

Sugar Maples Stormwater Retrofit Project

Assessment & Design Report

Town of Windham, Greene County, New York

Prepared for:

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TABLE OF CONTENTS

1.0 PROJECT INFORMATION	1
1.1 PROJECT NAME AND LOCATION	1
1.2 PROJECT OWNER	1
1.3 PROJECT SPONSOR	1
1.4 PROJECT ENGINEER	2
1.5 PROJECT FUNDING	2
2.0 PROJECT BACKGROUND	3
2.1 PROJECT GOALS AND OBJECTIVES	3
2.2 EXISTING SITE CONDITIONS	3
2.2.1 PROJECT LOCATION	3
2.2.2 DRAINAGE LOCATION AND PATTERN	3
2.2.3 EXISTING LAND USE AND COVER	4
2.2.4 PROJECT AREA SOILS	4
2.2.5 WATER RESOURCES	4
2.2.6 EXISTING STORMWATER CONVEYANCE SYSTEMS	4
2.2.7 EXISTING CONDITION HYDROLOGY	4
2.2.8 EXISTING CONDITION POLLUTANT LOAD	5
3.0 PROPOSED PERMANENT STORMWATER CONTROLS	5
3.1 IMPROVED CONVEYANCE SYSTEM AND BIORETENTION AREA	5
3.2 RAINGARDENS	6
3.3 PERMEABLE GRASS PARKING AREA	6
3.4 PROPOSED CONDITION POLLUTANT LOAD	6

Appendices:

Appendix A - Figures

Attached - Erosion and Sediment Control Plan Drawing

1.0 Project Information

1.1 Project Name and Location

Sugar Maples Stormwater Retrofit Project

Greene County Route 56 and Greene County Route 40

Town of Windham - Hamlet of Maplecrest

Greene County, New York

1.2 Project Owner

Catskill Mountain Foundation

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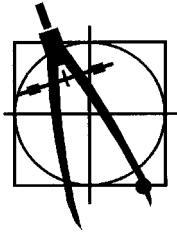
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1.5 Project Funding

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2.0 Project Background

The project serves approximately 4.7 acres of relatively high-density commercial buildings (31% impervious) and residential homes and lawn areas in the Hamlet of Maplecrest in the Town of Windham. Existing stormwater from the area is conveyed as sheet, shallow, and channel flow discharging to the Batavia Kill. The Batavia Kill is a tributary of the Schoharie Creek, which is listed on the 1996 WI/PWI as “stressed” with the primary pollutant being “silt (sediment)”. Furthermore, the Schoharie Reservoir is listed on the NYS-DEC 2002 303(d) List as high priority for TMDL development with the Cause/Pollutant being Silt/Sediment.

2.1 Project Goals and Objectives

The fundamental project goal is to have an overall increase in water quality by providing point and non-point source mitigation from the impacts of pollutants associated with stormwater runoff from the site. Other project goals and objectives include:

- Provide a measurable reduction in most pollutant loading including Total Suspended Solids, Phosphorus, Nitrogen, Heavy Metals, and Petroleum Products.
- Increased storm flow attenuation and reduction provided through implementation of SMPs.
- Provide valuable information as to the individual effectiveness of treatment practices implemented on site.
- Provide valuable data set for future land use planning and stormwater management.
- Provide public outreach and education on stormwater impacts and the various practices and techniques available to mitigate existing and future impacts, and management of the proposed measures.
- Develop cooperative partnerships on many levels including private enterprises, local municipalities, County, State and Federal governments, NYC DEP, and residents of the watershed.
- Demonstrate good housekeeping/pollution prevention.

2.2 Existing Site Conditions

2.2.1 Project Location

The project site is located on Greene County Route 56 (CR-56), in the Hamlet of Maplecrest, in the Town of Windham. The project area is located 100 to 200 ft from the Batavia Kill near the intersection of Greene County Route 56 and County Route 40. **Figure 1** is a location map containing topographic information and the location of the reach within the Batavia Kill watershed.

2.2.2 Drainage Location and Pattern

The project area is located in the upper portion of the Batavia Kill watershed and has a drainage area measuring 4.7 acres. The drainage area of the Batavia Kill is approximately 11.5 square miles to the confluence of the second order stream which enters it on this site. Surface runoff from the project area flows as sheet flow and shallow concentrated flow



until just before it crosses the CR 56 where it becomes channel flow and outlets to the Batavia Kill.

2.2.3 Existing Land Use and Cover

The current land use within the project area is residential and commercial buildings The Catskill Mountain Foundation which owns the land uses it as a campus for the arts and public education during the summer months. Adjacent land uses are primarily medium density residential. Impervious surfaces presently consist of several building rooftops and driveways and CR-56. Impervious surface accounts for 31% of the 4.7 acre drainage area. Remaining land covers include 26% meadow, and 43% lawns. **Figure 2** delineates the land use and cover of the drainage area.

2.2.4 Project Area Soils

One soil type is located within the project area; Tunkhannock gravelly loam, fan, 3-8% slopes (TvB). The Hydrological Soil Group (HSG) for TvB soil is A, indicating that the soil on the site is generally well drained however it is suspected the majority of the soils have reduced infiltration capacity due to historic soil disturbance from development.

2.2.5 Water Resources

The project area is adjacent to the Batavia Kill. The Batavia Kill is listed on the 2002 NYS DEC Priority Waterbodies List (PWL) under HUC 02020005/020 Batavia Kill, Middle and tributaries (1202-0058) as Habitat/hydrology known to be stressed, Minor Impacts with a known problem species (knotweed) and Silt/sediment as suspected pollutants. Sources of pollutants are listed as; Known - streambank erosion and habitat modification, and Possible - construction, and failing onsite systems.

2.2.6 Existing Stormwater Conveyance Systems

A single 10" circular steel culvert transects CR-56 draining into the project area. Field investigations, hydrologic and hydraulic modeling were performed to assess the current condition of the culvert. This evaluation determined the culvert was in poor condition and inadequate in size and capacity to handle substantial runoff from the contributing drainage area to the south of CR-56.

2.2.7 Existing Condition Hydrology

In order to evaluate the project site hydrology an existing condition model was developed using Pond Pack software incorporating NRCS TR-20 methodology. Using digital imagery, land cover was digitized and topology data collected to develop times of concentration for each treatment area. Rainfall amounts for the 2-, 10-, 25- and 100-year design storms in Greene County are 3.0", 5.0", 6.0" and 8.0". Findings from the model are displayed in **Table 1**.



Table 1. Existing Condition Discharge Estimates (cfs)

Catchment	Area (sq. ft)	2-Year	10-Year	100-Year
B1	6625	0.78	1.00	1.71
B2	3128	0.37	0.47	0.81
B3	527	0.06	0.08	0.14
B4	2409	0.29	0.37	0.62
Bioretention Area	204732	0.14	1.67	5.97

2.2.8 Existing Condition Pollutant Load

Annual pollutant load estimates were calculated using the "The Simple Method", as described in The NYS Stormwater Management Design Manual (NYSDEC 2001). Input data consisted of the effective annual rainfall of 42.4" for Greene County and existing land use and cover characteristics. **Table 2** displays annual estimates in pounds of Total Suspended Solids (TSS), Total Phosphorous (TP), and Total Nitrogen (TN) discharge from the four catchments.

Table 2. Existing Condition Pollutant Loading (lbs/yr)

Catchment	Area (sq. ft)	TSS	TP	TN
B1	6625	94.41	0.40	3.64
B2	3128	44.57	0.19	1.72
B3	527	7.51	0.03	0.29
B4	2409	34.33	0.15	1.32
Bioretention Area	204732	895.41	4.25	40.50

3.0 Proposed Permanent Stormwater Controls

Several SMP's are proposed to treat the stormwater water quality primarily from the impervious drainage areas. Individual components were selected based on existing and proposed land uses, physical feasibility, cost, and treatment capability and performance. Ease of maintenance, and aesthetic value, and educational benefits were also considered with preference given to more effective infiltration and filtering practices. The proposed plan can be seen on attached sheet **SM-07**.

3.1 Improved Conveyance System and Bioretention Area

CR-56 bisects the entire length of CMF properties. In general this length of highway lacks effective stormwater infrastructure to treat and convey runoff on its natural path to the Batavia Kill. As proposed, GCSWCD will implement a system that will collect runoff from the impervious surface associated with CR-56 and four acres of high density buildings associated with the Sugar Maples Resort and route it through a new bioretention area for treatment prior to safely discharging it to the Batavia Kill.

The existing culvert under CR-56 is a steel 10 inch pipe which is partially blocked with sediment and debris. This retrofit component includes installing a new 24 inch culvert in addition to a new catch basin and manhole. This culvert was designed for passage of the 100 year storm, and the new manhole with additional knockouts will enable additional areas to be tied into the system in the future.



The bioretention area will be implemented on properties owned by CMF along CR 56 between the US Post Office and an existing building slated for demolition. The area will provide treatment of the water quality volume as defined by NYS Stormwater Design Manual (NYSDEC 2003) from 4.7 acres, including rooftops, and CR56. The area will be extensively planted with native vegetation suitable for use in bioretention areas.

3.2 Raingardens

Raingardens will serve to filter runoff from the rooftops associated with four buildings on the Sugar Maples site. Raingardens are small bioretention structures which were chosen for their aesthetic and educational values, small footprint, and ability to reduce TSS quantities discharged from the site. Raingardens will treat a total of 13,355 square feet of rooftop which produces a water quality volume of 1,145 cubic feet. New roof gutters will collect rainfall and outlet to raingardens. Localized grading will be provided to improve conveyance from impervious surfaces to the treatment areas. Generally the soils underlying the entire site are all in the “A” hydrological group which should promote infiltration reducing stormwater runoff from the site. Runoff from large storm events will bypass through an outlet structure to the Batavia Kill. All raingardens will be planted with native vegetation suitable for bioretention treatment systems.

3.3 Permeable Grass Parking Area

A permeable grass parking area is proposed to increase usage of the site and discourage vehicles from parking along the shoulder of CR-56. The parking area will be installed on the footprint of a building which will be demolished as a component of this project. This will result in converting approximately 2400 square foot of impermeable surface to a grassed pervious parking area. Additionally this parking area will provide accessibility to the site. The Sugar Maples Arts Center operates during the summer months therefore a permeable grass parking area will not be exposed to excessive salt and plowing. Permeable grass paving was selected as it will infiltrate rainfall reducing stormwater runoff promoting infiltration into the native soils.

Excavation and removal of the existing building foundation to the depth of suitable native material will be required. The system will consist of a layered sub grade, meeting load and porosity for storage and infiltration requirements. A six-inch layer of well graded topsoil reinforced with a geosynthetic matrix will act as the system pavement. The topsoil will be seeded with grasses creating a natural looking area. Alcoa’s cellular confinement system known as Geoweb was selected due to its capability of reducing the compaction of soil from use, improved strength, and expected lifespan.

3.4 Proposed Condition Pollutant Load

Removal efficiencies of proposed practices for total suspended solids (TSS), total phosphorous (TP) and total nitrogen (TN) were applied to the existing condition data from estimates obtained from Appendix A or The NYS Stormwater Management Design Manual (NYSDEC 2001). **Table 3** displays these findings including pounds removed, the proposed condition representing pollutant loads with treatments implemented.



Table 3. Proposed Condition Pollutant Loading

TSS Removal					
Catchment	Existing (lbs/Yr)	Treatment	Removed (lbs/Yr)	Proposed (lbs/Yr)	% Reduction Achieved
B1	94.41	Filtration	80.3	14.2	85%
B2	44.57	Filtration	37.9	6.7	85%
B3	7.51	Filtration	6.4	1.1	85%
B4	34.33	Filtration	29.2	5.1	85%
Bioretention Area	895.41	Filtration	761.1	134.3	85%
Total	1076		914.8	161.4	85%
TP Removal					
Catchment	Existing (lbs/Yr)	Treatment	Removed (lbs/Yr)	Proposed (lbs/Yr)	% Reduction Achieved
B1	0.40	Filtration	0.24	0.16	60%
B2	0.19	Filtration	0.11	0.08	60%
B3	0.03	Filtration	0.02	0.01	60%
B4	0.15	Filtration	0.09	0.06	60%
Bioretention Area	4.25	Filtration	2.55	1.70	60%
Total	5.0		3.01	2.01	60%
TN Removal					
Catchment	Existing (lbs/Yr)	Treatment	Removed (lbs/Yr)	Proposed (lbs/Yr)	% Reduction Achieved
B1	3.64	Filtration	1.46	2.18	40%
B2	1.72	Filtration	0.69	1.03	40%
B3	0.29	Filtration	0.12	0.17	40%
B4	1.32	Filtration	0.53	0.79	40%
Bioretention Area	40.50	Filtration	16.20	24.30	40%
Total	47.5		18.99	28.48	40%

