annual green)	$	297,362.48
King & King Architects (GIF)	$	100,000.00
Jefferson Clinton Commons (GIF)	$	100,000.00
ESF Foundation, Abby Lane Housing (GIF)	$	78,000.00
Hotel Skyler (GIF)	$	100,000.00
Near West Side Initiatives, Inc. (GIF)	$	22,730.69
Near West Side Initiatives, Inc. (GIF)	$	78,000.00
Tash Taskale (GIF)	$	100,011.00
St. Lucy's Church (GIF)	$	125,000.00
Putnam Properties (GIF)	$	75,757.00
Centro (GIF)	$	65,390.00
500 W. Onondaga St. Inc. (GIF)	$	52,740.00
CNY Jazz Arts Foundation (GIF)	$	52,188.00
Jim & Juli Boeheim Foundation (GIF)	$	163,203.51
Home Headquarters, Inc. (GIF)	$	40,500.00
Galleries of Syr, 147 E. Onondaga St. (GIF)	$	100,000.00
Syracuse Housing (GIF)	$	120,290.00

CONTRACTORS FOR
CONSTRUCTION PROJECTS
CSO's (cont)

Kopp Billing Agency (GIF)	$	25,300.00
CNY Philanthropy (GIF)	$	62,700.00
American Beech (GIF)	$	53,050.00
Park Central Presbyterian Church (GIF)	$	61,050.00
Loon Creek (GIF)	$	137,350.00
NHW Syracuse (GIF)	$	129,400.00
McMahan/Ryan Child Advocacy (GIF)	$	178,050.00
Jeffrey DeRoberts (GIF)	$	99,311.00
Bethany Baptist Church (GIF)	$	343,333.00
St. Lucy's Church (GIF)	$	69,000.00
500 W. Onondaga St. Inc. (GIF)	$	34,347.00
Onondaga Commons LLC (GIF)	$	124,200.00
Onondaga Commons LLC (GIF)	$	198,300.00
Onondaga Commons LLC (GIF)	$	175,787.00
Onondaga Commons LLC (GIF)	$	77,800.00
Gemmi Boy (GIF)	$	47,537.00
Mr. Lady Bug (GIF)	$	46,700.00
Grace Episcopal Church (GIF)	$	99,000.00
Snapse Downtown (GIF)	$	35,700.00
360 Warren Associates (GIF)	$	107,864.00
Housing Visions Unlimited (GIF)	$	194,650.00
Near West Side Initiatives, Inc. (GIF)	$	34,500.00
Scannell Properties (GIF)	$	204,000.00
Genesee Armory (GIF)	$	144,400.00
Third National Associates (GIF)	$	533,300.00
Center for Peace & Social Justice (GIF)	$	57,700.00
Graham Millwork (GIF)	$	90,500.00
Onondaga Commons LLC (GIF)	$	124,100.00
Onondaga Commons LLC (GIF)	$	33,400.00
Onondaga Commons LLC (GIF)	$	294,300.00
PEACE (GIF)	$	52,200.00
Syracuse Business Center (GIF)	$	517,000.00
Erie Bruce Corp (GIF)	$	151,700.00
538 Erie Boulevard West (GIF)	$	130,850.00
Near West Side Initiatives, Inc. (GIF)	$	94,300.00
UAS (GIF)	$	57,600.00
Brewster Medical (GIF)	$	221,000.00
Richmond UAS Properties (GIF)	$	299,200.00
Taksum Assoc. (GIF)	$	45,200.00
Zip Networks (GIF)	$	205,775.00
Ra lin Inc. (GIF)	$	137,000.00
Ra lin Inc. (GIF)	$	238,400.00
Butternut St. LLC (GIF)	$	104,430.00
Nojaim Inc. (GIF)	$	234,800.00
St. Joseph's Hospital Health Center (GIF)	$	145,900.00
Auto Row (GIF)	$	138,000.00

CONTRACTORS FOR
CONSTRUCTION PROJECTS
CSO's (cont)

WCNY (GIF)	$	98,527.00
Auto Row (GIF)	$	164,000.00
University Hill Apts. (GIF)	$	36,500.00
J C Smith Inc. (GIF)	$	84,411.00
St. Joseph's Hospital Health Center (GIF)	$	33,100.00
Housing Visions Unlimited (GIF)	$	70,200.00
R J Westcott (GIF)	$	125,750.00
R J Westcott (GIF)	$	130,400.00
R J Westcott (GIF)	$	18,000.00
Nick's Garage (GIF)	$	382,000.00
Tan A Grocery (GIF)	$	52,000.00
Consuela's-Tato Britter Transp. (GIF)	$	38,237.50
Auto Row (GIF)	$	147,600.00
Jorge Auto Repair (GIF)	$	109,500.00
Pyramids Halal Meat (GIF)	$	49,000.00
Lisa Welch (GIF)	$	32,877.00
Heritage Lincoln (GIF)	$	654,600.00
JNJ (GIF)	$	83,200.00
900 E Fayette (GIF)	$	65,800.00
712-715 E Fayette Group (GIF)	$	47,600.00
Gadsen Property (GIF)	$	58,000.00
MPL Armory m(GIF)	$	48,000.00
Near West Side (GIF)	$	681,658.00
North Side Learning (GIF)	$	189,000.00
751 N Salina LLC (GIF)	$	53,800.00
Lisa Welch (GIF)	$	40,423.00
800 Block (GIF)	$	170,500.00

ERIE BOULEVARD STORAGE SYSTEM

M. Hubbard Construction	$	1,556,752.00
Ridley Electric (Electrical)	$	154,059.00
Endeco/YSI (SE33923)	$	24,117.90

FRANKLIN STREET FCF

Burns Bros (Mechanical)	$	179,167.67
Scriba Electric (Electrical)	$	144,640.61
Burns Bros. (Plumbing)	$	28,400.00
Maxim	$	3,568,029.43

HARBOR BROOK CSO ABATEMENT

Joseph J. Lane Construction (Interceptor Sewer Replacement)	$	23,391,425.07
Bette Cring (Elephant Barn Greening)	$	207,701.00
John Dudley Construction (Geddes St)	$	279,068.06
J&B Installations (Hazard Library/Erie Canal Museum)	$	67,275.00
Economy Paving (Rosamond Gifford Zoo)	$	688,638.00

CONTRACTORS FOR
CONSTRUCTION PROJECTS
CSO's (cont)

J.J. Lane (Lower HB)	$ 5,373,078.94
A.J. Montclair (HB CSO Storage)	$ 260,000.00
C.O. Falter (HB CSO Storage)	$ 30,259,100.80
Davis Wallbridge (Onon Cty Pub Library)	$ 378,920.43
Cornerstone Paving (Parking Lots)	$ 149,195.48
Green Culture	$ 80,665.00
Tumbers, Schichtels Nursery (trees), Proscapes, Dixie	$ 347,542.53
City of Syracuse	$ 3,342,875.63
VIP	$ 51,382.74
Steadman Old Farm	$ 11,480.00
Bette Cring (Zoo Wetlands)	$ 1,290,064.10
Marcellus Const. (CSO 063)	$ 5,612,007.53
OnSite	$ 8,755.00
J J Lane (CSO 18)	$ 4,370,168.29
Patricia Electric (Wetland Pilot)	$ 197,767.56
MOU City of Syracuse (Road Reconstruction)	$ 138,165.00
Davis Wallbridge (Wadsworth Park)	$ 345,524.55
Acts II (Lewis Park)	$ 217,285.58
J & J Landscape (Annual Green)	$ 25,807.00
DE Tarolli (Green Structures)	$ 12,576.00
Knapp Electric (Wetlands)	$ 41,856.00
Vitale Excavating (Bedding Sand), Butler Fence	$ 232,533.35
Barton & Loguidice	$ 4,600.00
NYSARC, Inc. (GIF)	$ 78,907.14
Vibrant Spaces, LLC (GIF)	$ 153,618.00
James Ranalli, W. Genesee (GIF)	$ 616,100.00
Vibrant Spaces, LLC (GIF)	$ 198,680.00
Brooklyn Pickle (GIF)	$ 30,555.00
St. Patrick's Loft (GIF)	$ 177,300.00
Smith Housing (GIF)	$ 52,600.00
Richard Destito (GIF)	$ 232,200.00
Burnet Park Newstand (GIF)	$ 60,622.00
Visiting Nurse Assoc. of CNY (GIF)	$ 60,349.20
All Times (GIF)	$ 92,600.00

HARBOR BROOK FCF

C.O. Falter Construction Corp. (General)	$ 373,370.21

KIRKPATRICK ST. PUMP STATION & FORCE MAIN

C.O. Falter Construction Corp.	$ 4,398,009.12
C.O. Falter Construction Corp.	$ 4,425,766.31
Patricia Electric	$ 761,184.63
King & King Mechanical	$ 245,569.51
G.J. Adams Plumbing	$ 51,624.16

CONTRACTORS FOR
CONSTRUCTION PROJECTS
CSO's (cont)

MALTBIE STREET FCF	
Over & Under Piping	$ 152,418.00
MIDLAND AVENUE CONVEYANCES	
Marcellus Construction (General)	$ 1,836,434.47
MIDLAND AVENUE PHASE II CONVEYANCES & RTF	
Empire Dismantlement Corp. (Demolition)	$ 457,681.50
Murnane Building Contractors, Inc. (General)	$ 47,929,392.75
Ridley Electric Company (Electrical)	$ 2,904,771.00
MIDLAND AVENUE PHASE III CONVEYANCES	
Titan Wrecking & Environmental, LLC (Demolition)	$ 290,801.39
Edward Joy Company (HVAC)	$ 2,053,808.50
Edward Joy Company (Plumbing)	$ 484,717.17
Tumbers, Schichtels Nursery, Ballantyne, Other(Batcon)	$ 595,409.00
J.J. Lane	$ 12,098,662.37
Acts II (Hugh's Magnet School Parking Lot)	$ 314,439.81
Davis Wallbridge (Onon Cty Pub Library)	$ 116,033.35
J & J Landscape (annual green)	$ 92,997.00
VIP (Onon Public Library)	$ 25,691.39
Green Culture (Rain Barrels)	$ 44,335.50
Weather Guard Tecta (USPO Salina St)	$ 242,860.00
MOU City of Syracuse (Road Reconstruction)	$ 408,332.04
MA Bongiovanni (storage Tank)	$ 66,130.00
MOU City of Syracuse (ESF)	$ 100,000.00
Env. Design (Gazones Stormwater)	$ 118,172.50
Barton & Loguidice (green design)	$ 334,800.00
D E Tarolli (Annual green)	$ 2,606,540.28
Marcellus Construction (green Infrastructure)	$ 2,428,114.52
Jubilee Homes of Syracuse (GIF)	$ 200,000.00
Dunbar Association, Inc. (GIF)	$ 99,840.00
Syracuse Model Neighborhood (GIF)	$ 250,000.00
People's AME Zion Church (GIF)	$ 61,300.00
People's Community Dev. Corp (GIF)	$ 80,825.00
Salina Shoe Salon (GIF)	$ 48,000.00
People's AME Zion Church (GIF)	$ 5,000.00
Matawon Development Group (GIF)	$ 24,214.00
Tucker Missionary Baptist Church (GIF)	$ 146,700.00
Swallows (GIF)	$ 111,900.00
Viraj NY (GIF)	$ 125,200.00
Viraj Salina (GIF)	$ 320,100.00
Believers Chapel (GIF)	$ 167,800.00
Southside Comm. Coalition (GIF)	$ 59,800.00

CONTRACTORS FOR
CONSTRUCTION PROJECTS
CSO's (cont)

SEWER SEPARATION - CSO 022/045	
Joy Process Mechanical (Plumbing)	$ 853,536.68
Joseph J. Lane Construction	$ 4,757,886.66
SEWER SEPARATION - CSO 024	
C.O. Falter Construction Corp.	$ 698,863.74
SEWER SEPARATION - CSO 053/054	
C.O. Falter Construction Corp.	$ 2,000,817.40
SEWER SEPARATION - CSO 038, 040, 046A&B	
C.O. Falter Construction Corp.	$ 3,524,487.29
SEWER SEPARATION - CSO 047 & 048	
C.O. Falter Construction Corp.	$ 1,654,022.34
SEWER SEPARATION - CSO 050	
Joseph J. Lane Construction	$ 4,360,527.06
SEWER SEPARATION - CSO 051	
Joseph J. Lane Construction	$ 5,029,323.00
SEWER SEPARATION - OTHER	
Other - tree, fence	$ 144,701.90
Pastime Athletic Club (GIF)	$ 92,700.00
SIPHON REHABILITATION	
Insituform Metropolitan	$ 1,021,822.99
C.O. Falter Construction Corp. (General)	$ 877,095.43
Scriba Electric (Electrical)	$ 26,470.20
Maxim Construction (General)	$ 2,311,125.85

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WEP ACRONYMS

ACJ	Amended Consent Judgment
AMP	Ambient Monitoring Program
AMSA	Association of Metropolitan Sewerage Agencies
ARRA	American Recovery and Reinvestment Act
ASLF	Atlantic States Legal Foundation
AWQS	Ambient Water Quality Standards
BAF	Biological Aerated Filter (Biostyr)
BMP	Best Management Practices
BOD	Biological Oxygen Demand
BPJ	Best Professional Judgment
Brew	WEP's Standard Abbreviation for the Brewerton Wastewater Treatment Plant
Bville	WEP's Standard Abbreviation for the Baldwinsville Wastewater Treatment Plant
CAA	Clean Air Act
CALM	Consolidated Assessment and Listing Methodology
CAMP	Community Air Monitoring Plan
CIP	Capital Improvement Plan
CMOM	Capacity, Management, Operation, and Maintenance
CSLAP	Citizens Statewide Lake Assessment Program
CSO	Combined Sewer Overflow
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
EBM	Ecosystem-Based Management
ECL	Environmental Conservation Law
ECM	Energy Conservation Measures
EECBG	Energy Efficiency and Conservation Block Grant
ELAP	Environmental Laboratory Approval Program
EMS	Environmental Management System
ERM	Environmental Resource Mapper
FCF	Floatable Control Facility
FOG	Fats, Oil, and Grease
GIF	Green Improvement Fund

HRFS	High Rate Flocculation Settling
I & I	Inflow & Infiltration
IW	Industrial Wastewater
km	Kilometers
km^2	Square Kilometers
LA	Load Allocations
LF	Linear Feet
m	Meters
MCP	Municipal Compliance Plan
MDV	Multiple Discharge Variance
Metro	WEP's Standard Abbreviation for the Metropolitan Syracuse Wastewater Treatment Plant
MGD	Million Gallons Per Day
mg/L	Milligrams Per Liter
MIS	Main Interceptor Sewer
ML	WEP's Standard Abbreviation for the Meadowbrook/Limestone WWTP
MS4s	Municipal Separate Storm Sewer Systems
mt	Metric Tons
NACWA	National Association of Clean Water Agencies
NBP	National Biosolids Partnership
NELAC	National Environmental Laboratory Accreditation Conference
NPDES	National Pollutant Discharge Elimination System
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSEFC	New York State Environmental Facilities Corp.
NYWEA	New York Water Environmental Association
OAK	WEP's Standard Abbreviation for the Oak Orchard WWTP
OLP	Onondaga Lake Partnership
OLWQM	Onondaga Lake Water Quality Model
OU	Odor Unit
P2	Prevention Program
P2CO	Prevention Program County Operations
PdM	Predictive Maintenance

PIDs	Photo-ionization Detectors
PFRP	Process to Further Reduce Pathogens
PLA	Project Labor Agreement
POTW	Publicly Owned Treatment Works
PWL	Priority Waterbodies List
RTF	Regional Treatment Facility
SCA	Sediment Consolidation Area
SCADA	Supervisory Control and Data Acquisition
SEPS	Secondary Effluent Pump Station
SEQR	State Environmental Quality Review
SGIP	Suburban Green Infrastructure Program
SHB	Solids Handling Building
SMPs	Storm Water Management Practices
SOP	Standard Operating Procedure
SORP	Sewer Overflow Response Plan
SPCC	Spill Prevention, Control, and Countermeasures
SPDES	State Pollutant Discharge Elimination System
SRP	Soluble Reactive Phosphorus
SSES	Sanitary Sewer Evaluation Study
SSI	Sewage Sludge Incinerator
SSV	Site-Specific Variance
SUNY-ESF	State University of New York College of Science and Forestry
SWMM	Storm Water Management Modeling
SWMP	Storm Water Management Plan
SWPPP	Storm Water Pollution Prevention Plan
TBEL	Stechnology-Based Effluent Limits
TDP	Total Dissolved Phosphorus
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
TSI	Trophic State Index
UAA	Use Attainability Analysis
UFI	Upstate Freshwater Institute
ug/l	Micrograms per Liter
USEPA	United States Environmental Protection Agency

USFWS	United States Fish and Wildlife Service
USGBC	United States Green Building Council
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
WAN	Wide Area Network
WLA	Waste Load Allocations
WEF	Water Environment Federation
WEP	Water Environment Protection
WET	Whole Effluent Toxicity
WLA	Waste Load Allocations
WQBEL	Water Quality-Based Effluent Limits
WR	WEP's Standard Abbreviation for the Wetzel Road Wastewater Treatment Plant
WSE	Waste Stream Environmental